TRACKING CHANGES TO SPECIAL PROVISIONS

Because of problems in the field with modifications to the Special Provisions by both contractors and field personnel, we will now start identifying those changes in the proposals.

When preparing and submitting draft special provisions please follow the following process:

Start by downloading the most current SP2016. The Special Provisions Unit will not be accepting provisions copied from prior spec books unless no current alternative exists and the specification has been brought into conformance with the current spec year.

(A) If you want to use a C.O. SP2016 write-up of an item but WILL NOT be making any changes within the write-up, then do the following:

Show Section Name and number

Example:

S-X (1910) COST ESCALATION
SP2016-53

Just show the Section Name and Number. When you leave the SP2016-Number intact, this will indicate to the Special Provisions Unit that you have not changed the section and want the most current write-up.

(B) If you want to use a C.O. SP 2016 write-up, but WILL be making changes within the write-up, then do the following prior to sending us your file:

Show Section Name and SP2016 number, followed by "modified".

Example:

S-X (1910) COST ESCALATION
SP2016-53 - MODIFIED

Show entire special provision, including your revisions. Make it as easy as possible for the Special Provisions Unit to recognize your changes. Highlight changes to the provisions in yellow so they are easily identified. In addition, select the paragraph and add a right border where the modifications were made as shown below.
The Department reserves the right to revise the Proposal Package at any time before the date and time for opening Proposals. The Department will issue a numbered and dated Addendum for any revision of the Proposal Package. The Department will electronically post each Addendum as announced in an e-mail notification to each Bidder on the Department’s list of Bidders. The Department will include each Addendum with all Proposal Forms issued to the Bidder after the date of the Addendum.

If you DO NOT show the sections as “modified”, the Special Provision Unit will most likely assume you want the current section from the SP2016. So, you may not get what you want.

(C) You don’t need to mark your changes in the following sections:

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DIVISION S

S-1 CONTACT INFORMATION
Use on all jobs.
SP2016-1

Direct questions about this Project, including pre-bid questions, to __________________. (District needs to supply Resident Engineer's name and phone number.)

S-2 PRE-LETTING CONFERENCE
The pre-letting conference should be held 2 weeks prior to the letting. Addendums go out 10 days prior to the letting and the pre-letting conference has to be held prior to the addendums going out so that any concerns brought up in the pre-letting conference can be addressed via addendum.
SP2016-2

The Department will hold a Pre-Letting Conference to discuss any questions regarding this Contract. The Department encourages all interested parties to attend. The meeting will start at ___________ on ___________. The meeting location is the MnDOT District Headquarters at ___________, Minnesota.

S-3 SPECIAL PROVISIONS RELATING TO INDIAN EMPLOYMENT
Use SP2016-41 (NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR TRIBAL LANDS) with this write-up when there is a NPDES permit on the job and the project limits will be within Tribal Lands.
SP2016-3

MnDOT promotes and encourages Indian employment on transportation projects on or near reservations, consistent with 23 USC §140 (d).

S-3.1 This Project is on or near a reservation. The Contractor must work with the tribal government to use Indian labor in performing Contract work. The Contractor must contact the Tribal employment rights officer, (Name), from the (Tribe or Band), at (phone number and e-mail address) to identify Indian employment opportunities.

Use S-.2 if the Project has OJT requirements.

S-3.2 The Project has on-the-job training (OJT) requirements. MnDOT advises the Contractor to consider Indians for designated OJT positions. The OJT positions can be in highway heavy trades classifications (such as heavy equipment operators, truck drivers, carpenters, laborers, cement masons, iron workers, electricians, painters, pipefitters and plumbers).

Specific OJT requirements for this Project are in the ON-THE-JOB TRAINING PROGRAM section of these Special Provisions.

Use S-.3 if the Project does NOT have OJT requirements.

S-3.3 This Project does not contain any specific OJT requirements. The absence of a specific OJT goal does not relieve the Contractor of any other responsibilities.

Use S-.4 ONLY if the Project is fully or partially located on a reservation.

S-3.4 The reservation’s tribal government may have a Tribal Employment Rights Ordinance (TERO) or similar policy. The Contractor will be required to comply with those portions of the ordinance or policy that require payment of a TERO fee or use of an Indian preference in employment. The Contractor must contact the Tribal employment rights officer to determine specific TERO fee and Indian employment preference requirements before submitting a bid on the Project.
NOTE to designer: Include the sentence below only if MnDOT knows the fee percentage 6 weeks before the bid opening. The percentage is based on the designer’s estimated cost of the work on the reservation as a portion of the estimated total Project cost. Contact MnDOT Contract Management if the Project is on the Red Lake reservation because the Special Provisions may need to be modified.

The TERO fee for this Project will apply to ___ percent of the total bid amount.

S-3.5 If the Contractor or subcontractor is not in compliance with these Special Provisions, the Department will address the noncompliance with the Contractor and/or subcontractor and the Tribal employment rights officer. If the tribe requests it, the Contractor must meet with the Tribal employment rights officer to discuss Indian employment issues.

The Contractor must submit the attached “MnDOT Indian Employment Tracking Form” to the MnDOT Office of Civil Rights no later than 30 days after substantial completion. The Engineer may withhold payment for failure to submit this form. The form must list all Indians who were hired for the Project after being referred by one of the federally-recognized tribal TERO offices in Minnesota, whether hired by the Contractor or any subcontractor.

S-3.6 If the Contractor is considering suspending or terminating an employee referred by the Tribal employment rights officer, the Contractor must notify the Tribal employment rights officer to seek assistance in resolving the problem. Nothing in these Special Provisions is intended to interfere with the Contractor’s ability to dismiss any employee for cause including, but not limited to, lack of adequate skills or training, inability to perform because of state or federal law, or breach of the Contractor’s safety standards or other standards of conduct.

S-3.7 This Special Provision supplement about Indian employment does not replace other equal employment opportunity requirements in the Contract.

S-4 EQUAL PAY
Use on all jobs.
SP2016-4

The Department cannot execute a contract in excess of $500,000 with a business that has 40 or more employees on a single day during the prior 12 months in this state or a state where the business has its primary place of business, unless the business has an equal pay certificate or has certified in the Electronic Bid File that the business is exempt. Bidders may find more information on the Equal Pay Certificate Requirement at Minnesota Statutes Section 363A.44 or at this website:

http://mn.gov/mdhr/compliance/equal_pay.html

S-5 RESPONSIBLE CONTRACTOR
Use on all jobs.
SP2016-5

The Department cannot award a construction contract in excess of $50,000 unless the bidder is a “responsible contractor” as defined in Minnesota Statutes §16C.285, subdivision 3.

A bidder must verify it meets the minimum criteria detailed in the law. A bidder must submit its verification electronically by completing the “Responsible Contractor” section in the “Officers and Acknowledgements” Folder within the Electronic Bid File. A company officer must certify statements in that section. Bidders only need to complete the electronic verification; DO NOT email, fax, or send paper forms to the Department. The Department will not accept emailed, faxed or other paper submissions and will only accept electronic verifications.
A bidder must obtain a verification from each subcontractor it will have a direct contractual relationship with. At the Department’s request, a bidder must submit signed subcontractor verifications. A contractor or subcontractor must obtain an annual verification from each motor carrier it has a direct contractual relationship with. A motor carrier must give immediate written notice if it no longer meets the minimum responsible contractor criteria. The requirement for subcontractor verifications does not apply to:

- Design professionals licensed under Minnesota Statutes §326.06; and
- A business or person that supplies materials, equipment, or supplies to a subcontractor on the Project, including performing delivering and unloading services in connection with the supply of materials, equipment, and supplies. But, a business or person must submit a verification if it delivers mineral aggregate such as sand, gravel, or stone that will be incorporated into the Work by depositing the material substantially in place, directly or through spreaders, from the transporting vehicle.

A bidder or subcontractor who does not meet the minimum criteria specified in the statute, or who fails to verify compliance with the criteria, is not a “responsible contractor” and is ineligible to be awarded the Contract for this Project or to work on this Project. Submitting a false verification makes the bidder or subcontractor ineligible to be awarded a construction contract for this Project. Additionally, submitting a false statement may lead to contract termination. If only one bidder submits a bid, the Department may, but is not required to, award a contract even if that bidder does not meet the minimum criteria.

COMPLIANCE WITH TAX LAW REQUIREMENTS

Use on all jobs.

SP2016-6

The Department cannot make final payment to the Contractor until the Contractor demonstrates that it and all its subcontractors have complied with the Income Tax withholding requirements of Minnesota Statutes, section 290.92 for wages paid for work performed under the contract. To establish compliance, the Contractor must submit a “Contractor Affidavit” either online or in paper form (IC134) to the Minnesota Department of Revenue. The contractor will receive written certification of compliance when the Department of Revenue determines that all withholding tax returns have been filed and all withholding taxes attributable to the work performed on the contract have been paid. The Contractor must then provide this written certification to the Department to receive final payment.

Every subcontractor working on the Project must submit an approved “Contractor Affidavit” from the Minnesota Department of Revenue to the Contractor before the Contractor can file its own Contractor Affidavit. The Contractor is advised to obtain the certification from each subcontractor as soon as the subcontractor completes work on the Project. Experience has shown that waiting until the project is complete to obtain the forms from all subcontractors is likely to result in significant additional work for the Contractor as it will be difficult or impossible to collect all forms.

The Department of Revenue, in association with the Department of Employment and Economic Development, offers a free seminar to help contractors understand tax law requirements. The Department strongly urges the Contractor and all subcontractors to attend the “Employment Taxes & Employer Responsibilities Seminar” or similarly offered classes. You can find a schedule and more information on the Department’s website at: www.revenue.state.mn.us/businesses/withholding/Pages/EducationandOutreach.aspx.

Complying with this requirement is considered part of the Work under this contract. The Department will enforce this requirement equally with all other Contract requirements. Contractor delay in complying with this requirement will cause the Department to delay final payment and Contract Acceptance. The Department may also report non-compliance to the Department of Revenue, which may result in enforcement action by the Department of Revenue.
S-7  
REFERENCE INFORMATION DOCUMENTS  
Use when requested by Dist. District needs to supply the hyperlink in the first paragraph.  
REVISED 01/08/16  "DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS."

SP2016-7  

Bidders are advised that Reference Information Documents (RID) regarding this Project can be found at: ftp://ftp2.xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Bidders shall consider and use the information provided in the RID at their own risk. The Department has provided the RID because it contains information bidders may find useful. The Department has provided the RID “as is”. The Department does not represent or warrant that the RID information is complete, accurate, or that it conforms with the requirements of this Contract. The RID is not an affirmative representation by the Department of any information contained in the RID. A Bidder should not rely on information in the RID without performing its own reasonable investigation.

Bidders understand and agree that the Department is not responsible or liable in any respect for any loss, damage, injury, liability, cost, or cause of action whatsoever arising out of information provided (or not provided) in the RID or from the Bidder’s reliance on the RID. An omission, error, or inaccuracy in the RID will not entitle the Contractor to additional compensation, nor will such omission, error, or inaccuracy provide the basis for a claim under Mn/DOT 1517.

Bidders further acknowledge and agree that:

(a) The information in the RID is not a representation of fact by the Department and the Department may not have fully investigated or verified information in the RID,

AND

(b) The Department did not check for any material omissions in the RID,

AND

(c) The Bidder must conduct its own reasonable studies, analyses and investigations to verify or supplement the RID information. Any use of the RID information is entirely at the Bidder's own risk and at its own discretion.

S-8  
EMERALD ASH BORER COMPLIANCE  
For use in Anoka, Chisago, Dakota, Hennepin, Houston, Olmsted, Ramsey, Scott, and Winona counties. Also use on jobs that are in counties that border these 9 counties just in case (Carver, Dodge, Fillmore, Goodhue, Kanabec, Isanti, Le Sueur, Mower, Pine, Rice, Sherburne, Sibley, Wabasha, Washington, and Wright).  
REVISED 01/08/16  "DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS."

SP2016-8  

All or part of this Project is located in a county which the Minnesota Department of Agriculture (MDA) has placed under an Emerald Ash Borer Quarantine. Contractor may contact MDA at 1-888-545-6684 or visit the Emerald Ash Borer website at http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx to find more information. The Contractor must comply with the following requirements.

S-8.1  
The Contractor will not:

(1) Offer any part of an Ash tree (Fraxinus spp.) from a quarantined area to any industry or individual without an Emerald Ash Borer Compliance Agreement with MDA; or
(2) Make available any part of an ash tree or any non-coniferous (hardwood) species with bark from the quarantined area for use as firewood; or
(3) Transport any part of an ash trees, in any form, outside of a quarantined county without complying with an Emerald Ash Borer Compliance Agreement with MDA; or
(4) Transport any part of ash trees, in any form, outside the state of MN without contacting John.o.haanstad@aphis.usda.gov to obtain the United States Department of Agriculture’s and the MDA’s joint approval of the Emerald Ash Borer Compliance Agreement.

S-8.2 The Contractor will:

(1) Dispose of ash trees according to the Emerald Ash Borer Compliance Agreement; and
(2) Use the ash wood chips within the construction limits for erosion control, construction exit pads, or other project related needs.

S-8.3 The Department will not directly compensate the Contractor for compliance with these requirements.

S-9 PARTNERING
To be used on all projects. CO Special Provisions will use the informal partnering paragraphs unless told otherwise by the District.
REVISED 04/08/16  \[DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.\]
SP2016-9

Partnering is required on this Contract.

Use S-.1 and S-.2 for all projects unless formal partnering is required.
S-9.1 The pre-construction letter and questionnaire will be sent out by the MnDOT Engineer prior to the pre-construction conference. The Contractor must fill out and return the questionnaire to the MnDOT Engineer within 5 working days of receipt of the request. An example pre-construction letter and questionnaire can be found in Appendix A, of MnDOT’s “Partnering Field Guide”.

S-9.2 Pre-activity planning discussions will be held prior to each major construction activity and prior to any minor activity that the MnDOT Engineer determines. An example pre-activity discussion checklist can be found in Appendix G, of MnDOT’s “Partnering Field Guide”.

Use S-.3 thru S-.6 for all projects requiring formal partnering.
S-9.3 The Department and Contractor shall jointly select a professional partnering facilitator. The Department and Contractor shall equally share the facilitator’s costs. The Contractor shall pay all facilitator costs and submit paid invoices to MnDOT for 50 percent reimbursement. MnDOT will prepare a Change Order for reimbursement.

S-9.4 The pre-construction letter and questionnaire will be sent out by the MnDOT Engineer prior to the pre-construction conference and/or partnering workshop. The Contractor must fill out and return the questionnaire to the MnDOT Engineer within 5 working days of receipt of the request. An example pre-construction letter and questionnaire can be found in Appendix A, of MnDOT’s “Partnering Field Guide”.

S-9.5 Pre-activity planning discussions will be held prior to each major construction activity and prior to any minor activity that the MnDOT Engineer determines. An example pre-activity discussion checklist can be found in Appendix G, of MnDOT’s “Partnering Field Guide”.

S-9.6 Before construction begins, a kick-off partnering workshop session will be held. Multiple partnering workshop sessions may be held throughout the project. The Department will take meeting minutes for
each session and distribute them to those in attendance. The partnering workshop session is explained in Chapter 3 of MnDOT’s “Partnering Field Guide”.

Use S-.7 and S-.8 for all projects (both formal and informal partnering).

S-9.7 Partnering shall be conducted in accordance with MnDOT’s “Partnering Field Guide”, http://www.dot.state.mn.us/const/tools/index.html.

S-9.8 All costs associated with the Partnering provisions are incidental, except as otherwise provided in the Contract.

S-10 USE OF ADHESIVE ANCHORS

Use on all jobs.

SP2016-10 Do not use adhesive anchors in sustained tension. Contractor may use adhesive anchors, in a non-direct tensile application, such as metal rail attachment.

S-11 TARGETED GROUP BUSINESS (TGB) AND VETERAN-OWNED SMALL BUSINESS

Use on 100% STATE FUNDED projects.

SP2016-11 The MnDOT Targeted Group Business (TGB) and Veteran-owned Small Business programs are part of the MnDOT initiative to increase small business participation on state funded projects. These programs are intended to provide eligible businesses with increased access to state contracting opportunities. Eligibility requirements for both programs are established pursuant to Minn. Stat. §16C.16 and Minn. Rule Parts 1230.1600-1820. TGBs and Veteran-owned Small businesses bidding as Prime Contractors may receive a preference in the bid amount, and contracts may include goals to increase participation of TGBs and Veteran-owned small businesses as subcontractors.

Bidders are directed to the attached "Targeted Group Business (TGB) and Veteran-Owned Small Business Special Provisions" for details.

S-12 MINNESOTA REPORT ON JOBS REQUIREMENTS

Use on all jobs that have Minnesota bond funds issued through legislation after the Chapter 152 bond funds. Contact a STIP or PPMS coordinator with questions regarding applicable bond funds.

SP2016-12 This Contract is funded all or in part by Minnesota bond funds and is subject to the jobs reporting requirements of Minnesota Statute § 16A.633. Contractor and its subcontractors will complete and submit an annual employment reports as set forth on the attached Minnesota Report on Jobs (Exhibit XX). Information will include the following:

(1) Number of employees;
(2) Job types;
(3) Hourly wages;
(4) Total payroll;
(5) Number of jobs retained and created; and
(6) Contractor’s DUNS number.

The costs of providing the required report shall be incidental to the Contract as a whole.
S-13 ELECTRONIC SUBMISSION OF PAYROLLS AND STATEMENTS AND BIDDERS LISTS FOR FEDERALLY FUNDED PROJECTS

Use on all jobs that have Federal funds on them. For use on MnDOT administered projects only.

SP2016-13

These provisions govern how the apparent low bidder must submit the Bidders/Quoters List and how the Prime Contractor and all subcontractors shall submit all certified payroll documentation, and post prompt pay requirements. These provisions supersede the following section of the “SPECIAL PROVISIONS DIVISIONS A – LABOR” Section IV. Payrolls & Statements, Subparts (B) (C) & (H) and the following language under FHWA 1273 Section IV. DAVIS-BACON AND RELATED ACTS PROVISIONS, Part 3. Payrolls and Basic Records subpart b. (1)

...except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last for digits of the employee’s social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at [http://www.dol.gov/whd/forms/wh347.pdf](http://www.dol.gov/whd/forms/wh347.pdf) or its successor site....

And all Part 3. subpart b. (3) of this Proposal. The requirement to submit electronic payrolls through AASHTOWare Project, Civil Rights and Labor (CRL) system supersedes the requirement to file the Equal Employment Opportunity (EEO) Special Provisions forms EEO-12 and EEO-13. These provisions also supersede the DBE Consolidated Good Faith Efforts Form Part F only.

The Department will not provide additional compensation to ensure compliance with these provisions by the apparent low bidder, Prime Contractor, or any lower tier subcontractors.

**General Information:** Due to the need for timely submittal of electronic documents, especially the Bidder/Quoters List (S-13.4), the Department highly recommends that all bidders and quoters prior to submitting a bid submit the MnDOT, Contractor/Vendor Form or Trucking Company/Vendor Form to MnDOT, Office of Construction & Innovative Contracting, Labor Compliance Unit. These forms can be accessed at: [http://www.dot.state.mn.us/const/labor/forms.html](http://www.dot.state.mn.us/const/labor/forms.html).

S-13.1 SYSTEM REQUIREMENTS

The Contractors shall submit certified payroll statements, bidders/quoters list, and post the Contract’s prompt payment requirements electronically using a CRL system for which access will be provided by the Department. To utilize the CRL system, the Contractor must have the following:

• A computer running the operating system Windows 7 or newer
• Internet Explorer version 9 (IE9 or newer IE 11 will be required with 3.0)
• High-Speed Internet Access (no dial-up access)
• Microsoft Excel 2007 or newer

The Department has a link to the CRL system on the MnDOT LCU CRL website at [http://www.dot.state.mn.us/const/labor/civil-rights-labor.html](http://www.dot.state.mn.us/const/labor/civil-rights-labor.html) and will provide a log-in ID for the CRL system to a designated employee(s) of the apparent low bidder, Prime Contractor and approved subcontractors identified on the Request-to-Sublet forms. The log-in ID and password are unique to the designated employee and must not be shared with other employees. The employees can register from the MnDOT LCU CRL website.

The Department has also provided manuals for the CRL system, E-Learning Tool, and other important system links including upcoming training sessions on the MnDOT LCU CRL website.

S-13.2 CERTIFIED PAYROLL SUBMISSION
The Prime Contractor and all subcontractors must use CRL system to provide MnDOT with electronic certified payrolls. The Prime Contractor must ensure that all subcontractors have submitted their vendor information to MnDOT on the required forms listed above prior to working on the Project.

The Prime Contractor will work with Project Engineer (PE) to receive the appropriate login ID’s for their company along with their approved subcontractors working on the Project; for purposes of this specification the term “subcontractor” include trucking entities subject to the Contract Special Provision – Division A – Labor. The Prime Contractor shall ensure all subcontractors submit their certified payrolls electronically into the system.

There are three ways to submit certified payrolls electronically into the system:

- Manually enter data into CRL
- Import payroll data by using CRL system payroll spreadsheet with XML converter tool
- Convert payroll program data to TransXML and import into the system. Information on how to convert to TransXML can be found at: https://xml.cloverleaf.net/resourcekit/

The Month-end Truck Report forms required by the Contract must be submitted to the PE through the use of the required paper documents.

The Prime Contractor is responsible for and must assist subcontractors on inputting their payroll data into the system and if necessary, provide to the PE along with the submitted electronic data, a signed paper certified payroll from the subcontractor.

The PE may at any time require, upon written demand, paper certified payrolls from any or all contractors working on the Project based on the original Contract’s Special Provision- Division A and FHWA 1273.

S-13.3 PROMPT PAY REQUIREMENTS
The Prime Contractor must post payments based on prompt pay requirements to first-tier subcontractors into CRL and all first-tier subcontractors must post payments in the CRL system to second-tier subcontractors. All subcontractors must verify the receipt of such payments from the Prime Contractor or subcontractor in the CRL system. The PE may at any time require, upon written demand, paper documents related to Contractor payments from any or all contractors working on the Project to ensure the prompt pay requirements of this Contract are met.

S-13.4 BIDDER/QUOTERS LIST REQUIREMENTS
The Apparent Low Bidder (ALB) will be required to use the CRL system to prepare and submit an electronic bidders/quoters list. The ALB must ensure that all subcontractors and suppliers that provide a bid or quote have submitted to MnDOT a Contractor/Vendor Form or Trucking Company/Vendor Form. These forms may be accessed at: http://www.dot.state.mn.us/const/labor/forms.html. Completed forms must be submitted to MnDOT, Office of Construction & Innovative Contracting, Labor Compliance Unit, prior to completing the electronic bidders/quoters list to ensure the firms’ information is in the CRL system. The electronic bidders/quoters list is completed by selecting the name of the firm from a vendor list populated from information contained in the CRL system. The ALB must access the system using the log-in assigned by MnDOT. If you need additional assistance, the ALB needs to contact the Civil Rights, Small Business Contracting Supervisor. The log-in ID and password are unique to the designated employee and must not be shared with other employees. The ALB must manually enter the following information for each subcontractor or supplier who provided a quote or bid to perform work or supply materials on this Project. This information is required for all DBE and non-DBE subcontractors and suppliers.

- Firm name; (selected from drop down list)
- Firm address; (Default)
- Firm's status as a DBE or non-DBE(Default)
- Proposal line items the firm is proposing to perform AND dollar amount of each line item
The bidders/quoters list is due on the Submission Due Date specified in the DBE Special Provisions, Section 5, for this Contract. The ALB is required to provide the name of the company’s authorized Bidder/Quoter Signee. The Department recommends that all bidders submit this Signee to the Office of Civil Rights, Small Business Contracting Supervisor, prior to bidding on the proposal.

S-13.5 MINNESOTA GOVERNMENT DATA PRACTICES ACT
All data submitted by bidders, the ALB, Prime Contractor, and subcontractors and maintained in CRL are subject to and governed by the Minnesota Government Data Practices Act (Minnesota Statutes Chapter 13 or MGDPA). Within CRL, bidders, the ALB, Prime Contractor, and subcontractors may have access to not public data, as classified by the MGDPA, including, but not limited to Social Security numbers and user log-in IDs and passwords. Bidders, the ALB, Prime Contractor, and subcontractors must establish appropriate security safeguards for access to not public data and shall employ all suitable precautions to ensure continued protection of not public data. Bidders, the ALB, Prime Contractor, and subcontractors are subject to the civil remedies of Minn. Stat. §13.08 for the unauthorized access or release of not public data.

S-14 ELECTRONIC SUBMISSION OF PAYROLLS AND STATEMENTS AND BIDDERS LISTS FOR STATE FUNDED PROJECTS
Use on all jobs that are 100% State funded. For use on MnDOT administered projects only.

These provisions govern how the apparent low bidder must submit the Bidders/Quoters List and how the Prime Contractor and all subcontractors shall submit all certified payroll documentation, and post prompt pay requirements. These provisions supersede the following section of the “SPECIAL PROVISIONS DIVISIONS A – LABOR” Section IV. Payrolls & Statements, Subparts (B) & (D). The requirement to submit electronic payrolls through web Trns*port Civil Rights and Labor (wTCRL) system supersedes the requirement to file the Equal Employment Opportunity (EEO) Special Provisions forms EEO-12 and EEO-13. These provisions supersede the TGB/VETs Consolidated Good Faith Efforts Form Part F only.

The Department will not provide additional compensation to ensure compliance with these provisions by the apparent low bidder, Prime Contractor, or any lower tier subcontractors.

General Information: Due to the need for timely submittal of electronic documents, especially the Bidder/Quoters List (S-14.4), the Department highly recommends that all bidders and quoters prior to submitting a bid submit the MnDOT, Contractor/Vendor Form or Trucking Company/Vendor Form to MnDOT, Office of Construction & Innovative Contracting, Labor Compliance Unit. These forms can be accessed at: http://www.dot.state.mn.us/const/labor/forms.html.

S-14.1 SYSTEM REQUIREMENTS
The Contractors shall submit certified payroll statements, bidders/quoters list, and post the Contract’s prompt payment requirements electronically using a wTCRL system for which access will be provided by the Department. To utilize the wTCRL system, the Contractor must have the following:

- A computer running the operating system Windows XP or Windows 7
- Internet Explorer version 8 or 9 (IE9 is preferred - cannot use IE10)
- High-Speed Internet Access (no dial-up access)
- Microsoft Excel 2007 or newer

The Department will provide a link to and a log-in ID for the wTCRL system to a designated employee of the apparent low bidder, Prime Contractor and approved subcontractors identified on the Request-to-Sublet forms. The log-in ID and password are unique to the designated employee and must not be shared with other employees.
The Department has provide manuals for the wTCRL system, E-Learning Tool, and other important system links including upcoming training sessions at: http://www.dot.state.mn.us/const/labor/civil-rights-labor.html

S-14.2 CERTIFIED PAYROLL SUBMISSION
The Prime Contractor and all subcontractors must use wTCRL system to provide MnDOT with electronic certified payrolls. The Prime Contractor must ensure that all subcontractors have submitted their vendor information to MnDOT on the required forms listed above prior to working on the Project.

The Prime Contractor will work with Project Engineer (PE) to receive the appropriate login ID’s for their company along with their approved subcontractors working on the Project; for purposes of this specification the term “subcontractor” include trucking entities subject to the Contract Special Provision - Division A – Labor. The Prime Contractor shall ensure all subcontractors submit their certified payrolls electronically into the system.

There are three ways to submit certified payrolls electronically into the system:

- Manually enter data into wTCRL
- Import payroll data by using wTCRL system payroll spreadsheet with XML converter tool
- Convert payroll program data to TransXML and import into the system. Information on how to convert to TransXML can be found at: https://xml.cloverleaf.net/resourcekit/

The Month-end Truck Report forms required by the Contract must be submitted to the PE through the use of the required paper documents.

The Prime Contractor is responsible for and must assist subcontractors on inputting their payrolls data into the system and if necessary, provide to the PE along with the submitted electronic data, a signed paper certified payroll from the subcontractor.

The PE may at any time require, upon written demand, paper certified payrolls from any or all contractors working on the Project based on the original Contract’s Special Provision- Division A.

S-14.3 PROMPT PAY REQUIREMENTS
The Prime Contractor must post payments based on prompt pay requirements to first-tier subcontractors into wTCRL and all first-tier subcontractors must post payments in the wTCRL system to second-tier subcontractors. All subcontractors must verify the receipt of such payments from the prime Contractor or subcontractor in the wTCRL system. The PE may at any time require, upon written demand, paper documents related to Contractor payments from any or all contractors working on the Project to ensure the prompt pay requirements of this Contract are met.

S-14.4 BIDDER/QUOTERS LIST REQUIREMENTS
The Apparent Low Bidder (ALB) will be required to use the wTCRL system to prepare and submit an electronic bidders/quoters list. The ALB must ensure that all subcontractors and suppliers that provide a bid or quote have submitted to MnDOT a Contractor/Vendor Form or Trucking Company/Vendor Form. These forms may be accessed at: http://www.dot.state.mn.us/const/labor/forms.html. Completed forms must be submitted to MnDOT, Office of Construction & Innovative Contracting, Labor Compliance Unit, prior to completing the electronic bidders/quoters list to ensure the firms’ information is in the wTCRL system. The electronic bidders/quoters list is completed by selecting the name of the firm from a vendor list populated from information contained in the wTCRL system. The ALB must access the system using the log-in assigned by the Office of Civil Rights, Small Business Contracting Supervisor. The log-in ID and password are unique to the designated employee and must not be shared with other employees. The ALB must manually enter the following information for each
subcontractor or supplier who provided a quote or bid to perform work or supply materials on this Project. This information is required for all TGB, Veteran-owned and non-TGB/Veteran-owned subcontractors and suppliers.

- Firm name;
- Firm address;
- Firm's status as a TGB/Veteran-owned or non-TGB/Veteran-owned
- Proposal line items the firm is proposing to perform AND dollar amount

The bidders/quoters list is due on the Submission Due Date specified in the TGB/Veteran Preference Special Provisions, Section 5, for this Contract. The ALB is required to provide the name of the company’s authorized Bidder/Quoter Signee. The Department recommends that all bidders submit this Signee to the Office of Civil Rights, Small Business Contracting Supervisor, prior to bidding on the proposal.

S-15 (1103) DEFINITIONS
Use on all jobs.

The provisions of MnDOT 1103 are supplemented as follows:

S-15.1 The following definition is added to MnDOT 1103:

**Unit Day.** 12:00 AM to 11:59 PM (0000-2359) or any portion thereof.

S-16 (1301) CONSIDERATION OF PROPOSALS (LANE RENTAL METHOD)
Note: Contact Kevin Kosobud, Project Development Engineer, Office of Construction and Innovative Contracting, prior to incorporating this special provision. The Designer must indicate the Location allowed for each Type of Lane Rental & Assessment Rates.

The Provisions of Mn/DOT 1301 are hereby supplemented as follows:

S-16.1 **GENERAL**

The process for bidding on this Project will take into account not only the Contract amount bid for regular construction items, but also the bidder’s anticipated total Lane Rental costs. The Contractor’s bid amount for Item 2016.601 (Lane Rental) should reflect the amount of Lane Rental assessments that the Contractor anticipates to be charged as result of their work schedule.

Item 2016.601 (Lane Rental) will become the “Lane Rental Working Fund”, against which predetermined rates for lane mile/hour Lane Rental assessments will be charged.
S-16.2 LANE RESTRICTIONS
No lane restrictions will be permitted as specified in Section S-1404 (MAINTENANCE OF TRAFFIC AND TRAFFIC CONTROL) of these Special Provision.

S-16.3 LANE RENTAL ASSESSMENTS
The following chart outlines the type of lane rental and the assessment rate associated with each type.

<table>
<thead>
<tr>
<th>TYPE OF LANE RENTAL</th>
<th>ASSESSMENT RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lane/mile/hour</td>
</tr>
<tr>
<td>Type A</td>
<td>$$</td>
</tr>
<tr>
<td>Type B</td>
<td>$$</td>
</tr>
<tr>
<td>Type C</td>
<td>$$</td>
</tr>
</tbody>
</table>

The following chart outlines the locations, times and rates where Lane Rental charges will be applied.

<table>
<thead>
<tr>
<th>ROADWAY / LOCATION</th>
<th>TYPE OF LANE RENTAL</th>
<th>TIME AND DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type C</td>
<td></td>
</tr>
</tbody>
</table>

There will be no Lane Rental assessments for traffic restrictions that occur at other times not shown in the above chart.

There will be no Lane Rental assessments for shoulder closures.

Lane Rental charges apply concurrently for each traffic impact.

Lane Rental charges will be assessed when lane closures are in place, whether or not work is in progress and regardless of weather conditions. The Engineer, in his/her sole discretion, reserves the right to waive Lane Rental charges in extenuating circumstances.

The Lane Rental assessment rates apply to traffic restrictions in one travel direction. If the Contractor is allowed by Special Provision to restrict traffic in both directions at the same time and if the Contractor chooses to do so, Lane Rental charges will be assessed for each direction.

Work accomplished under Moving Operations and Mobile Operations as shown in the Field Manual for Temporary Traffic Control Layouts will be chargeable at the applicable Lane Rental assessment rates as shown above.

The Lane Rental rate per lane per mile per hour (lane/mile/hour) will be assessed for each hour (or any portion of an hour) that a lane closure is in effect, and for each lane mile (or portion of a lane mile) that is affected. Any fraction of a mile or an hour shall be considered a full mile and/or full hour. If any portion of an hour spans two or more assessment rates, the Contractor will be charged the highest of the rates. The lane closure will be measured from the placing of the first device in a lane until all devices are removed from the traveling lanes such that the roadway is safely re-opened to traffic.
The Department will record Lane Rental assessments on a daily basis, and submit a weekly tabulation to the Contractor the following week. The Contractor must submit to the Engineer any disputes of the Lane Rental assessments within one week of receipt of the weekly tabulation.

S-16.4 **EXTRA WORK**

When possible, Extra Work shall be completed concurrently with regular Contract work shown in the Plan. When Extra Work is completed concurrently with regular Contract work, the Lane Rental charges shall be prorated based on the relative value of work performed.

If, in the opinion of the Engineer, Extra Work can not be completed concurrently with regular Contract work shown in the Plan, no Lane Rental charges will be assessed. The Contractor shall comply with the Lane Restriction section of this Special Provision and shall make every attempt to minimize disruptions to traffic.

S-16.5 **PREPARATION OF PROPOSAL**

The bidder shall establish the number of hours of lane closures for each type to complete the work required under this Contract. Using the hours established by the bidder and the rates shown in the tables above, the bidder shall enter the total lump sum value of Lane Rental as Bid Item 2016.601 (Lane Rental).

*Use the following clause when you want to include a maximum amount they can bid.*

The Lump Sum value of Lane Rental shall not exceed $XXX,XXX. Bids showing the Lane Rental value in excess of this amount will be considered non-responsive and will be rejected.

S-16.6 **CONSIDERATION OF BIDS**

Each bid submitted shall consist of two parts:

1. The Contract amount of construction pay items (not including item 2016.601 (Lane Rental)).

2. The lane rental value entered by the bidder to complete all work required in this Contract as specified in this Special Provision (Bid Item 2016.601 (Lane Rental)). In the Schedule of Prices, in the Unit Price column, the bidder shall enter the Lump Sum value of Lane Rental as indicated above.

OR

2. The lane rental value entered by the bidder to complete all work required in this Contract as specified in this Special Provision (Bid Item 2016.601 (Lane Rental)). In the Schedule of Prices, in the Unit Price column, the bidder shall enter the Lump Sum value of Lane Rental as indicated above. Bidders shall be aware of the maximum bid amount for the Lane Rental item as indicated above in this Special Provision.

The successful bid will then be determined by the Department as the lowest combination of (1) and (2). This combination will be used only to determine the successful bidder and will not be used to determine the Contract award amount nor final payment to the Contractor when the project is completed. Only construction pay item unit prices will be used to determine final payment to the Contract, except as may be adjusted as indicated elsewhere in this Contract.

S-16.7 **PAYMENT**

No direct payment will be made for Item 2016.601 (Lane Rental) Lump Sum.

At the conclusion of the Project, the Contractor will receive an incentive payment or disincentive monetary deduction equal to the amount of the “Lane Rental Working Fund”, (which is equal to the amount bid by
the Contractor for Item 2016.601 (Lane Rental), minus the amount of the total of all Lane Rental assessments for the entire Project. The total incentive amount will not exceed $YY,000 (xxxx dollars). Payment of the incentive will be made on the first partial estimate voucher processed after the Completion of Work has concluded.

**S-17 (1301) CONSIDERATION OF PROPOSALS (A+B METHOD)**

Note: Consult with Kevin Kosobud, Project Development Engineer, Office of Construction and Innovative Contracting, before incorporating this special provision.

NEW WRITEUP 09/25/15 ◄DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-14.3

The Provisions of Mn/DOT 1301 are hereby supplemented as follows:

S-17.1 **GENERAL**

The process for the consideration of proposals for the award of this Project will take into account not only the Contract amount bid for construction items, but also the bidder's proposed number of Calendar Days to complete all work required as defined in Section S-X.2(4) of this Special Provision. This method, as described below, shall be used to determine the successful bidder. It shall not be used to determine the award amount nor final payment to the Contractor when the Project is completed.

S-17.2 **DEFINITION OF TERMS**

For this Project the following definitions apply:

1. **Calendar Day** – {define your criteria, clarify if it conflicts with 1803.5}
2. **Contract Amount** -- The summation of the products of the quantities shown in the bid schedule multiplied by the unit bid prices (excluding Item 2016.621 (Contract Time)).
3. **Daily Road User Cost** – The amount which represents the average daily cost of inconvenience to the road users. The Daily Road User Cost is $x,xxx.00.

**OR use the following if A+B is applied to the contract as a whole:**

1. **Daily Road User Cost** - The amount which represents the average daily cost of inconvenience to the road users plus liquidated damages. The Daily Road User Cost is $x,xxx.00.
2. **Completion of Work** -- All work required to complete {define scope of work to be completed. This is the only area you need to enter the scope of work}. The Completion of Work is XX Calendar Days.

S-17.3 **PREPARATION OF PROPOSAL**

The bidder shall establish the number of Calendar Days to be used for the Completion of Work as defined in Section S-X.2 of this Special Provision.

The total number of Calendar Days established by the bidder shall be less than or equal to XX Calendar Days but not less than YY Calendar Days. Bids showing the Completion of Work specified in Section S-X.2 of this Special Provision in excess of XX Calendar Days, or less than YY Calendar Days will be considered non-responsive and will be rejected. Any decision by a bidder to bid less than XX Calendar Days is entirely at the bidder's own risk; the Department does not warrant that the Completion of Work can be completed in less than XX Calendar Days.

The bidder shall enter the number of Calendar Days bid as Item 2016.621 (Contract Time) on the Proposal Site Page of the Schedule of Prices, in the # of Days column.
CONSIDERATION OF BIDS
Each bid submitted shall consist of two parts:

(a) The Contract Amount of construction pay items (not including Item 2016.621 (Contract Time)).

(b) Bid Item 2016.621 (Contract Time): Total number of Calendar Days proposed by the bidder for the Completion of Work specified in Section S-X.2 of this Special Provision.

The successful bid will then be determined by the Department as the lowest combination of (a) and (b) according to the following formula:

\[(a) + (b) \times \text{RUC}] = \text{bid amount for award consideration.}\]

Where RUC = Daily Road User Cost

The preceding formula will be used to determine the successful bidder and will not be used to determine the Contract award amount nor final payment to the Contractor when the Project is completed. Only the Contract Amount will be used to determine final payment to the Contractor, except as may be adjusted under the conditions of the Contract.

DISINCENTIVE

Failure to complete the work within the established number of Calendar Days stated by the Contractor will be subject to monetary deductions and/or damages as shown in Section S-1807 (FAILURE TO COMPLETE THE WORK ON TIME) of these Special Provisions.

INCENTIVE

In the event that the Completion of Work as defined in Section S-X.2 of this Special Provision is completed in advance of established number of Calendar Days stated by the Contractor in Item 2016.621 (Contract Time), payment otherwise due in the Contract will be adjusted with an incentive as shown in Section S-1806 (DETERMINATION OF CONTRACT TIME) of these Special Provisions.

AWARD OF CONTRACT

Contract Award must be in accordance with the provisions of MnDOT 1302 and the following:

BID DOCUMENTS SUBMISSION

The Contractor must submit a legible copy of bid documentation used to prepare the bid for this Contract to the MnDOT Contract Administration Engineer or the Engineer’s authorized representative. MnDOT will review the documentation with the Contractor and place the bid documentation in a secure, locked place in the St. Paul Transportation Building as described in paragraph (C). Minnesota Statutes, section 13.72, subdivision 16 classifies the bid documentation as nonpublic or private data.

"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 costs, Contractor’s overhead costs and its calculated overhead rate, payment rates for the Contractor’s employees, material sources, efficiency or productivity factors, arithmetic
extensions, and the rates and quotations from subcontractors and material suppliers to the extent the Contractor used
the rates and quotations 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. The manuals may be included in the bid documentation by
reference. The reference must include the name and date of the publication and the publisher. (The phrase "bid
documentation" does not include documents provided by MnDOT for the Contractor’s use in bidding this Project.)

The Contractor must submit the bid documentation to MnDOT in a container suitable for sealing
no later than ten (10) Calendar Days after Contract Award.

The Contractor must clearly mark the container "Bid Documentation" and write 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 MnDOT will retain the bid bond.

(B) In addition to the bid documentation, the Contractor must also place in the sealed container a
notarized affidavit signed by an individual the Contractor has authorized to execute bidding Proposals. In the
affidavit, the Contractor must list each bid document with sufficient specificity that the Department may compare
the affidavit list and the bid documentation to ensure that all of the listed bid documentation is enclosed. The
affidavit must attest that the affiant has personally examined the bid documentation, that the affidavit lists all of the
documents the Contractor used to determine the bid for this Project, and that all such bid documentation has been
included.

(C) When the Department receives the bid documentation, the Contract Administration Engineer or
the Engineer’s authorized representative and the Contractor will verify the accuracy and completeness of the bid
documentation compared to the affidavit. If there is a discrepancy, the Contractor must immediately furnish to
MnDOT any other needed bid documentation. MnDOT, 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.

The Contract Administration Engineer or the Engineer’s authorized representative will establish
an informal escrow arrangement by delivering the sealed container to the Contracts and Lettings Supervisor or the
Supervisor’s authorized representative. The Contracts and Lettings Supervisor or representative must store the
container in a secure, locked place in the St. Paul Transportation Building.

(D) The bid documentation and affidavit must remain in secure storage during the life of the Contract
or until the Contractor notifies MnDOT of its intention to submit a claim, or initiate litigation against MnDOT,
related to the Contract. Notice of the Contractor's intent to submit a claim, or initiate litigation against MnDOT, is
sufficient evidence for MnDOT to open and obtain custody of the bid documentation. If no notice is received, and
the Contractor has signed the Certificate of Final Acceptance, or, at the discretion of the Department, upon Final
Acceptance of Work, MnDOT will release the sealed container to the Contractor.

(E) By submitting the bid documentation, the Contractor affirms that the sealed container contains all
of the bid documentation used to determine the bid and that the Contractor will use no other bid documentation 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.
MnDOT will have the option to terminate the Contract for default. These remedies are not exclusive, and MnDOT
may take other action as available under law.

(F) Subcontractors bidding work equaling or exceeding $50,000.00 must submit bid documents as
described in Paragraphs A and B above. The subcontractor must seal the subcontractor’s bid documents in a separate
container and have its representative deliver them to the MnDOT Contract Administration Engineer or Engineer’s authorized representative.

The subcontractor’s bid documents must remain in secure storage during the life of the Contract or until the Contractor notifies MnDOT of its intention to submit a claim, or initiate litigation against MnDOT, related to the subcontractor’s work. Notice of the Contractor’s intent to submit a claim, or initiate litigation against MnDOT, arising out of the subcontractor’s bid documentation. If no notice is received and the Contractor has signed the Certificate of Final Acceptance, or, at the discretion of the Department, upon Final Acceptance of Work, MnDOT will release the sealed container to the Contractor.

By submitting the bid documentation, the subcontractor affirms that its sealed container delivered to MnDOT contains all of the information used to determine the bid, and that the subcontractor will use no other bid documentation in litigation over claims brought by the Contractor arising out of the subcontractor’s work.

(G) The bid documentation and affidavit in escrow are, and will remain, the Contractor’s or subcontractor’s property. MnDOT 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 MnDOT receives notice of the Contractor’s intention to file a claim or unless litigation ensues between MnDOT and the Contractor. If notice is received, or litigation is commenced, the bid documentation and affidavit become MnDOT’s property.

(H) Payment for compilation of the data, container, cost of verifying the bid documentation or any other costs that the Contractor incurs in fulfilling these requirements are considered incidental to the Contract.

S-19  **(1306) EXECUTION AND APPROVAL OF CONTRACT**
*Use on jobs where the letting date and start date are 6 weeks or less apart.*

SP2016-16

The provisions of MnDOT 1306 are modified by substituting the following paragraph for the first paragraph of 1306:

The lowest responsible Bidder shall sign and return the Contract with the required Payment and Performance Bonds no later than three business days after Award.

S-20  **(1402) CONTRACT REVISIONS**
*Use on jobs with building removals where the buildings are still occupied at time of letting.*

SP2016-17

This special provision supplements the provisions of MnDOT 1402.

S-20.1 The State reserves the right to delete from the Contract the work required on any parcel upon which any building has not been vacated prior to a date which, in the opinion of the Engineer, would cause delay and inconvenience to the Contractor.

If the State deletes work according to this provision, the State will base final payment to the Contractor on the Contract unit bid prices for the work which the Contractor actually performed in accordance with the terms of the Contract.
S-21  (1404) MAINTENANCE OF TRAFFIC AND (2563) TRAFFIC CONTROL

The following write-up was created by the Traffic Control Specification Review Committee. Whomever in the District is putting together the time and traffic for the job, needs to go through the following write-up and pick and choose which portions are needed on the job.

THE SPECIAL PROVISIONS UNIT CAN NOT DO THIS FOR YOU.

REVISED 05/13/16  DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-18

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 Speed Limits in Work Zones Guideline
- the Minnesota Flagging Handbook;
- the Minnesota Standard Signs 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.

Use the following paragraph on jobs that have FEDERAL FUNDING on them.

The Contractor is advised of the changes to the Prevailing Wage Coverage as noted in the Notice to Bidders - Traffic Control Prevailing Wage Coverage contained in the front of this Proposal.

S-21.1  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.

Choose one of the following:

The Contractor shall furnish the Engineer names, addresses and phone numbers of at least two (2) local persons responsible for all traffic control devices.

OR
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 a daily charge assessed at a rate of $250.00 per day for each day or any portion thereof with which the Engineer determines that the Contractor has not complied.

(E) 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-21.2 GENERAL REQUIREMENTS

(A) All portable sign assemblies shall be perpendicular to the ground. No roll-up signs will be allowed unless authorized by the Engineer. 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 under the Approved/Qualified Products List (APL/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 inplace 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 temporary rigid signs. 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](http://www.dot.state.mn.us/products/signing/pdf/typelabel.pdf)

The sheeting materials APL/QPL, including the retroreflective sheeting types, is located at [http://www.dot.state.mn.us/products/signing/sheeting.html](http://www.dot.state.mn.us/products/signing/sheeting.html)

**Fill in the blanks in the following paragraph.**

(D) At the beginning of the Project, the Contractor shall store at least ________ extra Type III barricades and _______ 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-1404.10 (ADDITIONAL TRAFFIC CONTROL DEVICES AND EXTENDED USE OF TRAFFIC CONTROL DEVICES)** of this Special Provision.

**Districts should use the following to designate which operations, if any, will be allowed to utilize the Type A channelizers instead of barrels.**

(E) On _________________ operations, weighted channelizers (Type A) may be used in place of drums (Type B) for delineation in non-transition areas and may also be used to delineate the edge of a pavement drop-off of 4 inches [100 mm] or less. Except as authorized by the Engineer, these devices will only be allowed during daytime operations and cannot be used in unattended work zones.

On _________________ operations, 36 inch (900 mm) tubular markers (Type A) may be used in place of drums (Type B) for delineation in non-transition areas or to delineate the edge of pavement drop-off of 4 inches (100 mm) or less. Except as authorized by the Engineer, these devices will only be allowed during daytime operations and cannot be used in unattended work zones.

**Use (F) only if it applies to the Project!**

(F) **In Place Signing**

All in place signs and delineators mounted on less than three posts (not including back bracing) and which interfere with the Contractor's normal operation, shall be relocated outside of the work area by the
Contractor at the direction of the Engineer. Any signs that are removed and might be reused are to be stored in such a manner as to protect the sign from scratching, fading, or other harmful results until said signs are reinstalled or delivered to MnDOT. All signs mounted on three or more posts requiring relocation will be relocated by State forces. The Contractor shall notify the Engineer \( xxx \) Working Days prior to the required relocation work. Signs mounted on three or more posts that must be removed but not relocated shall be removed by the Contractor. 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. Regulatory signs, not otherwise covered by this Contract, may only be removed, replaced, or relocated by MnDOT personnel.

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

**OR**

(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 affects 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 MnDOT. 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.

Optional: Use this paragraph when you do not want the Contractor unloading or loading equipment without a full shoulder closure.

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)

- **Flaggers**— In addition to an ANSI Class 2 vest, shirt, or jacket, flagger shall wear high visibility Class E long pants and a hat.
- **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 and retro-reflective headgear.

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 be 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.

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.

The State will **assess monetary deductions in the amount of $1000.00 for each Calendar Day or portion thereof,** that the Contractor fails to provide sufficient numbers of light plants as described in this Section S-__. As light plants may be dedicated or otherwise made available to the Project, this assessment will be chargeable even if reasons beyond the control of the Contractor such as breakdowns, late delivery of materials, weather delays, or other unanticipated problems cause the work to be accomplished in non-daylight hours.

**Use (M) when there is a pay item for Workers Present Speed Limit**
(M) **Workers Present Speed Limit**

A “Workers Present Speed Limit” will be required on this project at all times that lane closures are in use and workers are present in the lane adjacent to through traffic. Provide speed limits signs and assemblies in accordance with the “Speed Limits in Work Zone Guidelines.” This publication may be obtained from the Office of Traffic, Safety and Technology, the District Traffic Engineer or at the following website: http://www.dot.state.mn.us/speed/pdf/WZSpeedLimitGuideline.pdf.

Payment for workers present speed limits will be made by the Unit Day as provided in Section S-2563 (WORKERS PRESENT SPEED LIMIT) of these Special Provisions.

**OR**

All costs incurred to provide workers present speed limits shall be incidental.

(N) The Contractor shall provide a Traffic Control Supervisor. Payment and measurement will be made as provided in Section S-2563 (TRAFFIC CONTROL SUPERVISOR) of these Special Provisions.

(O) 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-21.3 **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 60 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/vehiclelighting/vehiclesafetylights.html. The list may also be obtained by contacting:

Vehicle Warning Lights  
Office of Construction MS722  
Transportation Bldg.  
395 John Ireland Blvd.  
St. Paul, MN 55155

OR by calling: (651)366-3585

This list is updated periodically. Warning light suppliers and manufacturers may contact the above for information on adding new products to the list.
A \textbf{S$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-21.4 LANE CLOSURE REQUIREMENTS

\textit{Use only the paragraphs that apply to this Project!}

\textbf{Use for Metro District}

\begin{itemize}
  \item \textbf{(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 2 business days prior to the closure. When a temporary lane closure is used by the Contractor, the closure shall be incidental work.
  
  The Contractor shall contact the Regional Transportation Management Center (RTMC) at 651-234-7093 at the time when a lane freeway closure begins and again at the time when the freeway lane closure ends. The Contractor shall also contact the RTMC at the beginning and end times of full freeway roadway closures.
\end{itemize}

\textbf{Use for all Districts, except Metro}

\begin{itemize}
  \item \textbf{(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.
  
  Choose the appropriate \textbf{(B)}
  
  \textbf{(B)} Temporary lane restrictions will only be allowed as described in 1) and 2) below. If 1) and 2) conflict, the more restrictive condition will apply.

\begin{enumerate}
  \item Work that will restrict or interfere with traffic will not be permitted between the hours of ____ A.M. and ____ A.M. and between the hours of ____ P.M. and ____ P.M. \textbf{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.}
  
  \item Temporary lane closures will be permitted in accordance with the hours and number of lanes allowed as indicated in the Metro Lane Closure Manual, \url{http://www.dot.state.mn.us/metro/trafficeng/lanclosure/index.html}. Lane closures that cross segments as defined in the Manual shall follow the more restrictive limits.
\end{enumerate}

The Engineer will have the right to lengthen, shorten, or otherwise modify the foregoing periods of restrictions as actual traffic conditions may warrant. \textbf{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.}

\textbf{OR}

\begin{itemize}
  \item \textbf{(B)} Work that will restrict or interfere with traffic will not be permitted between the hours of ____ A.M. and ____ A.M. and between the hours of ____ P.M. and ____ P.M. \textbf{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
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.

OR

(B) Temporary lane closures will be permitted in accordance with the hours and number of lanes allowed as indicated in the Metro Lane Closure Manual, [http://www.dot.state.mn.us/metro/trafficeng/laneclosure/index.html](http://www.dot.state.mn.us/metro/trafficeng/laneclosure/index.html). Lane closures that cross segments as defined in the Manual shall follow the more restrictive limits. 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.

OR

(B) Temporary lane closures or other traffic restrictions will only be permitted between the official hours of sunrise and sunset. 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.

OR

(B) The Contractor shall maintain traffic as follows at the locations and times listed below:

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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.

OR

(B) Insert TMC Chart here

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) 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 inplace 3 days or more, shall use the Type III barricade only.

(D) All lane closures shall have Drum (Type B) Channelizers with florescent reflectorized sheeting in the lane closure taper and in any shifts in traffic alignment.

(E) 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.

Optional: Use this paragraph when there will be work performed in areas that have minimal shoulder or median widths and high speeds and volumes.

(F) 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.

OR

When working on the shoulder or median the Contractor shall install the traffic control according to Layout 2 (Work on Shoulder) of the Field Manual. Notes 1 and 2 are deleted on Layout 2.

(G) Temporary lane restrictions and/or closures for removing and/or erecting overhead structures are permitted between the hours of _______ A.M. and _______ A.M. 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 $1500.00 per hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not complied.

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 $1500.00 per hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not complied.

(H) No center lane closures will be permitted. Only double lane closures as shown in the Field Manual will be allowed at the times as directed by the Engineer. This may require night lane closures if traffic volumes warrant.

(I) The Contractor shall maintain a minimum of 1.25 miles [two km] between temporary lane closures, except if allowed by the Engineer.

Need to choose whether flashing arrow panel is incidental or will be paid for under Additional traffic control devices.

(J) **Flashing Arrow Boards**

The Contractor shall provide one vehicle or trailer mounted flashing arrow board for each lane of each work area where traffic is restricted. The arrow board shall meet the requirements of the MN MUTCD, and be on the Temporary Traffic Control Electronic Equipment Approved/Qualified Products List for “Flashing Arrow Boards” found at: http://www.dot.state.mn.us/products/temporarytrafficcontrol/tccontroller/equipment.html. The flashing arrow board shall be equipped with a light that is visible to personnel in the work area to indicate that the unit is in operation. The flashing arrow board shall be incidental.
The Contractor shall provide one vehicle or trailer mounted flashing arrow board for each lane of each work area where traffic is restricted. The arrow board shall meet the requirements of the MN MUTCD, and be on the Temporary Traffic Control Electronic Equipment Approved/Qualified Products List for “Flashing Arrow Boards” found at: http://www.dot.state.mn.us/products/temporarytrafficcontrol/tcelectronicequipment.html. The flashing arrow board shall be equipped with a light that is visible to personnel in the work area to indicate that the unit is in operation. Payment for flashing arrow board will be made by the unit day as provided elsewhere in these Special Provisions.

If the flashing arrow board is incidental delete the last sentence of the following paragraph.

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.

The Flashing Arrow Board shall be stored off the shoulder when not in use, except if allowed by the Engineer. In the event the Engineer allows the arrow board to remain on the shoulder, the arrow board shall be delineated according to Layout 4 (Partial Shoulder Closure) in the Field Manual, as determined by the Engineer.

When not being actively used as a traffic control device, the Flashing Arrow Board 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.

Use (K) when portable changeable message sign is required

(K) Portable Changeable Message Signs

The Contractor will provide a Portable Changeable Message sign (s) on this project to communicate real time information, as shown in the plans or directed by the Engineer.

(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: http://www.dot.state.mn.us/products/temporarytrafficcontrol/tcelectronicequipment.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.

Except as approved by the Engineer, the message sign shall be stored off the shoulder when not in use. In the event the Engineer allows the message board to remain on the shoulder the message sign shall be delineated according to Layout 4 (Partial Shoulder Closure) in the Field Manual, as determined by the Engineer.

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.

Payment for Portable Changeable Message Signs furnished and installed, as directed by the Engineer, will be made for each PCMS by the Unit Day as specified in Section S-2563 (PORTABLE CHANGEABLE MESSAGE SIGN) of these Special Provisions.
All costs incurred to provide Portable Changeable Message Signs shall be incidental.

Choose the appropriate (L).

(L) **Truck/Trailer Mounted Attenuators (TMAs) For All Lane Closures**

If the Contractor establishes a lane closure on a high-speed roadway, a vehicle equipped with a truck/trailer mounted attenuator that meets Test Level 3 requirements of NCHRP 350 (or AASHTO’s Manual for Assessing Safety Hardware (MASH)) shall be placed in the closed lane next to traffic prior to the active work site, as directed by the Engineer. The lane closure shall meet the requirements described in the appropriate Field Manual layout.

**AND/OR**

(L) **Truck/Trailer Mounted Attenuators (TMAs) For Mobile Operations**

If the Contractor establishes any temporary traffic control zone defined as “Mobile” by the Field Manual; Truck/Trailer Mounted Attenuators (TMA) SHALL be used on all work vehicles or equipment operating totally or partially in the traffic lane. All references to “should” in the Field Manual in regards TMA use for Mobile layouts are hereby changed to “shall”. The truck mounted attenuator shall meet the requirements of NCHRP 350 or AASHTO’s Manual for Assessing Safety Hardware (MASH). If on a high-speed roadway, the TMA shall meet Test Level 3 requirements.

1. If any work vehicle, equipment or manual work zone is not equipped with a TMA, a shadow vehicle equipped with a TMA shall be utilized in lieu thereof. The TMA mounted shadow vehicle shall maintain a minimum distance as per manufactures specifications from any operation that is otherwise unprotected by a TMA.

2. This requirement shall apply to all operations utilizing a Mobile work zone; including, but not limited to interim and permanent traffic striping and marking, stripe removal, rumble strip grinding, bituminous core cutting, running of the profilograph, and any other operations meeting the criteria for Mobile operations, as shown in the Field Manual.

Any Truck/Trailer Mounted Attenuators used shall be on the Mobile Crash Attenuator Approved/Qualified Products List for “Truck/Trailer Mounted Attenuators” found at: [http://www.dot.state.mn.us/products/temporarytrafficcontrol/mobilecrashattenuators.html](http://www.dot.state.mn.us/products/temporarytrafficcontrol/mobilecrashattenuators.html)

If any work vehicle, equipment or manual work zone is not equipped with a TMA, a shadow vehicle equipped with a TMA shall be utilized in lieu thereof. The TMA mounted shadow vehicle shall maintain a minimum distance of 200 and maximum distance of 300 feet from any operation that is otherwise unprotected by a TMA.

This requirement shall apply to all operations utilizing a Mobile work zone; including, but not limited to interim and permanent traffic striping and marking, stripe removal, rumble strip grinding, bituminous core cutting, running of the profilograph, and any other operations meeting the criteria for Mobile operations, as shown in the Field Manual.

Payment for Truck Mounted Attenuator (TMAs), as directed by the Engineer, will be made for each Truck/Trailer Mounted Attenuator by the Unit Day as specified in Section **S-2563 (TRUCK/TRAILER MOUNTED IMPACT ATTENUATOR (TMA))** of these Special Provisions.

**S-21.5 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 Flaggers as required to adequately control traffic. Flaggers shall conform to the requirements set forth in the MN MUTCD. Payment for Flaggers will be made by the unit hour for each Flagger as provided elsewhere in these Special Provisions.

OR

(B) The Contractor shall furnish Flaggers as required to adequately control traffic. Flaggers shall conform to the requirements set forth in the MN MUTCD. All costs incurred to provide such Flaggers shall be incidental.

OR

(B) The Contractor shall furnish Flaggers as required to adequately control traffic. Flaggers shall conform to the requirements set forth in the MN MUTCD. Measurement and payment will be made as provided in Section S-2563 (FLAGGER) of these Special Provisions.

(C) The Contractor shall provide two-way radios for Flaggers.

Flaggers 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 Flaggers clothing shall be considered incidental.

The Contractor shall keep the separation distance between the last sign in the “flagger ahead” signing sequence and the actual flagger to the amount shown in the Field Manual, whenever it is practical. The maximum separation distance allowed from the signs to the flagger shall be ½ mile [0.8 km]. The Contractor shall use multiple flagger signing set-ups or continuously move the signing for moving flagging operations to keep within the distance limit. The “flagger ahead” signing sequence shall not be in place when flagging operations are not in effect.

The maximum distance between flaggers shall be ½ mile [0.8 km] unless otherwise authorized by the Engineer. In the event a distance longer than one mile is authorized, the Engineer may order the Contractor to provide two pilot cars at no additional cost to MnDOT.

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-__. 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 ___ 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.

**Use (D) only if it applies to the Project!**

(D) The Contractor shall furnish at least one pilot car and driver for leading traffic through the work zone. Pilot Car operations shall be in accordance with the following:

1. Pilot cars shall be utilized on all two lane roadways.
2. Pilot Vehicles shall:
   (a) Be capable of being turned around quickly in a small area.
   (b) Equipped with lights that meet the requirements of Section S-1404.3 (VEHICLE WARNING LIGHT SPECIFICATION) of this Special Provision.
   (c) Have a standard sign G20-4, “PILOT CAR, FOLLOW ME”, mounted on the rear of the vehicle. Mounting height of sign should be minimum of one foot from the ground.
3. Flaggers shall:
   (a) have portable radio communication with the pilot car.
   (b) not park vehicles at the flagging station.
4. The Contractor shall:
   (a) take necessary precautions to prevent any traffic that enters the highway between Flaggers from going in the opposite direction as the pilot car caravan.
   (b) In no case allow or force traffic onto the shoulders because of their operations without prior approval of the Engineer.
5. The Contractors equipment shall follow in line and use the roadway in a manner similar to all other through traffic during the time of lane, speed, and pilot car restrictions.

**Optional Language:**

6. The Contractor shall:
   (a) Use two pilot cars for night operations, one pilot car for each direction.

(E) The Contractor shall furnish off-duty police officers in uniform with cars and a reflectorized high-visibility safety vest to direct traffic if deemed necessary and so ordered by the Engineer. "Police Officer" means every officer authorized to direct or regulate traffic or to make arrests for violations of traffic rules. Payment for police officers will be made by the unit hour as provided elsewhere in these Special Provisions.

**OR**

(E) The Contractor shall furnish off-duty police officers in uniform with cars and a reflectorized high-visibility safety vest to direct traffic if deemed necessary and so ordered by the Engineer. "Police Officer" means every officer authorized to direct or regulate traffic or to make arrests for violations of traffic rules. No direct payment for police officers will be made; this work shall be incidental.

**Use only the paragraphs in S-.6 that apply to the Project!**

S-21.6 MILLING, SEALCOATING, AND PAVING OPERATIONS

**Use the (A) paragraph that applies to the Project**
(A) Milling and paving operations shall be completed over the full width of all traffic carrying lanes, including turn lanes, bypass, etc., under construction on each day's run.

OR

(A) The Contractor shall schedule milling and bituminous paving operations such that milled areas will be covered with a wear course within 24 hours of completion of the milling, except for delays caused by inclement weather.

OR

(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.

If the Project location has Aggregate shoulders, use the following

(G) The Contractor is directed to Section S-2232 (MILL PAVEMENT SURFACE) of these Special Provisions for additional requirements to maintain shoulders.

Use the (H) paragraph that applies to the Project

(H) The Contractor shall maintain traffic with a minimum of delay during milling and paving operations at intersections controlled by signals or by all-way stop signs. The Contractor shall provide off-duty police officers, at no expense to the Department, to direct and control traffic around and through milling and paving operations at those intersections. "Police officer" means every officer authorized to direct or regulate traffic or to make arrests for violations of traffic rules.

OR

(H) The Contractor shall maintain traffic with a minimum of delay during milling and paving operations at intersections controlled by signals or by all-way stop signs. The Contractor shall provide off-duty police officers to direct and control traffic around and through milling and paving operations at those intersections. "Police officer" means every officer authorized to direct or regulate traffic or to make arrests for violations of traffic rules. Payment for police officers will be made by the unit hour as provided elsewhere in these Special Provisions.
(I) The Contractor may close intersecting streets to traffic, other than at intersections controlled by signals or "All Way Stop" signs during milling and paving operations in the intersection, but only if there are adequate alternate routes for the intersecting street traffic. The Contractor shall not close adjacent intersecting streets to traffic concurrently. The Contractor shall notify the local road authorities of its schedule to close intersecting streets 48 hours in advance of the closure.

Use (J) on seal coating projects

(J) When traffic is allowed to drive on the sealed surface, the Contractor shall furnish and install "LOOSE GRAVEL" and "FRESH OIL" 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.

S-21.7 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.

Use only the paragraphs that apply to this Project!

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

Choose paragraph 1 or 2.

1 The Contractor shall furnish off-duty police officers with cars for directing and controlling traffic during such times as the existing or temporary signal system at each location is out of operation. "Police officer" means every officer authorized to direct or regulate traffic or to make arrests for violations of traffic rules. Off-duty police officers shall be furnished in such numbers as deemed necessary by the Engineer to direct traffic. Payment for police officers will be made by the unit hour as provided elsewhere in these Special Provisions.

2 The Contractor shall furnish off-duty police officers with cars for directing and controlling traffic during such times as the existing or temporary signal system at each location is out of operation. "Police officer" means every officer authorized to direct or regulate traffic or to make arrests for violations of traffic rules. Off-duty police officers shall be furnished in such numbers as deemed necessary by the Engineer to direct traffic. Payment for police officers will be considered incidental.

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-21.8 PORTABLE SIGNAL SYSTEM

The Contractor shall provide two (2) portable signals, to control traffic and all necessary advance signing as directed by the Engineer. The portable signals shall meet the requirements of the MN MUTCD and beyond the Temporary Traffic Control Electronic Equipment Approved/Qualified Products List for “Portable Signal Systems – Trailer Mounted” or “Portable Signal Systems – Pedestal Mounted” found at: [http://www.dot.state.mn.us/products/temporarytrafficcontrol/tcelectronicequipment.html](http://www.dot.state.mn.us/products/temporarytrafficcontrol/tcelectronicequipment.html). Time the signal to cause as little delay as possible to the traveling public, and at no time shall the delay exceed [ ] minutes. The signal timing of each portable traffic signal system will be reviewed by District Traffic Engineering staff.
Payment for the portable signal system will be made for each Portable Traffic Signal by the Unit Day. See Section S-__ (PORTABLE SIGNAL SYSTEM) of these Special Provisions for additional information.

Use only the paragraphs in S-.9 that apply to the Project!

S-21.9 MAINTENANCE AND STAGING OF TRAFFIC CONTROL

(A) The Contractor shall maintain, at all times, the existing traffic movements at the following intersections: __________; __________; and __________.

(B) Pedestrian traffic shall be maintained and guided through the Project at all times. See Section S-2563 (ALTERNATE PEDESTRIAN ROUTE) of these Special Provisions.

(C) and (D) apply ONLY if there is not a tab in the Plan - fill in the # of signs

(C) On the day operations on the road begin, the Contractor shall provide ______ G20-1 "ROAD WORK NEXT ____ MILES" signs and ____ G20-2A "END ROAD WORK" signs to be placed, as directed by the Engineer. These signs will be placed at the end(s) of the Project. Payment for these signs shall be included in the lump sum payment for traffic control.

(D) The Contractor shall furnish, install, and maintain ____ "ROAD WORK AHEAD" and ____ "END ROAD WORK" signs in advance of and beyond each end of the construction limits as directed by the Engineer. The Contractor shall also furnish, install, and maintain ____ "ROAD WORK AHEAD" signs in advance of the construction limits on all intersecting roads and streets as directed by the Engineer. The signs shall conform to the standards shown in the MN MUTCD. Furnishing and erecting these signs shall be incidental. The signs shall remain the property of the Contractor.

(E) The Contractor shall cover all signs that 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. Bolt the cover to the sign and place a minimum of 1/8 inch spacers (such as plastic or rubber) between the sign face and the cover. See the Typical Temporary Sign Framing and Installation Details Sheet found in the Plan or at http://www.dot.state.mn.us/trafficeng/workzone/wz-templets/pdf/layout%2020.pdf for details. This work will be done as required by the Engineer.

(F) 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.

(G) The Contractor shall maintain a lane width of not less than ____ feet in each direction. In no case shall traffic be allowed or forced onto the shoulders as a result of the Contractor's operations without prior approval of the Engineer.

During the time of lane, speed, and pilot car restrictions, the Contractor’s equipment shall follow in line and use the roadway in a manner similar to all other through traffic.

(H) 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 __________, phone number __________ at least 24 hours prior to posting any parking ban within the City.

(I) The Contractor shall keep the Right-of-Way fence closed up, except during work hours, by means of the in place fence, newly constructed fence, temporary fence (at the Contractor's expense), or a combination thereof.
(J) 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.

(K) 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.

S-21.10 MEASUREMENT AND PAYMENT

Choose one of the following:

All traffic control required under this Contract shall be performed as incidental work.

OR

No measurement will be made of the various Items that constitute Traffic Control but all such work will be construed to be included in the single Lump Sum payment under Item 2563.601 (Traffic Control).

OR

Traffic control will be measured and paid for as follows:

No measurement will be made of the various items that constitute Traffic Control, but all such work shall be construed to be included in the lump sum payment under Item 2563.601 (Traffic Control). The lump sum payment shall be compensation in full for all costs of furnishing, installing, maintaining and removing the individual traffic control devices except for items as listed in the Traffic Control Plan.

OR

Traffic Control will be measured and paid for as follows:

Payment for furnishing, installing, maintaining, relocating and subsequently removing traffic control devices (including flaggers) as required will be made as a lump sum under Item 2563.601 (Traffic Control) and according to the following schedule:

(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.

OR

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.

**OR**

Traffic Control will be measured and paid for as follows:

Lump Sum Traffic Control under Item(s) 2563.601 (Traffic Control).

The lump sum payment(s) shall be compensation in full for all costs of furnishing, installing, maintaining, relocating, and removing the individual traffic control devices as shown on the Traffic Control Layouts in the Plans and/or as specified in these Special Provisions. The lump sum shall also include any extra signing needed to facilitate traffic switches or for transitioning traffic from one stage to another.

If the Contractor requests changes in traffic control as shown on the Traffic Control Layout(s), and these changes are implemented, there will be no increase or decrease in the lump sum payment(s) for the stage(s) of traffic control.

Partial payments for lump sum Item 2563.601 (Traffic Control) will be made as follows:

1. When all traffic control devices for an individual stage, as shown on the Traffic Control Layouts, have been installed, 75% of the Contract Unit Price for that stage will be paid.
2. When all work in an individual stage and all traffic control devices for that stage are removed, the remaining 25% of the Contract Unit Price for that stage will be paid.
Use S-.11 for all Projects. The items shown below are in addition to what is covered by the traffic control pay item. Therefore nothing needs to be deleted from S-.12. (For example, if flaggers are incidental they should still be left in S-.12. The flaggers listed in S-.12 are in addition to the flaggers covered by the traffic control pay item.)

S-21.11 ADDITIONAL TRAFFIC CONTROL DEVICES AND EXTENDED USE OF TRAFFIC CONTROL DEVICES

The Engineer may require extra traffic control devices in addition to the traffic control devices shown on the plan Traffic Control Layouts, or in the Field Manual, as warranted by traffic conditions. The Department will pay for extra traffic control devices ordered under this section according the schedule of predetermined prices in Table 2563-1. The Department will also use the predetermined prices in Table 2563-1 to pay for (1) additional temporary lane closures for Extra Work; and (2) extended use for all traffic control devices which are impacted by excusable and compensable delays, as defined in MnDOT 1806.2B.

The Department will not use the predetermined unit prices listed in Table 2563-1 if payment for a device is specifically provided for elsewhere in the Contract.

(A) General Requirements:
The Contractor must furnish the additional traffic control devices as ordered by the Engineer.

The devices installed must meet contract requirements and be in a functional and legible condition as determined in the sole discretion of the Engineer. Devices not meeting these requirements must be immediately replaced or repaired.

(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.

Driven post supports and all mounting hardware for 48 inch x 48 inch signs [1220 X 1220 mm] and Standard Signs are considered incidental.

Standard Signs, 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.

Standard Signs with Portable Supports will be calculated and paid for as follows: Total Standard Sign Sq. Ft + Portable Support Cost (listed in Table 2563-1) = Standard Signs with Portable Supports Cost per day.

Construction Signs - Special will be measured by the sign face area thereof furnished, installed including supports, and removed as specified.

Temporary Molded Plastic Barrier and Temporary Concrete Barrier will be measured by the number of linear feet furnished multiplied by the number of Calendar Days each linear foot the barrier is in service.

Flaggers and Police Officers will be measured by the number of hours each is in service on the job. Police Officers shall be equipped with a patrol vehicle at all times on the job.

(C) Payment:
For contracts without a sub-contract agreement for traffic control services; reasonable invoices may be accepted for additional traffic control devices obtained. The reasonableness of the invoice for additional traffic control is subject to audit in accordance with MnDOT 1721.
Total compensation for Additional Traffic Control Devices and the Extended Use of Traffic Control Devices will have a maximum payout allowance based on average lifespan as determined by the department.

The following devices will have a 180 Day maximum pay out allowance: Reflectorized Cones/Weighted Channelizer Devices, Surface Mounted/Weighted Delineators, Opposing Traffic Lane Divider, Reflectorized Safety Drum, Reflectorized Safety Drum w/Down Arrow, Flasher Type A (Low Intensity), Flasher Type B (High Intensity) and Flasher Type C (Steady Burn).

The following devices will have a 365 Day maximum pay out allowance: Type I Barricade, Type II Barricade, Direction Indicator Barricade, Type III Barricade, 48 X 48 Inch [1220 x 1220 mm] Standard Sign, 48 X 48 Inch [1220 x 1220 mm] Standard Sign w/Portable Supports, Standard Signs, Standard Signs w/Portable Supports, Standard Signs Portable Support Cost per day, Construction Sign - Special, Temporary Plastic Molded Barrier and Temporary Concrete Barrier Energy Absorption End Treatment System.

The following devices have a maximum pay out allowance five years or greater: Temporary Concrete Barrier, Portable Changeable Message Board, Flashing Arrow Board and Portable Radar Trailer.

(C.1) Devices, Flagger and Police Officers:
Payment for all additional traffic control devices, Flaggers and police officers, as ordered by the Engineer, will be made in accordance with the following schedule:

Table 2563-1 ADDITIONAL TRAFFIC CONTROL DEVICES, FLAGGERS and POLICE OFFICERS

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Item</th>
<th>Unit</th>
<th>Pre-determined Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2563.610</td>
<td>Flagger</td>
<td>Hour</td>
<td>* 1</td>
</tr>
<tr>
<td>2563.610</td>
<td>Police Officer</td>
<td>Hour</td>
<td>* 2</td>
</tr>
<tr>
<td>2563.613</td>
<td>Reflectorized Cones/Weighted Channelizer Devices</td>
<td>Each/Day</td>
<td>$0.13</td>
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<td>2563.613</td>
<td>Surface Mounted/Weighted Delineators</td>
<td>Each/Day</td>
<td>$0.22</td>
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<tr>
<td>2563.613</td>
<td>Opposing Traffic Lane Divider</td>
<td>Each/Day</td>
<td>$1.26</td>
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<td>2563.613</td>
<td>Type I Barricade</td>
<td>Each/Day</td>
<td>$0.29</td>
</tr>
<tr>
<td>2563.613</td>
<td>Type II Barricade</td>
<td>Each/Day</td>
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</tr>
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<td>2563.613</td>
<td>Direction Indicator Barricade</td>
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<td>2563.613</td>
<td>Type III Barricade</td>
<td>Each/Day</td>
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<td>2563.613</td>
<td>Reflectorized Safety Drum</td>
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<td>Reflectorized Safety Drum w/Down Arrow</td>
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<td>2563.613</td>
<td>Flasher Type A (Low Intensity)</td>
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<td>2563.613</td>
<td>Flasher Type B (High Intensity)</td>
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<td>2563.613</td>
<td>Flasher Type C (Steady Burn)</td>
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<td>48 X 48 Inch [1220 x 1220 mm] Standard Sign</td>
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<td>48 X 48 Inch [1220 x 1220 mm] Standard Sign w/Port. Sup.</td>
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<td>2563.613</td>
<td>Roll up Sign W/Stand</td>
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<td>2563.617</td>
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<td></td>
<td>Standard Sign Portable Support Cost per day</td>
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**Special Provisions - SP2016 Book**

▲ DO NOT DELETE THE ABOVE REVISION DATE. This is how we tell which version of the SP2016 book you used when preparing your specs for your job.  

S.P. Number of Your Job goes here

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Item</th>
<th>Unit</th>
<th>Pre-determined Price</th>
</tr>
</thead>
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<td>Linear Foot/Day</td>
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<td>Portable Changeable Message Board * 3</td>
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<td>2563.613</td>
<td>Flashing Arrow Board * 4</td>
<td>Each/Day</td>
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<td>2563.613</td>
<td>Portable Radar Trailer * 4</td>
<td>Each/Day</td>
<td>$21.36</td>
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</table>

*1 Will be paid in accordance with MnDOT 1904.4A.

*2 Will be paid at the invoice price plus 10%.

*3 (PCMS) Type C Trailer Mounted Message Signs will be permitted. The Contractor shall continually operate each PCMS at maximum legibility.

*4 The Contractor shall continually operate each Flashing Arrow Board or Portable Radar Trailer at maximum legibility.

*5 Construction Signs – Special includes fabrication, installation, supports and removal as specified. Construction Signs - Special are not eligible for additional compensation due to extended use as described in Sections C.2 “Labor” and C.3 “Equipment” listed below.

(C.2) Labor:  
Payment for labor to furnish, install, and remove additional traffic control devices listed in Table 2563-1 as set forth in C.1 “Devices, Flagger and Police Officers”, will be in accordance with 1904.3(4) or 1904.4A.

Payment for labor to inspect and maintain additional traffic control devices will be incidental to the 2563.601 (Traffic Control) Item already contained in the Plan during the original contract period, unless a contract revision meets the requirements listed in MnDOT 1402.3.

Payment for labor to inspect and maintain all traffic control devices, when an extension of contract time is due to an excusable and compensable delay in accordance with MnDOT 1806.2B, will be in accordance with MnDOT 1904.3(4) or 1904.4A.

(C.3) Equipment:  
Payment for equipment to furnish, install, and remove additional traffic control devices listed in Table 2563-1 as set forth in C.1 “Devices, Flagger and Police Officers”, shall be in accordance with MnDOT 1904.3(4) or 1904.4C.

Payment for equipment to inspect and maintain additional traffic control devices will be incidental to the 2563.601 (Traffic Control) Item already contained in the Plan during the original contract period, unless a contract revision meets the requirements listed in MnDOT 1402.3.

Payment for equipment to inspect and maintain all traffic control devices, when an extension of contract time is due to an excusable and compensable delay in accordance with MnDOT 1806.2B, will be in accordance with MnDOT 1904.3(4) or 1904.4C.

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**S-22**

(1505) **COOPERATION BY CONTRACTORS**

The provisions of MnDOT 1505 are supplemented as follows:

S-22.1 A separate contract for ☐☐☐☐☐ is currently in progress near this Project.
S-22.2 The State plans to call for bids on additional contract(s) for _________. That contract work will be performed concurrently with the work under this Contract.

S-22.3 The City of ____________ has taken bids on the following project:

S-22.4 The Contractor shall coordinate work and cooperate with the holders of those current and future separate contracts, as required by MnDOT 1505.

S-23 (1505) COOPERATION BY CONTRACTORS (BRIDGE)
Use the following when a bridge assessment report has been prepared for a project and it indicates over 160 sq. ft. or 260 linear feet or 35 cubic feet of asbestos containing material on the bridge.

SP2016-20 The provisions of MnDOT 1505 are supplemented as follows:

S-23.1 The Department will oversee asbestos and regulated waste removal on this Project. A separate contractor working for the Department will perform this oversight. The Contractor must provide access to the work site for the oversight contractor as needed.

S-24 (1507) UTILITY PROPERTY AND SERVICE

SP2016-21 Contractor shall perform construction operations near utility properties in accordance with the provisions of MnDOT 1507, except as modified below:

S-24.1 Add the following to MnDOT 1507.2:

(3) The Contractor shall acquire a Positive Response confirmation from MnDOT for all proposed excavations when the Gopher State One Call has indicated that proposed excavations may affect MnDOT utilities. The Contractor may call MnDOT Electrical Services Section (ESS) Dispatch Locating to confirm the status of MnDOT owned Utility infrastructure. Contractor can contact MnDOT Electrical Services Section (ESS) Dispatch Locating at (651) 366-5750 or (651) 366-5751. The Contractor shall be responsible for all damage to MnDOT owned Utility infrastructure if the Contractor did not acquire a Positive Response confirmation from MnDOT.

S-24.2 Any work performed by the Contractor that does not comply with MnDOT 1507.2 may be considered Unauthorized Work in accordance with MnDOT 1512.2.

S-24.3 All utilities related to this Project are classified as "Level D," 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-24.4 The bidder agrees that it shall use the Plan to identify the location of MnDOT storm water drainage facilities in order to meet the requirements of Minnesota Statutes Ch. 216D and Minnesota Rules 7560.0250 which apply to MnDOT storm water drainage facilities.

S-24.5 The following utility owners have existing facilities which the work under this Contract may affect. Where necessary, the utility owners intend to relocate or adjust the facilities in advance of or concurrently with the Contractor's operations.
The utility owner contact list, provides current contacts for the utilities. See the utility owner contact link at http://www.dot.state.mn.us/utility/contacts.html.

OR

S-24.6 The following utility owners have existing facilities in the area of construction. The work under this contract will not affect these facilities. The utility owners listed below are for informational purposes only.

The utility owner contact list, provides current contacts for the utilities. See the utility owner contact link at http://www.dot.state.mn.us/utility/contacts.html.

Use the following paragraph when needed

S-24.7 The work under this Contract will affect The City of ___________ utilities such as storm sewer, sanitary sewer, and water supply. Those affected utilities are included in the Plan for adjustment or relocation. The Contractor shall notify ___________, City Engineer at telephone __________, before the date the Contractor intends to start work. The Contractor shall give that office any information necessary for the responsible authorities to make suitable arrangements.

S-25 (1508) CONSTRUCTION STAKES, LINES, AND GRADES

Only one 1508 writeup should be used when needed. They conflict with each other so be careful if you are using two of them together. DO NOT SEND THEM ALL IN. Do not use any 1508 writeup when have the pay item 2011.601 Construction Surveying on the plan. Instead use either SP2016-54 ((2011) CONSTRUCTION SURVEYING) or SP2016-54.1 ((2011) CONSTRUCTION SURVEYING (METRO)).

SP2016-22

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

S-25.1 The following is added to the first paragraph of MnDOT 1508:

The Contractor must submit a priority list for staking to the Engineer at the Pre-construction Conference and will be required to inform the Engineer a minimum of 36 hours before any deviation from that list or the need for any additional staking.

The State will furnish lath for all control points and Right of Way hubs established before construction staking.

The Contractor shall furnish lath for any construction stakes the Contractor wants protected. The Engineer will place the lath at the time of construction staking. Only if there is a change in the Plan length will subcuts be staked.

Bridge staking will be in accordance with the standards shown in the manuals.

The Engineer will set the following construction stakes:

(A) Centerline alignment (if needed for construction).

(B) One set of slope points on each side.

(C) Blue tops at 100 foot [30 m] intervals on the Right of Way line for each side.
S-25.2 The following is added to the fourth paragraph of MnDOT 1508:

The cost of replacing stakes and marks will be based on the actual number of hours of field and office work in accordance with the following wage and equipment rates:

<table>
<thead>
<tr>
<th>Rate Description</th>
<th>Hourly Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer or Land Surveyor</td>
<td>$80 per hour</td>
</tr>
<tr>
<td>4-person crew</td>
<td>$240 per hour</td>
</tr>
<tr>
<td>3-person crew</td>
<td>$180 per hour</td>
</tr>
<tr>
<td>2-person crew</td>
<td>$125 per hour</td>
</tr>
<tr>
<td>1-person crew</td>
<td>$75 per hour</td>
</tr>
</tbody>
</table>

S-26 (1508) CONSTRUCTION STAKES, LINES, AND GRADES

Only one 1508 writeup should be used when needed. They conflict with each other so be careful if you are using two of them together. DO NOT SEND THEM ALL IN. Do not use any 1508 writeup when have the pay item 2011.601 Construction Surveying on the plan. Instead use either SP2016-54 (2011) CONSTRUCTION SURVEYING or SP2016-54.1 (2011) CONSTRUCTION SURVEYING (METRO).

SP2016-23

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

S-26.1 The following is added to the first paragraph of MnDOT 1508:

The Contractor must provide a prioritized written list of Project staking segments for construction staking by the Engineer. Each segment must not exceed 1/2 mile (0.8 km) in length. The Contractor must provide the list at the pre-construction conference. The Engineer will schedule staking according to the priority list as work progresses. When the Contractor requests a change in priority, the Contractor must provide at least 36 hours advance notice to the Engineer, excluding non-work days, to allow the Engineer to remobilize a survey crew to the revised priority staking segment.

The Engineer will mark all alignment and elevation control points with Department-furnished lath. The Department will furnish all survey stakes and hubs. However, the Contractor must furnish lath for any additional construction stakes where the Contractor desires increased visibility. The Engineer will place the Contractor's lath at the time of construction staking.

S-26.2 The following is added to the third paragraph of MnDOT 1508:

The Department will provide necessary staking for construction and inspection purposes to the following extent:

(A) Centerline alignment, where needed for additional construction staking. The Department will not replace centerline alignment except as necessary for replacing of other construction stakes.
(B) Reference hubs (bluetops) at approximate 100 foot [30 m] intervals at a measured distance either side of centerline, including cut or fill instructions for roadbed centerline and planned ditch grades.

(C) Line and grade stakes for pipe culvert, storm drain, and tile drainage work at the pipe ends, at each structure, at any break in flow line grade or alignment, and at intervals along the pipe no less than 50 feet [15 m] apart.

(D) One set of subgrade bluetops, either on each subgrade shoulder or at centerline, depending on the Contractor’s preferred option. The bluetops will be placed at 100 foot [30 m] intervals on tangent sections or curves flatter than 20 degrees, and at approximate 50 foot [15 m] intervals on curves of 2 degrees and sharper.

(E) Where gravel base and/or surfacing is a part of the work, one additional set of bluetops placed as in D above, for either the top of the base or for the surfacing, depending on the Contractor’s preferred option.

S-27  (1508) CONSTRUCTION STAKES, LINES, AND GRADES
Only one 1508 writeup should be used when needed. They conflict with each other so be careful if you are using two of them together. DO NOT SEND THEM ALL IN. Do not use any 1508 writeup when have the pay item 2011.601 Construction Surveying on the plan. Instead use either SP2016-54 ((2011) CONSTRUCTION SURVEYING) or SP2016-54.1 ((2011) CONSTRUCTION SURVEYING (METRO)).

SP2016-24

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

S-27.1

The following is added to the first paragraph of MnDOT 1508:

The Engineer will set no construction stakes except for station stakes at 300 foot [90 m] intervals. The Engineer may run levels and provide locations and depths of leveling course as the Engineer deems necessary. The Engineer will locate subgrade repair sections for planned corrections.

S-28  (1508) CONSTRUCTION STAKES, LINES, AND GRADES
Only one 1508 writeup should be used when needed. They conflict with each other so be careful if you are using two of them together. DO NOT SEND THEM ALL IN. Do not use any 1508 writeup when have the pay item 2011.601 Construction Surveying on the plan. Instead use either SP2016-54 ((2011) CONSTRUCTION SURVEYING) or SP2016-54.1 ((2011) CONSTRUCTION SURVEYING (METRO)).

SP2016-25

The following is added to the first paragraph of MnDOT 1508:

The Engineer will set no stakes for construction in areas where shoulder grading and base construction may be referenced to the in place surfacing. In locations where the entire roadbed will be reconstructed for a distance of 200 feet [60 m] or more, the Engineer will set stakes as the Engineer deems necessary and will also set bluetops at either the grading shoulders or centerline (Contractor's option). The Engineer will provide construction staking for all culvert extensions and changed ditch grades on the Project in accordance with paragraph 3.
S-29  **(1508) CONSTRUCTION STAKES, LINES, AND GRADES**

Only one 1508 writeup should be used when needed. They conflict with each other so be careful if you are using two of them together. **DO NOT SEND THEM ALL IN. Do not use any 1508 writeup when have the pay item 2011.601 Construction Surveying on the plan. Instead use either SP2016-54 ((2011) CONSTRUCTION SURVEYING) or SP2016-54.1 ((2011) CONSTRUCTION SURVEYING (METRO)).**

SP2016-26

The provisions of MnDOT1508 are hereby modified and supplemented as follows:

Bridge construction staking will be as described in MnDOT 1508, except that the Engineer will provide offset points and the Contractor will be required to re-establish all working points needed during construction from these offset points. The Engineer will furnish a bench mark in the vicinity of this substructure. The Contractor will be responsible for establishing required grade points from the bench mark. The Contractor must assume full responsibility for all measurements made by the Contractor from the stakes and marks so established.

S-30  **(1514) MAINTENANCE DURING CONSTRUCTION**

*Use on all jobs.*

SP2016-27

The provisions of MnDOT 1514 are supplemented with the following:

In addition to the requirements under MnDOT 2051 (Maintenance and Restoration of Haul Roads), the Engineer may require additional sweeping of roads adjacent to the construction site to ensure safety for the traveling public, protect the environment, uphold local requirements, or as otherwise directed by the Engineer.

Payment for additional sweeping ordered by the Engineer is 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-31  **(1601) SOURCE OF SUPPLY AND QUALITY**

*Use for FEDERALLY Funded Jobs*

REVISED 06/03/16 **DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.**

SP2016-28

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.** The Contractor may use one of the following means to submit their stipulation:
1. Submit the stipulation form within the proposal.
2. If the Contractor submits a "Two Way Electronic Bid" as described in MnDOT 1206, the completed chart must be submitted to MnDOT prior to the bid opening and no later than 9:30 A.M. on the day of the bid opening.
   a) E-Mail the form to biddocsubmital.dot@state.mn.us; place the State Project number in the subject line
   b) Mail or otherwise deliver the stipulation to Nancy Boeve, 395 John Ireland Boulevard, M.S. 650, St. Paul, MN 55155.

The "Stipulation for Foreign Iron or Steel Materials" form is attached or can be found on the MnDOT Web site: http://www.dot.state.mn.us/bidlet/forms.html.

Prior to performing 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-32  (1602) NATURAL MATERIAL SOURCES

Use on most jobs for all Districts. DISTRICT TO SUPPLY PRICES OF MATERIAL FROM PITS. District also needs to contact Cultural Resources Unit (culturalresources.dot@state.mn.us) for SHPO confirmation of pits. Special Provisions Unit will request aggregate source pit sheets and leases from Terry Beaudry at Office of Materials. Always use SP2016-34 (LAWS TO BE OBSERVED (CULTURAL RESOURCES – FEDERALLY FUNDED)) or SP2016-35 (LAWS TO BE OBSERVED (CULTURAL RESOURCES – STATE FUNDED)) with this write-up.

SP2016-29

The provisions of MnDOT 1602 are supplemented with the following:

S-32.1 The expansion of any existing natural material sources, or the creation of new Natural Material Sources, will be subject to the requirements of the Farmland Protection Act of 1981 (FPFA or the ACT). Coordination to comply with FPFA shall be the responsibility of the Contractor. Contact the Natural Resources Conservation Service (NRCS) office for the county in which the source is located for further information.

!!!!!!! If the Plan includes pits then include S-.2 through S-.4 & either S-.5 or S-.6!!!!!!!

S-32.2 Materials may be obtained for use throughout the Contract from the sources listed below at the appropriate price. The Contractor shall obtain required licenses and permits, and pay all applicable fees or sales/user taxes to the proper Federal, State, or Local Agency. (See MnDOT 1702, Permits, Licenses, and Taxes.) The quoted price does not include the sales tax or any other taxes.
The prefix "M" before a pit number indicates ownership of the pit by the Department. A prefix "NE" before a pit number indicates non-exclusive lease with a private owner.

<table>
<thead>
<tr>
<th>Price of Material Used From Source for the Production of Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1, 3, 4, 5, or 6 Aggregate</td>
</tr>
<tr>
<td>Bituminous Aggregate (-4 and +4, combined)</td>
</tr>
<tr>
<td>Aggregate Bedding</td>
</tr>
<tr>
<td>Aggregate Backfill</td>
</tr>
<tr>
<td>Stabilizing Aggregate</td>
</tr>
<tr>
<td>Coarse Filter Aggregate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pit No.</th>
<th>EXPIRATION DATE OF LEASE</th>
<th>PRICE PER CY. YD. (E.V.)</th>
<th>PRICE PER CU. YD. (C.V.)</th>
<th>PRICE PER CY. YD. (L.V.)</th>
<th>PRICE PER TON</th>
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<table>
<thead>
<tr>
<th>“Sand Price” for Material Used From Source for a Granular Product</th>
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</thead>
<tbody>
<tr>
<td>Select Granular Borrow</td>
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<tr>
<td>Granular Borrow</td>
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<tr>
<td>Granular Bedding</td>
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<tr>
<td>Fine Filter Aggregate</td>
</tr>
<tr>
<td>Sand Cover</td>
</tr>
<tr>
<td>-#4 Bituminous Sand</td>
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<tr>
<td>-#4 Concrete Sand</td>
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</tbody>
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<tr>
<th>Pit No.</th>
<th>EXPIRATION DATE OF LEASE</th>
<th>PRICE PER CY. YD. (E.V.)</th>
<th>PRICE PER CU. YD. (C.V.)</th>
<th>PRICE PER CY. YD. (L.V.)</th>
<th>PRICE PER TON</th>
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<tr>
<th>“Rock Price” for Material Used From Source for:</th>
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<tr>
<td>Riprap</td>
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<tr>
<th>Pit No.</th>
<th>EXPIRATION DATE OF LEASE</th>
<th>PRICE PER CY. YD. (E.V.)</th>
<th>PRICE PER CU. YD. (C.V.)</th>
<th>PRICE PER CY. YD. (L.V.)</th>
<th>PRICE PER TON</th>
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</tbody>
</table>
“Rock Price” for Material Used From Source to Produce an Aggregate Product

<table>
<thead>
<tr>
<th>Pit No.</th>
<th>EXP I RATIO N DATE OF LEASE</th>
<th>PRICE PER CY. YD. (E.V.)</th>
<th>PRICE PER CU. YD. (C.V.)</th>
<th>PRICE PER CY. YD. (L.V.)</th>
<th>PRICE PER TON</th>
</tr>
</thead>
</table>

S-32.3 The Department’s Charge for material from a leased source will be direct payment, by the Contractor, to the owner of leased source, upon furnishing the Contractor with statements showing the quantities to date and the amount due. Full reimbursement will be required before final payment is made on the Contract.

S-32.4 The Department’s Charge for material from a Department owned source will be deducted from the moneys due on partial and final estimates, upon furnishing the Contractor with statements showing the quantities to date and the amount due. Full reimbursement will be required before final payment is made on the Contract. Upon conclusion of the Contract, any processed or unprocessed material not used shall become the property of the Department.

Use S-.5 for all Districts except District 3 when have pits.

S-32.5 Charges for material from a Department owned or leased source will be based on the actual quantities hauled from the source, less any water and other materials added from outside sources prior to weighing.

Use S-.6 for District 3 ONLY when have pits.

S-32.6 Charges for material from a Department owned or leased source will be based on the actual amount of material excavated from the source excluding stripping or the removal of overburden.

S-33 (1606) STORAGE OF MATERIALS
Use when requested by District. This can be used by the District when there is excavation.

SP2016-30

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

S-33.1 If the Contractor elects to crush excavated materials within the Project Limits, the quantity of crushed material will be limited to only the quantity required for this Project. Do not crush materials other than those found within the Project Limits, unless approved in writing by the Engineer. The Contractor may not remove crushed material from the Project Limits, unless approved in writing by the Engineer.

S-34 (1701) LAWS TO BE OBSERVED (WET LANDS)
Use when material will be hauled from or brought to the construction site.

SP2016-31

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

S-34.1 If the Contractor operations involve the excavation and/or disposal of material off MnDOT 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-35 (1701) LAWS TO BE OBSERVED (BUILDING REMOVALS OR MOVES)
Use on building removals or when buildings are being moved.

SP2016-32

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

S-35.1 SANITARY PROVISIONS

The Contractor must comply with lawful directives of the governing municipality's Health Department ("Health Department"). When applicable, the Contractor shall effectively exterminate rodents and other pests on properties before commencing demolition work. Rodent extermination is incidental to demolition and removal work:

(A) Rodenticide
   The Contractor shall use a rodenticide that will ensure a fast kill with the first baiting of the structure. The Contractor shall use rodenticide properly and safely in accordance with manufacturer's directions and all applicable laws, ordinances, and regulations.

(B) Location of Bait Stations
   Contractor must establish a sufficient number of bait stations throughout each structure, as determined by the Health Department. Bait station locations must include the basement and sub-basements, areaways, and any sheds or shelters on the site. Select bait station locations to ensure a high percentage of kill on the first application.

(C) Type of Bait Stations
   Bait must be placed under covered bait stations which are secured to the structure or properly weighted when used in sheds or shelters on the site. Bait placed within the structure usually will not require additional safeguards, but the Contractor must use all reasonable precautions in each structure. Where possible, the Contractor shall toenail, bar or lock entrance doors to these structures to minimize the danger to children. An exterminating sign is required for each structure as specified by the Health Department.

(D) Time of Baiting
   Place the bait in each building three calendar days prior to the date that the building is to be demolished. Check all baiting stations within the three-day period of baiting, or as required by the Health Department.

(E) Rodent Pickups
   The Contractor shall pick up all dead rodents at the end of the three-day baiting period and before commencing demolition. The Contractor must dispose of all dead rodents in accordance with all applicable laws and regulations.
(F) **Bait Pickup**
The Contractor must remove all bait and bait stations before demolishing a structure. Handle all bait and bait stations in a manner designed to eliminate hazards to humans or animals. Comply with any additional precautionary measures requested by the Health Department. Dispose of all waste bait in accordance with applicable laws and regulations.

(G) **Inspection**
The Contractor must give the Engineer written notice of each property undergoing treatment. The Contractor must give the written notice at least 24 hours before beginning the actual work, and the notice must include the date the exterminating work will begin. The Contractor must provide access to structure during the baiting period for authorized officials of the Health Department. The Contractor must consult with the Health Department and other applicable local officials during the baiting operations if the Contractor or a local official finds that rodents are not being effectively exterminated.

S-35.2 The Contractor shall use MnDOT-approved companies for testing, waste transport and disposal of asbestos and regulated wastes, as provided in MnDOT's manual "Asbestos and Regulated Waste Manual For Structure Demolition Or Relocations for Construction Projects". The manual is available on the following website: [http://www.dot.state.mn.us/environment/buildingbridge/index.html](http://www.dot.state.mn.us/environment/buildingbridge/index.html). Contact Mark Vogel at 651.366.3630 or Jackie Klein at 651.366.3637, Office of Environmental Stewardship, with any questions regarding the manual.

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-35.3 The Contractor shall:

(A) All work must comply with applicable federal and state regulations.

(B) Provide the Minnesota Pollution Control Agency (MPCA) and the Engineer written notice of intent to demolish or move a structure - see form "Notification of Intent to Perform a Demolition" at [http://www.pca.state.mn.us/publications/w-sw4-21.pdf](http://www.pca.state.mn.us/publications/w-sw4-21.pdf). Provide such notice to the MPCA and the Engineer at least 10 working days before any move or demolition.

(C) In addition to (A) and (B), if the buildings contain any asbestos, the Contractor shall:

1. Use a MnDOT-approved oversight contractor to oversee the work of the MnDOT-approved asbestos abatement contractor.
2. If there is over 160 sq ft, 260 linear ft, or 35 cu ft of asbestos on the premises, submit "Notification of Asbestos Related Work", to the MPCA and the MN Department of Health. Submit notice at least 10 working days before commencing abatement activities. The Contractor shall submit a copy of the completed notification to the Engineer at the same time.
3. Submit all required documentation to the MPCA and the MN Department of Health, and copy the Engineer on all submittals. Information on MPCA requirements 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 Department of Health requirements can be found at [http://www.health.state.mn.us/divs/eh/asbestos/index.html](http://www.health.state.mn.us/divs/eh/asbestos/index.html).
4. Comply with all applicable USDOT packaging and transportation requirements when transporting asbestos-containing waste. 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](http://www.dot.state.mn.us/environment/buildingbridge/disposal.html).
(5) Dispose of all asbestos-containing waste in an MPCA-permitted mixed municipal solid waste or Industrial landfill, or a landfill permitted to accept asbestos-containing waste as listed under Landfills/Regulated Waste at http://www.dot.state.mn.us/environment/buildingbridge/index.html under Approved Contractors. Do not dispose of asbestos-containing waste in demolition debris landfills.

(6) Ensure that the oversight contractor provides the Engineer with a final report meeting the requirements contained in MnDOT's manual "Asbestos and Regulated Waste Manual for Structure Demolition or Relocations for Construction Projects". The manual is available on the following website: http://www.dot.state.mn.us/environment/buildingbridge/index.html.

(7) Notify the Engineer immediately if, while removing or renovating a utility facility or bridge, the Contractor encounters additional asbestos materials or regulated wastes, other than that noted in the Assessment Summary. The Engineer may suspend work in accordance with MnDOT 1501. Abatement of the additional asbestos materials or regulated wastes will be paid for as Extra Work in accordance with MnDOT 1402.5.


S-35.4 The Contractor shall comply with all applicable MnDOT policies and all applicable laws, rules, and regulations governing removing and recycling/disposing of any regulated wastes including, but not limited to: (see manual for procedures and approved contractors/end sites)

1. Chlorofluorocarbons (CFC’s):
   The Contractor shall use persons certified through 40 CFR pt 82 subp. F to evacuate CFC containing equipment that are affixed to the structure (central air conditioning, heat pumps etc.). After the evacuation of all CFC’s in the equipment the Contractor shall furnish the Engineer with a MPCA Verification of Refrigerant Removal form: (http://www.pca.state.mn.us/air/pubs/veriffrm.pdf). Unattached equipment can be processed on site as above or sent to a MnDOT approved end site.

2. Polychloronatedbiphenols (PCB’s)

3. Mercury

4. Lead

5. Other Regulated/Hazardous Waste

6. Solid Wastes

When shipping any of these wastes, the Contractor must 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-35.5 FAILURE TO COMPLY WITH THE NOTIFICATION PROVISIONS IN THIS SECTION WILL BE DEEMED A MATERIAL BREACH OF CONTRACT. IF A REGULATORY AGENCY IMPOSES MONETARY SANCTIONS ON MnDOT THAT ARE BASED, IN WHOLE OR IN PART, UPON THE ACTS OR OMISSIONS OF THE CONTRACTOR, THE CONTRACTOR AGREES TO INDEMNIFY MnDOT AND TO HOLD MnDOT HARMLESS FOR SAME, EXCEPT TO THE EXTENT THAT ANY SANCTIONS WERE CAUSED BY MnDOT’S OWN NEGLIGENCE.
S-36  (1701) LAWS TO BE OBSERVED (BRIDGE)
Use when there is a Removal of Bridge item or Bridge Deck on either the grading plan or the bridge plan. Keep in the “S” section on all jobs.

SP2016-33

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

S-36.1  The Contractor shall use MnDOT-approved companies for testing, waste transport and disposal of asbestos and regulated wastes, as provided in MnDOT's manual "Asbestos and Regulated Waste Manual For Structure Demolition Or Relocations for Construction Projects". The manual is available on the following website: http://www.dot.state.mn.us/environment/buildingbridge/index.html. Contact Mark Vogel at 651.366.3630 or Jackie Klein at 651.366.3637, Office of Environmental Stewardship, with any questions regarding the manual.

The Contractor shall only use MnDOT-approved contractors for the following work: building/bridge assessments, asbestos abatement and regulated waste oversight, asbestos removal, regulated waste removal, and regulated waste disposal and recycling. Contact Mark Vogel at 651.366.3630 or Jackie Klein at 651.366.3637, Office of Environmental Stewardship, 651.366.3630, with any questions regarding the manual.

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

S-36.2  The Contractor shall:

(A) All work must comply with applicable federal and state regulations.

(B) Provide the Minnesota Pollution Control Agency (MPCA) and the Engineer written notice of intent 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 at least 10 working days before any move or demolition.

(C) In addition to (A) and (B), if the bridge contains any asbestos, the Contractor shall:

(1) Use a MnDOT approved oversight contractor to oversee the work of the MnDOT-approved asbestos abatement contractor.

(2) If there is over 160 sq ft, 260 linear ft, or 35 cu ft of asbestos on the premises, submit "Notification of Asbestos Related Work", to the MPCA and the MN Department of Health. Submit notice at least 10 working days before commencing abatement activities. The Contractor shall submit a copy of the completed notification to the Engineer at the same time.

(3) Submit all required documentation to the MPCA and the MN Department of Health, and copy the Engineer on all submittals. Information on MPCA requirements can be found at http://www.pca.state.mn.us/programs/asbestos_p.html. Information on Department of Health requirements can be found at: http://www.health.state.mn.us/divs/eh/asbestos/index.html.

(4) Comply with all applicable USDOT packaging and transportation requirements when transporting asbestos-containing waste. 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 MPCA-permitted mixed municipal solid waste or Industrial landfill or a landfill permitted to accept asbestos-containing waste as listed under Landfills/Regulated Waste at
Ensure that the oversight contractor provides the Engineer with a final report meeting the requirements contained 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.

Notify the Engineer immediately if while removing or renovating a utility facility or bridge, the Contractor encounters additional asbestos materials or regulated wastes, other than that noted in the Assessment Summary. The Engineer may suspend work in accordance with MnDOT 1501. Abatement of the additional asbestos materials or regulated wastes will be paid for as Extra Work in accordance with MnDOT 1402.5.


The Contractor shall comply with all applicable MnDOT policies, and all applicable laws, rules, and regulations governing removing and recycling/disposing of any regulated wastes including, but not limited to:

1. Treated Wood
2. Lead Paint
3. Lead Plates
4. Polychlorinated biphenols (PCB’s)
5. Mercury

When shipping any of these wastes, the Contractor must 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.

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

(1701) LAWS TO BE OBSERVED (CULTURAL RESOURCES – FEDERALLY FUNDED)

Use on Federally funded jobs with the exception of building removal, landscaping, signals, lighting, or signing Only projects.

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

For any project that MnDOT funds or conducts, or that is located in MnDOT Right of Way, including owned or leased Natural Materials Resources, the following terms will apply:

(A) MnDOT is responsible for obtaining a Cultural Resources Unit (CRU) findings letter.

(B) Contractor will notify MnDOT if contractor intends to use any material from a proposed excavation area on any land controlled by MnDOT. MnDOT must request a review from the MnDOT CRU before
allowing any contractor to use any material from a proposed excavation area on any land controlled by MnDOT. The review may take 45 calendar days or longer (includes up to 35 days for tribal consultation when necessary) after receipt of the request. If MnDOT CRU determines that a survey is needed, the review period may be even longer. Contractor is responsible for any delays due to the length of the review and may not base a claim for damages due to delay of Contract on the length of the review.

S-37.2 If the Contractor selects the excavation and disposal of material from locations other than MnDOT Right of Way, the following term will apply:

   (A) A CRU findings letter is not necessary.

   (B) Contractor must comply with Minnesota Statutes § 307.08, Minnesota Private Cemeteries Act, if applicable.

S-37.3 If any human remains are encountered within the Project limits, the Contractor shall immediately stop work in the vicinity, notify the Engineer, and request suspension of work near the discovery area, in accordance with MnDOT 1803.6.

S-38 (1701) LAWS TO BE OBSERVED (CULTURAL RESOURCES – STATE FUNDED)
Use on 100% State funded jobs with the exception of building removal, landscaping, signals, lighting, or signing Only projects.
SP2016-35

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

S-38.1 For any project that MnDOT funds or conducts, or that is located in MnDOT Right of Way, including owned or leased Natural Materials Resources, the following terms will apply:

   (A) MnDOT is responsible for obtaining a Cultural Resources Unit (CRU) findings letter.

   (B) Contractor will notify MnDOT if contractor intends to use any material from a proposed excavation area on any land controlled by MnDOT. MnDOT must request a review from the MnDOT CRU before allowing any contractor to use any material from a proposed excavation area on any land controlled by MnDOT. The review may take 15 calendar days or longer after receipt of the request. If MnDOT CRU determines that a survey is needed, the review period may be even longer. Contractor is responsible for any delays due to the length of the review and may not base a claim for damages due to delay of Contract on the length of the review.

S-38.2 If the Contractor operations require the excavation and disposal of material from locations other than MnDOT Right of Way, the following term will apply:

   (A) A CRU findings letter is not necessary.

   (B) Contractor must comply with Minnesota Statutes § 307.08, Minnesota Private Cemeteries Act, if applicable.

S-38.3 If any human remains are encountered within the Project limits, the Contractor shall immediately stop work in the vicinity, notify the Engineer, and request suspension of work in the vicinity of the discovery area, in accordance with MnDOT 1803.6.
S-39 (1701) LAWS TO BE OBSERVED – CARGO PREFERENCE ACT, USE OF UNITED STATES - FLAGGED VESSELS

Use only on Federally funded jobs.

NEW WRITEUP 01/08/16 "DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

S-39.1 The Contractor must utilize privately-owned United States-flag commercial vessels to ship at least 50% of the gross tonnage whenever shipping any equipment, material, or commodities pursuant to this Contract. This requirement applies only to the extent that such U.S.-flag vessels are available at fair and reasonable rates. Compute gross tonnage separately for dry bulk carriers, dry cargo liners, and tankers. The term "pursuant to this Contract" means this provision applies to materials or equipment acquired for this specific Project. Materials used for highway construction generally originate from existing inventories rather than being acquired solely for a specific project. For example, the requirements generally do not apply to shipments of Portland cement, asphalt cement, or aggregates, as suppliers and contractors use these materials to replenish existing inventories. But, the Cargo Preference Act does apply if any material or equipment is acquired solely for this specific Project.

S-39.2 The Contractor must furnish a legible copy, in English, of a rated, “on-board” commercial ocean bill of lading for each shipment of cargo described in clause S__.1. The Contractor must provide the bill of lading to the Department and to the following:

Division of National Cargo
Office of Market Development
Maritime Administration
Washington DC, 20590

The Contractor must provide the bills of lading no later than 20 days after the date of loading for shipments originating within the U.S.A., or no later than 30 days after the date of loading for shipments originating outside the U.S.A.

S-39.3 The Contractor must include or incorporate this provision in all subcontracts.

S-40 (1706) EMPLOYEE HEALTH AND WELFARE

SP2016-36

The provisions of MnDOT 1706 are supplemented with the following:

S-40.1 The Contractor must not use motor vehicle equipment that has an obstructed rear view unless:

(A) The vehicle has a reverse alarm that is audible above the surrounding noise level; or

(B) An observer signals to the operator that it is safe to reverse.

S-40.2 The Department may assess a monetary deduction $500 per incident for a violation of safety standards that could result in death or dismemberment.

S-40.3 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__.1 above), confined space safety, blasting operations, and personal safety devices.

S-40.4 The Contractor cannot avoid complying with safety standards by paying the deduction.
S-41  (1707) PUBLIC CONVENIENCE AND SAFETY
SP2016-37
Metro Transit has bus service in the Project area which will be affected by this construction. The Contractor shall notify the following Metro Transit representative prior to the start of the Project:

For all Metro projects use:
Lisa Johnson
Manager of Street Operations
Lisa.Johnson@metc.state.mn.us
612-349-7570

For all other Districts use: ______________________ has bus service in the Project area. The Contractor shall notify the Company prior to the start of the Project as follows:

S-42  (1712) PROTECTION AND RESTORATION OF PROPERTY
Use when requested by District. District will use this when environmental permits or documents are required.
SP2016-38
Bidders may review any environmental documents and permits concerning this Project before bidding. The Department's contact persons in the District are as follows:

Environmental Documents:
Insert name here
Insert person's title here
Insert address here
Insert phone number here

Permits:
Insert name here
Insert person's title here
Insert address here
Insert phone number here

S-43  (1717) AIR, LAND, AND WATER POLLUTION (CONCRETE GRINDING)
Use on projects with concrete grinding or bridge approach panels. Always use this when using SP2016-123 (CONCRETE GRINDING), SP2016-124 (CONCRETE GRINDING WITH NO INCENTIVES), and Texture Planing of Bridge Deck Slab Surface which is in the Division SB.
SP2016-39
The provisions of MnDOT 1717 are supplemented and/or modified with the following:

S-43.1  CONCRETE DIAMOND GRINDING OPERATIONS AND SLURRY MANAGEMENT
The Engineer will not permit residue and water to flow across adjacent traffic lanes, flow onto shoulder, flow off bridge decks, flow into gutters, or flow onto private property. The Contractor shall provide a plan for both the on-site and off-site slurry management. The Contractor shall choose, and the Engineer will approve, the methods for slurry management in accordance with the following provisions.
Slurry Management is prohibited within federally recognized tribal land boundaries. Identification of federally recognized tribal land boundaries are found on the following website:
http://mn.gov/indianaffairs/tribes.html and will be identified by the Engineer in the Plan.

S-43.2 On-site slurry management is prohibited within Areas of Environmental Sensitivity (AES). These areas will require off-Site slurry management. No slurry discharge is allowed in the AES or within the buffers (see table 1717-1) to an AES. Identification of the AES are as follows:

1. MnDNR Public Waters Inventory (PWI).
2. National Wetland Inventory (NWI).
3. Calcareous fens.
4. Permanent vegetation designated for preservation, such as areas adjacent to the right of way identified as a ‘Site of Biodiversity Significance’ or ‘Native Plant Community’ by the DNR Minnesota Biological Survey (MBS).
5. Prairie remnants, including but not limited to areas adjacent to Railroad Rights-of-way Prairies.
6. Wooded areas with specimen trees.
7. Locations with Federal or State listed Threatened or Endangered plant species.
8. Locations with Federal or State listed Threatened or Endangered aquatic species.
9. Historic properties.

Identification of items 1-5 are found on the following web link:
http://deli.dnr.state.mn.us/data_search.html.

Identification of items 6-9 are provided by the Office of Environmental Stewardship (OES) staff through the project’s Early Notification Memo (ENM) process.

The Engineer will identify all AES in the plans.

Other constraints within the project that must be addressed in the Slurry Management Plan (Section S-1.5) and require slurry collection are as follows:

1. Roadways that utilize curb and gutter to convey storm water to catch basin inlets into a closed drainage system (storm sewers).
2. Inlet structures that utilize a piping system to convey storm water directly into stormwater treatment facilities or AES.
3. Bridge deck grinding.
4. Stormwater treatment ponds.
5. Infiltration/filtration basins.

S-43.3 OFF-SITE SLURRY MANAGEMENT (when slurry is collected and taken to a containment basin or treatment facility)

Any areas identified in Section S-1.2, along with other areas identified by the Engineer will require slurry collection in accordance with the following:

1. Collect and transport slurry in water-tight haul units to prevent spills.
2. Provide a temporary or permanent lined containment basin outside the right-of-way to decant the collected slurry.
3. Areas outside of the right-of-way may require a separate NPDES Construction Stormwater Permit as per Minnesota Pollution Control Association (MPCA).
4. Follow additional requirements in Section S-1.5, Slurry Management Plan.
ON-SITE SLURRY MANAGEMENT (when slurry is spread during the diamond grinding operation)

The Engineer will allow the Contractor to spread the slurry within MnDOT right of way on the vegetated slope and median in accordance with the following requirements:

1. Maximum Buildup of Slurry Sediment
   The Contractor shall spread the slurry at a rate to prevent sediment buildup of greater than ½ inch [13 mm] in any location by:
   a. Spreading the slurry either further up / down the slope with each subsequent pass of the grinder.
   b. Spread the material evenly on the adjacent slopes by using appropriate equipment (i.e., chain drags, tine harrows, plug aeration, dissipater plate, etc.) to break up the material.
   c. Remove and haul off site any sediment buildup of greater than ½ inch [13 mm].
   d. Other spreading methods, as approved by the Engineer.

2. Vegetated Medians – The Engineer will allow slurry spreading within the entire roadway median in accordance with the following:
   a. Maintain a vegetated buffer zone (as per Table 1717-1) from any identifiable point of concentrated storm water flow. The following are examples of points of concentrated storm water flow in medians:
      i. A transverse ditch bottom width of < 5 feet.
      ii. Longitudinal scouring is apparent within median.
      iii. An identifiable low point (V ditch) that runs parallel to the roadway.
   b. Do not spread slurry in areas identified for protection in accordance with Section S-1.2.
   c. Maintain the vegetated buffer zones as per Table 1717-1.

3. Vegetated Outside Slopes – Deposit the slurry on either the in-slope or back-slope and maintain the vegetated buffer zones outlined in Table 1717-1.

4. In order to minimize sediment infiltration into drainage systems, the Contractor shall:
   a. Only place slurry in locations that flow away from the roadway.
   b. Begin the slurry spreading operation a minimum of 1-foot [0.3 m] from the paved shoulder.
   c. Provide compost filter log for inlet protection.
   d. Leave compost filter log in place after project is completed.
Table 1717-1
Buffer Zone / Areas Slurry Spreading is NOT Allowed

<table>
<thead>
<tr>
<th>Location</th>
<th>Vegetated Buffer Distance, ft [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Toe of in-slope or fill slope</td>
<td>5 [1.5]</td>
</tr>
<tr>
<td>*Toe of back-slope</td>
<td>5 [1.5]</td>
</tr>
<tr>
<td>Water level in roadside ditch or median ditch</td>
<td>5 [1.5]</td>
</tr>
<tr>
<td>Stormwater treatment ponds</td>
<td>100 [30]</td>
</tr>
<tr>
<td>Infiltration/filtration basins</td>
<td>100 [30]</td>
</tr>
<tr>
<td>Areas of Environmental Sensitivity</td>
<td>100 [30]</td>
</tr>
<tr>
<td>Stormwater inlet without inlet protection</td>
<td>100 [30]</td>
</tr>
<tr>
<td>Stormwater inlet with inlet protection</td>
<td>50 [15]</td>
</tr>
</tbody>
</table>

* Does not apply to median areas with a transverse ditch bottom width > 5 feet [1.5 m] and standing water is not present.

S-43.5 SLURRY MANAGEMENT PLAN

Prior to grinding operations, the Contractor shall submit to the Engineer in writing the proposed Slurry Management Plan for approval. Grinding operations shall not begin until the Plan is approved by the Engineer.

The Slurry Management Plan shall include the following:

1. When discharging on the slope, provide method to identify discharge start and stop locations for the equipment operator. Examples include:
   a. Lath and flagging tape
   b. Barrels
   c. The Engineer may approve other options as suggested by the Contractor.

2. When using a containment basin:
   a. Provide an estimate of the expected volume of slurry on the project and the volume of the containment basin.
   b. Ownership and location of the temporary containment basin.
   c. Method used to line the temporary containment basin. Examples include:
      i. Clay (including thickness of clay layer)
      ii. Impermeable membrane (including thickness of membrane).
   d. Describe management of water. Examples include:
      i. Allowing the water to evaporate,
      ii. Re-using the water in the grinding operation, slurry broadcast operation, in a commercially useful manor (include engineering need, i.e., dust control, grade compaction),
      iii. Water sent via sanitary sewer (provide proper permits)
      iv. Hauling to a water treatment facility; (provide the name of the treating facility).
   e. Describe management of the solids (fines). Examples include:
      i. Using the solids as a fill material, a component in recycled aggregate or any other commercially useful application (include engineering need),
      ii. Solids transported to a reuse storage facility, MPCA permitted lined mixed municipal solid waste or industrial landfill. Furnish the Engineer with a document that identifies the name and location of the reuse storage facility or a MPCA permitted lined mixed municipal solid waste or industrial landfill.
(f) Describe restoration of the containment basin area. Include fill material, topsoil, seed mixtures and temporary covers.

(3) pH control plan must include:
   (a) Procedure used to maintain the pH of the slurry within the acceptable range,
   (b) Example of pH test results log.

S-43.6 CONTROL OF pH
Monitor and control the pH of the slurry for all operations to maintain a pH between 6 and 12.

   (1) Calibrate the test equipment prior to start-up of daily operations.
   (2) At the start-up of operations, test the pH at least once per hour to ensure it is within the acceptable limits.
   (3) Once the pH control plan is operational and producing consistent results, the testing frequency may be reduced to 4 tests per day.
   (4) Keep a signed and dated log of all pH test results for each piece of equipment collecting slurry and have available to the Engineer upon request.

S-43.7 PRIOR TO CONCRETE GRINDING OPERATIONS
The Engineer will schedule a pre-grinding meeting at the project site. The Engineer and Contractor will review the Slurry Management Plan for approval, including identification of the AES, acceptable slurry management practices, and any other aspects of the Plan as determined by the Engineer.

S-43.8 STOP WORK
Stop operations and perform the necessary corrective actions before proceeding when any of the following conditions occur:

   (1) Raining during operations resulting in discharge of slurry into buffer areas,
   (2) Equipment failing to contain or remove slurry,
   (3) Defined quality control requirements are not followed,
   (4) The slurry is discharged into areas not approved in the Slurry Management Plan,
   (5) The pH is outside the designated range,
   (6) The slurry discharges into waters of the state, or
   (7) A spill.

Notify the State Duty Officer immediately if condition (6) or (7) occurs.

1-800-442-0798 for Out-State; 651-649-5451 for Metro area

S-44 (1717) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT
Use only when NPDES permit is required. In Section S-.1 choose A, B, C, or D. District needs to provide the permit ID number(s) under S-.1.

Pollution of natural resources of air, land and water by operations under this Contract must be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted and established by the Minnesota Pollution Control Agency (M.P.C.A.), and in accordance with the provisions of MnDOT 1717, these Special Provisions, and the following:

S-44.1 By signing the MPCA/NPDES Declaration and completing the electronic online NPDES CSW permit, the Contractor is a co-permitee with the Department to ensure compliance with the terms and conditions of the Construction General Storm Water Permit (MN R100001) and is responsible for those portions of the permit
where the operator is referenced. This Permit establishes conditions for discharging storm water to waters of the State from construction activities that disturb 1 acre [0.4 hectares] or more of total land area. A copy of the permit is available at http://www.pca.state.mn.us/water/stormwater/stormwater-c.html or by calling 651-296-3890.

Use A when there is a single MPCA/NPDES permit on the job and the Contractor applies and pays for it. District needs to supply the permit ID number in the blank below.

(A) The Department shall initiate the on-line permit application for this project and share the application with the Contractor. The permit ID number for this project is 

The Contractor shall complete the application through the electronic online process and pay for the MPCA/NPDES Permit on this Project. Payment for the application shall be incidental to the Contract and no direct compensation will be made. The Contractor shall follow the below steps.

• Create User ID account with MPCA E-services (if already have account skip to next step)
• Contact District Resident Engineer associated with this project (in order for the Resident Engineer to share the permit application)
• Request to share the MPCA/NPDES permit application for the above permit ID number and provide your User ID.
• Wait to receive Email From MPCA E-services that a permit is shared
• Log into E-Services
• select shared document
• Select section 5 and place the Contractor contact information (you will need to select the highlighted continue button on screen to scroll to certification section of application)
• Complete certification signature
• Complete payment section.
• Print out confirmation

A MPCA/NPDES Permit Affidavit form will be sent to the Contractor with the Contract award packet. A copy of the MPCA confirmation and a signed Permit Affidavit form must be returned with the Contract and Bond. Submittal of the copy of the Confirmation and Permit Affidavit is mandatory for Contract approval. No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the MPCA/NPDES Permit is in effect and the Department has received the required documentation.

Use B when MnDOT has purchased the NPDES permit and the Contractor must complete and apply for the transfer. Do not use this option unless you know for certain the agency holds and has paid for the permit.

(B) The Department will apply and pay for the MPCA/NPDES General Construction Stormwater Permit as Owner and Contractor on this project. The Department will provide the Contractor with the Notice of Termination/Permit Modification Form with the Existing Permit Identification, Option 2, Current Owners Authorization Signature, and Current Contractor Authorization signature completed, as part of the Contract document package. The Contractor shall complete New Contractors Authorized Signature section, send the form to the MPCA and post the transfer document, the Permit and MPCA’s letter of coverage on the project site.

A MPCA/NPDES Permit Affidavit form will be sent to the Contractor with the Contract award packet. A copy of the signed permit Transfer form and a signed Permit Affidavit form must be returned with the Contract and Bond. Submittal of the copy of the signed Transfer Form and Permit Affidavit is mandatory for Contract approval. No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the Department has received the required documentation.
**Use C when there are multiple NPDES permits on the job and the Contractor pays and applies for the permits. The number of permits needs to be filled in. This option is only used when project with separate SP’s are combined. District needs to supply the permit ID number(s) in the blank below.**

(C) This Contract requires ___ different MPCA/NPDES Permits.

The Department shall initiate the on-line permit applications for this project and share the application with the Contractor. The permit ID numbers for this project are ___. The Contractor shall complete the application thru the electronic online process and pay for the NPDES Permit on this Project. Payment for the applications shall be incidental to the Contract and no direct compensation will be made. The Contractor will follow the below steps for each permit application.

- Create User ID account with MPCA E-services (if already have account skip to next step)
- Contact District Resident Engineer associated with this project
- Request to share the MPCA/NPDES permit application for the above permit ID numbers and provide your User ID.
- Wait to receive Email From MPCA E-services that a permit is shared
- Log into E-Services
- select shared document
- Select section 5 and place the Contractor contact information (you will need to select the highlighted continue button on screen to scroll to certification section of application)
- Complete certification signature
- Complete payment section.
- Print out confirmation

A copy of the MPCA confirmation and a signed Permit Affidavit form must be returned with the Contract and Bond. Submittal of the copy of the Confirmation and Permit Affidavit is mandatory for Contract approval. No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the MPCA/NPDES Permit is in effect and the Department has received the required documentation.

**Use D when there are multiple NPDES permits on the job and MnDOT has purchased the permits and the Contractor must complete and apply for the transfers. The number of permits needs to be filled in. Do not use this option unless you know for certain the Department holds and has paid for the permits. District needs to supply the permit ID number(s) in the blank below.**

(D) This Contract requires ___ different MPCA/NPDES Permits. The Department will apply and pay for the MPCA/NPDES Permits required for this Contract. The permit ID numbers for this project are ___. The Department will provide the Contractor with a copy of the original completed application, the Notice of Termination/Permit Modification Forms with the Existing Permit Identification, Option 2, Current Owners Authorization Signature, and Current Contractor Authorization Signature completed for each permit, as part of the Contract document package. The Contractor shall Complete New Contractors Authorized Signature section for each permit, send the forms to the MPCA and post the transfer documents, the permits and MPCA’s letter of coverage on the project site.

A MPCA/NPDES Permit Affidavit form will be sent to the Contractor with the Contract award packet. A copy of the signed permit Transfer forms and a signed Permit Affidavit forms must be returned with the Contract and Bond. Submittal of the copy of the signed Transfer and Permit Affidavit Forms is mandatory for Contract approval. No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the Department has received the required documentation.

S-44.2 The Contractor shall be solely responsible for complying with the requirements listed in Part II.B and Part IV of the General Permit.
The Contractor shall be responsible for providing all inspections, documentation, record keeping, maintenance, remedial actions, and repairs required by the permit. All inspections, maintenance, and records required in the General Permit Paragraphs IV.E, 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 the permit.

The Contractor shall have all logs, documentation, inspection reports on site for the Engineer's review and shall post the permit and MPCA's letter of coverage 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 from MnDOT, 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.

S-44.3 Emergency Best Management Practices must be enacted to help minimize turbidity of surface waters and relieve runoff from extreme weather events. It is required to notify the MPCA Regional Contact Person within 2 days of an uncontrolled storm water release. The names and phone numbers of the MPCA Regional Contract personnel can be found at: http://www.pca.state.mn.us/water/stormwater/stormwater-c.html. The Contractor is reminded that during emergency situations involving uncontrolled storm water releases that the State Duty Officer must be contacted immediately at 1-800-422-0798 or 1-651-649-5451.

S-44.4 The Contractor shall review and abide by the instructions contained in the permit package. The Contractor shall hold MnDOT 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-44.5 The Contractor is advised that the MPCA/NPDES Permit makes reference to a Storm Water Pollution Prevention Plan (SWPPP). This Projects’ SWPPP is addressed throughout MnDOT’s Standard Specifications for Construction, as well as this Project’s Plan and these Special Provisions. The following table identifies NPDES permit requirements and cross-references where this Contract addresses each requirement.
NPDES Permit Requirements | Cross-Reference within this Contract
--- | ---
Obtain NPDES Permit; Permit Compliance; Submit Notice of Termination | MnDOT 1701, 1702; and 1717 Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Certified Personnel in Erosion / Sediment Control Site Management Develop a Chain of Command | MnDOT 1506, 1717, and 2573; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Project / Weekly Schedule (for Erosion / Sediment Control) Completing Inspection / Maintenance Log / Records | MnDOT 1717 and 2573; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit); and
Project Specific Construction Staging | The Plans; MnDOT 1717; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit); and 1806 (Determination and Extension of Contract Time)
Temporary Erosion / Sediment Control | The Plans; MnDOT 2573, 2574 and 2575
Maintenance of Devices / Sediment removal Removal or Tracked Sediment Removal of Devices | The Plans; MnDOT 1717 and 2573; Special Provisions: 1514 (Maintenance During Construction), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Dewatering | MnDOT 2105.3C and 2451.3C; May also require DNR Permit
Temporary work not shown in the Plans Grading areas (unfinished acres exposed to erosion) | MnDOT 1717, 2573, and 2575; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Permanent Erosion / Sediment Control and Turf Establishment | The Plans; MnDOT 1717, 2573, 2574, and 2575; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)

**S-45 (1717) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR TRIBAL LANDS**

*Use only when NPDES permit is required and when SP2016-3 (SPECIAL PROVISIONS ENCOURAGING INDIAN EMPLOYMENT) is used on the job and the project limits will be within Tribal Lands.*

**REVISED 04/26/16** *(DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.)*

SP2016-41

Pollution of natural resources of air, land and water by operations under this Contract must be prevented, controlled, and abated by the Contractor in accordance with the rules, regulations, and standards adopted and established by the Environmental Protection Agency (EPA), and in accordance with the provisions of MnDOT 1717, these Special Provisions, and the following:

**S-45.1** By signing the Proposal and completing the Permit Affidavit form, the Contractor is a co-permitee with the Department to ensure compliance with the terms and conditions of the Construction General Permit (CGP) and is responsible for those portions of the permit where the operator is referenced. The CGP establishes conditions for discharging storm water to waters of the United States from construction activities that disturb 1 acre [0.4...**
S-45.2 Within the boundaries of the [insert proper title of tribal land] a NPDES Permit is required through the Federal EPA. MnDOT will apply for the permit and make any payments required for the EPA Construction General Permit (CGP). The Contractor will be required to construct the project in accordance with the requirements of CGP No. MNR10000I, the Project’s Plan and specifications, and these Special Provisions. No work which disturbs soil or work in waters of the US will be allowed on this Project until the EPA/NPDES Permit is in effect and the Department has received the required documentation including the Permit Affidavit form.

S-45.3 The Contractor must comply with the requirements listed in Part 2-7 of the EPA CGP.

The Contractor must perform all inspections, maintenance, remedial actions, and repairs required by the CGP. The Contractor must create, maintain, and provide all records and documents as required by the CGP. The Contractor must use standard forms for logging all required inspection and maintenance activities. The Contractor must provide all inspection and maintenance forms used on this Project to the Engineer every two weeks for retention in accordance with the permit.

The Contractor must have all logs, documentation, and inspection reports on site for the Engineer’s review; and must post the permit and requirements on site. The Contractor must immediately rectify any failure to comply with a requirement of an applicable permit or regulation, regardless of whether such non-compliance is self-noted or noted by the Engineer. Both the Contractor and the engineer must attend all meetings with the EPA or any applicable local authority. No work required by said entities, and for which the Contractor would request additional compensation from MnDOT, shall be started without approval from the Engineer. Any contract revision resulting from action by a regulatory authority, including the EPA, is subject to MnDOT 1402.

S-45.4 Emergency Best Management Practices must be enacted to help minimize turbidity of surface waters and relieve runoff from extreme weather events. The Contractor is required to notify the EPA Regional Contact Person within 2 days of an uncontrolled storm water release. The names and phone numbers of the EPA Regional Contact personnel is Brian Bell; (312) 886-0981. The Contractor is reminded that during emergency situations involving uncontrolled storm water releases the State Duty Officer must be contacted immediately at 1-800-422-0798 or 1-651-649-5451.

S-45.5 The Contractor shall review and abide by the instructions contained in the permit package. The Contractor shall hold MnDOT 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-45.6 The Contractor is advised that Section 5 of the NPDES permit makes reference to a Storm Water Pollution Prevention Plan (SWPPP). This Project’s SWPPP is addressed throughout MnDOT’s Standard Specifications for Construction, as well as this Project’s Plan and these Special Provisions. Table 1717-1 provides cross reference information for permit compliance.
Table 1717-1

<table>
<thead>
<tr>
<th>NPDES Permit Requirements</th>
<th>Cross-Reference within this Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain NPDES Permit; Permit Compliance;</td>
<td>MnDOT 1701, 1702; and 1717 Special Provisions: 1717</td>
</tr>
<tr>
<td>Certified Personnel in Erosion / Sediment Control Site Management</td>
<td>MnDOT 1506, 1717, and 2573; Special Provisions: 1717</td>
</tr>
<tr>
<td>Develop a Chain of Command</td>
<td>MnDOT 1717 and 2573; Special Provisions: 1717</td>
</tr>
<tr>
<td>Project / Weekly Schedule (for Erosion / Sediment Control) Complementing Inspection / Maintenance Log / Records</td>
<td>The Plans; MnDOT 1717; Special Provisions: 1717</td>
</tr>
<tr>
<td>Project Specific Construction Staging</td>
<td>MnDOT 1717 and 2573; Special Provisions: 1717</td>
</tr>
<tr>
<td>Temporary Erosion / Sediment Control</td>
<td>The Plans; MnDOT 2573 and 2575</td>
</tr>
<tr>
<td>Maintenance of Devices / Sediment removal Removal or Tracked Sediment Removal of Devices</td>
<td>The Plans; MnDOT 1717 and 2573; Special Provisions: 1717</td>
</tr>
<tr>
<td>Dewatering</td>
<td>MnDOT 2105.3B and 2545.3C;</td>
</tr>
<tr>
<td>Temporary work not shown in the Plans Grading areas (unfinished acres exposed to erosion)</td>
<td>MnDOT 1717, 2573, and 2575; Special Provisions: 1717</td>
</tr>
<tr>
<td>Permanent Erosion / Sediment Control and Turf Establishment</td>
<td>The Plans; MnDOT 1717, 2573, and 2575; Special Provisions: 1717</td>
</tr>
</tbody>
</table>

S-46 (1718) FURNISHING RIGHT OF WAY

No work shall be performed by the Contractor outside the existing Right of Way without the authority of the Project Engineer at the following locations:

<table>
<thead>
<tr>
<th>Parcel(s) #</th>
<th>RT or LT</th>
<th>Engineer's Station</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

It is anticipated that such authorization will be given on or before a title and possession date of.

S-47 IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

Use only on Federally funded jobs.

The bidder is agreeing that the following is true by signing this bid form:

(1) 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 C.F.R. Part 15), is not listed on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 C.F.R. 15.20.

(2) That 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-48 (1801) SUBLETTING OF CONTRACT

Use S-.1 and S-.2 on all jobs. Use S-.3 for All Building Removal jobs, i.e. where building removal is not part of the grading Contract, but is the majority of the work.

The provisions of MnDOT 1801 are modified as follows:

Use S-.1 on all jobs.

S-48.1 For Projects in excess of $50,000, the Contractor may sublet work only to subcontractors that meet the definition of “responsible contractor” in Minnesota Statutes §16C.285, subdivision 3. The Contractor shall obtain verifications of compliance with §16C.285 from subcontractors using a form provided by the Department. The Contractor must provide such verifications to the Department upon the Department’s request.

Use S-.2 on all jobs.

S-48.2 The third paragraph of MnDOT 1801 is modified to read:

On Contracts with Disadvantaged Business Enterprise (DBE), Targeted Group Business (TGB) or Veteran-Owned Small Business (VET) established goals, or any combination thereof, the Contractor's organization shall perform Work amounting to not less than 30 percent of the total original Contract Amount. The Department will deduct specialty items from the total original Contract Amount before calculating the amount of Work that the Contractor shall perform.

Use S-.3 for All Building Removal jobs, i.e. where building removal is not part of the grading Contract, but it is the majority of the work.

S-48.3 The second sentence of the first paragraph of MnDOT 1801 is modified to read:

If approved by the Engineer and if the Contractor's organization performs Work amounting to at least 30 percent of the total original Contract Amount, the Contractor may sublet a portion of the Contract.

S-49 BLANK

DELETED 04/08/16

SP2016-45

S-50 (1802) TRAINING FOR CONSTRUCTION TRUCK OPERATORS

Use on all jobs

REVISED 05/13/16 DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-46

Construction truck operators that haul construction materials such as borrow, aggregate base, asphalt mixtures and concrete paving mixtures are encouraged to become trained in Construction Truck Operator Training (CTOT).
The CTOT course covers the Federal and State construction truck and driver requirements and regulations. The course also covers safe driving techniques. The course includes presenters from the Minnesota State Patrol, Minnesota Department of Transportation, and Hennepin Technical College.

For additional information, contact:

Hennepin Technical College
E-Mail: Eric.Gohl@hennepintech.edu
Phone: 952-995-1346
Website: HennepinTech.edu/ctot

Call 952-995-1330 to register and/or get location information for upcoming CTOT Classes.

S-51 PROSECUTION OF WORK (ADA)
Use on all jobs with curb ramps/ADA Improvements in them. Absolutely no changes can be made to this language!!

SP2016-47

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

S-51.1 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-1.1B 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.

Landings – An initial landing is the first required landing of a pedestrian ramp. All initial landings required at the top of a ramped sloped surface (>2% longitudinal slope), shall be formed and placed separately in an independent concrete pour. This does not include initial landings placed at roadway grade such as depressed corners, parallel ramps, or rural flat landings. Secondary landings consist of all landings beyond the initial landing. These secondary landings do not require a separate landing pour. All landings adjacent to push buttons shall be formed and placed separately in an independent concrete pour, regardless of ramp type.

Wet casting or drill and grouting of dowel bars will be required in accordance with the details shown in Standard Plan 5-297.250 Sheet 5 of 5. These bars may be either smooth or deformed and shall be installed with 2 inch minimum concrete cover. When not accounted for in the Plan, payment for these bars will be made.
under Item 2301.602 (Drill & Grout Reinforcement Bar (Epoxy Coated)) by the Each at the Predetermined Price of $10.00 per bar furnished and installed. All necessary subgrade preparation and aggregate base placement for the entire ramp construction limit shall be done before the initial landing is constructed at each location.

(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-1.1B. 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) This section applies when no sidewalk joint information is provided in the plan. The Contractor will round all sidewalk joints with a ¼ inch radius edging tool, contraction joints shall extend to at least 30 percent of walk thickness and shall be ¼ inch maximum width. The Contractor shall have the option of providing saw cuts to construct all sidewalk joints and the gutter joints within the PAR. When greater than 50 feet of continuous sidewalk runs are constructed the contractor shall saw cut all joints. The top grade break of walkable flares need a visual joint to indicate a change in grade. This visual joint shall have ¼ inch radius, ¼ inch maximum width and ¼ inch depth. All saw cut work associated with PAR construction shall be incidental.

(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.

Use (G) on all jobs that have pedestrian signal system work.

(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.
SPECIAL PROVISIONS - SP2016 BOOK

Last Revision by CO Special Provisions: 08/04/16

▲ DO NOT DELETE THE ABOVE REVISION DATE. This is how we tell which version of the SP2016 book you used when preparing your specs for your job.

S-P. Number of Your Job goes here

SP2016-48

The provisions of MnDOT 1803 are modified as follows:

Always use either S-.1 or S-.2. Always use S-.1 on IDIQ jobs unless CPM schedule is approved to be used by OCIC. The blank in S-.4 needs to be filled in by Construction. The value should be from 14 to 30 calendar days. If no value is inserted, CO Special Provisions will use 14 as the value. Always use S-.3 thru S-.5. Always use S-.6 when using S-.2.

S-52 (1803) PROGRESS SCHEDULES

Always use either S-.1 or S-.2. Always use S-.1 on IDIQ jobs unless CPM schedule is approved to be used by OCIC.

S-52.1 This Contract allows for the use of a “Bar Chart Schedule” as the Progress Schedule for the Project.

OR

Always use S-.6 when using S-.2.

S-52.2 This Contract requires the use of a Critical Path Method (CPM) Schedule as the Progress Schedule for the Project.

Always use S-.3 thru S-.5.

S-52.3 The provisions of MnDOT 1803.3 A are hereby deleted and the following is substituted therefor:

A General Requirements

If the Contractor intends to use Critical Path Method (CPM) schedules, or when the Department specifies the Work under this Contract shall be scheduled using CPM, the Work shall be planned, accomplished, and reported using CPM for the Contractor’s Progress Schedules.

The Contractor will access the Department’s Enterprise Project Management System (EPMS) Primavera P6 software to plan and schedule all work shown in the contract documents.

A.1 MnDOT Enterprise Project Management System (EPMS)

MnDOT has installed Primavera P6 software on internet accessible servers for use by appropriate Department personnel, Consultants, and Contractors. The State will provide access to MnDOT’s Primavera P6 software and the MnDOT Enterprise Project Management System (EPMS), for use by the Contractor for preparing, maintaining, and submitting all schedules.

A.2 MnDOT Enterprise Project Management System (EPMS) Configuration

The Department will determine the storage location for the project schedule files on the Department’s Enterprise Project Management System and will provide the Contractor with the naming convention for all progress schedule submissions. As this software is an enterprise application, the Department will be the sole entity to modify the EPMS structure, the Organizational Breakdown Structure (OBS), Global Activity Codes, Global Calendars, User Defined Fields, Security Profiles, Administrative Categories, and Administrative Preferences.

A.3 Minimum Network Requirements for EPMS

The latest Citrix On-line plug-in must be downloaded to the computer being used to access the MnDOT EPMS system. The latest MnDOT approved Citrix Client can be downloaded at: http://webportal.dot.state.mn.us.
A.4 Contractor Access to MnDOT Enterprise Project Management System (EPMS)

The Contractor shall submit a P6 Request for Access Form for each proposed Primavera user to obtain the required User ID’s and Passwords for access to the MnDOT Citrix Webportal and Primavera P6 Software on the Department’s network servers. The form, in PDF format, can be downloaded from http://www.dot.state.mn.us/const/tools/contracttime.html under the heading Primavera P6 and shall be submitted to CPMSchedule.DOT@state.mn.us.

The P6 Request for Access Form may be submitted any time following the announcement by the Department that the Contractor has been awarded the contract. The Department will process these requests and should generally provide the User ID’s and Passwords within one week of receipt of the P6 Request for Access Form. The User ID’s and passwords will be provided to the Contractor (for the Project Scheduler plus one other person) to obtain secure Internet access to the Primavera P6 software and project schedule data.

Instructions on how the Contractor will access the MnDOT Citrix Webportal & Primavera P6 Software can be downloaded at: http://www.dot.state.mn.us/const/tools/docs/MnDOTCitrixWebporta_P6Software.pdf.

A.5 Importing/Exporting Schedule Files

The Department will not “Import” or accept Schedule files from any other computer system.

A.6 Project Scheduler

1. The Contractor shall designate an individual, entitled the Project Scheduler, who will develop and maintain the construction progress schedule.
2. The Project Scheduler is recommended to have at least three (3) days of training in Primavera P6 from a certified instructor, and at least one (1) year of Critical Path Method scheduling experience using Primavera or Microsoft Project scheduling software. For an instructor to be deemed “Certified” they must be certified by Oracle to train personnel in the use of Primavera P6.
3. The Project Scheduler may be a full or part time position or may be filled by a consultant. Scheduling certifications from AACE and PMI will meet the minimum requirements.
4. The Contractor may fill the Project Scheduler position using a person employed by the Contractor who is not on the project, except for meetings and other times when the Project Scheduler’s presence is required on the project to satisfactorily fulfill Progress Schedule requirements of the contract documents.
5. The Contractor is not required to submit documentation to the Department to verify the Project Scheduler meets the recommended qualifications above. However, if the Engineer determines the Project Scheduler does not have sufficient skill or experience in Critical Path Method scheduling as a result of Progress Schedule submissions being substantially deficient for several submissions, or that Progress Schedule submissions are repeatedly not submitted within the required contract timeframes, the Engineer may require that the person be removed from the project in accordance with 1802 “Qualification of Workers”.

A.7 File-Naming Convention

The Contractor shall use a file-naming convention as modeled in Table 1803-3. If the schedule is not accepted, the Contractor shall resubmit under the file name as modeled for the 2nd version, etc. The ####-#### indicates a placeholder for the State Project Number.
Table 1803-3  
Progress Schedule Filename convention

<table>
<thead>
<tr>
<th>Schedules</th>
<th>1st Version</th>
<th>2nd Version</th>
<th>3rd Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Baseline Schedule (All Schedules until it is Accepted as Baseline)</td>
<td>####-####-BS-1</td>
<td>####-####-BS-2</td>
<td>####-####-BS-3</td>
</tr>
<tr>
<td>1st Update to Progress Schedule</td>
<td>####-####-1BSU-1</td>
<td>####-####-1BSU-2</td>
<td>####-####-1BSU-3</td>
</tr>
<tr>
<td>2nd Update to Progress Schedule, etc.</td>
<td>####-####-2BSU-1</td>
<td>####-####-2BSU-2</td>
<td>####-####-2BSU-3</td>
</tr>
<tr>
<td>1st Revised Schedule</td>
<td>####-####-1RE-1</td>
<td>####-####-1RE-2</td>
<td>####-####-1RE-3</td>
</tr>
<tr>
<td>1st Update to Revised Schedule</td>
<td>####-####-1REU-1</td>
<td>####-####-1REU-2</td>
<td>####-####-1REU-3</td>
</tr>
<tr>
<td>2nd Revised Schedule, etc.</td>
<td>####-####-2RE-1</td>
<td>####-####-2RE-2</td>
<td>####-####-2RE-3</td>
</tr>
<tr>
<td>1st Impact Schedule</td>
<td>####-####-1IS-1</td>
<td>####-####-1IS-2</td>
<td>####-####-1IS-3</td>
</tr>
<tr>
<td>2nd Impact Schedule, etc.</td>
<td>####-####-2IS-1</td>
<td>####-####-2IS-2</td>
<td>####-####-2IS-3</td>
</tr>
</tbody>
</table>

A.8  Float Suppression / Sequestered Float

The Contractor shall not suppress or sequester float. Examples of prohibited float suppression or sequestration include, but are not limited to:

1. Logic relationships that provide no tangible or sequential value between unrelated activities.
2. Logic relationships that demand completion of an activity that could otherwise continue beyond a Successor’s start or finish dates.
3. Excessively long durations.

The Contractor shall obtain the Engineer’s approval before using lags or leads. The Contractor shall remove any lags or leads and replace with an activity identifying the lag or lead upon the request of the Engineer, regardless of whether the Department allowed the lag or lead in a previous Progress Schedule.

The Contractor shall not be entitled to compensation or a time extension for delays that could have been avoided by revising activity durations or logic used to sequester float.

A.9  Use of Float

The Contractor acknowledges that all float (including Total Float, Free Float, and Sequestered Float) is a shared commodity available to the Project and is not for the exclusive benefit of any party. Float is an expiring resource available to accommodate changes in the Work, however originated, or to mitigate the effect of events that may delay performance or completion of all or part of the Work.

It is understood that identified contingencies, as described in 1803.3.D, “Weather and Duration Contingency”, become available Float as time elapses and the contingency is not used.

The blank in S-.4 needs to be filled in by construction. The value should be from 14 to 30 calendar days. If no value is inserted, CO Special Provisions will use 14 as the value.

S-52.4 The first sentence of the first paragraph of 1803.3.B.2 is hereby changed to read:

Baseline Schedule acceptance is a condition of NTP2 and shall not exceed Calendar Days from NTP1.
The following is hereby added at the end of 1803.3.B2:

(6) Work Break Down Structure:
   Level 1 is the project level;
   Level 2 shall have four nodes; MILESTONES, SUBMITTAL, CONSTRUCTION, and POST CONSTRUCTION;
   Level 3 the node for SUBMITTAL activities shall have at least two sub nodes; SHOP DRAWINGS, and PROCUREMENT/FABRICATION;
   The node for CONSTRUCTION activities shall be broken into nodes for various PHASES of construction work;
   The node for POST CONSTRUCTION activities requires no sub nodes.
   Level 4 The nodes for PHASES of Construction activities should include sub nodes for the various STAGES of work;
   Level 5 The nodes for STAGES of work should include sub nodes for the various highway features: bridges, highway segments, interchanges, intersections/roundabouts, etc.;
   Level 6 The nodes for highway features should be broken into their components (a bridge into components such as Piles, Substructure, Superstructure), and a highway segment into components such as pavement, drainage, earthwork, lighting, traffic signals, etc.

(7) Standard Schedule Activities to be Included:

<table>
<thead>
<tr>
<th>M1060</th>
<th>Contractor Start Contract Work</th>
<th>Start Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1070</td>
<td>Substantial Completion</td>
<td>Finish Milestone</td>
</tr>
<tr>
<td>M1090</td>
<td>Contract Completion Date</td>
<td>Finish Milestone</td>
</tr>
</tbody>
</table>

Always use S-.6 when using S-.2. Note to Designer/Construction: The tables in S-.6 need to be adjusted with project specific data found under the heading of “Weather Contingency” at the following website: http://www.dot.state.mn.us/const/tools/contracttime.html under the heading Weather Contingency Study.

The third bullet point of MnDOT 1803.3.D is hereby deleted and replaced with the following:

D. Weather and Duration Contingency

(3) Calendar for each major item of Work affected by weather or seasonal limitations shall include as a minimum the number of non-work days indicated in the Table below. The Contractor is responsible for adjusting the values dependent on

Note to Designer/Construction: The tables in this paragraph need to be adjusted with project specific data found under the heading of “Weather Contingency” at the following website: http://www.dot.state.mn.us/const/tools/contracttime.html under the heading Weather Contingency Study.
Non-Work Days for Major Items of Work by Month

<table>
<thead>
<tr>
<th>Major Item of Work</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removals</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Excavation and embankment</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Subgrade (granular embankment)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Base</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Surfacing</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Bridge Substructure</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Bridge Superstructure</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Utility and culvert work</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Lighting and electrical</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Turf establishment</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Non-Work Days for Major Items of Work by Month

<table>
<thead>
<tr>
<th>Major Item of Work</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removals</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Excavation and embankment</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Subgrade (granular embankment)</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Base</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Surfacing</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Bridge Substructure</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Bridge Superstructure</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Utility and culvert work</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Lighting and electrical</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Turf establishment</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

S-53  
(1803) LIMITATION OF OPERATIONS - NIGHT CONSTRUCTION  
Include for Metro projects when applicable. Metro Construction will decide when this is to be used on their project. Metro Construction needs to fill in the blanks for the times in the first sentence.  
SP2016-49

Modify MnDOT 1803.5, “Limitation of Operations”, with the following:

S-53.1 Night Construction means construction between the hours of ___ p.m. to ___ a.m. occurring within 500 feet of any sensitive areas such as:

- Hospitals;
- Nursing homes;
- Private residences including condos and apartments;
- Businesses;
- Hotels/motels.

The Contractor must not perform the following activities during Night Construction:

- Pile driving/removal;
- Concrete pavement demolition;
- Sawing for pavement removal;
- Crushing operations;
- Jack-hammering.

The Engineer must approve any deviation from these prohibitions.
The Contractor must have a supervisor on site during Night Construction. The supervisor must have satisfactorily completed the “MnDOT Noise Mitigation for Night Construction” training within the past five years, as shown in the Department’s records. This free 30 minute training is available online at http://www.dot.state.mn.us/onlinelearning/construction/noisemitigation. The Contractor must provide the Engineer with the nighttime supervisor’s name and a copy of the current certification prior to beginning Night Construction.

In addition, the Contractor must:

- Notify owners or occupants of all buildings in sensitive areas (within 500 feet of the Night Construction). Notify owners or occupants of the type, location, and duration of the work. Provide notice in writing no later than five calendar days prior to beginning the work. Provide a copy of the notification to the Engineer and the City.
- Provide a contact person who is on site to ensure that any issues related to Night Construction are immediately addressed.
- Use only equipment having OSHA-approved ambient sound-sensing backup alarms or, as an alternative, use an observer may in accordance with OSHA standards.
- Allow for equipment to turn-around in lieu of backing-up (this includes equipment entering/exiting the project).
- Construct temporary noise mitigation enclosures or curtains around stationary equipment (e.g., generators, compressors) that are within 500 feet of sensitive areas.
- Ensure that tailgates on trucks are not slammed. Truck drivers unable to control the tailgates from slamming must be removed from the project.
- Ensure that all engines and engine driven equipment used for hauling or construction are equipped with an adequate muffler in constant operation and properly maintained to prevent excessive or unusual noise.

If the Engineer determines that the Contractor is not in compliance with the Night Construction requirements, the Engineer will suspend Night Construction. The suspension will remain in effect until the Contractor remedies the non-compliance or obtains the Engineer’s acceptance of an action plan that satisfactorily addresses the non-compliance. The suspension will be considered an avoidable delay.

S-54 (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME
Use on all jobs.

NOTE: All Special Provisions relating to Contract Time should either be in 1806 or 1807 – NOT 1803 -1404 or any other spec.

REVISED 09/25/15  DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

The Department will determine Contract Time in accordance with the provisions of MnDOT 1806 and the following:

S-54.1 Contractor must start construction operations by [date], or no later than eight Calendar days after the date of Notice Contract Approval, whichever is later. Contractor must not begin construction operations before contract approval.

S-54.2 Contractor must complete all work required under this Contract, except maintenance work and Final Clean Up, in no more than _______ Working Days.

OR
S-54.3 Contractor must complete all work required under this Contract, except maintenance work and Final Clean Up, on or before _______.

Use the following for Intermediates
S-54.4 In addition to the other Contract Time requirements, the Contractor must complete all work required to _______ _______ (“in no more than [x] working days”, “in no more than [x] calendar days”, or “on or before [a completion date]”).

If using A+B, use S-.5.
S-54.5 All work required for the Completion of Work as defined in Section S-1301 (CONSIDERATION OF PROPOSALS (A+B METHOD)) under this Contract, shall be completed within the time frame specified by the Contractor as set forth in Section S-1301 (CONSIDERATION OF PROPOSALS (A+B METHOD)) of these Special Provisions.

Add the following if you are including an incentive:

a) In the event that the Completion of Work is completed in advance of this time frame, payment otherwise due in the Contract will be adjusted with an incentive payment of $XX,000.00 (xxxxx Dollars) for each Calendar Day that the Completion of Work specified in is completed prior to the specified time frame. The total incentive amount shall not exceed $YY,000 (xxxx dollars). Payment of the incentive will be made on the first partial estimate voucher processed after the Completion of Work has concluded.

Use S-.6 on all jobs.
S-54.6 Unless authorized in writing by the Engineer, the Contractor must not begin construction operations that impact, restrict, or interfere with traffic, before receiving NTP2. The Engineer will determine whether operations impact, restrict, or interfere with traffic in the Engineer’s sole discretion.

Do not use if DIST. has section like this in their (1404).
S-54.7 The Contractor must not perform work that will restrict or interfere with traffic between 12:00 noon on the day before and 9:00 A.M. on the day after any consecutive combination of a Saturday, Sunday, and legal holiday. The Contractor may request exceptions to this requirement. Exceptions must be approved in writing by the Engineer.

(A) If the Contractor chooses not to work at all on the day before the holiday period, then the Department will not assess working day charges.

(B) If the Contractor chooses to work before 12:00 noon on the day before the holiday period (or later than 12:00 noon if approved by the Engineer), then the Department will assess working day charges only for the actual hours worked.

Use the following on all multiyear projects whether they are completion day contracts or working day contracts (per Contract Admin) or late in year.
S-54.8 The following language is deleted from MnDOT 1806.3: "(3) During the inclusive period from November 15 through April 15, except as specified in 1806.1, “Determination and Extension of Contract Time, General.”"

Use the following when needed on the project. Use only on working day contracts.
S-54.9 The following phrase is deleted from MnDOT 1806.3: “(2) On Saturdays, Sundays, and legal holidays”; and is replaced with: “(2) On Sundays and legal holidays”. The effect of this modification is that MnDOT will assess Working Day charges six (6) days per week, Monday through Saturday, excluding legal holidays.
Use the following when needed on the project. Use only on working day contracts.
S-54.10 The Department will base working day charges on a ten hour working day.

Use the following when needed on the project. Use only on completion day contracts. Revise accordingly.
S-54.11 The Department based Contract Time (Completion Date) on an anticipated six day work week, Monday through Saturday.

Do not use S-.12 for DIST. 1 jobs
S-54.12 When, in the opinion of the Engineer, the Contractor cannot perform work on the Project due to failure of material delivery beyond the control of the Contractor, the Engineer will agree to suspend Work in conformance with MnDOT 1803.6, or will cease the charging of working days, as determined by the Engineer.

The Engineer will issue a Resumption of Work Order, or resume the charging of working days, after the Contractor has received delivery of the required material.

Always use S-.13 when using SP2016-117 (HIGH PERFORMANCE DOWEL BAR – 32 mm (1.25 inch)) or when using SP2016-118 (HIGH PERFORMANCE DOWEL BAR - 38 mm (1.5 inch)).
S-54.13 The following language is added to 1806.2.C: “(6) Delays of any kind due to furnishing and installing Stainless Steel-Type Dowels.”

S-55 (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME (LANDSCAPING)
Only use on jobs that are 100% landscaping. Do not use SP2016-50 (DETERMINATION AND EXTENSION OF CONTRACT TIME) on 100% landscaping jobs. Use SP2016-51 instead.
SP2016-51
The Department will determine Contract Time in accordance with the provisions of MnDOT 1806 and the following:

S-55.1 Contractor may start preparatory work after Month XX, 20XX or upon Notice Contract Approval, whichever is later.

S-55.2 This project is located in Zone X and Plant Installation Period is Spring 20XX.

S-55.3 Complete the installation of all plant species during the Plant Installation Period as specified in S-1.2 and the following table:

<table>
<thead>
<tr>
<th>Plant Installation Period (PIP) – Zone 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type (Species)</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Coniferous</td>
</tr>
<tr>
<td>Deciduous Container and B&amp;B</td>
</tr>
<tr>
<td>Deciduous Bare Root</td>
</tr>
<tr>
<td>Perennial</td>
</tr>
<tr>
<td>Seedlings</td>
</tr>
</tbody>
</table>
## Plant Installation Period (PIP) – Zone 4

<table>
<thead>
<tr>
<th>Type (Species)</th>
<th>Spring Period</th>
<th>Fall Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniferous</td>
<td>April 7th to May 17th</td>
<td>August 25th to September 15th</td>
</tr>
<tr>
<td>Deciduous Container and B&amp;B</td>
<td>April 7th to June 30th</td>
<td>August 25th to November 1st</td>
</tr>
<tr>
<td>Deciduous Bare Root</td>
<td>April 7th to June 1st</td>
<td>October 10th to November 15th</td>
</tr>
<tr>
<td>Perennial</td>
<td>May 1st to June 30th</td>
<td>August 25th to September 15th</td>
</tr>
<tr>
<td>Seedlings</td>
<td>April 7th to June 1st</td>
<td>-------------------------------</td>
</tr>
</tbody>
</table>

S-55.4 The Contractor must furnish written evidence showing, that all orders have been placed as needed to complete all work on this Project. The Contractor must furnish this written evidence to the Engineer no later than \( X \) days after Notice Contract Approval. Evidence must include written verification from growers, manufacturers, suppliers and subcontractors that all ordered materials will be delivered at a date sufficient to complete the Project as specified in this section S-___. Written verification must identify the anticipated calendar date of delivery of the ordered materials.

S-55.5 Incidental turf repair includes completely restoring and establishing turf during the **Spring 20XX** Season of Planting for seed mixture(s) 25-141, 33-261, and 33-361. In ditch or flow areas use seed mixture 33-261, in areas within 10 feet of pond edges use seed mixture 33-361, in all other areas use seed mixture 25-141.

S-55.6 The Engineer may extend any Plant Installation Period (PIP) depending on the Engineer's assessment of planting conditions.

S-55.7 If the Contractor has not completed the work by the end of a PIP, the Engineer may extend the time allowed to complete the plant installation to the next appropriate PIP only if the Contractor can demonstrate the delays encountered were beyond the Contractor's control in accordance with MnDOT 1806.2. The time extension will be in proportion to the original time allotted to complete the work.

S-55.8 Contractor must complete all work required under this Contract, except plant establishment work and Final Clean Up, on or before **July 15, 20XX**.

S-55.9 Plant Establishment Work as defined in MnDOT 2571, “Plant Installation and Establishment”, will extend for a period of two years from the date of Plant Installation completion.

S-55.10 The Contract Time, for all other work not previously exempted herein, will be determined in accordance with the provisions of MnDOT 1806.

### S-56 (1807) FAILURE TO COMPLETE THE WORK ON TIME

The District needs to choose the appropriate paragraphs which apply to their project. Use on all jobs.

**REVISED 09/25/15** DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-52

The provisions of MnDOT 1807 are supplemented as follows:

*If using A+B, use S-.1.*

S-56.1 The State will deduct from any monies due or coming due to the Contractor an amount equal to {RUC value} per Calendar Day for failure to complete all the work specified in Section S-1806 (DETERMINATION AND EXTENSION OF CONTRACT TIME) that remains uncompleted after the expiration of Calendar Days established by the Contractor in accordance with Section S-1301 (CONSIDERATION OF PROPOSALS (A+B METHOD)) of these Special Provisions.
Use **S-.2 for intermediate dates.**

S-56.2 The Department will assess the Contractor a monetary deduction in an amount equal to $_____ for each Calendar Day that any of the work specified in Section **S-1806.** (DETERMINATION AND EXTENSION OF CONTRACT TIME) of these Special Provisions remains incomplete after the expiration of the working period provided therefore.

Use **S-.3 to reduce damages for final cleanup**

S-56.3 The Department may reduce the daily liquidated damages to $_______ when the only remaining items are maintenance or Final Cleanup.

**Choose the applicable rows in the table shown below and modify (if needed).**

S-56.4 For informational purposes only, bidders are advised that in addition to the requirements of MnDOT 1807, other Sections of these Special Provisions, as shown below, contain requirements for assessment of monetary deductions to this Contract:

<table>
<thead>
<tr>
<th>S</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1404</td>
<td>MAINTENANCE OF TRAFFIC AND (2563) TRAFFIC CONTROL</td>
</tr>
<tr>
<td>1706</td>
<td>EMPLOYEE HEALTH AND WELFARE</td>
</tr>
<tr>
<td>2331</td>
<td>PAVEMENT JOINT ADHESIVE</td>
</tr>
<tr>
<td>2331</td>
<td>BITUMINOUS PAVEMENT CRACK TREATMENT CLEAN AND SEAL</td>
</tr>
<tr>
<td>2533</td>
<td>PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337</td>
</tr>
<tr>
<td>2533</td>
<td>PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 - ANCHORED</td>
</tr>
<tr>
<td>2563</td>
<td>TRAFFIC CONTROL SUPERVISOR</td>
</tr>
<tr>
<td>2563</td>
<td>INTELLIGENT WORK ZONE SYSTEM</td>
</tr>
<tr>
<td>2563</td>
<td>ALTERNATE PEDESTRIAN ROUTE</td>
</tr>
<tr>
<td>2563</td>
<td>WORKERS PRESENT SPEED LIMIT</td>
</tr>
<tr>
<td>2563</td>
<td>PORTABLE CHANGEABLE MESSAGE SIGN</td>
</tr>
<tr>
<td>2580</td>
<td>INTERIM PAVEMENT MARKING</td>
</tr>
</tbody>
</table>

S-56.5 The liquidated damages set forth in MnDOT 1807 and any monetary deductions as set forth above may apply equally, separately, and may be assessed concurrently.

**S-57**

**COST ESCALATION**

*Use on all jobs.*

SP2016-53 The provisions of MnDOT 1910 are hereby supplemented with the attached Fuel Escalation Clause.

**S-58**

**CONSTRUCTION SURVEYING**

*This write-up is to be used on all jobs when construction Project surveying is to be done by the Contractor. Construction needs to fill in sections S-.2 B & C. Do not use any 1508 special provision when using this writeup.*

SP2016-54 The provisions of MnDOT 1508 are hereby modified and supplemented as follows:

S-58.1 **GENERAL SURVEY SPECIFICATIONS**

This Contract provides for the Contractor to accomplish the Construction Surveying for this Project. MnDOT 1508 is herewith modified to the extent that the Contractor shall meet all the requirements of, and
provide all the services listed in, MnDOT 1508 which would otherwise be provided by MnDOT. Furthermore, in accordance with MnDOT 1401, the Contractor is advised that the Contract may not fully describe every detail or make specific allowances for all probable exceptions and contingencies related to the Construction Surveying requirements for this Project. Additional best management practices (BMP's) for Construction Surveying are identified in Appendix A of the MnDOT Surveying and Mapping Manual, in addition to the requirements shown below:

S-58.2 SURVEYING TO BE PERFORMED BY MnDOT

(A) MnDOT will set the initial horizontal and vertical control points in the field for the Project as indicated in the Plans. Upon request, MnDOT will also provide electronic data on the control so established. This electronic data will be provided in the format that was used in the accomplishment of the surveys for the Construction Plan, and in Construction Plan development itself. However, due to the many different processes that the design survey data goes through and the large variety of sources of input in the final production of the Plan itself, no warrantee is made as to the value or adaptability of the electronic data to the Surveyor. No warrantee is made that the data systems used by MnDOT or any consultants employed by MnDOT for Surveying or Construction Plan preparation will be compatible with the systems used by the Contractor’s Surveyor. Information shown on the printed “Plan” shall always govern over any electronic “Plan” data.

At the discretion of the MnDOT Engineer, spot checks may be performed upon the Contractor’s surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in a manner that will assure proper controls and accuracy, the Engineer will order the Contractor to redo such work, to the standards specified in the Contract, at no additional cost to MnDOT.

If MnDOT sustains undue costs in checking excessive amounts of Contractor Construction Surveying, or must perform survey work that is the Contractor’s responsibility, the Engineer may deduct MnDOT’s cost from monies due or becoming due the Contractor in accordance with the following rates:

<table>
<thead>
<tr>
<th>Hourly Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered Engineer or Licensed Land Surveyor $80.00</td>
</tr>
<tr>
<td>4-person crew and equipment $240.00</td>
</tr>
<tr>
<td>3-person crew and equipment $180.00</td>
</tr>
<tr>
<td>2-person crew and equipment $125.00</td>
</tr>
<tr>
<td>1-person with equipment $75.00</td>
</tr>
</tbody>
</table>

or as incurred by MnDOT should it become necessary, due to MnDOT resource commitments, to have such work performed by a consultant under contract to MnDOT.

(B) MnDOT will measure the following pay quantities:

(List those pay quantities that MnDOT will measure here.)

Alternatively use, “MnDOT will measure all of the pay quantities except the following:

(List those pay quantities that will not be measured by MnDOT but are to be measured by the Contractor, here.)
(C) MnDOT will be responsible for setting the following final monumentation: (Remove those that will be placed by the Contractor.)

- Horizontal Control
- Vertical Control
- Alignment
- Right-of-Way

S-58.3 CONSTRUCTION SURVEYING BY THE CONTRACTOR

(A) Contractor Construction Surveying Requirements

Construction Surveying is defined as accurately providing all necessary computations, stakes and marks to establish lines, slopes, elevations, points, continuous profile grades in accordance with MnDOT 1508 and the requirements shown in the Plan for Construction Staking; so that the Contractor’s forces are able to construct all required work for the Project in accordance with the Contract requirements; and so that MnDOT Engineers and Inspectors are able to complete all necessary inspection and Contract Administration duties. The staking shall include, but not be limited to, clearing and grubbing, removals, grading, culverts, embankments, borrow, aggregate base course, pavements, bridges, utilities, signs, pavement markings, erosion control and turf establishment items to complete the Project as represented in the Plans. The Surveying must be done in a way that is timely, and that is reflective of the continuing and ongoing nature of construction and inspection activities which will generally require frequent, separate Project visits by the Contractor’s survey crew to the Project to accommodate the various stages of construction and inspection activities that will occur.

The Surveyor shall be prepared to make all necessary surveying checks for field verification of actual conditions and shall make the necessary minor surveying and staking adjustments to fit the construction to actual field conditions. In addition, some Plan details may be dependent upon actual field conditions at the time of construction. It may be necessary to perform some field survey or office computations in order to stake these components. All work referred to in this paragraph is considered part of the work of Construction Surveying and no additional payment will be made for this work.

The Contractor shall retain a Professional Land Surveyor or Professional Engineer, licensed in the State of Minnesota, to directly supervise the Construction Surveying. Any determination of, or marking of, Right-of-Way must be performed under the supervision of a Licensed Land Surveyor. Additionally, for those projects let after August 31, 2007, an individual holding a NSPS - ACSM Level III certification in Construction Surveying, an LSIT, or a licensed Surveyor/Engineer, shall be on the Project site at all times to directly supervise the survey crew(s).

The Contractor shall:

1. Be responsible for the preservation of all reference points, monuments, government land corners, horizontal and vertical control points, stakes, and marks that are established by MnDOT or others within the Project limits. If the Contractor or its surveyor fails to preserve these items and if they must be reestablished by MnDOT, the Engineer will deduct a charge from monies due or becoming due the Contractor according to the Department’s costs as shown elsewhere in these Special Provisions.

2. Be responsible to review, balance, adjust, correct, and investigate MnDOT provided data and to perform work on survey data and control points that may be necessary to use the survey points and data, all at no extra cost to MnDOT, unless it is determined by the MnDOT Engineer that latent errors existed in the information provided by MnDOT.

3. Start and end all level runs, traverses, or GPS control surveys, from known control. Complete all control surveys at no worse than the standards specified for supplemental control in Chapter 2, MnDOT Surveying and Mapping Manual.
4. Unless otherwise agreed to, set all stakes and marks in accordance with the Staking Information Sheets included in the Plan.

5. Furnish and install traffic control devices in accordance with the Field Manual for Temporary Traffic Control Zone Layouts, Part VI, (MN MUTCD), when crew members are exposed to traffic.

6. Perform all Construction Surveying for all Project construction as shown in MnDOT 1508, and shall install reference points as needed for the use of any public utility crews that are staking or accomplishing utility relocation or construction associated with this Contract.
   a. From Horizontal and Vertical Control Points established by the Engineer.
   c. According to the MnDOT Surveying and Mapping manual.
   d. According to actual existing field conditions.

7. Perform Bridge and Structure Construction staking which includes setting and reestablishing Working Points and Reference Points by XYZ coordinates to provide line and grade during all stages of work, and at all substructures and segments of Bridge or Structure Construction, as shown below:
   a. Establish Working Points or Reference Points, approved by the Engineer, on the ground as shown on the Bridge Layout sheet in the Plans.
   b. Transfer of required points from the ground to the top of footing after completion of concrete footing construction. If the structure is a curved wall or bridge edge of slab, curb, coping, median, or railing, the Contractor’s Surveyor shall mark a curved line on the footings, forms, or deck slab, to the proper degree of curvature within 1/8 inch in 10 feet [3 mm in 3 meters], 1:1000, as needed for construction and inspection activities.
   c. Transfer required points to the top of all finished structures.
   d. Transfer required points to the superstructure deck forming. (MnDOT personnel will complete all work associated with beam stool elevations.)

8. Bear all costs, including but not limited to the cost of actual reconstruction of Contract work, that may be incurred due to errors in Contractor’s Construction Surveying.

9. Document surveying during construction in a form acceptable to the Engineer and allow the Engineer access to surveying notes and calculations. The survey documentation includes:
   a. Control station monumentation with reference ties.
   b. Field notes that were used to set construction stakes, control the Project, and document monument locations. The Contractor shall use bound, hard cover field books for recording survey data and field notes; store field notes on an electronic medium; or use both methods. If an electronic medium is used, the raw field data files must be available. When using an electronic medium, the Contractor shall make all files and data available in the Standard formats used by the Department.

10. Present the Engineer with the as-built Survey Data. The as-built Survey Data shall include the following:
a. Changes from the Plan
   i. Alignment
   ii. Profile
   iii. Sewer
   iv. (List other items as desired)
b. Locations of utilities relocated or emplaced as part of the Project
c. Identify any alignment, Right-of-Way, property, or control monumentation destroyed during the Project
d. Any alignment, Right-of-Way, property, or control monumentation that was placed during the Project and that still exists at Project completion.
e. The information shall include the x, y and, if applicable, the z coordinates in the Project datum. If the original item had no coordinate reference, then show the revised centerline station and offset.
f. The information shall be provided in both electronic (Microstation and GeoPak) and hard copy format.
g. In the case of new monumentation, there should also be a report describing how the monumentation was placed. This will include copies of any fieldwork (traverse or leveling) as well as any adjustments used. It shall also include tie sheets, to include a description of the physical object placed as the monument.

11. Furnish survey documentation and as-built Survey Data to the Engineer within the time limits indicated in the surveying work schedule.

(B) Contractor Construction Surveying Activities

1. The Contractor shall give the Engineer a 14 calendar day written notice before the Contractor needs MnDOT to establish any horizontal and vertical control points shown in the Plan for Construction Surveying.

2. At the preconstruction conference, the Contractor shall submit to the Engineer for approval a written Construction Surveying Work Plan and Schedule detailing:

   a. Pertinent information as to how the requirements in these specifications, and the requirements in Appendix A of the MnDOT Surveying and Mapping Manual, are being met by the Contractor’s Surveyor.
   b. A Project specific Construction Surveying Work Schedule for the Construction Surveying and how it relates to the time frame for construction activities and MnDOT inspection needs.
   c. A proposed method of communications between the Contractor, Surveyor, and MnDOT Project Personnel.
   d. How and when the Contractor’s Surveyor will make delivery of the as-built Survey Data to MnDOT.

3. During the course of construction, the Contractor shall give notice of commencement of any Construction Surveying activities according to MnDOT 1803.4.

S-58.4 METHOD OF MEASUREMENT
The Engineer will measure Construction Surveying on a lump sum basis.

S-58.5 BASIS OF PAYMENT
MnDOT will pay for Item 2011.601 (Construction Surveying) on a Lump Sum Basis at the Contract unit bid price. Payment shall be compensation in full for all surveying work including preparation of the
quality management plan, materials, surveying equipment, labor, office work, and any incidental costs required by the Contract.

(A) Payment Schedule

MnDOT will authorize partial payments for construction surveying in accordance with Table 2011-1 below, up to 90 percent of the lump sum bid price. The Contractor will receive the final 10 percent of the lump sum bid price when the survey computations, notes, miscellaneous documents, and as-built Survey Data as specified have been received and accepted by the Engineer within the time limits specified by the Survey Work Schedule. If the Contractor fails to provide acceptable documentation and the as-built Survey Data within the time limits specified, Mn/DOT reserves the right to reduce the lump sum payment for Contractor Construction Surveying by a percentage of up to 10 percent of the lump sum bid price.

<table>
<thead>
<tr>
<th>When Percent of Original Contract Amount Completed*</th>
<th>Pay Percent of Construction Surveying</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>20</td>
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<tr>
<td>15</td>
<td>50</td>
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<tr>
<td>50</td>
<td>75</td>
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<tr>
<td>90</td>
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</tr>
</tbody>
</table>

* The percent of Original Contract Amount = the amount earned by the Contractor, excluding money earned for mobilization and material on hand, divided by the total value of the original contract (all contract items).

(B) Payment for Extra Work

When the Engineer determines that extra or additional Construction Surveying beyond the scope of the original Contract is required and orders the Contractor to accomplish this work, compensation will be made as Extra Work in accordance with MnDOT 1904 and at the same rate shown for a MnDOT survey crew above. If the Construction Surveying is accomplished by a subcontract, the prime Contractor allowance will be five (5) percent.

(C) Payment

Payment for Construction Surveying will be made on the basis of the following:

<table>
<thead>
<tr>
<th>Item No.</th>
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<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011.601</td>
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<td>Lump Sum</td>
</tr>
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S-59  (2011) CONSTRUCTION SURVEYING (METRO)

This write-up is to be used on all Metro jobs when construction Project surveying is to be done by the Contractor. Construction needs to fill in sections S-2 B & C. Do not use any 1508 special provision when using this writeup. NEW WRITÉUP 08/28/15  DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-54.1

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

S-59.1 GENERAL SURVEY SPECIFICATIONS

This Contract provides for the Contractor to accomplish the Construction Surveying for this Project. MnDOT 1508 is herewith modified to the extent that the Contractor shall meet all the requirements of, and
provide all the services listed in, MnDOT 1508 which would otherwise be provided by MnDOT. Furthermore, in accordance with MnDOT 1401, the Contractor is advised that the Contract may not fully describe every detail or make specific allowances for all probable exceptions and contingencies related to the Construction Surveying requirements for this Project. Additional best management practices (BMP's) for Construction Surveying are identified in Appendix A of the MnDOT Surveying and Mapping Manual, in addition to the requirements shown below:

S-59.2 SURVEYING TO BE PERFORMED BY MnDOT

(A) MnDOT will set the initial horizontal and vertical control points in the field for the Project as indicated in the Plans. Upon request, MnDOT will also provide electronic data on the control so established. This electronic data will be provided in the format that was used in the accomplishment of the surveys for the Construction Plan, and in Construction Plan development itself. However, due to the many different processes that the design survey data goes through and the large variety of sources of input in the final production of the Plan itself, no warrantee is made as to the value or adaptability of the electronic data to the Surveyor. No warrantee is made that the data systems used by MnDOT or any consultants employed by MnDOT for Surveying or Construction Plan preparation will be compatible with the systems used by the Contractor’s Surveyor. Information shown on the printed “Plan” shall always govern over any electronic “Plan” data.

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If MnDOT sustains undue costs in checking excessive amounts of Contractor Construction Surveying, or must perform survey work that is the Contractor’s responsibility, the Engineer may deduct MnDOT’s cost from monies due or becoming due the Contractor in accordance with the following rates:

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(B) MnDOT will measure the following pay quantities:

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(C) MnDOT will be responsible for setting the following final monumentation: (Remove those that will be placed by the Contractor.)

Horizontal Control
Vertical Control
Alignment
Right-of-Way

S-59.3 CONSTRUCTION SURVEYING BY THE CONTRACTOR

(A) Contractor Construction Surveying Requirements

Construction Surveying is defined as accurately providing all necessary computations, stakes and marks to establish lines, slopes, elevations, points, continuous profile grades in accordance with MnDOT 1508 and the requirements shown in the Plan for Construction Staking; so that the Contractor’s forces are able to construct all required work for the Project in accordance with the Contract requirements; and so that MnDOT Engineers and Inspectors are able to complete all necessary inspection and Contract Administration duties. The staking shall include, but not be limited to, clearing and grubbing, removals, grading, culverts, embankments, borrow, aggregate base course, pavements, bridges, utilities, signs, pavement markings, erosion control and turf establishment items to complete the Project as represented in the Plans. The Surveying must be done in a way that is timely, and that is reflective of the continuing and ongoing nature of construction and inspection activities which will generally require frequent, separate Project visits by the Contractor’s survey crew to the Project to accommodate the various stages of construction and inspection activities that will occur.

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1. Be responsible for the preservation of all reference points, monuments, government land corners, horizontal and vertical control points, stakes, and marks that are established by MnDOT or others within the Project limits. If the Contractor or its surveyor fails to preserve these items and if they must be reestablished by MnDOT, the Engineer will deduct a charge from monies due or becoming due the Contractor according to the Department’s costs as shown elsewhere in these Special Provisions.

2. Be responsible to review, balance, adjust, correct, and investigate MnDOT provided data and to perform work on survey data and control points that may be necessary to use the survey points and data, all at no extra cost to MnDOT, unless it is determined by the MnDOT Engineer that latent errors existed in the information provided by MnDOT.

3. Start and end all level runs, traverses, or GPS control surveys, from known control. Complete all control surveys at no worse than the standards specified for supplemental control in Chapter 2, MnDOT Surveying and Mapping Manual.
4. Unless otherwise agreed to, set all stakes and marks in accordance with the Staking Information Sheets included in the Plan.

5. Furnish and install traffic control devices in accordance with the Field Manual for Temporary Traffic Control Zone Layouts, Part VI, (MN MUTCD), when crew members are exposed to traffic.

6. Perform all Construction Surveying for all Project construction as shown in MnDOT 1508, and shall install reference points as needed for the use of any public utility crews that are staking or accomplishing utility relocation or construction associated with this Contract.
   a. From Horizontal and Vertical Control Points established by the Engineer.
   c. According to the MnDOT Surveying and Mapping manual.
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7. Perform Bridge and Structure Construction staking which includes setting and reestablishing Working Points and Reference Points by XYZ coordinates to provide line and grade during all stages of work, and at all substructures and segments of Bridge or Structure Construction, as shown below:
   a. Establish Working Points or Reference Points, approved by the Engineer, on the ground as shown on the Bridge Layout sheet in the Plans.
   b. Transfer of required points from the ground to the top of footing after completion of concrete footing construction. If the structure is a curved wall or bridge edge of slab, curb, coping, median, or railing, the Contractor’s Surveyor shall mark a curved line on the footings, forms, or deck slab, to the proper degree of curvature within 1/8 inch in 10 feet [3 mm in 3 meters], 1:1000, as needed for construction and inspection activities.
   c. Transfer required points to the top of all finished structures.
   d. Transfer required points to the superstructure deck forming. (MnDOT personnel will complete all work associated with beam stool elevations.)

8. Bear all costs, including but not limited to the cost of actual reconstruction of Contract work, that may be incurred due to errors in Contractor’s Construction Surveying.

9. Document surveying during construction in a form acceptable to the Engineer and allow the Engineer access to surveying notes and calculations. The survey documentation includes:
   a. Control station monumentation with reference ties.
   b. Field notes that were used to set construction stakes, control the Project, and document monument locations. The Contractor shall use bound, hard cover field books for recording survey data and field notes; store field notes on an electronic medium; or use both methods. If an electronic medium is used, the raw field data files must be available. When using an electronic medium, the Contractor shall make all files and data available in the Standard formats used by the Department.

10. Furnish survey documentation and as-built Survey Data to the Engineer within the time limits indicated in the surveying work schedule.
(B) Contractor Construction Surveying Activities

1. The Contractor shall give the Engineer a 14 calendar day written notice before the Contractor needs MnDOT to establish any horizontal and vertical control points shown in the Plan for Construction Surveying.

2. At the preconstruction conference, the Contractor shall submit to the Engineer for approval a written Construction Surveying Work Plan and Schedule detailing:
   a. Pertinent information as to how the requirements in these specifications, and the requirements in Appendix A of the MnDOT Surveying and Mapping Manual, are being met by the Contractor’s Surveyor.
   b. A Project specific Construction Surveying Work Schedule for the Construction Surveying and how it relates to the time frame for construction activities and MnDOT inspection needs.
   c. A proposed method of communications between the Contractor, Surveyor, and MnDOT Project Personnel.
   d. How and when the Contractor’s Surveyor will make delivery of the as-built Survey Data to MnDOT.

3. During the course of construction, the Contractor shall give notice of commencement of any Construction Surveying activities according to MnDOT 1803.4.

S-59.4 METHOD OF MEASUREMENT
The Engineer will measure Construction Surveying on a lump sum basis.

S-59.5 BASIS OF PAYMENT
MnDOT will pay for Item 2011.601 (Construction Surveying) on a Lump Sum Basis at the Contract unit bid price. Payment shall be compensation in full for all surveying work including preparation of the quality management plan, materials, surveying equipment, labor, office work, and any incidental costs required by the Contract.

(A) Payment Schedule
MnDOT will authorize partial payments for construction surveying in accordance with Table 2011-1 below, up to 90 percent of the lump sum bid price. The Contractor will receive the final 10 percent of the lump sum bid price when the survey computations, notes, miscellaneous documents, and as-built Survey Data as specified have been received and accepted by the Engineer within the time limits specified by the Survey Work Schedule. If the Contractor fails to provide acceptable documentation and the as-built Survey Data within the time limits specified, Mn/DOT reserves the right to reduce the lump sum payment for Contractor Construction Surveying by a percentage of up to 10 percent of the lump sum bid price.
### Table 2011-1

<table>
<thead>
<tr>
<th>When</th>
<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Original</td>
<td>Percent of</td>
</tr>
<tr>
<td>Contract Amount</td>
<td>Construction</td>
</tr>
<tr>
<td>Completed*</td>
<td>Surveying</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>50</td>
</tr>
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<td>90</td>
<td>90</td>
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</table>

* The percent of Original Contract Amount = the amount earned by the Contractor, excluding money earned for mobilization and material on hand, divided by the total value of the original contract (all contract items).

(B) Payment for Extra Work
When the Engineer determines that extra or additional Construction Surveying beyond the scope of the original Contract is required and orders the Contractor to accomplish this work, compensation will be made as Extra Work in accordance with MnDOT 1904 and at the same rate shown for a MnDOT survey crew above. If the Construction Surveying is accomplished by a subcontract, the prime Contractor allowance will be five (5) percent.

(C) Payment
Payment for Construction Surveying will be made on the basis of the following:

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<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011.601</td>
<td>Construction Surveying</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

### S-60

(2011) CONSTRUCTION SURVEYING FOR ASPHALT BOND BREAKER LAYER UNDER CONCRETE OVERLAYS

Use this when constructing concrete overlays on an asphalt bond breaker layer. For asphalt bond breaker layer, two alternates have been developed for control of payment for concrete overlays. The first option offers Agency surveying; the second option offers Contractor surveying. The designer should insert the selected option in the Special Provisions. The 2 options are listed below as S-.2 and S-.3. Provision S-.2 allows the Agency to have 5 days to survey the bond breaker layer, the designer should verify and alter that as needed in the District. SP2016-55

S-60.1 THICKNESS AND SURFACE SMOOTHNESS REQUIREMENTS
Place the asphalt bond breaker layer to a grade and tolerance such that the overlying PCC pavement thickness will meet minimum design requirements.

After compaction, the asphalt bond breaker layer surface and thickness tolerance will comply with the following:

1. The elevation of the finished surface of asphalt bond breaker layer at any point of measurement shall not vary by more ± 5/8 inch [± 16 mm] from the prescribed elevation for that point as determined from the grades staked by the Engineer and the cross section shown in the Plan.
2. The compacted thickness of the asphalt bond breaker layer within ± 1/4 inch [± 6 mm] of the compacted depth shown on the typical section in the Plan.
(3) Correct any areas which are deficient by more than 1/2 inch [13 mm] by scarifying, adding mixture, compacting, shaping, and finishing in accordance with these specification, or as directed by the Engineer.

(4) The normal HMA and PCC thickness tolerance apply.

S-60.2 MNDOT SURVEY METHOD FOR PAVEMENT PROFILE CONTROL

(1) Place the asphalt bond breaker layer to the width and compacted depth shown on the typical section in the plans.

(2) Subsequent to the complete placement of the asphalt bond breaker, notify the Engineer. As soon as practical, MnDOT will survey the asphalt bond breaker layer at 100 feet [30 m] maximum intervals (25 feet [7 m] in transition areas) at the centerline and 12 feet [3.6 m] left and right of centerline and place hubs at 50 foot [15 m] intervals on both sides of roadway. Based on this survey, MnDOT will establish a concrete paving profile that closely follows the old profile to control concrete quantity but has no abrupt changes within (5 days)* of completion of the asphalt bond breaker layer.

(3) Set and use stringlines for grade control on both sides of the roadway during paving operations.

(4) The Engineer will not accept a claim for any additional ride incentive or a reduction in the ride disincentive due to MnDOT selecting the finished profile of the concrete overlay.

*Suggested time period. This District may modify.

S-60.3 CONTRACTOR SURVEY METHOD FOR PAVEMENT PROFILE CONTROL

(1) Place the asphalt bond breaker layer to the width and compacted depth shown on the typical section in the plans.

(2) Subsequent to the complete placement of all of the asphalt bond breaker layer, survey the pavement surface at 50 foot [15 m] maximum intervals (25 feet [7 m] in transitions) at the centerline and 12 feet [3.6 m] left and right of centerline and place hubs at 50 foot [15 m] intervals on both sides of roadway. Use these results to establish a recommended paving profile for review by the Engineer. The Engineer will approve or disapprove the Contractor's recommended paving profile within 3 working days. The Engineer will base approval on a concrete paving profile that closely follows the old profile to control concrete quantity but has no abrupt changes.

(3) Set and use stringlines for grade control on both sides of the roadway during their paving operations.

(4) The Engineer will not accept a claim for any additional ride incentive or a reduction in the ride disincentive due to MnDOT selecting the finished profile of the concrete overlay.

S-60.4 MEASUREMENT AND PAYMENT

The Engineer will consider Measurement and Payment for surveying incidental.
S-61  (2011) AS-BUILTS
Include in all Metro Projects to be let after July 1, 2015 unless otherwise included from District for projects let prior or outside of Metro.

This work shall consist of providing MnDOT with as-built electronic data and mark-up drawings, as described below, for the following asset classes that are part of the construction project:

**Add/Remove groups requiring as-builds for the project.**

1) Traffic Management Systems  
2) Drainage/Stormwater Systems  
3) Signing  
4) Lighting  
5) Traffic Control Signals

As-builts shall capture all new asset features and shall capture existing features if they are connected to by new features and/or run through existing conduits (new communication or power cables). The work shall occur in accordance with MnDOT Standard Specifications, MnDOT Standard Plans/Plates, the Plans, and the following:

**S-61.1 ELECTRONIC DATA COLLECTION AND SUBMITTAL**

The following provisions shall apply to the data collection and submittal requirements for As-builts:

(A) Contractor shall utilize the following two methods for the collection of data. Unless otherwise specified in the Plan, Method (1) shall be used for data collection associated with drainage work, including but not limited to, storm sewer, culverts, catch basins, manholes, and appurtenances. Unless otherwise specified in the Plan, Method (2) shall be used for data collection associated with all other items requiring as-built data.

(1) Method (1) All coordinates shall be sub-foot accurate x, y and one-tenth-foot accurate z. Data shall be collected using County Coordinate System.

(2) Method (2) All coordinates shall be sub-meter accurate x, y. Contractor shall have no more than 10% error in attribute accuracy for Method 2. Unless otherwise specified, the coordinates shall be collected in the 1996 adjustment to the UTM15N North American Datum (NAD83).

(B) The locating of underground facilities for the purpose of this pay item shall be done by the contractor or their sub-contractor and the contractor shall not utilize Gopher State One-call for this work.

(C) Data collector shall coordinate with facility installer to exchange information on placement changes or the addition of any items and on the timing of the work. Some feature locations should be collected as they are installed.

(D) Refer to website (http://www.dot.state.mn.us/metro/gisspec/) for feature specific collection guidance and submittal procedure.

(E) The Contractor shall acquire MnDOT approval of the electronic tabular format prior to collection of the data and submission to MnDOT. Data dictionaries shall be used and will be provided by Mn/DOT.

(F) Electronic formats shall be made in American Standard Code for Information Interchange (ASCII) Comma Separated Value file and/or Environmental Systems Research Institute (ESRI) shapefiles.
(G) The Contractor will gain approval no later than 15 working days after initial submittal of the final package to MnDOT. Any discrepancies will be resolved by the Contractor prior to final approval and/or acceptance by MnDOT.

S-61.2 MARK-UP DRAWINGS
The following provisions shall apply for regional traffic management systems, lighting, and drainage/stormwater features:

(A) The original “as-designed” contract plan set should be marked-up to show all additions, deletions, and other changes made during construction.

(1) Track any plan note modifications
(2) Two copies of the marked up plans must be submitted to the Construction Project Engineer in .pdf format at the time of initial submittal of the electronic data as specified in Section S-__.1.G.
(3) As-built drawings shall be accurate and are an official record of the project at the time of construction completion.

S-61.3 MEASUREMENT AND PAYMENT
No measurement will be made of the various Items that constitute As-builts but all such work will be construed to be included in the single Lump Sum payment under Item 2011.601 (As Built), which shall be compensation in full for all costs incidental thereto, including but not limited to data collection, electronic formats, required features, as-built drawings, and all materials and labor necessary.

S-62 (2013) ROAD/WEATHER SENSOR AND CABLE
SP2016-57
This work shall consist of furnishing, installing, connecting and aligning replacement roadway surface sensors and sub-surface temperature probes at the existing Road Weather Information System (R/WIS) stations listed below, or as specified in the Plans. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

S-62.1 This work includes:

- Furnishing and installing the replacement sensors and sub-surface probes and sensor cables.
- Furnishing and installing replacement extension cables and replacement conduit where damaged by construction operations.
- Splicing new sensor cables to existing sensor extension cables in splice boxes in accordance with the manufacturer's instructions using approved splice kits, and/or installing new sensor cables into the R/WIS road side station or Remote Processing Unit (RPU).
- Alignment of the RPU to operate with the new sensors and probes after they are installed.
- Returning the existing R/WIS station and all connected sensors to proper operations after installation of the replacement sensors.
- All components provided must be compatible with the existing MnDOT Statewide RWIS network

S-62.2 MATERIALS

(A) General
A1 Regulations and Code

All electrical equipment to be furnished shall conform to the standards of the requirements of the NEMA, the Underwriters' Laboratories, Inc. (UL), or the Electronic Industries Association (EIA), whichever is applicable.

Materials, electrical equipment, and workmanship shall conform to the National Electrical Code (NEC), the standards of the American Society of Testing and Materials (ASTM), the standards of the American National Standards Institute (ANSI), the standards of the Institute of Transportation Engineers (ITE), and to local laws and ordinances that apply.

All electrical conductors shall be copper and all wire sizes for electrical conductors shall be based on the American Wire Gauge (AWG).

A2 Warranties, Guarantees, and Instruction Sheets

Warranties and guarantees on new materials and electrical equipment shall apply to the items furnished by the Contractor. Manufacturers' warranties and guarantees furnished for materials and electrical equipment, calibration sheets, and instruction sheets and parts lists supplied with materials and electrical equipment, shall be submitted to the Engineer before final acceptance of the Project or when requested by the Engineer.

The Contractor shall warrant and guarantee all materials and electrical equipment furnished to the Project to be free from defects in materials and workmanship in accordance with the following:

(a) Warranties and guarantees that are offered by the material and electrical equipment manufacturer as a customary trade practice shall be turned over to the Department. The Department shall be named as the obligee on all manufacturers' warranties and guarantees.

(b) The Contractor shall warrant and guarantee satisfactory in-service operation of all materials and electrical equipment for a period of 12-months. The 12-month in-service warranty period shall begin with the completion of the testing and commissioning of the newly installed sensors.

The Contractor shall replace or correct any part or parts of materials and electrical equipment that are found defective within the 12-month in-service warranty period. No compensation will be made to the Contractor for such replacements or corrections.

The above warranty and guarantee requirements shall not apply to any part or parts of materials and electrical equipment that have been, in the opinion of the Engineer, subject to misuse, negligence, or accident by anyone other than the Contractor.

B1 Surface Pavement Sensors

Surface pavement sensors shall be compatible with the existing SCAN® RPU that is manufactured by Surface Systems, Incorporated (SSI), St. Louis, MO., Telephone: (314) 569-1002, Fax: (314) 569-3567

B2 Surface Pavement Sensor

Surface pavement sensor shall be able to measure and report pavement temperature, pavement condition, and freezing point temperature of brine on the roadway. The sensor shall be constructed of materials with thermal characteristics similar to surrounding pavement materials. The sensor shall conform to the requirements as listed below.
### Detection Method
- Passive, conductance & capacitance

### Operating Temperature Range
- \(-22^\circ F \) to \(176^\circ F\)

### Temperature Sensing Element Accuracy
- \(\pm 0.36^\circ F\) over the range of \(-22^\circ F\) to \(122^\circ F\)

### Temperature Sensor Type
- Thermoliner Component

### Solution Freeze Point
- \(-5^\circ F\) to \(32^\circ F\)

### Percent of Ice (Slush)
- 0 to 100%

### Depth of Solution
- 0.01 to 0.50 inches

### Chemical Concentration
- 0 to 100%, relative amount of chemical in solution by weight

### Operating Performance
- Not degraded by climatic conditions, traffic impacts, snow removal equipment

### Physical Size
- 5.25 inches diameter
- 1.75 inches thick

### Thermal Characteristics
- Similar to common pavement materials

### Surface Texture
- Approximates the roadway pavement color and texture

### Installation Method
- Top of sensor flush with roadway surface
- Special epoxy sealer (applied)

### Cable
- Special SSI Type IIA attached and molded into sensor with non-removable water-proof cable entrance

### Cable Length
- 150 feet standard, attached to sensor
- 300 feet optional, attached to sensor

### Maximum Cable Length
- 2500 feet

### Reliability
- MTBF of 40,000 hours

### Maintenance
- Sealed unit, none required

---

**B3 Sub-Surface Temperature Probe**

Sub-Surface Temperature Probe shall be able to measure and report subsurface temperatures below the roadway surface. The probe shall have an operating temperature range from \(-22^\circ F\) to \(176^\circ F\) and its sensing element accuracy is \(\pm 0.36^\circ F\) over the range of \(-22^\circ F\) to \(122^\circ F\). The probe shall conform to the requirements as listed below.

<table>
<thead>
<tr>
<th>Temperature Sensor Type</th>
<th>Thermoliner Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>Special SSI Type IIA attached and molded into sensor with non-removable water proof cable entrance</td>
</tr>
<tr>
<td>Cable Length</td>
<td>150 feet standard, attached to sensor</td>
</tr>
<tr>
<td></td>
<td>300 feet optional, attached to sensor</td>
</tr>
<tr>
<td>Maximum Cable Length from RPU</td>
<td>2500 feet</td>
</tr>
<tr>
<td>Reliability</td>
<td>MTBF of 87,600 hours</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Sealed unit, non-required</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.0189 Vdc per 1°F</td>
</tr>
<tr>
<td>Response Time</td>
<td>125 msec per sensor read; under 5 Minutes Between Sensor Reading</td>
</tr>
<tr>
<td>Warranties</td>
<td>1 Year</td>
</tr>
</tbody>
</table>

---

**B4 Extension cable**

The extension cable shall be a standard, direct-bury-rated, telephone cable with six (6) pairs and a 19AWG conductor size, that meets the REA PE-39 specifications.
B5 Cable Splice
Sensor cable splice shall be a waterproof splice using 3M #9882 or equal.

B6 Conduit and Accessories
Conduit and fittings shall be of the type and size as specified in the Plan. The Contractor may install conduit and fittings of a larger size than specified. Where conduit size is not specified in the Plan, the conduit shall be 1 inch minimum and shall be sized such that all electrical cables and conductors to be installed within the conduit run will occupy not more than 40 percent of inside cross-sectional area.

B6.1 Rigid Steel Conduit (RSC) and Conduit Fittings ................................................................. 3801
B6.2 Intermediate Metal Conduit (IMC) and Conduit Fittings ..................................................... 3802
B6.3 Non-Metallic Conduit (NMC) and Conduit Fittings ............................................................. 3803
B6.4 Conduit Expansion fittings ................................................................................................. 3839
B7 Electrical Junction Boxes ................................................................................................... 3838

S-62.3 CONSTRUCTION REQUIREMENTS

(A) General
The locations of component parts, as indicated in the Contract, are approximate only. The Engineer will establish the exact locations.

A1 Compliance with Electrical Codes and Standards
Construction operations shall conform to the National Electrical Code, to the State of Minnesota Board of Electricity Examiners, and to all State of Minnesota laws and local ordinances governing electrical installations.

A2 Permits and Inspections
The Contractor shall secure all necessary permits and inspections with no cost to the Department.

Bidder are advised that compliance with MnDOT 1702 will be enforced in conjunction with the construction of any kind or type of electrical system or conduit system for the conveyance of electrical cables and 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.

(B) Existing Electrical Systems
The Department is responsible for maintenance while the Contractor is performing work on existing electrical systems. The Department will furnish electrical energy for operation and will repair or replace any component parts of an existing electrical system damaged by public traffic or natural causes.

(C) Sensors and Wiring
The Contractor shall install the Surface Pavement Sensor, the Subsurface Temperature Probe and the Sensor Cable in accordance with the details in the Plan.

When the pavement sensors and sub-surface temperature probes are located beyond 150 feet from the RPU an extension cable is spliced onto the sensor cable and the extension cable is then run into the RPU. The splice is located in a pull box or splice box. The Contractor shall make the connection between the new sensor cable and the extension cable, using a waterproof, re-enterable telephone splice. If the extension cable is damaged during construction operations, the Contractor shall furnish and install a new extension cable.

(D) Conduit and Fittings

D1 General
The Contractor shall furnish and install replacement conduit where damaged by the Contractor's operations.

D2 Existing Conduit
Existing underground conduit that is incorporated into a new or revised electrical system shall be cleaned and blown out with compressed air before placing new electrical cables and conductors therein. The Contractor shall replace old grounding bushings and ground wire in existing handholes (pullboxes) to maintain a continuously grounded system.

D3 Joints
The Contractor shall trim the inside and outside of cut ends of non-metallic conduit to remove rough edges. The Contractor shall use standard non-metallic couplings or non-metallic conduit with an attached preformed coupling. The Contractor shall clean non-metallic conduit sections with a joint cleaner and shall cement joints with a PVC cement.

The conduit ends shall butt or come together for the full circumference thereof.

D4 Open Ends
All open ends of non-metallic conduit shall immediately be capped or plugged to prevent the entrance of moisture until the installation of the electrical conductors, at that time they shall be furnished with standard non-metallic conduit bell ends to prevent damage to the electrical cables and conductors.

Open ends of non-metallic conduit not containing electrical conductors shall be capped or plugged utilizing standard non-metallic conduit caps or plugs.

(E) Testing and Commissioning
Once all replacement sensors have been physically installed and associated cables installed and/or spliced, the Contractor shall be responsible for coordinating and arranging for the sensor manufacturer’s Field Service Engineer to be on-site to perform the testing and commissioning of the newly installed sensors. Testing and commissioning shall include all final hooks ups, powering up of the newly installed sensors, Remote Processing Unit alignment of the sensors and verification of the proper system operation.

All testing and commissioning operations shall be by field service engineer, in the presence of the Engineer. Testing and commissioning shall demonstrate to the satisfaction of the Engineer that the materials and installation of the replacement sensors are in accordance with the Contract. The Contractor shall provide the electrical instruments, apparatus, tools, and labor (including traffic control) as may be necessary to perform the testing and commissioning procedures. Such electrical instruments, apparatus, and tools shall remain the property of the Contractor after the testing and commissioning procedures are completed.

The Contractor shall furnish to the Engineer, in triplicate, signed and dated "Testing and Commissioning Report" for each roadside site where replacement sensors have been furnished and installed as part of the Contract along with the following information:

1. Project numbers and location identification.
2. The data sheet, model number, serial number, and location on the roadway for each pavement sensor that has been installed in this Contract.
3. Completed and signed ESS Operational/Acceptance Test Checklist for each affected RPU site. The Engineer will provide a copy of the ESS Operational/Acceptance Test Checklist to the Contractor.

In the event that the testing and commissioning operations failed, the Engineer may direct the Contractor to replace any part of or the entire sensor and lead-in cable system, all at no expense to the Department. All of the above-mentioned testing and commissioning shall be repeated and recorded for the "revised" Testing and
Commissioning Report. Each replacement sensor and lead-in cable system furnished and installed as part of the Contract shall pass the above-mentioned testing and commissioning and be operational to the satisfaction of the Engineer. These tests shall not preclude the Department from testing each sensor and lead-in cable system with their own test equipment to ensure proper operation.

(F) Restoration and Cleanup

Where damage is caused by the Contractor's operations, the Contractor shall, at no expense to the Department, repair or replace any damaged component parts of an existing electrical system promptly to meet all governing specifications for new construction for the component damaged. Should the Contractor fail to perform the required repairs or replacements, the cost of performing such repairs or replacements will be deducted from any moneys due or becoming due the Contractor.

Sidewalks, curbs and gutters, pavements, base materials, sod, plants, and other items removed, broken, or damaged by the Contractor's construction operations shall be replaced or reconstructed with the same kind or type of original material or material of equal quality. The reconstruction work shall be done in an acceptable manner for the class or type of work involved and shall be undertaken and completed as soon as practicable. All reconstruction work shall be maintained by the Contractor in a satisfactory condition until final acceptance.

S-62.4 MEASUREMENT

The work to be performed at each Roadway Weather Sensor and Cable location will be measured as an integral unit complete at each Road/Weather Sensor and Cable location. Each location being considered as one unit. Measurement will be made by the number of Road/Weather Sensor and Cable locations installed as specified.

S-62.5 PAYMENT

Payment will be made under Item 2013.602 (Road/Weather Sensor and Cable) at the Contract bid price per each, which shall be compensation in full for the surface pavement sensors, sensor cables, sub-surface temperature probes, extension cables, splices, conduit, sealant, labor, tools, materials, testing, commissioning, and all incidentals necessary to complete the work.

S-63 (2013) ROAD WEATHER INFORMATION SYSTEM (R/WIS)

This work shall consist of furnishing, installing, connecting and commissioning a complete new Road Weather Information System (R/WIS) station as specified in the Plans. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

S-63.1 This work includes:

- Furnishing installing a complete Road Weather Information System (RWIS) compatible with the existing MnDOT Statewide RWIS network. The system shall be manufactured by Surface Systems, Inc. (SSI), 11612 Lilbum Park Road, St. Louis, MO 63146, phone: (314) 569-1002.
- Installation shall be in accordance the attached SSI Highway Installation Instructions.
- Furnishing power and telephone service to the site.
- Commissioning and integrating the system into the statewide network.

The system shall include the tip down tower and base, RPU and cabinet, a WIVIS precipitation classifier, air temperature relative humidity sensor, wind sensor monochrome video camera barometric pressure sensor, pavement sensors and subsurface temperature probe. A complete list of materials necessary for these components can be found in the installation manual.
The RPU furnished shall be the most recent version of the Linux RPU as furnished by SSI. The operating system shall be a Linux operating system.

S-63.2 MATERIALS

(A) General

A1 Regulations and Code

All electrical equipment to be furnished shall conform to the standards of the requirements of the NEMA, the Underwriters' Laboratories, Inc. (UL), or the Electronic Industries Association (EIA), whichever is applicable.

Materials, electrical equipment, and workmanship shall conform to the National Electrical Code (NEC), the standards of the American Society of Testing and Materials (ASTM), the standards of the American National Standards Institute (ANSI), the standards of the Institute of Transportation Engineers (ITE), and to local laws and ordinances that apply.

All electrical conductors shall be copper and all wire sizes for electrical conductors shall be based on the American Wire Gauge (AWG).

A2 Warranties, Guarantees, and Instruction Sheets

Warranties and guarantees on new materials and electrical equipment shall apply to the items furnished by the Contractor. Manufacturers' warranties and guarantees furnished for materials and electrical equipment, calibration sheets, and instruction sheets and parts lists supplied with materials and electrical equipment, shall be submitted to the Engineer before final acceptance of the Project or when requested by the Engineer.

The Contractor shall warrant and guarantee all materials and electrical equipment furnished to the Project to be free from defects in materials and workmanship in accordance with the following:

(a) Warranties and guarantees that are offered by the material and electrical equipment manufacturer as a customary trade practice shall be turned over to the Department. The Department shall be named as the oblige on all manufacturers' warranties and guarantees.

(b) The Contractor shall warrant and guarantee satisfactory in-service operation of all materials and electrical equipment for a period of 12-months. The 12-month in-service warranty period shall begin with the completion of the testing and commissioning of the newly installed sensors.

The Contractor shall replace or correct any part or parts of materials and electrical equipment that are found defective within the 12-month in-service warranty period. No compensation will be made to the Contractor for such replacements or corrections.

The above warranty and guarantee requirements shall not apply to any part or parts of materials and electrical equipment that have been, in the opinion of the Engineer, subject to misuse, negligence, or accident by anyone other than the Contractor.

S-63.3 CONSTRUCTION REQUIREMENTS

(A) General

The locations of component parts, as indicated in the Contract, are approximate only. The Engineer will establish the exact locations.
A1 Compliance with Electrical Codes and Standards
Construction operations shall conform to the National Electrical Code, to the State of Minnesota Board of Electricity Examiners, and to all State of Minnesota laws and local ordinances governing electrical installations.

A2 Permits and Inspections
The Contractor shall secure all necessary permits and inspections with no cost to the Department.

Bidders are advised that compliance with MnDOT 1702 will be enforced in conjunction with the construction of any kind or type of electrical system or conduit system for the conveyance of electrical cables and 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.

(B) Testing and Commissioning
The Contractor shall be responsible for coordinating and arranging for the manufacturer's Field Service Engineer to be on-site to perform the testing and commissioning of the new system. Testing and commissioning shall include all final hookups, powering up of the system and sensors, Remote Processing Unit alignment of the sensors and verification of the proper system operation system.

All testing and commissioning operations shall be by field service engineer, in the presence of the Engineer. Testing and commissioning shall demonstrate to the satisfaction of the Engineer that the materials and installation of the replacement sensors are in accordance with the Contract. The Contractor shall provide the electrical instruments, apparatus, tools, and labor (including traffic control) as may be necessary to perform the testing and commissioning procedures. Such electrical instruments, apparatus, and tools shall remain the property of the Contractor after the testing and commissioning procedures are completed.

The Contractor shall furnish to the Engineer, in triplicate, signed and dated "Testing and Commissioning Report" for each roadside site where replacement sensors have been furnished and installed as part of the Contract along with the following information:

1. Project numbers and location identification.
2. The data sheet, model number, serial number, and location on the roadway for each pavement sensor that has been installed in this Contract.
3. Completed and signed ESS Operational/Acceptance Test Checklist for each affected RPU site. The Engineer will provide a copy of the ESS Operational/Acceptance Test Checklist to the Contractor.

In the event that the testing and commissioning operations failed, the Engineer may direct the Contractor to replace any part, all at no expense to the Department. All of the above-mentioned testing and commissioning shall be repeated and recorded for the "revised" Testing and Commissioning Report. operational to the satisfaction of the Engineer. These tests shall not preclude the Department from testing with their own test equipment to ensure proper operation.

(C) Restoration and Cleanup
Sidewalks, curbs and gutters, pavements, base materials, sod, plants, and other items removed, broken, or damaged by the Contractor's construction operations shall be replaced or reconstructed with the same kind or type of original material or material of equal quality. The reconstruction work shall be done in an acceptable manner for the class or type of work involved and shall be undertaken and completed as soon as practicable. All reconstruction work shall be maintained by the Contractor in a satisfactory condition until final acceptance.
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▲ DO NOT DELETE THE ABOVE REVISION DATE. This is how we tell which version of the SP2016 book you used when preparing your specs for your job.

S. P. Number of Your Job goes here

S-63.4 MEASUREMENT
The work to be performed at each Roadway Weather Information System will be measured as an integral unit complete at each Roadway Weather Information System. The system shall be considered as one each. Measurement will be made by the number of Roadway Weather Information Systems installed as specified.

S-63.5 PAYMENT
Payment will be made under Item 2013.602 (Road/Weather Information Station) at the Contract bid price per each, which shall be compensation in full for the tower, base, RPU, power, telephone, all sensors, camera, testing, commissioning, and all incidentals necessary to complete the work.

S-64 (2016) QUALITY MANAGEMENT - PAVER MOUNTED THERMAL PROFILE (PMTP) METHOD
This write-up is to be used when the total contract, net lane miles to be paved for the given specification are greater than or equal to 6; when adequate data cellular coverage is available at least one time per day during paving; and when adequate global navigation satellite system (GNSS) coverage is available throughout the project limits. Note to Designer – The Designer and Construction personnel will decide which specifications (highlighted in the following paragraph) to include to require the PMTP method.

REVISED 08/04/16 - DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-59

Note to Designer – The Designer and Construction personnel will decide which specifications (highlighted in the following paragraph) to include to require the PMTP method.

MnDOT 2360 (Plant Mixed Asphalt Pavement) and 2365 (Stone Matrix Asphalt – SMA) are modified with the following:

S-64.1 DESCRIPTION
This work consists of using the Paver Mounted Thermal Profile (PMTP) Method to continually monitor the surface temperature of the mat immediately behind the paver screed during placement operations.


A Definitions
Refer to Sections 210 “Definitions” in the MnDOT Advanced Materials and Technology Manual for definitions related to the paver mounted thermal profile method not included below.

A.1 ADVANCED MATERIALS AND TECHNOLOGY MANUAL. A Department manual that contains requirements, best practices and examples related to the use of technologies such as the paver mounted thermal profile method, intelligent compaction method and 3D production monitoring for excavation. References to the Advanced Materials and Technology Manual from the contract are to the edition in effect on the letting date.

A.2 AUXILIARY LANE. See MnDOT 1103 “Definitions”. This provision is required only on continuous left turn lanes and passing lanes. Exclude auxiliary lane tapers, ramps, shoulders, cross-overs, non-continuous turn lanes, loops, bypass lanes, acceleration/deceleration lanes and intersecting streets.

A.3 DAILY THERMAL COVERAGE (DTC). The percent of thermal coverage (TC) for the given lot.

A.4 DRIVING LANE. See traffic lane.

A.5 PAVER MOUNTED THERMAL PROFILE (PMTP) METHOD. This method uses a system that continually monitors the surface temperature readings of the mat immediately behind the paver screed during placement operations.
A.6 RANGE. The difference between the surface temperature readings at the 98.5 and 1 percentile.

A.7 SURFACE TEMPERATURE READINGS. The temperatures of the mat immediately behind the paver screed during placement operations.

A.8 THERMAL COVERAGE (TC). The percent of the total paving area, for the given lift, where surface temperature readings (meeting the requirements of this special provision) are collected and stored.

A.9 THERMAL PROFILES. The surface temperature readings and associated GNSS coordinates and time stamps.

A.10 THRU LANE. See traffic lane.

A.11 TRAFFIC LANE. See MnDOT 1103 “Definitions”. This provision is required on all traffic lanes with the exception of traffic lane tapers and roundabouts (including the traffic lane between the roundabout and mainline transition prior to and after the radius point of the roundabout).

A.12 VETA. A standardized intelligent construction data management (ICDM) software that stores, maps and analyzes geospatial data resulting from intelligent compaction, thermal profiling and spot test data (e.g., density, moisture). This software can perform standardized data processing, analysis and reporting to provide Project summary results quickly in the field from various intelligent compaction and thermal profiling manufacturers. In particular, the software can provide statistics, histograms, correlations for these measurements, document coverage area and evaluate the uniformity of compaction and surface temperature measurements as part of the Project quality control operations. Veta can be downloaded from the Advanced Materials and Technology Website.

B Acronyms and Abbreviations
Refer to Section 220 “Glossary of Acronyms and Abbreviations” in the MnDOT Advanced Materials and Technology Manual for the full name or meaning of acronyms and/or abbreviations used within this provision.

S-64.2 MATERIALS – (BLANK)

S-64.3 CONSTRUCTION REQUIREMENTS

A Equipment Requirements

A.1 PMTP System Supplier
Use a thermal equipment supplier that can provide a qualified representative for on-site technical assistance during the initial setup, pre-construction verification, and data management and processing, as needed, during the Project to maintain equipment within specifications and requirements.

A.2 PMTP System Software
Provide the Engineer with access to the cloud storage and cloud computing before the start of paving requiring the PMTP method until ninety (90) days after final acceptance of all work per MnDOT 1516.2.

Use PMTP software, and cloud computing and storage, capable of collecting, mapping, retaining and analyzing the mat temperature readings during placement and exporting thermal profile data meeting the requirements of this provision and supporting the following features:

(1) Filtering by surface temperature reading location (items 8 through N of Table 2016-3 [PMTP]).
(2) Display through a map/graph:
   (2.1) Surface temperature readings across the required width and with respect to a
         user defined sublot length,
   (2.2) Paver speed and
   (2.3) Paver stops (location and duration).
(3) Provide the paving length and duration.

A.3 PMTP System

A.3.a System Requirements
Use a PMTP system that functions independently from the paving crew during normal paving
operations, but requires an operator to initiate the start of data collection. After initializing the equipment, no
operator attendance is required for continuous data collection.

Provide the Engineer with PMTP System(s), calibrated and installed according to Manufacturers
recommendations.

Ensure the PMTP System meets the requirements of Table 2016-1 (PMTP) and is instrumented
with the following:

<table>
<thead>
<tr>
<th>Table 2016-1 (PMTP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMTP System Requirements</td>
</tr>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Longitudinal and Lateral Surface Temperature Readings</td>
</tr>
<tr>
<td>Surface Temperature Readings Total Measurement Width</td>
</tr>
</tbody>
</table>
| Surface Temperature Readings | Range: 32°F (0°C) to 480°F (250°C)
  Accuracy: ± 3.6°F (2°C) or
  ± 2.0% of the sensor reading, whichever is greater. |
| GNSS | Accuracy of measurements on the asphalt mat ≤ ± 4 feet<br>(1.2 m) in the X and Y Direction |

(1) Modem, or Wi-Fi, for transferring data to cloud storage.
(2) Onboard Documentation System – Use an onboard documentation system with a
minimum of the following capabilities:
   (2.1) Display (in real-time) a map of the surface temperature readings, total distance,
paver speed and location in terms of station and/or GNSS coordinates.
   (2.2) Report the surface temperature readings and GNSS status.
   (2.3) Provide real-time statistical summaries of the surface temperature readings.
   (2.4) Have the ability to manually export data using a removable media device.
   (2.5) Allows the operator to define the lot currently being placed per Tables 2016-4<br>(PMTP) and 2016-5 (PMTP).

A.3.b Thermal Profiling Data
Export the thermal profiling data:

(1) as dbase ASCII or Text Format, or
(2) directly into Veta if a file format compatible with Veta is available.
Ensure the PMTP date/time stamp is reflective of the local time zone for both mapped and exported data.

Encrypt the data logged in the results files to prevent tampering or manipulation.

Include the information in Tables 2016-2 (PMTP) in the header of each data file or section. Include the fields in Table 2016-3 (PMTP) with each data point.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Example Data included in Header</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State Project Number, Highway and/or Section</td>
<td>Highway 77</td>
</tr>
<tr>
<td>2</td>
<td>Machine Trade Name</td>
<td>ABC Company</td>
</tr>
<tr>
<td>3</td>
<td>Machine ID (serial number)</td>
<td>1234AC78</td>
</tr>
<tr>
<td>4</td>
<td>Lateral Spacing between surface temperature measurements (feet)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Longitudinal Spacing between surface temperature measurements (inch)</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Vertical Distance between the PMTP system and asphalt pavement mat (inch)</td>
<td>120</td>
</tr>
<tr>
<td>7</td>
<td>Reporting resolution for independent surface temperature data – in the paver moving direction (inch)</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>Number of lateral surface temperature measurements/sensors</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>Number of surface temperature measurement data blocks</td>
<td>5000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Date Field Name</th>
<th>Data Format Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date Stamp (YYYYMMDD)</td>
<td>20080701</td>
</tr>
<tr>
<td>2</td>
<td>Time Stamp (HHMMSS.S -military format)</td>
<td>090504.0 (9 hr 5 min. 4.0 s.)</td>
</tr>
<tr>
<td>3</td>
<td>Longitude (decimal degrees, with at least 6 significant digits)</td>
<td>94.859204</td>
</tr>
<tr>
<td>4</td>
<td>Latitude (decimal degrees, with at least 6 significant digits)</td>
<td>45.227773</td>
</tr>
<tr>
<td>5</td>
<td>Distance (feet)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Direction heading (degree angle, clockwise from the north); or calculated value, in Veta, using values from the other data blocks.</td>
<td>45</td>
</tr>
<tr>
<td>7</td>
<td>Speed (feet per minute or inches per minute)</td>
<td>30.0</td>
</tr>
<tr>
<td>8</td>
<td>Surface temperature Reading/Location 1 (°F)</td>
<td>290</td>
</tr>
<tr>
<td>9</td>
<td>Surface temperature Reading/Location 2 (°F)</td>
<td>295</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
<td>…</td>
</tr>
<tr>
<td>N</td>
<td>Surface temperature Reading/Location N (°F)</td>
<td>300</td>
</tr>
</tbody>
</table>

* Surface temperature readings/locations are numbered from 1 to N, left to right, in the direction of paving.

B Design File
The Engineer will create the background alignment file(s) containing, at a minimum, the following layers: centerline, station text, station tick marks and labeling for exceptions.

Note – Highly accurate horizontal positioning is not required since the required accuracy for the PMTP system is less than or equal to ± 4 ft (1.2 m) (see Table 2016-1 [PMTP]). See Chapter 7 “Alignment” of the MnDOT Design Scene (http://www.dot.state.mn.us/pre-letting/scene/index.html) for further guidance.

The Engineer will provide the following within three (3) working days of Contract approval:

1. 2D-DGN and 2D-KMZ background alignment file(s);
2. County coordinate system used to generate design file(s); and
3. Total lane miles per lift (rounded to the nearest hundredth) for lifts on MnDOT 2360 and/or MnDOT 2365 requiring thermal profiling.

The Engineer is allowed five (5) working days to update files with Engineer approved changes requested by the Contractor.

### C Field Stationing

Ensure that field station markers, when used, match the centerline stationing used in the background alignment design file.

### D PMTP System Setup on Paver(s)

Refer to section 440 “Paver Mounted Paver Mounted Thermal Profile (PMTP) Method” of the Advanced Materials and Technology Manual for recommended system checks of the PMTP System(s) prior to paving.

Instrument all pavers that are paving the traffic and required auxiliary lanes with the PMTP System (see S-xx.3.F). The PMTP system is not required on the secondary paver for instances where echelon paving is used to assist with the paving of auxiliary lanes. Secondary pavers are considered as those pavers that are not used for paving of traffic lanes, but are used for paving of approaches, ramps, intersecting streets, etc.

Ensure that the installed PMTP System takes measurements within 10 ft (3 m) of the trailing edge of the screed plate.

Ensure that brackets and/or other obstructions, used for pavement smoothness, that are located in the measurement area do not affect more than two (2) surface temperature readings recorded in the lateral direction (items number 8 through N in Table 2016-3 [PMTP]).

Verify that the surface temperature readings and the GNSS are working within the requirements of this Special Provision when requested by the Engineer.

### E Definition of Lot and Sublot for Thermal Profiling

#### E.1 Lot Establishment

The Engineer defines a lot as all asphalt paving for a given day, lift, material type and centerline offsets.

Distinctly identify the lots for thermal profile measurements using the standardized format per Tables 2016-4 (PMTP) and 2016-5 (PMTP). Ensure that the lot designations are digitally stored with the associated thermal profile measurements. See section 420 “Lot Establishments” of the Advanced Materials and Technology Manual for examples of the standardized naming convention for lots.
The GNSS coordinates contain the date component of the lot designation, and therefore, it is not included in the standardized naming convention.

<table>
<thead>
<tr>
<th>Standardized Format</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROUTE-MATL-L#-XXX-XXX</td>
<td>Undivided Highways (e.g., TH68-HMA-L1-12L-CL)</td>
</tr>
<tr>
<td>ROUTE-MATL-L#-XXX-XXX-DT</td>
<td>Divided Highways (e.g., TH68-HMA-L1-12L-CL-NB)</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>ROUTE</strong></td>
<td><strong>ROUTE DESIGNATION.</strong> Replace “ROUTE” with the route system, as designated by the following acronyms or short form, immediately followed by the route number (e.g., TH12).</td>
</tr>
<tr>
<td>Acronym or Short Form</td>
<td>Full Name or Meaning</td>
</tr>
<tr>
<td>CR</td>
<td>County Road</td>
</tr>
<tr>
<td>CSAH</td>
<td>County State Aid Highway</td>
</tr>
<tr>
<td>MS</td>
<td>Municipal Street</td>
</tr>
<tr>
<td>MSAS</td>
<td>Municipal State Aid Street</td>
</tr>
<tr>
<td>TH</td>
<td>Trunk Highway</td>
</tr>
</tbody>
</table>

| **MATL** | **MATERIAL/SURFACE TYPE.** The material/surface type is designated by the following acronyms or short form: |
| Acronym or Short Form | Specification | Full Name or Meaning |
| HMA | 2360 | Hot Mix Asphalt |
| WMA | 2365 | Warm Mix Asphalt |
| SMA | 2365 | Stone Matrix Asphalt |

| **L#** | **LIFT NUMBER.** The lift number is designated by the following acronym or short form: |
| Acronym or Short Form | Full Name or Meaning |
| L1 | Lift 1 |
| L2 | Lift 2 |
| L3 | Lift 3 |
| … | … |
| Ln | Lift n |
Table 2016-5 (PMTP)
Standardized Abbreviations for Thermal Profile Lots

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXX-XXX</td>
<td>CENTERLINE OFFSET. The location of the left and right edge of the production area with respect to the centerline, facing in the direction of increasing stationing. Stationing typically increases from West to East and South to North. Each character of the abbreviation is defined as the following:</td>
</tr>
<tr>
<td>(a)</td>
<td>The offset distance (in feet rounded to the whole number) from the centerline to the left edge of the production area (e.g., CL, 12, 24). CL reflects the Center Line.</td>
</tr>
<tr>
<td>(b)</td>
<td>R or L, to reflect Right (R) or Left (L) of Centerline, in the direction of increasing station numbering.</td>
</tr>
<tr>
<td>(c)</td>
<td>The offset distance (in feet rounded to the whole number) from the centerline to the right edge of the production area (e.g., CL, 12, 24). CL reflects the Center Line.</td>
</tr>
<tr>
<td>(d)</td>
<td>R or L, to reflect Right (R) or Left (L) of Centerline, in the direction of increasing station numbering.</td>
</tr>
<tr>
<td>DT</td>
<td>DIRECTION OF TRAVEL. The direction of travel is designated by the following acronyms or short form:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acronym or Short Form</th>
<th>Full Name or Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB</td>
<td>North Bound</td>
</tr>
<tr>
<td>SB</td>
<td>South Bound</td>
</tr>
<tr>
<td>EB</td>
<td>East Bound</td>
</tr>
<tr>
<td>WB</td>
<td>West Bound</td>
</tr>
</tbody>
</table>

E.2 Sublot Establishment Using Veta
Once established, the Engineer will divide the lot into 150 linear ft (45 linear m) sublots. Partial sublots will be treated as follows:

1. Lot \( \geq 150 \) linear ft (45 linear m)
   1.1 Sublot \(< 75 \) linear ft (23 linear m) is combined with the previous sublot.
   1.2 Sublot \( \geq 75 \) linear ft (23 linear m) is treated as one sublot.
2. Lot \(< 150 \) linear ft (45 linear m)
   2.1 Surface temperature readings from lot are treated as one sublot.

Set the sublot “start” and “end” location for the given lot in Veta to correspond with the start and end of paving, respectively. Ensure that these locations are immediately adjacent to the beginning and end of the surface temperature readings.

F Thermal Profile Measurements
Collect thermal profiles on 100 percent of each lift for the following lanes:
(1) **Traffic Lanes** (excluding traffic lane tapers and roundabouts (including the traffic lane between the roundabout and mainline transition prior to and after the radius point of the roundabout) and

(2) the following **Auxiliary Lanes:**

(2.1) **Continuous Left Turn Lanes** and

(2.2) **Passing Lanes**

Thermal profiles are not required on auxiliary lane tapers, ramps, shoulders, cross-overs, non-continuous turn lanes, loops, bypass lanes, acceleration/deceleration lanes and intersecting streets.

Ensure that the PMTP system is not capturing measurements outside of the traffic and required auxiliary lanes, as 100 percent of the recorded data is used in the thermal segregation analysis (see S-xx.3.J.1). Turn the data collection and recording off when not collecting thermal profile measurements.

**G PMTP System Failure**

System Failure occurs when the PMTP system does not meet the following requirements and those outlined in this provision for more than 20 percent of the day’s paving distance that the paver with the PMTP system traveled:

(1) from one (1) or more lateral surface temperature reading per items 8 through N of Table 3, and/or

(2) by the GNSS receiver.

Contact the Engineer verbally, or via e-mail, when PMTP system failure occurs and immediately after resolution of the issues. Additionally, provide the Engineer with a written notification of the dates of PMTP system failure, along with a brief description detailing the PMTP system failure and the paving areas affected by this failure.

The day of PMTP system failure notification and the following two (2) working days are accepted as providing a daily thermal coverage of 100 percent, for each day of this grace period. The daily thermal coverage is considered zero during the subsequent days of PMTP system failure.

No monetary price adjustments for thermal segregation, per Table 2016-10 (PMTP), are made during PMTP system failure.

**H Thermal Profile Analysis Software**

Use the Veta software to plot thermal profile measurements and to determine thermal segregation and coverage. Produce *.VETAPROJ filenames in the **SPXXX-XXX ROUTE PMTP** standardized format per Table 2016-6 (PMTP).
### Table 2016-6 (PMTP)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPXXXX-XXX</td>
<td><strong>STATE PROJECT NUMBER.</strong> Replace the “X’s” with the state project numbers (e.g., SP5509-79).</td>
</tr>
<tr>
<td>ROUTE</td>
<td><strong>ROUTE NUMBER.</strong> Replace “ROUTE” with the route system, as designated by the following acronyms or short form, immediately followed by the route number(s) mapped in the given Veta project. (e.g., TH12, TH12-34, TH12-34-56)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acronym or Short Form</th>
<th>Full Name or Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>County Road</td>
</tr>
<tr>
<td>CSAH</td>
<td>County State Aid Highway</td>
</tr>
<tr>
<td>MS</td>
<td>Municipal Street</td>
</tr>
<tr>
<td>MSAS</td>
<td>Municipal State Aid Street</td>
</tr>
<tr>
<td>TH</td>
<td>Trunk Highway</td>
</tr>
</tbody>
</table>

| PMTP                  | PMTP reflects the paver mounted thermal profile method, the data set contained within the Veta project file. |

*Example *.VETAPROJ filename: SP1234-56 TH78 PMTP

Add the **county name** at the end of the Veta project file name for instances where projects are calibrated for more than one county (e.g., site calibrations are completed in both Carlton and Pine County – two Veta projects are created [SP1234-56 TH78 IC Carlton; SP1234-56 TH78 Pine]).

Create filter groups, operation filter and sublot names using the **LOT# MMDDYY LOTNAME** standardized format per Table 2016-7 (PMTP).

### Table 2016-7 (PMTP)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOT#</td>
<td><strong>LOT NUMBER.</strong> The lot number is a two-digit number increasing sequentially (01, 02, 03, …, n). Create filter groups, operation filters and sublot names in sequential order with respect to the lot dates.</td>
</tr>
</tbody>
</table>

Lots containing Exceptions and/or Temporary Exceptions: Include a capital letter, in alphabetical order (A, B, …), immediately after the two-digit lot number to designate the side of the exception, or temporary exception, that the thermal profile data reflects (e.g., 01A, 01B, 02A, 02B, …).

<table>
<thead>
<tr>
<th>MM</th>
<th>MONTH (include leading zeros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD</td>
<td>DAY OF MONTH (include leading zeros)</td>
</tr>
<tr>
<td>YY</td>
<td>TWO-DIGIT YEAR</td>
</tr>
</tbody>
</table>

| LOTNAME      | **STANDARDIZED LOT NAME** per Table 2016-4 (PMTP) |

* Example Filter Group/Operation Filter Name (lot contains no exceptions):
  01 070915 TH12-HMA-L1-CL-12R, 02 071015 TH12-HMA-L1-CL-12R, …

* Example Filter Group/Operation Filter Name (lot contains an exception):

Temporary exceptions are areas to be paved at a later date.
I  Veta Software Operator Certification

Provide a software operator that is knowledgeable in the use of Veta and has taken the hands-on class and/or an E-Learning class provided by the Engineer. Provide documentation that the software operator has completed the class to the MnDOT Advanced Materials and Technology Unit. Certification expires 3 years from the date of receiving the certification. Certifications will be invalidated (expired) prior to 3 years if significant changes are made to Veta. A list of certified Veta Software Operators, along with expiration dates, is available on the MnDOT Advanced Materials and Technology (AMT) website at: http://www.dot.state.mn.us/materials/amt/veta.html.

J  Calculations

J.1  Thermal Segregation

J.1.a  Surface Temperature Readings

Evaluate thermal segregation using 100 percent of the recorded data for each sublot.

Exclude the following surface temperature readings from each sublot:

1. Surface temperature readings less than 180°F (80°C); and
2. Surface temperature readings within 2 ft (0.5 m) prior to and 8 ft (2.5 m) after paver stops that are greater than 1 minute in length.

J.1.b  Range

Calculate the Range, reported to the nearest tenth degree Fahrenheit, for each sublot per Equation 2016-1 (PMTP):

Equation 2016-1 (PMTP):  \[ \text{Range} = T_{\text{max}} - T_{\text{min}} \]

Where:  \( T_{\text{max}} \) = surface temperature reading at the 98.5 percentile (°F) and  \( T_{\text{min}} \) = surface temperature reading at the 1 percentile (°F).

J.1.c  Thermal Segregation Category

Categorize the surface temperature readings for each sublot with respect to the ranges specified in Table 2016-8 (PMTP). Record the total number of low, moderate and severe sublots for the given lot in electronic form PMTP-102.

<table>
<thead>
<tr>
<th>Range</th>
<th>Thermal Segregation Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt; 25.0°F)</td>
<td>Low</td>
</tr>
<tr>
<td>25.1°F &lt; Range ≤ 50.0°F</td>
<td>Moderate</td>
</tr>
<tr>
<td>50.1°F &lt; Range</td>
<td>Severe</td>
</tr>
</tbody>
</table>

J.2  Thermal Coverage

Calculate thermal coverage for each lift per Equation 2016-4 (PMTP) using form PMTP-101.

J.2.a  Thermal Profile Lot Length

Equation 2016-2 (PMTP):  \[ \text{Thermal Profile Lot Length} = \sum_{i=1}^{n} \text{Sublot Length}_i \]

Where:
● Thermal Profile Lot Length = the total linear length of the surface temperature readings used for the thermal segregation analysis for the given lot, ft (reported to the nearest whole number);
● \(n\) = the total number of sublots; and
● Sublot Length = the linear length of sublot \(i\), ft (reported to the nearest whole number).

J.2.b Thermal Profile Lift Length

Equation 2016-3 (PMTP): \[
\text{Thermal Profile Lift Length} = \sum_{i=1}^{n} (\text{Thermal Profile Lot Length}_i)
\]

Where:
● Thermal Profile Lift Length = the total linear length of the surface temperature readings used for the thermal segregation analysis for the entire lift, ft (reported to the nearest whole number);
● \(n\) = the total number of lots for the entire lift; and
● \((\text{Thermal Profile Lot Length}_i)\) = the total linear length of the surface temperature readings used for the thermal segregation analysis for the given lot \(i\) and lift as calculated by Veta, ft (reported to the nearest whole number). (See Equation 2016-2 [PMTP])

J.2.c Thermal Coverage

Equation 2016-4 (PMTP): \[
\text{Thermal Coverage} = \left( \frac{\text{Thermal Profile Lift Length}}{\text{Lane Miles (LM)}} \right) \times 5280 \times 100
\]

Where:
● Thermal Coverage = see S-xx.1.A.8, \% (reported to the nearest whole number);
● Thermal Profile Lift Length = see Equation 2016-3 (PMTP), ft (reported to the nearest whole number); and
● Lane Miles (LM) = Total number of lane miles for the given lift requiring thermal profiling, miles (reported to the hundredth).

J.3 Monetary Price Adjustment

J.3.a Thermal Coverage (TC)

Calculate monetary price adjustments for thermal coverage for the given lift and material type per Table 2016-9 (PMTP). Surface temperature readings that do not have associated GNSS coordinates are not used in the calculations to determine thermal coverage.

<table>
<thead>
<tr>
<th>Table 2016-9 (PMTP)</th>
<th>Monetary Price Adjustment for Thermal Coverage (TC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Coverage (%) (Form PMTP-101)</td>
<td>Total Price Adjustment Per Lift and Material Type</td>
</tr>
<tr>
<td>(\geq 70)</td>
<td>No Price Adjustment</td>
</tr>
<tr>
<td>(&lt; 70)</td>
<td>Total Price Adjustment (Disincentive) = ((20 \times \text{TC} - $1400) \times (\text{LM}))</td>
</tr>
</tbody>
</table>

where:
\(\text{TC} = \) Thermal Coverage, see S-xx.3.J.2.e and \(\text{LM} = \) Lane Miles, see S-xx.3.J.2.e.
J.3.b Thermal Segregation
Calculate monetary price adjustments for thermal segregation per Table 2016-10 (PMTP). Surface temperature readings that do not have associated GNSS coordinates are not be used in the calculations to determine thermal segregation categories of sublots per Table 2016-8 (PMTP). Prorate monetary price adjustments for sublot linear length, as established in S-xx.3.E.2, that are not equal to 150 linear feet.

Record the monetary price adjustment for the given lot in electronic form PMTP-102.

<table>
<thead>
<tr>
<th>Thermal Segregation Category</th>
<th>Adjustment per 150-ft Sublot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>$20 incentive</td>
</tr>
<tr>
<td>Moderate</td>
<td>No pay adjustment</td>
</tr>
<tr>
<td>Severe</td>
<td>$20 disincentive</td>
</tr>
</tbody>
</table>

K Submittals

K.1 Thermal Profiling Data Submittal
Store the thermal profiling data internally until transfer of data. Transfer the thermal profiling data directly from the PMTP to Cloud Storage within 15-minute intervals, or at least once per day when there is limited cellular coverage.

Notify the Engineer when cellular coverage is limited or not available.

Transfer the thermal profiling data directly to the Engineer at the end of daily paving when cellular coverage is not available.

K.2 Veta Projects
Submit daily Veta projects (updated to include the previous day’s lots and all prior lots) to the Engineer two (2) working days from the given day of paving requiring the PMTP method. Ensure Veta project includes the following:

(1) Alignment File
(2) Surface Temperature Readings
(3) Filter Groups per:
   (3.1) lot (e.g., 01 090415 TH12-HMA-L1-12L-CL),
   (3.2) lane and per lift (e.g., TH12-HMA-L1-12L-CL) and
   (3.3) lift (e.g., TH12-HMA-L1)
(4) Operation Filters per lot (e.g., 01 090415 TH12-HMA-L1-12L-CL)
(5) Data Filter (Temperature ≥ 180°F)
(6) Sublot Filters per lot (e.g., 01 090415 TH12-HMA-L1-12L-CL)
(7) Override Filters per paver per:
   (7.1) lift (e.g., TH12-HMA-L1 Paver ID) and
   (7.2) lane and per lift (e.g., TH12-HMA-L1-12L-CL Paver ID)

Note – the override filters are needed for cases where more than one paver (paving in Echelon) is instrumented with the PMTP system.

Submit the final version of the Veta Project(s) within 14-calendar days of completion of paving efforts requiring the PMTP method.
L.4  Forms

Submit forms PMTP-101 and PMTP-102 within 14-calendar days of completion of paving efforts requiring the PMTP method.

S-64.4  METHOD OF MEASUREMENT – (BLANK)

S-64.5  BASIS OF PAYMENT

The Contract lump sum prices for the thermal profiling include all costs related to this Special Provision.

Interruptions in the availability of MnCORS VRS Network and/or satellite signals to operate this system will not result in any reduction to the daily thermal coverage or adjustment to the “Basis of Payment” for any construction items or to Contract time.

The Department will pay for the thermal profiling on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016.601</td>
<td>Quality Management.................................................................</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

S-65  (2016) QUALITY MANAGEMENT SPECIAL – INTELLIGENT COMPACTION (IC) METHOD

This write-up is to be used: when the total contract, net lane miles requiring compaction for the given specification are greater than or equal to 6; when adequate data cellular coverage is available at least one time per day during the compaction efforts; when adequate global navigation satellite system (GNSS) coverage is available throughout the project limits; and on 2353, only when used in conjunction with 2360. Note to Designer – The Designer and Construction personnel will decide which specifications (highlighted in the following paragraph) to include to require the IC method.

Note to Designer – The Designer and Construction personnel will decide which specifications (highlighted in the following paragraph) to include to require the IC method.

MnDOT 2215 Stabilized Full Depth Reclamation (SFDR), 2331 Cold-In-Place Recycled Bituminous (CIR), 2353, 2360 and 2365 are modified with the following:

S-65.1  DESCRIPTION

This work consists of using the Intelligent Compaction (IC) Method to continually monitor compaction efforts during grading and/or asphalt paving operations.


A  Definitions

Refer to Section 210 “Definitions” in the MnDOT Advanced Materials and Technology Manual for definitions related to the intelligent compaction method not included below.

A.1  ADVANCED MATERIALS AND TECHNOLOGY MANUAL. A Department manual that contains requirements, best practices and examples related to the use of technologies such as the paver mounted thermal profile method, intelligent compaction method and 3D production monitoring for excavation. References to the Advanced Materials and Technology Manual from the contract are to the edition in effect on the letting date.
A.2 AUXILIARY LANE. See MnDOT 1103 “Definitions”. This provision is required only on continuous left turn lanes and passing lanes. Exclude auxiliary lane tapers, ramps, shoulders, cross-overs, non-continuous turn lanes, loops, bypass lanes, acceleration/deceleration lanes and intersecting streets.

A.3 CUMULATIVE MEASUREMENT PASS COUNT. The gridded final coverage data for pass count (the number of passes). The pass count reflects the number of roller passes in one area of the mat (e.g., 0.3 m by 0.3 m [1 ft by 1 ft area]), not the total number of passes across the width of the mat for a given roller.

A.4 LOT ROLLER COVERAGE (LRC). The percent of roller coverage (RC) for the given lot.

A.5 DRIVING LANE. See traffic lane.

A.6 GRIDDED ALL PASSES DATA. Includes all measurement passes recorded for a given grid.

A.7 GRIDDED FINAL COVERAGE DATA. Data that summarizes the final (last) measurement pass recorded for a given grid (e.g., total pass count, last stiffness, last temperature). Grid sizes are typically at a mesh size of 1 ft (0.3 m) in the X and Y direction for post-processed data.

A.8 INTELLIGENT COMPACTION. Compaction efforts completed using an instrumented roller.

A.9 INSTRUMENTED ROLLER. A self-propelled roller integrated with a global position monitoring system and onboard documentation system that can display real-time color-coded maps of roller location, number of passes, roller speeds, and amplitude and vibration frequencies of the roller drum. Some systems are also equipped with drum vibration instrumentation, infrared temperature sensors, and/or Automatic Feedback Control. The onboard documentation system on these rollers would also display real-time color-coded maps of stiffness response or pavement surface temperatures, or both.

A.10 LAYER. The total thickness of each material type. It may be comprised of single or multiple lifts.

A.11 LIFT. A unit of material within a layer that is placed for compaction.

A.12 MEASUREMENT PASS. A roller pass, performed by an instrumented roller, where all required information, per this provision, is recorded in a data file.

A.13 ROLLER COVERAGE (RC). The percent of required compaction area where the minimum required cumulative measurement pass count is achieved.

A.14 THRU LANE. See traffic lane.

A.15 TRAFFIC LANE. See MnDOT 1103 “Definitions”. This provision is required on all traffic lanes with the exception of traffic lane tapers and roundabouts (including the traffic lane between the roundabout and mainline transition prior to and after the radius point of the roundabout).

A.16 VETA. A standardized intelligent construction data management (ICDM) software that stores, maps and analyzes geospatial data resulting from intelligent compaction, thermal profiling and spot test data (e.g., density, moisture). This software can perform standardized data processing, analysis and reporting to provide Project summary results quickly in the field from various intelligent compaction and thermal profiling manufacturers. In particular, the software can provide statistics, histograms, correlations for these measurements, document coverage area and evaluate the uniformity of compaction and surface temperature measurements as part of the Project quality control operations. Veta can be downloaded from the Advanced Materials and Technology Website.
B  Acronyms and Abbreviations
Refer to Section 220 “Glossary of Acronyms and Abbreviations” in the MnDOT Advanced Materials and Technology Manual for the full name or meaning of acronyms and/or abbreviations used within this provision.

S-65.2  MATERIALS – (BLANK)

S-65.3  CONSTRUCTION REQUIREMENTS
The Department does not guarantee the accuracy and compatibility of electronic data provided by the Department. The Plan documents, originally provided with the Contract, remain the basis of the Contract. The Contractor is responsible for any necessary conversions of the provided electronic data.

A  Equipment Requirements

A.1  Intelligent Compaction System Requirements
Use instrumented rollers calibrated according to Manufacturer’s recommendations and meeting the requirements of Tables 2016-1 (IC) and 2016-2 (IC). Refer to section 430 “Intelligent Compaction Method” in the Advanced Materials and Technology Manual for recommended system checks of each instrumented roller prior to compaction efforts.

Intelligent compaction systems from multiple manufacturers are allowed; however, use systems from the same manufacturer on rollers working in tandem.

Use intelligent compaction software, and cloud computing, capable of mapping and exporting gridded all passes and gridded final coverage data meeting the requirements of this provision and supporting the following features:

(1) Filtering by: instrumented roller, date and time stamp, and lot designation.
(2) Creating boundaries.
(3) Calculation of gridded final coverage data using filtered data (e.g., gridded final coverage for a given roller and lot; gridded final coverage within the entire Project limits).

Provide the Engineer with access to the cloud storage and cloud computing prior to the start of compaction efforts requiring the IC method until ninety (90) days after final acceptance of all work per MnDOT 1516.2.
Table 2016-1 (IC)
Required Instrumented Roller Equipment

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
<th>Instrumented Rollers</th>
<th>Instrumented Roller Components</th>
<th>Onboard Documentation System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Required</td>
<td>GNSS</td>
<td>Accelerometer</td>
</tr>
<tr>
<td>2215 (SFDR),</td>
<td>Self-Propelled, Vibratory: Smooth, Single-Drum Steel</td>
<td>Required *</td>
<td>Required †</td>
<td>None</td>
</tr>
<tr>
<td>2331 (CIR)</td>
<td>Smooth, Double-Drum Steel Pad (Sheep’s) Foot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2215 (SFDR),</td>
<td>Self-Propelled, Pneumatic Roller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2331 (CIR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2353, 2360, 2365</td>
<td>Self-Propelled, Vibratory: Smooth Double-Drum Steel</td>
<td>Required †</td>
<td>Required †</td>
<td>Required</td>
</tr>
<tr>
<td>2360, 2365</td>
<td>Self-Propelled, Pneumatic Roller</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Instrument all rollers used in locations requiring the intelligent compaction method with the technology, where the total contract, net lane miles requiring compaction, for the given specification, are greater than or equal to 6. Instrumented rollers are required on 2353 only when intelligent compaction is required on 2360.

† Use the intelligent compaction method during the duration of compaction efforts in areas requiring this method.

‡ Capability to use the County Coordinate System file for site calibration.

§ Instrument rollers with one non-contact, temperature sensor, mounted on or near, the front of the roller for measuring pavement surface temperatures. A second temperature sensor may be mounted on, or near, the rear.

# The modem or Wi-Fi is used for transferring data to cloud storage.

** Use an onboard document system with a minimum of the following capabilities:

1. Displays real-time, color-coded maps of: line work (alignment file), roller drum location, number of roller passes, intelligent compaction measurement value (ICMV) for systems with an accelerometer, and pavement surface temperature for systems with temperature sensors.
2. Displays and store current value for: roller speed, vibration frequency, vibration amplitude, GNSS coordinates, and pass count.
3. Ability to internally store data until data transfer, to automatically transfer data to cloud storage, and to manually transfer data using a removable media device.
4. Allows operator to define, label, and/or select the standardized name of each lot.
### Table 2016-2 (IC)

<table>
<thead>
<tr>
<th>Operating Parameter</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNSS</td>
<td>± 2 in (50 mm) in the X and Y Direction</td>
</tr>
<tr>
<td>Rolling Speed</td>
<td>± 0.3 mph (0.5 kph)</td>
</tr>
<tr>
<td>Frequency</td>
<td>± 2 Hz</td>
</tr>
<tr>
<td>Amplitude</td>
<td>± 0.008 in (0.2 mm)</td>
</tr>
<tr>
<td>Temperature</td>
<td>± 2.7°F (±1.5°C)</td>
</tr>
</tbody>
</table>

### Intelligent Compaction Measurement Pass Data

Export gridded all passes and gridded final coverage data:

1. as dbase ASCII or Text Format, or
2. directly into Veta if a file format compatible with Veta is available.

Include the information in Table 2016-3 (IC) in the header of each data file or section, or with each data point. Include the fields listed in Table 2016-4 (IC) with each data point.

### Table 2016-3 (IC)

<table>
<thead>
<tr>
<th>Data Field Name</th>
<th>Data Format Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Identification</td>
<td>SPXXXX-XX</td>
</tr>
</tbody>
</table>

### Table 2016-4 (IC)

| Data Field Name * || Data Format Examples |
|-------------------||----------------------|
| Date Stamp †      | 20080701              |
| Time Stamp †      | 214622.962            |
| (HHMMSS,SS –military format) | (21 hr 46min. 22.96 s.) |
| Roller Trade Name | Roller Model          |
| Roller ID         | serial number, machine ID |
| Northing (Y) (ft) ‡ | 153328.47             |
| Easting (X) (ft) ‡ | 524195.65             |
| Height (Z) (ft) ‡ | 909.85                |
| GPS Mode          | RTK Fixed             |
| Roller Pass Number (calculated from Grid) | 2 |
| Roller Direction  | Forward, Reverse (or an index) |
| Roller Speed      | 4.0                   |
| Vibration On      | Yes, No, On, Off (or an index) |
| Frequency         | 38.4                  |
| Amplitude         | 0.6                   |
| Surface Temperature § | 120                |
| Intelligent Compaction Measurement Value (ICMV) ** | 20.0 |

* Include measurement units in a header or as part of the field name.
|| Use a data mesh size of 18 in (450 mm) or less in the X and Y directions for post-
Table 2016-4 (IC)
Required Fields in Gridded All Passes and Gridded Final Coverage Data Files for Each Data Point

<table>
<thead>
<tr>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>processed data.</td>
</tr>
<tr>
<td>† Ensure the intelligent compaction system’s date/time stamp is reflective of the local time zone for both mapped and exported data.</td>
</tr>
<tr>
<td>‡ Collect the XYZ coordinates, unless otherwise specified, in the County Coordinate System used in the background alignment file(s) using NAD83 (adjustment as specified by the Department) and NAVD88 vertical datum.</td>
</tr>
<tr>
<td># Coordinates indicate the left and right edge of the roller drum, or can be used to determine the left and right roller drum edge.</td>
</tr>
<tr>
<td>$ Surface temperature measurements are required for rollers instrumented with temperature sensors.</td>
</tr>
<tr>
<td>** ICMVs are required for rollers instrumented with accelerometers.</td>
</tr>
</tbody>
</table>

**B** Control Points
The Engineer will set temporary control points, prior to the Project start date, meeting the following requirements. Permanent control points meeting the following requirements can be used; however, the Engineer will collect coordinates for these points to ensure that there have been no disturbances.

1. Two (2) control points, at the start and at the end of the Project (totaling four).
2. Control points spaced at a maximum of every 3 miles within 150 feet of centerline. Alternate the control points on each side of the alignment. **Contact the contractor to determine whether the number of control points can be reduced. Some intelligent compaction systems allow for an increase in spacing between control points.**
3. All control points have a clear line of site to satellites to allow for calibration.
4. Five (5) of the control points, meeting the following requirements (the remaining control points may be two dimensional [2D]):
   4.1 Three Dimensional (3D),
   4.2 Accuracy ≤ 0.1 ft in the X-, Y- and Z-Direction,
   4.3 Equally spaced throughout the Project and
   4.4 One (1) control point at the start and end of the Project.
5. The remaining control points with an accuracy of ≤ 0.1 ft in the X- and Y-Direction.

The Engineer will provide control point coordinate information in a *txt or *csv format, for both the permanent and temporary control points, 7 working-days prior to the start of compaction efforts. The Engineer will include the following information in the file(s):

1. Point Name
2. X coordinate (Easting)
3. Y coordinate (Northing)
4. Z coordinate (Elevation)
5. Point Code / Description

The Engineer will also include available MnDOT Geodetic Data Sheets that are relevant to the Project limits and the MN County Coordinate System file and name of the zone used to establish the control points.

**C** Design File
The Engineer will create the background alignment file(s) containing at a minimum, the following layers: closed complex shapes; centerline; station text; tick marks; and labeling for exceptions. See Chapter 7 “Alignment” of the MnDOT Design Scene [http://www.dot.state.mn.us/pre-letting/scene/index.html](http://www.dot.state.mn.us/pre-letting/scene/index.html) for guidance on creation of the complex shapes.
Ensure horizontal positioning of the line work is within ± 2 in (50 mm).

The Engineer will provide the following within three (3) working days of Contract approval:

1. 2D-DGN and 2D-KMZ background alignment file(s);
2. County coordinate system used to generate design file(s); and
3. Total lane miles per lift (rounded to the nearest hundredth) for lane miles requiring the intelligent compaction method.

The Department is allowed five (5) working days to update files with Department approved changes requested by the Contractor.

Load the alignment file onto the onboard documentation system of each instrumented roller and into the cloud computing mapping software.

D Field Stationing
Ensure that field station markers, when used, match the centerline stationing used in the background alignment design file.

E Site Analysis, Setup and Calibration
Complete the site setup and calibration prior to compaction efforts.

Use the County Coordinate System file for the site calibration.

F Definition of Lot and Sublot for Measurement Passes

F.1 Lot Establishment
The Engineer defines a lot as all measurement passes for a given day, material type, lift and centerline offsets for 2353, 2360 and 2365.

The Engineer defines a lot as all measurement passes for a given material type and lift for MnDOT 2215 (SFDR) and 2331 (CIR) for undivided highways. The Engineer defines a lot as all measurement passes for a given material type, lift and direction of travel for MnDOT 2215 (SFDR) and 2331 (CIR) for divided highways.

Distinctly identify the lots for measurements passes using the standardized format per Tables 2016-5 (IC) and 2016-6 (IC). Ensure that the lot designations are digitally stored with the associated measurement pass data. See section 420 “Lot Establishments” of the Advanced Materials and Technology Manual for examples of the standardized naming convention for lots.

The Engineer will create complex shape layers in the background alignment file(s) for each traffic and required auxiliary lane. Notify the Engineer, fourteen calendar days prior to the start of compaction efforts, if different production widths are anticipated (e.g., 18-ft paving).

The GNSS coordinates contain the date component of the lot designation, and therefore, are not included in the standardized naming convention.
Table 2016-5 (IC)
Standardized Naming Convention for Measurement Passes Lots

<table>
<thead>
<tr>
<th>Standardized Format*</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROUTE-MATL-L#-XXX-XXX</td>
<td>Undivided Highways (e.g., TH68-HMA-L1-12L-CL)</td>
</tr>
<tr>
<td>ROUTE-MATL-L#-XXX-XXX-DT</td>
<td>Divided Highways (e.g., TH68-HMA-L1-12L-CL-NB)</td>
</tr>
</tbody>
</table>

* Add an additional designation behind the ROUTE for instances where more than one site calibration is needed within the project limits (e.g., a site calibration was completed for the northern and southern limits of the project – a “N” and “S” would be added behind the ROUTE [TH68N-HMA-L1-12L-CL, TH68S-HMA-L1-12L-CL]).

Table 2016-6 (IC)
Standardized Abbreviations for Measurement Passes Lots

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROUTE DESIGNATION.</td>
<td>Replace “ROUTE” with the route system, as designated by the following acronyms or short form, immediately followed by the route number (e.g., TH12).</td>
</tr>
<tr>
<td><strong>Acronym or Short Form</strong></td>
<td><strong>Full Name or Meaning</strong></td>
</tr>
<tr>
<td>CR</td>
<td>County Road</td>
</tr>
<tr>
<td>CSAH</td>
<td>County State Aid Highway</td>
</tr>
<tr>
<td>MS</td>
<td>Municipal Street</td>
</tr>
<tr>
<td>MSAS</td>
<td>Municipal State Aid Street</td>
</tr>
<tr>
<td>TH</td>
<td>Trunk Highway</td>
</tr>
</tbody>
</table>

MATERIAL/ SURFACE TYPE. The material/surface type is designated by the following acronyms or short form:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Acronym or Short Form</th>
<th>Full Name or Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2215</td>
<td>SFDR-P</td>
<td>Stabilized Full Depth Reclamation – Pulverization per 2215.3.C.3</td>
</tr>
<tr>
<td>2215</td>
<td>SFDR-I</td>
<td>Stabilized Full Depth Reclamation – Mixing/Injecting per 2215.3.C.6</td>
</tr>
<tr>
<td>2331</td>
<td>CIR</td>
<td>Cold In-Place Recycled Bituminous</td>
</tr>
<tr>
<td>2353</td>
<td>UTBWC</td>
<td>Ultrathin Bonded Wearing Course</td>
</tr>
<tr>
<td>2360</td>
<td>HMA</td>
<td>Hot Mix Asphalt</td>
</tr>
<tr>
<td>2360</td>
<td>WMA</td>
<td>Warm Mix Asphalt</td>
</tr>
<tr>
<td>2365</td>
<td>SMA</td>
<td>Stone Matrix Asphalt</td>
</tr>
</tbody>
</table>
### Table 2016-6 (IC)

#### Standardized Abbreviations for Measurement Passes

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L#</strong></td>
<td>LIFT NUMBER. The lift number is designated by the following acronym or short form:</td>
</tr>
<tr>
<td></td>
<td>Acronym or Short Form</td>
</tr>
<tr>
<td></td>
<td>L1</td>
</tr>
<tr>
<td></td>
<td>L2</td>
</tr>
<tr>
<td></td>
<td>L3</td>
</tr>
<tr>
<td></td>
<td>...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XXX-XXX</th>
<th>CENTERLINE OFFSET. The location of the left and right edge of the production/compaction area with respect to the centerline, facing in the direction of increasing stationing. Stationing typically increases from West to East and South to North. Each character of the abbreviation is defined as the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) The offset distance (in feet rounded to the whole number) from the centerline to the left edge of the production area (e.g., CL, 12, 24). <strong>CL</strong> reflects the Center Line.</td>
</tr>
<tr>
<td></td>
<td>(b) R or L, to reflect Right (R) or Left (L) of Centerline, in the direction of increasing station numbering.</td>
</tr>
<tr>
<td></td>
<td>(c) The offset distance (in feet rounded to the whole number) from the centerline to the right edge of the production area (e.g., CL, 12, 24). <strong>CL</strong> reflects the Center Line.</td>
</tr>
<tr>
<td></td>
<td>(d) R or L, to reflect Right (R) or Left (L) of Centerline, in the direction of increasing station numbering.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DT</th>
<th>DIRECTION OF TRAVEL. The direction of travel is designated by the following acronyms or short form:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acronym or Short Form</td>
</tr>
<tr>
<td></td>
<td>NB</td>
</tr>
<tr>
<td></td>
<td>SB</td>
</tr>
<tr>
<td></td>
<td>EB</td>
</tr>
<tr>
<td></td>
<td>WB</td>
</tr>
</tbody>
</table>

### F.2 Sublot Establishment (Blank)

### G Intelligent Compaction Measurement Passes

Complete measurement passes on 100 percent of the following lanes and per the requirements of Table 2016-7 (IC):
(1) Traffic Lanes (excluding traffic lane tapers and roundabouts (including the traffic lane between the roundabout and mainline transition prior to and after the radius point of the roundabout) and

(2) the following Auxiliary Lanes:
   (2.1) Continuous Left Turn Lanes and
   (2.2) Passing Lanes

Measurement passes are not required on auxiliary lane tapers, ramps, shoulders, cross-overs, non-continuous turn lanes, loops, bypass lanes, acceleration/deceleration lanes and intersecting streets.

<table>
<thead>
<tr>
<th>Specification *</th>
<th>Measurement Pass Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2215 (SFDR), 2331 (CIR)</td>
<td>All roller passes on each lift.</td>
</tr>
<tr>
<td>2353, 2360, 2365</td>
<td></td>
</tr>
<tr>
<td>* Input (or select) the lot identification, using the on-board display, prior to compacting the given material.</td>
<td></td>
</tr>
</tbody>
</table>

Complete measurement passes on control strips. Provide the Engineer with the date, location and time frame that the control strip compaction was completed to delineate data from the production data set.

Turn data collection and recording off when not performing measurement passes.

Provide the Engineer immediate viewing of the measurement pass data on the instrumented roller’s onboard documentation system upon request.

**H Instrumented Roller Failure**

Instrumented roller failure occurs when the instrumented roller system does not collect and/or store data per the requirements of this provision and/or the roller becomes inoperable.

Contact the Engineer verbally, or via e-mail, when instrumented roller failure occurs and immediately after resolution of the issues. Additionally, provide the Engineer with written notification of the dates of instrumented roller failure, along with a brief description detailing the instrumented roller failure and the compaction areas affected by this failure.

The day of instrumented roller failure notification and the following two (2) working days are accepted as providing a roller coverage of 100 percent for the given roller, for each day of this grace period. The roller coverage is reflective of the actual measurements during subsequent days of instrumented roller failure for the given roller.

**I Coordinates**

The Engineer will use a rover to collect coordinates for the boundaries of each lot for MnDOT 2353, 2360 and 2365 and of exceptions for MnDOT 2215 (SFDR), 2331 (CIR), 2353, 2360 and 2365. The Engineer will record coordinates per form IC-106.

The Engineer may use a rover to collect the following coordinates:

(1) Verification/quality assurance test locations where the intelligent compaction method is required (e.g., density cores, dynamic cone penetrometer, nuclear gauge, light weight deflectometer). Record coordinates per form IC-107.

(2) Boundaries of areas requiring corrective action (record coordinates per form IC-105).

**J Intelligent Compaction Analysis Software**
Use the Veta software to plot measurement pass data and to determine roller coverage. Produce *.VETAPROJ filenames in the SPXXXX-XXX ROUTE IC standardized format per Table 2016-8 (IC).

<table>
<thead>
<tr>
<th>Table 2016-8 (IC) Standardized Naming Convention for *.VETAPROJ Files *</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abbreviation</strong></td>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>SPXXXX-XXX</td>
<td>STATE PROJECT NUMBER. Replace the “X’s” with the state project numbers (e.g., SP1234-56).</td>
</tr>
<tr>
<td>ROUTE</td>
<td>ROUTE NUMBER. Replace “ROUTE” with the route system, as designated by the following acronyms or short form, immediately followed by the route number(s) mapped in the given Veta project. (e.g., TH12, TH12-34, TH12-34-56)</td>
</tr>
<tr>
<td>Acronym or Short Form</td>
<td>Full Name or Meaning</td>
</tr>
<tr>
<td>CR</td>
<td>County Road</td>
</tr>
<tr>
<td>CSAH</td>
<td>County State Aid Highway</td>
</tr>
<tr>
<td>MS</td>
<td>Municipal Street</td>
</tr>
<tr>
<td>MSAS</td>
<td>Municipal State Aid Street</td>
</tr>
<tr>
<td>TH</td>
<td>Trunk Highway</td>
</tr>
<tr>
<td>IC</td>
<td>IC reflects the intelligent compaction method, the data set contained within the Veta project file.</td>
</tr>
</tbody>
</table>

*Example *.VETAPROJ filename: SP1234-56 TH78 IC

Add the county name at the end of the Veta project file name for instances where projects are calibrated for more than one county (e.g., site calibrations are completed in both Carlton and Pine County – two Veta projects are created [SP1234-56 TH78 IC Carlton; SP1234-56 TH78 Pine]).

Designate filter groups and operation filter names using the LOT# MMDDYY LOTNAME standardized format per Table 2016-9 (IC).
### Table 2016-9 (IC)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOT#</td>
<td>LOT NUMBER. The lot number is a two-digit number increasing sequentially (01, 02, 03, …, n). Create filter groups and operation filters in sequential order with respect to the lot dates. Lots containing Exceptions and/or Temporary Exceptions: Include a capital letter, in alphabetical order (A, B, …), immediately after the two-digit lot number to designate the side of the exception, or temporary exception, that the measurement pass data reflects (e.g., 01A, 01B, 02A, 02B, …).</td>
</tr>
<tr>
<td>MM</td>
<td>MONTH (include leading zeros)</td>
</tr>
<tr>
<td>DD</td>
<td>DAY OF MONTH (include leading zeros)</td>
</tr>
<tr>
<td>YY</td>
<td>TWO-DIGIT YEAR</td>
</tr>
<tr>
<td>LOTNAME</td>
<td>STANDARDIZED LOT NAME per Table 2016-5 (IC) *</td>
</tr>
</tbody>
</table>

* Example Filter Group/Operation Filter Name (lot contains no exceptions): 01 070915 TH12-HMA-L1-CL-12R, 02 071015 TH12-HMA-L1-CL-12R, …


Temporary exceptions are areas with grading and/or paving completed at a later date.

### K Veta Software Operator Certification

Provide a software operator that is knowledgeable in the use of Veta and has taken the hands-on class and/or an E-Learning class provided by the Engineer. Provide documentation that the software operator has completed the class to the MnDOT Advanced Materials and Technology Unit. Certification expires 3 years from the date of receiving the certification. Certifications will be invalidated (expired) prior to 3 years if significant changes are made to Veta. A list of certified Veta Software Operators, along with expiration dates, is available on the MnDOT Advanced Materials and Technology (AMT) website at: [http://www.dot.state.mn.us/materials/amt/veta.html](http://www.dot.state.mn.us/materials/amt/veta.html).

### L Calculations

#### L.1 Roller Coverage

Determine roller coverage, independently for each manufacturer’s intelligent compaction system, using the cumulative measurement pass count recorded by the instrumented rollers for each lift of the compaction areas as required per S-xx.3.G.

Roller coverage is achieved when the cumulative measurement pass count is greater than or equal to one (1) (measurement pass) times the number of instrumented rollers used for the given lot. Instrumented rollers working in tandem are counted as one (1) instrumented roller.

Evaluate roller coverage for each manufacturer’s intelligent compaction system independently for compliance with Table 2016-10 (IC).

Calculate lot roller coverage for each lot per Equation 2016-1 (IC). Calculate the lot roller coverage on each side of an exception separately for a lot extending through exception(s).

**Equation 2016-1 (IC):**

\[
\text{Lot Roller Coverage} = \left( \frac{\text{Lot Area Covered}}{\text{Required Lot Area}} \right) \times 100
\]

Where:
Lot Roller Coverage = see S-xx.1.A.4, % (reported to the tenth);
Lot Area Covered = the total measurement pass area where roller coverage was achieved for
the given lot, square feet (reported to the nearest whole number); and
Required Lot Area = total area requiring measurement passes for the given lot, square feet
(reported to the nearest whole number).

Calculate roller coverage for each lift of a given material per Equation 2016-2 (IC).

Equation 2016-2 (IC): Roller Coverage = \( \frac{\sum_{i=1}^{n}(\text{Lot Area Covered}_i)}{\sum_{i=1}^{n}(\text{Required Lot Area}_i)} \) \times 100
Where:
Roller Coverage = see S-xx.1.A.13, % (reported to the tenth);
n = the total number of lots for the entire lift and given material type;
Lot Area Covered = the total measurement pass area where roller coverage was achieved for
lot \( i \), square feet (reported to the nearest tenth); and
Required Lot Area = total area requiring measurement passes for lot \( i \), square feet (reported to the nearest tenth).

L.2 Monetary Price Adjustment – Roller Coverage (RC)
Calculate the monetary price adjustments for roller coverage per Table 2016-10 (IC).

<table>
<thead>
<tr>
<th>Roller Coverage (%)</th>
<th>Total Price Adjustment Per Lift and Material Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \geq 70 )</td>
<td>No Price Adjustment</td>
</tr>
</tbody>
</table>
| \( < 70 \) | Total Price Adjustment (Disincentive) = \( 20 \times \text{RC} - \$1400 \) \times (LM) where:
| | \( \text{RC} \) = Roller coverage for the given lift, % (reported to the tenth)
| | \( \text{LM} \) = Total number of lane miles for the given lift requiring the intelligent compaction method, miles (reported to the hundredth) |

M. Submittals

M.1 Intelligent Compaction Data Submittal
Store the measurement pass data internally until transfer of data. Transfer the data directly from
the roller to the cloud storage within 15-minute intervals, or at least once per day when there is limited cellular
coverage.

Notify the Department when cellular coverage is limited or not available.

M.2 Coordinates
The Engineer will provide the lot boundary coordinates weekly per form IC-106.

M.3 Veta Projects
Submit daily Veta projects (updated to include the previous day’s lots and all prior lots) to the Engineer two (2) working days from the given day of compaction efforts requiring the IC method. Ensure Veta projects includes the following:

1. **Alignment File**
2. **Gridded All Passes Data**
3. **Filter Groups** per:
   - (3.1) lot (e.g., 01 090415 TH12-HMA-L1-12L-CL),
   - (3.2) lane and per lift (e.g., TH12-HMA-L1-12L-CL All Machines) and
   - (3.3) lift (e.g., TH12-HMA-L1 All Machines)
4. **Operation Filters** per Lot (e.g., 01 090415 TH12-HMA-L1-12L-CL). Update the Location Filter within each Operation Filter two (2) working days upon receipt of the lot boundary coordinates from the Engineer.
5. **Override Filters per roller** per:
   - (5.1) lift (e.g., TH12-HMA-L1 CB634D CDF00461) and
   - (5.2) lane and per lift (e.g., TH12-HMA-L1-12L-CL CB634D CDF00461)

Submit the final version of the Veta Project(s) within 14-calendar days of completion of compaction efforts requiring the IC method.

**M.4 Forms**

Submit form IC-108 within 14-calendar days of completion of compaction efforts requiring the IC method.

**S-65.4 METHOD OF MEASUREMENT – (BLANK)**

**S-65.5 BASIS OF PAYMENT**

The Contract lump sum prices for the intelligent compaction method includes all costs related to this Special Provision.

Interruptions in the availability of MnCORS VRS Network and/or satellite signals used to operate this system will not result in any reduction to the lot roller coverage (lot area covered and required lot area) or adjustments to the “Basis of Payment” for any construction items or to Contract time.

The Department will pay for the intelligent compaction method on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016.601</td>
<td>Quality Management Special</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

**S-66 (2031) FIELD OFFICE AND LABORATORY**

*Use only when requested to by District. District needs to choose which of the following equipment to use.*

*SP2016-61*

In addition to the field office furnishings listed in MnDOT 2031.3B1, the Contractor shall furnish the State with the following equipment for use by MnDOT Project personnel:

(A) **Fax**

1. 30 page auto document feeder
2. Transmission speed - 15 seconds
3. 10 pages of memory
4. Telephone hand set with Fax/Phone switching
S-66.1 The equipment and accessories furnished are subject to approval by the Engineer.

S-66.2 Should the above equipment become damaged beyond repair or stolen, the Contractor shall provide an equivalent replacement within three (3) working days of the loss or the use of the equipment during the life of the Contract. Replacement shall be incidental. All repairs needed to this equipment shall be made by the Contractor within the above specified time at no direct cost to the State during the life of this Contract.

S-66.3 The above equipment will be returned to the Contractor ninety (90) days after final acceptance of all Contract work is made in accordance with MnDOT 1516.4.

S-66.4 The above equipment will be included for payment under Item 2031.501 (Field Office Type □) or under Item 2031.503 (Field Laboratory Type □).

S-67 (2031) FIELD OFFICE AND LABORATORY – BROADBAND SERVICES

The designer should consider the following:

If wireless access will be required, the designer must modify the provision as needed.

For Broadband service needs,

- Duration of project
- Size of staff
- Location
- Minimum bandwidth speeds to be required. (Consult with local MIS on available options).
  Suggested speeds:
  - 1-15 Staff = 768k
  - 16 and above Staff = 1.5M

SP2016-62 In addition to the requirements set forth in MnDOT 2031.3, the Contractor shall provide the following for exclusive use by State personnel for the entire length of the Contract including periods of work suspension:

S-67.1 GENERAL REQUIREMENTS OF CONTRACTOR

The Contractor shall provide MnDOT with the information required by the Internet Service Provider (ISP) to authorize communication between the ISP and MnDOT technical staff for purposes of problem resolution. This information shall include the name of the provider, a phone number for technical support and the account number as a minimum. The Contractor shall determine if additional information will be required from the ISP. This information shall be in writing and shall be provided to the Engineer at the Pre-Construction meeting.

S-67.2 BROADBAND SERVICES TECHNICAL REQUIREMENTS

The Contractor shall provide the following service:

- Minimum bandwidth size shall be (district to insert)
- Terminating in an Ethernet connection
- Static Public IP Address(es) – For Internet Use
  - (Minimum of two assignable host addresses, one for the remote VPN firewall, one for the ISP Gateway)
Required IP addressing information provided to MnDOT for remote VPN firewall Configuration:
   o IP address (Static Assignable Host Range)
   o ISP Gateway Address
   o Subnet Mask

ISP Modem Hardware – Firewall configuration settings must be manageable, allowing for the firewall security level to be set to “off”.

S-67.3 MnDOT will provide the Hardware for Remote VPN Access/Wireless Access.

S-67.4 The above equipment will be returned to the Contractor ninety (90) days after final acceptance of all Contract work is made in accordance with MnDOT 1516.4.

S-67.5 The above equipment will be included for payment under Item 2031.501 (Field Office Type__) or under Item 2031.503 (Field Laboratory Type__) or Item 2031.602 (Combination Field Laboratory - Office).

S-68 (2031) COMBINATION FIELD LAB - OFFICE
The Designer needs to fill in the type of service required under S-4. Use S-.3A(6) ONLY when a credit card will be used for long distance phone calls.

SP2016-63 A combination Field Lab - Office shall be furnished in accordance with the provisions of MnDOT 2031 except as modified below:

S-68.1 A combination Field Lab - Office may be one unit containing both a field lab and a field office.

S-68.2 The Combination Field Lab - Office shall be constructed and equipped to all provisions of MnDOT 2031.3A except as modified below:

   (A) Minimum total exterior dimensions shall not be less than 256 square feet [23.8 m²].
   (B) Minimum total exterior dimensions for the Field Lab area shall not be less than 160 square feet [14.9 m²].
   (C) Minimum total exterior dimensions for the Field Office area shall not be less than 96 square feet [8.9 m²].
   (D) Field Lab and Field Office areas shall be separated by a wall to effectively isolate the Field Lab from the Field Office.

S-68.3 In addition to the requirements set forth above, each combination Field Lab - Office shall be equipped to meet all the provisions of MnDOT 2031.3B1 (Field Office Furnishings) and MnDOT 2031.3B2 (Field Laboratory Furnishings) except as modified below:

   (A) Field Office Furnishings
      (1) One (1) desk with minimum total exterior dimensions of 30 by 90 inches [750 x 2300 mm].
      (2) Two or more file drawers.
(3) One (1) drafting desk having top dimensions not less than 36 by 48 inches [900 x 1200 mm]. It shall be commercially built, tilt or slant top desk of the wall mounted, pedestal or cabinet style.

(4) Shelf space totaling at least 8 linear feet [2.4 m] of open shelving not less than 12 inches [300 mm] in width.

(5) One (1) drafting stool and sufficient desk chairs, swivel type, to utilize all desks and provide seating for at least two additional persons.

Use S-.3A(6) ONLY when a credit card will be used for long distance phone calls.

(6) The Contractor shall provide local telephone service in the field office only for the duration of the Contract. Provisions shall be made to ensure all long distance phone calls shall be made using credit card only. Payment for local telephone service will be considered incidental.

(B) Field Laboratory Furnishings

(1) One (1) sturdily built work bench with minimum dimensions of 30 by 84 inches [750 x 2100 mm].

(2) Shelf space above work bench or at other convenient locations, totaling a minimum of 8 linear feet [2.4 m] (8 inch [200 mm] minimum width).

S-68.4 In addition to the requirements set forth above, the Combination Field Lab - Office shall meet the requirement of MnDOT 2031.3C with Type __ Service.

S-68.5 Measurement will be made by the number of combination field labs - offices furnished as specified. Payment will be under Item 2031.602 (Combination Field Laboratory - Office) at the Contract bid price per each, which shall be compensation in full for all costs relative thereto. In the event the Contractor utilizes two separate units to meet the above requirements for the Combination Field Lab - Office, they will be measured for payment as one unit.

S-69 (2041) ON-THE-JOB-TRAINING PROGRAM

Special Provisions will determine how many trainees will be on the project. (Use only on Fed. Funded jobs which are 100 working days or over in length and $1 million or more in cost. (If the job is a completion date project, go to chart 3 located on the last page of http://www.dot.state.mn.us/const/documents/Productionrates_000.pdf to determine the number of working days on the job. If in 1806, the District has used calendar days instead of working days or a completion date, then use that calendar day number to determine if trainees are required. The calendar day number must be over 100.))

This write-up is for MnDOT projects ONLY.

SP2016-64

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 for the purpose of developing full journeymen in the type of trade involved. THE NUMBER OF HOURS OF TRAINING TO BE FULFILLED UNDER THIS CONTRACT WILL BE ____; UTILIZING AT LEAST ______ TRAINEES. In the event the Contractor subcontracts a portion of the work, the Contractor must determine how much of the training requirement will be
fulfilled by the subcontractor. Despite a subcontractor agreement, the Contractor remains the primary party responsible for meeting the training requirements imposed by this special provision. The Contractor must ensure that these provisions are incorporated into its subcontracts. If 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 is required to complete all sections of the “On-the-Job Training (OJT) Program Approval Form”. The Apparent Low Bidder must submit the completed form to the MnDOT Office of Civil Rights. FORMS ARE DUE NO LATER THAN 4:30 PM CENTRAL TIME ON THE FIFTH BUSINESS DAY FOLLOWING THE DATE SPECIFIED FOR BIDS TO BE DUE. The form can be found in the attached Equal Employment Opportunity (EEO) Special Provisions and on the MnDOT Office of Civil Rights website - http://www.dot.state.mn.us/civilrights/pdf/ojt/ojt-programapproval.pdf. The Contractor will receive credit for each trainee currently enrolled and new enrollees in an approved program and will be reimbursed accordingly.

THE completed OJT PROGRAM APPROVAL FORM MUST BE SUBMITTED by one of the following methods:

a) E-mail: christian.guerrero@state.mn.us; place the State Project number in the subject line

b) Fax: Christian Guerrero at 651-366-3129

CONTRACTORS PARTICPATING IN THE MNDOT ON-THE-JOB (OJT) TRAINING ALTERNATIVE PROGRAM MUST RECEIVE PRIOR WRITTEN APPROVAL FROM THE OFFICE OF CIVIL RIGHTS. AN APPROVED CONTRACTOR IN THE 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” AS INSTRUCTED ABOVE. The trainees approved under the 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 it took to recruit minority and women trainees 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 employee 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 must 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 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, and/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 include, but are not limited to, 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 MnDOT’s Office of Civil Rights, and must include a minimum of 500 training hours but shall not 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 MnDOT’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 MnDOT’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 lay-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. All required forms needed to satisfy the requirements of these Special Provisions can be found in the attached EEO Special Provisions, on the MnDOT 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 requirements in the contract and 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 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 MnDOT’s OJT Supportive Services Programs. In conjunction with any employees recruited from MnDOT’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 MnDOT’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 MnDOT Office of Civil Rights. The ratio of trainee to mentor may not exceed 3 to 1. A listing of MnDOT’s OJT Supportive Services Programs can be found on the Office of Civil Rights website cited above.

S-70  
(MAINTENANCE AND RESTORATION OF HAUL ROADS)  
(Absolutely no changes can be made to the language in this write-up!!)

The provisions of MnDOT 2051 are supplemented by the following:

S-70.1 In addition to the amount the Contractor bids for Item 2051.501 (Maintenance and Restoration of Haul Roads), the State agrees to reimburse the Contractor at the predetermined unit prices set forth below for materials ordered by the Engineer. All materials ordered by the Engineer for the Maintenance and Restoration of haul roads will be measured as set forth in the applicable section of the Standard Specifications.

Each of the following materials measured as provided above, will be paid for at the following predetermined unit prices:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Unit Price (in dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2118.501</td>
<td>Aggregate Surfacing Class 1</td>
<td>$7.00/ton ($7.72/t)</td>
</tr>
<tr>
<td>2130.501</td>
<td>Water</td>
<td>$10.00/1000 gal. ($2.50/m³)</td>
</tr>
<tr>
<td>2131.502</td>
<td>Calcium Chloride Solution</td>
<td>$0.50/gal. ($0.14/liter)</td>
</tr>
<tr>
<td>2211.501</td>
<td>Aggregate Base Class 5</td>
<td>$7.00/ton ($7.72/t)</td>
</tr>
<tr>
<td>2360.501</td>
<td>Type SP 12.5 Wearing Course Mixture (4, B)</td>
<td>$27.95/ton ($30.81/t)</td>
</tr>
<tr>
<td>2231.501</td>
<td>Bituminous Patching Mixture</td>
<td>$47.00/ton ($51.70/t)</td>
</tr>
</tbody>
</table>

Crushing will not be required in the production of Class 1 material.

The above prices will be considered to be compensation in full for furnishing and providing the materials complete in place, including, but not limited to, royalty, waste, equipment rental, labor, overhead, profit, and incidentals. When materials other than those listed above are ordered by the Engineer, they will be paid for as extra work in accordance with MnDOT 1402.5, with the Contractor and the Department sharing equally in the costs. Separate payment will not be made for costs of blading and reshaping necessary for the maintenance and restoration of haul roads. The cost of such work shall be incidental.

The above shall be performed to restore visible damage.
S-71  (2101) CLEARING AND GRUBBING

Use either S-.1 or S-.2 when it has been determined that there are Long Eared Bats in the project limits. District to choose when to use either of these.

S-71.1 The Contractor will complete clearing operations for this project between November 1 and March 31.

S-71.2 The Contractor will complete clearing operations for this project between August 16 and May 31.

District to choose which of the following paragraphs to use on the Project

S-71.3 The Landscape Unit of the Office of Environmental Stewardship has reviewed this Project for possible plant material salvage. All transplanting will be done by MnDOT Maintenance forces prior to the Contract starting date. All remaining plant material shall be removed and disposed of according to the Standard Specifications.

S-71.4 The trees indicated in the Plan to be removed will be affected by construction of this Project and cannot be saved. The Contractor shall remove only those trees necessary to be removed to construct this Project. All other trees shall be protected from damage during construction.

S-71.5 The Forester has reviewed the in place plantings affected by the Project and provided written recommendations. Some trees were recommended for transplanting, and MnDOT Maintenance and the City of ___________ will transplant what they can use. All remaining plantings shall be removed and disposed of according to the Standard Specifications.

S-71.6 The Contractor shall remove only those trees necessary to be removed to construct this Project. All other trees shall be protected from damage during construction.

S-71.7 The Contractor shall take special care to preserve existing trees and shrubs wherever possible. This may include careful grading operations, slight adjustments of slopes, and placing snow fence at tree drip lines. Snow fence has been provided in the Contract to help preserve trees and shrubs. Snow fence placement is shown in especially sensitive locations.

S-71.8 MnDOT personnel from the Office of Environmental Stewardship will review tree and shrub preservation with the Contractor and the Engineer at the time of the staking for the clearing and grubbing operations.

S-71.9 All trees of landscape or transplantable size have been paid for as part of the Right of Way Settlements by the City and are to be removed also. The property owners will have the responsibility of providing replacements.

S-71.10 The following trees and shrubs will be transplanted by MnDOT Maintenance forces prior to the Contract starting date:

Insert list of trees and shrubs here.
S-72  (2102) PAVEMENT MARKING REMOVAL

Lead Work - Use S-.1 only when requested by District. Use S-.2 when there is any pavement marking removal on the job. Construction needs to choose which option at the end of S-.2 is to be used.

The provisions of MnDOT 2102 are modified and/or supplemented with the following:

Use S-.1 only when requested by District.

S-72.1 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 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:


(B) Protective Clothing
Provide protective clothing for MnDOT inspectors in any area with lead exposure above 30 μg/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 inspectors to wash at the site. If showers are provided for the Contractor's employees, they must be available for MnDOT's 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 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 for this delay.

Use S-.2 when there is any pavement marking removal on the job.

S-72.2 MnDOT 2102.3 is hereby deleted and replaced with the following:

Before making a change in traffic pattern, remove conflicting pavement markings as required by the contract and as directed by the Engineer without damaging the pavement structure or surface texture. If determined by the Engineer, repair damaged areas as directed by the Engineer at no additional cost to the Department.

Remove pavement markings on the basis of nominal widths and actual lengths as originally applied and still visible at the time of pavement marking removal. Remove irregularly shaped markings by enclosing them within rectangular boundaries of least dimension as determined by the Engineer.

Control or restrict operations to avoid exposing traffic to hazardous conditions in accordance with 1701, “Laws to be Observed,” 1707, “Public Convenience and Safety,” and 1717, “Air, Land, and Water
Pollution.” Remove expended materials or agents used in the pavement marking removal process from the pavement surface as the work progresses. Dispose of removed marking material in accordance with 1701, “Laws to be Observed,” and 1717, “Air, Land, and Water Pollution.”

Removed pavement marking material shall become the property of the Contractor.

**Construction needs to choose which option shown below is to be used.**

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

**OR**

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

**OR**

All Pavement marking removal shall be done utilizing water-blasting equipment.

**OR**

All Pavement marking removal shall be done utilizing sandblasting equipment.

**OR**

All Pavement marking removal shall be done utilizing grinding equipment.

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**S-73 (2103) BUILDING REMOVAL**

*Use SP2016-69 (CONSTRUCTION WASTE MANAGEMENT AND DEBRIS RECYCLING REQUIREMENTS) when needed. Always use SP2016-72 (REMOVE TANK) with this write-up.*

SP2016-68

The building and basement removal shall be performed in accordance with the provisions of MnDOT 2103, except as modified and supplemented below. All asbestos and regulated waste/material assessments and removal shall be in accordance with all applicable rules/regulations and MnDOT Policy. See Section S-1701 (LAWS TO BE OBSERVED (BUILDING REMOVALS OR MOVES)) of these Special Provisions for additional information.

S-73.1 All asbestos and/or regulated waste shall be disposed of in accordance with Section S-1701 (LAWS TO BE OBSERVED (BUILDING REMOVALS OR MOVES)) of these Special Provisions

S-73.2 Building removal shall consist of removing from the Right of Way the buildings listed in the Plans under each separate parcel number and shall be construed to include the tabulated miscellaneous removals at the location(s) indicated in the Plans. Miscellaneous removal and disposal operations shall be performed consistent with the applicable provisions of MnDOT 2104.

If during the course of the building removal process, additional asbestos materials or regulated wastes, other than that noted in the Plans or Special Provisions are encountered, the Contractor shall notify the MnDOT Project Engineer who shall suspend work and the Contractor shall furnish a documented inspection consistent with Section S-1701 (LAWS TO BE OBSERVED (BUILDING REMOVALS OR MOVES)) of these Special Provisions. The work, as outlined in this paragraph, will be paid for as Extra Work.
Use for Out-state
S-73.3 Appointments for viewing the building may be arranged by contacting Mr. ___________, MnDOT District Right of Way Representative, (Put in Dist. i.e. Brainerd, etc.), telephone ___________.

Use for Metro
S-73.4 Appointments for viewing the building may be arranged by contacting Rebecca Swenson, MnDOT District Right of Way Representative, Metro, telephone (651) 234-7598.

S-73.5 It is required that building demolition contractors, housemovers and buyers, and their authorized sub-contractors be required to carry a copy of the MnDOT Contract approval letter when working on or in MnDOT owned houses and buildings.

S-73.6 All hazardous and regulated waste/s shall be removed prior to any sale, demolition or moving of houses. All material shall be removed, identified, and disposed of in accordance with Section S-1701 (LAWS TO BE OBSERVED (BUILDING REMOVALS OR MOVES)) of these Special Provisions. The Contractor will not receive permission to begin the removals, with the exception of material needed for hazardous and regulated waste assessment or testing, until the MnDOT Project Engineer has copies of all required notices.

S-73.7 The Contractor will not be allowed to proceed with the demolition or moving of buildings until the MnDOT Project Engineer has received copies of all required notifications as indicated in Section S-1701 (LAWS TO BE OBSERVED (BUILDING REMOVALS OR MOVES)) of these Special Provisions.

Use S-.8 on building removals that have had asbestos testing done by the District. District to supply asbestos & reg. waste assessment summary report. (Attachment may have a different name. If it does make sure to rename it here.)
S-73.8 See the attached "Asbestos and Regulated Waste Assessment Summary" for information on whether or not asbestos or regulated waste was detected in the building(s) and must be removed.

The assessment summary included with the Plan or Special Provisions are intended for informational purposes. Quantity, type and analysis of any asbestos or regulated waste containing material are estimates intended as a general guide.

Use S-.9 when regulated waste is present in the building(s) to be removed but the regulated waste abatement process will be completed before contract award. When using S-.9 do not use S-.8.
S-73.9 Hazardous Materials encountered at the subject properties will be abated under separate contract prior to the commencement of this Building Removal Contract.

S-73.10 FAILURE TO COMPLY WITH NOTIFICATION PROVISIONS WILL BE DEEMED A MATERIAL BREACH OF CONTRACT. IN THE EVENT THAT A REGULATORY AGENCY IMPOSES MONETARY SANCTIONS ON MnDOT THAT ARE BASED, IN WHOLE OR IN PART, UPON THE ACTS OR OMISSIONS OF THE CONTRACTOR, THE CONTRACTOR AGREES TO INDEMNIFY MnDOT AND TO HOLD MnDOT HARMLESS FOR SAME, EXCEPT TO THE EXTENT THAT ANY SANCTIONS WERE CAUSED BY MnDOT’S OWN NEGLIGENCE.
S-74 (2103) CONSTRUCTION WASTE MANAGEMENT AND DEBRIS RECYCLING REQUIREMENTS

This writeup should be included for all building demolition projects. District needs to edit S-.3 for their project.

SP2016-69

The Contractor is required to provide a construction waste management plan which shall stipulate the process to be used for waste reduction and recycling of construction demolition debris. The requirements of MnDOT 2103 and Section S-2103 (BUILDING REMOVAL) of these Special Provisions are supplemented with the following:

S-74.1 The Contractor will use facilities that separate building components off site unless the contractor can show not cost effective. MnDOT approved off site building recycling companies can be found at: http://www.dot.state.mn.us/environment/buildingbridge/index.html under Approved contractors.

S-74.2 The Contractor shall develop a Construction Waste Management Plan (CWM) for the work prior to any demolition and waste removal commencing. Submit the CWM plan to the Engineer. The Engineer will review and accept the plan. The CWM plan shall contain the following information:

(A) The Contractor shall designate a person who shall be responsible for overseeing and documenting results of the CWM plan. Provide a contact name and telephone number to the Engineer.

(B) The Contractor shall identify the construction debris waste management company(s) who will be used to recycle each material as required in Section S-.3.

(C) The plan shall stipulate if the construction debris will be sorted in separate debris boxes onsite or disposed of in one box and sorted and recycled at an off-site sorting facility. Provide the name address and telephone number of the offsite sorting facility.

(D) The plan shall stipulate what materials the Contractor intends to recycle and where each type of material shall be disposed of as specified in Section S-.3.

(E) A copy of the CWM plan shall remain onsite at all times until the Building Removal and demolition is complete.

(F) MnDOT shall receive (2) two copies of the CWM plan, with an enclosed electronic copy, which shall be provided to the Project Engineer.

S-74.3 The Contractor shall recycle/salvage/reuse the following materials: [DISTRICT TO EDIT FOR THEIR PROJECT.]

1. Bituminous pavement
2. Concrete pavement
3. Concrete block
4. Brick
5. Wood
6. Packaging and cardboard
7. Asphalt shingles
8. Steel, copper, aluminum and all other ferrous and non-ferrous metals.
9. Gypsum board
10. Plaster
11. Glass
12. Carpet and carpet pad
13. Trees, shrubs and brush clearing if mulched and reused.

The Contractor may elect to salvage materials for reuse. Provide a list of materials removed from the Project site, the intended reuse and their approximate weights on the attached Demolition Debris Recycling Form. See Section S-.5.
The materials listed herein shall be recycled, salvaged or reused and not disposed of in a MPCA permitted demolition landfill.

The Contractor may use only recyclers approved by MnDOT. Reference Approved Vendors list at: http://www.dot.state.mn.us/environment/regulatedmaterials/pdf/waste-contractors.pdf

S-74.4 The Contractor may elect to provide separate debris boxes onsite or provide one debris box that will be taken to a sorting facility offsite. If the Contractor elects to provide separate debris boxes onsite all boxes must be clearly labeled with the material each box shall be designated to hold. All boxes shall be monitored daily to avoid illegal dumping by the public.

S-74.5 The Contractor shall submit the Demolition Debris Recycling Form once a month. The Contractor shall also provide documentation of the movement and disposal of demolition debris, including copies of all manifest, weight tickets, receipts and invoices. The project shall be clearly identified on all documentation. Documentation shall be submitted regardless of the disposal method used to determine the percentage of materials recycled.

S-75 (2104) REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES

SP2016-70 Abandoned structures and other obstructions shall be removed from the Right of Way and disposed of in accordance with the provisions of MnDOT 2104, except as modified below:

Use the following paragraph when there are 2104 pay items on the plan.
S-75.1 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 1402.5.

Use the following paragraph when there are no 2104 pay items on the plan.
S-75.2 All removal and disposal operations shall be incidental. 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 1402.5.

Use only when requested to by District
S-75.3 All removals shall be disposed of by the Contractor outside the Right of Way in accordance with MnDOT 2104.3D3 to the satisfaction of the Engineer.

Use only when there is a Remove Sidewalk pay item
S-75.4 Sawing of sidewalks needed for removal shall be incidental.
S-76  **(2104) REMOVE AND HAUL TREATED WOOD**
The designers should include this write-up whenever the project has work associated with known or suspected sources of treated wood such as but not limited to the following: noise walls, guard rail posts, fence posts, pilings, building demolition, temporary wooden bridge decks.

SP2016-71

If the Contractor is required to dispose of treated wood, the provisions of MnDOT 2104 are supplemented with the following:

S-76.1  The Contractor can elect to reuse the treated wood for its original intended purpose. The Contractor shall furnish a completed Transfer of Ownership form to the Engineer prior to removing any treated wood from the Project limits. The Transfer of Ownership form is available at the following website: http://www.dot.state.mn.us/environment/buildingbridge/index.html.

S-76.2  If the Contractor cannot or elects not to re-use the treated wood for its original intended purpose, but must be disposed, the following shall apply:

(A)  The Contractor shall dispose of all waste treated wood in a MPCA permitted Minnesota solid waste or industrial landfill or landfills listed under Landfills/Regulated Waste at http://www.dot.state.mn.us/environment/buildingbridge/index.html. The Contractor shall not dispose of waste treated wood in a demolition landfill. Within 30 days after the treated wood is transported to the landfill, the Contractor shall provide the Engineer with shipping manifests, scale tickets and invoices. Shipping manifests shall include, but are not limited to, the following information: specify treated wood as the type of waste, quantity of wood, date of hauling and disposal, and location of disposal.

(B)  The Contractor has the option to chip creosote treated wood on site instead of hauling it to a landfill. After the wood is chipped on site, the Contractor shall transport the chipped wood off site to a MPCA permitted incinerator that is permitted to burn creosote treated wood. Call 651.366.3630 for list of incinerators permitted to burn creosoted treated wood. This applies to creosote treated wood only.

S-76.3  Measurement and payment for the removal and disposal of treated wood will be made only when specifically included for payment as such in the Proposal and as listed in the Plans. All other removal and disposal of treated wood operations shall be incidental.

S-77  **(2104) REMOVE TANK**
Always use with any building, tank, or tank component removals.

Let Carolyn Boben (D1, D2, D3, Metro East, Metro North) or Sarah Jarman (D4, D6, D7, D8, Metro South, Metro West) know about all projects with tank removals so they can get any special provision changes to us. For example, if tanks contain non-petroleum products, these provisions will need to be changed. If it is a locally led project, the provisions may also need to be changed pending the agreement between MnDOT and the local agency.

REVISED 09/25/15  ▲ DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-72

MnDOT 2104.3.C.4 is hereby deleted and replaced with the following:

C.4  **PETROLEUM STORAGE TANKS**
Contractor shall completely remove all petroleum storage tanks and associated piping systems in accordance with applicable regulations and MnDOT requirements as specified herein. Some of the following requirements may be more stringent than current Minnesota Pollution Control Agency (MPCA) requirements. Any questions regarding the requirements shall be directed to Carolyn Boben (D1, D2, D3, Metro East, Metro North) at 651-366-3621 or Sarah Jarman (D4, D6, D7, D8, Metro South, Metro West) at 651-366-3609.
MnDOT will hire the tank system removal oversight consultant who will:

1. Verify the appropriate notifications have been made before removal.
2. Conduct oversight of the removal and collect required samples as necessary.
3. Verify appropriate change in status documents have been completed.

C.4.a Petroleum Storage Tanks

The Contractor shall:

1. Hire a MnDOT approved storage tank contractor to perform the removal, cleaning, and disposal of the tank(s). MnDOT approved tank contractors can be found under the “MnDOT Approved List of Waste Contractors” at: http://www.dot.state.mn.us/environment/regulatedmaterials/wastemgmt.html
2. Obtain all required permits and complete all required notifications.
3. Provide a copy of the draft "Notification/Change in Status for Underground Storage Tanks" form to the Engineer at least 48 hours ahead of submitting to the MPCA for the Engineer to review/comment prior to submittal to MPCA. Contractor shall make changes/revisions based on Engineer’s comments and submit to MPCA and copy Engineer, no later than 10 days prior to removal of any part of the petroleum storage tank system.
4. Have a MPCA Certified Supervisor on site during petroleum storage tank removal.
5. The tank and contents will be managed in a way where no spills occur to the ground. If any spills occur, cleanup and all costs relative thereto will be the responsibility of the Contractor.
6. Drain all connecting pipes and collect drained fuel for proper reuse or disposal.
7. Remove tank contents and containerize for proper recycling.
8. Remove all explosive vapors from the tank.
9. Manage tank and tank contents in accordance with applicable US DOT Hazardous Materials Transport requirements.
10. Manage removed petroleum contents at a MnDOT approved fuel recycling facility found at: http://www.dot.state.mn.us/environment/regulatedmaterials/wastemgmt.html.
11. Manage clean metal tanks dismantled on-site by recycling them as metal scrap; if fiberglass, dispose in MPCA permitted landfill.
12. Provide a signed, dated copy of the shipping paper for petroleum storage tank contents to the Engineer no later than 10 days after delivery of recyclable fuel to the recycling facility.
13. Provide written certification and/or a signed, dated shipping paper for dismantled tank disposal at a metal scrap recycler to the Engineer no later than 10 days after delivery of a dismantled tank to the recycler.
14. Provide a signed copy of the "Notification/Change in Status for Underground Storage Tanks" form to the Engineer within 15 days of the tank removal. Engineer will obtain signatures from MnDOT’s tank system removal oversight consultant and submit back to Contractor. Contractor shall submit the final document to the MPCA and copy Engineer, no later than within 30 days after removal of the tank.

C.4.b Measurement includes tank removal and submittal of completed notifications. Payment will be made according to the following schedule: 80% will be paid after the tank and contents have been removed and properly disposed reused or, and 20% will be paid following receipt of all copies of required notifications.
S-78  (2104) ABATE ASBESTOS-CONTAINING PIPES OR CULVERTS

Use on all jobs that have excavation on them.
Mark Vogel (651-366-3630) or Jackie Klein (651-366-3637) should be contacted before any revisions to this special provision are made.

SP2016-73

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).

S-78.1 ACM MANAGEMENT

(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/index.html 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-78.2 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 or landfills listed under Landfills/Regulated Waste at http://www.dot.state.mn.us/environment/buildingbridge/index.html at the MnDOT Approved List of Waste Contractors link 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-78.3 MEASUREMENT AND PAYMENT
Measurement will be made from center to center of junction fittings, catch basins, or manholes, and will include the length of any aprons required to be removed in conjunction therewith. Payment will be made under Item 2104.501 (Abate Asbestos-Containing Pipes) at the Contract bid price per linear foot [meter], 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.

OR (Use if no payment specified in plans)

When asbestos-containing pipes or culverts are encountered during excavation, the Contractor shall notify MnDOT Project Engineer who shall suspend work. The Contractor shall furnish a documented inspection and evaluation by a MnDOT approved certified MDH contractor prior to the resumption of work. All testing and, if necessary, removal of Asbestos Containing Pipes or Culverts will be paid for as Extra Work.

S-79 (2104) ABESTOS CONTAINING WASTE MATERIAL ABATEMENT
Use when requested by District.
NEW WRITING 06/03/16 ◀DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.
SP2016-73.1

Contractor will retain an asbestos abatement contractor from the MnDOT approved list of asbestos containing waste materials (ACWM) abatement contractors found at: http://www.dot.state.mn.us/consult/prequal/documents/pqbyworktype.pdf under 19.5. All disturbance or removal of the ACWM will be managed as regulated ACWM. The asbestos abatement contractor will perform abatement and disposal of ACWM to ensure compliance with all applicable federal and state regulations. All ACWM 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 prior to abatement activities. Mark Vogel (651-366-3630) shall be contacted before any revisions to this
special provision are made. Under this provision the disturbance or removal of the asbestos containing material (ACM) will be managed as regulated asbestos containing waste material. All asbestos containing waste material 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 prior to abatement activities. Mark Vogel (651-366-3630) or Jackie Klein (651-366-3637) shall be contacted before any revisions to this Special Provision are made.

S-79.1 CONTRACTOR WILL:

(A) Act as the Authorized Agent of the Minnesota Department of Transportation and make application for, sign, and secure any and all permits, notifications, etc. Responsible for all permit fees associated with the work performed.

(B) Abate, transport, and dispose of asbestos containing waste materials (ACWM). The work will be conducted under oversight provided by the State’s Oversight Contractor (retained by State under separate contract).

S-79.2 ASBESTOS CONTAINING WASTE MATERIALS (ACWM) ABATEMENT AND MANAGEMENT

(A) State’s Oversight Contractor will:

1. Stake the limits of excavation at the locations of the ACWM for removal and GPS coordinates.
2. Sign all shipping papers prior to the ACWM being transported off site.
3. Prepare and provide the Emission Control Plan (ECP) in accordance with all applicable MPCA requirements to the Engineer and Contractor prior to any excavation activities.
4. Provide oversight of abatement, transport and disposal of ACWM.

(B) Contractor will:

1. Schedule and coordinate all work with the Engineer and State’s Oversight Contractor.
2. When excavating soil contaminated with asbestos containing material, treat the entire soil volume as asbestos containing material. NO HAND SEPARATING OF ACWM IS ALLOWED IN THE ACWM IMPACTED AREA unless approved by State’s Project Manager.
3. ACWM will not be staged excavated on site. All ACWM will be directly loaded from the excavation for transport to a MnDOT approved landfill for disposal. If a situation arises where this cannot be done, the written plan provided by State’s Oversight Contractor must be followed prior to any excavation activities.
4. Provide a list of all personnel performing ACWM abatement work and will provide proof of training (Minnesota Department of Health (MDH) Asbestos Hard Card) for each individual performing ACWM abatement work to State’s Oversight Contractor prior to commencing any abatement work at the site. Make sure all personnel performing ACWM abatement work carry their MDH Asbestos Hard Cards at all times when actively performing abatement work.
5. Complete a utility check prior to the start of any on site work. Refer to requirements in MnDOT 1507, “Utility, Property, and Service”.
6. Complete and submit a MDH/Minnesota Pollution Control Agency (MPCA) asbestos abatement notification form in accordance with all MDH and MPCA requirements. Provide a copy of the completed form to State’s Oversight Contractor at the same time it is sent to the regulatory agencies. Provide proof to State’s Oversight Contractor that the
MDH and MPCA have received notification of the asbestos abatement (either by facsimile receipt or certified mail) before commencing the ACWM abatement.

7. Confirm with the State’s Oversight Contractor that the ECP has been completed prior to commencing asbestos containing waste material abatement and fully comply with the ECP.

8. No transporting of ACWM will take place unless State’s Oversight Contractor is present to sign the shipping papers (manifests). In cases where State is not the owner of the ACWM (i.e., City utility), no transporting of ACWM will take place unless the owner of the ACWM is present to sign the shipping papers (manifests).

9. Backfill the excavation area with clean fill as directed by the Engineer.

S-79.3 ABESTOS CONTAINING WASTE MATERIALS (ACWM) DISPOSAL

(A) Contractor will:

1. Transport all ACWM abated from the project limits to a MPCA permitted Municipal Solid Waste (MSW) landfill or a MPCA permitted Industrial Landfill facility or a State approved landfill. ACWM MUST NOT BE DISPOSED AT A DEMOLITION LANDFILL. MnDOT approved landfills can be found at: http://www.dot.state.mn.us/environment/buildingbridge/index.html to link MnDOT Approved List of Waste Contractors.

2. Provide all required information to the landfill (typically waste profile forms) necessary to obtain landfill acceptance for the ACWM for disposal.

3. For non-emergency work, provide the completed waste profile form(s) required by the landfill to State’s Oversight Contractor for review a minimum of five (5) working days prior to beginning excavation or as approved by State’s Oversight Contractor.

4. Transport all ACWM directly from the project site to the landfill. There will be no co-mingling of ACWM from the project with non-project waste.

S-79.4 DOCUMENTATION

(A) Contractor will:

1. Provide State’s Oversight Contractor will clear legible copies of the shipping papers, landfill receipts, work plan, daily sign-in, certifications, MDH hard cards, and any other pertinent documentation within ten (10) days after the waste is transported from the project site.

S-79.5 MEASUREMENT AND PAYMENT

Payment will be made under Item 2105.609 (Haul and Dispose of Contaminated Material) at the Contract bid price per ton, which shall be payment in full for all permits, disposal fees, loading and hauling of material, tarping loads (incidental), and all costs relative thereto.

S-80 (2104) ASBESTOS AND REGULATED WASTE ASSESSMENT

SP2016-74

This work shall consist of requiring the Contractor to furnish asbestos and regulated waste assessments. All asbestos and regulated waste assessments shall be in accordance with all applicable federal and state regulations and MnDOT Policy. See Section S-1701 (LAWS TO BE OBSERVED (BUILDING REMOVALS)) of these Special Provisions for additional information. 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: http://www.dot.state.mn.us/environment/buildingbridge/index.html. Contact Mark Vogel at
S-80.1 Compensation for asbestos and regulated waste assessments will be paid for on the basis of Lump Sum where one evaluation will be required for each parcel regardless of the number of buildings or structures situated on each parcel. Payment will be made under Item 2104.601 (Regulated Waste Evaluation) at the Contract Bid Price per LUMP SUM.

Should the laboratory test reveal asbestos or other regulated waste of a type requiring separate abatements prior to the building demolitions or moves, the Contractor shall follow all applicable rules and regulation, plus complete the abatement with all documentation to be furnished to the above named individuals. Compensation for abatement and disposal, if necessary, will be paid for under "Extra Work".

S-81 (2104) REGULATED WASTE ASSESSMENT (BRIDGE)
For Division S or Division SB depending on which plan contains pay items (Remove Old Bridge) and (Asbestos and Regulated Waste Assessment (Bridge)).

SP2016-75
This work shall consist of requiring the Contractor to furnish asbestos and regulated waste assessments for the work on Bridge No. ______. This assessment will include any utilities located on the bridge. All asbestos and regulated waste assessments shall be in accordance with all applicable rules/regulations and MnDOT Policy. See Section S-1701 (LAWS TO BE OBSERVED (BRIDGE)) of these Special Provisions for additional information. Comply with MnDOT's manual "Asbestos and Regulated Waste Manual for Structure Demolition or Relocations for Construction Projects" available on the following web site: http://www.dot.state.mn.us/environment/buildingbridge/index.html.

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. The list of MnDOT approved assessment contractors can be found at: http://www.dot.state.mn.us/environment/buildingbridge/index.html.

S-81.1 Compensation for asbestos and regulated waste assessments will be paid for on the basis of Lump Sum where one evaluation will be required for each bridge. Payment will be made under Item 2104.601 (Regulated Waste Evaluation) at the Contract Bid Price per LUMP SUM.

Should the laboratory test reveal asbestos or other regulated waste (with the exception of the lead paint indicated elsewhere in this Contract) of a type requiring separate abatements prior to the demolitions or renovation, the Contractor shall follow all applicable rules and regulation, plus complete the abatement with all documentation to be furnished to the above named individuals. Compensation for abatement and disposal, if necessary, will be paid for under "Extra Work".

S-82 (2104) REMOVAL OF ASBESTOS AND REGULATED WASTE (BRIDGE)
For Division S or Division SB depending on which plan contains pay items for (Remove Old Bridge), (Removal of Regulated Waste (Bridge)), and (Remove Regulated Waste Material (Utility)).

SP2016-76
This work shall consist of the removal and disposal 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:

S-82.1 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 Contractor shall notify the MnDOT Project Engineer who shall suspend work and the Contractor shall furnish a documented inspection and
evaluation by a MnDOT approved certified MDH contractor prior to the resumption of work. The work, as outlined in this paragraph, will be paid for as Extra Work.

S-82.2 All asbestos and/or regulated waste shall be disposed of 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. The Contractor's 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: http://www.dot.state.mn.us/environment/buildingbridge/index.html. Contact Mark Vogel at 651.366.3630 or Jackie Klein at 651.366.3637, Office of Environmental Stewardship, 651.366.3630, with any questions regarding the manual.

S-82.3 All material shall be removed, identified, and disposed of in accordance with Section S-1701 (LAWS TO BE OBSERVED (BRIDGE)) of these Special Provisions. The Contractor will not receive permission to begin the regulated waste removals, with the exception of material needed for hazardous and regulated waste assessment or testing, until the MnDOT Project Engineer has copies of all required notices.

S-82.4 Disposal of materials by the Contractor shall be in accordance with MnDOT 1506, 2104.3D, 2442 and the following:

The Contractor shall furnish written information to the MnDOT Project Engineer as to disposal of steel bridge beams and other steel bridge components coated with lead paint or over 50 ppm PCB’s. (See the attached "Notification Form on Disposal of Bridge Steel"). This information shall include method of stabilization and disposal; name, address, and telephone number of disposal site; certification that Contractor has notified disposal site of presence of lead paint; acknowledgment by Contractor of OSHA requirements relating to lead; and certification that Contractor is familiar with proper handling and disposal of materials with lead-based paint systems. The form supplied in this Special Provision shall consist of the signature of the authorized Superintendent verifying that the information is correct.

S-82.5 The Contractor will not be allowed to proceed with the demolition or renovation of bridges until the MnDOT Project Engineer has received copies of all required notifications as indicated in Section S-1701 (LAWS TO BE OBSERVED (BRIDGE)) of these Special Provisions.

The Contractor shall be responsible to 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.

Use this section for bridge removals that have had asbestos testing done by the District. District to supply asbestos & reg. waste assessment summary report. (Attachment may have a different name. If it does make sure to rename it here.)

S-82.6 See the attached "Asbestos and Regulated Waste Assessment Summary" for information on whether or not asbestos or regulated waste was detected in the bridge(s) to be removed or renovated.

The assessment summary included with the Plan or Special Provisions are intended for informational purposes. Quantity, type and analysis of any asbestos or regulated waste containing material are estimates intended as a general guide.

Use the following section when regulated waste is present on the bridge(s) to be removed but the regulated waste abatement process will be completed before contract award. When using this do not use the preceding.

S-82.7 Regulated Materials encountered at the subject properties will be abated under separate contract prior to the commencement of this Contract.
S-82.8  Use on projects with a pay Item 2104.601 (Remove Regulated Waste Material (Bridge))

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)).

S-82.9  Use on projects with a pay Item 2104.601 (Remove Regulated Waste Material (Utility))

No measurement will be made of any portion of the asbestos or regulated waste material removal from any Utility, 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 (Utility)).

S-83  (2104) REMOVE ASBESTOS AND REGULATED WASTE MATERIAL

This work shall consist of removing asbestos and regulated waste material in accordance with the applicable MnDOT Standard Specifications and the following:

S-83.1  See attached "Asbestos and Regulated Waste Assessment Summary".

Asbestos and Regulated Waste Assessment Summary Reports included with the Plan or Special Provisions are intended for informational purposes. Quantity, type and analysis of any asbestos or regulated waste containing material are estimates intended as a general guide.

S-83.2  All asbestos and/or regulated waste shall be disposed of 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. The Contractor's 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: http://www.dot.state.mn.us/environment/buildingbridge/index.html. Contact Mark Vogel at 651.366.3630 or Jackie Klein at 651.366.3637, Office of Environmental Stewardship, 651.366.3630, with any questions regarding the manual.

Use for Out-state

S-83.3  Appointments for viewing the building may be arranged by contacting Mr. [Name], MnDOT District Right of Way Representative, (Put in Dist. i.e. Brainerd, etc.), telephone [Phone number].

Use for Metro

S-83.4  Appointments for viewing the building may be arranged by contacting Rebecca Swenson, MnDOT District Right of Way Representative, Metro, telephone (651) 234-7598.

S-83.5  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).

S-84  (2104) HAUL SALVAGED MATERIALS

This work shall consist of loading and hauling salvaged materials, not required for installation elsewhere under this Contract, to the designated storage area(s) and depositing said materials thereat in a manner satisfactory to the Engineer.

The designated storage area is [Designated Storage Area].
Use any of the following three paragraphs when needed  

The Contractor shall carefully clean and bundle, if appropriate, the salvaged materials to the satisfaction of the Engineer prior to loading.

The Contractor shall give the Engineer at least 24 hours’ notice before salvaged materials are to be delivered to the storage area. This will allow arrangements to be made to have a yard man available to accept the salvaged materials.

It shall be the Contractor's responsibility to neatly stockpile the material at the storage site with his forces as directed by the Engineer.

Use when have multiple salvage items

Salvaged material shall arrive at the storage area in carefully segregated lots so that it can be easily and quickly placed in its proper storage location. The Contractor shall unload the salvaged material and place it at the locations in the yard designated by the yard man.

S-84.1  No measurement will be made of the individual items, but the haul of all such items shall be construed to be included in the single lump sum for which payment is made.

S-84.2  Payment will be made under Item 2104.601 (Haul Salvaged Material) at the Contract lump sum bid price, which shall be payment in full for all costs relative to hauling the materials to, and depositing the materials, at the locations specified.

S-85  (2104) ABANDON PIPE SEWER

SP2016-79  

This work shall consist of sealing and abandoning an existing pipe sewer in accordance with the applicable MnDOT Standard Specifications, as noted in the Plan, and the following:

S-85.1  The abandoned pipe sewer shall be filled with granular material and capped watertight. Filling and capping of the abandoned sewer pipe shall be considered incidental.

S-85.2  Measurement will be made by the length of pipe sewer sealed and abandoned as specified. Payment will be made under Item 2104.603 (Abandon Pipe Sewer) at the Contract bid price per meter [linear foot], which shall be payment in full for all costs involved.

S-86  (2104) REMOVE SEALANT MATERIALS

SP2016-80  

This work shall consist of removing joint/crack seal material from the concrete base in accordance with the applicable MnDOT Standard Specifications, as directed by the Engineer, and the following:

S-86.1  Joints, cracks and surface of the concrete base shall be cleared of debris by brooming and air pressure (100 p.s.i.g., min. [690 KPa, min.]). Provide for disposal of removed material outside the Right of Way in accordance with MnDOT 2104.

S-86.2  Depressions which result after air blasting or removal operations, which are greater than two inches in depth and four inches in width, cracks and joints that are 1-1/2 inches+[40 mm+] in width shall be patched with [ ], as directed by the Engineer. Patching these areas shall be done ahead of the paver and rolled with a pneumatic tired roller.
S-86.3 Measurement will be made by the linear foot [meter] along the centerline of the roadway where the sealant material is removed as specified. Payment will be made under Item 2104.603 (Remove Sealant Material) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.

S-87 **(2104) REMOVE SEALANT MATERIALS**

**SP2016-81**

This work shall consist of removing joint/crack seal material from the concrete base in accordance with the applicable MnDOT Standard Specifications, as directed by the Engineer, and the following:

S-87.1 Prior to shattering the pavement, joints, cracks and surface of concrete base shall be cleared of debris by brooming and air pressure (100 p.s.i.g., min. [690 KPa, min.]). Provide for disposal of removed material outside the Right of Way in accordance with MnDOT 2104.

S-87.2 Measurement will be made by the linear foot [meter] along the centerline of the roadway where the sealant material is removed as specified. Payment will be made under Item 2104.603 (Remove Sealant Material) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.

**OR**

S-87.3 Measurement will be made by length in road stations of 100 feet along the centerline of the roadway where the sealant material is removed as specified. Payment will be made under Item 2104.619 (Remove Sealant Material) at the Contract bid price per road station, which shall be payment in full for all costs involved.

S-88 **(2104) REMOVE AND REPLACE BITUMINOUS PAVEMENT (ADA)**

*Always include SP2016-136 (PLANT MIXED ASPHALT PAVEMENT) or SP2016-139 (PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID when using this pay item and select the appropriate mix type. SP2016-82***

This work shall consist of full depth sawing, removing, and replacing the bituminous surface adjacent to the newly constructed curb and gutter in accordance with MnDOT 2104, 2360, other Contract provisions, and the following:

S-88.1 **CONSTRUCTION REQUIREMENTS**

The Contractor shall provide a full depth bituminous sawcut at a line that is offset 2 feet from the proposed gutter face as shown in the Plans. This bituminous saw cut shall be performed radially as needed to follow the proposed curb radius. The Contractor shall then remove and dispose of the full depth bituminous between the sawcut and existing curb and gutter. The aggregate base shall be compacted to the satisfaction of the Engineer.

*Designer must meet with Materials Engineer and Resident Engineer to determine which option the District would like to use and delete the other option.*

**Full Depth Bituminous:** After the curb and gutter has been constructed, the 2 foot wide void between the gutter face and the existing roadway shall be filled with a bituminous mixture of the same thickness as the adjacent pavement and to a compacted level resulting in the edges/joints between the compacted bituminous and the gutter face/existing bituminous roadway are less than ¼ inch vertically.

**Concrete Base with Bituminous Overlay:** After the curb and gutter has been constructed, the 2 foot wide void between the gutter face and the existing roadway shall be filled with Concrete Mix No. 3A32 from the bottom of the adjacent existing pavement, then consolidated and struck off at a point 2 inches below the finish grade of the roadway. The remaining 2 inches shall be filled with a bituminous mixture to a compacted level resulting in the edge/joint between the compacted bituminous and the gutter face/existing bituminous roadway is less than ¼ inch vertically.
Compaction shall be obtained with mechanical tampers in areas not accessible to conventional rolling equipment. Compaction shall be achieved to the satisfaction of the Engineer.

The surface slope of the bituminous patch in front of the truncated domes must not exceed 5% measured perpendicular to the flow line or edge of roadway.

**Additional Minor Pavement Removal and Replacement**

If the Engineer determines that additional pavement removal is necessary, this pay item can be utilized to complete additional minor roadway work beyond the initial 2 foot width. This work could consist of replacing damaged pavements or accommodating the construction of minor curb alignment changes in order to complete ADA work. For the area beyond the 2 foot width, the basis of payment will be 1 Linear Foot of removal and replacement for every 2 Square Feet of additional affected roadway area.

**S-88.2 METHOD OF MEASUREMENT**

Measurement will be by the linear foot at the face of curb.

**S-88.3 BASIS OF PAYMENT**

Payment will be made under Item 2104.603 (Remove and Replace Bituminous Pavement) at the Contract bid price per linear foot, which shall be compensation in full for all costs of performing the work as specified, including, but not limited to, cleanup and disposal operations.

**S-89 (2105) EXCAVATION AND EMBANKMENT – QUALITY MANAGEMENT**

Use with 2106.601 (Contractor Testing) when there are also 2105 pay items on the same plan. For CO Special Provisions - Make sure to use the revised Schedule of Materials Control (SMC) with this writeup when creating the pdf of the proposal!!!

MnDOT 2105 is hereby modified as follows:

**S-89.1**

Add the following to MnDOT 2105.1:

**GENERAL QUALITY MANAGEMENT PROVISIONS AND DESCRIPTION**

**General Quality Management Provisions**

1. Test according to the Schedule of Materials Control.

2. Contractor will notify Engineer, when embankment is ready for QA compaction acceptance testing. Additional layers and lifts placed above layers and lifts without passing QC & QA testing results are considered “Unauthorized Work”, per 1512.

3. Yearly calibration of all QC equipment is required. Have calibration records available immediately upon request.

4. Provide the following at the preconstruction meeting:

   a. Names of all testing personnel and certification numbers.

   b. Equipment certifications
5. The Engineer may elect to perform additional tests at any time to determine Contract Compliance.

6. Locate all test locations by either GPS coordinates or by station, offset and elevation and place this information on the test report.

S-89.2 Replace MnDOT 2105.3.B with the following:

B Contractor Quality Control (QC) Testing

Perform tests as required in the Schedule of Materials Control.

Submit results to the Engineer within one hour after test completion for moisture tests and within one day for all other tests.

Test corrected areas that fail either QC or Quality Assurance (QA).

Submit a preliminary, required before work commences, and final a Grading and Base Report (G&B-001), and a Weekly Grading and Base Testing Summary Report (submit the following Monday).

B.1 Aggregate Certification

Certify granular materials on Form G&B-104, and attached all required test results.

Material placed without certifications is unauthorized work in accordance with 1512, “Unacceptable and Unauthorized Work.”

B.2 Moisture Control

For material not meeting 3149.2.B.1, determine the optimum moisture content percentage by performing a proctor test. For material meeting 3149.2.B.1, determine the optimum moisture content percentage by either performing a proctor test, or use Form G&B-305.

Test for the moisture content in areas that appear least likely to meet specifications.

Determine the moisture content during compaction using test methods listed in the Grading and Base Manual or by alternate methods approved by the Engineer.

Meet the moisture content requirements listed in Table 2105-2.

<table>
<thead>
<tr>
<th>Table 2105-2</th>
<th>Moisture Content Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum Compaction Requirements</strong></td>
<td>**Relative Moisture Content * **</td>
</tr>
<tr>
<td>100 % of maximum density</td>
<td>65 % – 102 %</td>
</tr>
<tr>
<td>95 % of maximum density</td>
<td>65 % – 115 %</td>
</tr>
<tr>
<td>Quality Compaction</td>
<td>65 % – 102 %</td>
</tr>
<tr>
<td>Penetration Index Method</td>
<td>≥ 65 %</td>
</tr>
</tbody>
</table>

* As determined on form G&B-105
Correct for moisture in areas represented by failing moisture tests, before testing the compaction. Compaction tests taken in areas represented by failing moisture tests are not valid.

B.3 Test Rolling

Test roll, per the Schedule of Materials Control and Contract, the top surface of non-granular subgrade and the top of any granular surface not meeting the requirements of 3149.2.B.2 per 2111 using the test roller as specified in the Contract. If no test roller is specified, use test roller TR10.

B.4 Aggregate Quality Sampling

Sample aggregate for quality testing, when required, from samples obtained at placement. The Engineer may permit sampling from a stockpile or the pit face before placement.

- Sample in an area determined by the Engineer and split materials in the presence of the Engineer.
- Give the split samples to the Engineer.

B.5 Aggregate Gradation Tests

When there are four or more gradations required for any material type, chart gradations per Grading and Base Manual Section 5-692.111, Figure 1 and Table 2 for each material type.

- Sample in an area determined by the Engineer and split materials in the presence of the Engineer.
- Give the split sample to the Engineer.

B.6 Compaction Testing

For materials meeting the requirements of 3149.2B, “Granular Materials”, test for Compaction compliance using the Penetration Index (PI) Method (compliance is determined by Table 2105-6).

Test for compaction in areas with the greatest rutting or deflection, and near structures and trenches.

Compaction tests taken in areas represented by failing moisture tests are not valid.

Correct all areas represented by a failing tests, then perform new QA and QC test(s) at the same rate for the corrected area per the Schedule of Materials Control in areas with the greatest rutting or deflection.

For any materials not meeting the requirements of 3149.2B, “Granular Materials”, test for compaction compliance by following Specified Density Method requirements.

For the Specified Density Method:

- Determine the maximum density by performing a proctor test.
- Obtain a minimum of one proctor sample for each major soil type, and provide a split sample to the Engineer for each proctor sample.
• Soil type is defined according to the Triaxial Chart in the Grading and Base Manual.

• Perform a sand cone test, or use a nuclear gauge to determine density compliance.

• Use the Specified Density Method for virgin materials only.

The Engineer may determine the governing material for proctor maximum density.

S-89.3 Replace MnDOT 2105.3.G with the following:

**G** Agency Quality Assurance Testing (QA)

Test according to the Schedule of Materials Control.

**G.1 Aggregate Quality Testing**

• When quality tests are required, choose sample location, observe Contractor’s sampling and splitting, and obtain a split sample, randomly from the first day’s production at the project site. The Engineer may allow for sampling from a stockpile or the pit face.

• Perform aggregate quality testing for acceptance.

**G.2 Aggregate Gradation Testing**

• Perform gradation tests, from spilt samples obtained from the Contractor during placement.

• Determine the sampling locations and witness the splitting of the sample.

• Select gradation samples at locations that are at risk of not meeting the specification requirements.

**G.3 Moisture Testing**

• Obtain and test for moisture at time of compaction using a split sample from the Contractor, or obtain material for testing within three feet of the Contractor’s test location, if the Contractor is testing moisture in-place.

• Determine governing proctor material for optimum moisture determination.

**G.4 Compaction Testing**

Test for compaction location using either:

• Penetration Index (PI) Method (for material meeting 3149.2B), or

• Specified Density Method (for material not meeting 3149.2B), or

• If designated by the Contract, the Quality Compaction Method.

Determine test locations in areas with the greatest rutting or deflection, and near structures.
After Contractor corrects any area represented by a failing test, perform retests in areas with the greatest rutting or deflection.

G.4.a Specified Density

- Use the Specified Density or Quality Compaction method for acceptance for materials not meeting the requirements of 3149.2B, “Granular Materials”.
- Obtain a split sample for each proctor material from the Contractor.
- Determine governing proctor material for maximum density determination for the QA sample.
- Use the Specified Density Method for virgin materials only.

G.4.b Penetration Index Method

- Use the granular penetration index or Quality Compaction method for materials meeting the requirements of 3149.2B, “Granular Materials”.

The criteria for allowable DCP penetration are listed in Table 2105-6.

G.5 Test Rolling

Observe and document all test rolling as required by the Schedule of Materials Control.

G.6 Compliance Determination – Tolerances and Substitution of QA Results

G.6.a Compliance Determination – Aggregate Qualities

Aggregate Quality acceptance is based upon passing QA test results.

G.6.b Compliance Determination – Aggregate Gradations

Randomly select split gradation samples and perform gradations.

Aggregate gradation acceptance is based upon either:

i) Passing QC and QA test results, or

ii) Passing QC results & QA test results within the tolerance of Table 2105-A for any sieve.

If the criteria of 2105.3.G.6.b.i or 2105.3.G.6.b.ii are not met, substitute the QA result for the QC result.

<table>
<thead>
<tr>
<th>Test Protocol</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Passing 3&quot;, 2&quot;, 1&quot;, 1/4&quot; and 3/8&quot; sieves</td>
<td>6%</td>
</tr>
<tr>
<td>% Passing #4, #10 and #40 sieves</td>
<td>5%</td>
</tr>
</tbody>
</table>
% Passing #200 sieves | 2.0%

If the QA gradation sample results are not within the tolerance of Table 2105-A, perform gradations on the sample preceding and the sample following the sample that was out of tolerance. Again, determine compliance for these new tests as per the original out of tolerance sample. Continue performing gradations in each direction, both the preceding and the following direction, until samples are within tolerance of Table 2105-A.

G.6.c Compliance Determination – Moisture Calculation

QC test results must meet requirements. For each required moisture companion test, the Contractor’s test result is within tolerance, if the results are within 1.0% of the Contractor’s test results. Substitute the Agency’s results if not within 1.0%. Continue to test in new companion locations, until the two tests results are 1.0% tolerance.

G.6.d Compliance Determination – Maximum Density & Optimum Moisture Determination:

For each required proctor test, the Contractor’s test result is within tolerance, if the results are within 2.0% of the Contractor’s optimum moisture determination and within 3.0 pounds/ft³ for the maximum density determination. Substitute the Agency’s results, if not within tolerance. Continue performing proctors, both for the previous sample and the next sample, until samples results are within tolerance for both maximum density and optimum moisture.

G.6.e Compliance Determination – Compaction

Compaction acceptance is based upon passing QC and QA test results and passing Test Rolling (2111), if required by the Contract. The Engineer will delineate the extent of failing areas.

Designer Note: Include the following measurement and pay item change under 2105.5K, once per project.

S-89.4 Add the following to MnDOT 2105.4:

E Quality Management

Quality Management will be measured by lump sum and is called Contractor Testing. It includes all Quality Control requirements for 2105, 2106, 2112, 2118, 2211, 2212, 2215 and 2221.

S-89.5 Add the following to MnDOT 2105.5:

F Quality Management

For Quality Management (Contractor Testing), the Agency will pay for a partial payment of 25% after all required calibrations, certifications, and preliminary forms are submitted. The Agency will pay for an additional partial payment of 35% when 50% of the 2105, 2106 and 2215 items have been placed and accepted. The Agency will pay for a partial payment of an additional 20% when 100% of the 2105, 2106 and 2215 items have been placed and accepted. The additional 20% will be paid out when all other base, surfacing and shouldering materials have been placed and accepted and required reports have been submitted to the Engineer.

S-89.6 Add the following pay item to MnDOT 2105.5K:

| Item No. | Item | Unit |
The provisions for rock blasting, as covered herein, are applicable to all uses of explosive materials in the fragmentation of rock for the purpose of excavation of rock materials. These provisions cover the usage of explosives, Project documentation, safety, public relations and vibration controls, required for the types of rock excavation listed below. Construction details for these items are found elsewhere in these Special Provisions, or the MnDOT Standard Specifications.

(A) (2105) Rock Excavation refers to the main fragmentation blasting resulting from appropriately spaced production holes drilled throughout the rock excavation area. This includes rock excavated outside the normal roadway grading section as defined under Rock Channel Excavation.

(B) (2105) Controlled Excavation refers to the controlled use of explosives and blasting accessories in carefully spaced and aligned drillholes to produce a shear plane in the rock along the specified excavation backslope. Controlled excavation techniques covered by this specification include presplitting and cushion (trim) blasting.

(C) (2451) Structure Excavation, Class R refers to removal of rock materials (bedrock, boulders, detached rock, or concrete) where the excavation will be used for the placement of bridge or miscellaneous structure footings.

S-90.1 GENERAL REQUIREMENTS

(A) Use of Explosives. The regulatory requirements of OSHA Safety and Health Standards 29 CRF, Part 1926, Subpart U, "Blasting and Use of Explosives", shall apply. All blasting operations, including the storage and handling of explosives and blasting agents, shall be performed in accordance with the applicable provisions of the MnDOT Standard Specifications and all other pertinent federal, state, and local regulations. Whenever explosives are used, they shall be of such character and in such amount as is permitted by state and local laws and ordinances and all respective agencies having jurisdiction over them. The person(s) responsible for the use of explosive materials shall be knowledgeable and experienced in their use and handling. Blasting will be limited to a period between 8:00 a.m. and 5:00 p.m., or as otherwise approved by the Engineer.

(B) Blasting Plan Submittal. Not less than three weeks prior to commencing drilling and blasting operations, or at any time the Contractor proposes to change the drilling and blasting methods, the Contractor shall submit a "Blasting Plan" to the Engineer for review. The blasting plan shall describe in full details, the drilling and blasting patterns the Contractor proposes to use for the types of blasting required by the Contract. The blasting plan shall include (at a minimum):

1. Name and experience of Blaster(s).
2. Type of explosives, primers and initiators including manufacturers' data sheets for all explosive products.
3. General blasting configurations including hole size, spacing, loading pattern, detonation procedure, anticipated maximum pounds [kilograms] of explosive per delay, powder factor, number of lifts, and limits of blasting.
4. Procedures to inform and protect the public and adjacent property (e.g. signs, horns, letters, personal visits, etc.)
5. Flyrock control plan
6. Proposed "Shot Log" for individual blasts.
The blasting plan submittal is for quality control and record keeping purposes. Review of the blast plan by the Engineer shall not relieve the Contractor of his responsibility for the accuracy and adequacy of the plan when implemented in the field. When the Contract requires the Contractor to retain a blasting consultant to assist with the blast design, all blasting plan submittals must be approved by the blasting consultant.

(C) Shot Log. The Contractor is required to submit records (shot logs) for each individual shot on forms approved by the Engineer. The shot log shall be maintained by the Contractor and submitted to the Engineer at the end of each day. No blasting will be allowed until the shot log from the preceding day has been submitted to the Engineer. The shot log shall include the following information (at a minimum):

1. Location of the shot by station and offset.
2. Plan view of the drill pattern including free face, burden, hole spacing, diameters and angles.
3. Section view showing type and amount of explosives, primers, initiators, location and depth of stemming, lift height and subdrill depth.
4. Initiation sequence of holes including cumulative delay times and delay system.
5. Maximum peak particle velocity measured at the closest (or most critical receptor), location of monitoring station and scaled distance.

(D) Scaling and Stabilization. All rock on the excavated face that is loose, hanging, or which creates a potentially dangerous situation shall be removed or stabilized, to the Engineer's satisfaction, during or upon completion of the excavation in each lift. Drilling of the next lift will not be allowed until this work has been completed.

Exposed rock slopes shall be scaled throughout the span of the Contract and at such frequency as required to remove all hazardous loose rock or overhangs. The slopes shall be hand scaled using a suitable standard steel mine scaling rod. Subject to the Engineer's approval, other methods such as machine scaling, hydraulic splitters, or light blasting may be used in lieu of or to supplement hand scaling. Payment for scaling and removal of scaled rock from outside the excavation limits shall be incidental.

If in-place stabilization of backslope rock is required, due to defects inherent in the bedrock structure or weathering, as determined by the Engineer, rock bolting or other Engineer-approved stabilization techniques shall be used and paid for as extra work. Stabilization necessitated, in the opinion of the Engineer, by the Contractor's blasting or excavation operations, shall be performed at the Contractor's expense.

(E) Safety. The Contractor shall observe the entire blast area for a minimum of 5 minutes following a blast to guard against rock fall before commencing work in the cut. The Contractor is responsible for the safety of workers and the public in general.

The Engineer will, at all times, have the authority to prohibit or halt the Contractor’s blasting operations if it is apparent that, through the methods being employed, the required slopes are not being obtained in a stable condition, or the safety, convenience, or property of the public is being jeopardized.

The Contractor is advised that structures may be located close to the proposed work and that noise and vibration producing activities shall be conducted so as to preclude damage to these structures and undue annoyance to their occupants. The Contractor shall be responsible for all damage caused by his activities.

(F) Public Relations. The Contractor is required to have both letter and personal contact with residents or owners of buildings that are adjacent to the construction area or near enough to it for ground vibrations from construction operations (including blasting) to affect the structure, personal property, or water wells. This contact shall be made prior to the beginning of any blasting or other vibration producing activity. The Contractor shall furnish a list of those contacted to the Engineer, as part of the blasting plan.
The Contractor shall identify a contact person for complaints from the public, and shall maintain a log of such complaints, and any action taken by the Contractor. This log shall be available to the Engineer at his request.

S-90.2 FLYROCK CONTROL
Before the firing of any blast in areas where flying rock may result in personal injury or damage to property or the work, the rock to be blasted shall be covered with approved blasting mats, soil, or other equally serviceable material, to prevent flyrock. Flyrock control procedures will be approved by the Engineer.

S-90.3 FRESH CONCRETE VIBRATION CONTROLS
During the course of the work, the Contractor may desire to conduct vibration producing activities (such as blasting, vibratory compaction, pavement breaking or operation of heavy construction equipment) in the vicinity of freshly poured concrete. The following maximum* vibration levels for fresh concrete shall apply:

<table>
<thead>
<tr>
<th>Concrete Age (hours)</th>
<th>Maximum Peak Particle Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>No Limit</td>
</tr>
<tr>
<td>3-12</td>
<td>1.0 [25]</td>
</tr>
<tr>
<td>12-24</td>
<td>1.5 [40]</td>
</tr>
<tr>
<td>24-48</td>
<td>2.5 [65]</td>
</tr>
<tr>
<td>48 or more</td>
<td>4.0 [100]</td>
</tr>
</tbody>
</table>

(*The term maximum as used herein refers to the maximum of three mutually perpendicular transducer components.)

The Contractor shall provide the necessary monitoring equipment (typically a vibration seismograph) to assure that these limits are not exceeded. Any monitoring equipment supplied shall be capable of measuring a peak particle velocity of at least 4.0 inches per second [100 mm per second]. Vibrations shall be measured at a point directly between the concrete structure and the closest point of the vibration producing operation. The actual measuring point will be determined by the Engineer, and the geophone will typically be buried in the soil adjacent to the structure or placed on the structure. When located on the structure, the geophone must be grouted or mechanically fastened (bolted) to the structure.

If the Contractor desires to utilize higher vibration limits than those permitted above, he must submit a recommendation prepared by a recognized Consultant with expertise in this field. The Consultant report must be specific to this Project and shall include (at a minimum): 1) the proposed vibration limits, 2) basis for these limits, 3) specific equipment that will be employed to monitor the vibrations, and 4) potential impact of the proposed vibration levels on other structures or buildings on or off the Right of Way. The Engineer will review the submittal and respond within two weeks. If the use of higher vibration levels is approved and subsequent damage occurs, such as cracking of the concrete or deterioration of support rock below the structure, lower vibration levels will be established. Any damage caused by the higher limits shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the State.

The above vibration limits, or any new limits established for the protection of fresh concrete on this Project, do not relieve the Contractor from complying with any other vibration limits that may be in force on the Project, nor do they relieve the Contractor from responsibility for damage to any existing structures (on or off the Right of Way) that may be affected by vibrations at lower levels than are allowed herein for the protection of the concrete.

The Engineer, at his discretion (or in consultation with the Geology Unit, Office of Construction Materials and Engineering), may waive the requirement for vibration monitoring if the vibration producing operation is conducted at such a distance that ground vibrations cannot be readily felt by a person standing adjacent to the location where the concrete will be poured.
Payment for all work specified for monitoring vibrations in the vicinity of fresh concrete as described above, including but not limited to, furnishing monitoring equipment and maintaining appropriate records, shall be considered incidental.

S-90.4 VIBRATION CONTROL AND MONITORING
Whenever vibration damage to adjacent structures is possible, the Contractor shall monitor each blast with an approved seismograph located, as approved, between the blast area and the closest (or most critical) structure subject to blast damage. The seismograph shall be capable of recording peak particle velocity for three mutually perpendicular components of vibration in the range generally found in construction blasting.

The peak particle velocity of each component shall not be allowed to exceed the safe limits, as established below, for all adjacent structures subject to vibration damage.

(A) Ground Vibration Control Limit. The maximum single component peak particle velocity resulting from construction activity shall not exceed the safe blasting criteria established in Office of Surface Mining recommendations, OSM Alternative Blasting Level Criteria (Modified from Figure B 1, RI 8507 U.S. Bureau of Mines). This criteria allows a constant peak particle velocity (ppv) of 2.0 inches per sec (ips) above 30 Hz. Below 30 Hz, the maximum velocity decreases at a rate equivalent to a constant peak displacement of 0.01 inch to 11 Hz. Between 11 Hz and 4 Hz the maximum velocity is 0.75 ips. Below 4 Hz the maximum velocity decreases at a rate equivalent to a constant peak displacement of 0.03 inch.
(B) **Air Blast Control Limit.** The maximum measured air blast resulting from blasting shall not exceed 135 dB (0.015 psi) Linear-Peak weighting. A and C weighting systems are not allowed.

(C) **Vibration Monitors.** An amplitude/frequency vibration monitor shall be supplied that is capable of measuring, recording and producing a printed paper version of the frequency and peak particle velocity in each of three mutually perpendicular axes (“vector sum” instrumentation is not allowed). The instrument must have the appropriate sampling rate and velocity range to measure vibration levels generally found in construction blasting (must be able to measure peak particle velocity up to at least 4 inches per second). The instrument shall be capable of measuring Linear Scale air blast pressure (other weighting systems, such as A- or C-scale are not allowed). The instrument must also be capable of plotting the measured vibration level against the OSM criteria, or be capable of reporting the frequency and displacement of each vibration event. The vibration monitoring equipment must have current calibration documentation. All vibration monitoring equipment shall be approved by the Engineer prior to usage on the Project.

When blasting near buildings, structures or utilities which may be subject to damage from blast induced ground vibrations, the ground vibrations shall be controlled by the use of properly designed delay sequences and allowable charge weights per delay. Allowable charge weights per delay shall be based on vibration levels which will not cause damage. The allowable charge weights per delay shall be established by carrying out trial blasts and measuring vibration levels. The trial blasts shall be carried out in conformance with the blasting test.
sections described elsewhere in these provisions, modified as required to limit ground vibrations to a level which
will not cause damage.

Payment for all work specified for monitoring vibrations as described above, including but not
limited to, furnishing monitoring equipment and maintaining appropriate records, shall be considered an incidental.

S-91 (2105) ROCK EXCAVATION (PRODUCTION BLASTING)

Rock excavation, as covered herein, refers to the main fragmentation blasting resulting from
appropriately spaced production holes drilled and detonated in the excavation area. This includes the blasting
procedures for rock channel excavation, and for general excavation areas adjacent to controlled excavation slopes or
in areas where no controlled excavation is required. General rock excavation of this nature is referred to in these
provisions as "production blasting".

All production blasting shall be governed by the appropriate provisions of MnDOT 2105 and these
Special Provisions.

S-91.1 PROCEDURE
Production blast holes shall be drilled on the patterns as submitted by the Contractor in the
Blasting Plan. Hole diameters shall not exceed 6 inches [150 mm] unless approved by the Engineer. Detonation of
production holes shall generally be on a controlled delay sequence toward a free face to minimize environmental
effects.

If controlled excavation is specified, the row of production blast holes immediately adjacent to any
backslope shaped by controlled excavation shall be drilled on a plane approximately parallel to the controlled back
slope. Production holes shall not be drilled closer than 6 feet [1.8 m] to the controlled excavation slope, unless
approved by the Engineer. When shooting to an intermediate working bench, the bottom of the production holes
shall not be lower than the bottom of the adjacent controlled blast holes.

It is the Contractor’s responsibility to take all necessary precautions in the production blasting so
as to preserve the integrity of the final rock backslope.

S-91.2 TEST SECTION(S)
Prior to commencing full-scale production blasting, the Contractor shall demonstrate the adequacy
of the proposed blasting technique by drilling, blasting, and excavating short test sections of between 25 - 50 feet
[7.6 - 15.2 m] in length, to determine which combination of method, hole spacing, and charge works best for the
rock type and existing geologic conditions. When field conditions warrant, as determined by the Engineer, the
Contractor may be ordered/permitted to use test section lengths other than specified above. Unless otherwise
ordered by the Engineer, such test sections may be incorporated as part of the planned excavation.

Requirements for controlled and production blasting operations or any ground vibration or airblast
limits covered elsewhere in these Special Provisions shall also apply to the blasting carried out in conjunction with
the test sections.

The Contractor will not be allowed to drill ahead of the test shot area until the test section has been
excavated and the results evaluated by the Engineer. If the results of the test shot(s), in the opinion of the Engineer,
are unsatisfactory, then, notwithstanding the Engineer's prior review of such methods, the Contractor shall adopt
such revised methods as are necessary to achieve the required results. Unsatisfactory test shot results include an
excessive amount of fragmentation or overbreak beyond the indicated lines and grade, excessive flyrock, or
nonconformance to other requirements within these specifications (such as vibrations limits). All costs incurred by
the Contractor in adopting revised blasting methods necessary to produce an acceptable test shot shall be considered
incidental.
S-91.3 **MEASUREMENT AND PAYMENT.**
Measurement for Rock Excavation and/or Rock Channel Excavation will be made by the number of cubic yards [cubic meters] of inplace rock removed. Payment will be made under Item 2105.503 (Rock Excavation) or Item 2105.513 (Rock Channel Excavation) at the Contract bid price per cubic yard [cubic meter], which shall be payment in full for all costs incidental thereto.

S-92 **(2105) SETTLEMENT PLATES**
SP2016-85
This work shall consist of furnishing and installing settlement plates in accordance with the "Settlement Plate" detail in the Plan, the provisions of MnDOT 2105, and the following:

S-92.1 The Contractor shall maintain the settlement plates to the satisfaction of the Engineer. Any plates damaged by the Contractor's operations shall be repaired or replaced at the Contractor's own expense.

S-92.2 Bidders are advised that State forces will monitor the settlement plates during the tenure of this Contract. The Contractor shall cooperate with said forces in a manner consistent with the provisions of MnDOT 1505.

S-92.3 Measurement will be made by the number of settlement plates furnished and installed as specified. Payment will be made under Item 2105.602 (Settlement Plates) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto.

S-93 **(2105) CONSTRUCT TURN LANE**
SP2016-86
This work shall consist of furnishing all materials (except those items for which payment is specifically provided) and equipment and performing all operations required to construct the turn lanes as detailed in the Plans, in accordance with the applicable Standard Specifications, except as modified or supplemented below:

S-93.1 Before constructing embankments on existing slopes, the topsoil shall be removed, stockpiled if necessary, and subsequently placed on the newly constructed slope.

S-93.2 The Contractor shall, at his/her own expense, blade, shape and otherwise prepare the existing shoulder as required to facilitate the turning lane construction.

S-93.3 Borrow material for embankment construction shall be common borrow conforming to the requirements of MnDOT 2105.2B.

S-93.4 Consolidation of shoulder widening embankments and aggregate base courses, shall be achieved by the "Quality Compaction Method" as set forth in MnDOT 2105.3F2 and MnDOT 2211.3D2b respectively.

S-93.5 Excavation operations adjacent to the existing pavement concurrently with similar operations on the side of the pavement directly opposite and for a distance of 500 feet there from will not be permitted.

S-93.6 Within 48 hours after opening an excavation adjacent to the existing pavement said excavation shall be backfilled to an elevation no more than 3 inches below the top edge of the pavement thereat.

S-93.7 Measurement will be made by the number of turning lanes constructed, and payment therefore will be made under Item 2105.602 (Construct Turn Lanes) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto (except for the required culvert and bituminous construction which will be compensated for separately) including, but not limited to: (1) stripping and redistributing the existing...
topsoil; (2) preparing the existing shoulder; (3) embankment construction; (4) aggregate base construction, and (5) turf establishment work.

S-94  **(2105) WEEP TRENCH**

SP2016-87

This work shall consist of constructing a weep trench adjacent to the existing pavement in order to facilitate drainage. The work shall be performed in accordance with the Plan details and the provisions of MnDOT 2105, and the following:

Measurement will be made by each and payment will be made under Item 2105.602 (Weep Trench) at the Contract bid price per each, which price shall be compensation in full for all costs relative thereto.

S-95  **(2105) SHOULDER TRENCHING**

SP2016-88

This work shall consist of excavating a trench adjacent to the existing pavement in order to facilitate widening construction. The work shall be performed in accordance with the Plan details and the provisions of MnDOT 2105, except as modified below:

S-95.1 The bottom of the trench shall be compacted over its full width by a minimum of four passes with an approved roller.

S-95.2 The trench will not be allowed to remain open overnight and trenching operations will not be permitted on opposite sides of the roadbed concurrently.

S-95.3 The material obtained from the trenching excavation shall not be stockpiled on the shoulders beyond the end of the working day in which it was excavated and it shall not be used to bring the existing aggregate shoulders to the required grade and cross-section.

The material obtained from the trenching excavation shall be disposed of according to the provisions of MnDOT 2105 but shall not be disposed of in any area determined to be a wetland by the Engineer.

S-95.4 Measurement will be made by length in linear feet [meters] along the centerline of the roadbed. Separate measurement will be made for the shoulder trenching performed on each side of the roadbed.

S-95.5 Payment will be made under Item 2105.603 (Shoulder Trenching) at the Contract price per linear foot [meter], which shall be compensation in full for all costs relative thereto.

S-96  **(2105) SOIL STABILIZATION GEOGRID**

SP2016-89

This work shall consist of construction geogrids for embankment construction in accordance with the details shown in the Plan, the applicable MnDOT Standard Specifications, and the following:

Measurement will be made by the area of geogrids constructed as specified. Payment will be made under Item 2105.604 (Soil Stabilization Geogrid) at the Contract bid price per square yard [square meter], which shall be compensation in full for the cost of furnishing and installing the required materials, including securing devices, complete and in place as shown on the Plans, or as directed by the Engineer.
S-97  (2105) GEOTEXTILE FABRIC BOND BREAKER INTERLAYER FOR CONCRETE OVERLAY

Use this provision when constructing a concrete overlay of an existing concrete pavement.

Install a geotextile fabric bond breaker interlayer on an existing concrete pavement in accordance with the provisions of Mn/DOT 2105, 2301, the plans and as modified below:

S-97.1 MATERIAL REQUIREMENTS

The geotextile interlayer material shall comply with the requirements of Table 1 shown below:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirements</th>
<th>Test Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geotextile type</td>
<td>Nonwoven, needle-punched geotextile, no thermal treatment (calendaring or IR)</td>
<td>Manufacturer Certificate of Compliance</td>
</tr>
<tr>
<td>Color</td>
<td>Uniform/nominally same-color fibers</td>
<td>Visual Inspection</td>
</tr>
<tr>
<td>Mass per unit area</td>
<td>≥ 14.7 oz/yd² [500 g/m²]</td>
<td>ASTM D 5261</td>
</tr>
</tbody>
</table>
| Thickness under load (pressure)           | [a] At 0.29 psi [2 kPa]: ≥ 0.12 in [3.0 mm]  
[b] At 2.9 psi [20 kPa]: ≥ 0.10 in [2.5 mm]  
[c] At 29 psi [200 kPa]: ≥ 0.04 in [1.0 mm] | ASTM D 5199                     |
| Wide-width tensile strength               | ≥ 685 lb/ft [10 kN/m]               | ASTM D 4595                     |
| Wide-width maximum elongation             | ≤ 130%                                   | ASTM D 4595                     |
| Water permeability in normal direction under load (pressure) | At 2.9 psi [20 kPa]: ≥ 3.3x10⁻⁴ ft/s [1x10⁻⁴ m/s] | Mod. ASTM D 5493 or ASTM D 4491 |
| In-plane water permeability (transmissivity) under load (pressure) | [a] At 2.9 psi [20 kPa]: ≥ 1.6x10⁻³ ft/s [5x10⁻⁴ m/s]  
[b] At 29 psi [200 kPa]: ≥ 6.6x10⁻⁴ ft/s [2x10⁻⁴ m/s] | Mod. ASTM D 6574 or ASTM D 4716 |
| Weather resistance                        | Retained strength ≥ 60%              | ASTM D 4355 @ 500 hrs. exposure |
| Alkali resistance                         | ≥ 96% polypropylene/polyethylene     | Manufacturer certification of polymer |

S-97.2 CERTIFICATION, SAMPLING AND TESTING REQUIREMENTS

(A) Certificates of Compliance

Ensure the supplier submits to the Engineer a Certificate of Compliance and a document stating the manufacturer’s MARV with each shipment of geotextile. The minimum average roll value (MARV) requirements shall conform to AASHTO M288, which require a 97.7 percent degree of confidence. Provide a copy of the Certificate of Compliance and MARV with each geotextile sample sent to the Materials Laboratory for testing.

(B) Sampling and Testing Requirements
The Department’s inspection and test results will determine acceptance of the geotextile, in accordance with MnDOT 1603.4, “Acceptance.” In the presence of the Engineer, randomly select samples in the field at the rates and sample sizes shown in the Schedule of Materials Control. Cut samples across the full width of the roll. Do not sample the first full turn (outside layer) or the last full turn (inside layer) of the roll.

CONSTRUCTION REQUIREMENTS

(A) Handling and Placement Requirements

(1) Prior to the placement of the fabric layer, remove loose or deteriorated surfacing, clean the surface by power sweeping, and air blasting. Removal of deteriorated areas from joints, cracks, bituminous-patched areas, etc. may require air blasting, the use of a small milling machine, or handwork as directed by the Engineer. Perform air blasting with high-pressure 100 psi \([690\text{kPa}]\) equipment. Patch spalls and other surface defects with an approved patching material. The patching material for use shall consist of a bituminous material, cementitious material, or other equivalent material meeting the approval of the Engineer. The patch shall provide a flat, tight surface before placement of the interlayer or concrete overlay.

(2) Roll fabric out on underlying layer. Fabric should be tight without excess wrinkles and folds. Place the fabric within 7 days of concrete paving.

(2.1) When covering the entire surface with the fabric, the fabric should overlap by 8 in +/- 2 in \([200\text{ mm} +/- 50\text{ mm}]\). In no location should more than 3 layers of fabric overlap.

(2.2) When placing fabric strips only under dowel bar basket assemblies, the fabric width should extend 2 in – 3 in outside each side of the bottom rungs of the dowel bar basket assembly for the entire width of the roadway.

(3) Fabric should extend beyond the edge of the new concrete and into a location that facilitates drainage by 4 in +/- 2 in \([10\text{ mm} +/- 5\text{ mm}]\).

(4) Fabric must terminate in or next to a drainable pavement layer, or exposed in such a way that free drainage of water within the fabric is not impaired.

(5) Place the fabric bond breaker layer to a grade and tolerance such that the overlying PCC pavement thickness will meet minimum design requirements.

(6) Adhere the fabric to the underlying layer using an approved cylinder spray adhesive for geotextiles and recommended by the manufacturer for use to attach the fabric to the underlying concrete or asphalt. Apply a minimum 12 in wide adhesive bond to attach any edge of geotextile fabric to the underlying pavement or to another piece of geotextile fabric. Apply pressure to the fabric to set the adhesive prior to placing the concrete. The Contractor may propose and demonstrate alternate methods for satisfactorily anchoring the fabric to the Engineer for approval.

(7) Slightly dampen, but not saturate, the fabric, prior to concrete placement.

(B) Maintenance

Maintain the geotextile fabric bond breaker layer during and after placement throughout its entire length until placement of the concrete overlay. During this maintenance period, correct any deficiencies to the satisfaction of the Engineer. The bond breaker layer shall properly drain at all times. Do not place fabric on areas subject to excess traffic until immediately before concrete placement.

During construction, keep the bond breaker and associated drain trenches free of fine soils or other contaminants. If contamination of the bond breaker layer occurs, remove and replace or clean the surface to the satisfaction of the Engineer to assure drainage capacity as designed at no cost to the Department.
If a rain event occurs after placement of the geotextile fabric bond breaker, the Engineer will allow the use of rollers to remove excess water from the fabric, or any method acceptable to the Engineer, prior to concrete paving.

(C) PERMEABLE AGGREGATE BASE DRAIN INSTALLATION

When specified, install drains after the pavement is constructed and before placing any shoulder aggregate/base aggregate per MnDOT 2502.3.E. Do not operate trucks or other equipment longitudinally directly over the edge drain system.

S-97.4 MEASUREMENT AND PAYMENT
The Engineer will measure the number of square yards [square meters] of satisfactorily installed geotextile. The Engineer will base payment made under Item 2105.604 (Geotextile Fabric Special) at the Contract bid price per square yard [square meter], including, but not limited to, geotextile, overlap, placement, anchoring, and any needed repairs.

S-98 (2105) GEOTEXTILE FOR SEPARATION (STABILIZATION)

This work shall consist of placing geotextile below the fill material (may be underwater) at the location(s) shown in the Plan, or as directed by the Engineer. The work shall be accomplished according to MnDOT 2105, these Special Provisions, or as directed by the Engineer. The purpose of the geotextile layer is to provide separation between the fill and underlying softer soils, to prevent mixing, to provide stability during compaction, to provide some reinforcement and to minimize differential movement. The Contractor's proposed construction sequence for geotextile and fill placement shall be submitted to the Engineer for review at least 21 days prior to beginning of this element of construction.

S-98.1 MATERIAL REQUIREMENTS
Geotextile shall conform to the requirements of MnDOT 3733, Type V.

S-98.2 CONSTRUCTION REQUIREMENTS
The prepared surface shall be relatively smooth and free of stones, sticks, or other debris or irregularities that would tend to puncture or tear the geotextile. Unless otherwise directed or approved by the Engineer, the geotextile shall be placed with the highest strength direction (usually the "machine" or roll direction) oriented in the direction of the greatest expected field stress. (This will usually be at right angles to the centerline of the construction.)

If multiple pieces of geotextile are required, adjacent strips shall be field or factory sewn, with the seams to have a strength as specified in MnDOT 3733.2B. All seams shall be sewn using a "double spool" machine capable of sewing a Federal Type 401 locking stitch. Seam type (flat, "J", or butterfly), thread strength (25 pound [110 Newtons] minimum), number of rows of stitching (1 or 2) and stitches per inch [25 mm] (typically 5-7), shall be consistent with achieving the required seam strength and as recommended by the geotextile manufacturer.

The geotextile shall be adequately secured so that it is not displaced during subsequent construction. No traffic or construction equipment will be permitted to operate directly on the geotextile. Any damaged geotextile shall be repaired to the satisfaction of the Engineer by patching and sewing or, when appropriate, a 36 inch [900 mm] overlap on all sides without sewing.

Fill shall be placed onto the fabric in uniform lifts as required by the applicable specification and approved by the Engineer, but in no case shall lifts in excess of 12-18 inches [300 - 450 mm] be used, unless required to bring the fill above water level or provide stability. Fill material shall be as shown in the Plan or as directed by the Engineer. For placement underwater and for 2 feet [600 mm] above water level, granular materials shall be used unless otherwise provided in the Plans or approved by the Engineer.
S-98.3  **MEASUREMENT AND PAYMENT**
Measurement will be made of the number of square yards [square meters] of satisfactorily installed geotextile approved by the Engineer. No allowance will be made for seams. Payment will be made under Item 2105.604 (Geotextile Fabric Type V) at the Contract bid price per square yard [square meter], which shall be compensation in full for all work including, but not limited to, geotextile, seaming, placement, anchoring, and any needed repairs.

S-99  **(2105) CONTROLLED EXCAVATION**
**SP2016-91**
Where required, controlled excavation techniques, as covered herein, shall be used for forming highway rock cut slopes at the locations shown on the Plans and/or as staked by the Engineer. Unless otherwise provided, controlled excavation shall be used on all rock backslopes steeper than 1V:1H. No overbreak allowance will be provided outside of controlled excavation backslopes.

Controlled excavation refers to the controlled use of explosives and blasting accessories in carefully spaced and aligned drill holes to produce a finished surface or shear plane in the rock along the specified backslope. This procedure will produce a relatively smooth backslope, will minimize overbreak and the need for scaling, and optimize slope stability. Controlled excavation techniques covered by this specification include presplitting and cushion (trim) blasting, although other types of controlled excavation may occasionally be appropriate. When presplitting, the detonation of the presplit line shall be before the detonation of any adjacent production holes. Cushion blasting is similar to presplitting, except that the detonation along the finished face shall be performed after the detonation of the production holes.

Presplitting is the technique specified herein and cushion blasting (or other controlled excavation methods) may only be used in special situations and with permission of the Engineer. If a controlled excavation technique other than presplitting or cushion blasting is permitted, those requirements of these Special Provisions relating to hole size, hole spacing, explosive type, stemming location and type, detonation delays, down-hole detonating cord, and other similar constraints will be modified to permit the Contractor to vary the controlled excavation elements as appropriate to achieve the specified results. All requirements of these Special Provisions relating to presplitting, which would be equally applicable to other forms of controlled excavation, are retained and will be enforced on the Project. The Controlled Excavation Pay Item will be applicable to all types of controlled excavation procedures used by the Contractor.

S-99.1  **SHOT LOG**
A shot log, with the same format as required with the production blasting, will be submitted for each controlled excavation shot. When controlled excavation patterns are shot in conjunction with a production round, two shot logs shall be provided to the Engineer (one for each activity); these shall be identified by the shot number, but labeled "A" and "B" for controlled and production shots, respectively.

S-99.2  **BLASTING TEST SECTION(S)**
Prior to commencing full-scale controlled excavation operations, the Contractor shall demonstrate the adequacy of the proposed blasting technique by drilling, blasting, and excavating short test sections of between 25 - 50 feet [7.6 - 15.2 m] in length, to determine which combination of method, hole spacing, and charge works best for the rock type and existing geologic conditions. When field conditions warrant, as determined by the Engineer, the Contractor may be ordered/ permitted to use test section lengths other than specified above. Unless otherwise ordered by the Engineer, such test sections may be incorporated as part of the planned excavation along the designed backslope. The term test section shall mean drilling, loading, shooting and exposure of the complete face to viewing. Unless otherwise approved by the Engineer, each test section must include a backslope that has a minimum height of at least 10 feet [3 m] measured vertically.
The Contractor will not be allowed to drill ahead of the test shot area until the test section has been excavated and the results evaluated by the Engineer. An ideal presplit face will have a relatively smooth fracture connecting adjacent drill holes, the trace (cast or "half barrel") of each hole will be clearly evident, and specifications for face tolerances will be met. If the results of the test shot(s), in the opinion of the Engineer, are unsatisfactory, then, notwithstanding the Engineer's prior review of such methods, the Contractor shall adopt such revised methods as are necessary to achieve the required results. Unsatisfactory test shot results include an excessive amount of fragmentation or overbreak beyond the presplit line, absence of satisfactory evidence of drill hole traces (half-casts), out-of-tolerance face, excessive flyrock, or nonconformance to other requirements within these specifications. All costs incurred by the Contractor in adopting revised blasting methods necessary to produce an acceptable test shot shall be considered incidental.

The spacing between holes, powder type, loading pattern or shot sequence shall be varied according to the characteristics and structure of the bedrock formations. Unless otherwise allowed by the Engineer, the Contractor shall begin the tests with the controlled excavation holes spaced no more than 2 feet [600 mm] apart, then adjust if needed, until the Engineer approves the spacing to be used for full-scale controlled excavation operations. If at any time during the progress of the work, the methods of drilling and blasting do not produce the desired result of a uniform slope and shear face within the tolerances specified, the Contractor will be required to drill, blast, and excavate additional short sections, not exceeding 25 - 50 feet [7.6 - 15.2 m] in length, until a technique is arrived at that will produce the desired results. If the Contractor modifies any element from the test section (including personnel), he shall so inform the Engineer and an additional test section may be required. Extra cost resulting from this requirement shall be borne by the Contractor.

Requirements for controlled and production blasting operations or any ground vibration or airblast limits covered elsewhere in these Special Provisions shall also apply to the blasting carried out in conjunction with the test shots.

S-99.3 CONTROLED EXCAVATION METHODS

(A) Presplitting. All presplitting, including that carried out in conjunction with the "Blasting Test Section" requirements outlined above, shall be performed as specified below.

Unless otherwise permitted by the Engineer, the Contractor shall completely remove all overburden soil and loose or decomposed rock along the top of the excavation for a distance of at least 30 feet [10 m] beyond the end of the production hole drilling limits, or to the end of the cut, before drilling the presplitting holes. Potentially dangerous boulders or other material located beyond the excavation limits shall also be removed. Payment for removal of the material located beyond the excavation limits shall be incidental.

Presplit holes shall be drilled within 3 inches [75 mm] of the staked collar location. Presplit holes shall extend a minimum of 30 feet [10 m] beyond the limits of the production holes to be detonated, or to the end of the cut as applicable. All drilling equipment used to drill the presplit holes shall have mechanical devices affixed to that equipment to accurately determine the angle at which the drill steel enters the rock. Presplit hole drilling will not be permitted if these devices are either missing or inoperative.

The Contractor shall control his drilling operations by the use of proper equipment and technique to ensure that no hole shall deviate from the plane of the planned backslope by more than 9 inches [225 mm] either parallel or normal to the slope. After shooting, no rock shall protrude toward the roadway more than 1 foot [300 mm] from the plane of the designated backslope. The Engineer may require removal of any rock protruding beyond the permissible 1 foot [300 mm] tolerance or, at his discretion, relax the backslope tolerance for an occasional protruding rock that is not a safety hazard. For those slopes to be covered by retaining structures, the face tolerance requirement may also be waived by the Engineer, but these discretionary actions do not relieve the Contractor from his responsibility for removing any protrusions that might in any way interfere with adjacent structures, the forming for such structures, or the intention of the design.
The presplit drill holes shall be not less than 2-1/2 inches [62.5 mm] and not more than 3 inches [75 mm] in diameter, unless holes up to a maximum of 4 inches [100 mm] are approved by the Engineer.

The length of presplit holes for any individual lift shall not exceed 30 feet [10 m] unless the Contractor can demonstrate to the Engineer that he can stay within the prescribed tolerances and produce an acceptable slope. Upon satisfactory demonstration, the length of holes may be increased to a maximum of 60 feet [18.3 m] upon written approval of the Engineer. If greater than 5% of the presplit holes are misaligned in any one lift, the Contractor shall reduce the height of the lifts until the 9 inch [225 mm] hole alignment tolerance is met.

When the cut height will require more than one lift, a nominal 12 inch [300 mm] offset between lifts shall be permitted to allow for drill equipment clearances. The Contractor shall begin the presplit drilling at a point which will allow for necessary offsets and shall adjust, at the start of lower lifts, to compensate for any drift which may have occurred in the upper lifts. Payment for the additional excavation volume, resulting from the allowed 12 inch [300 mm] offsets, shall be at the Contract unit price for rock excavation. Drilling up to 2 feet [600 mm] below ditch bottom will be allowed to facilitate removal of the toe berm, but payment will be based on the overbreak line shown in the Plans.

Before placing charges, the Contractor shall determine that the hole is free of obstructions for its entire depth. All necessary precautions shall be exercised so that the placing of the charges will not cause caving of material from the walls of the holes. Drill hole conditions may vary from dry to filled-with-water. The Contractor will be required to use whatever type(s) of explosives and/or blasting accessories necessary to accomplish the specified results.

The maximum diameter of explosives used in presplit holes shall not be greater than 1/2 the diameter of the presplit hole. Only standard explosives manufactured especially for presplitting shall be used in presplit holes, unless otherwise approved by the Engineer. Bulk ammonium nitrate and fuel oil (ANFO) shall not be allowed to be loaded in the presplit holes. Detonating cord shall be used for down-hole and trunk line connections.

The bottom charge of a presplit hole may be larger than the line charges, but shall not be large enough to cause overbreak. The top charge of the presplit hole shall be placed far enough below the collar and be reduced sufficiently to avoid overbreaking and heaving. Unless approved otherwise by the Engineer, the upper 3 feet [1 m] shall not be loaded. The upper portion of all presplit holes, from the top-most charge to the hole collar, shall be stemmed. Stemming materials shall be minus 3/8 inch [9.5 mm] clean, dry, angular granular material or pea gravel, with not more than 4 percent passing the No. 200 [75 μm] sieve.

As long as equally satisfactory controlled excavation slopes are obtained, the Contractor, at his option, may either presplit the backslope face before drilling for production blasting or may presplit the slope face and production blast at the same time, provided that the presplitting drill holes are fired first. If required to reduce ground vibrations or noise, and approved by the Engineer, presplit holes may be delayed, providing the hole-to-hole delay is no more than 25 milliseconds and satisfactory backslopes are achieved.

(B) Cushion (Trim) Blasting. Where the horizontal distance from the designed rock backslope to the inplace existing rock face is less than 15 feet [4.6 m], and when specifically approved by the Engineer, the Contractor may cushion blast in lieu of presplitting. Cushion blasting is similar to presplitting except that the detonation of holes along the design backslope shall be after the detonation of all production holes. Difference in delay time between the cushion shots and the nearest production row shall not be greater than 75 milliseconds nor less than 25 milliseconds. With the exception of the above detonation variation, requirements previously given for presplitting shall also apply to cushion blasting. Where permitted, cushion blasting will also be measured and paid for under Item 2105.604 (Controlled Excavation).

S-99.4 MEASUREMENT AND PAYMENT
Measurement for Controlled Excavation will be made by the number of square yards [square meters] of acceptable controlled excavation performed. The Engineer may use the percentage of lineal drill hole
traces (half-casts) remaining intact on the presplit face as an indication of acceptable work. Presplit backslopes which are excessively shattered, show excessive overbreak, or in any way do not meet the intention of this specification will be declared unacceptable and no direct payment will be made. Payment will be made under Item 2105.604 (Controlled Excavation) at the Contract price per square yard [square meter], which shall be payment in full for all costs incidental thereto.

S-100  (2105) RAILROAD TRACK SUB-BALLAST

This work shall consist of construction railroad track sub-ballast in accordance with the applicable MnDOT Standard Specifications, the details shown in the Plans, and the following:

S-100.1 The sub-ballast material shall meet the requirements of MnDOT 3138 for Class 5 Aggregate.

S-100.2 Measurement will be made by volume of the sub-ballast placed, as computed on the basis of planned dimensions of the sub-ballast, using either cross sectional area and length or sub-ballast area and thickness. Payment will be made under Item 2105.607 (Railroad Track Sub-Ballast (CV)) at the Contract bid price per cubic yard [cubic meter], which shall be payment in full for all costs incidental thereto.

S-101  (2106) EXCAVATION AND EMBANKMENT

Use on all jobs with 2106 Embankment and Excavation pay items. Always use SP2016-34 (LAWS TO BE OBSERVED (CULTURAL RESOURCES – FEDERALLY FUNDED)) or SP2016-35 (LAWS TO BE OBSERVED (CULTURAL RESOURCES – STATE FUNDED)) with this write-up.

SP2016-93

Modify MnDOT 2106 as follows:

S-101.1 Add the following to MnDOT 2106.1, “Description”:

This is an Excavation/Embankment Project in which payment of the excavation items and embankment items will be payment in full for all work associated with the grading operations. No shrinkage factors have been applied or will be applied to any Excavation or Embankment items. The Contractor is responsible to fully construct the embankment sections as specified in the Plan and Special Provisions. Material generated from the specified excavations on the Project may be utilized in the embankment sections, where applicable, if the material meets the specifications of the Contract. No separate payment will be made for obtaining grading materials from off the Project nor will any payment be made for disposing of unsuitable or excess material.

S-102  (2106) EXCAVATION AND EMBANKMENT – COMPACTED VOLUME

METHOD - QUALITY MANAGEMENT

Use with 2106.601 (Contractor Testing) when there are also 2106 pay items on the same plan. For CO Special Provisions - Make sure to use the revised Schedule of Materials Control (SMC) with this writeup when creating the pdf of the proposal!!!

NEW WRITEUP 01/08/16 ►DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-93.1

MnDOT 2106 is hereby modified as follows:

S-102.1 Add the following to MnDOT 2106.1:

GENERAL QUALITY MANAGEMENT PROVISIONS AND DESCRIPTION

1. Test according to the Schedule of Materials Control.

2. Contractor will notify Engineer, when embankment is ready for QA compaction acceptance testing. Additional layers and lifts placed above layers and lifts without passing QC & QA testing results are considered “Unauthorized Work”, per 1512.

3. Yearly calibration of all QC equipment is required. Have calibration records available immediately upon request.

4. Provide the following at the preconstruction meeting:
   a. Names of all testing personnel and certification numbers.
   b. Equipment certifications

5. The Engineer may elect to perform additional tests at any time to determine Contract Compliance.

6. Locate all test locations by either GPS coordinates or by station, offset and elevation and place this information on the test report.

S-102.2 Replace MnDOT 2106.3.B with the following:

**B Contractor Quality Control (QC) Testing**

Perform tests as required in the Schedule of Materials Control.

Submit results to the Engineer within one hour after test completion for moisture tests and within one day for all other tests.

Test corrected areas that fail either QC or Quality Assurance (QA).

Submit a preliminary, required before work commences, and final a Grading and Base Report (G&B-001), and a Weekly Grading and Base Testing Summary Report (submit the following Monday).

**B.1 Aggregate Certification**

Certify granular materials on Form G&B-104, and attached all required test results.

Material placed without certifications is unauthorized work in accordance with 1512, “Unacceptable and Unauthorized Work.”

**B.2 Moisture Control**

For material not meeting 3149.2.B.1, determine the optimum moisture content percentage by performing a proctor test. For material meeting 3149.2.B.1, determine the optimum moisture content percentage by either performing a proctor test, or use Form G&B-305.

Test for the moisture content in areas that appear least likely to meet specifications.
Determine the moisture content during compaction using test methods listed in the Grading and Base Manual or by alternate methods approved by the Engineer.

Meet the moisture content requirements listed in Table 2106-2.

<table>
<thead>
<tr>
<th>Minimum Compaction Requirements</th>
<th>Relative Moisture Content *</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 % of maximum density</td>
<td>65 % – 102 %</td>
</tr>
<tr>
<td>95 % of maximum density</td>
<td>65 % – 115 %</td>
</tr>
<tr>
<td>Quality Compaction</td>
<td>65 % – 102 %</td>
</tr>
<tr>
<td>Penetration Index Method</td>
<td>≥ 65 %</td>
</tr>
</tbody>
</table>

* As determined on form G&B-105

Correct for moisture in areas represented by failing moisture tests, before testing the compaction. Compaction tests taken in areas represented by failing moisture tests are not valid.

**B.3 Test Rolling**

Test roll, per the Schedule of Materials Control and Contract, the top surface of non-granular subgrade and the top of any granular surface not meeting the requirements of 3149.2.B.2 per 2111 using the test roller as specified in the Contract. If no test roller is specified, use test roller TR10.

**B.4 Aggregate Quality Sampling**

Sample aggregate for quality testing, when required, from samples obtained at placement. The Engineer may permit sampling from a stockpile or the pit face before placement.

a) Sample in an area determined by the Engineer and split materials in the presence of the Engineer.

b) Give the split samples to the Engineer.

**B.5 Aggregate Gradation Tests**

When there are four or more gradations required for any material type, chart gradations per Grading and Base Manual Section 5-692.111, Figure 1 and Table 2 for each material type.

a) Sample in an area determined by the Engineer and split materials in the presence of the Engineer.

b) Give the split sample to the Engineer.

**B.6 Compaction Testing**

For materials meeting the requirements of 3149.2B, “Granular Materials”, test for Compaction compliance using the Penetration Index (PI) Method (compliance is determined by Table 2106-6).
Test for compaction in areas with the greatest rutting or deflection, and near structures and trenches.

Compaction tests taken in areas represented by failing moisture tests are not valid.

Correct all areas represented by a failing tests, then perform new QA and QC test(s) at the same rate for the corrected area per the Schedule of Materials Control in areas with the greatest rutting or deflection.

For any materials not meeting the requirements of 3149.2B, “Granular Materials”, test for compaction compliance by following Specified Density Method requirements.

For the Specified Density Method:

a) Determine the maximum density by performing a proctor test.

b) Obtain a minimum of one proctor sample for each major soil type, and provide a split sample to the Engineer for each proctor sample.

c) Soil type is defined according to the Triaxial Chart in the Grading and Base Manual.

d) Perform a sand cone test, or use a nuclear gauge to determine density compliance.

e) Use the Specified Density Method for virgin materials only.

The Engineer may determine the governing material for proctor maximum density.

S-102.3 Replace MnDOT 2106.3G with the following:

G **Agency Quality Assurance Testing (QA)**

Test according to the Schedule of Materials Control.

G.1 **Aggregate Quality Testing**

a) When quality tests are required, choose sample location, observe Contractor’s sampling and splitting, and obtain a split sample, randomly from the first day’s production at the project site. The Engineer may allow for sampling from a stockpile or the pit face.

b) Perform aggregate quality testing for acceptance.

G.2 **Aggregate Gradation Testing**

a) Perform gradation tests, from spilt samples obtained from the Contractor during placement.

b) Determine the sampling locations and witness the splitting of the sample.

c) Select gradation samples at locations that are at risk of not meeting the specification requirements.

G.3 **Moisture Testing**
a) Obtain and test for moisture at time of compaction using a split sample from the Contractor, or obtain material for testing within three feet of the Contractor’s test location, if the Contractor is testing moisture in-place.

b) Determine governing proctor material for optimum moisture determination.

G.4 Compaction Testing

Test for compaction location using either:

a) Penetration Index (PI) Method (for material meeting 3149.2B), or

b) Specified Density Method (for material not meeting 3149.2B), or

c) If designated by the Contract, the Quality Compaction Method.

Determine test locations in areas with the greatest rutting or deflection, and near structures.

After Contractor corrects any area represented by a failing test, perform retests in areas with the greatest rutting or deflection.

G.4.a Specified Density

a) Use the Specified Density or Quality Compaction method for acceptance for materials not meeting the requirements of 3149.2B, “Granular Materials”.

b) Obtain a split sample for each proctor material from the Contractor.

c) Determine governing proctor material for maximum density determination for the QA sample.

d) Use the Specified Density Method for virgin materials only.

G.4.b Penetration Index Method

a) Use the granular penetration index or Quality Compaction method for materials meeting the requirements of 3149.2B, “Granular Materials”.

The criteria for allowable DCP penetration are listed in Table 2106-6.

G.5 Test Rolling

Observe and document all test rolling as required by the Schedule of Materials Control.

G.6 Compliance Determination – Tolerances and Substitution of QA Results

G.6.a Compliance Determination – Aggregate Qualities

Aggregate Quality acceptance is based upon passing QA test results.

G.6.b Compliance Determination – Aggregate Gradations

Randomly select split gradation samples and perform gradations.
Aggregate gradation acceptance is based upon either:

i) Passing QC and QA test results, or

ii) Passing QC results & QA test results within the tolerance of Table 2106-A for any sieve.

If the criteria of 2106.3.G.6.b.i or 2106.3.G.6.b.ii are not met, substitute the QA result for the QC result.

| Table 2106-A
 Allowable Tolerance Between Contractor and Agency Tests |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Protocol</td>
<td>Tolerance</td>
</tr>
<tr>
<td>% Passing 3”, 2”, 1”, ¼” and 3/8” sieves</td>
<td>6%</td>
</tr>
<tr>
<td>% Passing #4, #10 and #40 sieves</td>
<td>5%</td>
</tr>
<tr>
<td>% Passing #200 sieves</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

If the QA gradation sample results are not within the tolerance of Table 2106-A, perform gradations on the sample preceding and the sample following the sample that was out of tolerance. Again, determine compliance for these new tests as per the original out of tolerance sample. Continue performing gradations in each direction, both the preceding and the following direction, until samples are within tolerance of Table 2106-A.

G.6.c Compliance Determination – Moisture Calculation

QC test results must meet requirements. For each required moisture companion test, the Contractor’s test result is within tolerance, if the results are within 1.0% of the Contractor’s test results. Substitute the Agency’s results if not within 1.0%. Continue to test in new companion locations, until the two tests results are 1.0% tolerance.


For each required proctor test, the Contractor’s test result is within tolerance, if the results are within 2.0% of the Contractor’s optimum moisture determination and within 3.0 pounds/ft³ for the maximum density determination. Substitute the Agency’s results, if not within tolerance. Continue performing proctors, both for the previous sample and the next sample, until samples results are within tolerance for both maximum density and optimum moisture.

G.6.e Compliance Determination – Compaction

Compaction acceptance is based upon passing QC and QA test results and passing Test Rolling (2111), if required by the Contract. The Engineer will delineate the extent of failing areas.

Designer Note: Include the following measurement and pay item change under 2106.5K, once per project.

S-102.4 Add the following to MnDOT 2106.4:

E Quality Management
Quality Management will be measured by lump sum and is called Contractor Testing. It includes all Quality Control requirements for 2105, 2106, 2112, 2118, 2211, 2212, 2215 and 2221.

S-102.5 Add the following to MnDOT 2106.5:

F Quality Management

For Quality Management (Contractor Testing), the Agency will pay for a partial payment of 25% after all required calibrations, certifications, and preliminary forms are submitted. The Agency will pay for an additional partial payment of 35% when 50% of the 2105, 2106 and 2215 items have been placed and accepted. The Agency will pay for a partial payment of an additional 20% when 100% of the 2105, 2106 and 2215 items have been placed and accepted. The additional 20% will be paid out when all other base, surfacing and shouldering materials have been placed and accepted and required reports have been submitted to the Engineer.

S-102.6 Add the following pay item to MnDOT 2106.5K:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2106.601</td>
<td>Contractor Testing</td>
<td>..........................................................Lump Sum</td>
</tr>
</tbody>
</table>

S-103 (2112) SUBGRADE PREPARATION – QUALITY MANAGEMENT

Use with 2106.601 (Contractor Testing) when there is also a subgrade preparation pay item on the same plan.  
For CO Special Provisions - Make sure to use the revised Schedule of Materials Control (SMC) with this writeup when creating the pdf of the proposal!!

MnDOT 2112 is hereby modified as follows:

S-103.1 Add the following to MnDOT 2112.1:

GENERAL QUALITY MANAGEMENT PROVISIONS AND DESCRIPTION


1. Test according to the Schedule of Materials Control.

2. Contractor will notify Engineer, when embankment is ready for QA compaction acceptance testing. Additional layers and lifts placed above layers and lifts without passing QC & QA testing results are considered “Unauthorized Work”, per 1512.

3. Yearly calibration of all QC equipment is required. Have calibration records available immediately upon request.

4. Provide the following at the preconstruction meeting:
   a. Names of all testing personnel and certification numbers.
   b. Equipment certifications

5. The Engineer may elect to perform additional tests at any time to determine Contract Compliance.
6. Locate all test locations by either GPS coordinates or by station, offset and elevation and place this information on the test report.

S-103.2 Replace MnDOT 2112.3.B with the following:

**B Contractor QC Testing**

Perform tests as required in the Schedule of Materials Control.

Submit results to the Engineer within one hour after test completion for moisture tests and within one day for all other tests.

Test corrected areas that fail either QC or Quality Assurance (QA).

Submit a preliminary, required before work commences, and final a Grading and Base Report (G&B-001), and a Weekly Grading and Base Testing Summary Report (submit the following Monday).

**B.1 Moisture Control**

For material not meeting 3149.2.B.1, determine the optimum moisture content percentage by performing a proctor test. For material meeting 3149.2.B.1, determine the optimum moisture content percentage by either performing a proctor test, or use Form G&B-305.

Obtain a minimum of one proctor sample for each major soil type, and provide a split sample to the Engineer for each proctor sample.

Soil type is defined according to the Triaxial Chart in the Grading and Base Manual.

Test for the moisture content in areas that appear least likely to meet specifications. The Engineer may designate any test location.

Determine the moisture content during compaction using test methods listed in the Grading and Base Manual.

Maintain the moisture content between 65 and 102 percent of optimum moisture content. Correct moisture in areas represented by failing moisture tests before testing the compaction.

**B.2 Compaction Testing**

Compaction tests taken in areas represented by failing moisture tests are not valid.

For the Specified Density Method:

a) Determine the maximum density by performing a proctor test.

b) Obtain a minimum of one proctor sample for each major soil type, and provide a split sample to the Engineer for each proctor sample.

c) Soil type is defined according to the Triaxial Chart in the Grading and Base Manual.

d) Perform a sand cone test or use a nuclear gauge to determine density compliance.
e) Correct then retest areas that fail compaction testing

The Engineer may determine the governing material for proctor maximum density.

S-103.3 Replace MnDOT 2112.3.C with the following:

C Compaction

Test for compaction compliance per 2105. Use the Specified Density Method for materials not meeting 3149.2B1 or use the Penetration index method for materials meeting 3149.2B1.

Achieve and maintain compaction requirements, until placement of the next lift

S-103.4 Replace MnDOT 2112.3.D with the following:

D Agency Quality Assurance Testing (QA)

D.1 Moisture Testing

Obtain and test for moisture at time of compaction using a split sample from the Contractor, or obtain material for testing within three feet of the Contractor’s test location, if the Contractor is testing moisture in-place.

Determine governing proctor material for optimum moisture determination for split sample.

D.2 Compaction Testing

Determine compaction test locations and test in areas with the greatest rutting or deflection, and near structures.

Obtain a split sample for each proctor performed by the Contractor.

Determine governing proctor material for the QA maximum density determination.

After Contractor corrects an area represented by a failing test, and the Contractor has passing QC tests, retest in the areas most likely to fail.

D.3 Compliance Determination – Tolerances and Substitution of QA Results

D.3.a Compliance Determination – Moisture Calculation

QC test results must meet requirements. For each required moisture companion test, the Contractor’s test result is within tolerance if the results are within 1.0% of the Agency’s test results. Substitute the Agency’s results if not within 1.0%. Continue to test in new companion locations, until the two tests results are 1.0% tolerance.

D.3.b Compliance Determination – Maximum Density & Optimum Moisture Determination: Proctor

For each required proctor test, the Contractor’s test result is within tolerance, if the Agency results are within 2.0% of the Contractor’s optimum moisture determination and within 3.0 pounds/ft³ for the maximum density determination. Substitute the Agency’s results, if not within tolerance. Continue
D.3.c Compliance Determination – Compaction

Compaction acceptance is based upon passing QC and QA test results and passing any Test Rolling (2111), if required by the Contract. The Engineer will delineate the extent of failing areas.

**Designer Note: Include the following measurement and pay item change once per project.**

S-103.5 Add the following to MnDOT 2112.4:

**A Quality Management**

Quality Management will be measured by lump sum and is called **Contractor Testing**. It includes all Quality Control requirements for 2105, 2106, 2112, 2118, 2211, 2212, 2215 and 2221.

S-103.6 Add the following to MnDOT 2112.5:

For Quality Management (**Contractor Testing**), the Agency will pay for a partial payment of 25% after all required calibrations, certifications, and preliminary forms are submitted. The Agency will pay for an additional partial payment of 35% when 50% of the 2105, 2106 and 2215 items have been placed and accepted. The Agency will pay for a partial payment of an additional 20% when 100% of the 2105, 2106 and 2215 items have been placed and accepted. The additional 20% will be paid out when all other base, surfacing and shouldering materials have been placed and accepted and required reports have been submitted to the Engineer.

The Department will pay for Quality Management (**Contractor Testing**) on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016.601</td>
<td>Contractor Testing</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

**S-104 (2112) SHOULDER PREPARATION**

This work shall be performed in accordance with the provisions of MnDOT 2112 and the following:

S-104.1 The existing shoulder subgrade from Sta. ___+___ to Sta. ___+___ shall be compacted by the "_______ Compaction" Method.

S-104.2 Approximately ____ cubic yards [cubic meters] of in place shoulder material shall be removed and disposed of by the Contractor. This work shall be performed as incidental.

S-104.3 Measurement will be made by the linear foot [meter] along the centerline of the roadway where shoulder preparation is performed as specified. Payment will be made under Item 2112.603 (Shoulder Preparation) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs of preparing the shoulder subgrade, as specified, except that any expenses incurred in correcting unstable conditions below the top 6 inches [150 mm] will be compensated for separately.

**OR**
S-104.4  Measurement will be made by length in road stations of 100 feet along the centerline of the roadway where shoulder preparation is performed as specified. Payment will be made under Item 2112.619 (Shoulder Preparation) at the Contract bid price per road station, which shall be payment in full for all costs of preparing the shoulder subgrade, as specified.

S-105  **(2118) AGGREGATE SURFACING**

Use when have any 2118 pay items. Always use SP2016-252.1 (AGGREGATE FOR SURFACE AND BASES COURSES) with this writeup.

NEW WRITEUP 11/20/15  ❙DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-94.1  MnDOT 2118 is modified as follows:

S-105.1  Add the following to MnDOT 2118.3.B:

Test for minimum clay content and plasticity index at the discretion of the Engineer.

S-106  **(2118) AGGREGATE SURFACING (CV) CLASS □**

**District needs to fill in Class type and type of compaction.**

SP2016-95  This work consists of the placement, grading, and compaction of Class □ Aggregate in accordance with Mn/DOT 2211 and 3138, as directed by the Engineer, and the following:

S-106.1  Compaction shall be achieved by the "□□□□□ Compaction" Method described in Mn/DOT 2211.3D2 or as directed by the Engineer.

S-106.2  Measurement will be made by volume, computed on the basis of planned dimensions of the surfacing using surface area and thickness. Payment will be made under Item 2118.607 (Aggregate Surfacing (CV) Class □□□) at the Contract bid price per cubic yard [cubic meter], which shall be payment in full for all costs involved.

S-107  **(2123) TRACTOR MOUNTED BACKHOE**

SP2016-96  This work shall consist of furnishing and operating a tractor mounted backhoe in accordance with the provisions of MnDOT 2123 and the following:

S-107.1  The backhoe shall be tractor mounted and power operated, and of sufficient size and operating depth for the purpose intended and to the satisfaction of the Engineer.

S-107.2  Measurement will be made in accordance with the provisions of MnDOT 2123.4A and payment will be made under Item 2123.610 (Tractor Mounted Backhoe) at the Contract bid price per hour, which shall be compensation in full for all costs relative thereto.
S-108  **(2123) CRAWLER MOUNTED BACKHOE**

SP2016-97

This work shall consist of furnishing and operating a crawler mounted hydraulic backhoe in accordance with the provisions of MnDOT 2123 and the following:

S-108.1 The backhoe shall be crawler mounted and shall be rated at least 3/4 cubic yards [0.6 m³] capacity on the smallest bucket recommended for the unit by the manufacturer.

S-108.2 The Contractor shall provide any required transportation for this unit from one site to any other with no direct payment made for the moving or for backhoe time during the time of transport.

S-108.3 This equipment shall be used for miscellaneous ditch cleanout as directed by the Engineer.

S-108.4 The Contractor shall provide any necessary flagmen and traffic control during time of use of equipment hours under MnDOT 2123, in accordance with MnDOT 1404.

S-108.5 Measurement will be made in accordance with the provisions of MnDOT 2123.4A and payment will be made under Item 2123.610 (Crawler Mounted Backhoe) at the Contract bid price per hour, which shall be compensation in full for all costs relative thereto.

S-109  **(2123) 1.5 CUBIC YARD BACKHOE**

SP2016-98

This work shall consist of the removal of sediment trapped in retention devices or deposited in retention ponds. Sediment removal shall consist of excavating and other associated operations to remove sediment and restore the capacity of the temporary erosion control device. Sediment shall be removed to the original grade or as necessary to restore the function of the device as determined by the Engineer. Sediment removed shall be spread or disposed of to the satisfaction of the Engineer. The Contractor will be compensated for sediment removal on an equipment rental hourly basis in accordance with MnDOT 2123. Spreading, hauling, and disposing of material shall be at no expense to the Department.

Sediment removal shall be accomplished with a backhoe or other suitable equipment capable of reaching out and excavating semi-solid material. The backhoe shall be of the full-revolving crawler type and shall have a bucket size 1.5 cubic yards. Size of the boom and the power unit shall be as recommended by the manufacturer for use with the bucket size. Depending on site conditions, the Engineer may allow a rubber tired tractor type backhoe to be used. Payment for the rubber tired tractor backhoe will be prorated based on rated capacity of the machine.

Sediment removal will be measured by the number of hours of actual equipment working time in accordance with MnDOT 2123.4. Sediment removed may be fluid or semi-solid and its consistency shall not be considered a basis of claim for adjusted unit prices. Payment will be made under Item 2123.610 (1.5 cubic yard Backhoe) at the Contract bid price per hour, which shall be payment in full for all costs involved.

S-110  **(2211) AGGREGATE BASE**

SP2016-99

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

*Use S-.1 when needed.*

S-110.1 Compaction shall be achieved by the "Compaction Method" described in MnDOT 2211.3D2.
S-111 (2211) AGGREGATE BASE, (2118) AGGREGATE SURFACING, (2212) DRAINABLE AGGREGATE BASE, AND (2221) SHOULDER BASE AGGREGATE – QUALITY MANAGEMENT

Use with 2106.601 (Contractor Testing) when there are also 2211, 2118, 2212, and 2221 pay items on the same plan. For CO Special Provisions - Make sure to use the revised Schedule of Materials Control (SMC) with this writeup when creating the pdf of the proposal!!!

NEW WRITEUP 01/08/16 ◄DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-99.1

MnDOT 2211, 2118, 2212, and 2221 are hereby modified as follows:

S-111.1 Add the following to MnDOT 2118.1, 2211.1, 2212.1 and 2221.1:

GENERAL QUALITY MANAGEMENT PROVISIONS AND DESCRIPTION


1. Test according to the Schedule of Materials Control.

2. Contractor will notify Engineer, when embankment is ready for QA compaction acceptance testing. Additional layers and lifts placed above layers and lifts without passing QC & QA testing results are considered “Unauthorized Work”, per 1512.

3. Yearly calibration of all QC equipment is required. Have calibration records available immediately upon request.

4. Provide the following at the preconstruction meeting:
   
a. Names of all testing personnel and certification numbers.

b. Equipment certifications

5. The Engineer may elect to perform additional tests at any time to determine Contract Compliance.

6. Locate all test locations by either GPS coordinates or by station, offset and elevation and place this information on the test report.

S-111.2 Replace MnDOT 2211.3.B with the following:

B Contractor QC Testing

Test according to the Schedule of Materials Control.

Certify materials on Form G&B-104. Attach all required aggregate test results to Form G&B-104.

Submit results to the Engineer within one hour after test completion for moisture tests and within one day for all other tests.
Submit a preliminary, required before work commences, and final a Grading and Base Report (G&B-001), and a Weekly Grading and Base Testing Summary Report (submit the following Monday).

Retest corrected base, which fails either QC or Quality Assurance (QA) testing. Correct failing material, before placing the next lift and provide copies to the Engineer before QA testing.

Test for the moisture content in areas that appear least likely to meet specifications.

B.1 Aggregate Quality Testing

Sample aggregate for quality testing, when required, from samples obtained at placement. The Engineer may permit sampling from a stockpile before placement.

Sample in an area determined by the Engineer and split materials in the presence of the Engineer.

Give the split samples to the Engineer.

B.2 Aggregate Gradation Tests

When there are four or more gradations required for each material type, chart gradations per Grading and Base Manual Section 5-692.111, Figure 1 and Table 2 for each material type.

Sample in an area determined by the Engineer and split materials in the presence of the Engineer.

Give the split sample to the Engineer.

B.3 Moisture Control

Determine the required moisture content per Table 2211-1.

Test for the moisture content in areas that appear least likely to meet specifications.

Determine the moisture content during compaction using test methods listed in the Grading and Base Manual or by alternate methods approved by the Engineer.

Correct for moisture in areas represented by failing moisture tests, before testing the compaction.

B.4 Compaction Testing

Compaction tests taken in areas represented by failing moisture tests are not valid.

Test for Compaction using the Penetration Index (PI) Method. Meet the requirements of Table 2211-3.

Test for compaction in areas with the greatest rutting or deflection, and near structures.

Correct any area represented by a failing test, and then retests in areas with the greatest rutting or deflection.

S-111.3 Replace MnDOT 2211.3.D with the following:

D Agency Quality Assurance Testing (QA)
Test according to the Schedule of Materials Control.

D.1 Aggregate Quality Testing

When quality tests are required, choose sample location, observe Contractor’s sampling and splitting, and obtain a split sample, randomly from the first day’s production at the project site. The Engineer may allow for sampling from a stockpile.

Perform aggregate quality testing for acceptance.

D.2 Aggregate Gradation Testing

Perform gradation tests, from split samples obtained during placement.

Observe the sampling, splitting and obtain the split sample from the Contractor.

Determine sample locations from the roadway after spreading, but before compaction using the random sampling method in the Grading and Base Manual.

D.3 Moisture Testing

Obtain and test for moisture at time of compaction using a split sample from the Contractor, or obtain material within three feet of the Contractor’s test location, if the Contractor is testing moisture in-place.

D.4 Compaction Testing

Test for compaction using either:

Penetration Index (PI) Method (for 2211), or

The Quality Compaction Method (for 2212, 2118 and 2221) by verifying each lift meets the criteria of 2105.3.F.2.

The requirements of Quality Compaction are also required for all compaction methods.

Test in areas with the greatest rutting or deflection, and near structures.

After Contractor corrects any area represented by a failing test, have the Contractor perform a QC retest, then perform a QA retest after a passing QC test(s) in areas with the greatest rutting or deflection.

D.5 Compliance Determination – Tolerances and Substitution of QA Results

D.5.a Compliance Determination – Aggregate Qualities

Aggregate Quality acceptance is based upon passing QA test results.

D.5.b Compliance Determination – Aggregate Gradations

Aggregate gradation acceptance is based upon QC results, along with any substitution of QA test results for QC results, when the QC and QA results are not within tolerance.
Compare the QA test results with the QC test results. Substitute the QA result for the QC result, when the two tests are not within tolerance of Table 2211-A for any sieve.

| Table 2211-A |
|------------------|------------------|
| **Allowable Tolerance Between Contractor and Agency Tests** | |
| **Test Protocol** | **Tolerance** |
| % Passing 3”, 2”, 1”, ¾” and 3/8” sieves | 6% |
| % Passing #4, #10 and #40 sieves | 5% |
| % Passing #200 sieves | 2.0% |

If the QA gradation sample results are not within the tolerance of Table 2211-A, perform gradations on the sample preceding and the sample following the sample that was out of tolerance. Again, determine whether to substitute the QA test result for the QC result based upon Table 2211-A. Continue performing gradations in each direction, both the preceding and the following, until samples are within tolerance of Table 2211-A.

D.5.c **Compliance Determination – Moisture Calculation**

QC & QA test results must meet requirements. For each required moisture companion test, the Contractor’s test result is within tolerance if the results are within 1.0% of the Agency’s test results. Substitute the Agency’s results if not within 1.0%. Continue to test in new companion locations, until the two tests results are 1.0% tolerance.

D.5.d **Compliance Determination – Compaction**

Compaction acceptance is based upon passing QC and QA test results and passing any Test or Proof Rolling (2111), if required by the Contract. The Engineer will delineate the extent of failing areas.

**Designer Note: Include the following measurement and pay item change under 2211.5 once per project.**

S-111.4 Add the following to MnDOT 2211.4:

**Quality Management**

Quality Management will be measured by lump sum and is called **Contractor Testing**. It includes all Quality Control requirements for 2105, 2106, 2112, 2118, 2211, 2212, 2215 and 2221.

S-111.5 Add the following to MnDOT 2211.5:

For Quality Management (**Contractor Testing**), the Agency will pay for a partial payment of 25% after all required calibrations, certifications, and preliminary forms are submitted. The Agency will pay for an additional partial payment of 35% when 50% of the 2105, 2106 and 2215 items have been placed and accepted. The Agency will pay for a partial payment of an additional 20% when 100% of the 2105, 2106 and 2215 items have been placed and accepted. The additional 20% will be paid out when all other base, surfacing and shouldering materials have been placed and accepted and required reports have been submitted to the Engineer.

The Department will pay for Quality Management (**Contractor Testing**) on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
</table>
S-111.6 Replace MnDOT 2118.3A with the following:
Meet the 2211.3B Special Provisions. See Section S-__.2.

S-111.7 Replace MnDOT 2118.3B with the following:
Meet the 2211.3D Special Provisions. See Section S-__.3.

S-111.8 Replace MnDOT 2212.3B with the following:
Meet the 2211.3B Special Provisions. See Section S-__.2.

S-111.9 Replace MnDOT 2212.3D with the following:
Meet the 2211.3D Special Provisions. See Section S-__.3.

S-111.10 Replace MnDOT 2221.3B with the following:
Meet the 2211.3B Special Provisions. See Section S-__.2.

S-111.11 Replace MnDOT 2221.3D with the following:
Meet the 2211.3D Special Provisions. See Section S-__.3.

S-112 **(2215) RECLAMATION**
*Use on all projects using 2215.*

Modify MnDOT 2215 as follows:

S-112.1 Replace MnDOT 2215.3.A.2 with the following:

**A.2 Agency Quality Assurance (QA) – General**

Test according to the Schedule of Materials Control, except that moisture testing of stabilized layer during curing before placement of HMA is not required.

S-112.2 Replace MnDOT 2215.3.B.7 with the following:

**B.7 Placing and Compacting**

- Uniformly mix reclamation material before spreading.
- Spread and compact the reclamation material to the profile and cross section shown on the plans before placing the next layer.
- Maintain the moisture content from 3 to 7 percent by dry weight during compaction.
- Place and compact reclamation materials in maximum 3-inch [75 mm] lifts using a pneumatic-tired roller in compliance with 2215.3.B.4.
For lifts thicknesses from 3 inches [75 mm] to 6 inches [150 mm] compact using both a pneumatic-tired and pad foot vibratory rollers in compliance with 2215.3.B.4.

The Contractor may use excess reclamation material from other locations on the project to attain the profile or cross-section as shown on the plans.

Compact the full thickness to achieve a penetration index value of 10 mm and a seating value of 40 mm as measured by the MnDOT Standard Dynamic Cone Penetrometer (DCP) method, as determined by Form G&B-205.

Place and compact to support traffic, while allowing no greater than ½ inch [13 mm] of surface displacement, when measured using a straightedge.

Construct the layer to ±0.05 ft [15 mm] of the profile and cross-section as required by the contract in accordance with 2112, “Subgrade Preparation.”

S-112.3  Replace MnDOT 2215.3.C.6 with the following:

C.6  Mixing/Injecting

- Produce the SFDR layer by mixing and injecting the liquid bituminous material into the pulverized pavement.
- Use a minimum 6 inch overlap between passes of the reclaimer.
- Demonstrate that the asphalt stabilizing agent is uniformly blended into the recycled pavement. If the first mixing fails to produce uniformity, remix the stabilized layer until it is achieved.
- Maintain bituminous material within ±10⁰ F of the optimum temperature recommended by the supplier. If the supplier does not provide a recommendation, maintain the foamed asphalt temperature between 305⁰ F & 325⁰ F.
- After consultation with the Contractor, the Engineer may direct the Contractor to vary the application rate of Bituminous Material for Mixture compared to the mix requirements on Form G&B-408 for areas of pulverized bituminous which the Engineer believes are either too rich or too dry.

S-112.4  Replace MnDOT 2215.3.C.8 with the following:

C.8  Shaping and Compacting of Bituminous Stabilized Material

Remove any remaining pad foot marks and spread the material.

Place and compact the material to within ±0.05 feet of the profile and so that the cross section has no variations greater than ½ inch within 10 feet.

Complete final shaping and compaction within two hours of bituminous material injection.

S-112.5  Replace MnDOT 2215.3.C.10 with the following:
C.10  Fog Seal and Bituminous Requirements

Apply a CSS-1h bituminous fog seal per 2355, “Bituminous Fog Seal” at a rate of 0.10 to 0.16 gallons per square yard no more than 3 days after the last section has been stabilized.

Place the asphalt pavement:

a)  No sooner than three calendar days after SFDR, at any location, has been injected and compacted,

b)  When the SFDR surface does not deflect under construction equipment and meets quality compaction per 2105.3.F.2.

c)  When the SFDR is capable of meeting the required bituminous placement and compaction requirements.

S-113  (2215) RECLAMATION – QUALITY MANAGEMENT

Use with 2106.601 (Contractor Testing) when there are also 2215 pay items on the same plan.  For CO Special Provisions - Make sure to use the revised Schedule of Materials Control (SMC) with this writeup when creating the pdf of the proposal!!!

NEW WRITEUP 01/08/16  ◄DO NOT REMOVE THIS.  IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-100.1

MnDOT 2215 is hereby modified as follows:

S-113.1  Add the following to MnDOT 2215.1:

GENERAL QUALITY MANAGEMENT PROVISIONS AND DESCRIPTION


1.  Test according to the Schedule of Materials Control.

2.  Contractor will notify Engineer, when embankment is ready for QA compaction acceptance testing.  Additional layers and lifts placed above layers and lifts without passing QC & QA testing results are considered “Unauthorized Work”, per 1512.

3.  Yearly calibration of all QC equipment is required.  Have calibration records available immediately upon request.

4.  Provide the following at the preconstruction meeting:

   a.  Names of all testing personnel and certification numbers.

   b.  Equipment certifications

5.  The Engineer may elect to perform additional tests at any time to determine Contract Compliance.

6.  Locate all test locations by either GPS coordinates or by station, offset and elevation and place this information on the test report.
S-113.2 Replace MnDOT 2215.3.A.1 with the following:

A.1 Contractor QC Testing

- Test according to the Schedule of Materials Control
- Submit results to the Engineer within one hour after test completion for moisture tests and within one day for all other tests.
- Submit a preliminary, required before work commences, and final a Grading and Base Report (G&B-001), and a Weekly Grading and Base Testing Summary Report (submit the following Monday).
- Sample and test for gradation within the first 500 feet of production and within 500 feet after a failing gradation.
- Test corrected areas that fail either QC or Quality Assurance (QA).

A.1.a Aggregate Gradation Tests

Perform gradation tests from samples gathered after pulverization and before compaction.

A.1.b Moisture Control

Test for the moisture content in areas that appear least likely to meet specifications. The Engineer may designate any test location.

Determine the moisture content during compaction using test methods listed in the Grading and Base Manual.

Correct for moisture in areas represented by failing moisture tests before testing the compaction.

A.1.c Compaction Testing

Compaction tests taken in areas represented by failing moisture tests are not valid.

Test for Compaction using the Penetration Index (PI) Method.

Test for compaction in areas with the greatest rutting or deflection, and near structures.

Correct any area represented by a failing test, and then perform retests in areas with the greatest rutting or deflection.

A.1.d Depth Testing

Measure the reclaim depth, both the bituminous and aggregate base using Form G&B-401.

S-113.3 Replace MnDOT 2215.3.A.2 with the following:

A.2 Agency Quality Assurance Testing (QA) –General

Test according to the Schedule of Materials Control
A.2.a Aggregate Gradation Testing

Perform gradation tests from samples gathered after pulverization and before compaction.

A.2.b Moisture Testing

Perform moisture tests from sample obtained from a split sample from the Contractor, or obtain material within three feet of the Contractor’s test location, if the Contractor is testing moisture in-place.

A.2.c Compaction Testing

Test for compaction using the Penetration Index (PI) Method. Test in areas with the greatest rutting or deflection, and near structures. The requirements of Quality Compaction are also required for all compaction methods.

After Contractor corrects any area represented by a failing test, performs additional tests in areas with the greatest rutting or deflection.

A.2.d Depth Check

Measure the reclaim depth.

A.3 Compliance Determination – Tolerances and Substitution of QA Results

A.3.a Compliance Determination – Aggregate Gradations

Aggregate gradation acceptance is based upon passing QC and QA results. Contractor is required to re-pulverize areas with failing gradations.

A.3.b Compliance Determination – Moisture Calculation

QC test results must meet requirements. For each required moisture companion test, the Contractor’s test result is within tolerance if the results are within 1.0% of the Agency’s test results. Substitute the Agency’s results if not within 1.0%. Continue to test in new companion locations, until the two tests results are 1.0% tolerance.

A.3.c Compliance Determination – Compaction

Compaction acceptance is based upon passing QC and QA test results and passing any Test Rolling (2111), if required by the Contract. If the sample fails, the Engineer will delineate the extent of failing area.

A.3.d Compliance Determination – Depth Check

QA depth checks must be within ½” of the QC depth check at a companion location. Continue to test in new companion locations, until the QC and QC tests results are within a tolerance of ½”.

Designer Note: Include the following two measurement and pay item changes, once per project.

S-113.4 Add the following to MnDOT 2215.4:

D Method of Measurement - Quality Management
Quality Management will be measured by lump sum and is called Contractor Testing. It includes all Quality Control requirements for 2105, 2106, 2112, 2118, 2211, 2212, 2215 and 2221.

S-113.5 Add the following to MnDOT 2215.5:

**B Quality Management**

For Quality Management (Contractor Testing), the Agency will pay for a partial payment of 25% after all required calibrations, certifications, and preliminary forms are submitted. The Agency will pay for an additional partial payment of 35% when 50% of the 2105, 2106 and 2215 items have been placed and accepted. The Agency will pay for a partial payment of an additional 20% when 100% of the 2105, 2106 and 2215 items have been placed and accepted. The additional 20% will be paid out when all other base, surfacing and shouldering materials have been placed and accepted and required reports have been submitted to the Engineer.

The Department will pay for Quality Management (Contractor Testing) on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016.601</td>
<td>Contractor Testing</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

**S-114 (2221) SHOULDER BASE AGGREGATE**

Aggregate shouldering courses shall be constructed in accordance with the provisions of MnDOT 2221 except as modified below:

*Use S-.1 when needed.*

S-114.1 Compaction shall be achieved by the "[Compaction Method]" described in MnDOT 2211.3D2.

**S-115 (2231) BITUMINOUS PATCHING MIXTURE**

*Use S-.1 and S-.2 when requested by Dist. Use S-.3 when the needed.*

The provisions of MnDOT 2231 are supplemented with the following:

*Use when patching concrete road prior to overlay*

S-115.1 The bid price for this item shall include all costs of removing deteriorated pavement material and loose steel, cleaning and drying the holes to be patched, and furnishing and placing the patching mixture.

*Use when required for joint and crack filler*

S-115.2 The bid price for this item shall be compensation in full for all costs of routing, cleaning, and tack coating severely deteriorated transverse and longitudinal cracks prior to placing any overlays. The work shall be done in accordance with the Plan to the satisfaction of the Engineer.

*Use when needed.*

S-115.3 Payment will be made under Item 2360.505 (Type SP 12.5 Bituminous Mixture For Patching) at the Contract bid price per ton.
SPECIAL PROVISIONS - SP2016 BOOK

Last Revision by CO Special Provisions: 08/04/16

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▲ DO NOT DELETE THE ABOVE REVISION DATE. This is how we tell which version of the SP2016 book you used when preparing your specs for your job.

S.P. Number of Your Job goes here

S-116 (2231) PAVEMENT SEATING
SP2016-103

This work shall consist of seating the existing concrete pavement prior to constructing the bituminous courses thereon. The work shall be performed in accordance with the applicable MnDOT Standard Specification, the Plans and the following:

S-116.1 After removal of the patches and joint seal material the pavement shall be rolled until the concrete pieces are firmly seated. Seating should be done just prior to placement of the leveling course. Any loose pieces of broken concrete that are not firmly seated shall be removed prior to opening to traffic or placing the bituminous courses thereon.

The equipment to be used for the seating of the cracked pavement shall be pneumatic tired, towed by suitable tractive equipment and shall conform to the following requirement:

The roller shall have 2 wheels spaced not less than 6 feet [1.8 m] apart (center to center transversely).

The tire size shall be either 18 X 24 or 18 X 25, with an inflation rating of 95 psi [655 kPa]. Each tire shall be inflated to a pressure of not less than 95 psi [655 kPa].

The gross weight on the roller shall be not less than 14.9 tons [13.5 metric tons] and not more than 15.1 tons [13.7 metric tons] on each wheel or as approved by the Engineer.

Other equipment may be used equivalent to the above, as directed by the Engineer.

Rolling shall be done by making 2 passes over each strip covered by the width of a tire. Unrolled areas between tire paths shall not be wider than 12 inches [300 mm]. The roller shall be operated at a uniform speed and in a pattern approved by the Engineer.

S-116.2 MEASUREMENT AND PAYMENT
Pavement Seating will be measured separately by length in linear feet [meters] along the centerline of the roadbed where such work is performed.

Payment will be made under Item 2231.603 (Pavement Seating) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto, including, but not limited to:

(1) mechanically seating the existing pavement with an approved roller, and

(2) removing and disposing of loose pieces of broken concrete which are not firmly seated.

Disposal of the broken concrete shall be in accordance with MnDOT 2104.3D3.

S-117 (2231) PAVEMENT CLEANING
Designer needs to fill in what bituminous patching mixture to use in S-.2.
SP2016-104

After surface widening operations and fracturing and seating have been performed, the existing bituminous patches and loose spalled concrete shall be removed and disposed of outside of the Right of Way according to the provisions of MnDOT 2104.3D3.

S-117.1 Prior to the placement of the bituminous leveling mixture, the pavement shall be cleaned by power sweeping and air blowing (including removing loose material from joints, cracks and bituminous patched areas) with 100 psi [690 kPa] nominal air pressure as directed by the Engineer.
§117.2 Depressions or cavities which result after air blasting or removal operations which are greater than 2 inches [50 mm] in depth and 2 inches [50 mm] in width; and cracks and joints that are 1-1/2 inches [38 mm] or greater in width shall be patched with Bituminous Patching Mixture. Patching of these areas shall be done ahead of the paver or blade, and rolled with a pneumatic tired roller.

§117.3 After cleaning and patching the surface, the Contractor shall follow up closely with the bituminous tight blade leveling mixture.

§117.4 Measurement will be made by length in linear feet [meters] along the centerline of the roadbed where such work is performed.

§117.5 Payment will be made under Item 2231.603 (Pavement Cleaning) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto. No extra compensation will be made for the increased width of roadway.

§118 (2231) PAVEMENT CRACKING

This work shall consist of fracturing the existing concrete pavement prior to constructing the bituminous courses thereon. The work shall be performed in accordance with the applicable MnDOT Standard Specifications, the Plans and the following:

§118.1 Prior to mechanically fracturing the in place concrete pavement the bituminous base widening and Class(s) of shoulder aggregate(s) shall be placed adjacent and to at least the top of the concrete pavement. The bituminous base widening after final compaction shall be slightly higher (but not to exceed 1/4 inch [6 mm]).

§118.2 Fracturing shall be accomplished with a spade type breaker mounted on a vehicle capable of controlled forward and transverse movement and fracturing the pavement to the full depth, all as approved by the Engineer, yet maintain aggregate interlock in the fractured faces.

§118.3 The concrete shall be cracked transversely at approximately 3 - 4 feet (+/- 1/2 foot) [0.9 - 1.2 m (+/- 0.15 m)] intervals with no break closer than 2-1/2 feet [0.76 m] from an existing transverse joint and transverse crack. Fracturing exceptions (i.e. bridge areas, culverts, drainage systems, urban locations, etc.) shall be as noted in the Plans.

§118.4 Before routine fracturing operations begin, the Contractor shall use a 100 foot [30 m] test strip on the Project to demonstrate that the operation is satisfactory to the Engineer.

§118.5 After surface widening operations and fracturing have been performed, the existing bituminous patches and loose spalled concrete shall be removed. The in place joint seal material shall be removed prior to the placement of the new surface.

§118.6 Prior to the placement of the bituminous leveling the pavement shall be cleaned by power sweeping and air blowing (including removing loose material from joints, cracks and bituminous patched areas) with 100 PSI [690 kPa] nominal air pressure as directed by the Engineer. After cleaning the surface, the Contractor shall follow up closely with the bituminous leveling course. Placement shall be by blade lay, paver or combination thereof as set forth elsewhere in these Special Provisions under MnDOT 2331.

§118.7 No in place concrete pavement shall be fractured unless it can be covered with all bituminous courses during the same construction season.
S-118.8 The Contractor shall be responsible for cutting (saw or core drill) samples of sufficient size to permit determination of the extent and type of mechanical cracking of the in place concrete. The Contractor should anticipate multiple cutting locations of the concrete in the 100 foot [30 m] test strip area for each mechanical cracking machine. For the routine fracturing, the Contractor shall cut the concrete at a rate of not less than one sample location per mile per lane width per mechanical cracking machine. All cutting locations shall be under the supervision of the Engineer. Analysis of the cores to determine extent of fracturing shall be determined by the Engineer.

S-118.9 MEASUREMENT AND PAYMENT
Pavement cracking will be measured separately by linear feet [meters] along the centerline of the roadbed where such work is performed.

Payment will be made under Item 2231.603 (Pavement Cracking) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto, including but not limited to: (1) mechanically fracturing the pavement and (2) cutting (saw or core drill) samples of the in place concrete for mechanical cracking analyses.

S-119 (2231) BITUMINOUS SURFACE (CRACK AND JOINT REPAIR)

SP2016-106

This work shall consist of treating cracks in the milled bituminous surface in accordance with the provisions of MnDOT 2231 except as modified below:

S-119.1 High pressure air (100 psi [690 kPa] minimum) shall be used to blow loose materials out of cracks 1/2 inch [13 mm] or larger.

S-119.2 All cracks shall be sprayed with an emulsified asphalt tack coat meeting the requirements of MnDOT 2357.

S-119.3 Cracks 1/2 inch [13 mm] or larger shall be backfilled with Mixture for Joints and Cracks or a bituminous mixture meeting the requirements of MnDOT 2361.

S-119.4 All compaction shall be by the "Ordinary Compaction" method.

S-119.5 Measurement will be made by the length of cracks and joints repaired as specified.

Payment for cracks that are only treated with emulsified asphalt will be made under Item 2231.603 (Bituminous Surface Crack and Joint Repair) at the Contract bid price per linear foot [meter], which shall be compensation in full for furnishing and applying the tack material as specified.

Payment for cracks that are required to be backfilled will be made under Item 2231.603 (Bituminous Surface Crack and Joint Repair) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto, including air blasting, furnishing and applying the tack material, and furnishing and placing the backfill mixture.
S-120 (2231) PAVEMENT BREAKING (RUBBLIZING)

SP2016-107

This work consists of breaking (rubblizing) and seating the in place concrete pavement as shown in the Plans. This work will be performed in accordance with the applicable MnDOT Standard Specifications and the following:

Before breaking (rubblizing), saw full depth joints and completely sever load transfer devices to isolate the breaking (rubblizing) area from adjacent areas of concrete pavement that are to remain. Saw jointed pavements at an existing joint.

S-120.1 The breaking (rubblizing) equipment must be self-contained, self-propelled and capable of breaking the concrete to nominal maximum dimensions of 3 inches at the surface of the pavement and 9 inches for the full depth of the pavement, without displacing the broken pieces, while maintaining the existing profile and cross-section.

(A) Before concrete breaking (rubblizing) operations begin, construct a 400 foot test strip on the Project to demonstrate the operations are satisfactory to the Engineer. Backfill all excavations adjacent to the concrete to be broken (rubblized) to the same elevation as the top of the concrete and compact prior to breaking (rubblizing) the concrete. Additional compaction may be necessary after the breaking (rubblizing) is completed. Any additional compaction will be considered incidental work for which no direct payment will be made.

S-120.2 No public traffic is allowed on the broken (rubblized) concrete. Minimize construction traffic on the rubblized concrete. Seat the broken (rubblized) concrete by rolling with a steel wheeled vibratory roller and a pneumatic tired roller. Additionally, maintain the seated condition of the broken (rubblized) concrete as directed by the Engineer until the placement of the leveling course (non-wear) mixture.

(A) Apply water as directed by the Engineer and in accordance with MnDOT 2130. Application of water is considered incidental work for which no direct compensation will be made.

(B) Rollers used to seat the broken (rubblized) concrete are subject to the approval of the Engineer in accordance with MnDOT 2360.3.B.2.e and 1805.

S-120.3 Cutting and removing steel reinforcement and tie bars that migrate to the surface is considered incidental work for which no direct compensation will be made.

S-120.4 Before placing the bituminous leveling course (non-wear) clean the surface of the broken (rubblized) and seated pavement by removing debris, loose concrete chunks, and other foreign material. Brooming of the broken (rubblized) and seated pavement is not allowed.

S-120.5 Measurement will be made by area on those sections where such work is performed. Payment will be made under Item 2231.604 (Pavement Breaking) at the Contract bid price per square yard.
S-121 (2232) MILL PAVEMENT SURFACE
District to determine if whether S-.1 or S-.2 is needed.

The provisions of MnDOT 2232 are modified and/or supplemented with the following:

Designers need to determine the state of existing aggregate shoulders early in the scoping process. If aggregate shoulders are in an overall poor condition, language is needed stating that existing aggregate shoulders will be brought up flush to the inplace pavement before any milling, paving or other operations begin. The Designers need to choose the appropriate method of payment.

S-121.1 Prior to any milling or paving the Contractor shall place aggregate shouldering material, in a sufficient quantity to bring the existing shoulder flush with the edge of inplace pavement, as determined by the Engineer. The Contractor shall conform to all the requirements of MnDOT 2221. Payment will be made under Item 2221.502 (Shoulder Base Aggregate (LV) Class__) at the Contract bid price per cubic yard [cubic meter].

OR

S-121.2 Prior to any milling or paving the Contractor shall place aggregate shouldering material, in a sufficient quantity to bring the existing shoulder flush with the edge of inplace pavement, as determined by the Engineer. The Contractor shall conform to all the requirements of MnDOT 2221. This work shall be considered incidental.

S-122 (2232) MILLED RUMBLE STRIPS
Use for rumble strips at stop line locations

This work shall consist of constructing rumble strips in accordance with the applicable MnDOT Standard Specifications, the details in the Plan, and the following:

S-122.1 Rumble strips are to be located in advance of "Stop Ahead" and "Stop" signs as shown in the Plan.

S-122.2 Sheet No. ____ in the Plan shows the Details to be used in constructing the rumble strips. Milling shall be the only acceptable method of constructing the rumble strips. A rumble strip consists of two (2) strips each 5 feet [1.5 m] long and one (1) placed in each wheel track.

S-122.3 Rumble strips shall be coated with an asphalt emulsion fog seal per MnDOT 2355 prior to final striping. This work shall be incidental.

S-122.4 Measurement will be made by the number of rumble strips constructed as specified. Payment will be made under Item 2232.602 (Milled Rumble Strips) at the Contract bid price per each, which shall be payment in full for all costs incidental to constructing the rumble strips as specified.

S-123 (2232) MILLED RUMBLE STRIPS
Use for continuous rumble strips on bituminous shoulders

This work shall consist of constructing continuous rumble strips on the bituminous shoulder in accordance with the provisions of MnDOT 2232, the details in the Plan, as directed by the Engineer, and the following:

S-123.1 Milling shall be the only acceptable method of constructing the rumble strips.
Rumble strips shall be coated with an asphalt emulsion fog seal per MnDOT 2355 prior to final striping. This work shall be incidental.

S-123.3 Measurement will be made by length, in linear feet [meters], for each shoulder. Payment will be made under Item 2232.603 (Milled Rumble Strips) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.

S-124 (2232) MILLED RUMBLE STRIPS (CONCRETE)
Use for continuous rumble strips on concrete shoulders.

This work shall consist of constructing continuous rumble strips on the concrete shoulder in accordance with the provisions of Mn/DOT 2232, Mn/DOT 1717, the details in the Plan, as directed by the Engineer, and the following:

S-124.1 Milling shall be the only acceptable method of constructing the rumble strips.

S-124.2 MEASUREMENT AND PAYMENT
Measurement will be made by length, in linear feet [meters], for each shoulder. Payment will be made under Item 2232.603 (Milled Rumble Strips (Concrete)) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.

S-125 (2232) MILLED RUMBLE STRIPS - INTERMITTENT

This work shall consist of constructing intermittent rumble strips on the bituminous shoulder in accordance with the provisions of MnDOT 2232, the details in the Plan, as directed by the Engineer, and the following:

S-125.1 Milling shall be the only acceptable method of constructing the rumble strips.

S-125.2 Rumble strips shall be coated with an asphalt emulsion fog seal per MnDOT 2355 prior to final striping. This work shall be incidental.

S-125.3 Measurement will be made of the length of the intermittent milled rumble strip constructed on each shoulder, including gaps and excluding entrances, ramps and turnlanes. Payment will be made under Item 2232.603 (Milled Rumble Strips - Intermittent) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.

S-126 (2232) MILL AND PATCH BITUMINOUS PAVEMENT (ADA)
Always include SP2016-136 (PLANT MIXED ASPHALT PAVEMENT) or SP2016-139 (PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID) when using this pay item and select the appropriate mix type.

This work shall consist of milling and patching the existing bituminous surface adjacent to the newly constructed curb and gutter in accordance with the provisions of MnDOT 2232, 2360, other Contract provisions, and the following:

S-126.1 CONSTRUCTION REQUIREMENTS
The bituminous surface shall be milled to a depth of 2 inches for a width of 2 feet in front of the proposed curb and gutter as shown in the Plans and in conformance with requirements of MnDOT 2232, Mill Pavement Surface. All milling must occur before the new curb and gutter is placed. After the new curb and gutter has been constructed the Contractor shall place bituminous material over the milled surface. The compacted surface...
shall be at a level resulting in the edges/joints between the surface and the gutter face/existing bituminous roadway are less than ¼ inch vertically. Compaction shall be obtained with mechanical tampers in areas not accessible to conventional rolling equipment. Compaction shall be achieved to the satisfaction of the Engineer.

The surface slope of the bituminous patch in front of the truncated domes must not exceed 5% measured perpendicular to the flow line or edge of roadway.

**Surface Correction**
If the Engineer determines that additional milling and patching is necessary, this pay item can be utilized to complete additional minor roadway work beyond the initial 2 foot width. This work could consist of correcting surface deterioration, vertical discrepancies, drainage, or similar activities in order to provide an ADA compliant street crossing. For the area beyond the 2 foot width, the basis of payment will be 1 Linear Foot of mill and patch for every 2 Square Feet of additional surface correction area.

**S-126.2 METHOD OF MEASUREMENT**
Measurement will be by the linear foot at the face of curb.

**S-126.3 BASIS OF PAYMENT**
Payment will be made under Item 2232.603 (Mill and Patch Bituminous Pavement) at the Contract bid price per linear foot, which shall be compensation in full for all costs of performing the work as specified, including, but not limited to, cleanup and disposal operations.

**S-127 (2301) CONCRETE PAVEMENT FOR ALTERNATE BID**
- **Use this write-up whenever there is any concrete pavement pay items EXCEPT bridge approach panels and concrete pavement rehabilitation on the job.**
- **Always use SP2016-144 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID), SP2016-39 (AIR, LAND AND WATER POLLUTION (CONCRETE GRINDING)), and SP2016-115 (CONCRETE PAVEMENT) with this write-up.**

MnDOT 2301 is hereby modified as follows:

**S-127.1**
MnDOT 2301.2.M.1 and 2301.2.M.3 shall be deleted and replaced with the following:

**2301.2.M.1 Coarse Aggregate Quality Incentive/Disincentive**

The Engineer will accept the coarse aggregate for paving concrete in accordance with the aggregate quality requirements of 2301, 2461, and 3137. **No additional Coarse Aggregate Quality Incentive/Disincentive shall apply.**

**2301.2.M.3 Well-Graded Aggregate Optional Incentive**

**No additional Well-Graded Aggregate Optional Incentive shall apply.**

**S-127.2**
MnDOT 2301.3.P shall be deleted and replaced with the following:

**P Pavement Smoothness – IRI (International Roughness Index)**

Provide concrete pavement smoothness in accordance with 2399, “Pavement Surface Smoothness for Alternate Bid.”

**S-127.3**
MnDOT 2301.4.B.1 shall be deleted and replaced with the following:
B.1 Structural Concrete

If the contract includes the contract item Structural Concrete or Structural Concrete High Early, the Engineer will measure the volume in accordance with the following:

1. Verify the volume measurements from the computerized batch ticket printouts from the plant, as verified by 2301.3.E.2, “Concrete Ingredient Summaries,” and the consideration of any waste as agreed with the Engineer.

2. Include the volume of all specified concrete pavements into a single item without regard to grade, strength, width, or thickness of the concrete pavement, except if the plans include a contract item for high-early strength concrete.

3. Apply incentives or disincentives for Structural Concrete based on the cubic yard [cubic meter].

S-127.4 MnDOT 2301.5.B and 2301.5.B.1 shall be deleted and replaced with the following:

B Place Concrete Pavement

Unless the plans include a separate contract item for work incidental to Place Concrete Pavement, the contract square yard [square meter] price for Place Concrete Pavement includes the cost of constructing the pavement, including fine grading; forming, including all headers; providing and installing keyway and keyway bars, tie bars, taper steel, stopper bars, and other reinforcement bars; placing; spreading; screeding; vibration monitoring; finishing; curing; protecting; sawing; and sealing the concrete.

B.1 Structural Concrete

The Engineer will field calculate the volume of Structural Concrete and Structural Concrete High Early placed. The contract cubic yard [cubic meter] price for Structural Concrete and Structural Concrete High-Early includes the cost of producing, delivering, and depositing the concrete, including the cost of the batch materials, mixing operations, and the plant-lab office. The Engineer will verify volume of concrete from the computerized batch ticket printouts from the plant, with consideration of any waste. The Engineer will determine the maximum allowable project volume by multiplying the Place Concrete Pavement measurement by the thickness shown in the plans plus ¾ inch [19 mm] for the entire project. If the plans include a separate contract item for Structural Concrete High-Early or if the Contractor requests high-early and the Engineer approves, the Department will not provide extra compensation for the production of high-early strength concrete.

If the plans do not include a separate contract item for Structural Concrete High-Early and the Engineer orders high-early concrete, the Department will pay for additional cement at a rate of the invoice cost plus 15 percent.
S-128  

**CONCRETE PAVEMENT**

- Use this write-up whenever there is any concrete pavement pay items **EXCEPT** bridge approach panels and concrete pavement rehabilitation on the job.
- Use this write-up with **SP2016-114 (CONCRETE PAVEMENT FOR ALTERNATE BID)** AND with **SP2016-39 (AIR, LAND AND WATER POLLUTION (CONCRETE GRINDING))**.
- Use one of the following with this write-up:
  - **SP2016-143 (PAVEMENT SURFACE SMOOTHNESS)** for non-alternate jobs
  - **SP2016-144 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID)** for alternate jobs.

**SP2016-115**

MnDOT 2301 is hereby modified as follows:

### Table 2301-3

<table>
<thead>
<tr>
<th>If the gradation meets the following:</th>
<th>Classify material type as:</th>
<th>Gradation Test Procedures</th>
<th>Quality Test Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermediate Aggregate</td>
<td>Coarse Aggregate (+4 Portion)</td>
<td>Spec. 3137.2.D.3 except 3137.2.D.3(c) modified to maximum 40% carbonate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fine Aggregate (-4 Portion)</td>
<td>3126 Shale in Sand (-4 Portion)</td>
</tr>
<tr>
<td>100% passing the 1/2” and ≤90% passing #4</td>
<td>Intermediate Aggregate</td>
<td>Fine Aggregate * (Minimum 1000 g sample)</td>
<td>Shale Content Test by AASHTO T113 MnDOT Modified (+4 Portion)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3126 Shale in Sand (-4 Portion)</td>
</tr>
<tr>
<td>100% passing the 3/8” and ≤90% passing #4</td>
<td>Coarse Sand</td>
<td>Fine Aggregate</td>
<td>Shale Content Test by AASHTO T113 MnDOT Modified (+4 Portion)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3126 Shale in Sand (-4 Portion)</td>
</tr>
</tbody>
</table>

* Include a ½” sieve in the fine aggregate sieve stack. If a ½” sieve is not available, test the +4 portion as a coarse aggregate and the -4 portion as a fine aggregate.

**C.5 Ternary Mixes**

Ternary mixes are defined as portland cement and two other supplementary cementitious materials, or blended cement and one other supplementary cementitious material with a maximum replacement of 40% by weight.
Table 2301-5 of MnDOT 2301.2.L.1 shall be deleted and replaced with the following:
Table 2301-5
Concrete Mix Design Requirements

<table>
<thead>
<tr>
<th>Concrete Grade</th>
<th>Estimated Concrete Contract Quantity (yd³)</th>
<th>Mix Number</th>
<th>Mix</th>
<th>Maximum w/c ratio</th>
<th>Minimum Cement Content (lbs/yd³)</th>
<th>Cementitious Content (lbs/yd³)</th>
<th>Air Content %</th>
<th>Gradation Requirements</th>
<th>Minimum Aggregate Size Required</th>
<th>Maximum %SCM (Fly Ash/Slag/Ternary)</th>
<th>Slump Range</th>
<th>3137 Spec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≥ 3,500</td>
<td>3A21</td>
<td>0.40</td>
<td>0.42</td>
<td>385</td>
<td>530 – 615</td>
<td>7.0</td>
<td>Job Mix Formula</td>
<td>1 1/2” nominal</td>
<td>33/35/40</td>
<td>½ - 3”</td>
<td>2 – 5”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3A41</td>
<td>0.40</td>
<td>0.42</td>
<td>385</td>
<td>530 – 615</td>
<td>7.0</td>
<td>Job Mix Formula</td>
<td>3/4” nominal</td>
<td>33/35/40</td>
<td>½ - 3”</td>
<td>2 – 5”</td>
</tr>
<tr>
<td></td>
<td>&lt; 3,500 and Minor work and fill-ins not provided by the primary paving plant</td>
<td>3A21</td>
<td>0.42</td>
<td>0.42</td>
<td>385</td>
<td>530 – 615</td>
<td>7.0</td>
<td>3126 and Table 3137-4 Or Job Mix Formula</td>
<td>3/4” nominal</td>
<td>33/35/40</td>
<td>½ - 3”</td>
<td>2 – 5”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3A41</td>
<td>0.42</td>
<td>0.42</td>
<td>385</td>
<td>530 – 615</td>
<td>7.0</td>
<td>3126 and Table 3137-4 Or Job Mix Formula</td>
<td>3/4” nominal</td>
<td>33/35/40</td>
<td>½ - 3”</td>
<td>2 – 5”</td>
</tr>
<tr>
<td></td>
<td>Engineer Approved or Plan Allowed High-Early</td>
<td>3AHE ‡</td>
<td>0.40</td>
<td>0.42</td>
<td>385</td>
<td>&gt; 615 – 750</td>
<td>7.0</td>
<td>3126 and Table 3137-4 Or Job Mix Formula</td>
<td>3/4” nominal</td>
<td>33/35/40</td>
<td>½ - 3”</td>
<td>2 – 5”</td>
</tr>
</tbody>
</table>

* Provide additional cementitious material to meet requirements in accordance with this section at no additional cost to the Department.

† Adjust slump in accordance with 2461.3.G.7.a for slipform concrete placement.

‡ The Contractor may use 100% Portland cement for High Early Concrete, provided no mitigation is required for the fine aggregate in accordance with Table 2301-2 or the coarse aggregate in accordance with Table 2301-4. If mitigation is required, the Contractor is required to use a minimum of 15% of any supplementary cementitious material when designing High Early Concrete.
Table 2301-16
Paving Concrete

<table>
<thead>
<tr>
<th>Air Content Before Consolidation, %</th>
<th>Adjusted Contract Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 9.0</td>
<td>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,”</td>
</tr>
<tr>
<td>6.0 – 9.0</td>
<td>The Department will pay 100 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer</td>
</tr>
<tr>
<td>&gt; 5.0 – &lt; 6.0</td>
<td>The Department will pay 75 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer</td>
</tr>
<tr>
<td>&gt; 4.0 – ≤ 5.0</td>
<td>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,”</td>
</tr>
<tr>
<td>≤ 4.0</td>
<td>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 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 epoxy penetrant sealer from the Approved/Qualified Products List.</td>
</tr>
</tbody>
</table>

S-128.5 MnDOT 2301.3.K.1 and 2301.3.K.1.a shall be deleted and replaced with the following:

K.1 Pavement Texture
Pull the carpet drag longitudinally over the finished surface to produce a uniform final finish textured surface. Provide a texture depth of at least 1.00 mm in accordance with ASTM E 965-87, “Test Method for Measuring Surface Macrotexture Depth Using a Sand Volumetric Technique.”

Provide artificial grass type carpeting for the carpet drag meeting the following characteristics and requirements:

(1) Molded polyethylene pile face,
(2) Blade length from ⅝ in to 1 in [15 mm to 25 mm], and
(3) Total weight of at least 70 oz per sq. yd [2.35 kg per sq. m].

Mount the drag on a bridge having external alignment control. Provide a drag as wide as the concrete placed without causing edge slump. Maintain continual contact between the drag and the pavement surface at all times during texturing. Apply down pressure on the pavement surface as necessary to achieve uniform texturing.

The Contractor may use manual methods including brooms to achieve similar results on the edges of the pavements and ramps, and other locations as approved by the Engineer.

The Contractor may use other texturing equipment to obtain an equivalent texture as approved by the Engineer, in conjunction with the Concrete Engineer.

For concrete pavements with a posted vehicle speed less than or equal to 35 mph [56 km/hr], use either a carpet drag or broom drag longitudinally to achieve a uniform final finish textured surface.
K.1.a Texture Testing
The Engineer will identify the texture testing locations in accordance with 2301.3.I, “Definition of Lot and Sublot for Concrete Field Testing,” and the following:

1. Use the MnDOT Probing Coring Texture MIT-SCAN-T2 Workbook to determine the random testing locations.
2. Provide the Concrete Texture Report generated from the MnDOT Probing Coring Texture MIT-SCAN T2 Workbook to the Contractor prior to the start of paving.
3. Offset the texture test at a point located transversely in the outside wheel path.

Perform surface texture testing of the concrete pavement and provide the test results to the Engineer no later than 48 h after pavement placement unless otherwise approved by the Engineer.

S-128.6 The fourth paragraph of MnDOT 2301.3.O shall be deleted and replaced with the following:

Perform operations on new pavement as approved by the Engineer and in accordance with the following:

1. When moving on and off the pavement, construct a ramp to prevent damage to the pavement slab.
2. Operate the paving equipment on protective mats to prevent damage to the pavement surface and joints. Before placing the protective mats, keep the pavement surface free of debris by sweeping or other methods as approved by the Engineer.
3. Operate equipment on a slab without causing damage. If damage results, suspend operations and take corrective action as approved by the Engineer. Do not operate the equipment wheels or tracks within 4 in [100 mm] of the slab edge.
4. When hauling aggregate and other materials across newly constructed joints, keep the pavement surface free of debris by sweeping or other method as approved by the Engineer to prevent spalling of the pavement joints.

S-129 (2301) DRILL AND GROUT REINFORCEMENT BAR (EPOXY COATED)
SP2016-116

This work shall consist of drilling, grouting, and inserting No. __ epoxy coated reinforcement bars in accordance with the provisions of MnDOT 2301 and the following:

The Engineer will measure by the number of epoxy coated reinforcement bars that are furnished, installed, and grouted in place as specified. The Engineer will make payment under Item 2301.602 (Drill and Grout Reinforcement Bar (Epoxy Coated)) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto.

S-130 (2301) HIGH PERFORMANCE DOWEL BAR – 1.25 inch (32 mm)
Use when enhanced dowel bars are desired. Always use S-.12 from SP2016-50 (DETERMINATION AND EXTENSION OF CONTRACT TIME) when using this writeup.
REVISED 11/20/15 ►DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.
SP2016-117

This work shall consist of furnishing and installing dowels in accordance with the applicable MnDOT Standard Specifications and one of the following options:

(A) 316L Stainless Steel Tubes having a finished (smooth) surface with a minimum outside diameter of 1.25 inches [32 mm] and a length of 15 inches [381 mm]. The tubes shall have a minimum wall thickness of
0.06 inch [1.5 mm] and shall be press-filled with a Grade 60 minimum carbon steel. A lubricant, adhesive or epoxy shall be used between the tube and the carbon steel to fill any voids.

(B) 316L Stainless Steel Tubes having a finished (smooth) surface with a minimum outside diameter of 1.25 inches [32 mm] and a length of 15 inches [381 mm]. The tubes shall have a minimum wall thickness of 0.12 inches [3.0 mm] and shall be filled with polyester resin, vinyl-ester resin, or Portland cement grout with a minimum compressive strength of 5000 pounds per square inch [34 MPa].

(C) 316L Solid Stainless Steel Bars having a finished (smooth) surface with a minimum outside diameter of 1.25 inches [32 mm] and a length of 15 inches [381 mm].

(D) Rolled Zinc Alloy (U.N.S. Z41121) Bars having a finished (smooth) surface with a minimum outside diameter of 1.25 inches [32 mm] and a length of 15 inches [381 mm]. The bars shall have a 0.040 inch [1.0-mm] minimum thickness over Grade 60 (minimum) carbon steel.

(E) Glass Fiber Reinforced Polymer (GFRP) Coated Steel Bars having a finished (smooth) surface with a minimum outside diameter of 1.25 inches [32 mm] and a length of 15 inches [381 mm]. The bars shall be 1.0 inch [25 mm] diameter, Grade 60 minimum carbon steel, with a fully bonded 0.125 inch [3.175mm] thick GFRP coating meeting the Material Specifications of Section 4 of The AASHTO LRFD Bridge Design Guide Specifications for GFRP Reinforced Concrete Bridge Decks & Traffic Railings – 2009 Edition. The GFRP dowel bars will be mechanically attached to the dowel basket as approved by the Agency Concrete Engineer.

All stainless steel type, zinc alloy-clad, or GFRP dowel bars shall be approved by the Agency Concrete Engineer.

Only one stainless steel type, zinc alloy-clad, or GFRP dowel bar option will be allowed per Project; intermixing of different dowel types will not be allowed. Substitutions will not be allowed unless specifically approved by the Agency Concrete Engineer.

S-130.1 MEASUREMENT AND PAYMENT
Measurement will be made by the number of dowels installed as specified. Payment will be made under Item 2301.602 (1.25 inch [32 mm] Dowel Bar (High Performance)) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto.

S-131 (2301) HIGH PERFORMANCE DOWEL BAR – 1.5 inch (38 mm)
Use when enhanced dowel bars are desired. Always use S-.12 from SP2016-50 (DETERMINATION AND EXTENSION OF CONTRACT TIME) when using this write-up.

REVISED 11/20/15  ▲ DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-118

Furnish one of the following high performance dowel bar options and install in accordance with the applicable MnDOT Standard Specifications:

(A) 316L Stainless Steel Clad Bars having a finished (smooth) surface with a minimum outside diameter of 1.5 inches [38 mm] and a length of 15 inches [381 mm]. Provide bars with a 0.06 inch [1.5 mm] minimum thickness cladding over Grade 60 minimum carbon steel.

(B) 316L Stainless Steel Tubes having a finished (smooth) surface with a minimum outside diameter of 1.5 inches [38 mm] and a length of 15 inches [381 mm]. Provide tubes having a minimum wall thickness of 0.06 inch [1.5 mm] press-filled with a Grade 60 minimum carbon steel. Use a lubricant or adhesive or epoxy between the tube and the carbon steel to fill any voids.
(C) 316L Stainless Steel Tubes having a finished (smooth) surface with a minimum outside diameter of 1.5 inches \[38 \text{ mm}\] and a length of 15 inches \[381 \text{ mm}\]. Provide tubes having a minimum wall thickness of 0.12 inches \[3.0 \text{ mm}\], filled with polyester resin, vinyl-ester resin, or Portland cement grout with a minimum compressive strength of 5000 pounds per square inch \[34 \text{ MPa}\].

(D) 316L Stainless Steel Schedule 40 Pipes conforming to ASTM A312 having a finished (smooth) surface with a minimum nominal size of 1.25 inches \[32 \text{ mm}\] and a length of 15 inches \[381 \text{ mm}\]. Provide stainless steel pipe having a wall thickness of 0.14 inches \[3.5 \text{ mm}\] filled with a durable material or snug-fitting end caps to prohibit any intrusion of concrete or other materials.

(E) 316L Solid Stainless Steel Bars having a finished (smooth) surface with a minimum outside diameter of 1.5 inches \[38 \text{ mm}\] and a length of 15 inches \[381 \text{ mm}\].

(F) Rolled Zinc Alloy (U.N.S. Z41121) Bars having a finished (smooth) surface with a minimum outside diameter of 38 mm (1.5 inches) and a length of 381 mm (15 inches). Provide bars having a 1.0-mm (0.040 inch) minimum thickness over Grade 60 (minimum) carbon steel.

(G) Glass Fiber Reinforced Polymer (GFRP) Coated Steel Bars having a finished (smooth) surface with a minimum outside diameter of 1.5 inches \[38 \text{ mm}\] and a length of 15 inches \[381 \text{ mm}\]. Provide bars 1.25 inch \[32 \text{ mm}\] diameter, Grade 60 minimum carbon steel, with a fully bonded 0.125 inch \[3.175 \text{ mm}\] thick GFRP coating meeting the Material Specifications of Section 4 of The AASHTO LRFD Bridge Design Guide Specifications for GFRP Reinforced Concrete Bridge Decks & Traffic Railings – 2009 Edition. Mechanically attach the GFRP dowel bars to the dowel basket as approved by the Concrete Engineer.

The Concrete Engineer shall approve all stainless steel type, zinc alloy-clad, or GFRP dowel bars. Use only one stainless steel type, zinc alloy-clad, or GFRP dowel bar option per Project unless specifically approved by the Concrete Engineer. The Concrete Engineer will not allow intermixing of different dowel types.

S-131.1 MEASUREMENT AND PAYMENT
The Engineer will measure dowel bars by the actual number of individual dowels placed. The Engineer will pay in accordance with Item 2301.602 (1.5 inch \[38 \text{ mm}\] Dowel Bar (High Performance)) at the Contract bid price per each.

S-132 (2301) CONCRETE PAVEMENT LUGS
SP2016-119
This work shall consist of constructing concrete pavement lugs in accordance with the detail shown on Sheet No. ___ of the Plans, the provisions of MnDOT 2301, and the following:

The Engineer will measure by the length of pavement lugs constructed as specified. The Engineer will make payment under Item 2301.603 (Concrete Pavement Lugs) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.
S-133 (2301) SLAB JACKING
SP2016-120

This work is raising in place bridge approach panels by a mudjacking/pressure grouting process in accordance with the applicable provisions of MnDOT 2301 and the following:

S-133.1 Furnish all labor, equipment, and material, including traffic control, necessary to perform the work intended. Place sufficient portable weights or other means on the approach panel to prevent uplift at the bridge abutment during the mudjacking process, as directed by the Engineer.

S-133.2 Submit a layout of the mudjack hole location and spacing for each proposed bridge approach panel to the Engineer for approval. The Engineer will approve each layout before drilling is started. Provide a 2-1/2 inch [62.5 mm] diameter hole size with alternate sizes approved by the Engineer.

S-133.3 The spacing and location of the mudjack holes will vary depending upon the amount that the panel is to be raised and if the existing panel is cracked. The Engineer will determine the final elevation of each approach panel. Typical hole spacing is shown in the Plan. Hole spacing shall not exceed 6 feet [1.8 m] center-to-center so that not more than 25 to 30 square feet [2.3 to 2.8 square meters] of panel is raised by pumping at any one hole. The Engineer may require additional holes if the panel is cracked. The location of the holes should avoid drilling into the panel lug as shown in the Plan. The Contractor is advised that each panel contains one mat of reinforcement bars consisting of transverse #5 bars at 1 foot [300 mm] spacing and #6 bars at 6 inch [150 mm] spacing placed longitudinally. The Contractor should employ an experienced operator to make the decision on the hole spacing.

S-133.4 Provide an experienced individual to make the decision on the consistency of the mixture and the volume of each batch mixed. Provide a mudjack mixture consisting of the following:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>425 pounds [193 kg]</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>335 pounds [152 kg]</td>
</tr>
<tr>
<td>Agricultural Lime</td>
<td>2295 pounds [1041 kg]</td>
</tr>
<tr>
<td>Water</td>
<td>Enough to attain a thick creamy texture</td>
</tr>
</tbody>
</table>

S-133.5 Drill all holes for the mudjacking for the entire panel before jacking is started. Start mudjacking at the lowest outboard corner of the panel and proceed towards the bridge. Perform jacking in stages while carrying traffic in the adjacent lane. The Engineer may require alternate shifting of a lane closure.

S-133.6 Mudjack on a continuous basis without interruption (except for a traffic shift) on each panel until the desired lift is achieved or as directed by the Engineer. Clean and fill mudjack holes with concrete as directed by the Engineer.

S-133.7 Construct a temporary bituminous ramp from the in place roadway to the newly raised panel, under flag person control, as many times as necessary during the mudjacking process as directed by the Engineer. Maintain the temporary ramps until removal is necessary to place the permanent surfacing. Remove the ramps.

S-133.8 The Engineer will measure the entire surface area of any bridge approach panel that is raised without regard to the number of holes drilled, the amount of mudjack material used, or the distance that the panel is raised. The Engineer will make payment for mudjacking bridge approach panels under Item 2301.604 (Slab Jacking) at the Contract bid price per square yard [square meter], which is compensation in full for all costs, including traffic control, and all labor, materials, equipment necessary to perform the work, and place, maintain, remove temporary bituminous ramps.
S-134  BLANK
This is now under SP2016-89.1 (2105) GEOTEXTILE FABRIC BOND BREAKER INTERLAYER FOR CONCRETE OVERLAY.
MOVED 03/01/16
SP2016-121

S-135  (2302) CONCRETE PAVEMENT REHABILITATION (CPR)
This write-up is to be used when there is concrete pavement rehabilitation on the project. When there is only concrete pavement rehabilitation on the project, then SP2016-115 (CONCRETE PAVEMENT) is not needed with this write-up. Note to Designer – The Designer and Construction personnel shall decide whether to include highlighted language related to MnDOT 1903 or not. The Designer may need to use SP2016-123 (CONCRETE GRINDING) or SP2016-124 (CONCRETE GRINDING WITH NO INCENTIVES) when concrete grinding is planned for the CPR project. NOTE to DESIGNER in Special Provisions: The Provisions are set up to require all partial and full-depth concrete repairs are completed by October 15th. If opening times are desired at < 12 hours – contact the Concrete Engineering Unit for additional special provisions. These do not cover early opening times.

2302.1  DESCRIPTION
This work shall consist of performing concrete pavement repairs, load transfer restoration, and joint/crack sawing and sealing in accordance with the Concrete Pavement Rehabilitation (CPR) Standard details, and the following.

2302.2  MATERIALS
A  Structural Concrete ..............................................................................................................................................2461
A.1  Partial Depth Repairs, Type B, Mix No. 3U18 .................................................................................................3105
A.1.a  Pre-bagged Grade 3U18 or 3U18M Concrete Patch Mix
Provide a dry, bagged MnDOT Grade 3U18 concrete patch mix, in accordance with 3105. The Engineer will allow 75 lb [34.1 kg] or 3000 lb [1364 kg] bags.
A.1.b  Field-Proportioned Grade 3U18 Concrete Patch Mix
Provide Grade 3U18 concrete mix by mass in accordance with Table 2302-1.

<table>
<thead>
<tr>
<th>Table 2302-1</th>
<th>Mix Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Weight, lb/kg</td>
</tr>
<tr>
<td>Type I Cement</td>
<td>100 [45.5]</td>
</tr>
<tr>
<td>Coarse Aggregate, ASTM #89</td>
<td>159 [72.4]</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>162 [73.7]</td>
</tr>
</tbody>
</table>

A.1.c  Coarse Aggregate Gradation Requirements, ASTM #89 or CA-80
Provide either an ASTM #89 or CA-80 Gradation in accordance with Table 3137-4 for use in Grade 3U18 concrete patch mix or Dowel Bar Retrofit Repairs. Provide coarse aggregate meeting the quality requirements of 3137.2.D.3, “Coarse Aggregate for Concrete Pavement.”

A.2 Full Depth Repairs, Type C and Type CX, Mix No. 3R52 and 3RHE52 ............................. 2461
B Reinforcement Bars ................................................................................................................. 3301
C Dowel Bars................................................................................................................................ 3302
D Curing Materials
D.1 Poly-Alpha Methylstyrene (AMS) Membrane Curing Compound ...................................... 3754
D.2 Linseed Oil Membrane Curing Compound ............................................................................ 3755
D.3 Plastic Curing Blankets ............................................................................................................ 3756
D.4 Insulation Board ........................................................................................................................ 3760
E Joint Sealant .............................................................................................................................. 3725
F Preformed Joint Filler .............................................................................................................. 3702
G Form Coating Material ............................................................................................................. 3902
H Dowel Bar Retrofit (DBR) Repair Materials .......................................................................... 2302
H.1 Approved Non-Shrink Rapid Set Concrete for Dowel Bar Retrofit Repairs

Provide a Packaged, Dry, Non-Shrink, Rapid- Hardening Concrete Material for backfilling Dowel Bar Retrofits repairs from the MnDOT Approved/Qualified Product List.

The Engineer will allow on site addition (extension) of coarse aggregate in accordance with the following:

(a) Limit coarse aggregate extension to same source/same percent mass extension as was utilized in the AMRL certified laboratory trial-batch testing.
(b) Limit the coarse aggregate extension to the manufacturer’s recommended maximum or to a maximum of 50 percent by mass, whichever is less
(c) Meets aggregate quality requirements of Standard Specification 3137.2.D.3

H.1.a DBR Project Submittal Requirements

At least 21 days prior to performing DBR repairs, submit the following information to the MnDOT Concrete Engineering Unit for review:

(a) A concrete mix design including the coarse aggregate source at the proposed extension percentage.
(b) A signed letter from the Rapid-Hardening Cementitious Material manufacturer stating the means and methods specified in both MnDOT Special Provision 2302 and outlined on the Dowel Bar Retrofit detail sheets are acceptable procedures.
(c) Any field testing requirements recommended by the manufacturer of the Rapid-Hardening Cementitious Material.

The Engineer in conjunction with the Concrete Engineer will determine final acceptance of the DBR repair backfill material based on satisfactory field placement and performance, in accordance with 2302.3.F.4 “Test Section” and 2302.3.G “Repair Warranty.”

H.2 End Caps

Provide tight fitting, nonmetallic non-organic end caps that will allow for a ¼ inch [6 mm] expansion movement of the dowel bar at each end.

H.3 Compressible Foam Core Board

Provide at least 3/8 inch [9 mm] thick, compressible foam core board material constructed of rigid Styrofoam or closed cell foam faced with poster board material or plastic faced material on each side to reestablish the crack/joint the full width and depth of the slot, as shown in the Plan detail. The Engineer will not permit multiple pieces to obtain the proper thickness or height. Preformed Joint Filler conforming to 3702 is not allowed.

H.4 Dowel Bar Support Chairs

Provide two, nonmetallic support chairs that are either epoxy coated steel in accordance with ASTM A 884/A 884M or fabricated of commercial quality nonmetallic, non-organic material to support each dowel bar. The chairs when placed shall press securely against the slot face to firmly hold the dowels in the proper position while the backfill material is placed and consolidated.

H.5 Caulking Filler

Provide any commercial caulk that is designed as a crack sealant that is compatible with the proposed patching material. Use the caulking filler for sealing the existing joint or crack at the bottom and sides of the slot as shown in the Dowel Bar Retrofit detail.

2302.3 CONSTRUCTION REQUIREMENTS

A 3U18 Concrete Mixture Requirements for Partial Depth Repairs

Incorporate concrete into the concrete pavement rehabilitation repairs in accordance with Specification 2302, the Plan, Concrete Pavement Rehabilitation (CPR) Standard details, and the following.

Mix all dry pre-bagged grade 3U18 concrete patch mix on site, in a paddle type mixer for at least 5 minutes.

The Engineer may also allow batching by volume in a mobile type mixer to produce grade 3U18 concrete patch mix. Proportion the cement, coarse and fine aggregate by volume (±2 percent) in accordance with 2404.3.E.1, “Mixer Requirements” and 2461.3.D.2 “Batching by Volume.”

Make batch water adjustments to achieve a maximum slump of 1 inch [25mm] 5 minutes after batching.

Do not accelerate concrete strength gain to facilitate early strength of pavement repairs solely for construction traffic unless approved by the Engineer.
Because of the increased rate of hardening of concrete that incorporate accelerating type admixtures, take extra precautions as necessary to ensure satisfactory finishing, curing, and protection of the concrete repairs. The Contractor assumes full responsibility for the performance of the concrete. The Engineer will determine final acceptance of the Type B repair concrete based on satisfactory field placement and performance, in accordance with 2302.3.G “Repair Warranty.”

Refer to Table 2302-2, “MnDOT Mix 3U18 Opening Times”, to determine the allowable mix adjustments to Grade 3U18 concrete. When anticipated time to opening for construction equipment or general traffic is less than 7 calendar days, and the ambient temperatures are anticipated to remain at or above 60°F [15°C] during the curing time, provide approved admixture as outlined in Table 2302-2. The mix design will include the admixtures solution as part of the total recommended mixing water.

<table>
<thead>
<tr>
<th>Anticipated Minimum Time to Opening *</th>
<th>Concrete Mix Grade</th>
<th>Admixture Dosage &amp; Type Based on manufacturer’s recommended dosage rate</th>
<th>Mix Design Responsibility</th>
<th>Testing and Strength Required for Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 7 calendar days</td>
<td>3U18</td>
<td>None Required</td>
<td>2302</td>
<td>None *</td>
</tr>
<tr>
<td>72 hours to 7 calendar days</td>
<td>3U18</td>
<td>Type A ‡</td>
<td>2302</td>
<td>None *</td>
</tr>
<tr>
<td>36 hours to &lt; 72 hours</td>
<td>3U18</td>
<td>Type A ‡</td>
<td>2302</td>
<td>Control Cylinders as per 2302.3.B.4(c) # π</td>
</tr>
<tr>
<td>12 hours to &lt; 36 hours</td>
<td>3U18</td>
<td>As Needed §</td>
<td>2302</td>
<td>Control Cylinders as per 2302.3.B.4(c) # π</td>
</tr>
</tbody>
</table>

* If at any time the ambient temperature falls below 60°F [15°C] during the curing time, use control specimens to determine opening times in accordance with 2302.3.B.4.
|| The maximum slump for 3U18 mixes measured after 5 minutes is 1 inch [25 mm].
|| Accelerating admixtures are not allowed when the ambient air temperature exceeds 80°F [27°C] without the approval of the Concrete Engineer.
|| Use manufacturer’s recommended dosage rate to achieve 3000 psi [20.6 MPa] minimum compressive strength or 500 psi [3.4 MPa] flexural strength at the time of opening.
|| The Contractor may request to the Engineer a reduction in the number of control specimens required based on control specimen strengths and site conditions.
|| Use a Type A, C or E admixture in accordance with 2302.3.A and the manufacturer’s recommended dosage rate to achieve 3000 psi [20.6 MPa] minimum compressive strength or 500 psi [3.4 MPa] flexural strength at the time of opening.
|| Do not allow construction vehicles or general traffic on Type B repairs unless a minimum of 12 hours have elapsed and control cylinders achieve a minimum compressive strength of 3000 psi [20.6 MPa] or 500 psi [3.4 MPa] flexural strength.

A.1 3R52 or 3RHE Concrete Mixture Requirements for Full Depth Repairs

Provide a contractor designed concrete in accordance with Specification 2461, the Plan, Concrete Pavement Rehabilitation (CPR) Standard details, and the following.
Design either a concrete grade 3R52 or 3RHE to be incorporated into Type C Repairs in accordance with specification 2461 “Structural Concrete.”

Refer to Table 2302-3, “Mix 3R52 and 3RHE52 Opening Requirements,” to determine the criteria for opening 3R52 and 3RHE concrete to traffic.

Do not accelerate concrete strength gain to facilitate early strength of pavement repairs solely for construction traffic unless approved by the Engineer.

Because of the increased rate of hardening of concrete that incorporates accelerating type admixtures, take extra precautions as necessary to ensure satisfactory finishing, curing, and protection of the concrete repairs. The Contractor assumes full responsibility for the performance of the concrete. The Engineer will determine final acceptance of the Type C repair concrete based on satisfactory field placement and performance, in accordance with 2302.3.G. “Repair Warranty”.

<table>
<thead>
<tr>
<th>Anticipated Minimum Time to Opening *</th>
<th>Concrete Mix Grade</th>
<th>Admixture Dosage &amp; Type</th>
<th>Mix Design Responsibility</th>
<th>Testing and Strength Required for Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 7 calendar days</td>
<td>3R52</td>
<td>2461† ‡</td>
<td>Contractor</td>
<td>None</td>
</tr>
<tr>
<td>&lt; 7 calendar days to ≥ 12 hours</td>
<td>3R52 3RHE52</td>
<td>2461† ‡</td>
<td>Contractor</td>
<td>Control Cylinders as per 2302.3.B.4(c) # π</td>
</tr>
</tbody>
</table>

† Accelerating admixtures are not allowed when the ambient air temperature exceeds 80°F [27°C] without the approval of the Concrete Engineer.
‡ Use manufacturer’s recommended dosage rate to achieve 3000 psi [20.6 MPa] minimum compressive strength or 500 psi [3.4 MPa] flexural strength at the time of opening.
# The Contractor may request to the Engineer a reduction in the number of control specimens required based on the results of the control specimen strengths and site conditions.
π Do not allow construction vehicles or general traffic on Type C repairs unless a minimum of 12 hours has elapsed and control cylinders achieve a minimum compressive strength of 3000 psi [20.6 MPa] or 500 psi [3.4 MPa] flexural strength.

A.2 Placement Limitations

For (Type A) Repairs:

(a) Do not place joint sealant when the ambient temperature is below 40°F [5°C], nor when the joint faces show signs of frost or moisture.
(b) Do not perform Type A repairs until the concrete grinding operations are completed.
(c) If the pavement joints are widened, seal the joints before traffic is placed on the repairs.
(d) Do not place joint sealant outside of the manufacturer’s temperature recommendations.

For (Type B) Repairs:
(a) Do not place concrete at ambient temperatures less than 50°F [10°C].
(b) Do not place concrete when in-place pavement temperatures are below 50°F [10°C].
(c) Do not place any concrete mixture after October 15th.
(d) Do not place epoxy resin adhesive or non-shrink grout for bonding reinforcement bars to in place concrete outside of the manufacturer’s temperature recommendations.
(e) Do not use accelerating admixtures (Types C and E) when the ambient air temperature exceeds 80°F [27°C] without the approval of the Concrete Engineer.

For (Type C) Repairs:

(a) Installation of the Dowel Bar Anchoring Test Section in accordance with 2302.3.E.3 is required prior to anchoring any additional dowel bars. If the Contractor performs additional anchoring of dowel bars prior to Engineer approval, the Engineer will consider those repairs as unauthorized in accordance with 1512, “Unacceptable and Unauthorized Work.”
(b) Place concrete in accordance with 2461 and 2302.3.B.3.c in these provisions.
(c) Do not place any concrete mixture after October 15th, unless approved by Concrete Engineer, in conjunction with the Engineer, and an approved cold weather protection plan is in place.
(d) Do not place epoxy resin adhesive or non-shrink grout for bonding reinforcement bars or dowel bars to in place concrete outside of the manufacturer’s temperature recommendation.

For Dowel Bar Retrofits:

(a) Do not place pre-blended Non-Shrink Rapid Set Concrete Material when the pavement temperatures are above 90°F [30°C].
(b) Maintain pre-blended Non-Shrink Rapid Set Concrete Material temperature at or below 90°F [30°C].

For Concrete Grinding:

(a) Do not grind the concrete unless the openings times and minimum strengths established in either Table 2302-2, Table 2302-3 or, 2302.3.B.5.a of these provisions have been met.
(b) The Engineer will schedule a pre-grinding meeting at the project site. At the pre-grinding meeting, submit to the Engineer in writing the proposed Slurry Management Plan the grinding contractor will utilize to remain in conformance with Specification 1717. At the pre-grinding meeting, the Engineer and Contractor will review the site to identify the environmentally sensitive areas.

B General

Establish traffic control 1-day in advance of the beginning of the rehab operation for rehab surveys and locations.

B.1 Removals

Dispose of all removals outside the right of way in accordance with Specification 2104 to the satisfaction of the Engineer.

Repair any damage to any in-place pavement, roadway structure, joints, shoulders or appurtenance caused by the Contractor’s operations as directed by the Engineer prior to final acceptance at no cost to the
Department. Replace bituminous shoulder pavement, as directed by the Engineer, as an incidental cost to performing adjacent concrete repairs.

To prevent concrete pavement blow ups, saw full-depth relief cuts in the adjacent lanes and remove a transverse section 4 inches [100 mm] wide by full-width of the slab as the Contractor determines necessary to protect the existing concrete pavement. If the Contractor chooses not to saw a relief cut and damage is caused to the remaining concrete pavement, the Contractor shall make repairs as directed by the Engineer, at no cost to the Department. Prior to opening to traffic, backfill the void formed after concrete removal with Class 5 or other material as approved by the Engineer at no cost to the department. Maintain the backfill material flush within a tolerance of +/- 1/2 inch [+/-13 mm] with adjacent concrete.

B.2 Placing and Finishing Concrete

Use concrete placing and finishing procedures that do not result in rounding of the surface at any joints or headers.

Reestablish longitudinal and transverse joints and cracks according to Joint Repair (Type A1) detail.

Edging is required adjacent to all inserts and forms in fresh concrete.

Fill overlaps in saw cuts from removal operations with an approved hot pour joint sealant at no cost to the Department.

Assure that concrete repairs do not protrude beyond the original cross-section of the pavement by more than 3/8 inch [10 mm] by forming or sawing the edges.

Provide surface texturing for skid resistance to all repairs consisting of brooming in the long dimension of the repair including when concrete grinding is to take place. Tine Type C repairs that abut existing concrete surfacing in the same manner that they were tined during the original construction. When concrete grinding is required, tining is not required.

B.3 Concrete Curing and Protection

After completing final finishing operations, cure all exposed concrete surfaces. Use one of the following curing methods:

1. For Type B Repairs, place the membrane curing compound conforming to 3754 or 3755 within 10 minutes of concrete placement or once the bleed water has dissipated unless otherwise directed by the Engineer in accordance with 2302.3.B.3.a.1.

2. For Type C Repairs, place the membrane curing compound conforming to 3754 or 3755 within 30 minutes of concrete placement or once the bleed water has dissipated unless otherwise directed by the Engineer in accordance with 2302.3.B.3.a.1. Place the membrane-curing compound on the edges within 30 minutes after permanent removal of the forms or curing blankets unless otherwise specified in the Contract.

3. Place plastic curing blankets or completely saturated burlap curing blankets as soon as practical without marring the surface in accordance with 2302.3.B.3.a.2.

Whenever weather conditions are such as to cause unusual or adverse placing and finishing conditions or equipment failures occur, expedite the application of a curing method or temporarily suspend the mixing and placing operations, as the conditions require.
If necessary to remove the coverings to saw joints or perform other required work, remove the covering for the minimum time required to complete that work.

Failure to comply with the above provisions will result in the Engineer, in conjunction with the Concrete Engineer, applying a monetary deduction in accordance with 1503 and 1512 and the following:

1. For Type B Repairs, the Department will apply a monetary deduction of 100% of the unit bid price for the concrete in question.
2. For Type C Repairs, the Department will apply a monetary deduction of $50.00 per cu. yd [$65.00 per cu. m] or 50% of the Contractor-provided invoice amount for the concrete in question, whichever is less.

The Contractor may remove and replace the Type B or Type C Repairs at their own expense in lieu of the monetary deduction.

B.3.a Curing Methods

B.3.a.1 Membrane Curing Method

Before application, agitate the curing compound as received in the shipping container to obtain a homogenous mixture. Protect membrane-curing compounds from freezing before application. Handle and apply the membrane-curing compound in accordance with the manufacturer’s recommendations.

Apply the curing compound in accordance with the following:

1. At a rate of 1 gal per 150 sq. ft [1 L per 4 m²] of surface curing area.
2. Apply curing compound homogeneously to provide a uniform, solid, white opaque coverage on all exposed concrete surfaces (equal to a white sheet of typing paper). If using a Department - approved curing compound with a non-white base color, apply the compound to provide a uniform, solid, opaque consistency meeting the intent of the requirement in this section.
3. If the curing compound is damaged during the curing period, immediately repair the damaged area by re-spraying.
4. If the Engineer determines that the initial or corrective spraying result in unsatisfactory curing, the Engineer may require the Contractor to use the blanket curing method at no additional cost to the Department.

Use an airless spraying machine for applying the curing compound on the concrete that complies with the following:

1. A re-circulating bypass system that provides for continuous agitation of the reservoir material,
2. Separate filters for the hose and nozzle, and
3. Multiple or adjustable nozzle system that provides for variable spray patterns.

B.3.a.2 Blanket Curing Method

After completion of the finishing operations and without marring the concrete, cover the concrete with curing blankets. Install in a manner that envelops the exposed concrete and prevents loss of water vapor. After the concrete has cured, apply membrane curing compound to the concrete surfaces that will remain exposed in the completed work.

B.3.b Protection Against Rain
Protect the concrete from damage due to rain. Have available, near the site of the work, materials for protection of the edges and surface of concrete. Should any damage result, the Engineer will suspend operations until corrective action is taken and may subject the rain-damaged concrete to 1503 and 1512.

**B.3.c Protection Against Cold Weather for Full Depth (Type C) Repairs**

If the national weather service forecast for the construction area predicts air temperatures of 36 °F [1 °C] or less within the next 24 h and the Contractor wishes to place concrete, submit a cold weather protection plan.

Protect the concrete from damage including freezing due to cold weather. Should any damage result, the Engineer will suspend operations until corrective action is taken and may subject the damaged concrete to 1503 and 1512.

**B.3.c.1 Cold Weather Protection Plan**

Submit a proposed time schedule and Plans for cold weather protection of concrete in writing to the Engineer for acceptance that provides provisions for adequately protecting the concrete during placement and curing. Include a method of monitoring the concrete temperatures. Ensure concrete pavement repair temperatures remain above 32° F [0° C] for the entire cure time as defined in 2302.3.B.4 (c). Do not place concrete until the Engineer accepts the Contractor's cold weather protection plans.

**B.4 Opening to Construction Equipment and Traffic**

The Engineer will not allow the Contractor to open concrete pavement repairs to construction equipment / vehicles, concrete grinding equipment, cleanup equipment or, public traffic unless one of the following requirements has occurred:

(a) When MnDOT designed 3U18 concrete or Contractor designed 3R5 / 3RHE52 concrete attains a minimum age of 7 calendar days, or

(b) When MnDOT designed 3U18 concrete attains a minimum age of 72 hours and the admixture type, dosage rate, and minimum ambient temperature requirements outlined in Table 2302-2 are met, or

(c) MnDOT designed 3U18 concrete or Contractor designed 3R5 / 3R5 HE concrete attains a minimum age of 12 hours and control strength specimens obtain minimum compressive strength of 3000 psi [20.6 Mpa] or minimum flexural strength of 500 psi [3.44 Mpa]

(d) For dowel bar retrofits repairs, reached a minimum age of 4 hours and control strength specimens obtain minimum flexural strength of 500 psi [3.44 Mpa] or minimum compressive strength of 3000 psi [20.6 Mpa].

(e) For both c) and d) above, the Contractor will cast and cure the control specimens in accordance with 2461. The Engineer will test the control specimens in accordance with ASTM C39. If the Engineer is unable to test the control specimens the Contractor will test the control specimens in accordance with the following:

(i) Supply and operate (in the presence of the Engineer) a calibrated mechanical or hydraulic concrete cylinder testing machine, in accordance with ASTM C39;

(ii) Perform testing at a distance no greater than 30 miles from the control specimen fabrication site; and

(iii) At no additional cost to the Department.

When opening times are less than 3 days, provide the Engineer with a letter from the manufacturer stating the required minimum cure times of the Epoxy Resin Adhesive (ERA) or Non-Shrink Grout (NGS) used to anchor either the dowel bars or reinforcement bars comply with the early opening times. Do not
open to construction equipment or traffic until the manufacturer’s recommended minimum cure times are met.

Once one of the above conditions has been met, sweep the portion of the closed traffic lane with a power pick-up broom prior to opening. Use water to control dust at the discretion of the Engineer.

C Type A Repairs

Type A repairs include: Variable Width Joint Crack Repair / Joint Repair (Type A1) and Variable Width In place Joint or Crack Repair / Joint Repair (Type A2).

Saw and clean transverse and longitudinal joints or cracks as specified below, in preparations for sealing, seal joints or cracks.

C.1 Removals

When performing Variable Width Joint Crack Repair / Joint Repair (Type A1):

Remove the in place joint sealer if applicable. The Contractor may remove the in place joint sealer in conjunction with widening of the in place joint or crack.

Widen in place or newly constructed transverse or longitudinal joint or crack by saw cutting and to a depth shown on the Variable Width Joint Crack Repair / Joint Repair (Type A1) detail. Freshly saw both joint faces. Do not widen the in place joint or crack greater than 1/4 inch [6 mm] from its existing width.

When performing the Variable Width In Place Joint or Crack Repair / Joint Repair (Type A2):

Remove all of the existing joint seal material from the in place joint insofar as possible with ripping teeth, wire brush, sawing or other reasonable equipment to the satisfaction of the Engineer.

Do not use equipment that will cause spalling of the pavement surface.

C.2 Preparation

Thoroughly clean all joints and cracks by water flushing immediately after sawing.

After joint has dried, sandblast then air blast.

Assure that the joints or cracks are clean, dry, and free of all incompressible material before applying sealant.

C.3 Repair

Install a closed cell backer rod when joints or cracks are 1/4 inch [6 mm] or greater. Install backer rod of a diameter and to the depth shown on the Joint Repair (Type A) details.

Use a MnDOT Approved hot pour joint sealer meeting the requirements of Specification 3725.

Apply joint sealer in accordance with the Manufacturer’s recommendations.

Fill joints or cracks to 1/16 inch [1.6 mm] below the pavement surface. Any overfilling of hot pour joint sealer will require removal and replacement by the Contractor at no cost to the Department.
D Type B Repairs

Type B Repairs include: Partial Depth Repair (Type BA), Partial Depth Repair Special (Type BE), and Joint and Crack Repair (Type B3).

Remove deteriorated concrete at designated (Type B) repair areas, reestablish joints and cracks, furnish, place, and cure 3U18 concrete to the original slope and grade, saw and seal newly reestablished joints.

D.1 Removals

The Engineer will not allow “Jackhammers” for partial depth concrete removals. Removal chipping hammers are limited to a maximum rated weight of 35 pounds [15.9 kg].

Equip milling machines used for concrete removal with a device for stopping at preset depths to prevent damage to the dowel bars.

Remove the concrete surface and all deteriorated concrete in the designated repair areas to a minimum depth of 2 inches [50 mm].

Do not damage the dowel bars during the removal process. Any damage is the responsibility of the Contractor.

Remove the concrete surface in the designated repair area by either of the following:

(a) Milling transversely or longitudinally. Chip-out secondary spalling resulting from the contractor’s removal operations at no cost to the Department.
(b) Delineate the repair area by saw cuts and chipping back the saw cuts to a 30°- 60° angle.

D.2 Preparation

If dowel bar or reinforcement bars cross-sectional loss due to corrosion is slight, place duct tape over the dowel bar, or another bond breaking material approved by the Engineer. Cut or burn-off the bar if the dowel bars are misaligned, exhibit corrosion to a greater degree or if the end of the dowel is exposed. If this involves more than three adjacent dowels, remove and replace the entire joint with a Full Depth Repair (Type CD).

Sandblast then air blast Type B Repairs clean.

Drill and grout No.4 epoxy coated reinforcement bars for Partial Depth Repair Special (Type BE). Maintain a minimum of 2 in [50 mm] concrete cover around bar. Install additional drill and grout No.4 epoxy coated bars at 6 in [150 mm] center-to-center while maintaining the minimum concrete cover.

The installation of the preformed joint filler is required before concrete placement in order to reestablish the joint or crack within the repair and to prevent the infiltration of the concrete into the crack or joint that runs through the repair. Allowing concrete to infiltrate into the joint or crack may cause the repair to fail. In some instances (mainly when concrete is removed under dowel bars), the preformed joint filler will not completely plug the joint or crack within the repair. If this circumstance is encountered, remove a section of the dowel to allow the placement of the preformed joint filler or place clean concrete sand to fill the void below the joint filler.

The practice of using sand in places where joint filler installation is impractical may result in a reduced repair life and is meant to be used on an occasional basis. Therefore, the Engineer should make an
early determination of the extent of this type of fix and may want to use a Full Depth Repair (Type CD) in lieu of the Crack and Joint Repair (Type B3).

D.2.a Application of Bonding Agent

The Contractor will choose a method for bonding the 3U18 mix to the in-place concrete in accordance with the following:

1. Bonding Grout Method
   1.1 Provide and place bonding grout to the prepared concrete repair surface consisting of 2 parts of Type I or Type I/II portland cement and 1 part sand, mixed with sufficient water to form a slurry with the consistency of cream.
   1.2 Mix the grout mechanically and apply by brushing or scrubbing (with a stiff bristle broom) on to the in place concrete surface and then immediately placing concrete after grouting.
   1.3 If the grout dries or whitens, sandblast again and reapply grout.
   1.4 The life of the grout shall not exceed one (1) hour.

2. Water Bonding Method
   2.1 Apply clean potable water to the Type B repair surface to achieve a saturated surface dry condition prior to concrete (3U18) backfilling.
   2.2 Do not allow standing water within the Type B repair limits.
   2.3 Apply bonding grout around the outside edge of the Type B repairs immediately after texturing in accordance with 2302.3.D.3, “Repair”.

D.3 Repair

Furnish, place, finish and cure MnDOT Grade 3U18 as replacement concrete for all Type B repairs.

Provide a repaired surface tolerance that does not vary by more than 1/8 in [3 mm] from the existing pavement surface as measured with a straight edge placed over the joint. Replace or grind the repair as necessary to correct deficiencies.

Apply surface texture; immediately after surface texturing place cement/sand slurry (bonding grout) around the outside edges of the Type B repair; cure and protect the concrete repair.

Saw and seal reestablished joints and cracks within Type B repairs in accordance with the Variable Width Joint Crack Repair / Joint Repair (Type A1).

E Type C Repairs

Type C Repairs include: Full Depth Repair (Type CD-LV), Full Depth Repair (Type CD-HV), Pavement Replacement (Type CX), Full Depth Repair (Type CA-LV), Spot Full Depth Repair (Type C1-LV) and Utility Trench Full Depth Repair (Type C2).

All repairs with the designation LV are intended for use on non-state designated roadways only. The Full Depth Repair (Type C1-LV, Type C2-LV and CA-LV) are for use on projects with small quantity of repairs. Contact the Concrete Engineering Unit for recommendations.

Saw cut concrete full depth and perform full-depth concrete removal; restore and compact the grade; install reinforcement bars, dowel bars, or both; and furnish, place, finish, and cure concrete and saw and seal joints.
E.1 Removals

Saw cut the concrete pavement full depth.

Remove in place concrete pavement. Removal of the concrete pavement must take place within 48 hours of the full depth saw cutting, unless otherwise allowed by the Engineer.

Repair or replace any damage to the adjacent pavement that occurs during the removal process to the satisfaction of the Engineer and at no cost to the Department.

E.2 Preparation

Furnish and install 18 in x 1.25 inch [460 mm x 31 mm] diameter dowel bars in conformance with Specification 3302 and details, or when the Full Depth Repair is used in the longitudinal direction furnish and install 18 in [460 mm] No. 8 epoxy coated reinforcement bars, in lieu of the dowel bars, in conformance with Specification 3301 and details. Provide dowel bars or reinforcement bars that are free of dirt, grease, oil or other foreign material.

Use drill bit(s) 1/8 inch or greater than the nominal outside diameter of the dowel bar or epoxy coated reinforcing steel that are anchored to the in place concrete pavement.

Provide a drill assembly or gang drill assemblies capable of drilling straight and true holes, to the required penetrating depth, drilling at mid concrete pavement thickness, and to the tolerances shown below.

Install dowel bars in Full Depth Repair (Type CD-LV), Full Depth Repair (Type CD-HV) and if applicable the Spot Full Depth Repair (Type C1-LV) in accordance with the following tolerances:

(a) The final placement of the dowel bars is 9 in [225 mm] into the face of the in place concrete slab.
(b) Parallel to the top of the pavement within +/- 1/4 in [3 mm] in 9 in [225 mm].
(c) Parallel to the other dowel bars within +/- 1/8 in [1.5 mm] in 9 in [225 mm].
(d) Parallel to the roadway centerline +/- ½ in [6 mm] in 9 in [225 mm].

Place dowel bar baskets assemblies as outlined in the Pavement Replacement (Type CX) and Full Depth Repair (Type CA-LV) details.

Use either the Epoxy Resin Adhesive (ERA) or Non-Shrink Grout (NSG) Installation Method to anchor the dowel bars and reinforcement bars into the concrete. Clean and prep the drilled holes in accordance with adhesive manufacturer’s recommendations.

E.2.a Epoxy Resin Adhesive (ERA) Installation Method

From the approved products list furnish an ERA material with a stated application of anchoring dowel bars or reinforcement bars. Provide to the Engineer an installation data sheet from the manufacturer. The ERA will meet AASHTO M 235 Type IV (Load Bearing Applications), Grade 3 (Non-sagging consistency) and of a Class (Temperature Range) to match the pavement temperature at the time of application. ERA Class (Temperature Range) designations are as follows:

(a) Class A, for use below 40°F [4°C].
(b) Class B, for use between 40°F and 60°F [4°C and 15°C].
(c) Class C, for use above 60°F [15°C] the highest allowable temperature to be defined by the manufacturer of the ERA.
When pavement temperatures are below 40°F [4°C] use Class A, when pavement temperatures are between 40°F and 60°F [4°C and 15°C] use either Class A or B, when pavement temperatures are above 60°F [15°C] use Class A, B or C.

ERA injection can be by either a mechanical caulking apparatus or a pneumatic injection system and have a nozzle capable of reaching and filling the back of the drill hole. Fill drill hole and insert dowel or reinforcement bars in accordance with the manufacturer’s recommendations.

Final approval of the injection system and methods used to anchor dowels or reinforcement bars is based on actual field performance as verified by random coring.

E.2.b Non-Shrink Grout (NSG) Installation Method

From the approved products list furnish a NSG material with a stated application of anchoring horizontal dowel bars or reinforcement bars. Provide to the Engineer an installation data sheet from the manufacturer of NSG material.

Provide either self-contained grout capsule or pre bagged NSG utilizing an injection system capable of reaching and filling the back of the drill hole.

Final approval of the methods used to anchor dowels or reinforcement bars is based on actual field performance as verified by random coring.

E.3 Prior to Concrete Placement

When placing concrete adjacent to in place concrete pavement joints, protect all ends of transverse joints to the satisfaction of the Engineer to prevent concrete mortar from infiltrating into the existing joints, resulting in compression spalls.

Do not remove any preformed joint filler used in the re-establishment of joints in Type C repairs, except by sawing or as allowed by the Engineer.

E.4 Repair

Furnish, place, finish, and cure Grade 3R52 or 3RHE52 concrete for all Type C repairs.

In accordance with full depth repair details Types CD-HV, CD-LV, and CA-LV, furnish, and place transverse No. 4 epoxy coated reinforcing steel.

In accordance with the full depth repair detail Type C2-LV, furnish and install both transverse and longitudinal No. 4 epoxy coated reinforcing steel.

Provide a repaired surface tolerance that does not vary by more than 1/8 in [3 mm] from the existing pavement surface as measured with a straight edge placed over the joint. Replace or grind the repair as necessary to correct deficiencies.

Restore contraction joints by green sawing to a depth of 1/3 of the pavement thickness.

Construct L2KT longitudinal joints unless otherwise directed by the Engineer.

Saw and seal joints and cracks involving Type C repairs in accordance with Joint Repair (Type A1) detail.
### E.5 Dowel Bar Anchoring Test Section

Provide a dowel bar anchoring test section consisting of a complete Full Depth Repair (Type CD) at a site directed by the Engineer at least one (1) day prior to startup of major Full Depth Repair (Type CD) operations. Perform the dowel bar anchoring test section as follows:

(a) Saw cut and remove in place pavement to the dimensions shown on the Full Depth Repair (Type CD) detail.
(b) In the test section drill and install either 6 or 11 dowels in accordance with appropriate Full Depth Repair (Type CD).
(c) Use either an MnDOT approved Epoxy Resin Adhesive or Non-Shrink Grout as an adhesive to secure the dowel bars to the in place concrete pavement.
(d) Cure the dowel bar anchoring adhesive at least 4 hours before coring.
(e) DO NOT PLACE CONCRETE IN THE DOWEL BAR TEST SECTION.
(f) The Engineer will identify and mark three (3) core locations on a single side of the Full Depth Repair (Type CD).
(g) Take three (3) – 6 inch [150 mm] diameter full depth cores centered on the dowel and 1 1/2” from the sawed vertical face.

The Engineer in conjunction with the Concrete Engineer will determine if the anchoring of the dowels is acceptable. All cores will become the property of the Engineer.

If the Engineer determines the anchoring of the dowels is acceptable:

(a) The Engineer will notify the Contractor to begin production operations.
(b) The Engineer’s continued acceptance is based on satisfactory placement and performance.
(c) Place a full depth saw cut offset 1 foot from the vertical face of the test section.
(d) Completely remove the cored side of the dowel bar test section.
(e) Drill and anchor a new set of dowels as shown on the Full Depth Repair (Type CD).
(f) The Engineer will pay for the work in this paragraph at the unit bid price of Full Depth Repair (Type CD) and Pavement Replacement (Type CX).
(g) The working days for the test section are built into the total Contract Time.

If the Engineer determines the anchoring of the dowels is not acceptable:

(a) The Engineer will require the removal of the first test section.
(b) The Engineer will require another test section at the contractor’s expense.
(c) The Engineer will not extend the contract time for the additional test section.

The Engineer will consider the work in this section as incidental to the unit bid price for Full Depth Repair (Type CD) and Pavement Replacement (Type CX).

Provide traffic control for the test section in accordance with “Temporary Traffic Control Zone Layouts” or as shown in the Plans.

### E.6 Dowel Bar Anchoring Assurance

At the Engineer’s discretion, the Contractor will take additional cores to confirm consistent dowel bar or reinforcing steel anchoring. For each 1500 Lineal Feet of Full Depth Repair (Type CD), the Engineer will randomly choose two separate repairs and mark two dowel bars for assurance coring. The Engineer will review the cores to determine if the anchoring operations remain acceptable. If the dowel bars show
excessive air voids exist in the dowel bars adhesive, take additional cores as directed by the Engineer to determine the severity.

The Engineer will suspend Full Depth Repair operations if dowel bars are anchored improperly. Operations will not resume until the Contractor has demonstrated to the Engineer that the problem which caused the air voids is corrected.

If the cores show proper anchoring, back fill core holes with concrete mix 3U18.

When the coring operations have shown no problems with the Contractor’s dowel bar anchoring operations, the Engineer may decrease the frequency to two (2) assurance cores for every 3000 lineal feet of Full Depth Repair (Type CD).

The Engineer will consider the work in this section as incidental to the unit bid price for Full Depth Repair (Type CD) and Pavement Replacement (Type CX).

F Dowel Bar Retrofit

Retrofit dowel bars in mainline joints and/or mid panel cracks as shown on the Plans. Perform Dowel Bar Retrofits only after all other repairs are completed on the joint or crack.

F.1 Removal

Schedule operations so that all concrete removed during any work shift is replaced with dowel bars and backfill material prior to the time the lane is re-opened to traffic.

Employ saws equipped with gang mounted diamond blades capable of cutting the required amount of slots in each wheel path simultaneously. Vacuum up and remove water and saw residue from the pavement surface. Skewed joints or cracks may require slots longer than that specified in the details. The Engineer will not provide compensation for the additional sawing or any component of the dowel bar retrofit beyond the limits shown on the detail required to ensure at least 7 inches [175 mm] of dowel bar is placed on each side of the joint or crack. Limit traffic to five (5) days on sawn slots prior to completing the retrofit operation. For smaller projects (100 bars or less), the Engineer may allow walk-behind saws instead of slot saws as long as a template is used to ensure the slot locations are within the tolerances specified on the Dowel Bar Retrofit detail and below.

Make two saw cuts in the pavement to outline the longitudinal sides of each dowel bar slot. Saw the slots to the depth and length that allows placing the dowel at mid-depth in the pavement slab. Place the slot saw cuts:

(a) Parallel to the top of the pavement within +/- ¼ in [6 mm] in 18 inches [225 mm].
(b) Parallel to the other slots within +/- 1/8 in [3 mm] in 18 inches [225 mm]
(c) Parallel to the roadway centerline +/- ½ in [13 mm] in 18 inches [225 mm]. Always measure dowel bar offsets from the roadway centerline.

Remove the concrete between the parallel saw cuts with a chipping hammer. Do not punch through the bottom of the slot or dislodge the pavement that is to remain in place. During concrete removal operations, use a small brush hammer as necessary to produce a flat, level surface within the slot for placing the bar in the proper location. Dispose of the removal debris on a daily basis, unless otherwise approved by the Engineer.

F.2 Preparation
F.2.a  Slot Cleaning and Preparation

Sufficiently clean the bottom of the slots with a chipping or brush hammer to allow the dowel bar assembly to sit parallel to the pavement surface.

If needed dry the slot before sandblasting with a high pressure air blasting heat lance.

Sandblast the vertical sides and bottom of the slot after the concrete removal operations to remove all loose debris and saw residue. Continue to sandblast until all the sawing residue is removed and the vertical sawed faces are rough to the touch. The Contractor may recommend alternative methods of roughening for approval by the Engineer. The Engineer will require additional sandblasting if the slots become wet from any source after initial sand and air blasting other than 2302.F.3.

Immediately before beginning sealing of the joint or crack inside the slot, further clean all exposed surfaces and cracks with a “moisture and oil free” high pressure air blasting of 150 psi [1035 kPa] minimum.

Protect traffic from sand and air blasting in a manner approved by the Engineer.

F.2.b  Sealing Joints and Cracks in Slot

After sand and air blasting the slot, seal the bottom and sides of the crack with caulking material to keep the patching material from leaking into the joint or crack. Cure caulking material for a minimum of 2 hours or until tack free or according to the manufacturer's recommendations, whichever is longer, prior to placing the approved rapid set non-shrink concrete. The caulking filler shall not extend 3/8 in [9 mm] beyond each side of the existing joint or crack. The Contractor may complete sealing of the cracks in conjunction with furnishing and installing the dowel assembly.

F.2.c  Placing Dowel Assembly into Slot

Supply dowel bar chairs that provide a minimum of 1/2 in [13 mm] clearance between the bottom of the dowel and the bottom of the slot and with sufficient rigidity to hold the dowel bar in place during concrete placement and vibratory consolidation.

Furnish and install compressible foam core board at least 3/8 in [9 mm] thick and a minimum of 1/8 in [3 mm] thicker than the joint / crack to ensure no leakage of patching material into the crack. The compressible foam core board is to maintain the transverse joint / crack as through the slot. The compressible foam core board will remain in position and tight to all edges during placement of the concrete. If the compressible foam core board shifts during construction operations, remove and replace the dowel bar retrofit at the Contractor’s expense.

Apply form release agent as a bond breaker on dowel bars prior to their placement in the slots.

Install dowel assembly that has the bond breaker applied and is fitted with the compressible foam core board material, the support chairs, and the ¼ in [6 mm] expansion caps on both ends into the slot in accordance with the following:

(a)  Parallel to the top of the pavement within +/- ¼ in [6 mm] in 18 inches [225 mm].
(b)  Parallel to the other slots within +/- 1/8 in [3 mm] in 18 inches [225 mm].
(c)  Parallel to the roadway centerline +/- ½ in [13 mm] in 18 inches [225 mm]. (Always measure dowel bar offsets from the roadway centerline)
(d)  Minimum of 1/2 in [13 mm] clearance between the bottom of the dowel and the bottom of the slot.
F.3 Repair

Thoroughly moisten (with potable water) all surfaces of the slot immediately prior to filling with backfill material. The Engineer will not allow standing water in the slot.

Fill each prepared slot with an approved rapid set non-shrink concrete for dowel bar retrofit repairs. Ensure the compressible foam core board remains upright over the existing joint or crack during the backfill operation. Vibrate the rapid set non-shrink concrete with a small 1 inch [25 mm] diameter hand-held vibrator capable of thoroughly consolidating the concrete around the dowel bar and support chairs and without segregation.

Finish the concrete flush to within a tolerance of 1/16 in [1.5 mm] above the adjacent concrete surface. When concrete grinding is part of the Contract, leave the surface of the backfill material 1/4 in [6 mm] above the adjacent concrete surface.

Immediately after final finishing, coat concrete with a membrane curing compound in accordance with 2302.3.B.3.

F.4 Test Section

Provide a test section consisting of complete dowel bar retrofit at a site directed by the Engineer at least three (3) days prior to startup of major operations as follows:

(a) Install 24 retrofit dowels in the test section.
(b) The Engineer will identify and mark three (3) locations for coring.
(c) Take three (3) – 6 in [150 mm] diameter full depth cores at least 4 hours after completion of the test section.

The Engineer will determine if the retrofitting operation is acceptable.

If the Engineer allows the retrofitting operation to continue:

(a) The Engineer will notify the Contractor to begin production operations.
(b) The Engineer’s continued acceptance is based on satisfactory placement and performance.
(c) Completely remove and replace the dowel installation where the core samples were taken.
(d) The Engineer will pay for the work in this paragraph at the unit bid price for Dowel Bar Retrofit.
(e) The working days for the test section are built into the total Contract Time.

If approval of the retrofitting operation is not given:

(a) The Engineer will require the removal of the first test section.
(b) The Engineer will require another test section.
(c) The Engineer will not extend the contract time for the additional test section.

Provide traffic control for the test section in accordance with “Temporary Traffic Control Zone Layouts” or as shown in the Plans.

The Engineer will consider the work in this section as incidental to the unit bid price for Dowel Bar Retrofit.
F.5 Opening to traffic

The Engineer will not permit traffic by the public or Contractor on the newly placed concrete patching material until adequate strength is achieved, according to the manufacturer's recommendations or 3000 psi [20.6 MPa] whichever is greater.

F.6 Dowel Placement Alignment Assurance

At the Engineer’s discretion, the Contractor will take additional cores to confirm consistent dowel placement and proper consolidation for each 600 bars placed. The Engineer will randomly mark two retrofit locations for assurance coring. The Engineer will review the cores to determine if the retrofitting operation is acceptable. If the dowels are located incorrectly or air voids exist around the dowel bars, take additional cores, as directed by the Engineer, to determine the severity.

The Engineer will suspend dowel retrofitting operations if dowels are installed improperly. Dowel retrofitting operations will not resume until the contractor has demonstrated to the Engineer that the problem which caused the improper dowel positions or air voids is corrected. Replace any individual Dowel Bar Retrofit not functioning or damaged at the expense of the Contractor.

The Engineer will not allow water from the coring operation to flow across lanes occupied by public traffic or flow into closed drainage facilities.

After removal of the cores, completely remove and replace the dowel installation where the core samples were taken.

When the coring operations have shown no problems with the Contractor’s placement operations, the Engineer may decrease the frequency of assurance cores to every 1200 bars placed or more at the discretion of the Concrete Engineer.

Provide traffic control for the coring in accordance with “Temporary Traffic Control Zone Layouts” or as shown in the Plans.

The Engineer will consider the work in this section as incidental to the unit bid price for dowel bar retrofit.

G Repair Warranty

Remove and replace areas of failure that appear within thirty (30) calendar days at no cost to the Department. The 30 calendar day warranty will commence after all Type B, Type C, Dowel Bar Retrofits repair and Concrete Grinding (when required) are completed in a single traffic lane. The continuity of a single traffic lane is not broken by either staging or project exceptions unless otherwise authorized by the Engineer. Any subsequent warranty repairs are subject to the 30 calendar day specification at no cost to the Department.

Failures include (but are not limited to) the loss of bonding to the in place concrete or crack apparent in the repair other than the desired crack in the newly constructed joint or re-established crack.

Supply traffic control as requested by the Department for inspection of repairs within the 30 calendar day warranty period and for the repair of failures.

2302.4 METHOD OF MEASUREMENT
The Engineer will:

(A) **Not** measure extra width to accommodate the Contractor's equipment. Any extra width to accommodate the Contractor's equipment is at the Contractor's expense.

(B) Measure Variable Width Joint or Crack Repair / Joint Repair (Type A1) by the lineal length. The Engineer will not take separate measurements for varying widths. The Engineer will **not** measure and pay the restoration of joints and cracks through or alongside any Type B, Type C or Dowel Bar Retrofit repairs under this item.

(C) Measure Variable Width In Place Joint or Crack Repair / Joint Repair (Type A2) by the lineal length. The Engineer will not take separate measurements for varying widths.

(D) Measure Partial Depth Repair (Type BA) by the actual area of the repair. Take the measurements for the area calculations at the pavement surface; include the 30 to 60 degree tapers in the measurements for the area calculations.

(E) Measure Joint and Crack repair (Type B3) by the lineal length. The Engineer will take additional measurements for payment under this or other Type B repairs only when the following requirement are met:

1. In isolated areas the typical width of the repair is exceeded and the measured quantity is equal to or greater than 1 square foot [0.10 square meters]. This is not a cumulative quantity within a single Type B3 repair.
2. A full width pass with the mill is taken on both sides of the joint or crack as directed by the Engineer.
3. The Type B3 repair is placed on only one side of the joint or crack, and the opposite side of the joint or crack requires an additional repair when directed by the Engineer, regardless of the size of the repair preformed.

(F) Measure Partial Depth Repair Special (Type BE) by the area of the repair. Take the measurements for the Partial Depth Repair Special (Type BE) area calculation at mid depth of the concrete pavement. Pay in conjunction with the Partial Depth Repair (Type BA) or Joint and Crack repair (Type B3). The Engineer will take measurements for the Partial Depth Repair Special (Type BE) only when the following requirements are met:

1. When the in place concrete pavement is removed full depth, when the grade below the concrete pavement is visible and
2. When reinforcement bars are furnished and installed as shown in Partial Depth Repair Special (Type BE) detail and at least one reinforcement bar is installed per unit of measure.

When the above requirements are not met the Engineer will only take measurements for payment on the Partial Depth Repair (Type BA) or Joint and Crack repair (Type B3) regardless of the depth of the repair.

(G) Provide measurement for payment for overlapping Type BA and Type B3 repairs for the most expensive repair only.

(H) Measure the Full Depth Repair (Type CD) by the lineal width. Take a single lineal measurement of the repair at a right angle from the standard dimension of 4 feet [1.22 m] as shown on the Full Depth Repair (Type CD) detail. Unless the repair is placed at a skew to the roadway center line, then take the single lineal measurement along the skewed saw cut.
(I) Measure the Pavement Replacement (Type CX) by the area of the repair. Pay Pavement Replacement (Type CX) in conjunction with the Full Depth Repair (Type CD) or the Full Depth Repair (Type CA-LV). When the standard dimension of 4.0 feet [1.22 m] as outlined on the Full Depth Repair (Type CD) or Full Depth Repair (Type CA-LV) detail is exceeded, measure the area that is outside the 4.0 feet [1.22 m] dimension as Pavement Replacement (Type CX).

(J) Measure the Spot Full Depth Repair (Type C1-LV) by area of the repair.

(K) Measure the Utility Trench Full Depth Repair (Type C2-LV) by area of the repair.

(L) Measure the Full Depth Repair (Type CA-LV) by the lineal width. Take a single lineal measurement of the repair at a right angle from the standard dimension of 4 feet as shown on the Full Depth Repair (Type CA-LV) detail. Unless the repair is placed at a skew to the roadway centerline, then take the single lineal measurement along the skewed saw cut.

(M) Measure individual Dowel Bars per each, as supplied in dowel bar basket assemblies for Pavement Replacement (Type CX) repairs.

(N) Measure Drill and Grout Reinforcement bars per each, as furnished and installed as tie bars for Pavement Replacement (Type CX) of 75 feet [22.9 m] or greater in length.

(O) Measure Dowel Bar Retrofit per each dowel bar successfully installed.

(P) Measure Supplemental Reinforcement (Epoxy Coated) used for supplemental pavement reinforcement by mass.

2302.5 BASIS OF PAYMENT

The Engineer will pay for the various types of pavement, crack, joint and surface repairs in accordance with the schedule set forth below at the corresponding Contract unit bid price for each separate item of work. Which is compensation in full for costs of all materials, equipment, and labor required to complete the work as specified in the repair detail, to the satisfaction of the Engineer. Concrete mixes are considered incidental to the work in which they are incorporated.

(A) Payment for Variable Width Joint or Crack Repair / Joint Repair (Type A1) at the contract price per unit of measure is full compensation for all cost including but not limited to the cost of removing and disposing of the in place joint sealer, sawing cutting both faces of the joint or crack to the proper depth and width, cleaning, sandblasting. Furnishing and installing backer rod of the proper size and to the proper depth. Furnishing and installing (hot poured) Joint and Crack Sealer (3725). Cleanup, and any other materials, labor, or equipment necessary to complete the work as specified.

(B) Payment for Variable Width In Place Joint or Crack Repair / Joint Repair (Type A2) at the contract price per unit of measure is full compensation for all cost including but not limited to: Removing of the in place joint sealer, cleaning, sandblasting, furnishing and installing backer rod of the proper size and to the proper depth. Furnishing and installing (hot poured) Joint and Crack Sealer (3725). Cleanup, and any other materials, labor, or equipment necessary to complete the work as specified.

(C) Payment for Partial Depth Repair (Type BA) at the contract price per unit of measure is full compensation for all cost including but not limited to: Removing and disposing of the in place concrete pavement as marked by the Engineer, tapering the edges of the repair back at 30 to 60
degrees, cleaning, sandblasting and air blasting, furnishing and installing bonding grout, furnishing and installing preformed joint filler to reestablish the joint or crack within or along the repair. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, placing cement and sand slurry around the edges, curing and protecting the concrete. Sawing and sealing reestablished joints and cracks in accordance with the Joint Repair (Type A1) detail. Cleanup, and any other materials, labor, or equipment necessary to complete the work as specified.

(D) Payment for Joint and Crack repair (Type B3) at the contract price per unit of measure is full compensation for all cost including but not limited to: Removing and disposing of the in place concrete pavement as marked by the Engineer, tapering the edges of the repair back at 30 to 60 degrees, cleaning and sandblasting, furnishing and installing preformed joint filler to reestablish the joint or crack within or along the repair, furnishing and installing bonding grout. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, placing cement and sand slurry around the edges, curing and protecting the concrete. Sawing and sealing reestablished joints and cracks in accordance with the Joint Repair (Type A1) detail. Cleanup, and any other materials, labor, or equipment necessary to complete the work as specified.

(E) Payment for partial Depth Repair Special (Type BE) at the contract price per unit of measure is full compensation for all cost including but not limited to: Removing and disposing of the in place concrete pavement as marked by the Engineer, cleaning, sandblasting and air blasting, furnishing and grouting reinforcement bars (epoxy coated), furnishing and installing bonding grout, furnishing and installing preformed joint filler to reestablish the joint or crack within or along the repair. Furnishing and placing concrete within the repair and vibrating. If after removal the Engineer changes the initial Partial Depth Repair (Type BA) or Joint and Crack Repair (Type B3) to a Full Depth Repair (Type CD), the Department will pay the Contractor at a measured quantity of 40% of the Type B repair item plus the full cost for the Type C repair.

(F) Payment for full Depth Repair (Type CD) at the contract price per unit of measure is full compensation for all cost including but not limited to: Saw cutting the pavement full depth, removal and disposal of the in place pavement, restoring and compacting the base, furnishing and installing preformed joint filler, furnishing, drilling and anchoring dowel bars, coring both the dowel bar anchoring test section and the random assurance cores, and backfilling the assurance core holes with concrete mix 3U18. If the repair is used in the longitudinal direction, furnishing, drilling and anchoring reinforcement bars in lieu of dowel bars. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, curing and protecting the concrete. Sawing and sealing reestablished joints, cracks and saw cuts in accordance with the Joint Repair (Type A1) repair detail. Cleanup and any other materials, labor, or equipment necessary to complete the work as specified.

(G) Payment for Pavement Replacement (Type CX) at the contract price per unit of measure is full compensation for all cost including but not limited to: Saw cutting the pavement full depth, removing and disposal of the in place pavement, restoring and compacting the base, furnishing and installing preformed joint filler. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, curing and protecting the concrete. Sawing and sealing reestablished crack, joints and saw cuts in accordance with the Joint Repair (Type A1) repair detail. Cleanup and any other materials, labor, or equipment necessary to complete the work as specified.

(H) Payment for Spot Full Depth Repair (Type C1-LV) at the contract price per unit of measure is full compensation for all cost including but not limited to: Saw cutting the pavement full depth,
removal and disposal of the in place pavement, restoring and compacting the base, furnishing and installing preformed joint filler, furnishing, drilling and grouting dowel bars, epoxy coated reinforcement bars or both. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, curing and protecting the concrete. Sawing and sealing reestablished joints, cracks and saw cuts in accordance with the Joint Repair (Type A1) detail. Cleanup and any other materials, labor, or equipment necessary to complete the work as specified.

(J) Payment for Utility Trench Full Depth Repair (Type C2-LV) at the contract price per unit of measure is full compensation for all cost including but not limited to: Saw cutting the pavement full depth, removal and disposal of the in place pavement, restoring and compacting the base. Furnishing and installing preformed joint filler, furnishing, drilling and grouting epoxy coated reinforcement bars. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, curing and protecting the concrete. Sawing and sealing reestablished joints, cracks and saw cuts in accordance with the Joint Repair (Type A1) detail. Cleanup and any other materials, labor, or equipment necessary to complete the work as specified.

(K) Payment for Full Depth Repair (Type CA-LV) at the contract price per unit of measure is full compensation for all cost including but not limited to: Saw cutting the pavement full depth, removal and disposal of the in place pavement, restoring and compacting the base, furnishing and installing preformed joint filler and dowel bar baskets assemblies, drilling and grouting reinforcement bars. Furnishing and placing concrete within the repair, vibrating, screeding, finishing, applying surface texture, curing and protecting the concrete. Sawing and sealing reestablished joints, cracks and saw cuts in accordance with the Joint Repair (Type A1) detail. Cleanup, and any other materials, labor, or equipment necessary to complete the work as specified.

(L) Payment for Drill and Grout Reinforcement Bars at the contract price per unit of measure is full compensation for all cost including but not limited to, drilling concrete and furnishing reinforcement bars (epoxy coated) and installing reinforcement bars with an approved grout or epoxy bonding agent.

(M) Payment for Dowel Bar Retrofit at the contract price per unit of measure is full compensation for all cost including but not limited to: Sawing the slot, removal of the concrete within the slot, removing and vacuuming debris, sandblasting and air blasting, sealing the crack inside of the slot, the dowel bar and expansion caps, chairs, release agent, compressible Styrofoam or cardboard material. Furnishing and placing non-shrink rapid setting concrete mixture, finishing, curing and protecting the concrete. Sawing and sealing reestablished joints and cracks in accordance with the Joint Repair (Type A1) detail. Cleanup, and any other materials, labor, or equipment necessary to complete the work as specified.

(N) Payment for Supplemental Reinforcement Bars (Epoxy Coated) at the contract price per unit of measure is full compensation for all cost including but not limited to, furnishing and installing reinforcement bars (Epoxy Coated) as specified.

(O) Payment for Dowel Bars at the contract price per unit of measure is full compensation for all cost including but not limited to, furnishing and installing dowel bars in dowel bar baskets assemblies.

(P) The Engineer will modify the provisions of MnDOT 1907 to the extent that when the actual usage of joint sealer material is less than specified, the surplus material shall remain the property of the Contractor. The Contractor is paid 15% of the material cost in lieu of handling and transportation costs, unless otherwise directed by the Engineer.
**S-136  (2302) CONCRETE GRINDING**

*This write-up is to be used when there are ride incentives for Concrete Grinding on the project and the speed limit is 50 mph or greater. Always use SP2016-39 (AIR, LAND AND WATER POLLUTION (CONCRETE GRINDING)) with this write-up. NOTE to DESIGNER: Use SP2016-124 (CONCRETE GRINDING WITH NO INCENTIVES) if you have a project with a speed limit of less than 50 mph and/or urban areas.*

**SP2016-123**

S-136.1 **DESCRIPTION**

This work shall consist of grinding and texturing the surface of the existing concrete pavement on the [insert project description and/or limits here] in a longitudinal direction as directed by the Engineer. The intent of this specification is to improve skid resistance, correct surface defects (smoothness) and provide positive drainage.

A **Definitions**

The Department defines “Smoothness” as the Mean Roughness Index (MRI) value per 0.1 mi [0.16 km] segment. The Department defines “Areas of Localized Roughness” (ALR) as areas greater than or equal to the limiting criteria for a continuous MRI calculation with a 25 ft [7.62 m] interval, as calculated using the FHWA’s Profile Viewing and Analysis (ProVAL) software.

A.1 **Concrete Grinding Terminology and Definitions**

- Depth – Depth of the saw cut grooves; sometimes also referred to as height
- Land Area – The distance between consecutive grooves
- Groove – The width of the saw cut groove / width of the diamond blade

S-136.2 **MATERIAL REQUIREMENTS**

A **Inertial Profiler (IP)**

Provide a Department certified, calibrated, and documented IP meeting the requirements of ASTM E 950, Class 1 and procedures maintained by the MnDOT Pavement Engineering Section. Refer to the procedures maintained by the MnDOT Pavement Engineering Section or to the MnDOT Smoothness website for the required settings for individual certified profilers.
Provide an IP capable of producing a profilogram and exporting raw profile data in an unfiltered electronic Engineering Research Division (ERD) file format. Produce ERD filenames in the YYMMDD-T-N-D-L-B-E.ERD standardized format in accordance with Table 2302-1:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>YY</td>
<td>Two-digit year</td>
</tr>
<tr>
<td>MM</td>
<td>Month (include leading zeros)</td>
</tr>
<tr>
<td>DD</td>
<td>Day of month (include leading zeros)</td>
</tr>
<tr>
<td>T</td>
<td>Route type (I, MN, US, CSAH, etc.)</td>
</tr>
<tr>
<td>N</td>
<td>Route number (no leading zeros) and auxiliary ID (if applicable, for example E, W, etc.)</td>
</tr>
<tr>
<td>D</td>
<td>Primary route direction (I or D)</td>
</tr>
<tr>
<td>L</td>
<td>Lane number (1 for driving lane, increasing by one for each lane to the left)</td>
</tr>
<tr>
<td>B</td>
<td>Beginning station</td>
</tr>
<tr>
<td>E</td>
<td>End station</td>
</tr>
</tbody>
</table>

B Profile Analysis Software

Use ProVAL software to conduct a profile analysis to determine Smoothness and ALR. Report MRI values in units of in per mi to one digit right of the decimal [m per km to two digits right of the decimal] in accordance with conventional rounding procedures.

C Operator Certification

Provide an operator, trained in the operation of the particular IP in accordance with 2302.2.A, “Inertial Profiler,” and knowledgeable in the use of the required profile analysis software in accordance with 2302.2.B, “Profile Analysis Software.” Ensure profiler operators pass a proficiency test and possess a current certification issued by the Department. The Contractor may access a list of certified operators on the MnDOT Smoothness website. Provide documentation of operator certification to the Engineer.

D Submittals

D.1 Before Profiling

Provide the Engineer with current, valid documentation, issued by the Department, indicating both IP and the operator certification.

D.2 Day of Profiling

Submit a printout containing the IP’s settings, each segment’s left and right International Roughness Index (IRI) values, and the signature of the operator to the Engineer on the same day of the profiling.

Submit electronic files in ERD format representing the raw data from each pass on the same day of the profiling.

If the Contractor fails to submit actual data to the Engineer on the day of profiling, the Department will require the Contractor to re-profile the measured segments.

D.3 Upon Completion of Concrete Grinding
Within 5 calendar days after all concrete grinding and before beginning corrective work, submit a paper ProVAL summary report for each lane, indicating the results of the “Smoothness Assurance” analyses. Use the ERD filenames in accordance with 2302.2.A, “Inertial Profiler” to create ProVAL summary reports.

If the summary reports indicate no ALR, submit a final spreadsheet summary in accordance with 2302.2.D.5, “After Corrective Work.”

D.4 Corrective Work

If the summary report indicates ALR, the Engineer will decide whether to assess monetary deductions or require corrective work, dips will not require corrective work. If the Engineer requires corrective work, regrind any sections that show ALR into the acceptable range shown in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”

If the Engineer elects to assess a monetary deduction for ALR in accordance with Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements” instead of requiring corrective work, submit a final spreadsheet summary in accordance with 2302.2.D.5 “After Corrective Work.”

D.5 After Corrective Work

After re-profiling, submit a paper summary ProVAL report for each lane, indicating the results of updated “Smoothness Assurance” analyses to the Engineer. Submit an agency approved spreadsheet summary in tabular form, with each 0.1 mi [0.16 km] segment occupying a row to the Engineer. The Contractor may access an approved spreadsheet summary template in electronic form on the MnDOT Smoothness website.

The Engineer will determine the length in miles [kilometers] of each mainline traffic lane and compare the length to the summary reports length.

S-136.3 CONSTRUCTION REQUIREMENTS

The Engineer will schedule a pre-grinding meeting at the project site. At the pre-grinding meeting, submit to the Engineer in writing the proposed Slurry Management Plan the grinding contractor will utilize to remain in conformance with Specification 1717. At the pre-grinding meeting, the Engineer and Contractor will review the site to identify the environmentally sensitive areas.

Provide an evenly spaced longitudinal land and groove (line type) texture that is true in grade and uniform in appearance. Operate the grinder so the land and groove texture runs parallel to centerline or parallel to the outside edge of the pavement in areas of taper.

The height tolerance of the lands (depth of groove) is 1/8th in ± 1/16th in [3.18 mm ± 1.59 mm] when measured from the bottom of the groove to the peak of the land. The Engineer will base the land area (width) between grooves on the type of aggregate used in the concrete pavement. Select the number of blades per foot [meter] to provide the following land area requirements in accordance with Table 2302-2, “Land Area between Grooves.”

<table>
<thead>
<tr>
<th>Type of Aggregate</th>
<th>Limestone</th>
<th>Gravel/Granite/Quartzite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area Between Grooves</td>
<td>0.090 to 0.110 in [2.29 to 2.79 mm]</td>
<td>0.080 to 0.095 in [2.03 to 2.41 mm]</td>
</tr>
</tbody>
</table>

Remove existing joint seals prior to or in conjunction with this operation. When joint sealing is required, install joint sealant after the concrete grinding is completed. Any joint sealant installed under the same
contract as the concrete grinding and is subsequently damaged by the concrete grinding process will require removal and replacement, at no cost to the Department.

At the completion of concrete grinding, any rolling 100-foot [30.48 m] section of a lane is required to have at least 95 percent ground surface texture.

Provide a smooth transition to and from intersecting roadways by grinding a smooth vertical taper from the newly created grinding elevation up to the intersecting roadway elevation.

Provide positive drainage as required by 2302.3.D.3.

Provide all traffic control associated with the testing and any corrective action (when applicable) that is required of the final pavement surface.

Handle residue and excess water resulting from concrete grinding in accordance with 1717, “Air, Land, and Water Pollution.”

Install permanent pavement markings after the completion of concrete grinding. Replace any permanent pavement marking damaged or destroyed by concrete grinding at no cost to the Department.

A Pavement Surface Testing

Use an IP to measure the final ground concrete pavement for smoothness and ALR, unless otherwise excluded in Tables 2302-3, “Areas Excluded from Smoothness Evaluation” and 2302-4, “Areas Excluded from Smoothness and ALR Evaluation”.

Remove objects and foreign material from the pavement surface before performing the pavement surface evaluation. Provide traffic control required for Concrete Grinding, IP testing and performing corrective work on the final pavement surface.

Unless otherwise approved by the Engineer, perform all profiling in the presence of the Engineer. Re-profile any pavement profiled in the absence of the Engineer as directed by the Engineer at no additional cost to the Department.

Operate the IP in the direction of traffic and at the optimum speed recommended by the manufacturer. Test and evaluate each lane separately and measure profiles in the left and right wheel paths of each lane. Separate each lane into segments 0.1 mi [0.16 km] in length. Evaluate the remainder segment less than 0.1 mi [0.16 km] in each lane as an independent segment. The Engineer will prorate pay adjustments for length.

Make each pass continuously, regardless of length, and end passes before exclusions in accordance with Table 2302-4, “Areas Excluded from Smoothness and ALR Evaluation.”

B Exclusions

Table 2302-3, “Areas Excluded from Smoothness Evaluation” indicates areas excluded from Smoothness evaluation, but still require measurement with an IP, and are subject to evaluation for ALR and the 10 ft [3.05 m] straightedge. Table 2302-4, “Areas Excluded from Smoothness and ALR Evaluation” indicates areas excluded from surface testing with the IP, but are subject to evaluation with the 10 ft [3.05 m] straightedge.

Exclusion areas stated in Table 2302-3, “Areas Excluded from Smoothness Evaluation” and Table 2302-4, “Areas Excluded from Smoothness and ALR Evaluation” require ground surface coverage of at least 95 percent, measured in accordance with 2302.3.
Areas Excluded from Smoothness Evaluation

<table>
<thead>
<tr>
<th>Area Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramps and loops</td>
</tr>
<tr>
<td>Acceleration and deceleration lanes less than or equal to 1,000 ft. [304.80 m] in length</td>
</tr>
<tr>
<td>Bridge decks and approach panels unless ground under the same contract. (The occurrence of bridges shall not interrupt the continuity determination.)</td>
</tr>
<tr>
<td>Crossover intersections if the intersecting roadway is not closed. Begin and end exclusions 100 ft. [30.48 m] upstream / downstream from the intersection radius.</td>
</tr>
</tbody>
</table>

Areas Excluded from Smoothness and ALR Evaluation

<table>
<thead>
<tr>
<th>Area Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn lanes and Loops</td>
</tr>
<tr>
<td>10 ft. [3.05 m] on either side of obstructions in lane that obstruction is located.</td>
</tr>
<tr>
<td>Before intersections that end at a stop sign or yield signs and roundabouts- begin and end exclusions 100 ft. [30.48 m] upstream / downstream from the intersection radius.</td>
</tr>
</tbody>
</table>

C Calculations

C.1 Smoothness

Obtain the Smoothness values in an individual lane using the ProVAL “Smoothness Assurance” analysis with the 250 mm filter.

C.2 Areas of Localized Roughness

Identify ALR using the ProVAL “Smoothness Assurance” analysis, calculating MRI with a continuous short interval of 25 ft. [7.62 m] with the 250 mm filter.

D Pay Adjustments

D.1 Smoothness

At the completion of the Concrete Grinding, measure and evaluate Smoothness requirements using the minimum smoothness criteria outlined in Table 2302-5, “Smoothness Pay Adjustments and Corrective Work for Concrete Pavements”.

The Engineer will base Smoothness acceptance and payment adjustments on the IP measured values for each 0.10-mi [0.16 km] segment. The Engineer will not accept segments that show corrective work, unless the 0.10-mi [0.16 km] segment falls in an area excluded from smoothness evaluation as stated in Table 2302-3, “Areas Excluded from Smoothness Evaluation.”

If a segment is less than 100 ft. [30.48 m] in length and requires corrective work by Table 2302-5, “Smoothness Pay Adjustments and Corrective Work for Concrete Pavements” the Engineer will waive the corrective work requirement for the segment and instead assess a prorated disincentive. The Department will still subject the segment to ALR analysis in accordance with Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”
## Smoothness Pay Adjustments and Corrective Work for Concrete Pavements

<table>
<thead>
<tr>
<th>Smoothness in/mi [m/km]</th>
<th>Pay Adjustment $/0.1 mi [0.16 km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40.0 [0.63]</td>
<td>600.00</td>
</tr>
<tr>
<td>≥ 40.0 to &lt; 60.0 [0.63 – 0.95]</td>
<td>1800 – 30 × Smoothness [1800 – 1900.8 × Smoothness]</td>
</tr>
<tr>
<td>≥ 60.0 to &lt; 70.0 [0.95 – 1.11]</td>
<td>0.00</td>
</tr>
<tr>
<td>≥ 70.0 [1.11]</td>
<td>Corrective Work to ≤ 60.0 in/mi [0.95 m/km]</td>
</tr>
</tbody>
</table>

### D.2 Areas of Localized Roughness

At the completion of the Concrete Grinding, measure and evaluate for compliance with the ALR requirements as stated in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”

The Engineer will evaluate any areas of ALR that show corrective work. If the Engineer determines the cause of the ALR is due to a dip in the roadway, the Engineer will apply a monetary deduction as shown in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”

If the Engineer determines the cause of the ALR is due to a bump in the roadway, the Engineer can either accept the ALR with a monetary deduction as shown in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements” or require the Contractor to regrind the segment of roadway shown to have unacceptable ALR and retest with the IP. The Engineer will consider the roadway section acceptable when the retested segment contains no ALR.

<table>
<thead>
<tr>
<th>Equation</th>
<th>25 ft [7.62 m] Continuous MRI, in/mi [m/km]</th>
<th>Corrective Work or Monetary Deduction, per linear 1.0 ft [0.30 m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>With posted vehicle speed &gt; 45 mph [73 km/hr]</td>
<td>&lt; 175.0 [2.76]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 175.0 [2.76] to &lt; 250.0 [3.94]</td>
<td>Corrective Work or $25.00, as directed by the Engineer</td>
</tr>
<tr>
<td></td>
<td>≥ 250.0 [3.94]</td>
<td>Corrective Work as directed by Engineer</td>
</tr>
<tr>
<td>Ramps, loops, Crossover intersections if the intersecting roadway is not closed, any roadway with a posted vehicle speed ≤ 45 mph [73 km/hr]</td>
<td>&lt; 225.0 [3.55]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 225.0 [3.55] to &lt; 275.0 [4.34]</td>
<td>$10.00</td>
</tr>
<tr>
<td></td>
<td>≥ 275.0 [4.34]</td>
<td>$25.00</td>
</tr>
</tbody>
</table>

### D.3 Straightedge Evaluation

The Engineer will allow variations less than or equal to ¼ in [6.35 mm] within the span of the straightedge in the longitudinal or transverse direction to remain in place without correction or penalty. In no case will the Engineer lay the straightedge across a lane break cross slope.
The Engineer will require corrective work on surface deviations greater than ¼ in [6.35 mm] within the span of the straightedge in any direction. For corrected variations, the Engineer will accept deviations less than or equal to ¼ in [6.35 mm] (1/8 in between grinder passes) within the span of a 10 ft [3.05 m] straightedge in any direction.

Correct vertical lips that are a direct result of the grinding operation. Correct vertical lips in the adjacent turn lane, shoulder and/or curb and gutter that are greater than 1/4 in [6.35 mm] by grinding a taper or daylight / feather pass.

The maximum elevation deviation and vertical lip tolerance between grinder passes is 1/8 in [3.18 mm]. If a section of roadway does not meet the (between grinder passes) maximum 1/8 in [3.18 mm] tolerance, diamond grind as needed to bring any section of roadway shown to have elevation deviations or vertical lips greater than 1/8 in [3.18 mm] within compliance.

**S-136.4 METHOD OF MEASUREMENT**
The Engineer will measure to the nearest square yard [square meter] of concrete area ground based on the width ground times the length ground. The Engineer will measure daylight and feather passes by the average width ground times the length ground. The Engineer will also measure transition tapers on adjacent roadways.

**S-136.5 BASIS OF PAYMENT**
Payment for Concrete Grinding at the contract price per unit of measure is full compensation for all cost including but not limited to: Diamond grinding the concrete pavement to a minimum surface coverage stated in 2302.3, IP profiling, corrective work needed to meet both smoothness and ALR specifications, grinding tapers to provide smooth transitions, grinding daylight / feather passes and traffic control. The Contract unit price also includes any slurry disposal methods needed to meet the requirements of Specification (1717) Air, Land, and Water Pollution.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>2302.604</td>
<td>Concrete Grinding.............................................................. square yard [square meter]</td>
</tr>
</tbody>
</table>

**S-137 (2302) CONCRETE GRINDING WITH NO INCENTIVES**
This write-up is to be used if you have a project with a speed limit of less than 50 mph and/or urban areas. Always use SP2016-39 (AIR, LAND AND WATER POLLUTION (CONCRETE GRINDING)) with this write-up. 

**NOTE to DESIGNER:** Use SP2016-123 (CONCRETE GRINDING) when the speed limit is 50 mph or greater.

**SP2016-124**

**S-137.1 DESCRIPTION**
This work shall consist of grinding and texturing the surface of the existing concrete pavement on the [insert project description and/or limits here] in a longitudinal direction as directed by the Engineer. The intent of this specification is to improve skid resistance, correct surface defects (smoothness) and provide positive drainage.

**A Definitions**
The Department defines “Smoothness” as the Mean Roughness Index (MRI) value per 0.1 mi [0.16 km] segment. The Department defines “Areas of Localized Roughness” (ALR) as areas greater than or equal to the limiting criteria for a continuous MRI calculation with a 25 ft [7.62 m] interval, as calculated using the FHWA’s Profile Viewing and Analysis (ProVAL) software.

**A.1 Concrete Grinding Terminology and Definitions**
- Depth – Depth of the saw cut grooves; sometimes also referred to as height
S-137.2 MATERIAL REQUIREMENTS

A Inertial Profiler (IP)

Provide a Department certified, calibrated, and documented IP meeting the requirements of ASTM E 950, Class 1 and procedures maintained by the MnDOT Pavement Engineering Section. Refer to the procedures maintained by the MnDOT Pavement Engineering Section or to the MnDOT Smoothness website for the required settings for individual certified profilers.

Provide an IP capable of producing a profilogram and exporting raw profile data in an unfiltered electronic Engineering Research Division (ERD) file format. Produce ERD filenames in the YYMMDD-T-N-D-L-B-E.ERD standardized format in accordance with Table 2302-1:

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<th>Definition</th>
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<td>Two-digit year</td>
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<td>Month (include leading zeros)</td>
</tr>
<tr>
<td>DD</td>
<td>Day of month (include leading zeros)</td>
</tr>
<tr>
<td>T</td>
<td>Route type (I, MN, US, CSAH, etc.)</td>
</tr>
<tr>
<td>N</td>
<td>Route number (no leading zeros) and auxiliary ID (if applicable, for example E, W, etc.)</td>
</tr>
<tr>
<td>D</td>
<td>Primary route direction (I or D)</td>
</tr>
<tr>
<td>L</td>
<td>Lane number (1 for driving lane, increasing by one for each lane to the left)</td>
</tr>
<tr>
<td>B</td>
<td>Beginning station</td>
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<tr>
<td>E</td>
<td>End station</td>
</tr>
</tbody>
</table>

B Profile Analysis Software

Use ProVAL software to conduct a profile analysis to determine Smoothness and ALR. Report MRI values in units of in per mi to one digit right of the decimal [m per km to two digits right of the decimal] in accordance with conventional rounding procedures.

C Operator Certification

Provide an operator, trained in the operation of the particular IP in accordance with 2302.2.A, “Inertial Profiler,” and knowledgeable in the use of the required profile analysis software in accordance with 2302.2.B, “Profile Analysis Software.” Ensure profiler operators pass a proficiency test and possess a current certification issued by the Department. The Contractor may access a list of certified operators on the MnDOT Smoothness website. Provide documentation of operator certification to the Engineer.

D Submittals

D.1 Before Profiling

Provide the Engineer with current, valid documentation, issued by the Department, indicating both IP and the operator certification.

D.2 Day of Profiling
Submit a printout containing the IP’s settings, each segment’s left and right International Roughness Index (IRI) values, and the signature of the operator to the Engineer on the same day of the profiling.

Submit electronic files in ERD format representing the raw data from each pass on the same day of the profiling.

If the Contractor fails to submit actual data to the Engineer on the day of profiling, the Department will require the Contractor to re-profile the measured segments.

D.3 Upon Completion of Concrete Grinding

Within 5 calendar days after all concrete grinding and before beginning corrective work, submit a paper ProVAL summary report for each lane, indicating the results of the “Smoothness Assurance” analyses. Use the ERD filenames in accordance with 2302.2.A, “Inertial Profiler” to create ProVAL summary reports.

If the summary reports indicate no ALR, submit a final spreadsheet summary in accordance with 2302.2.D.5, “After Corrective Work.”

D.4 Corrective Work

If the summary report indicates ALR, the Engineer will decide whether to assess monetary deductions or require corrective work, dips will not require corrective work. If the Engineer requires corrective work, regrind any sections that show ALR into the acceptable range shown in Table 2302-6 “ALR Monetary Deductions and Corrective Work Requirements.”

If the Engineer elects to assess a monetary deduction for ALR in accordance with Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements” instead of requiring corrective work, submit a final spreadsheet summary in accordance with 2302.2.D.5 “After Corrective Work.”

D.5 After Corrective Work

After re-profiling, submit a paper summary ProVAL report for each lane, indicating the results of updated “Smoothness Assurance” analyses to the Engineer. Submit an agency approved spreadsheet summary in tabular form, with each 0.1 mi [0.16 km] segment occupying a row to the Engineer. The Contractor may access an approved spreadsheet summary template in electronic form on the MnDOT Smoothness website.

The Engineer will determine the length in miles [kilometers] of each mainline traffic lane and compare the length to the summary reports length.

S-137.3 CONSTRUCTION REQUIREMENTS

The Engineer will schedule a pre-grinding meeting at the project site. At the pre-grinding meeting, submit to the Engineer in writing the proposed Slurry Management Plan the grinding contractor will utilize to remain in conformance with Specification 1717. At the pre-grinding meeting, the Engineer and Contractor will review the site to identify the environmentally sensitive areas.

Provide an evenly spaced longitudinal land and groove (line type) texture that is true in grade and uniform in appearance. Operate the grinder so the land and groove texture runs parallel to centerline or parallel to the outside edge of the pavement in areas of taper.

The height tolerance of the lands (depth of groove) is 1/8th in ± 1/16th in [3.18 mm ± 1.59 mm] when measured from the bottom of the groove to the peak of the land. The Engineer will base the land area (width) between grooves on the type of aggregate used in the concrete pavement. Select the number of blades per foot
[meter] to provide the following land area requirements in accordance with Table 2302-2, “Land Area between Grooves.”

<table>
<thead>
<tr>
<th>Type of Aggregate</th>
<th>Limestone</th>
<th>Gravel/Granite/Quartzite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area Between Grooves</td>
<td>0.090 to 0.110 in [2.29 to 2.79 mm]</td>
<td>0.080 to 0.095 in [2.03 to 2.41 mm]</td>
</tr>
</tbody>
</table>

Remove existing joint seals prior to or in conjunction with this operation. When joint sealing is required, install joint sealant after the concrete grinding is completed. Any joint sealant installed under the same contract as the concrete grinding and is subsequently damaged by the concrete grinding process will require removal and replacement, at no cost to the Department.

At the completion of concrete grinding, any rolling 100-foot [30.48 m] section of a lane is required to have at least 95 percent ground surface texture.

Provide a smooth transition to and from intersecting roadways by grinding a smooth vertical taper from the newly created grinding elevation up to the intersecting roadway elevation.

Provide positive drainage as required by 2302.3.D.3.

Provide all traffic control associated with the testing and any corrective action (when applicable) that is required of the final pavement surface.

Handle residue and excess water resulting from concrete grinding in accordance with 1717, “Air, Land, and Water Pollution.”

Install permanent pavement markings after the completion of concrete grinding. Replace any permanent pavement marking damaged or destroyed by concrete grinding at no cost to the Department.

A Pavement Surface Testing

Use an IP to measure the final ground concrete pavement for smoothness and ALR, unless otherwise excluded in Tables 2302-3, “Areas Excluded from Smoothness Evaluation” and 2302-4, “Areas Excluded from Smoothness and ALR Evaluation”.

Remove objects and foreign material from the pavement surface before performing the pavement surface evaluation. Provide traffic control required for concrete grinding, IP testing and performing corrective work on the final pavement surface.

Unless otherwise approved by the Engineer, perform all profiling in the presence of the Engineer. Re-profile any pavement profiled in the absence of the Engineer as directed by the Engineer at no additional cost to the Department.

Operate the IP in the direction of traffic and at the optimum speed recommended by the manufacturer. Test and evaluate each lane separately and measure profiles in both the left and right wheel paths of each lane. Separate each lane into segments 0.1 mi [0.16 km] in length. Evaluate the remainder segment less than 0.1 mi [0.16 km] in each lane as an independent segment. The Engineer will prorate pay adjustments for length.

Make each pass continuously, regardless of length, and end passes before exclusions in accordance with Table 2302-4, “Areas Excluded from Smoothness and ALR Evaluation.”
B Exclusions

Table 2302-3, “Areas Excluded from Smoothness Evaluation” indicates areas excluded from Smoothness evaluation, but still require measurement with an IP, and are subject to evaluation for ALR and the 10 ft [3.05 m] straightedge. Table 2302-4, “Areas Excluded from Smoothness and ALR Evaluation” indicates areas excluded from surface testing with the IP, but are subject to evaluation with the 10 ft [3.05 m] straightedge.

Exclusion areas stated in Table 2302-3, “Areas Excluded from Smoothness Evaluation” and Table 2302-4, “Areas Excluded from Smoothness and ALR Evaluation” require ground surface coverage of at least 95 percent, measured in accordance with 2302.3.

<table>
<thead>
<tr>
<th>Table 2302-3 Areas Excluded from Smoothness Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramps and loops</td>
</tr>
<tr>
<td>Acceleration and deceleration lanes less than or equal to 1,000 ft [304.80 m] in length</td>
</tr>
<tr>
<td>Bridge decks and approach panels unless ground under the same contract.</td>
</tr>
<tr>
<td>(The occurrence of bridges shall not interrupt the continuity determination.)</td>
</tr>
<tr>
<td>Crossover intersections if the intersecting roadway is not closed. Begin and end exclusions 100 ft. [30.48 m] upstream / downstream from the intersection radius.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2302-4 Areas Excluded from Smoothness and ALR Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn lanes and Loops</td>
</tr>
<tr>
<td>10 ft. [3.05 m] on either side of obstructions in lane that obstruction is located.</td>
</tr>
<tr>
<td>Before intersections that end at a stop sign or yield signs and roundabouts- begin and end exclusions 100 ft. [30.48 m] upstream / downstream from the intersection radius.</td>
</tr>
</tbody>
</table>

C Calculations

C.1 Smoothness

Obtain the Smoothness values in an individual lane using the ProVAL “Smoothness Assurance” analysis with the 250 mm filter.

C.2 Areas of Localized Roughness

Identify ALR using the ProVAL “Smoothness Assurance” analysis, calculating MRI with a continuous short interval of 25 ft. [7.62 m] with the 250 mm filter.

D Pay Adjustments

D.1 Smoothness

At the completion of the Concrete Grinding, measure and evaluate Smoothness requirements using the minimum smoothness criteria outlined in Table 2302-5, “Smoothness Pay Adjustments and Corrective Work for Concrete Pavements.”

The Engineer will base Smoothness acceptance on the IP measured values for each 0.10-mi [0.16 km] segment. The Engineer will not accept segments that show corrective work, unless the 0.10-mi [0.16 km] segment falls in an area excluded from smoothness evaluation as stated in Table 2302-3, “Areas Excluded from Smoothness Evaluation.” The Engineer, in conjunction Concrete Engineer, may exempt other sections from
smoothness requirements stated in Table 2302-5, “Smoothness Pay Adjustments and Corrective Work for Concrete Pavements.”

If a segment is less than 100 ft. [30.48 m] in length and requires corrective work in accordance with Table 2302-5, “Smoothness Pay Adjustments and Corrective Work for Concrete Pavements” the Engineer will waive the corrective work requirement. All segments less than 100 ft. [30.48m] are still subject to ALR analysis in accordance with Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”

<table>
<thead>
<tr>
<th>Smoothness and Corrective Work Requirements for Concrete Grinding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoothness in/mi [m/km]</td>
</tr>
<tr>
<td>&lt; 90.0 [1.42]</td>
</tr>
<tr>
<td>≥ 90.0 [1.42]</td>
</tr>
</tbody>
</table>

### D.2 Areas of Localized Roughness

At the completion of the Concrete Grinding, measure and evaluate for compliance with the ALR requirements as stated in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”

The Engineer will evaluate any areas of ALR that show corrective work. If the Engineer determines the cause of the ALR is due to a dip in the roadway, the Engineer will apply a monetary deduction as shown in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements.”

If the Engineer determines the cause of the ALR is due to a bump in the roadway, the Engineer can either accept the ALR with a monetary deduction as shown in Table 2302-6, “ALR Monetary Deductions and Corrective Work Requirements” or require the Contractor to regrind the segment of roadway shown to have unacceptable ALR and retest with the IP. The Engineer will consider the roadway section acceptable when the retested segment contains no ALR.

### D.3 Straightedge Evaluation

The Engineer will require corrective work on surface deviations greater than ¼ in [6.35 mm] within the span of the straightedge in any direction. For corrected variations, the Engineer will accept deviations...
less than or equal to \(1/4\) in \([6.35\, \text{mm}]\) \((1/8\, \text{in} \ [3.18\, \text{mm}])\) between grinder passes) within the span of a 10 ft \([3.05\, \text{m}]\) straightedge in any direction. In no case will the Engineer lay the straightedge across a lane break cross slope.

Correct vertical lips that are a direct result of the grinding operation. Correct vertical lips in the adjacent turn lane, shoulder and/or curb and gutter that are greater than \(1/4\) in \([6.35\, \text{mm}]\) by grinding a taper or daylight / feather pass.

The maximum elevation deviation and vertical lip tolerance between grinder passes is \(1/8\) in \([3.18\, \text{mm}]\). If a section of roadway does not meet the (between grinder passes) maximum \(1/8\) in \([3.18\, \text{mm}]\) tolerance, diamond grind as needed to bring any section of roadway shown to have elevation deviations or vertical lips greater than \(1/8\) in \([3.18\, \text{mm}]\) within compliance.

**S-137.4**  
**METHOD OF MEASUREMENT**  
The Engineer will measure to the nearest square yard \([\text{square meter}]\) of concrete area ground based on the width ground times the length ground. The Engineer will measure daylight / feather passes by the average width ground times the length ground. The Engineer will also measure transition tapers on adjacent roadways.

**S-137.5**  
**BASES OF PAYMENT**  
Payment for Concrete Grinding at the contract price per unit of measure is full compensation for all cost including but not limited to: Diamond grinding the concrete pavement to a minimum surface coverage stated in 2302.3, IP profiling, corrective work needed to meet both smoothness and ALR specifications, grinding tapers to provide smooth transitions, grinding daylight / feather passes and traffic control. The Contract unit price also includes any slurry disposal methods needed to meet the requirements of Specification (1717) Air, Land, and Water Pollution.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2302.604</td>
<td>Concrete Grinding</td>
<td>.............................................. square yard ([\text{square meter}])</td>
</tr>
</tbody>
</table>

**S-138**  
**2331 BITUMINOUS JOINT SAWING AND SEALING**  
*This write-up is not to be used (except for short research or test sections) by order of the Materials Lab.*  
*Designer needs to choose which pay option to use for Seasonal saw cut under S-.4F.*  

SP2016-125  
This work shall consist of saw cutting, cleaning, drying and sealing transverse joints in new bituminous surfaces according to the Plans, the applicable MnDOT Standard Specifications, the details in the Plan, as directed by the Engineer, and the following:

**S-138.1**  
**MATERIALS**  

(A) The Contractor shall provide certification that the sealant meets the requirements of MnDOT 3723 or 3725 for Sawing and Sealing. Only those products that meet the requirements of MnDOT specifications and have performed satisfactorily based on Chemical Laboratory and field analysis shall be used. A list of certified sources is on file at the Chemical Laboratory, MnDOT Maplewood’s Office of Materials and Road Research. To obtain the list, call (651) 366-5548 or visit the website at: http://www.dot.state.mn.us/products/index.html

The crack sealant material shall be packaged and shipped in sealed containers. Each container shall be clearly marked with the name of the manufacturer, the trade name of the sealant, weight \([\text{mass}]\), the manufacturer’s batch and lot number, the application/pouring temperature, and the safe heating temperature. The Contractor shall furnish two (2) sample boxes for each lot of sealant used on the Project for field sampling. Each sample box shall have a capacity to hold 5 pounds \([2.3\, \text{kg}]\) of sealant. The boxes shall be Teflon or silicone-lined.
A copy of the manufacturer's recommendations pertaining to the heating and re-heating and application of the joint sealant material shall be submitted to the Engineer before the commencement of the work. The Contractor shall follow these recommendations.

The temperature of the sealer in the field application equipment shall not exceed the safe heating temperature recommended by the manufacturer. Temperatures above the safe heating temperature will result in rejection of the sealant material and will require disposal of the sealant material.

Mixing of different manufacturers' brands or different types of sealants shall be prohibited.

(B) Bond Breaker Tape
Bond breaker tape shall consist of regular masking tape or other suitable bond breaker tape designed for use with hot pour sealants. The width of the tape may be equal to but not more than 1/8 inch [3 mm] narrower than the width of the saw cut.

S-138.2 WEATHER LIMITATIONS
Sealant materials may be placed during a period of rising temperature after the air temperature in the shade and away from artificial heat sources has reached 40°F [4.4°C] and indications are for a continued rise in temperature. During a period of falling temperature, placement of the sealant material shall be suspended until the above conditions are met.

Sealants shall not be placed when, in the opinion of the Engineer, the weather or roadbed conditions are unfavorable. Sawing and sealing shall be permitted only during daylight hours.

S-138.3 EQUIPMENT REQUIREMENTS
The melting kettle shall be double jacketed boiler type, equipped with both agitation and recirculation systems capable of melting and applying the sealant through a pressure-fed hose and wand. The melter shall be capable of starting at ambient temperature and bringing the sealing material to application temperature in one hour or less, while continuously agitating and recirculating the sealant. The melter shall be equipped with automatic thermostatic controls and temperature gages to monitor the sealant temperature in the applicator lines and temperature of heat transfer oil in the kettle jacket.

A self-propelled power saw capable of providing a straight cut of uniform depth and width shall be used. Diamond saw blades with either single or gang blade arrangement shall be used. The saw blade or blades shall be of such size and configuration such that the desired joint reservoir shape and deep saw cut are achieved in one pass of the saw. Two pass cutting will not be allowed. No spacers between blades shall be allowed unless the Contractor can show that the desired reservoir and saw cut can be obtained with them. Either wet or dry sawing will be permitted provided the above conditions are met.

The air compressor shall be capable of producing a continuous stream of clean, dry air through the nozzle at 100 psi [690 kPa] and 125 cubic feet per minute (CFM) [3.5 m³/minute] minimum. The compressed air unit shall be equipped with water and oil traps and must produce sufficient air volume and pressure to remove all debris from the sawed joint and all adjacent road surfaces in a safe manner such that the debris will not re-enter the joint prior to the sealing operation.

The heat lance shall operate with propane and compressed air in combination and be capable of achieving a temperature of heated air at the exit orifice of 1,800°F [982°C] and a discharge velocity of 3,000 feet per second [914 m/sec.].

S-138.4 CONSTRUCTION DETAILS
(A) General
The Contractor shall conduct the operation so that saw cutting of transverse joints, cleaning, and sealing are a continuous operation. Traffic shall not be allowed to knead together or damage the sawed joints. Sawed joints not sealed before traffic is allowed on the pavement shall be re-sawed, if necessary, when sawing and sealing operations resume at no additional cost to the State. Saw cutting, cleaning and sealing shall not be done within 48 hours of placement of the wear course.

(B) Saw cutting of Transverse Joints

The transverse saw cut joints shall be cut into mainline pavement directly above existing transverse cracks in the mainline pavement, but shall terminate a distance of 1 foot [300 mm] shy of the shoulder pavement unless otherwise detailed on the Plans or directed by the Engineer. Existing straight cracks shall be marked by the Contractor where the crack meets the edge of the mainline so that the crack can be located after the final bituminous course is completed. The Contractor's procedure for locating these transverse cracks shall be subject to approval of the Engineer.

(C) Cleaning Operation

Dry sawed joints shall be thoroughly cleaned with an air compressor meeting the requirements previously outlined. Cleaning shall continue until the joint is dry and all dirt, dust or deleterious matter is removed from the joint and adjacent pavement to the satisfaction of the Engineer.

Wet sawed joints and adjacent pavement shall be thoroughly cleaned with a water blast (50 psi [345 kPa] minimum) immediately after sawing to remove any sawing slurry, dirt or deleterious matter adhering to the joint walls or remaining in the joint cavity. The joints shall then be dried with an air compressor. Cleaning shall continue until the joint is dry and all dirt, dust or deleterious matter is removed to the satisfaction of the Engineer. If the air compressor produces dirt or other residue from the joint cavity, the Contractor may be required to re-clean the joint with a water blast.

Following cleaning, the sawed joints shall be dried and warmed with a hot air lance. The Contractor shall be careful not to burn the pavement surface. After the hot air lance has been used to warm and dry the joint, the backer tape shall be placed into the bottom of the joint reservoir. Under no circumstances shall more than two (2) minutes elapse between the time the hot air lance is used and the sealant is placed.

The Contractor shall be required to provide protective screening, subject to approval of the Engineer, if his cleaning operations could cause damage to or interference with traffic in adjacent lanes.

(D) Sealing Operation

The joints shall be sealed when the sealant material is at the pouring temperature recommended by the manufacturer. The Contractor shall fill the joint such that after cooling, the sealant is flush with the adjacent pavement along the edges and the center does not sag more than 1/8 inch [3 mm] below the pavement or shoulder surface. Care shall be taken in the sealing of the joints so that the joints are not overfilled and the final appearance shall present a neat fine line. The applicator wand shall be returned to the machine and the joint sealant material recirculated immediately upon completion of each joint sealing. The Engineer may require the Contractor to use a squeegee to force the sealant material into narrow joint shapes if in the opinion of the Engineer the sealant material is not flowing into the joint properly. Sand shall not be spread on the sealed joints to allow for opening to traffic. The sealant shall be tack free before opening to traffic. A given quantity of sealant material shall never be heated at the pouring temperature for more than six (6) hours and shall never be reheated.

(E) Acceptance Sampling

The Contractor shall record the temperature of the kettle and the temperature of the sealant once every hour during the actual working operations. This information is to be recorded on the forms provided by the Engineer. At the end of each day’s production, the completed forms shall be presented to the Engineer, and they shall be placed in a permanent file by the Engineer. The Engineer shall continuously review the sealant temperatures. Temperatures measured more than 10°F [-12°C] above the manufacturer's specified safe heating
temperature shall result in the rejection of the material in use and the Contractor shall dispose of the overheated material, at his expense, in an acceptable manner.

(F) Seasonal Saw Cut
If the wear course is to be placed the year after the binder/leveling course, due to seasonal paving limitations, all exposed courses shall receive a 1 inch [25 mm] deep by 1/8 inch [3 mm] wide saw cut to control thermal and/or reflective cracking and to provide a means of properly referencing the saw cut to eventually be made in the top course. These saw cuts shall be made in all exposed courses. The seasonal saw cuts shall be made before any evidence of reflective cracking has developed.

After placement of the top wearing course the following spring, the Contractor shall be responsible for locating the underlying seasonal saw cuts in a manner approved by the Engineer. Once the wear course is placed and the underlying joints are located, the appropriate saw cut shall be made and the joint sealed according to the Plans. It is critical that the saw cuts not be offset more than 1 inch [25 mm] from the underlying seasonal saw cuts.

Seasonal saw cutting shall be paid for per linear foot [meter] under a separate pay item for such work and shall include the cost of all material, labor (including joint relocation) and equipment necessary to complete the work specified.

OR

Seasonal saw cutting shall be considered incidental.

OR

If seasonal saw cutting is required it will be paid for as Extra Work in accordance with MnDOT 1402.5.

S-138.5 WORKMANSHIP
Sealed joints shall be rejected if there is evidence of poor workmanship or obvious defects, such as, but not limited to the following:

(a) Sawed joint not filled completely
(b) Lack of bond to the sides of the joint
(c) Excessive debris or moisture in the joint
(d) Contamination of the sealant
(e) Sawed joint not filled flush

Rejected sealed joints shall be repaired, the sealant removed and disposed of in an appropriate manner and the joints resealed as necessary, to the Engineer's satisfaction and at no further cost to the State.

S-138.6 MEASUREMENT AND PAYMENT
Measurement will be made by the length of joints sawed and sealed as specified. Payment will be made under separate items for each joint type at the Contract bid price per linear foot [meter], which shall include the cost of all labor, equipment and materials necessary to complete the work as specified.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2331.603</td>
<td>Sawed and Sealed Joint</td>
<td>linear foot [meter]</td>
</tr>
<tr>
<td>2331.603</td>
<td>Seasonal Saw Cut</td>
<td>linear foot [meter]</td>
</tr>
</tbody>
</table>
S-139  (2331) PAVEMENT JOINT ADHESIVE
SP2016-126

S-139.1 DESCRIPTION
Apply the joint adhesive to the face of the longitudinal construction joint.

S-139.2 MATERIAL
Provide joint adhesive meeting requirements as specified in Table 1.

**TABLE 1 - JOINT ADHESIVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>TEST</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brookfield Viscosity, 400 °F [204 °C]</td>
<td>ASTM D 3236</td>
</tr>
<tr>
<td>Cone Penetration, 77 °F [25 °C]</td>
<td>ASTM D 5329</td>
</tr>
<tr>
<td>Resilience, 77 °F [25 °C]</td>
<td>ASTM D 5329</td>
</tr>
<tr>
<td>Ductility, 77 °F [25 °C]</td>
<td>ASTM D 113</td>
</tr>
<tr>
<td>Ductility, 39.2 °F [4 °C]</td>
<td>ASTM D 113</td>
</tr>
<tr>
<td>Tensile Adhesion, 77 °F [25 °C]</td>
<td>ASTM D 5329</td>
</tr>
<tr>
<td>Softening Point</td>
<td>ASTM D 36</td>
</tr>
<tr>
<td>Asphalt Compatibility</td>
<td>ASTM D 5329</td>
</tr>
</tbody>
</table>

S-139.3 CONSTRUCTION REQUIREMENTS

A. Equipment Requirements
Use a jacketed double boiler type melting unit, with both agitation and recirculation systems.
Provide a pressure feed wand application system.

B. Material Handling
Submit a copy of the manufacturer's recommendations for heating, re-heating, and applying the joint adhesive material.

Do not remove the joint adhesive from the package until immediately before it is placed in the melter. Joint adhesive boxes must be clearly marked with the name of the manufacturer, the trade name of the adhesive, the manufacturer's batch and lot number, the application/pour temperature, and the safe heating temperature. Feed additional material into the melter at a rate equal to the rate of material used.

Verify the pouring temperature of the joint adhesive at least once per hour at the point of discharge. Stop production if the adhesive falls below the recommended application/pour temperature. When the temperature of the adhesive exceeds the maximum safe heating temperature, stop production, empty the melter, and dispose of that adhesive in an environmentally safe method. No payment will be made for this material or its disposal.

Do not blend or mix different manufacturer’s brands or different types of adhesives.

C. Joint Adhesive Application
The face of the longitudinal joint must be clean and dry before the joint adhesive is applied. Apply the joint adhesive material to the entire face of the final lift of HMA pavement where an adjacent HMA pavement will be constructed. The joint adhesive can also be applied to the entire face of concrete pavement where an adjacent HMA shoulder pavement will be constructed. Recommended band thickness is approximately 1/8 inch [3 mm]. The use of an application shoe attached to the end of application wand is recommended. Do not overlap the joint by greater than 1/2 inch [12.5 mm] at the top of the joint or 2 inches [50 mm] at the bottom of the joint.
Apply the joint adhesive immediately in front of the paving operation. If the adhesive is tracked by construction vehicles, repair the damaged area and restrict traffic from driving on the adhesive.

S-139.4 QUALITY CONTROL
Acceptance of the joint adhesive material is based on the certification by the manufacturer that the sealant meets the requirements listed in Table 1. Field sampling shall be used to verify that the delivered joint adhesive meets the requirements of the specification. The Contractor shall take a sample from the application wand during the first 20 minutes of placing sealant from each melter on the Project in the presence of the Engineer.

Each sample shall consist of two (2) aluminum or steel sample containers with the capacity to hold 5 pounds [2.3 kg] of sealant each. The two (2) sampling containers shall be labeled with SP number, date, time, location, manufacturer and lot number of the sealant. Each container shall be numbered one of two, or two of two. The Engineer reserves the right to conduct supplementary sampling and testing of the sealant material.

The Contractor shall document the locations where the material from each lot number of sealant is placed.

If a field sample fails to meet any of the requirements in Table 1, the work completed with the material from the lot that the field sample represents, shall be subject to a two percent (2%) reduction in the Contract unit price of the final lift of the plant mixed asphalt pavement.

S-139.5 METHOD OF MEASUREMENT
Measure the joint adhesive by the linear foot [meter].

S-139.6 BASIS OF PAYMENT
Payment for the accepted quantity of joint adhesive at the Contract price of measure will be compensation in full for all costs of furnishing and applying the material as specified.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2331.603</td>
<td>Joint Adhesive</td>
<td>linear foot [meter]</td>
</tr>
</tbody>
</table>

S-140 (2331) COLD-IN-PLACE RECYCLED (CIR) BITUMINOUS

2331.1 DESCRIPTION
This special provision is applicable for Department mix design only.

Construct a Cold In-Place Recycled (CIR) Bituminous layer by:

- Milling the existing bituminous to produce a Recycled Asphalt Pavement (RAP).
- Crushing, screening and mixing the RAP with a Bituminous Material for Mixture.
- Placing and compacting to produce a CIR bituminous layer.

A. Definitions

A.1 Bituminous Material for Mixture
The liquid bituminous material added to RAP to produce the CIR Mixture.

A.2 Cold In-Place Recycled (CIR) Bituminous Mixture
The un-compact ed mixture of RAP, Bituminous Material for Mixture and other additives.
2331.2 MATERIALS

A. CIR Design Parameters
   A CIR mix design is recommended to determine the method (Foaming or Emulsion), bituminous type and amount of additives needed to construct CIR. Designer see Mix design criteria for CIR in the Grading and Base Manual section 5-692.291.

   A.1 Design Requirements
   Department: Provide mix design requirements, see Form G&B-408 in Contract.
   Contractor: Meet the following Design Parameters listed on Form G&B-408.

B. Gradation
   The gradation requirement for RAP is 97 - 100% passing the 1¼ inch sieve, and 99 - 100% passing the 1½ inch sieve.

C. Bituminous Material
   Use the type and grade of Bituminous Material (liquid bituminous material) at the rate on the mix design. Note that application rate of bituminous material may need to be varied throughout the project as material properties change per S-___.3.D. Meet the requirements of 3151, “Bituminous Material”.

D. Mineral Stabilizing Agent (Cement)
   Use mineral stabilizing agent at the rate required on Form G&B-408.
   Cement must conform to 3101, “Portland Cement”.

E. Add-Rock
   Use additional aggregates as required Form G&B-408.

F. Water
   Provide mixing water that meets 3906, “Water for Concrete and Mortar”.

2331.3 CONSTRUCTION REQUIREMENTS

A. General
   All forms and the Grading and Base Manual are available on the Grading and Base Website. Correct and re-test all failing areas.

   Before beginning cold in place operations, remove vegetation and topsoil adjacent to the surface.

   Repair structures damaged by Contractor: operations, neglect or negligence.

   Provide water in order to obtain optimum moisture content.

   Cold In-place Recycle when:

   1. The atmospheric temperature is 50°F and rising, when using an engineered emulsion; or when the atmospheric temperature is 60°F and rising, when using a non-engineered emulsion or foaming asphalt.
   2. It is not foggy or rainy.
   3. Freezing temperatures are not predicted within 48 hours after placement of any CIR.
Atmospheric temperature and predicted weather requirements are determined by the Engineer.

B. Equipment
Use self propelled equipment with the ability to: mill, crush, screen, size and mix the RAP along with the required recycling agents to produce a uniform homogeneous product.

For foamed asphalt applications, the reclaiming machine must also:

1. Accurately foam bituminous material and uniformly add specified water.
2. Provide samples of the foamed bituminous material through a sampling nozzle.

B.1 Milling
Use a self-propelled milling machine with the following characteristics:

- Minimum milling width of 12.5 feet.
- Must have a minimum 6 foot ski or multi point measuring device for milling control.
- Equipped with automatic depth and cross-slope controls
- Ability to maintain a constant cutting depth within ±1/4 inch of Plan depth in one pass.

B.2 Crushing/Sizing Unit
Use a self-propelled crushing/sizing unit with the following characteristics:

- Ability to crush and size all RAP to the gradation requirement of S-__.2.B.
- Equipped with a “closed loop” system that returns oversized materials to the crusher

B.3 Mixing Unit
Use a self-propelled pug mill mixing unit with the ability to thoroughly mix the RAP while injecting the Bituminous Material for Mixture and automatically metering it to within 0.1 percent. When performing CIR over concrete, meter bitumen by weight.

B.4 Paver
Use a paver equipped with a 20 foot ski meeting the requirements of 2360.3.B.2.a, “Paver”.

B.5 Bituminous Material for Mixture Supply Tankers
If foaming is required, equip the tankers with a visible thermometer that measures the temperature of the liquid Bituminous Material for Mixture in the bottom third of the supply tank.

B.6 Vane Feeder
If mineral stabilizing agent is required, use a computerized vane feeder capable of uniformly spreading it on the road surface prior to recycling.

B.7 Rollers

B.7.a Steel Wheeled Rollers
Use Steel Wheeled Roller(s) meeting the requirements of 2360.3.B.2.e(1).

B.7.b Pneumatic Tired Roller
Use Pneumatic Tired Roller(s) with a minimum weight of 25 tons meeting the requirements of 2360.3.B.2.e(2).

C Milling
Mill the existing pavement to Plan depth and width and to the gradation requirement of S-__.2.B.
Process paving fabric encountered during milling operations to meet the following:

- At least 90% must have an area less than 5 square inches and,
- None of the pieces may have a dimension greater than 4 inches in any direction.

**D Bituminous Material for Mixture Parameters**

Maintain bituminous material for foaming within ± 10°F of the optimum temperature recommended by the mix design. If the mix design does not provide a recommendation, maintain the foamed asphalt temperature between 305°F and 325°F.

After consultation with the Contractor, the Engineer may direct the Contractor to vary the application rate of Bituminous Material for Mixture compared to the mix design for areas of pulverized bituminous which the Engineer believes are either too rich or too dry.

**E Spreading Mineral Stabilizing Agent**

- Spread mineral stabilizing agent using a computerized vane feeder in a manner that minimizes dusting, i.e. do not spread when the wind is strong enough to coat traffic and/or the environment.
- Control the mineral stabilizing agent content to within ± 0.5 pounds/sy, of the design target on Form G&B-408.
- Start mixing operations, no longer than ½ hour after spreading stabilizing agent.

**F Mixing**

Mix the crushed RAP and Bituminous Material for Mixture into a homogenous mixture. Adjust the water application rate based on mixture consistency, coating and dispersion of the recycled materials.

**G Placement**

Do not heat the paver screed. Spread the CIR material in one continuous pass to Plan slopes, width and grades in one lift. Ensure that the mix does not segregated. Pave before emulsion breaks.

**H Compaction**

**General**

1. Correct, at no additional cost to the Department, bumps and dips in the profile greater than 1 inch in 25 feet.
2. Do not allow rollers or other construction equipment to remain stationary on CIR.
3. Do not permit traffic (including construction traffic) on the CIR Bituminous layer for at least two hours after final rolling or emulsion breaks (if applicable), whatever is longer.
4. Use visual observations of check cracking and shoving to prevent over-rolling.
5. Compact using the criteria in S-__.3H.1 “Control Strip”

**H.1 Control Strip**

Use a control strip to establish a rolling pattern. The control strip should represent a homogenous roadway section and have the following characteristics:

- Minimum area of 400 square yards
- Remain in-place and become a part of the completed work.

Use the following to establish a rolling pattern after initial breakdown is complete:
1. Randomly select three test points in the control strip and use a nuclear density device (ASTM D2950, in back-scatter mode) to determine a wet density at each point after each finish (steel) roller pass.

2. Ensure that the nuclear gauge rests on a flat surface. The density at each point is defined as the average of two readings offset 180 degrees.

3. Continue compacting until additional roller coverage does not produce appreciable increase in density. Provide documentation of the growth curve and maximum target density to the Engineer. Use this for QA/QC process.

4. Roll the remainder of that course in accordance with the pattern developed in the control strip for that roller.

5. Discontinue and reevaluate the rolling operation (pattern and timing), if surface cracking or checking occurs.

Use this rolling pattern until a new control strip is performed.

Establish a new rolling pattern by performing a new control strip when there are changes in the CIR mixture that cause the original control strip to no longer be representative; changes may include:

- In-place materials variation, including sections with varying thickness, construction history, etc.
- If vehicle leave indents in the compacted surface.
- Changes in RAP gradation
- 98% of Target Density is not achieved on two consecutive QC readings.
- Changes in the application rate of Bituminous Material for Mixture, outside of the mix design tolerance.

I Contractor Quality Control Testing Tests and Rates (QC)

Perform testing per the Schedule of Materials Control. Submit results to the Engineer electronically within 24 hours of the completion of the tests.

Correlate the nuclear gauge’s dry measurement density by direct moisture measurement (microwave oven or equivalent).

J Department Quality Assurance (QA)

Perform testing per the Schedule of Materials Control.

K. Profile, Curing and Surface Requirements

Maintain the CIR layer in a smooth, compacted condition free of ruts, distortions, potholes, loose aggregate, and to the the profile and cross section to until the placement of the next layer.

Remove all loose aggregate on the CIR surface immediately prior to placing the next layer.

Repair ruts, potholes, washboarding and other distortions.

L Fog Seal and Bituminous Requirements

Apply a CSS-1h bituminous fog seal per 2355, “Bituminous Fog Seal” at a rate of 0.10 to 0.16 gallons per square yard immediately prior to placing the asphalt pavement.

If required of the Contract, place the next layer of material (HMA, seal coat, etc.):

1. No sooner than three calendar days after the CIR, at any location, has been injected and compacted,
2. When the CIR surface does not deflect under construction equipment and meets quality compaction per 2105.3.F.2.
3. When the CIR is capable of meeting the required strength to place and compact the next layer, and the moisture content of the CIR does not cause a failure to the next material placement.

**Hold Point**

Any failing test or non-compliance with any part of this special provision creates a Hold Point, whereby no additional material may be placed until corrective action and passing retest(s) have occurred, or accepted by the Engineer. All additional material placed before corrective action and passing retest(s) occur constitutes Unauthorized Work per 1512.2.

**2331.4 Measurement**

Measure the CIR layer by the square yard.

Measure the Bituminous Material for Mixture by the ton.

Measure the Bituminous Material for Fog Seal by the gallon.

Measure the cement by the ton.

**2331.5 Payment**

The Department will pay for the correction of in-situ areas that are unstable through no fault of the Contractor’s operations, if directed by the Engineer, per 1402.5, “Extra Work”.

The contract unit price for the CIR includes the cost of production, testing, placement, occasional variations in bituminous pavement thickness, compacting, removing vegetation and topsoil adjacent to the surface, water and required and necessary maintenance including cleaning the surface.

Payment for any required additional aggregate or other additives designated in the Contract is incidental to the price of the bituminous material for mixture.

Payment for the CIR layer will be made on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.:</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2105.609</td>
<td>Cement</td>
<td>ton [tonne]</td>
</tr>
<tr>
<td>2331.604</td>
<td>Cold In-Place Recycle Bituminous Mixture</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2331.609</td>
<td>Bituminous Material for Mixture</td>
<td>ton [tonne]</td>
</tr>
<tr>
<td>2355.502</td>
<td>Bituminous Material for Fog Seal</td>
<td>gallon [liter]</td>
</tr>
</tbody>
</table>

S-141 (2331) COLD CENTRAL PLANT RECYCLING (CCPR) BITUMINOUS
NEW WRITEUP 04/26/16 ◄DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.
SP2016-127.1

**2331.1 Description**

This special provision is applicable for Department mix design only.

Construct a Cold Central Plant Recycling (CCPR) Bituminous layer by:
• Milling (if required in the Contract), the existing bituminous to produce a Recycled Asphalt Pavement (RAP), note that CCPR may also be produced from previously milled HMA.
• Crushing, screening and mixing the RAP with a Bituminous Material for Mixture and haul product to placement destination.
• Placing and compacting to produce a CCPR bituminous layer.

A. Definitions

A.1 Bituminous Material for Mixture
The liquid bituminous material added to RAP to produce the CCPR Mixture.

A.2 Cold Central Plant Recycled (CCRP) Bituminous Mixture
The un-compacted mixture of RAP, Bituminous Material for Mixture and other additives.

2331.2 MATERIALS

A. CCPR Design Parameters
A CCPR mix design is recommended to determine the method (Foaming or Emulsion), bituminous type and amount of additives needed to construct CCPR. Designer use Mix design criteria for CIR in the Grading and Base Manual section 5-692.291.

A.1 Design Requirements
Department: Provide mix design requirements, see Form G&B-408 in Contract.
Contractor: Meet the following Design Parameters listed on Form G&B-408.

B. Gradation
The gradation requirement for RAP is 97 - 100% passing the 1¼ inch sieve, and 99 - 100% passing the 1½ inch sieve.

C. Bituminous Material
Use the type and grade of Bituminous Material (liquid bituminous material) at the rate on the mix design. Note that application rate of bituminous material may need to be varied throughout the project as material properties change per S-23.3.D. Meet the requirements of 3151, “Bituminous Material”.

D. Mineral Stabilizing Agent (Cement)
Use mineral stabilizing agent at the rate required on Form G&B-408.
Cement must conform to 3101, “Portland Cement”.

E. Add-Rock
Use additional aggregates as required Form G&B-408.

F. Water
Provide mixing water that meets 3906, “Water for Concrete and Mortar”.

2331.3 CONSTRUCTION REQUIREMENTS

A. General
All forms and the Grading and Base Manual are available on the Grading and Base Website. Correct and re-test all failing areas.
Before milling, remove vegetation and topsoil adjacent to the surface.

Repair structures damaged by Contractor: operations, neglect or negligence.

Provide water in order to obtain optimum moisture content.

Place CCRP when:

1. The atmospheric temperature is 50°F and rising, when using an engineered emulsion; or when the atmospheric temperature is 60°F and rising, when using a non-engineered emulsion or foaming asphalt.
2. It is not foggy or rainy.
3. Freezing temperatures are not predicted within 48 hours after placement of any CCPR.

Atmospheric temperature and predicted weather requirements are determined by the Engineer.

B. Equipment

Use equipment with the ability to: mill, crush, screen, size and mix the RAP along with the required recycling agents to produce a uniform homogeneous product.

For foamed asphalt,

1. Accurately foam bituminous material and uniformly add specified water.
2. Provide samples of the foamed bituminous material through a sampling nozzle.

B.1 Milling

Use a self-propelled milling machine with the following characteristics:

- Must have a minimum 6 foot ski or multi point measuring device for milling control.
- Equipped with automatic depth and cross-slope controls
- Ability to maintain a constant cutting depth within ±1/4 inch of Plan depth in one pass.

B.2 Crushing/Sizing Unit

Use a crushing/sizing unit with the following characteristics:

- Ability to crush and size all RAP to the gradation requirement of S-__2.B.
- Equipped with a “closed loop” system that returns oversized materials to the crusher

B.3 Mixing Unit

Use a mixing unit with the ability to thoroughly mix the RAP while injecting the Bituminous Material for Mixture and automatically metering it to within 0.1 percent.

B.4 Paver

Provide a paver equipped with a 20 foot ski meeting the requirements of 2360.3.B.2.a, “Paver”.

B.5 Bituminous Material for Mixture Supply Tankers

If foaming is required, equip the tankers with a visible thermometer that measures the temperature of the liquid Bituminous Material for Mixture in the bottom third of the supply tank.

B.6 Rollers

B.6.a Steel Wheeled Rollers
B.6.b Pneumatic Tired Roller
Compact with a pneumatic tired roller with a minimum weight of 25 tons meeting the requirements of 2360.3.B.2.e(2).

B.6.C Pad Foot Vibratory Tired Roller
If compacting a lift greater than four inches, use a pad foot vibratory tired roller with a minimum weight of 25 tons.

B.7 Motor Grader
If compacting a lift greater than four inches, use a self-propelled motor grader with a minimum 12 foot blade.

C Milling
Mill the existing pavement to Plan depth and width and to the gradation requirement of S-___.2.B.

Process paving fabric encountered during milling operations to meet the following:

- At least 90% must have an area less than 5 square inches and,
- None of the pieces may have a dimension greater than 4 inches in any direction.

D Bituminous Material for Mixture Parameters
Maintain bituminous material for foaming within ± 10°F of the optimum temperature recommended by the mix design. If the mix design does not provide a recommendation, maintain the foamed asphalt temperature between 305°F and 325°F.

After consultation with the Contractor, the Engineer may direct the Contractor to vary the application rate of Bituminous Material for Mixture compared to the mix design for pulverized bituminous which the Engineer believes are either too rich or too dry.

E Incorporating Mineral Stabilizing Agent

- Add mineral stabilizing agent content to within ± 1% of the design target on Form G&B-408.
- If mineral stabilizing agents are used, place material immediately after mixing.

F Mixing
Mix the crushed RAP, mineral stabilizing agent and Bituminous Material for Mixture into a homogenous mixture. Adjust the water application rate based on mixture consistency, coating and dispersion of the recycled materials.

G Placement
Do not heat the paver screed. Spread the CCPR material in one continuous pass to Plan slopes, width and grades in one lift. Ensure that the mix does not segregated. Place material in even lifts no greater than 4 inches in thickness.

H Compaction

General
1. If a pad foot roller is used, remove pad foot marks and spread the material.
2. Correct, at no additional cost to the Department, bumps and dips in the profile greater than 1 inch in 25 feet.
3. Do not allow rollers or other construction equipment to remain stationary on CCPR.
4. Do not permit traffic (including construction traffic) on the CCPR Bituminous layer for at least two hours after final rolling or emulsion breaks (if applicable), whatever is longer.
5. Use visual observations of check cracking and shoving to prevent over-rolling.
6. Compact using the criteria in S-3H.1 “Control Strip”

H.1 Control Strip
Use a control strip to establish a rolling pattern. The control strip should represent a homogenous roadway section and have the following characteristics:

- Minimum area of 400 square yards
- Remain in-place and become a part of the completed work.

Use the following to establish a rolling pattern after initial breakdown is complete:

1. Randomly select three test points in the control strip and use a nuclear density device (ASTM D2950, in back-scatter mode) to determine a wet density at each point after each finish (steel) roller pass.
2. Ensure that the nuclear gauge rests on a flat surface. The density at each point is defined as the average of two readings offset 180 degrees.
3. Continue compacting until additional roller coverage does not produce appreciable increase in density. Provide documentation of the growth curve and maximum target density to the Engineer. Use this for QA/QC process.
4. Roll the remainder of that course in accordance with the pattern developed in the control strip for that roller.
5. Discontinue and reevaluate the rolling operation (pattern and timing), if surface cracking or checking occurs.

Use this rolling pattern until a new control strip is performed.

Establish a new rolling pattern by performing a new control strip when there are changes in the CCPR mixture that cause the original control strip to no longer be representative; changes may include:

- If vehicle leave indents in the compacted surface.
- Changes in RAP gradation
- 98% of Target Density is not achieved on two consecutive QC readings.
- Changes in the application rate of Bituminous Material for Mixture, outside of the mix design tolerance.

I Contractor Quality Control Testing Tests and Rates (QC)
Perform testing per the Schedule of Materials Control for CIR with the following revisions:

- Perform gradation once per every 10,000 square yards.
- No vane feeder calibration required.
- Sample and test RAP stockpile for moisture once in the morning of each day’s production. If rain occurs at the RAP stockpile during a production day or the day before production, test for moisture twice during the day’s production.

Submit results to the Engineer electronically within 24 hours of the completion of the tests.
Correlate the nuclear gauge’s dry measurement density by direct moisture measurement (microwave oven or equivalent).

J Department Quality Assurance (QA)
Perform testing per the Schedule of Materials Control for CIR with the following revisions:

- No vane feeder calibration required

K. Profile, Curing and Surface Requirements
Maintain the CCPR layer in a smooth, compacted condition free of ruts, distortions, potholes, loose aggregate, and to the the profile and cross section to until the placement of the next layer.

Remove all loose aggregate on the CCPR surface immediately prior to placing the next layer.

Repair ruts, potholes, washboarding and other distortions.

L Fog Seal and Bituminous Requirements
Apply a CSS-1h bituminous fog seal per 2355, “Bituminous Fog Seal” at a rate of 0.10 to 0.16 gallons per square yard immediately prior to placing the next layer.

If required of the Contract, place the next layer of material (HMA, seal coat, etc.):

1. No sooner than three calendar days after the CCPR, at any location, has been placed and compacted,
2. When the CCPR surface does not deflect under construction equipment and meets quality compaction per 2105.3.F.2.
3. When the CCPR is capable of meeting the required strength to place and compact the next layer, and the moisture content of the CIR does not cause a failure to the next material placement.

M Hold Point
Any failing test or non-compliance with any part of this special provision creates a Hold Point, whereby no additional material may be placed until corrective action and passing retest(s) have occurred, or accepted by the Engineer. All additional material placed before corrective action and passing retest(s) occur constitutes Unauthorized Work per 1512.2.

2331.4 MEASUREMENT
Measure the CCPR layer by the square yard.

Measure the Bituminous Material for Mixture by the ton.

Measure the Bituminous Material for Fog Seal by the gallon.

Measure Cement by the ton.

2331.5 PAYMENT
The Department will pay for the correction of in-situ areas that are unstable through no fault of the Contractor’s operations, if directed by the Engineer, per 1402.5, “Extra Work”.

The contract unit price for the CCPR includes the cost of production, testing, placement, occasional variations in bituminous pavement thickness, compacting, removing vegetation and topsoil adjacent to the surface, water and required and necessary maintenance including cleaning the surface.

Payment for any required additional aggregate or other additives designated in the Contract is incidental to the price of the bituminous material for mixture.

Payment for the CCPR layer will be made on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.:</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2105.609</td>
<td>Cement</td>
<td>ton [tonne]</td>
</tr>
<tr>
<td>2331.604</td>
<td>Cold In-Place Recycle Bituminous Mixture</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2331.609</td>
<td>Bituminous Material for Mixture</td>
<td>ton [tonne]</td>
</tr>
<tr>
<td>2355.502</td>
<td>Bituminous Material for Fog Seal</td>
<td>gallon [liter]</td>
</tr>
</tbody>
</table>

S-142  
**(2331) MASTIC FOR VOID FILLING**

SP2016-128

S-142.1  
**DESCRIPTION**
This work consists of repairing recessed voids in asphalt concrete pavement with a specified sealant material without milling or routing.

S-142.2  
**MATERIALS**
Asphalt repair mastic shall be composed of quality-selected asphalt and/or resins, select aggregates with structural integrity, synthetic rubber polymers, anti-oxidants, naturally occurring and man-made reinforcing material, and other modifiers.

Asphalt repair mastic shall be either:  
- Crafco - Mastic One
- Deery – Level & Go Repair Mastic or
- Nuvo – Gap

S-142.3  
**CONSTRUCTION REQUIREMENTS**

(A) **Surface Preparation:** Dry and clean all surfaces free of all dirt, dust, grease, and loose material prior to application of the mastic. Clean all surfaces by the use of compressed air produced from an air-compressor with the capability of producing a minimum of 125 cfm (0.06 cubic meters per second) of clean, oil-free compressed air equipped with a maximum of a ¼ inch (20 mm) diameter nozzle. The use of “backpack” type blowers is not allowed.

If surface temperatures are below 40°F (4°C), use a compressed air heat lance to thoroughly dry and condition the surface area as per the manufacturer’s recommendations. Use a compressed air heat lance with a minimum temperature of 750°F (400°C) and a minimum velocity of 650 feet per second. Do not use direct flame dryers. Do not overheat pavement surfaces. Use an air-compressor with the capability of producing a minimum of 125 cfm (0.06 cubic meters per second) of clean, oil-free compressed air.

If recommended by the mastic manufacturer, use a surface conditioner or primer approved by the mastic manufacturer. Apply to the surfaces prior to placement of the asphalt repair mastic. Cover all surface areas where the asphalt repair mastic will be placed with the surface conditioner. Do not install the asphalt repair mastic until the surface conditioner or primer has cured to a “tacky” consistency.

(B) **Installation:** The Contractor must be trained and approved by the mastic manufacturer.
The asphalt repair mastic shall be heated in a thermostatically controlled mastic mixer that utilizes oil as a heat transfer medium. Equip the mastic mixer with a full sweep horizontal agitator capable of gently lifting the material from the bottom of the reservoir and turning the material over and over. The agitator shall be capable of mixing and suspending materials.

Dispense the heated asphalt repair mastic onto the properly prepared pavement recess, in layers if needed. Immediately following, use a heated hand squeegee to level and smooth the repair mastic with the surrounding pavement surface until the material has formed a durable, well-bonded repair. Keep the heated hand squeegee free of material buildup to ensure a smooth, quality finished product.

Apply the asphalt repair mastic to the applicable surface area from the bottom up in lifts appropriate to the specific application. Due to the depths of some of the repair locations, two lifts may be required to obtain a level surface. In the event that multiple lifts are required, fill the work area to within 0.5 inch (12 mm) to 1 inch (25 mm) of the desired reservoir depth on the first lift. The first lift shall be properly cooled before any subsequent lifts are applied. Remove all excess material from the roadway and properly dispose of it.

Keep accurate running totals of the pounds of mastic used and provide them to the Engineer daily.

(C) Documentation: Include the following documentation.

(1) Written verification from the manufacturer stating the Contractor has received the required training and certification to install the asphalt repair mastic.

(2) Written certification from the manufacturer for each shipment, which shall include a statement of the asphalt repair mastic material quantity and quality control data for each production run. A production run shall be described as the quantity of material produced during one cycle from startup to shutdown of the manufacturer’s equipment.

(3) Manufacturer’s certificate of compliance for surface conditioner or primer.

S-142.4 METHOD OF MEASUREMENT
Measure the asphalt repair mastic by the pound of mastic applied. The manufacturer’s weights of the mastic will be accepted as the basis for measurement.

S-142.5 BASIS OF PAYMENT
The contract unit price for asphalt repair mastic includes the cost for all labor, equipment, materials, surface conditioner, or primer, and incidentals required to place the repair mastic.

The Department will pay for asphalt repair mastic on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.:</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2331.608</td>
<td>Crack Repair Special</td>
<td>Pound [kg]</td>
</tr>
</tbody>
</table>

S-143 (2331) BITUMINOUS PAVEMENT CRACK TREATMENT

S-143.1 DESCRIPTION
This work consists of sealing random transverse and longitudinal cracks in the bituminous pavement in accordance with the Plans and the applicable MnDOT Standard Specifications.
Rout and Seal: Rout, clean and seal transverse cracks less than or equal to 0.75 inches wide.

Clean and Seal: Clean and seal (without routing) transverse cracks greater than 0.75 inches wide and longitudinal cracks following the same procedures used for routed cracks.

Hold a pre-construction meeting between the Contractors, sub-contractors, and the Engineer prior to the beginning of any work. Items to be discussed include the traffic control plan, Contractor’s documentation requirements, Contractor submittals and material selection. The Contractor schedules the pre-construction meeting.

S-143.2 MATERIALS

A Rout and Seal at Transverse Cracks
Provide certification that the sealant meets the requirements of MnDOT 3725 for transverse cracks sealed using Rout and Seal method.

B Clean and Seal at Transverse and Longitudinal Cracks
Provide certification that the sealant meets the requirements of MnDOT 3723 or MnDOT 3719 for Clean and Seal cracks as shown on the Plans.

C Sealant Requirements
Only those products that meet the requirements of MnDOT specifications and have performed satisfactorily based on Chemical Laboratory and field analysis can be used. A list of certified sources is on file at the Chemical Laboratory, MnDOT Maplewood’s Office of Materials and Road Research. To obtain the list, call (651) 366-5548 or visit the website at: http://www.dot.state.mn.us/products/index.html

Package and ship the crack sealant material in sealed containers. The containers of seal will be clearly marked with the name of the manufacturer, the trade name of the sealant, weight [mass], the manufacturer's batch and lot number, the application/pouring temperature, and the safe heating temperature.

Submit a copy of the manufacturer's recommendations pertaining to the heating and re-heating and application of the joint sealant material to the Engineer before the commencement of the work and follow the recommendations.

Do not exceed the safe heating temperature as recommended by the manufacturer in the field. Reject and disposal of any sealant heated above the safe heating temperature

Do not place sealant, if the temperature of the material is below the manufacturer's recommended minimum application/ pouring temperature.

Mixing of different manufacturer’s brands or different types of sealants is prohibited.

D Basis of Material Acceptance
Acceptance of the sealant material is based on the certification by the manufacturer that the sealant meets the requirements listed above. Field sampling are used to verify that the delivered sealant meets the requirements of the specification. The Contractor takes a sample from the application wand during the first 20 minutes of placing sealant from each melter on the Project. Furnish the Department with one sample for each lot of sealant used on the Project. The Engineer reserves the right to obtain a second sample of sealant from the Contractor for each lot of sealant.

Obtain the samples of sealant from the application wand in the presence of the Engineer. Each sample consists of two (2) Teflon or silicone lined boxes with the capacity to hold 5 pounds of sealant. The two (2) sampling boxes shall be labeled with SP number, date, time, location, manufacturer and lot number of the sealant. The Engineer reserves the right to conduct supplementary sampling and testing of the sealant material.
The Engineer may randomly pick the time and date of the second sampling per lot of sealant. The Engineer reserves the right to conduct additional sampling and testing of the sealant material at no cost to the Contractor.

Document the locations where the material from each lot number of sealant is placed

S-143.3 CONSTRUCTION REQUIREMENTS

A Weather Limitations

Place sealant materials only during a period of rising temperature after the air and surface temperature in the shade and away from artificial heat sources has reached 50˚F and indications are for a continued rise in temperature. During a period of falling temperatures, which may fall below 50˚ F, suspend placement of the sealant material until the above conditions are met.

Do not place sealant material, if weather conditions are raining or wet. Should the sealant be placed and rain should fall before the sealant has properly cured, remove and replace the wet/contaminated sealant.

Do not place sealants when the weather or roadbed conditions are unfavorable.

Complete all crack sealing work in the Northern ‘Spring Load Restriction’ (SLR) zone before September 16. The Northern SLR zone extends from the northern limits of MN 39 at the Wisconsin state line in Duluth, west along MN 210 to Staples, then US 10 west to the North Dakota state line at Moorhead.

Complete all other SLR zones before October 1.

B Equipment Requirements

Use melting kettles equipped with be double jacketed boiler type, and with both agitation and recirculation systems capable of melting and applying the sealant through a pressure-fed hose and wand. The melter must be capable of starting at ambient temperature and bringing the sealant material to application temperature within one hour, while continuously agitating and recirculating the sealant. The melters must be equipped with automatic thermostatic controls and temperature gages to monitor the sealant temperature in the applicator lines and temperature of heat transfer oil in the kettle jacket.

The Engineer checks the pouring temperature of the sealant at the point of discharge into the reservoir. If the sealant falls below the recommended application/pouring temperature, all production stops until the recommended application/pouring temperature is obtained. Should the sealant temperature at the point of discharge exceed the maximum safe heating temperature, empty the melting kettle of all sealant, and dispose of the sealant in an environmentally safe method. No payment will be made for this sealant material or the disposal thereof.

Pavement Cutter: Use a self-propelled pavement cutter capable of providing a cut of uniform depth and width. The pavement cutter shall be capable of cutting the countersunk design configuration into the pavement, expeditiously, with ease and in a single pass.

Use an air Compressor capable of producing a continuous stream of clean, dry air through the nozzle at 75 to 150 pounds per square inch and 125 cubic feet per minute (CFM) minimum. The air compressor must be equipped with water and oil traps and must produce sufficient air volume and pressure to remove all debris from the crack (routed or not) and all adjacent road surfaces in a safe manner such that the debris will not re-enter the crack prior to the sealing operation. Check the traps used to remove moisture and oil at least once per day of production and replace when necessary.

The use of backpack blowers (leaf blowers) is not allowed.
The use of vacuum cleaning equipment will be allowed after demonstrating to the Engineer that the vacuum equipment can successfully clean the cracks.

Provide a heat lance operated with propane and compressed air in combination and be capable of achieving a temperature of heated air at the exit orifice of 1,800˚ F and a discharge velocity of 3,000 feet per second.

C Submittals

Melting kettle production data sheets shall be submitted daily for each kettle on the Project with the following information.

1. SP number, control section and route number.
2. Date, ambient air temperature (° F) at the beginning of the shift, mid-day and end of shift.
3. Sealant material temperature at the wand once an hour during working production.
4. Beginning and ending locations on Project for the day, including lane and direction.
5. The amount of materials used for the day in pounds, including lot numbers.
6. Sample(s) taken with Project location recorded.
7. Unique or atypical situations on the Project that may affect the placement or performance of the sealed crack.
8. The Contractor’s authorized signature.
10. Material test samples.

D Transverse Crack Preparation

Random transverse cracks measuring less than or equal to 0.75 inch wide shall be ‘Rout and Sealed’ to a width and depth of 0.75 inch. Cracks greater than 0.75 inch wide shall follow the ‘Clean and Seal’ method (without routing) of crack repair.

The pavement cutter must cut the design reservoir in one easy pass. Change cutters when it is evident that the reservoir configuration specified is not being achieved in an easy and expeditious manner in conformance with design. Demonstrate the cutters capability of following meandering cracks and maintaining centering of the reservoir over the crack ±0.25 inches. The resulting reservoirs must have vertical sidewalls and a uniform, horizontal profile. Cease production if requirements cannot be met.

E Longitudinal Crack Preparation

For random longitudinal cracks use the ‘Clean and Seal’ method (without routing) following the same procedures used for the transverse ‘Rout and Seal’ cracks.

F Reservoir, Crack Cleaning and Conditioning Operation

Rout and Seal: Thoroughly clean routed reservoirs with a minimum of one pass of the air wand not more than 2 inches [50 mm] from each face of the reservoir / crack. Cleaning continues until the reservoir / crack is dry and all dirt, dust or deleterious matter is removed. If the air compressor produces dirt or other residue, the Contractor will be required to re – clean the reservoir / crack.

Clean and Seal: Clean and Seal cracks with a minimum of one pass of the air wand not more than 2 inches from each face of the reservoir/crack. Clean until the reservoir / crack is dry and all dirt, dust or deleterious matter is removed. If the air compressor produces dirt or other residue, the Contractor will be required to re – clean the reservoir / crack.

Rout and Seal & Clean and Seal: Immediately prior to the placement of the crack sealant, condition the surface of both the sidewalls, as well as the pavement 1 inch on either side of their sidewalls with hot compressed air from a heat lance. This treatment continues until the affected areas are conditioned. Do not scorch the routed reservoir, crack or adjacent pavement surface. The Engineer reserves the right to randomly spot check the
reservoirs/ cracks to verify that they are clean and dry. Anytime the Engineer determines that this requirement is not being met, the Contractor stops production and modifies their operation to meet these requirements.

Rout and Seal & Clean and Seal: The Contractor is required to provide protective vehicles for damage and interference with traffic in adjacent lanes.

G Crack Sealing Operation
Place the crack sealant immediately after the completion of the cleaning and conditioning with the heat lance.

Seal Cracks when the sealant material is at the application/pouring temperature recommended by the manufacturer. Fill the transverse reservoirs by the use of the double fill method. (Note, the Contractor may need to use additional passing filling the reservoir / crack to meet the level fill requirement). Fill the final level of the reservoir flush with the pavement surface, no more than 1/8 inch thick, spread uniformly over the entire length of the crack. The width of the overband, including the routed reservoir, shall be 2.5 inches wide with a film thickness of the overband limited to 1/8 inch deep. The Contractor may be required to use a squeegee to force the sealant material into narrow cracks, if the sealant material is not flowing into the crack properly.

Repair longitudinal cracks using the Clean and Seal method using an application wand followed by a “V” shaped squeegee or by a round application head having a concave underside or other methods that meets the requirements for size and shape. Three inches is maximum allowable width of the application for standard coverage. The maximum film thickness of the overband is limited to 1/8 inch deep.

The final appearance must be a neat fine line and with the cracks are not overfilled. Return the applicator wand to the machine and the joint sealant material re – circulated immediately upon completion of each crack sealing.

Apply toilet paper or a light coating of sand, dust or an approved de – tacking agent for use with the specified sealant to the surface of the newly placed sealant if traffic results in tracking of the crack sealing material. Repair any damage by traffic to treated pavement areas. If the existing pavement markings are obliterated as a result of the crack treatment work, place temporary pavement markings before the roadway is opened to traffic.

Clean and remove all debris by the end of the workday. Operate at all times in a manner not deleterious to the public at large, or the Engineering and Labor Forces involved on the Project Site.

H Acceptance Sampling
Record the required information on the melting kettle production data sheets as required during the actual working operations. Present at the end of each day’s production, the completed sheets to the Engineer.

During crack sealing operations, the Engineer will review the sealant temperatures at the melting kettle intermittently during the working operations. If the temperatures are above the manufacturer’s specified safe heating temperature, the sealant will be rejected and disposed of in an environmentally safe method.

Observe each crack for acceptable workmanship both transverse cracks, whether sealed by the ‘Rout and Seal’ or ‘Clean and Seal’, and longitudinal cracks filled by ‘Clean and Seal’. Unsealed cracks will be brought to the attention of the Contractor. The Contractor will fill all unsealed cracks prior to re – opening the roadway to traffic.

I Workmanship
The Engineer will reject sealed cracks, if there is evidence of poor workmanship or obvious defects, such as, but not limited to the following:

• Routed reservoir not filled completely, flush with pavement surface.
• Lack of bond to the sidewalls of the joint reservoir or crack.
• Excessive debris or moisture in the joint reservoir or crack.
• Contamination of the sealant.
• Excessive pools of sealant on the pavement or shoulder surface.
• Excessively wide, thick sealant overband.

Repair rejected sealed cracks and remove and dispose of sealant in a legal and appropriate manner and the cracks resealed as necessary.

J Final Clean-Up
Remove any additional debris left on the roadway after the sealant has been placed and cured and before opening the road to traffic. The method used to complete this work must not damage the newly placed sealant; repair any damage to the sealant.

S-143.4 METHOD OF MEASUREMENT
The Engineer will measure sealed cracks by the Road Station of the Project. A road station is defined as a 100 foot segment measured along the centerline of the roadway and includes all lanes of traffic in both directions. Random cracking within the road station to be repaired includes cracks in the traffic lanes, acceleration lanes, deceleration lanes, widened medians, median cross-over lanes, turning lanes, paved shoulders, ramps and all auxiliary lanes, unless shown otherwise on the Plans.

For a divided highway, the road station in each direction will be measured separately.

S-143.5 BASIS OF PAYMENT
Payment will be made in accordance with the schedule set forth below at the Contract bid price per Road Station and includes the cost of furnishing all labor, traffic control, equipment and materials necessary to complete the work as specified.

If a field samples fails to meet any of the six (6) physical properties contained in MnDOT specifications, the work completed with the material from that lot the field sample represents, are subject to a reduction in the Contract unit price for sealant material to 20 percent for each failing property.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2331.619</td>
<td>Rout and Seal Bituminous Pavement Cracks</td>
<td>Road Station</td>
</tr>
</tbody>
</table>

S-144 (2331) BITUMINOUS PAVEMENT CRACK TREATMENT CLEAN AND SEAL

SP2016-130

This work consists of sealing random transverse and longitudinal cracks in the bituminous pavement in accordance with the Plans and the applicable MnDOT Standard Specifications.

Clean and Seal: Transverse cracks and longitudinal cracks shall be cleaned and sealed (without routing).

A pre-construction meeting shall be held between the Contractor, sub-contractors, and the Engineer prior to the beginning of any work. Items to be discussed include the traffic control plan, Contractor’s documentation requirements, Contractor submittals and material selection. The Contractor shall schedule the pre-construction meeting.

S-144.1 MATERIALS

(A) Clean and Seal at Transverse and Longitudinal Cracks
The Contractor shall provide certification that the sealant meets the requirements of MnDOT 3723 for Clean and Seal cracks. A list of certified sources is on file at the Chemical Laboratory, MnDOT Maplewood’s Office of Materials and Road Research. To obtain the list, call (651) 366-5548 or visit the website at: http://www.dot.state.mn.us/products/index.html

S-144.2 CONSTRUCTION REQUIREMENTS

(A) Basis of Material Acceptance

The crack sealant material shall be packaged and shipped in sealed containers. Each container shall be clearly marked with the name of the manufacturer, the trade name of the sealant, weight [mass], the manufacturer's batch and lot number, the application/pouring temperature, and the safe heating temperature. The Contractor shall furnish two (2) sample boxes for each lot of sealant used on the Project for field sampling. Each sample box shall have a capacity to hold 5 pounds [2.3 kg] of sealant. The boxes shall be Teflon or silicone-lined. Failure to supply sample boxes shall subject the Contractor to a $100.00 deduction from Contract price for each occurrence.

A copy of the manufacturer's recommendations pertaining to the heating and re-heating and application of the joint sealant material shall be submitted to the Engineer before the commencement of the work. The Contractor shall follow these recommendations.

The temperature of the sealer in the field application equipment shall not exceed the safe heating temperature recommended by the manufacturer. Temperatures above the safe heating temperature will result in rejection of the sealant material and will require disposal of the sealant material.

The Contractor shall not place sealant if the temperature of the material is below the manufacturer's recommended minimum application/pouring temperature.

Mixing of different manufacturer’s brands or different types of sealants is prohibited.

Acceptance of the sealant material is based on the certification by the manufacturer that the sealant meets the requirements listed above. Field sampling shall be used to verify that the delivered sealant meets the requirements of the specification. Prior to the sealing operation to begin, the Contractor shall take a sample from the application wand during the first 20 minutes of placing sealant from each melter on the Project. The Contractor shall furnish the Department one (1) sample for each lot of sealant used on the Project. The Engineer reserves the right to obtain a second sample of sealant from the Contractor for each lot of sealant.

The Contractor shall obtain samples of sealant from the application wand in the presence of the Engineer. Each sample shall consist of two (2) Teflon or silicone lined boxes with the capacity to hold 2.3 kg [5 pounds] of sealant. The two (2) sampling boxes shall be labeled with SP number, date, temperature, time, location, manufacturer, and lot number of the sealant. Each box shall be numbered one of two, or two of two. The Engineer reserves the right to conduct supplementary sampling and testing of the sealant material.

The Engineer will randomly pick the time and date of the second sampling per lot of sealant. The Engineer reserves the right to conduct additional sampling and testing of the sealant material at no cost to the Contractor, unless testing reveals the sealant material not meeting MnDOT specifications.

The Contractor shall document the locations where the material from each lot number of sealant is placed.
If a field sample fails to meet any of the six (6) physical properties contained in MnDOT specifications, the work completed with the material from that lot the field sample represents, will be subject to a reduction in the Contract unit price for sealant material to 20 percent for each failing property.

**(B) Weather Limitations**

Sealant materials shall only be placed during a period of rising temperature after the air and surface temperature in the shade and away from artificial heat sources has reached 50˚F [10˚ C] and indications are for a continued rise in temperature. During a period of falling temperatures, which may fall below 50˚F [10˚ C], placement of the sealant material shall be suspended until the above conditions are met.

Do not place sealant material if weather conditions are raining or wet. Should the sealant be placed and rain should fall before the sealant has properly cured, the Contractor shall remove and replace the wet/contaminated sealant.

Sealants shall not be placed when the weather or roadbed conditions are unfavorable.

Crack sealing work should be completed in the Northern ‘Spring Load Restriction’ (SLR) zone before September 16. The Northern SLR zone extends from the northern limits of MN 39 at the Wisconsin state line in Duluth, west along MN 210 to Staples, then US 10 west to the North Dakota state line at Moorhead.

All other SLR zones should be completed before October 1 of the current construction season.

**(C) Equipment Requirements**

**Melting Kettle:** shall be double jacketed boiler type, equipped with both agitation and recirculation systems capable of melting and applying the sealant through a pressure-fed hose and wand. The melter shall be capable of starting at ambient temperature and bringing the sealant material to application temperature within one hour, while continuously agitating and recirculating the sealant. The melter shall be equipped with automatic thermostatic controls and temperature gages to monitor the sealant temperature in the applicator lines and temperature of heat transfer oil in the kettle jacket.

The Contractor shall furnish, for use by the Engineer, an infrared temperature-measuring gun accurate to 1˚F at 400˚F [1˚C at 204˚ C]. **Failure of the Contractor to furnish infrared temperature-measure gun will result in a $500.00 deduction from the Contract total.** The Engineer may check the pouring temperature of the sealant at the point of discharge into the reservoir. If the sealant falls below the recommended application/pouring temperature, all production shall stop at that melting kettle until the recommended application/pouring temperature is obtained. Should the sealant temperature at the point of discharge exceed the maximum safe heating temperature, the melting kettle shall be emptied of all sealant, and the sealant shall be legally disposed of in an environmentally safe method. No payment will be made for this sealant material or the disposal thereof.

**Air Compressor:** shall be capable of producing a continuous stream of clean, dry air through the nozzle at 75 to 150 pounds per square inch [517 to 1034 kPa] and 125 cubic feet per minute (CFM) [3.5 m³/minute] minimum. The compressed air unit shall be equipped with water and oil traps and must produce sufficient air volume and pressure to remove all debris from the crack (routed or not) and all adjacent road surfaces in a safe manner such that the debris will not re-enter the crack prior to the sealing operation. The traps used to remove moisture and oil shall be checked by the Contractor at least once per day of production and replaced when necessary.

- The use of backpack blowers (leaf blowers) is not allowed.
• The use of vacuum cleaning equipment will be allowed after demonstrating to the Engineer that the vacuum equipment can successfully clean the cracks.

(D) **Submittals**

Melting kettle production data sheets shall be submitted daily for each kettle on the Project with the following information.

1. SP number, control section and route number.
2. Date, ambient air temperature (°F [°C]) at the beginning of the shift, mid-day and end of shift.
3. Kettle temperature once an hour during working production.
4. Sealant material temperature at the wand once an hour during working production.
5. Beginning and ending locations on Project for the day, including lane and direction.
6. The amount of materials used for the day in pounds [kilograms], including lot numbers.
7. Sample(s) taken with Project location recorded.
8. Unique or atypical situations on the Project that may affect the placement or performance of the sealed crack.
9. The Contractor’s authorized signature.

Material certification.
Material test samples.

(E) **Crack Cleaning and Conditioning Operation**

Clean and Seal cracks shall be thoroughly cleaned with a minimum of one pass of the air wand not more than 2 inches [50 mm] from each face of the crack. Cleaning shall continue until the crack is dry and all dirt, dust or deleterious matter is removed. If the air compressor produces dirt or other residue, the Contractor will be required to re-clean the reservoir / crack.

The Engineer reserves the right to randomly spot-check the cracks to verify that they are clean and dry. Anytime the Engineer determines that this requirement is not being met, the Contractor shall modify their operation to meet these requirements.

The Contractor shall be required to provide protective screening if cleaning and conditioning operations could cause damage to or interference with traffic in adjacent lanes.

(F) **Crack Sealing Operation**

The crack sealant shall be placed immediately after the completion of the cleaning.

All cracks using the Clean and Seal method shall be applied using an application wand followed by a “V” shaped squeegee or by a round application head having a concave underside or other methods that meets the requirements for size and shape. The maximum width of the application head shall be 2 inches [50.8 mm] for standard coverage. The maximum width of the application head shall be 4 inches [101.6 mm] for multi-crack locations. The maximum film thickness of the overband is limited to 0.125 inches [3 mm] deep.

Care shall be taken in the sealing of the cracks so that the cracks are not overfilled and the final appearance shall present a neat fine line. The applicator wand shall be returned to the machine and the joint sealant material re-circulated immediately upon completion of each crack sealing.
Sealants shall not be removed from their packaging until immediately before it is placed in the melter. The Contractor shall feed additional sealant into the melter at a rate equal to or less than the rate of placement of the sealant in the reservoirs / cracks.

The Contractor may apply toilet paper or a light coating of sand, dust or an approved de-tacking agent for use with the specified sealant to the surface of the newly placed sealant if traffic results in tracking of the crack sealing material. The Contractor shall repair any damage by traffic to treated pavement areas. If the existing pavement markings are obliterated as a result of the crack treatment work, temporary pavement markings shall be placed before the roadway is opened to traffic.

At the end of the workday the Contractor shall clean and remove all debris generated in the area of work operations. The Contractor’s operations shall, at all times, be conducted in a manner not deleterious to the public at large, or the Engineering and Labor Forces involved on the Project Site.

(G) Acceptance Sampling

During crack sealing operations, the Engineer may review the sealant temperatures at the melting kettle intermittently during the working operations. If the temperatures are above the manufacturer’s specified safe heating temperature, the sealant will be rejected. The Contractor shall empty the kettle of the over-heated material and legally dispose of it in an environmentally safe method.

The cracks, sealed by the ‘Clean and Seal’, will be observed on a crack-by-crack basis for acceptable workmanship. Unsealed cracks will be brought to the attention of the Contractor. The Contractor shall fill all unsealed cracks prior to re-opening the roadway to traffic.

(H) Workmanship

Sealed cracks will be rejected if there is evidence of poor workmanship or obvious defects, such as, but not limited to the following:

- Lack of bond to the sidewalls of the crack.
- Excessive debris or moisture in the crack.
- Contamination of the sealant.
- Excessive pools of sealant on the pavement or shoulder surface.
- Excessively wide, thick sealant overband.

Rejected sealed cracks shall be repaired, the sealant removed and disposed of in a legal manner and the cracks resealed as necessary.

(I) Final Clean Up

After the sealant has been placed and cured and before opening the road to traffic, any additional debris left on the roadway surface shall be removed. Any method used to complete this work shall not damage the newly placed sealant; the Contractor shall repair any damage to the sealant.

S-144.3 MEASUREMENT

The Engineer will measure sealed cracks by the Road Station of the Project. A road station is defined as a 100 foot [30.5 m] segment measured along the centerline of the roadway and includes all pavement of traffic in both directions. Random cracking within the road station to be repaired includes cracks in the traffic lanes, acceleration lanes, deceleration lanes, widened medians, median cross-over lanes, turning lanes, paved shoulders, ramps and all auxiliary lanes, unless shown otherwise on the Plans.

For a divided highway, the road station in each direction will be measured separately.
S-144.4 PAYMENT

Payment will be made in accordance with the schedule set forth below at the Contract bid price per Road Station, which shall include the cost of furnishing all labor, traffic control, equipment, and materials necessary to complete the work as specified.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2331.619</td>
<td>Seal Bituminous Pavement Cracks</td>
<td>Road Station</td>
</tr>
</tbody>
</table>

S-145 (2353) ULTRATHIN BONDED WEARING COURSE (UTBWC) (MSCR)

*Only use this when the District requests it. Always use SP2016-253.1 (BITUMINOUS MATERIAL (MSCR)) with this write-up.*

NEW WRITEUP 01/15/16 ▲DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-130.1

MnDOT 2353 is modified with the following:

S-145.1 Replace PG 64-34 with PG 58V-34 in MnDOT 2353.2.A.2.

S-145.2 Asphalt binder meeting AASHTO M332 (MSCR) is required. See Section S-__ (BITUMINOUS MATERIAL (MSCR)) of these Special Provisions.

S-146 (2356) BITUMINOUS SEAL COAT

*Use only on bituminous seal coat projects. Do not use when using either SP2016-132 (BITUMINOUS UNDERSEAL) or SP2016-133 (OTTA SEAL).*

REVISED 04/08/16 ▲DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-131

MnDOT 2356 is hereby modified as follows:

S-146.1 Replace MnDOT 2356.3.D with the following:

**D Application of Bituminous Material**

**D.1 Pre-Treat Longitudinal Pavement Markings**

Apply bituminous material one (1) foot wide over all longitudinal pavement markings. Cover center line skip stripe with continuous coverage. Apply in a rate range of 0.10 to 0.15 gallons per square yard. Apply bituminous material for seal coat immediately after pre-treating pavement markings.

**D.2 Application of Bituminous Material For Seal Coat**

Begin the rate of application for the bituminous material as determined by the mix design. Construct a test strip 200 ft [60 m] long to ensure the bituminous material application rate is adequate given the field conditions. After applying the bituminous material to this test strip, place the seal coat aggregate at the design application rate. Inspect the aggregate in the wheel paths for proper embedment. Make adjustments to the rate of application, if necessary. Construct one full lane width at a time. Make additional adjustments to the rate of application, if necessary.

Apply the bituminous material in accordance with Table 2356 2:
Table 2356-2
Recommended Application Temperatures

<table>
<thead>
<tr>
<th>Bituminous Material</th>
<th>Minimum Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRS-2P</td>
<td>140 F*</td>
</tr>
<tr>
<td>CSS-1h</td>
<td>100 F</td>
</tr>
</tbody>
</table>

* Intended for uniform lay down of emulsion

S-146.2 Replace MnDOT 2356.3.J Application of Bituminous Material for Fog Sealing with the following:

J Application of Bituminous Material for Fog Sealing
Apply fog seal to seal coated areas, after sweeping and before placement of permanent pavement markings.

Apply the fog seal in accordance with 2355, “Bituminous Fog Seal,” and as modified as follows:

1. Construct a 200 ft [60 m] test strip,
2. Review the application of diluted bituminous material and adjust the application rate as necessary to yield a uniform and full coverage of the underlying seal coat,
3. Apply from 0.07 gal to 0.18 gal per sq. yd [0.3 L to 0.8 L per sq. m] diluted,
4. Apply the fog seal to minimize the amount of overspray,
5. Do not allow traffic on the fog seal until it has cured and
6. Dilute the material at a ratio of 1:1 before application at place of manufacture.

S-146.3 Replace MnDOT 2356.4 METHOD OF MEASUREMENT with the following:

2356.4 METHOD OF MEASUREMENT
The Engineer will measure the bituminous material for fog seal per 2355.4. Conversion factors are located in the MnDOT Bituminous Manual.

The Engineer will measure the bituminous material for seal coat by volume at 60º F [15º C].

The Engineer will measure the seal coat by area of pavement surfaced.

S-147 SP2016-132 (2356) BITUMINOUS UNDERSEAL
Meet the requirements of MnDOT 2356 Bituminous Seal Coat, except as modified herein.

S-147.1 Replace MnDOT 2356.1 DESCRIPTION with the following:

2356.1 DESCRIPTION
A bituminous underseal is a seal coat used to enhance the bond between an overlay and the underlying pavement and to lessen the occurrence and severity of reflective cracking. It is the application of bituminous material, followed immediately by an application of a single layer of aggregates. Each reference to Seal Coat, unless revised below applies to Bituminous Underseal.

S-147.2 Meet the CONSTRUCTION requirements of MnDOT 2356.3 with the following revisions:

(A) Replace MnDOT 2356.3A Weather, Time and Date Limitations with the following:

A. Weather, Time and Date Limitations
If an underseal is applied after September 1, pave bituminous within 48 hours.

Construct bituminous underseal operations (including traffic restrictions on the freshly constructed bituminous underseal) according to the following:

1. The road surface may be damp, but there shall be no standing water.
2. No construction is allowed in foggy weather.

(B) Replace MnDOT 2356.3J Application of Bituminous Material for Fog Sealing with the following:

J. Application of Bituminous Material for Fog Sealing
A fog seal is not required, unless the underseal is not paved within seven days of the application of the underseal.

Apply fog seal to seal coated areas, after sweeping and before placement of permanent pavement markings.

Apply the fog seal in accordance with 2355, “Bituminous Fog Seal,” and as modified as follows:

1. Construct a 200 ft [60 m] test strip,
2. Review the application of diluted bituminous material and adjust the application rate as necessary to yield a uniform and full coverage of the underlying seal coat,
3. Apply from 0.07 gal to 0.18 gal per sq. yd [0.3 L to 0.8 L per sq. m] diluted,
4. Apply the fog seal to minimize the amount of overspray,
5. Do not allow traffic on the fog seal until it has cured and
6. Dilute the material at a ratio of 1:1 before application at place of manufacture.

S-147.3 Replace the METHOD OF MEASUREMENT requirements of MnDOT 2356.4 with the following:

2356.4 METHOD OF MEASUREMENT
The Engineer will measure the bituminous material for seal coat by volume at 60º F [15º C].

The Engineer will measure the seal coat by area of pavement surfaced.

S-147.4 Replace the BASIS OF PAYMENT requirements of MnDOT 2356.5 with the following:

2356.5 BASIS OF PAYMENT
Payment for bituminous material for fog seal is incidental.

The contract gallon [liter] price for accepted quantities of Bituminous Material for Seal Coat, including necessary additives, includes the costs of providing and applying the material as required by the contract.

The contract square yard [square meter] unit price for Bituminous Seal Coat includes the cost of providing and applying the material as required by the contract. The contract square yard [square meter] price for Bituminous Seal Coat includes the cost of all applied aggregate.

A. Monetary Price Adjustments
The Engineer may allow the Contractor to accept a monetary price adjustment instead of removing and replacing failing materials in accordance with the following:
(1) The Department will reduce the Contract price by 10% for each failing quality test per Table 3127-2.

(2) The Department will reduce the contract unit price for bituminous seal coat by 0.5 percent for each 1 percent passing outside of the requirements for any sieve as specified in 3127, “Fine Aggregate for Bituminous Seal Coat”, except for the #200 sieve, as determined by QA testing.

(3) The Department will reduce the contract unit price for bituminous seal coat by 2 percent for each 0.1 percent passing outside of the requirements for the #200 sieve as specified in 3127, “Fine Aggregate for Bituminous Seal Coat”, as determined by QA testing.

(4) The maximum monetary price adjustment is 50%. Material placed that has a cumulative monetary price adjustment greater than 50% is subject to remove and replace per 1512.1 Unacceptable Work.

The monetary price adjustment for 2356.5.A.2 and 2356.5.A.3 are based upon the contract bid price for bituminous seal coat, however if the contract bid price is less than 75% of the Department’s average bid price for Bituminous Seal Coat, the Engineer may use the average bid price to assess the monetary price adjustment.

The Department will add the monetary price adjustments for all failing test results together.

The Department will pay for Bituminous Underseal on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
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<tbody>
<tr>
<td>2356.505</td>
<td>Bituminous Material for Seal Coat</td>
<td>gallon [liter]</td>
</tr>
<tr>
<td>2356.506</td>
<td>Bituminous Seal Coat</td>
<td>Square yard [Square meter]</td>
</tr>
</tbody>
</table>

S-148  (2356) OTTA SEAL

SP2016-133

2356.1 DESCRIPTION

Otta Seal is the application of bituminous material, followed by an application of aggregate. The process is repeated for a second application unless a Seal Coat (2356) is being applied as the second application.

2356.2 MATERIALS

A Bituminous Material for Mixture
Provide HFMS-2S meeting the properties of ASTM D977.

B Aggregate
Provide aggregate composed of crushed stone, gravel and/or RAP meeting the requirements of class 5, and Tables 3138-1 and 3138-3 if no RAP is used or Table 3138-4 if RAP is used.

C Water
Use potable water as compatible with the otta seal and meeting AASHTO T 26.

2356.3 CONSTRUCTION REQUIREMENTS

A Weather Limitations
Construct the otta according the following requirements:
1. from May 1 to October 1,
2. during daylight hours,
3. when the pavement and air temperature are is 35°F and rising and
4. when wind does not cause uneven spraying of the bituminous material for mixture.

B Equipment

1. Distributor
   Use a distributor specified in 2360.3.B.2.d.

2. Aggregate Spreader
   Use a self-propelled mechanical type aggregate spreader that is capable of distributing the aggregate uniformly to the required width and at the designated rate. The aggregate spreader shall be a self-spreader type mounted on pneumatic-tired wheels.

3. Pneumatic-Tired Rollers
   Provide a minimum of two pneumatic-tired rollers as specified in 2360.3.B.2.e(2).

4. Broom
   If applying to an existing surfaced road, provide a motorized broom with a positive means of controlling vertical pressure and capable of cleaning the road surface prior to spraying bituminous material and removing loose particles after treatment as required.

C Base Requirements

1. Leveling, compaction, and moisture
   Compact the top of the existing aggregate surface before placing otta seal. Construct to a minimum 3% crown. Eliminate loose coarse aggregate, potholes, and washboards. Keep the moisture content at 3 – 7% moisture.

2. Evenness
   Construct the aggregate layer to ±0.05 ft [15 mm] of the profile and cross-section as required by the contract in accordance with 2112, “Subgrade Preparation.”

   Remove any loose aggregate and dirt from the road surface before placement of second application. Apply only to a dry surface.

D Application of an Otta Seal

Apply bituminous material at the rate designated in the Plan. Construct a short test section 100 feet long to ensure application rate is correct. After applying the bituminous material, place the cover aggregate at the Plan application rate to the test strip. The aggregate in the wheel paths of the chip spreader should be inspected to determine that the emulsion is just blotting through the aggregate. Adjustments to the application rate will be made if necessary. Apply one full lane width at a time (including shoulder). Additional adjustments may be necessary during the construction project.

Maintain and apply the emulsion at the required temperatures per Table 2356-1.
E. Application of Cover Aggregate

Prior to construction, calibrate the aggregate spreader in accordance with ASTM D5624. The deviation from the Plan aggregate application rate will not be more than ±1 pound per square yard in the transverse or longitudinal direction.

Apply specified aggregate at the rate in the Plan, after the emulsified asphalt has been applied and skims over i.e. breaks. The Engineer may make aggregate application rate adjustments during construction. Spread aggregate onto the first half of the road so that 2 to 4 inches of binder is not covered by aggregate along the longitudinal centerline joint. When the binder is spread on the second half of the road, cover the strip in the middle of the road that has not been covered by aggregate. Overlap the second layer longitudinal joint by 8 to 12 inches.

F. Rolling Operations

Roll the first layer at least three times and the second layer at least four times. You cannot over roll the treatment. Roll in a longitudinal direction at a 5 miles per hour or slower. The Engineer may require more passes to ensure the rolling is being done quickly enough for proper kneading of the aggregate and emulsion.

G. Sweeping

If applying over a previously treated surface, sweep off excess aggregate on the same day as construction.

H. Second Application

Apply second application of emulsions and aggregate 10 days to three weeks after the initial application.

I. Quality Control

Comply with the requirements of the Schedule of Materials Control

J. Quality Assurance

Comply with the requirements of the Schedule of Materials Control.

K Hold Point

Any failing test creates a Hold Point, whereby no additional material may be placed until corrective action and passing retest(s) have occurred, or accepted by the Engineer. All additional material placed before corrective action and passing retest(s) occur constitutes Unauthorized Work per 1512.2.

2356.4 METHOD OF MEASUREMENT

A Bituminous Material for Mixture

Bituminous material for mixture applied on the road will be measured by volume in gallons corrected to 60 °F.

B Otta Seal
Payment for otta seal as specified includes: stationing, purchase of specified aggregate, delivery of specified aggregate, all labor, equipment, and materials necessary for the placement of the otta seal treatment for full lane coverage, and other requirements as specified in the Plan.

2356.5 BASIS OF PAYMENT

Payment for the accepted quantities of bituminous materials (including any required additives) and otta seal at the Contract bid prices shall be compensation in full for all costs of constructing the otta seal as specified including cost of specified aggregate.

Payment of the accepted quantity of bituminous material (including required additives) for otta seal at the Contract price of measures will be compensation in full for all costs of furnishing and applying the material as specified.

Monetary Price Adjustments for Otta Seal Construction.

Monetary Price adjustments for failing aggregate quality assurance gradations requirements are as follows: 2 percent price reduction of the bid price for the otta seal pay item for each 1 percent passing outside of tolerance requirements for all sieves.

Payment for the accepted quantity of otta seal at the contract unit price of measure will be compensation in full for all cost of furnishing and applying the material as specified: including: equipment and labor for placement of the otta seal, delivery, purchase of aggregate, stationing, traffic control and other requirements as specified.

The Department will pay for Otta Seal on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2356.604</td>
<td>Bituminous Otta Seal..................................</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2331.609</td>
<td>Bituminous Material for Mixture....................</td>
<td>Ton [Tonne]</td>
</tr>
</tbody>
</table>

S-149 (2357) BITUMINOUS TACK COAT

Always use with SP2016-136 (PLANT MIXED ASPHALT PAVEMENT), SP2016-137 (PLANT MIXED ASPHALT PAVEMENT – POLYMER MODIFIED BINDER), SP2016-139 (PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID), SP2016-140 (POROUS ASPHALT PAVEMENT), and SP2016-142 (STONE MATRIX ASPHALT - SMA).

MnDOT 2357 is hereby modified as follows:

S-149.1 Delete MnDOT 2357.3H Acceptance of Tack Material and replace with:

H Acceptance of Tack Material

The Engineer will address failures related to 3151, “Bituminous Material,” or deficiencies related to workmanship or application, in accordance with 1512, “Unacceptable and Unauthorized Work.” The basis of measurement for tack failures or deficiencies is the full width of the lane by station. The Engineer may deduct up to 5% of the mixture Unit Price for failures related to 3151.
Use S-.2 when no pay item on the plan. (Tack incidental)

S-149.2  Delete MnDOT 2357.5 Basis of Payment and replace with:

2357.5  BASIS OF PAYMENT
All costs of furnishing and applying bituminous tack coat material will be incidental.

Use S-.3 when there is a pay item for tack.

S-149.3  Delete MnDOT 2357.5 Basis of Payment and replace with:

2357.5  BASIS OF PAYMENT
Payment for the accepted quantity of asphalt emulsion and cutback shall be at the Contract price per unit of measure for asphalt emulsion and neat cutback. The cost of providing and applying sand at pedestrian crossings will be incidental.

Payment for the tack coat will be made on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2357.502</td>
<td>Bituminous Material for Tack Coat</td>
<td>Gallon [Liter]</td>
</tr>
</tbody>
</table>

S-150  (2357) BITUMINOUS MATERIAL FOR SHOULDER TACK

This work shall consist of treating aggregate shoulders with bituminous material, in accordance with the provisions of MnDOT 2357 and the following:

S-150.1  Bituminous Material for Shoulder Tack shall consist of emulsified asphalt meeting MnDOT 3151 for CSS-1 or CSS-1h diluted 1:1. Dilution of the emulsion is allowed only by the supplier. No field dilution is allowed.

S-150.2  Water shall be applied to the ground surface immediately in advance of placing the asphalt emulsion. The rate and quantity of water to be applied shall be as directed by the Engineer. In general, the soil shall be moistened to a depth of at least 1 inch. Application of water shall be in accordance with MnDOT 2130. The asphalt emulsion shall be applied at a rate of 0.18 – 0.25 gallons per square yard. During placement, take every effort to obtain uniform distribution over the area specified. Distributor spray bars shall be used to the fullest extent possible and hand held nozzles are to be used only in inaccessible areas.

S-150.3  MEASUREMENT
Bituminous material used for tack coat will be measured by volume at 60°F [15°C].

S-150.4  PAYMENT
Payment for the accepted quantity of bituminous material used for shoulder tack at the Contract bid price per unit of measure will be compensation in full for all costs of furnishing and applying the material as specified. Furnishing and applying sand on newly tacked surfaces at pedestrian crossings shall be incidental. Payment for the shoulder tack will be made on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2357.606</td>
<td>Bituminous Material for Shoulder Tack</td>
<td>Gallon [liter]</td>
</tr>
</tbody>
</table>
S-151 (2358) BITUMINOUS PRIME COAT
Use on all jobs that have bituminous on them.
NEW WRITEUP 08/04/16 ◆DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.
SP2016-135.1
MnDOT 2358 is hereby modified as follows:
S-151.1 Delete MnDOT 2358.3C Application and replace with:
Apply the bituminous prime coat at a continuous uniform spread rate of 0.1 gal per sq. yd to 0.3 gal per sq. yd [0.45 L per cu. m to 1.35 L per cu. m].

S-152 (2360) PLANT MIXED ASPHALT PAVEMENT
Always use SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), and SP2016-143 (PAVEMENT SURFACE SMOOTHNESS) with this write-up.
REVISED 08/04/16 ◆DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.
SP2016-136
MnDOT 2360 is modified and/or supplemented with the following:
S-152.1 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

The Designer needs to fill in the numbers here. Examples of what is needed are:

| Type SP __ Wearing Course | SPWEB_40 |
| Type SP __ Non-Wearing Course | SPNWB_30 |

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-.2, S-.3, S-.4, S-.5 or S-.6.
S-152.2 Evaluate pavement smoothness requirements using equation HMA-A as specified in MnDOT 2399.3D.

OR

S-152.3 Evaluate pavement smoothness requirements using equation HMA-B as specified in MnDOT 2399.3D.

OR

S-152.4 Evaluate pavement smoothness requirements using equation HMA-C as specified in MnDOT 2399.3D.

OR

S-152.5 Evaluate pavement smoothness requirements using Percent Improvement as specified in MnDOT 2399.

OR
S-6 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-152.6 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.

Use S-.7 on ALL METRO projects.

S-152.7 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 either behind the paver or from the truck box at the plant site. Other sampling locations can be approved by the Engineer. The Contractor must decide and notify the Engineer where samples will be taken before production begins. The Contractor and Engineer must both agree to a change of sampling location once production has begun. 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-153 (2360) PLANT MIXED ASPHALT PAVEMENT – POLYMER MODIFIED BINDER

Always use SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), SP2016-143 (PAVEMENT SURFACE SMOOTHNESS), and SP2016-253 (BITUMINOUS MATERIAL-POLYMER MODIFIED BINDER) with this write-up.

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

S-153.1 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

The Designer needs to fill in the numbers here. Examples of what is needed are:

- Type SP ___ Wearing Course SPWEB_40_ (PMB)
- Type SP ___ Non-Wearing Course SPNWB_30_ (PMB)

(PMB) = Polymer Modified Binder

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-.2, S-.3, S-.4, S-.5 or S-.6.

S-153.2 Evaluate pavement smoothness requirements using equation HMA-A as specified in MnDOT 2399.3D.

OR
S-153.3 Evaluate pavement smoothness requirements using equation HMA-B as specified in MnDOT 2399.3D.

OR

S-153.4 Evaluate pavement smoothness requirements using equation HMA-C as specified in MnDOT 2399.3D.

OR

S-153.5 Evaluate pavement smoothness requirements using Percent Improvement as specified in MnDOT 2399.

OR

S-.6 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-153.6 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.

Use S-.7 on **ALL METRO** projects.

S-153.7 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 either behind the paver or from the truck box at the plant site.** Other sampling locations can be approved by the Engineer. **The Contractor must decide and notify the Engineer where samples will be taken before production begins.** The Contractor and Engineer must both agree to a change of sampling location once production has begun. **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-154 (2360) PLANT MIXED ASPHALT PAVEMENT (MSCR)
Only use this when the District requests it. Always use SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), SP2016-143 (PAVEMENT SURFACE SMOOTHNESS), and SP2016-253.1 (BITUMINOUS MATERIAL (MSCR)) with this write-up.

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

S-154.1 Delete MnDOT Table 2360-2 and replace with:

<table>
<thead>
<tr>
<th>Letter</th>
<th>PG Grade MSCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PG 52S – 34</td>
</tr>
<tr>
<td>B</td>
<td>PG 58S – 28</td>
</tr>
<tr>
<td>C</td>
<td>PG 58H – 34</td>
</tr>
<tr>
<td>E</td>
<td>PG 58H – 28</td>
</tr>
<tr>
<td>F</td>
<td>PG 58V – 34</td>
</tr>
<tr>
<td>H</td>
<td>PG 58V – 28</td>
</tr>
<tr>
<td>I</td>
<td>PG 58E – 34</td>
</tr>
<tr>
<td>L</td>
<td>PG 64S – 22</td>
</tr>
<tr>
<td>M</td>
<td>PG 49S – 34</td>
</tr>
</tbody>
</table>

S-154.2 Delete MnDOT 2360.2.E.7 and replace with:

E.7 Minimum Ratio of Added Asphalt Binder to Total Asphalt Binder
Control recycled materials used in mixture by evaluating the ratio of new added asphalt binder to total asphalt binder as show in Table 2360-8.

<table>
<thead>
<tr>
<th>Specified Asphalt Grade²</th>
<th>Recycled Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAS Only</td>
</tr>
<tr>
<td>PG 58X³-28, PG 52S-34, PG 64S-22, Wear</td>
<td>70</td>
</tr>
<tr>
<td>Worn</td>
<td>70</td>
</tr>
<tr>
<td>PG 58X³-34, Wear &amp; Non-Wear</td>
<td>80</td>
</tr>
</tbody>
</table>

³ X=S,H,V,E

¹ The ratio of added new asphalt binder to total asphalt binder is calculated as (added binder/total binder) x 100
² The Contractor can elect to use a blending chart to verify compliance with the specified binder grade. The Department may take production samples to ensure the asphalt binder material meets the requirements. The blending chart is on the Bituminous Office Website.
S-154.3 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

Type SP __ Wearing Course SPWEB_40_
Type SP __ Non-Wearing Course SPNWB_30_

S-154.4 Asphalt binder meeting AASHTO M332 (MSCR) is required. See Section S__ (BITUMINOUS MATERIAL (MSCR)) of these Special Provisions.

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-.5, S-.6, S-.7, S-.8 or S-.9.

S-154.5 Evaluate pavement smoothness requirements using equation HMA-A as specified in MnDOT 2399.3D.

OR

S-154.6 Evaluate pavement smoothness requirements using equation HMA-B as specified in MnDOT 2399.3D.

OR

S-154.7 Evaluate pavement smoothness requirements using equation HMA-C as specified in MnDOT 2399.3D.

OR

S-154.8 Evaluate pavement smoothness requirements using Percent Improvement as specified in MnDOT 2399.

OR

S-.9 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-154.9 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.

Use S-.10 on ALL METRO projects.
S-154.10 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 either behind the paver or from the truck box at the plant site. Other sampling locations can be approved by the Engineer. The Contractor must decide and notify the Engineer where samples will be taken before production begins. The Contractor and Engineer must both agree to a change of sampling location once production has begun. 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-155 (2360) PLANT MIXED ASPHALT PAVEMENT (LOCAL AGENCY)

☐ Use on local agency projects only where the local agency does not want to evaluate longitudinal joint cores.

Always use SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), and SP2016-143 (PAVEMENT SURFACE SMOOTHNESS) with this write-up.

REVISED 08/04/16 ▲ DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-138

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

S-155.1 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

The Designer needs to fill in the numbers here. Examples of what is needed are:

<table>
<thead>
<tr>
<th>Type</th>
<th>Wearing Course</th>
<th>Non-Wearing Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>SPWEB_40_</td>
<td>SPNWB_30_</td>
</tr>
</tbody>
</table>

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-.2, S-.3, S-.4, S-.5 or S-.6.

S-155.2 Evaluate pavement smoothness requirements using equation HMA-A as specified in MnDOT 2399.3D.

OR

S-155.3 Evaluate pavement smoothness requirements using equation HMA-B as specified in MnDOT 2399.3D.

OR

S-155.4 Evaluate pavement smoothness requirements using equation HMA-C as specified in MnDOT 2399.3D.

OR

S-155.5 Evaluate pavement smoothness requirements by Percent Improvement as specified in MnDOT 2399.

OR

S-.6 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-155.6 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.
Use S-.7 on ALL METRO projects.

Use S-.7 on ALL METRO projects.

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 either behind the paver or from the truck box at the plant site. Other sampling locations can be approved by the Engineer. The Contractor must notify the Engineer where samples will be taken before production begins. The Contractor and Engineer must agree to a change of sampling location once production has begun. 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.

The Designer needs to include all of S-.8 to S-.16 to remove Longitudinal Joint Cores from the standard 2360 (Plant Mixed Asphalt Pavement) specification.

S-155.8 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-155.9 MnDOT Table 2360-20 Longitudinal Joint Density Requirement is hereby deleted.

S-155.10 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 ± 0.5 inch [150 mm ± 12.5 mm] from the edge of the top of the mat (ex. center of 4 inch [100 mm] core barrel 8 ± 0.5 inches [200 mm ± 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-155.11 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-155.12 MnDOT 2360.3.D.1.n Longitudinal Joint Density is hereby deleted.

S-155.13 MnDOT 2360.3.D.1.p Shoulders is hereby deleted.

S-155.14 MnDOT Table 2360-24 Payment Schedule for Longitudinal Joint Density (SP Non-Wear and SP Shoulders, 4% Void) is hereby deleted.

S-155.15 MnDOT Table 2360-25 Payment Schedule for Longitudinal Joint Density (SP Non-wear and SP Shoulders, 3% Void) is hereby deleted.

S-155.16 MnDOT 2360.3.D.1.r Pay Factor Determination is hereby deleted.

S-156 (2360) PLANT MIXED ASPHALT PAVEMENT (LOCAL AGENCY) (MSCR)

☐ Use on local agency projects only where the local agency does not want to evaluate longitudinal joint cores.

Always use SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), and SP2016-253.1 (BITUMINOUS MATERIAL (MSCR)) with this write-up.

REVISED 08/04/16 .DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-138.1 MnDOT 2360 is modified and/or supplemented with the following:

S-156.1 Delete MnDOT Table 2360-2 and replace with:

<table>
<thead>
<tr>
<th>Letter</th>
<th>PG Asphalt Grades MSCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PG 52S – 34</td>
</tr>
<tr>
<td>B</td>
<td>PG 58S – 28</td>
</tr>
<tr>
<td>C</td>
<td>PG 58H – 34</td>
</tr>
<tr>
<td>E</td>
<td>PG 58H – 28</td>
</tr>
<tr>
<td>F</td>
<td>PG 58V – 34</td>
</tr>
<tr>
<td>H</td>
<td>PG 58V – 28</td>
</tr>
<tr>
<td>I</td>
<td>PG 58E – 34</td>
</tr>
<tr>
<td>L</td>
<td>PG 64S – 22</td>
</tr>
<tr>
<td>M</td>
<td>PG 49S – 34</td>
</tr>
</tbody>
</table>

S-156.2 Delete MnDOT 2360.2.E.7 and replace with:

E.7 Minimum Ratio of Added Asphalt Binder to Total Asphalt Binder

Control recycled materials used in mixture by evaluating the ratio of new added asphalt binder to total asphalt binder as show in Table 2360-8.
### Table 2360-8
Requirements for Ratio of Added New Asphalt Binder to Total Asphalt Binder\(^1\) min%:

<table>
<thead>
<tr>
<th>Specified Asphalt Grade(^2)</th>
<th>Recycled Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAS Only</td>
</tr>
<tr>
<td>PG 58X(^3)-28, PG 52S-34, PG 49-34, PG 64S-22</td>
<td>70</td>
</tr>
<tr>
<td>Wear</td>
<td>70</td>
</tr>
<tr>
<td>Non-Wear</td>
<td>80</td>
</tr>
<tr>
<td>PG 58X(^3)-34</td>
<td>80</td>
</tr>
<tr>
<td>Wear &amp; Non-Wear</td>
<td>80</td>
</tr>
</tbody>
</table>

\(^1\) The ratio of added new asphalt binder to total asphalt binder is calculated as (added binder/total binder) x 100

\(^2\) The Contractor can elect to use a blending chart to verify compliance with the specified binder grade. The Department may take production samples to ensure the asphalt binder material meets the requirements. The blending chart is on the Bituminous Office Website.

\(^3\) \(X=S,H,V,E\)

### S-156.3
Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

The Designer needs to fill in the numbers here. Examples of what is needed are:

- Type SP __ Wearing Course SPWEB_40_
- Type SP __ Non-Wearing Course SPNWB_30_

### S-156.4
Asphalt binder meeting AASHTO M332 (MSCR) is required. See Section S-__ (BITUMINOUS MATERIAL (MSCR)) of these Special Provisions.

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-.5, S-.6, S-.7, S-.8 or S-.9.

### S-156.5
Evaluate pavement smoothness requirements using equation HMA-A as specified in MnDOT 2399.3D.

OR

### S-156.6
Evaluate pavement smoothness requirements using equation HMA-B as specified in MnDOT 2399.3D.

OR

### S-156.7
Evaluate pavement smoothness requirements using equation HMA-C as specified in MnDOT 2399.3D.

OR

### S-156.8
Evaluate pavement smoothness requirements by Percent Improvement as specified in MnDOT 2399.
S-9 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-156.9 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.

Use S-.10 on ALL METRO projects.

S-156.10 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 either behind the paver or from the truck box at the plant site. Other sampling locations can be approved by the Engineer. The Contractor must decide and notify the Engineer where samples will be taken before production begins. The Contractor and Engineer must both agree to a change of sampling location once production has begun. 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.

The Designer needs to include all of S-.11 to S-.19 to remove Longitudinal Joint Cores from the standard 2360 (Plant Mixed Asphalt Pavement) specification.

S-156.11 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-156.12 MnDOT Table 2360-20 Longitudinal Joint Density Requirement is hereby deleted.

S-156.13 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 ± 0.5 inch [150 mm ± 12.5 mm] from the edge of the top of the mat (ex. center of 4 inch [100 mm] core barrel 8 ± 0.5 inches [200 mm ± 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-156.14 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-156.15 MnDOT 2360.3.D.1.n Longitudinal Joint Density is hereby deleted.

S-156.16 MnDOT 2360.3.D.1.p Shoulders is hereby deleted.

S-156.17 MnDOT Table 2360-24 Payment Schedule for Longitudinal Joint Density (SP Non-Wear and SP Shoulders, 4% Void) is hereby deleted.

S-156.18 MnDOT Table 2360-25 Payment Schedule for Longitudinal Joint Density (SP Non-wear and SP Shoulders, 3% Void) is hereby deleted.

S-156.19 MnDOT 2360.3.D.1.r Pay Factor Determination is hereby deleted.

S-157 (2360) PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID

Include SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), and SP2016-144 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID) with this writeup.

SP2016-139 MnDOT 2360 is modified and/or supplemented with the following:

S-157.1 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

The Designer needs to fill in the numbers here. Examples of what is needed are:

- Type SP ___ Wearing Course SPWEB_40_
- Type SP ___ Non-Wearing Course SPNWB_30_

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-.2, S-.3, or S-.4.

S-157.2 Evaluate pavement smoothness requirements by equation ALT-A as specified in 2399.3D in Section S-2399 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID) of these Special Provisions.

OR

S-157.3 Evaluate pavement smoothness requirements by Percent Improvement as specified in Section S-2399 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID) of these Special Provisions.

OR

S-.4 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-157.4 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-158 (2360) PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID (MSCR)

Only use this when the District requests it. Include SP2016-134 (BITUMINOUS TACK COAT), SP2016-135.1 (BITUMINOUS PRIME COAT), SP2016-144 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID), and SP2016-253.1 (BITUMINOUS MATERIAL (MSCR)) with this writeup.

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

S-158.1 Delete MnDOT Table 2360-2 and replace with:

<table>
<thead>
<tr>
<th>Table 2360-2 PG Asphalt Grades MSCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>M</td>
</tr>
</tbody>
</table>

S-158.2 Delete MnDOT 2360.2.E.7 and replace with:

E.7 Minimum Ratio of Added Asphalt Binder to Total Asphalt Binder

Control recycled materials used in mixture by evaluating the ratio of new added asphalt binder to total asphalt binder as show in Table 2360-8.
### Table 2360-8
Requirements for Ratio of Added New Asphalt Binder to Total Asphalt Binder\(^1\), min%:

<table>
<thead>
<tr>
<th>Specified Asphalt Grade(^2)</th>
<th>Recycled Material</th>
<th>RAS Only</th>
<th>RAS + RAP</th>
<th>RAP Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 58X(^3)-28, PG 52S-34, PG 49-34, PG 64S-22</td>
<td>Wear</td>
<td>70</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Non-Wear</td>
<td>70</td>
<td>70</td>
<td>65</td>
</tr>
<tr>
<td>PG 58X(^3)-34</td>
<td>Wear &amp; Non-Wear</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

\(^1\) The ratio of added new asphalt binder to total asphalt binder is calculated as \((\text{added binder}/\text{total binder}) \times 100\)

\(^2\) The Contractor can elect to use a blending chart to verify compliance with the specified binder grade. The Department may take production samples to ensure the asphalt binder material meets the requirements. The blending chart is on the Bituminous Office Website.

\(^3\) X=S,H,V,E

---

S-158.3 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

The Designer needs to fill in the numbers here. Examples of what is needed are:

- Type SP _ Wearing Course SPWEB_40_
- Type SP _ Non-Wearing Course SPNWB_30_

S-158.4 Asphalt binder meeting AASHTO M332 (MSCR) is required. See Section S-__ (BITUMINOUS MATERIAL (MSCR)) of these Special Provisions.

The Designer needs to let Special Provisions know how pavement smoothness will be evaluated – by S-5, S-6, or S-7.

S-158.5 Evaluate pavement smoothness requirements by equation ALT-A as specified in 2399.3D in Section S-2399 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID) of these Special Provisions.

OR

S-158.6 Evaluate pavement smoothness requirements by Percent Improvement as specified in Section S-2399 (PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID) of these Special Provisions.

OR

S-7 will be used when pavement surface smoothness will not be evaluated on the plant mixed asphalt pavement by specification 2399.

S-158.7 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.
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 either behind the paver or from the truck box at the plant site. Other sampling locations can be approved by the Engineer. The Contractor must decide and notify the Engineer where samples will be taken before production begins. The Contractor and Engineer must both agree to a change of sampling location once production has begun. 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-159  (2360) POROUS ASPHALT PAVEMENT
ONLY USE WITH CONSENT OF BITUMINOUS OFFICE.
Include SP2016-134 (BITUMINOUS TACK COAT) with this writeup.
SP2016-140

S-159.1 DESCRIPTION
This work consists of an open-graded, asphalt surface course that allows water to freely drain through it; composed of mineral aggregate and bituminous material, and placed on a prepared surface in accordance with these specifications.

Construct the porous asphalt pavement to the lines, grades, thicknesses, and typical cross-sections shown on the plans or established by the Engineer.

No porous friction course shall be constructed until the underlying surface has been cleaned, prepared and accepted by the Engineer.

S-159.2 MATERIALS

A Aggregates

Use only virgin aggregates.

A.1 Provide mineral aggregate in meeting the requirements of Table 2360-1, “Porous Asphalt Pavement Aggregate Gradation Broad Bands” and Table 2360-2, “Porous Asphalt Pavement Mixture Aggregate Requirements”:
Table 2360-1
Porous Asphalt Pavement Aggregate Gradation Broad Bands
(% passing of total washed gradation)

<table>
<thead>
<tr>
<th>Sieve Size, inch (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾&quot; (19.0)</td>
<td>100</td>
</tr>
<tr>
<td>½&quot; (12.5)</td>
<td>85-100</td>
</tr>
<tr>
<td>¾&quot; (9.5)</td>
<td>55-75</td>
</tr>
<tr>
<td>#4 (4.75)</td>
<td>10-25</td>
</tr>
<tr>
<td>#8 (2.36)</td>
<td>5-10</td>
</tr>
<tr>
<td>#200 (0.075)</td>
<td>2-4</td>
</tr>
</tbody>
</table>

Table 2360-2
Porous Asphalt Pavement Mixture Aggregate Requirements

<table>
<thead>
<tr>
<th>Aggregate Blend Property</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse Aggregate Angularity (MnDOT 1214) (one face), %</td>
<td>55</td>
</tr>
<tr>
<td>Coarse Aggregate Absorption, % (MnDOT 1204) AASHTO T85, Mn DOT modified</td>
<td>≤ 2</td>
</tr>
<tr>
<td>Clay Content (AASHTO T 176) (MnDOT 1215)</td>
<td>30</td>
</tr>
<tr>
<td>Total Spall in fraction retained on the #4 [4.75mm] sieve (MnDOT 1209)</td>
<td>2.5</td>
</tr>
<tr>
<td>Maximum Spall Content in Total Sample (MnDOT 1209)</td>
<td>2.5</td>
</tr>
<tr>
<td>Maximum Percent Lumps in fraction retained on the #4 [4.75mm] sieve</td>
<td>0.5</td>
</tr>
</tbody>
</table>

A.2 The Los Angeles Rattler loss on the coarse aggregate fraction (material retained on the #4 sieve [4.75-mm] cannot exceed 35 percent for any individual source used within the mix (MnDOT 1210).

A.3 Mineral Filler ............................................................................................................. AASHTO M17

B Additives

An additive is any material added to an asphalt mixture or material, such as mineral filler, asphalt additives, anti-strip, stabilizers, and similar products that do not have a specific pay item. When the Contract requires additives, compensation is included with the pay items for the appropriate mixture. If directed to incorporate additives, the compensation will be as Extra Work, at the unit price specified in the proposal. No compensation will be made for additives incorporated at the Contractor's option.

Do not incorporate additives into the mixture without approval of the Engineer. Add anti-foaming agents to asphalt cement at the manufacturer's recommended dosage rate.

C Asphalt Stabilizer ............................................................................................................. AASHTO T 305

Use a cellulose fiber asphalt stabilizer additive to control drain-down in the porous mixture. Feed the stabilizing additive through a separate system that proportions the required amount of stabilizer in uniform distribution at a dosage rate within 0.2-0.4 percent by weight of the total mix. The system must have low-level and no-flow indicators and a printout of the feed rate in lbs/min. Additionally, the stabilizer supply line must include a section of transparent pipe for observing consistency of flow or feed.

D Asphalt Binder Material........................................................................................................... 3151

Use PG 64-22 in the porous pavement.
S-159.3  MIXTURE DESIGN

A  Design the mixture in conformance with Appendix A of the National Asphalt Pavement Association information Series 131, Porous Asphalt Pavements for Storm water Management.

  a)  Use MnDOT Laboratory Manual Method 1816 (Corelok) to determine mixture bulk specific gravity.

B  Aggregate

At least 7 working days prior to the start of asphalt production, submit a minimum of 150 lbs. [60 kg] of the coarse aggregate fraction from the selected design aggregate structure. This sample will be tested for the voids in coarse aggregate fraction (VCA_{dc}) (MnDOT 1211 & AASHTO T19).

C  Mixture Sample

At least 7 working days before the start of asphalt production, submit the proposed Job Mix Formula (JMF) in writing and signed by a Level II Quality Management mix designer for each combination of aggregates to be used in the mixture. Include test data to demonstrate conformance to mixture properties as specified in Table 2360-2, “Porous Asphalt Pavement Mixture Aggregate Requirements” and Table 2360-4, “Porous Asphalt Pavement Mixture Requirements”. Use forms approved by the Department for the submission.

Submit an uncompacted mixture sample plus briquettes, in conformance with the JMF, compacted at the optimum asphalt content and required compactive effort for laboratory examination and evaluation. Provide a mixture sample size and the number of compacted briquettes and in accordance with the following:

<table>
<thead>
<tr>
<th>Table 2360-3 Porous Asphalt Pavement Mixture Sample Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>Uncompacted mixture sample size</td>
</tr>
<tr>
<td>Number of compacted briquettes</td>
</tr>
</tbody>
</table>

  a)  Tensile Strength Ratio
  In addition to the mixture sample submittal as described above submit an 20,000 g sample of loose mixture to the District Materials Laboratory for moisture sensitivity retained tensile strength ratio (TSR) testing. This testing is performed by the District Materials Laboratory for information only.

D  Mixture Requirements

The Department will base mixture evaluation on the trial mix tests in accordance with Table 2360-4, “Porous Asphalt Pavement Mixture Requirements.”
Table 2360-4

Porous Asphalt Pavement Mixture Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Requirement Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gyrations for $N_{\text{design}}$</td>
<td>50</td>
</tr>
<tr>
<td>Air Voids, % -- Wear</td>
<td>18%</td>
</tr>
<tr>
<td>Fines/Effective Asphalt</td>
<td>$\leq 1.2$</td>
</tr>
<tr>
<td>Draindown - based on a 1 hour reading at the anticipated production temperature</td>
<td>$\leq 0.3 %$</td>
</tr>
<tr>
<td>Stabilizer by weight of total mix, %</td>
<td>$0.2 - 0.4$</td>
</tr>
<tr>
<td>VCA Ratio</td>
<td>$V_{C_{\text{mix}}}/V_{C_{\text{ADRC}}}$</td>
</tr>
<tr>
<td>Minimum Asphalt Requirement, % by weight of mix</td>
<td>5.5-6.5</td>
</tr>
</tbody>
</table>

E Documentation

Include the following documentation and test results for each JMF submitted for review.

(1) Names of the individuals responsible for the QC of the mixture during production,
(2) Low project number of the Contract on which the mixture will be used,
(3) The following temperature ranges as supplied by the asphalt binder supplier:
   (3.1) Laboratory mixing and compaction,
   (3.2) Plant discharge, and
   (3.3) Field compaction.
(4) The percentage in units of 1 percent (except the No. 200 sieve [0.075 mm] in units of 0.1 percent) of aggregate passing each of the specified sieves for each aggregate to be incorporated into the mixture.
(5) Source descriptions of the following:
   (5.1) Location of material,
   (5.2) Description of materials,
   (5.3) Aggregate pit or quarry number, and
   (5.4) Proportion amount of each material in the mixture in percent of total aggregate.
(6) Composite gradation based on (4) and (5) above.
(7) Bulk and apparent specific gravities and water absorption (by % weight of dry aggregate). Both coarse and fine aggregate, for each product used in the mixture. Use MnDOT Laboratory Manual Method 1204 and 1205. The tolerance allowed between the Contractor's and the Department's specific gravities are $G_{\text{lb}}$ (individual) $= 0.040$ [+4 and -4] and $G_{\text{lb}}$ (combined) $= 0.020$.
(8) Test results from the composite aggregate blend at the proposed JMF proportions showing compliance with Table 2360-2, “Porous Asphalt Pavement Mixture Aggregate Requirements”:
   (8.1) Coarse Aggregate Angularity,
   (8.2) For the trial blend(s), determine the Voids in the Coarse Aggregate-Dry Rodded Condition ($V_{CA_{\text{DRRC}}}$) according to AASHTO T19. The VCA ratio ($V_{CA_{\text{mix}}}/V_{CA_{\text{ADRC}}}$) shall be less than 1.0, i.e. $V_{CA_{\text{mix}}}/V_{CA_{\text{ADRC}}}$.
(9) Asphalt binder percentage in units of 0.1 percent based on the total mass of the mixture and the PG grade.
(10) Each trial mixture design includes the following:
   (10.1) Using the selected design gradation, prepare mixes at the three binder contents in increments of 0.5 percent. Conduct draindown test (AASHTO T305) on loose mix at a temperature 60°F (15°C) higher than anticipated production temperature. Compact mix using 50 gyrations of a Superpave gyratory compactor and determine air void contents.
   (10.2) Maximum specific gravity for each asphalt binder content calculated based on the average of the effective specific gravities measured by using at least two
maximum specific gravity tests at the asphalt contents above and below the expected optimum asphalt binder content.

(10.3) Test results on at least two specimens at each asphalt binder content for the individual and average bulk specific gravities, density, and heights.

(10.4) Percent air voids of the mixture at each asphalt binder content.

(10.5) Fines to Effective Asphalt (F/A) ratio calculated to the nearest 0.1 percent.

(10.6) Evidence that the completed mixture will conform to all specified physical requirements as follows: asphalt content and densification %Gmm at N$_{design}$, design air voids (V$_a$), Fines/Effective Asphalt, draindown, percent Stabilizer by weight of total mix, and VCA ratio.

(11) Percent and manufacturer’s data for type of stabilizer used.

S-159.4 MIXTURE QUALITY MANAGEMENT

A Quality Control

The Contractor will perform Quality Control (QC) as part of the production process. QC is the process control of the operations related to mixture production and determining the quality of the mixture being produced. The QC sample is the Contractor’s sample taken and tested during production and used to control the production process. Provide and maintain a QC program for porous asphalt pavement production, including mix design, process control inspection, sampling and testing, and adjustments in the process related to the production of the porous asphalt pavement.

B Plant Certification

Provide the following to obtain certification:

(1) Completed and submitted request form application for plant inspection.
(2) Site map showing stockpile locations.
(3) Signed asphalt plant inspection report showing the plant and testing facility passed as documented by Asphalt Plant Inspection Report (TP 02142-02, TP 02143-02). The inspection report must also include documentation showing plant and laboratory equipment has been calibrated and is being maintained to the tolerance shown in the Bituminous Manual and sections 1200, 1800, and 2000 of the MnDOT Laboratory Manual.
(4) A Department-signed Mixture Design Report (MDR) before mixture production.

C Quality Assurance

The Engineer will perform Quality Assurance (QA) as part of the acceptance process. QA is the process of monitoring and evaluating various aspects of the Contractor’s testing as described below. The QA sample is the Department’s companion sample to the Contractor’s QC sample. QA testing is performed to accept the work. The Engineer will perform the following:

(1) Conduct QA and verification sampling and testing,
(2) Observe the QC sampling and tests,
(3) Monitor the required QC summary sheets and control charts,
(4) Verify calibration of QC laboratory testing equipment,
(5) Communicate Department test results to the Contractor’s personnel on a daily basis, and
(6) Ensure Independent Assurance (IA) sampling and testing requirements are met.

D Verification Sample
The Department will test a verification sample to assure compliance of the Contractor's QC program. The Department will provide the Contractor a verification companion, which is defined as a companion sample to the verification sample MnDOT uses. Take all verification samples from the truck box at the plant site. Test and use this verification companion sample as part of the QC program. Use the verification companion sample to replace the next scheduled QC sample. The Department recommends sampling enough material to accommodate retesting in case the samples fail.

Perform verification testing on at least one set of production tests daily to verify the requirements of Table 2360-1, “Porous Asphalt Pavement Aggregate Gradation Broad Bands”, Table 2360-2, “Porous Asphalt Pavement Mixture Aggregate Requirements”, and Table 2360-4, “Porous Asphalt Pavement Mixture Requirements”. Compare the verification companion sample to the verification sample for compliance with allowable tolerances in Table 2360-5. The Department will consider the verification process complete if the Contractor’s verification companion meets the tolerances in Table 2360-5.

If the tolerances between the Contractor’s verification companion and the Department’s verification sample do not meet the requirements of Table 2360-5, the Department will retest the material. If the retests fail to meet tolerances, the Department will substitute the Department's verification test results for the Contractor's results in the QC program and use those results for acceptance.

<table>
<thead>
<tr>
<th>Item</th>
<th>Allowable Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixture bulk specific gravity ($G_{mb}$)</td>
<td>0.030</td>
</tr>
<tr>
<td>Mixture maximum specific gravity ($G_{mm}$)</td>
<td>0.019</td>
</tr>
<tr>
<td>Coarse Aggregate Angularity, % fractured faces (%P)</td>
<td>15</td>
</tr>
<tr>
<td>Asphalt binder content:</td>
<td></td>
</tr>
<tr>
<td>Spot check method, %</td>
<td>0.2</td>
</tr>
<tr>
<td>Gradation sieve, % passing:</td>
<td></td>
</tr>
<tr>
<td>¾ in [19.0 mm], ½ in [12.5 mm], ⅜ in [9.5 mm], No. 4 [4.75 mm], No. 8 [2.36 mm]</td>
<td>4</td>
</tr>
<tr>
<td>No. 200 [0.075 mm]</td>
<td>2.0</td>
</tr>
</tbody>
</table>

E Contractor Quality Control

Provide QC technicians certified as a Level I Bituminous Quality Management (QM) Tester meeting the requirements of the MnDOT Technical Certification Program for QC testing and Level II Bituminous QM Mix Designer to make process adjustments. Provide at least one person per paving operation certified as a Level II Bituminous Street Inspector.

Provide a laboratory with equipment and supplies for Contractor quality control testing and maintain with the following:

1. Up-to-date equipment calibrations and a copy of the calibration records with each piece of equipment,
2. Telephone,
3. Fax and copy machine; however, the Engineer may waive the requirement to have a fax machine if internet and email are available,
4. Internet and Email,
5. Computer,
6. Printer, and
7. Microsoft Excel, version 2007 or newer
Laboratory equipment need to meet the requirements listed in Section 400 of the Bituminous Manual, Laboratory Manual, and these specifications, including having extraction capabilities. Before beginning production, the laboratory equipment needs to be calibrated and operational.

F Sampling and Testing

Take QC/QA samples from the truck box at the plant site. Sample randomly and in accordance with the Schedule of Materials Control and this provision. QC/QA samples are to be quartered from a larger sample of mixture. The procedure for truck box sampling is on the Bituminous Office website. Store compacted QC mixture specimens and loose QC and Department’s QA mixture companion samples for 10 calendar days. Label these split companion samples with companion numbers. Determine random numbers and locations using the Bituminous Manual, Section 5-693.7 Table A or ASTM D 3665, Section 5.

Sampling and testing is limited to coarse aggregate angularity, belt sample gradations, and asphalt spot checks. Obtain a 35 pound [15kg] belt sample for aggregate gradation.

G Production Test Rates

Testing rates are 1 test per every 500 tons of porous mixture produced with a minimum test rate of 1 test per day.

<table>
<thead>
<tr>
<th>Table 2360-6 Porous Asphalt Pavement Production Testing Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production Test</strong></td>
</tr>
<tr>
<td>Bulk Specific Gravity</td>
</tr>
<tr>
<td>Maximum Specific Gravity</td>
</tr>
<tr>
<td>Air Voids (calculated)</td>
</tr>
<tr>
<td>Asphalt Spot Check</td>
</tr>
<tr>
<td>Gradation</td>
</tr>
<tr>
<td>Coarse Aggregate Angularity</td>
</tr>
</tbody>
</table>

H Documentation:

Maintain documentation, including test summary sheets and control charts, on an ongoing basis. File reports, records, and diaries developed during the work as directed by the Engineer. These documents become the property of the Department.

Number test results in accordance with the MDR and record on forms approved and provided by the Department.

Include the following production test results and mixture information on the Department approved test summary sheet:

1. Percent passing on all sieves in accordance with Table 2360-1, “Porous Asphalt Pavement Aggregate Gradation Broad Bands”.
2. Coarse aggregate crushing,
3. Maximum specific gravity ($G_{mm}$).
4. Bulk specific gravity ($G_{nb}$).
5. Asphalt spot checks showing total asphalt binder content ($P_b$),
6. Calculated production air voids ($V_a$).
(7) Aggregate proportions in use at the time of sampling,
(8) Tons where sampled,
(9) Tons represented by a test and cumulative tons produced,
(10) Signature Line for MnDOT and Contractor Representative,
(11) Mixture Moisture Content, and
(12) MnDOT verification sample test result.

Submit copies of failing test results to the Engineer on a daily basis.

Provide the Engineer with asphalt manifests or bill of lading’s (BOL) on a daily basis.

Provide a daily plant diary, including a description of QC actions taken. Include changes or adjustments on the test summary sheets.

I  JMF Limits

<table>
<thead>
<tr>
<th>Item</th>
<th>JMF Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production air voids, %</td>
<td>±1.0</td>
</tr>
<tr>
<td>Asphalt Binder Content, Percent</td>
<td>±0.3</td>
</tr>
<tr>
<td>Sieve - % Passing</td>
<td></td>
</tr>
<tr>
<td>3/4&quot; [19mm], 1/2&quot; [12.5mm], 3/8&quot; [9.5 mm]</td>
<td>± 4</td>
</tr>
<tr>
<td>No. 4 [4.75], No. 8 [2.36 mm]</td>
<td>± 3</td>
</tr>
<tr>
<td>No. 200 [0.075 mm]</td>
<td>± 2.0</td>
</tr>
</tbody>
</table>

The mixture production targets and JMF limits are listed on the Mixture Design Report. JMF limits are used as the criteria for acceptance of materials based on individual (single) test results. Gradation JMF limits are not allowed outside the broadband requirements in Table 2360-1, “Porous Asphalt Pavement Aggregate Gradation Broad Bands”.

J  JMF Adjustment

Begin mixture production with materials within 5 percent of the design proportions and other mixture parameters within the JMF limits in accordance with Table 2360-6, “Porous Asphalt Pavement JMF Limits” for gradation, asphalt content, and aggregate proportions meeting the requirements of the reviewed Mixture Design Report. Use all aggregate proportions meeting the requirements of the Mixture Design Report unless the aggregate proportion is 0 percent.

K  JMF Request for Adjustment

The Contractor may make a request to the Bituminous Engineer or District Materials Engineer for a JMF adjustment to the mix design if the QC test results indicate a necessary change to achieve the specified properties. Do not use aggregates or materials not part of the original mix design to make adjustments unless otherwise approved by the Engineer, in conjunction with the District Materials Engineer or the Department Bituminous Engineer.

A Certified Level II Bituminous QM Mix Designer will review the requested change for the Department. If the request meets the design requirements in Table 2360-1,"Porous Asphalt Pavement Aggregate Gradation Broad Bands”, Table 2360-2,"Porous Asphalt Pavement Mixture Aggregate Requirements”, and Table 2360-4, “Porous Asphalt Pavement Mixture Requirements,” the Department will issue a revised Mixture Design Report.
Use an interactive communication process with the Engineer before making JMF adjustments. Make JMF adjustments only within the mixture specification gradation design broadbands in accordance with Table 2360-1, “Porous Asphalt Pavement Aggregate Gradation Broad Bands”. Submit a new JMF if redesigning the mixture.

The department will not allow consecutive requests for a JMF adjustment without production data.

L Failing Materials - - Gradation, Coarse Aggregate Angularity, Air Voids, and Percent Asphalt Binder

The determination of price adjustments for failing materials will be based on the criteria outlined below. Material acceptance is based on individual (single) test results.

If the individual results for gradation, coarse aggregate angularity, air voids, or percent asphalt binder exceed the JMF limits listed on the Mixture Design Report the material is considered unsatisfactory or unacceptable. Reduced payment as outlined in the table below shall apply to all tonnage represented by the individual test from the sample point of the failing test until the sample point when the test result is back within the JMF limit.

M Reduced Payment Schedule for Individual Test Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Pay Factor (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradation</td>
<td>90 %</td>
</tr>
<tr>
<td>Coarse Aggregate Crushing</td>
<td>85 %</td>
</tr>
<tr>
<td>Asphalt Binder Content</td>
<td>80 %</td>
</tr>
<tr>
<td>Air Voids</td>
<td>80%</td>
</tr>
</tbody>
</table>

(1) Lowest Pay Factor applies when there are multiple reductions on a single test.

The Contractor shall not operate below the specified minimum requirements for gradation, coarse aggregate crushing, air voids, or asphalt binder content on a continual basis. A continual basis shall be defined as all lots in a day’s production failing to meet minimum requirements for gradation, crushing, air voids, or binder content or two or more consecutive days which fail to meet specification requirements for gradation, crushing, air voids, or binder content.

S-159.5 CONSTRUCTION REQUIREMENTS

A Place the porous asphalt mixture when the ambient air temperature is at least 50°F (10°C) and rising.

B Porous mixtures cannot be stored for more than 90 minutes in the silo at the plant.

C Place the porous asphalt mixture with a track paver.

D Trucks must be covered when transporting porous mixture.

S-159.6 TACK COAT
Before placing successive porous layers, the previous course should be cleaned and a CSS1-h tack coat diluted 50/50 should be applied. The tack coat may be eliminated if the previous course is freshly placed and thoroughly clean.

S-159.7 PAVEMENT DENSITY

A. The minimum laydown temperature of the porous mixture is 275 degrees Fahrenheit.

B.1 Use a 5-ton steel-wheel roller(s) to compact the porous mixture. Make only two or three passes in the static mode. Vibratory compaction and pneumatic tired rollers are not allowed. Operate the roller(s) slowly enough to avoid displacement of the mixture.

B.2 Other Requirements

1) Transport the mix to the site in vehicles with smooth, clean dump beds that have been sprayed with a non-petroleum release agent.
2) Place the porous mixture directly over the storage bed and stone base course to the specified finished thickness.
3) After final rolling, no vehicular traffic of any kind is permitted on the surface until cooling and hardening has taken place, and in no case within the first 24 hours.
4) Transition to adjacent impervious bituminous paving shall be merged neatly with flush, clean line. Finished paving must be even, without pockets, and graded to elevations shown on drawing.
5) Do not use porous asphalt pavement beds for equipment or materials storage during construction, and, under no circumstances allow trucks to deposit soil on paved porous surfaces.

S-159.8 THICKNESS AND SURFACE SMOOTHNESS REQUIREMENTS

After compaction the thickness of the porous asphalt on the aggregate base will be within a tolerance of 1/2 inch [12 mm] of the thickness shown in the Plans. Each subsequent lift must be within a tolerance of 1/4 inch [6 mm] of the thickness shown in the Plans. The Engineer may require removal and replacement, at the Contractor’s expense, of any part of any lift that is constructed to less than the minimum required thickness.

S-159.9 METHOD OF MEASUREMENT

When paying for material by weight, the Engineer will measure separately asphalt mixture of each type by weight based on the total quantity of material hauled from the mixing plant. The Engineer will not make deductions for the asphalt materials.

S-159.10 BASIS OF PAYMENT

The Contract unit price for porous asphalt pavement used in each course includes the cost of constructing the asphalt surfacing and providing and incorporating asphalt binder, mineral filler, hydrated lime, and asphalt stabilizer.

The Department will pay for porous asphalt pavement on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2360.609</td>
<td>Porous Pavement</td>
<td>ton [metric ton]</td>
</tr>
</tbody>
</table>
S-160 (2360) FINE-GRADED (4.75 mm) ASPHALT MIXTURE

Always use SP2016-252.2 (GRADED AGGREGATE FOR FINE GRADED (4.75 mm) ASPHALT MIXTURE) with this write-up.

REVISED 03/01/16 - DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

Modify MnDOT 2360, “Plant Mixed Asphalt Pavement” as follows.

S-160.1 Replace MnDOT 2360.1, “DESCRIPTION” with:

2360.1 DESCRIPTION

This work consists of constructing a fine-graded (4.75 mm) thin lift mixture placed on a prepared surface in accordance with these specifications.

Construct the 4.75 mm mixture to the lines, grades, thicknesses, and typical cross-sections shown on the plans or established by the Engineer.

S-160.2 Add the following sentence to MnDOT 2360.2.D, “Bituminous Tack Coat”:

Emulsified Asphalt

AASHTO 208 - Dilution of the emulsion to 7 parts emulsion to 3 parts water or (1:1) is only allowed by the supplier. **No field dilution is allowed.** The storage tank for diluted emulsion must have a recirculation system or agitator that will prevent settlement or separation of the material.

<table>
<thead>
<tr>
<th>Table 2360-3 Residual Asphalt Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulsion</td>
</tr>
<tr>
<td>Undiluted</td>
</tr>
<tr>
<td>Diluted (7:3)</td>
</tr>
<tr>
<td>Diluted (1:1)</td>
</tr>
<tr>
<td>CSS-1 or CSS-1h</td>
</tr>
<tr>
<td>57%</td>
</tr>
<tr>
<td>40%</td>
</tr>
<tr>
<td>29%</td>
</tr>
</tbody>
</table>

Only Certified Sources are allowed for use. MnDOT’s Certified Source List is located at the following link: [http://www.dot.state.mn.us/products/index.html](http://www.dot.state.mn.us/products/index.html).

S-160.3 Replace MnDOT Table 2360-7 “Mixture Requirements” with:

<table>
<thead>
<tr>
<th>Table 2360-7 Mixture Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gyration mixture requirements:</td>
</tr>
<tr>
<td>For Ndesign</td>
</tr>
<tr>
<td>% Air voids at Ndesign wear</td>
</tr>
<tr>
<td>Adjusted Asphalt Film Thickness, minimum µ</td>
</tr>
<tr>
<td>TSR*, minimum %</td>
</tr>
<tr>
<td>Fines/effective asphalt</td>
</tr>
<tr>
<td>75</td>
</tr>
<tr>
<td>4.0</td>
</tr>
<tr>
<td>8.5</td>
</tr>
<tr>
<td>80†</td>
</tr>
<tr>
<td>1.2 – 2.0</td>
</tr>
</tbody>
</table>

* Use 6 in [150 mm] specimens in accordance with 2360.2.1, “Field Tensile Strength Ratio (TSR).”
† MnDOT minimum = 70
S-160.4 Replace MnDOT Table 2360-8, “Requirements for Ratio of Added New Asphalt Binder to Total Asphalt Binder min%:” with:

<table>
<thead>
<tr>
<th>Specified Asphalt Grade</th>
<th>Recycled Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 58X-28, PG 52S-34, PG 49S-34, PG 64S-22 Wear</td>
<td>70</td>
</tr>
<tr>
<td>PG 58X-34 Wear</td>
<td>80</td>
</tr>
</tbody>
</table>

1 The ratio of added new asphalt binder to total asphalt binder is calculated as (added binder/total binder) x 100

S-160.5 Replace MnDOT Table 2360-15, “Ratio of New Added Asphalt Binder to Total Asphalt Binder Acceptance Criteria” with:

<table>
<thead>
<tr>
<th>Specified Asphalt Grade</th>
<th>Recycled Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 58X-28, PG 52S-34, PG 49S-34, PG 64S-22 Wear (ind./moving average)</td>
<td>66/70</td>
</tr>
<tr>
<td>PG 58X-34 Wear (ind./moving average)</td>
<td>76/80</td>
</tr>
</tbody>
</table>

S-160.6 Add the following paragraph to MnDOT 2360.3.A.4, “Weather Limitations and Paving Date”:

The pavement surface temperature and ambient air temperature shall be at least 50 °F [10 °C]. A damp pavement is acceptable, if it is free of standing water and favorable weather conditions are expected.

S-160.7 Add the following paragraph to MnDOT 2360.3.B.2.a, “Paver”:

Apply the emulsion for tack so it is not driven on, immediately prior to the placement of the 4.75 mm mixture. Use a metered mechanical pressure spray bar at an application temperature of 120-180 °F [50 – 80 °C]. Accurately and continuously monitor the rate of spray and provide a uniform application across the entire pavement width. Apply at a rate as indicated in Table 2360-18A. No wheel or other part of the paving machine shall come in contact with the emulsion.

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Undiluted Emulsion</th>
<th>Diluted Emulsion (7:3)</th>
<th>Diluted Emulsion (1:1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Asphalt</td>
<td>0.05 to 0.07 [0.23 to 0.32]</td>
<td>0.08 to 0.10 [0.36 to 0.45]</td>
<td>0.10 to 0.14 [0.46 to 0.64]</td>
</tr>
<tr>
<td>Old Asphalt and PCC</td>
<td>0.08 to 0.10 [0.36 to 0.45]</td>
<td>0.13 to 0.15 [0.59 to 0.68]</td>
<td>0.16 to 0.20 [0.72 to 0.90]</td>
</tr>
<tr>
<td>Milled Asphalt and Milled PCC</td>
<td>0.07 to 0.11 [0.41 to 0.50]</td>
<td>0.10 to 0.13 [0.45 to 0.59]</td>
<td>0.14 to 0.22 [0.90 to 1.18]</td>
</tr>
</tbody>
</table>

S-160.9 Replace MnDOT Table 2360-26*, “Minimum Temperature Control” with the following:

<table>
<thead>
<tr>
<th>Air Temperature °F [°C]</th>
<th>Minimum Laydown Temperature °F [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 – 40 [0 -5]</td>
<td>Not allowed</td>
</tr>
<tr>
<td>41- 50 [6 -10]</td>
<td>Not allowed</td>
</tr>
<tr>
<td>61 -70 [16 -21]</td>
<td>255 [124]</td>
</tr>
<tr>
<td>71 – 80 [22 27]</td>
<td>245 [118]</td>
</tr>
<tr>
<td>81 – 90 [28 -32]</td>
<td>240 [116]</td>
</tr>
<tr>
<td>&gt;= 91 [33]</td>
<td>235 [113]</td>
</tr>
</tbody>
</table>

* Not applicable if using a Warm Mix Asphalt (WMA) additive

S-160.10 Replace MnDOT Table 2360-27, “Surface Requirements” with:

<table>
<thead>
<tr>
<th>Course/Location</th>
<th>Description</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear</td>
<td>Tolerance of final 2 lifts from the edge of a 10 foot [3 m] straightedge laid parallel to or at right angles to the centerline.</td>
<td>¼ in [6 mm]</td>
</tr>
<tr>
<td>Transverse joints/construction joints</td>
<td>Tolerance from the edge of a 10 foot [3 m] straightedge centered longitudinally across the transverse joint. Correction by diamond grinding required when directed by the Engineer.</td>
<td>¼ in [6 mm]</td>
</tr>
<tr>
<td>Transverse Slope</td>
<td>Tolerance for surface of each lift exclusive of final shoulder wear.</td>
<td>Not to vary by more than 0.4 % from plans.</td>
</tr>
<tr>
<td>Distance from edge of each lift and established centerline.</td>
<td>No less than the plan distance or more than 3 inches [75 mm] greater than the plan distance. The edge alignment of the wearing lift on tangent sections and on curve sections of 3 degrees or less can’t deviate from the established alignment by more than 1 inch [25 mm] in any 25 foot [7.5 m] section.</td>
<td>See Description</td>
</tr>
<tr>
<td>Final wear adjacent to concrete pavements.</td>
<td>After compaction the final lift wear adjacent to concrete pavements must be slightly higher but not to exceed 1/4” [6mm] than the concrete surface.</td>
<td>See Description</td>
</tr>
<tr>
<td>Final wear adjacent to fixed structures.</td>
<td>After compaction the final lift wear adjacent to gutters, manholes, pavement headers, or other fixed structures must be slightly higher but not to exceed 1/4” [6mm] than the surface of the structure.</td>
<td>See Description</td>
</tr>
<tr>
<td>Finished surface</td>
<td>Must be free of segregated and open and torn sections and deleterious material. *Excluding tight blade and scratch courses. No Flushing or “fat” spots</td>
<td>See Description</td>
</tr>
</tbody>
</table>

S-160.11 Delete the 3rd paragraph in MnDOT 2360.3.E.

S-160.12 Replace MnDOT 2360.3.E.1, “Lift Thickness” with the following:

E.1 Lift Thickness
The minimum finished wearing course thickness is \( \frac{3}{4} \)-inch [19 mm] with a maximum \( \frac{1}{2} \) inch [12.5 mm] vertical edge at any free edge.

**S-160.13**  
Replace MnDOT 2360.4, “Method of Measurement” with:

**2360.4 METHOD OF MEASUREMENT**

Measure the 4.75 mm mixture by area of pavement surfaced.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2360.503</td>
<td>Type SP 4.75 Wearing Course Mixture (S,F) 0.75” Thick</td>
<td>square yard [square meter]</td>
</tr>
</tbody>
</table>

**S-161 (2360) PLANT MIXED ASPHALT PAVEMENT - THICKNESS PAYMENT SCHEDULE**

This is to be used on jobs that have 2360 square yard pay items.

SP2016-141

The provisions of MnDOT 2360.3.E (Surface Requirements), MnDOT 2360.4 (Method of Measurement), and MnDOT 2360.5 (Basis of Payment) are supplemented with the following:

**S-161.1 ASPHALT THICKNESS PAYMENT CRITERIA**

The requirements of MnDOT 2360.3.E.1 (Lift Thickness) and 2360.4 (Method of Measurement) will not apply for work accomplished under Pay Items that are measured by area. Delete the 5th paragraph from MnDOT 2360.5 (Basis of Payment). The following requirements will apply:

**The Method of Measurement:** This item will be measured based on the Plan dimensions for standard width and/or irregular width paving at the dimensions and thickness specified unless otherwise directed by the Engineer. There will be no additional payment for asphalt pavement constructed with a greater thickness or width than required by the Plan. Actual thicknesses of the mixtures will be determined by measurement of the cores required for density testing and additional cores specifically cut for thickness checks.

**Changes in Method of Measurement:** The Engineer shall be allowed to direct the Contractor to construct Asphalt Pavement in thicknesses different than that shown in the Plan for small quantities. The Method of Measurement will be a direct proration from the original thickness to the changed thickness, with payment to be made at Contract unit prices. Changes greater than 10% of the estimated quantity for any item will be subject to renegotiation of unit prices.

**The Basis of Payment:** If the specified thicknesses are not obtained, the final payment for each item will be reduced in accordance with the tolerances and deductions shown in the Thickness Acceptance Schedule applied to each Thickness Lot using the procedure shown below. The Thickness Acceptance Schedule specification will apply to asphalt mixtures placed over all aggregate base, reclaimed bituminous, and any other unpaved, milled or previously paved surfaces.

1. **Thickness Lot for Measurement:** In Maximum Density Projects, the Thickness Lot will represent the same area as the Density Lot for the final lift of any particular mixture.

   In Ordinary Compaction Projects, the Thickness Lot shall represent a 1/2 mile [800 m] long segment for the final lift of any particular mixture, or portion thereof at the end of each segment of paving. Paving segments of less than 1/2 mile [800 m] will require fewer cores on a pro rata basis. The areas represented for thickness acceptance will be measured by length of paving segment times width of paving pass.
2. **Average Measured Thickness:** The Average Measured Thickness for each Thickness Lot will be the average of all the thickness measurements obtained from the core thicknesses of the density cores and the special thickness cores.

   For Maximum Density Projects, two (2) special thickness cores for each Thickness Lot shall be cut by the Contractor in addition to the regular density cores. These additional cores shall be considered incidental work and the location of these cores shall be taken at random locations selected by the Engineer. The special thickness cores shall not be taken within 1 foot [0.3 m] of any unsupported edge.

   For Ordinary Compaction Projects, four (4) thickness cores shall be cut for each Thickness Lot. The thickness cores cut by the Contractor shall be considered incidental work and the location of the cores shall be taken at random locations selected by the Engineer. The thickness cores shall not be taken within 1 foot [0.3 m] of any unsupported edge.

   If more than one lift of the same type of mixture is placed to obtain specified thickness, the Average Measured Thickness will be the average of the total thickness of each type of mixture, and will be determined with cores taken after the entire thickness of each type of mixture is placed.

   An additional 1/16 inch [1.6 mm] tolerance will be added to the Thickness Tolerances shown in the Thickness Acceptance Schedule, for the total thickness of non-wearing course asphalt pavement constructed on aggregate base or reclaimed bituminous surfaces. This additional amount of tolerance also applies to the total thickness of wearing courses paved directly on aggregate base or reclaimed bituminous surfaces.

<table>
<thead>
<tr>
<th>Thickness Acceptance Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thickness Tolerance</strong></td>
</tr>
<tr>
<td>The percent less than the total specified Pay Item thickness obtained from the Average Measured Thickness for each Lot.</td>
</tr>
<tr>
<td>0 to 5.0 % less than specified</td>
</tr>
<tr>
<td>5.1 to 17.0 % less than specified</td>
</tr>
<tr>
<td>17.1 to 23.0 % less than specified</td>
</tr>
<tr>
<td>23.1 to 30.0 % less than specified</td>
</tr>
<tr>
<td>In excess of 30.0 % less than specified</td>
</tr>
</tbody>
</table>
S-163  (2363) PERMEABLE ASPHALT STABILIZED STRESS RELIEF COURSE (PASSRC) AND PERMEABLE ASPHALT STABILIZED BASE (PASB) (MSCR)

Only use this when the District requests it. Always use SP2016-253.1 (BITUMINOUS MATERIAL (MSCR)) with this write-up.

NEW WRITEUP 01/15/16  ▲DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-141.2

MnDOT 2363 is modified with the following:

S-163.1  Replace PG 64-22 with PG 64S-22 in MnDOT 2363.2.B.

S-163.2  Asphalt binder meeting AASHTO M332 (MSCR) is required. See Section S-__ (BITUMINOUS MATERIAL (MSCR)) of these Special Provisions.

S-164  (2365) STONE MATRIX ASPHALT - SMA

Include SP2016-134 (BITUMINOUS TACK COAT) with this writeup.

SP2016-142

MnDOT 2365 is modified as follows:

S-164.1  Delete the third paragraph of MnDOT 2365.1 “Description”, and substitute the following:

Stone Matrix Asphalt Mixture Designation Code: SMWEE640H.

S-164.2  Delete Table 2365-1 in MnDOT 2365.2 “Materials”, and substitute the following:

<table>
<thead>
<tr>
<th>Table 2365-1 Graded E Stone Matrix Asphalt Aggregate Gradation Broad Bands (% passing of total washed gradation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size, inch (mm)</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>¾&quot; (19.0)</td>
</tr>
<tr>
<td>½&quot; (12.5)</td>
</tr>
<tr>
<td>3/8&quot; (9.5)</td>
</tr>
<tr>
<td>#4 (4.75)</td>
</tr>
<tr>
<td>#8 (2.36)</td>
</tr>
<tr>
<td>#200 (0.075)</td>
</tr>
</tbody>
</table>

S-164.3  Delete the last paragraphs of MnDOT 2365.5 “Basis of Payment”, and substitute the following:

The Department will pay for plant mixed SMA on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.:</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2365.501</td>
<td>Type SM* Wearing Course Mixture †‡</td>
<td>ton [metric ton]</td>
</tr>
</tbody>
</table>

* Aggregate size Designation E
† Traffic level 6
‡ AC binder grade designation “H”
S-165 (2365) STONE MATRIX ASPHALT - SMA (MSCR)

Only use this when the District requests it. Include SP2016-134 (BITUMINOUS TACK COAT) and SP2016-253.1 (BITUMINOUS MATERIAL (MSCR)) with this writeup.

NEW WRITEUP 01/15/16 - DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-142.1

MnDOT 2365 is modified as follows:

S-165.1 Delete the third paragraph of MnDOT 2365.1 “Description”, and substitute the following:

Stone Matrix Asphalt Mixture Designation Code: SMWEE640H.

S-165.2 Delete Table 2365-1 in MnDOT 2365.2 “Materials”, and substitute the following:

<table>
<thead>
<tr>
<th>Table 2365-1 Gradation E</th>
<th>Stone Matrix Asphalt Aggregate Gradation Broad Bands (% passing of total washed gradation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size, inch (mm)</td>
<td>% Passing</td>
</tr>
<tr>
<td>¾” (19.0)</td>
<td>100</td>
</tr>
<tr>
<td>½” (12.5)</td>
<td>86-96</td>
</tr>
<tr>
<td>3/8” (9.5)</td>
<td>60-85</td>
</tr>
<tr>
<td>#4 (4.75)</td>
<td>25-35</td>
</tr>
<tr>
<td>#8 (2.36)</td>
<td>15-25</td>
</tr>
<tr>
<td>#200 (0.075)</td>
<td>8.0-12.0</td>
</tr>
</tbody>
</table>


S-165.4 Asphalt binder meeting AASHTO M332 (MSCR) is required. See Section S-__ (BITUMINOUS MATERIAL (MSCR)) of these Special Provisions.

S-165.5 Delete the last paragraphs of MnDOT 2365.5 “Basis of Payment”, and substitute the following:

The Department will pay for plant mixed SMA on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.:</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2365.501</td>
<td>Type SM* Wearing Course Mixture †‡</td>
<td>ton [metric ton]</td>
</tr>
</tbody>
</table>

* Aggregate size Designation E
† Traffic level 6
‡ AC binder grade designation “H”
S-166  (2399) PAVEMENT SURFACE SMOOTHNESS
Use this with SP2016-115 (CONCRETE PAVEMENT) (unless it’s an alternate job) and SP2016-136 (PLANT MIXED ASPHALT PAVEMENT).

MnDOT 2399 is hereby modified as follows:

S-166.1  MnDOT 2399.3.B shall be deleted and replaced with the following:

B  Exclusions
Table 2399-2 indicates areas that are excluded from Smoothness evaluation, but still require measurement with an IP, and are subject to evaluation for ALR and the 10 ft [3.05 m] straightedge. Table 2399-3 indicates areas that are excluded from surface testing with the IP, but are subject to evaluation with the 10 ft [3.05 m] straightedge.

<table>
<thead>
<tr>
<th>Table 2399-2 Areas Excluded from Smoothness Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>For All Pavements</td>
</tr>
<tr>
<td>Paving in areas with a posted vehicle speed less than or equal to 45 mph [73 km/hr]</td>
</tr>
<tr>
<td>Ramps and loops</td>
</tr>
<tr>
<td>Acceleration and deceleration lanes less than or equal to 1,000 ft [304.80 m] in length</td>
</tr>
<tr>
<td>Projects less than 1,000 ft [304.80 m] in length</td>
</tr>
<tr>
<td>Bridge decks and approach panels – the occurrence of bridges shall not interrupt the continuity determination</td>
</tr>
<tr>
<td>For Bituminous Pavements</td>
</tr>
<tr>
<td>Single lift overlays placed directly on concrete</td>
</tr>
<tr>
<td>For Concrete Pavements</td>
</tr>
<tr>
<td>Intersections constructed under traffic – begin and end exclusion 100 ft [30.48 m] from the intersection radius</td>
</tr>
<tr>
<td>Doweled shoulders greater than or equal to 10 ft [3.05 m] in width</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2399-3 Areas Excluded from Smoothness and ALR Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>For All Pavements</td>
</tr>
<tr>
<td>Paving in areas with a posted vehicle speed less than or equal to 35 mph [56 km/hr]</td>
</tr>
<tr>
<td>Paving in areas with a cautionary vehicle speed less than or equal to 35 mph [56 km/hr]</td>
</tr>
<tr>
<td>Turn lanes, crossovers</td>
</tr>
<tr>
<td>10 ft [3.05 m] on either side of obstructions in lane that obstruction is located</td>
</tr>
<tr>
<td>Side streets, side connections</td>
</tr>
<tr>
<td>150 ft [45.72 m] before stop signs at an intersection</td>
</tr>
<tr>
<td>150 ft [45.72 m] before yield signs at a roundabout</td>
</tr>
<tr>
<td>For Bituminous Pavements</td>
</tr>
<tr>
<td>Paved shoulders</td>
</tr>
<tr>
<td>Intersections where mainline profiles are merged or blended into the cross street profile – begin and end exclusion 100 ft [30.48 m] from the intersection radius</td>
</tr>
<tr>
<td>For Concrete Pavements</td>
</tr>
<tr>
<td>Doweled shoulders less than 10 ft [3.05 m] in width</td>
</tr>
<tr>
<td>Undoweled shoulders</td>
</tr>
<tr>
<td>Headers adjacent to colored concrete</td>
</tr>
</tbody>
</table>
D.1 Smoothness

Evaluate Smoothness requirements using the equations and criteria in accordance with the following tables:

1. Table 2399-4 for bituminous pavements,
2. Table 2399-5 for concrete pavements, and
3. Table 2399-6 for percent improvement projects.

The Engineer will base pay adjustments on the segment Smoothness value (or percent improvement value, for percent improvement projects) measured at the completion of surface pavement, unless corrective work is required by the summary report results. If a segment is less than 100 ft [30.48 m] in length and Table 2399-4, Table 2399-5, or Table 2399-6 requires corrective work, the Engineer will waive the corrective work requirement for the segment and instead assess a prorated disincentive. The Department will still subject the segment to ALR analysis in accordance with Table 2399-7.

For segments requiring corrective work, reprofile the entire 0.1 mi [0.16 km] segment after performing corrective work as directed by the Engineer and enter the reprofiled Smoothness values into the final spreadsheet summary.

D.1.a Bituminous Pavements

Table 2399-4 contains pay adjustments for bituminous pavements. See Section 2360, “Plant Mixed Asphalt Pavement,” of the Special Provisions for the ride equation requirements.
### Table 2399-4
**Smoothness Pay Adjustments and Corrective Work for Bituminous Pavements**

<table>
<thead>
<tr>
<th>Equation</th>
<th>Smoothness in/mi [m/km]</th>
<th>Pay Adjustment $/0.1 mi [0.16 km]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HMA-A</strong></td>
<td>&lt; 25.0 [0.39]</td>
<td>400.00</td>
</tr>
<tr>
<td></td>
<td>25.0 – 75.0 [0.39 – 1.18]</td>
<td>800.00 – 16.000 × Smoothness [800.00 – 1013.763 × Smoothness]</td>
</tr>
<tr>
<td></td>
<td>&gt; 75.0 [1.18]</td>
<td>Corrective Work to ≤ 50.0 in/mi [0.79 m/km]</td>
</tr>
<tr>
<td><strong>HMA-B</strong></td>
<td>&lt; 30.0 [0.47]</td>
<td>270.00</td>
</tr>
<tr>
<td></td>
<td>30.0 – 80.0 [0.47 – 1.26]</td>
<td>594.00 – 10.800 × Smoothness [594.00 – 684.290 × Smoothness]</td>
</tr>
<tr>
<td></td>
<td>&gt; 80.0 [1.26]</td>
<td>Corrective Work to ≤ 55.0 in/mi [0.87 m/km]</td>
</tr>
<tr>
<td><strong>HMA-C</strong></td>
<td>&lt; 35.0 [0.55]</td>
<td>180.00</td>
</tr>
<tr>
<td></td>
<td>35.0 – 95.0 [0.55 – 1.50]</td>
<td>390.00 – 6.000 x Smoothness [390.00 – 380.161 x Smoothness]</td>
</tr>
<tr>
<td></td>
<td>&gt; 95.0 [1.50]</td>
<td>Corrective Work to ≤ 65.0 in/mi [1.03 m/km]</td>
</tr>
</tbody>
</table>

For bituminous projects, the Engineer will not pay any positive Total Pay Adjustments if greater than 25 percent of all mainline density lots for the project fail to meet the minimum density requirements in accordance with 2360, “Plant Mixed Asphalt Pavement.”

### D.1.b Concrete Pavements

For concrete pavements, the Engineer will use equation PCC-A.

### Table 2399-5
**Smoothness Pay Adjustments and Corrective Work for Concrete Pavements**

<table>
<thead>
<tr>
<th>Equation</th>
<th>Smoothness in/mi [m/km]</th>
<th>Pay Adjustment $/0.1 mi [0.16 km]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PCC-A</strong></td>
<td>&lt; 45.0 [0.71]</td>
<td>890.00</td>
</tr>
<tr>
<td></td>
<td>45.0 – 85.0 [0.71 – 1.34]</td>
<td>2892.50 – 44.500 × Smoothness [2892.50 – 2819.527 × Smoothness]</td>
</tr>
<tr>
<td></td>
<td>&gt; 85.0 [1.34]</td>
<td>Corrective Work to ≤ 65.0 in/mi [1.03 m/km]</td>
</tr>
</tbody>
</table>

### D.1.c Percent Improvement Projects

The Engineer will base pay adjustments on the segment percent improvement values. The Engineer will calculate the percent improvement in accordance with the following equation:
Determine the Smoothness Before Paving value before patching or other repair. Determine the Smoothness After Paving value after the completion of paving and any corrective work.

\[
\%I = \frac{\text{Smoothness Before Paving} - \text{Smoothness After Paving}}{\text{Smoothness Before Paving}} \times 100
\]

<table>
<thead>
<tr>
<th>Equation</th>
<th>Percent Improvement (%I)</th>
<th>Pay Adjustment $/0.1 \text{ mi} [$/0.16 \text{ km}]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI</td>
<td>&gt; 70.0</td>
<td>180.00</td>
</tr>
<tr>
<td></td>
<td>0.0 to 70.0</td>
<td>$-180.00 + 5.143 \times (%I)$</td>
</tr>
<tr>
<td></td>
<td>&lt; 0.0</td>
<td>Corrective Work to %I of at least 0.0</td>
</tr>
</tbody>
</table>

For bituminous percent improvement projects, the Engineer will not pay any positive Total Pay Adjustments if greater than 25 percent of all mainline density lots for the project fail to meet minimum density requirements in accordance with 2360, “Plant Mixed Asphalt Pavement.”

Correct segments with a percentage improvement of less than 33.0 percent at no additional cost to the Department as required by the Engineer.

S-166.3 MnDOT 2399.3.D.2 shall be deleted and replaced with the following:

D.2 Areas of Localized Roughness

The Engineer will evaluate ALR in accordance with Table 2399-7, “ALR Monetary Deductions and Corrective Work Requirements.”
### Table 2399-7
ALR Monetary Deductions and Corrective Work Requirements

<table>
<thead>
<tr>
<th>Equation</th>
<th>25 ft [7.62 m] Continuous MRI, in/mi [m/km]</th>
<th>Corrective Work or Monetary Deduction, per linear 1.0 ft [0.30 m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMA-A or HMA-B, and a posted vehicle speed &gt; 45 mph [73 km/hr]</td>
<td>&lt; 175.0 [2.76]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 175.0 [2.76] to &lt; 225.0 [3.55]</td>
<td>Corrective Work unless both the Engineer and the Contractor agree to a deduct of $25.00</td>
</tr>
<tr>
<td></td>
<td>≥ 225.0 [3.55]</td>
<td>Corrective Work unless both the Engineer and the Contractor agree to a deduct of $125.00</td>
</tr>
<tr>
<td>PCC-A and a posted vehicle speed &gt; 45 mph [73 km/hr]</td>
<td>&lt; 175.0 [2.76]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 175.0 [2.76] to &lt; 225.0 [3.55]</td>
<td>Corrective Work unless both the Engineer and the Contractor agree to a deduct of $25.00</td>
</tr>
<tr>
<td></td>
<td>≥ 225.0 [3.55]</td>
<td>Corrective Work</td>
</tr>
<tr>
<td>HMA-C, PI, ramps, loops, concrete intersections constructed under traffic, or any paving with a posted vehicle speed ≤ 45 mph [73 km/hr]</td>
<td>&lt; 225.0 [3.55]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 225.0 [3.55]</td>
<td>$25.00</td>
</tr>
</tbody>
</table>

The Engineer will consider areas of ALR acceptable if the retested segment contains no ALR. The Department will reduce payment for ALR remaining after retesting as determined by the Engineer and in accordance with Table 2399-7, “ALR Monetary Deductions and Corrective Work Requirements.”

---

**S-167 (2399) PAVEMENT SURFACE SMOOTHNESS FOR ALTERNATE BID**

*Use with SP2016-114 (CONCRETE PAVEMENT FOR ALTERNATE BID) and SP2016-139 (PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID).*

SP2016-144

MnDOT 2399 is hereby modified as follows:

S-167.1 Delete MnDOT 2399.3.D.1 and substitute the following:

**D.1 Smoothness**

Evaluate Smoothness requirements using the equation and criteria in accordance with the following table:

(1) Table 2399-4
The Engineer will base pay adjustments on the segment Smoothness value measured at the completion of surface pavement, unless corrective work is required by the summary report results. If a segment is less than 100 ft [30.48 m] in length and Table 2399-4 requires corrective work, the Engineer will waive the corrective work requirement for the segment and instead assess a prorated disincentive. The Department will still subject the segment to ALR analysis in accordance with Table 2399-5.

For segments requiring corrective work, reprofile the entire 0.1 mi [0.16 km] segment after performing corrective work as directed by the Engineer and enter the reprofiled Smoothness values into the final spreadsheet summary.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Smoothness in/mi [m/km]</th>
<th>Pay Adjustment $/0.1 mi [0.16 km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT-A</td>
<td>&lt; 30.0 [0.47]</td>
<td>270.00</td>
</tr>
<tr>
<td></td>
<td>30.0 – 80.0 [0.47 – 1.26]</td>
<td>594.00 − 10.800 × Smoothness [594.00 − 684.290 × Smoothness]</td>
</tr>
<tr>
<td></td>
<td>&gt; 80.0 [1.26]</td>
<td>Corrective Work to ≤ 55.0 in/mi [0.87 m/km]</td>
</tr>
</tbody>
</table>

For bituminous projects, the Engineer will not pay any positive Total Pay Adjustments if greater than 25 percent of all mainline density lots for the project fail to meet the minimum density requirements in accordance with 2360, “Plant Mixed Asphalt Pavement.”

S-167.2 Delete MnDOT 2399.3.D.2 and substitute the following:

D.2 Areas of Localized Roughness

The Engineer will evaluate ALR in accordance with Table 2399-7, “ALR Monetary Deductions and Corrective Work Requirements.”
### Table 2399-7
ALR Monetary Deductions and Corrective Work Requirements

<table>
<thead>
<tr>
<th>Equation</th>
<th>25 ft [7.62 m] Continuous MRI, in/mi [m/km]</th>
<th>Corrective Work or Monetary Deduction, per linear 1.0 ft [0.30 m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT-A, and a posted vehicle speed &gt; 45 mph [73 km/hr]</td>
<td>&lt; 175.0 [2.76]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 175.0 [2.76] to &lt; 225.0 [3.55]</td>
<td>Corrective Work unless both the Engineer and the Contractor agree to a deduct of $25.00</td>
</tr>
<tr>
<td></td>
<td>≥ 225.0 [3.55]</td>
<td>Corrective Work unless both the Engineer and the Contractor agree to a deduct of $125.00</td>
</tr>
<tr>
<td>Ramps, loops, concrete intersections constructed under traffic, or any paving with a posted vehicle speed ≤ 45 mph [73 km/hr]</td>
<td>&lt; 225.0 [3.55]</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>≥ 225.0 [3.55]</td>
<td>$25.00</td>
</tr>
</tbody>
</table>

The Engineer will consider areas of ALR acceptable if the retested segment contains no ALR. The Department will reduce payment for ALR remaining after retesting as determined by the Engineer and in accordance with Table 2399-7, “ALR Monetary Deductions and Corrective Work Requirements.”

---

**S-168 (2406) BRIDGE APPROACH PANELS**

*Use whenever there are any bridge approach panels on the job.*

SP2016-145

MnDOT 2406 is hereby modified as follows:

S-168.1 In MnDOT 2406.3.G paragraph 4 the phrase “…the contract does not contain a separate contact unit price…” is changed to read “…the contract does not contain a separate contact unit price…”

**S-169 (2411) CONSTRUCT CONCRETE OR MASONRY PLUG**

SP2016-146

This work shall consist of constructing an 8 inch [200 mm] minimum thickness masonry or concrete bulkhead in the end of an existing Box Culvert in accordance with the applicable MnDOT Standard Specifications and the following:

Measurement will be made by the number of bulkheads constructed as specified. Payment will be made under Item 2411.602 (Construct Concrete or Masonry Plug) at the Contract bid price per each, which shall be payment in full for all costs involved.
S-170  (2411) MECHANICALLY STABILIZED EARTH WALLS WITH PRECAST CONCRETE PANELS
A version of this spec can be found at http://www.dot.state.mn.us/pre-letting/prov/index.html. Designers will need to work with Khalid Obeidat of the Bridge Office when needed.
SP2016-147

S-171  (2411) PREFABRICATED MODULAR BLOCK WALL (PMBW) WITH AND WITHOUT SOIL REINFORCEMENT
A version of this spec can be found at http://www.dot.state.mn.us/pre-letting/prov/index.html. Designers will need to work with Khalid Obeidat of the Bridge Office when needed.
SP2016-148

S-172  (2442) REMOVAL OF EXISTING BRIDGES
Use S-.1 or S-.2 when needed and when not included in Division SB. Use S-.3 & S-.4 when have "Removal of Existing Bridge" item on grading plan. Use S-.5 when there are swallows and choose the appropriate paragraph for payment:
REVISED 08/04/16  DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.
SP2016-149

This work shall consist of the removal and disposal of inplace bridges in accordance with MnDOT 2442 and the following:

Use either of the following two paragraphs when needed and when not included in Division SB

S-172.1 The removal of existing concrete slope paving adjacent to and under Bridge No. _____ is part of the bridge removal operations and no additional compensation will be made therefore.

S-172.2 All materials removed for Bridge No. _____ shall become the property of the Contractor.

Use S-.3 & S-.4 when have "Removal of Existing Bridge" item on grading plan

S-172.3 The Contractor's 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: http://www.dot.state.mn.us/environment/regulatedmaterials/index.html. Contact Mark Vogel, Office of Environmental Stewardship, 651.366.3630 with any questions regarding the manual.

S-172.4 All material shall be removed, identified, and disposed of in accordance with Section S-1701 (LAWS TO BE OBSERVED (BRIDGE)) of these Special Provisions. The Contractor will not receive permission to begin the removals, with the exception of material needed for hazardous and regulated waste assessment or testing, until the MnDOT Project Engineer has copies of all required notices.

Use S-.5 when there are swallows and choose the appropriate paragraph for payment:

S-172.5 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. _____ 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 contact MnDOT’s Office of Environmental Stewardship (OES) to obtain the appropriate State and Federal permits. The OES contact is listed below.

Christopher E. Smith  
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: christopher.e.smith@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 1st to September 1st. 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.

Choose one of the two following paragraphs for payment method:

- 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.

- 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 paid for as Extra Work.
**SPECIAL PROVISIONS - SP2016 BOOK**

*Last Revision by CO Special Provisions: 08/04/16*

▲ DO NOT DELETE THE ABOVE REVISION DATE. This is how we tell which version of the SP2016 book you used when preparing your specs for your job.

Use the following if MnDOT will be removing or preventing nesting.

**S-172**

**BIDDERS**

Bidders are advised that prior to the Contract starting date any measures required for removal of nests or prevention of nesting will be performed by MnDOT forces.

**S-173**

**2451) STRUCTURE EXCAVATION AND BACKFILLS**

**NEW WRITEUP 11/06/15** ◄DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

In MnDOT 2451.5 Basis of Payment, the last paragraph is changed to read as follows:

The Department will pay for structure excavation and backfill in accordance with the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2451.501</td>
<td>Structure Excavation, Class ___</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.503</td>
<td>Granular Backfill ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.505</td>
<td>Aggregate Backfill ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.507</td>
<td>Granular Bedding ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.509</td>
<td>Aggregate Bedding ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.511</td>
<td>Coarse Filter Aggregate ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.513</td>
<td>Fine Filter Aggregate ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.514</td>
<td>Fine Aggregate Bedding ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.515</td>
<td>Coarse Aggregate Bedding ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2451.516</td>
<td>Conduit Aggregate Bedding ___*</td>
<td>cubic yard [cubic meter]</td>
</tr>
</tbody>
</table>

*For all granular material items, specify the basis of measure (loose volume or compacted volume) after the item name in accordance with 2451.4.B, “Granular Material.”

**S-174**

**2452) STEEL SHEET PILING (TEMPORARY)**

*When this is used check to see if it is in the Division SB also. If it is see if it is incidental. If it is you need to put in a statement in ours saying that the pay item is for the work on the grading portion only.*

This work shall consist of furnishing and driving steel sheet piling in accordance with MnDOT 2452, at the locations (and details if shown) in the Plans, and the following:

**S-174.1**

The Contractor shall design, furnish, place, and remove temporary steel sheet piling when required in the Contract or by the Engineer. The Contractor may furnish used sheet piling if it is in a condition acceptable to the Project Engineer.

At locations where the difference in ground elevation on the two sides of the sheet piling is greater than 15 feet [4.6 m], the Contractor shall submit plans for the sheet piling that have been prepared and certified by a Registered Professional Engineer in the State of Minnesota. The design criteria shall be shown on the submitted plans. At least six weeks before starting construction of the sheet piling, the Contractor shall supply the Engineer with three copies of the detailed plans and two copies of the associated calculations. Lateral support systems shall be required when retaining fills are greater than 20 feet [6 m] in height unless the Contractor's engineer can satisfactorily document they are not required.

**S-174.2**

Measurement will be made by the exposed area in square feet of exposed sheet piling that is necessary for the intended temporary use. In cases where an assumed bottom of excavation is shown in the plans and the Contractor drives the sheeting to the depth needed to retain the planned depth, measurement will be made by
the area of piling from the top of retained soil to the planned excavation level or to the actual excavation, whichever is lower (greater area). The Engineer may order a different planned exposure area prior to driving the piling based on field conditions. Except for the above, no measurement will be made for buried sheet piling nor for sheet piling that is exposed on both the front and back surfaces. Measurement will only be made for locations designated in the Contract or by the Engineer.

Payment will be made under Item 2452.618 (Steel Sheet Piling (Temporary)) at the Contract bid price per square foot, which shall be compensation in full for all costs of designing, furnishing, placing, and removing acceptable piling.

S-175 (2461) STRUCTURAL CONCRETE
Use when there is concrete on job (pavement, curb, gutter, sidewalk, barriers lighting, signing, signals, etc.). (If the job is signing, see if there is any concrete on the details. If none is shown, then this writeup is not needed.) (This writeup is not needed for RC pipe, precast concrete barriers, or precast concrete box culverts.) Always use SP2016-251 (BAGGED PORTLAND CEMENT CONCRETE PATCHING MIX GRADE 3U18 AND 3U18M) and SP2016-252 (COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE) with this writeup.

MnDOT 2461 is hereby modified as follows:

S-175.1 MnDOT 2461.2.A shall be modified to include the following:

A.5 Ternary Mixes
Ternary mixes are defined as portland cement and two other supplementary cementitious materials, or blended cement and one other supplementary cementitious material with a maximum replacement of 40% by weight.

S-175.2 MnDOT 2461.2.E shall be modified to include the following:

For all Concrete Grades shown in Table 2461-7, use any admixtures on the MnDOT Approved/Qualified Products list.

S-175.3 MnDOT 2461.2.F.1.d shall be deleted and replaced with the following:

F.1.d Coarse Aggregate Designation
Select the appropriate coarse aggregate gradation designation in accordance with Table 2461-3 based on the intended use and the gradation requirements in 3137, “Coarse Aggregate for Portland Cement Concrete.”
### Table 2461-3
Coarse Aggregate Designation for Concrete

<table>
<thead>
<tr>
<th>Designation</th>
<th>Coarse Aggregate Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Job Mix Formula (JMF) combination of fine and coarse aggregate</td>
</tr>
</tbody>
</table>

Table 3137-4, “Coarse Aggregate Designation for Concrete”

<table>
<thead>
<tr>
<th>Designation</th>
<th>Coarse Aggregate Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ASTM #467</td>
</tr>
<tr>
<td>2</td>
<td>ASTM #67</td>
</tr>
<tr>
<td>3</td>
<td>ASTM #7</td>
</tr>
<tr>
<td>4</td>
<td>ASTM #89</td>
</tr>
<tr>
<td>7</td>
<td>CA-7</td>
</tr>
<tr>
<td>8</td>
<td>CA-80</td>
</tr>
</tbody>
</table>

S-175.4 MnDOT 2461.2.F.1.e shall be deleted and replaced with the following:

**F.1.e Additional Concrete Mix Designation Digits**
The Contractor may add additional digits to the right of the required digits in the concrete mix number.

S-175.5 Table 2461-6 of MnDOT 2461.2.F.2.a shall be deleted and replaced with the following:
<table>
<thead>
<tr>
<th>Concrete Grade</th>
<th>OLD Mix Number</th>
<th>NEW Mix Number</th>
<th>Intended Use</th>
<th>Maximum w/c ratio †</th>
<th>Maximum Cementitious Content (lbs/yd³)</th>
<th>Maximum %SCM (Fly Ash/Slag/Ternary)</th>
<th>Slump Range</th>
<th>Minimum 28-day Compressive Strength, f’c</th>
<th>3137 Spec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Bridge Substructure</td>
<td>3Y43</td>
<td>3B52 *</td>
<td>Abutment, stems, wingwalls, paving brackets, pier columns and caps, CIP wall stems, pier struts</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 5&quot;</td>
<td>4000 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td>F Flatwork</td>
<td>3A22 3Y22</td>
<td>3F32 *</td>
<td>Slipform curb and gutter</td>
<td>0.42</td>
<td>750</td>
<td>30/35/0</td>
<td>½ - 3&quot; †</td>
<td>4500 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td></td>
<td>3A32 3Y22 3A43</td>
<td>3F52 *</td>
<td>Sidewalk, curb and gutter, slope paving, median sidewalk, driveway entrances, ADA pedestrian sidewalk</td>
<td>0.45</td>
<td>750</td>
<td>25/30/0</td>
<td>2 - 5&quot;</td>
<td>4500 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td>G General Concrete</td>
<td>3A43 3B42 3Y43</td>
<td>3G52 *</td>
<td>Footings, pilecap, walls, cast-in-place manholes and catch basins, fence posts, signal bases, light pole foundations, erosion control structures, cast-in-place box culverts, culvert headwalls, open flumes</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 5&quot;</td>
<td>4500 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td>M Median Barrier</td>
<td>3Y12 3M12</td>
<td>Slipform Median barrier, non-bridge</td>
<td>0.42</td>
<td>750</td>
<td>30/35/40</td>
<td>½ - 1” †</td>
<td>4500 psi</td>
<td>2.D.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3Y32 3M52</td>
<td>Median barrier, non-bridge</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 5&quot;</td>
<td>4500 psi</td>
<td>2.D.1</td>
<td></td>
</tr>
<tr>
<td>P Piling</td>
<td>1C62 1P62 *</td>
<td>Piling, leveling pads</td>
<td>0.60</td>
<td>750</td>
<td>30/35/40</td>
<td>3 - 6&quot;</td>
<td>3000 psi</td>
<td>2.D.1</td>
<td></td>
</tr>
<tr>
<td>R Pavement Rehabilitation</td>
<td>3A32 3B42</td>
<td>3R52 *</td>
<td>CPR - Full depth concrete repairs, concrete base</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 5&quot;</td>
<td>4000 psi</td>
<td>2.D.3</td>
</tr>
<tr>
<td>S Bridge Superstructure</td>
<td>3A32 3A42 3Y43 3Y46 3Y46A</td>
<td>3S52</td>
<td>Median barrier, raised median, pilaster, curb, sidewalk, approach panel, formed bridge barrier, parapet, end post, collar</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 5&quot;</td>
<td>4000 psi</td>
<td>2.D.2</td>
</tr>
<tr>
<td>X Miscellaneous Bridge</td>
<td>1X62 1X46</td>
<td>1X62</td>
<td>Cofferdam seals, rock sockets, drilled shafts</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>3 - 6&quot;</td>
<td>5000 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td></td>
<td>3X46</td>
<td>Drilled shafts above frost line</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>3 - 6&quot;</td>
<td>5000 psi</td>
<td>2.D.1</td>
<td></td>
</tr>
<tr>
<td>Y Bridge Deck #</td>
<td>3Y33 3Y33A 3Y36 3Y36A</td>
<td>3Y42-M 3Y42-S</td>
<td>Bridge decks, integral abutment diaphragms, pier continuity diaphragms, expansion joint replacement mix</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 4”</td>
<td>4000 psi</td>
<td>2.D.2</td>
</tr>
<tr>
<td></td>
<td>3YHPC-M 3YHPC-S 3YLHPC-M 3YLHPC-S</td>
<td>Bridge decks, integral abutment diaphragms, pier continuity diaphragms, expansion joint replacement mix</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 4”</td>
<td>4000 psi</td>
<td>See Special Provisions of Contract</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3A37 3Y37</td>
<td>3Y47 *</td>
<td>Deck patching mix</td>
<td>0.45</td>
<td>750</td>
<td>30/35/40</td>
<td>2 - 4”</td>
<td>4000 psi</td>
<td>2.D.2</td>
</tr>
</tbody>
</table>

* The Contractor may choose to use the Coarse Aggregate Designation “1” for the 4th digit in accordance with Table 2461-3. Mix 3Y47 requires the use of Coarse Aggregate Designation “7” or “3” for the 4th digit in accordance with Table 2461-3.

† If the intended use is not included elsewhere in the Specification or Special Provisions, use mix 3G52, unless otherwise directed by the Engineer.

‡ The minimum water/cement (w/c) ratio is 0.30.

‡ Adjust slump in accordance with 2461.3.G.7.a for slipform concrete placement.

# The “-S” indicates a bridge deck with a structural slab and “-M” indicates a monolithic bridge deck.
S-175.6 MnDOT 2461.2.F.2.b shall be deleted and replaced with the following:

**F.2.b High-Early Concrete Mix Design Requirements**

The Department defines High-Early (HE) concrete as concrete designed to achieve the minimum strength to opening at 48 hours. Unless otherwise included in the plans, all HE concrete requires approval of the Engineer prior to incorporation into the work.

Control cylinders are required for determining strength; in lieu of control cylinders the Contractor may use the maturity method in accordance with 2461.3.G.6, “Estimating Concrete Strength by the Maturity Method.”

The Department defines the concrete mix design requirements for High-Early concrete in accordance with Table 2461-7.

### Table 2461-7

**High-Early (HE) Concrete Requirements (Not applicable to Mass Concrete)**

<table>
<thead>
<tr>
<th>OLD Mix Number</th>
<th>NEW Mix Number</th>
<th>Concrete Grades Allowed</th>
<th>Minimum Time to Opening</th>
<th>Maximum w/c ratio</th>
<th>Maximum Cementitious Content (lbs/ yd$^3$) *</th>
<th>Slump Range</th>
<th>Minimum Strength to Opening</th>
<th>Minimum 28-day Compressive Strength, f'c</th>
<th>3137 Spec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A22HE</td>
<td>3HE32</td>
<td>F</td>
<td>48 hrs</td>
<td>0.42</td>
<td>750</td>
<td>1 – 3”</td>
<td>3000 psi</td>
<td>4500 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td>3A32HE, 3Y43HE</td>
<td>3HE52</td>
<td>B, F, G</td>
<td>48 hrs</td>
<td>0.42</td>
<td>750</td>
<td>2 – 5”</td>
<td>3000 psi</td>
<td>4500 psi</td>
<td>2.D.1</td>
</tr>
<tr>
<td>3Y33HE, 3Y46HE, 3Y37HE</td>
<td>3YHE52</td>
<td>Y (Repairs Only)</td>
<td>48 hrs</td>
<td>0.42</td>
<td>750</td>
<td>2 – 5”</td>
<td>3000 psi</td>
<td>4000 psi</td>
<td>2.D.2</td>
</tr>
<tr>
<td>3A32HE</td>
<td>3RHE52</td>
<td>R (Repairs Only)</td>
<td>48 hrs</td>
<td>0.42</td>
<td>750</td>
<td>2 – 5”</td>
<td>3000 psi</td>
<td>4000 psi</td>
<td>2.D.3</td>
</tr>
</tbody>
</table>

* Supplementary Cementitious Materials allowed.

|| Adjust slump in accordance with 2461.3.G.7.a for slipform concrete placement.

S-175.7 The second paragraph of MnDOT 2461.2.F.3 shall be deleted and replaced with the following:

Design the concrete mix to an absolute volume of 27.00 – 27.27 cu. ft [1.0 – 1.01 cu. m].

S-175.8 MnDOT 2461.2.F.3.a, 2461.2.F.3.a(1) and 2461.2.F.3.a(2) shall be deleted and replaced with the following:

**F.3.a Preliminary Test Data Requirements for Level 2 Mixes**

For Level 2 Mixes, submit the proposed Mix Design Proportions on the Contractor Mix Design Submittal based upon either a suitable experience record or conventional trial mixtures not to exceed the limits specified in Table 2461-6 or 2461-7.

**F.3.a(1) Suitable Experience Record**

A suitable experience record consists of at least 30 consecutive tests, or two groups of consecutive tests totaling at least 30 tests, within the previous 18 months. If the Contractor does not have 30 tests, the Concrete Engineer will consider a minimum of 10 test results representing a time period of at least 45 days.

The Concrete Engineer considers a suitable experience record to have the following characteristics as compared to the proposed mix:
(a) Average compressive strength ($f'c$) meeting the required 28-day compressive strength and no greater than 1000 psi above the required 28-day compressive strength,
(b) Same type or grade of cementitious materials,
(c) Same class of coarse aggregate,
(d) Proportions of coarse and fine aggregate within 10% of the proposed,
(e) Water/Cement ratio no greater than the maximum allowed,
(f) Supplementary cementitious material contents within 5%, and
(g) Batching conditions and testing procedures similar to those expected for the proposed work.

Submit all test results on the Strength Test Data sheet as part of the Contractor Mix Design Submittal.

The Concrete Engineer reserves the right to request batching data representing the suitable experience record submittal.

F.3.a(2) Conventional Trial Mixtures

If the Contractor does not have a suitable experience record as required in 2461.2.F.3.a(1) above, establish concrete proportions from trial mixtures, utilizing an AMRL accredited laboratory in accordance with the following:

(a) Use proportions and consistencies required for proposed work at the w/c ratios or cementitious materials content that will produce a strength meeting or exceeding the required 28-day compressive strength ($f'c$) in accordance with Table 2461-6 or 2461-7;
(b) Design trial mixtures to produce slump within ± 0.75 in. of maximum permitted;
(c) For air-entrained concrete, design trial mixtures to produce air content within ± 0.5 percent of maximum allowable air content;
(d) For each w/c ratio or cementitious materials content, make and cure at least three test cylinders for 28-day breaks in accordance with ASTM C 192. For HE concrete mixes, in addition to the 28-day cylinders, make a set of three test cylinders for 48-hour breaks in accordance with ASTM C 192.

Submit all test results for the trial mixtures, certified by the AMRL accredited laboratory, in addition to the Contractor Mix Design Submittal.

S-175.9 MnDOT 2461.2.G shall be deleted and replaced with the following:

G Department Designed Concrete Mixes

The Department will provide the mix proportions for the following concrete uses in accordance with Table 2461-10, “Department Designed Concrete Mixes”:

<table>
<thead>
<tr>
<th>Type of Concrete</th>
<th>Mix Number</th>
<th>Specification</th>
<th>Mix Design Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Batched Patching Mix</td>
<td>3U18</td>
<td>2302</td>
<td>Table 2302-1</td>
</tr>
<tr>
<td>Low Slump Concrete</td>
<td>3U17A</td>
<td>2404</td>
<td>Weekly Report of Low Slump Concrete</td>
</tr>
<tr>
<td>Grout</td>
<td>1AGrout and 3AGrout</td>
<td>2461</td>
<td>Table 2461-11</td>
</tr>
<tr>
<td>Lean Mix Backfill</td>
<td>Lean-Mix</td>
<td>2520</td>
<td>Table 2520-1</td>
</tr>
<tr>
<td>Random Riprap (Matrix)</td>
<td>3AGrout</td>
<td>2511</td>
<td>Special Provisions</td>
</tr>
<tr>
<td>Bagged Patching Mix</td>
<td>3U18 and 3U18M</td>
<td>3105</td>
<td>Table 3105-1</td>
</tr>
</tbody>
</table>
Table 2461-11
Concrete Mix Design Requirements for Grout Mixes

<table>
<thead>
<tr>
<th>Grout Mix Number*</th>
<th>Maximum w/c ratio</th>
<th>Water Content (pounds)</th>
<th>Cement Content (pounds)</th>
<th>Fine Aggregate Calculation (pounds)</th>
<th>%Air Content</th>
<th>Maximum Slump</th>
<th>Minimum 28-day Compressive Strength, f’c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1AGROUT</td>
<td>0.50</td>
<td>379</td>
<td>758</td>
<td>1031 x Specific Gravity</td>
<td>3.0%</td>
<td>As needed</td>
<td>4000 psi</td>
</tr>
<tr>
<td>3AGROUT</td>
<td>0.44</td>
<td>379</td>
<td>865</td>
<td>878 x Specific Gravity</td>
<td>10.0%</td>
<td>As needed</td>
<td>4000 psi</td>
</tr>
</tbody>
</table>

* Do not provide grout containing coarse aggregate or fly ash.

S-175.10 MnDOT 2461.3.F.1.a(3) shall be deleted and replaced with the following:

(3) Include a site map showing stockpile locations identified with the MnDOT pit number.

S-175.11 MnDOT 2461.3.F.1.b shall be deleted and replaced with the following:

F.1.b Maintaining Plant Certification

The Producer will maintain plant certification by:

(1) Notifying the Department of any upcoming cementitious or admixture changes;
(2) Updating the Contact Report with any material or equipment changes and submitting to the Department;
(3) Sampling and testing the materials in accordance with this section and the requirements of the Schedule of Materials Control;
(4) Documenting the production and testing of the materials used in the certified ready-mix concrete.

Any procedural changes that cause non-compliance with this program may result in decertification of the plant and cessation of further production of Department concrete as determined by the Concrete Engineer in accordance with 2461.3.F.4.h, “Decertification.”

S-175.12 MnDOT 2461.3.F.4.g shall be deleted and replaced with the following:

F.4.g Signing the Certificate of Compliance

The Producer’s MnDOT Certified Plant Level 1 or Level 2 technician will:

(1) Review the first Certificate of Compliance for each mix type, each day, for accuracy; and
(2) Legibly hand sign the Certificate of Compliance at a location designated for Producer signature signifying agreement to the terms of this program and to certify that the materials comply with the requirements of the Contract; and
(3) Write their MnDOT Technical Certification Number next to their signature.

S-175.13 Delete the Title of Table 2461-17 of MnDOT 2461.3.G.5.e and replace with the following:

Table 2461-17
Acceptance Criteria for Standard 28-day Cylinders

S-175.14 Delete MnDOT 2461.3.G.5.e(4) and replace with the following:
G.5.e(4) Non-Conforming Material

If the Contractor inadvertently places concrete not meeting the strength requirements into the work, the Engineer will not accept nonconforming concrete at the contract unit price. For concrete not meeting the moving average of three (3) consecutive strength tests, the Engineer will adjust the contract unit price for the contract item of the concrete in accordance with Tables 2461-19 for Concrete Grades F, G, M, P and R.

For Concrete Grades B, S, X and Y strength failures the Engineer, in conjunction with the Concrete Engineer, will determine adjusted contract unit prices in accordance with 1503, “Conformity with Contract Documents,” and 1512, “Unacceptable and Unauthorized Work.”

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.

<table>
<thead>
<tr>
<th>Moving average of 3 consecutive strength tests</th>
<th>Adjusted Contract Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 93.0% of f’c</td>
<td>The Department will pay 87.5 percent of the relevant contract unit price for materials placed as approved by the Engineer.</td>
</tr>
<tr>
<td>≥ 87.5% and ≤ 93.0% of f’c</td>
<td>The Department will pay 75 percent of the relevant contract unit price for materials placed as approved by the Engineer.</td>
</tr>
<tr>
<td>&lt; 87.5% of f’c</td>
<td>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.</td>
</tr>
</tbody>
</table>

S-175.15 MnDOT 2461.3.G.6.a and 2461.3.G.6.a(1) shall be deleted and replaced with the following:

G.6.a Development of Maturity-Strength Relationship

The Engineer will allow development of the maturity curve in either the laboratory or in the field, provided the precautions for field curing and testing are followed, as described in the MnDOT Concrete Manual. Test the concrete strength specimens for development of the maturity curve.

Determine the strength development criteria based on the type of concrete in accordance with the following:

1. For concrete pavement: 2301.3.O, “Opening Pavement to Traffic,”
4. For sidewalks, driveway entrances and curb and gutter, a minimum of 3000 psi [20.6 MPa] is required.

Until an acceptable strength-maturity relationship is established, verify strength using concrete beams or cylinders.
G.6.a(1) Procedure

Estimate the in-place concrete strength using the maturity method as described in ASTM C 1074, except as noted in this specification as follows:

(a) Using 15 beams or 17 cylinders;
(b) The Nurse-Saul method of computing maturity;
(c) A datum temperature of -10°C (14°F);
(d) Maintain specimens at temperatures greater than 50° F for the duration of the maturity curve development.

Test three (3) strength specimens at five different ages specified in Table 2461-20 for the type of concrete work.

<table>
<thead>
<tr>
<th>Table 2461-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronological Testing Ages of Strength Specimens</td>
</tr>
<tr>
<td>Type of Concrete</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Concrete Pavement as defined in 2301</td>
</tr>
<tr>
<td>Normal Strength Concrete as defined in 2461</td>
</tr>
<tr>
<td>High-Early (HE) Concrete as defined in 2461</td>
</tr>
<tr>
<td>Ultra High-Early (UHE) Concrete as defined in 2302</td>
</tr>
</tbody>
</table>

* The Contractor may adjust the testing ages if approved by the Engineer, in conjunction with the Concrete Engineer. Test at least two (2) sets of strength specimens before the anticipated opening strength.

S-175.16 The first paragraph of MnDOT 2461.3.G.6.c shall be deleted and replaced with the following:

Perform a verification strength test to ensure the in-place concrete strength correlates with the maturity-strength relationship as follows:

(1) Notify the Engineer at least 24 hours in advance of the time and location of both the verification specimen’s casting and strength testing.
(2) When the maturity curve is developed prior to the start of construction or in a laboratory, perform a verification strength test on the first day of concrete placement.
(3) Perform a verification strength test at least once every seven (7) calendar days during normal plant production.
(4) If the plant has not supplied concrete to the project for a period of greater than thirty (30) calendar days, perform a verification strength test.
(5) Cast 3 beams or 4 cylinders for each verification strength test.
(6) The Engineer will test the concrete strength specimens for verification of the maturity curve as close to the maturity value determined to represent the opening, loading or form removal strength criteria in accordance with section 5-694.500 of the Concrete Manual.
(7) Record the results of verification test on the Concrete Maturity-Strength Verification form and submit an updated copy with the newest test result to the Engineer the day that the verification test is completed.
(8) The Engineer may direct additional verification testing as necessary.
(9) Submit electronic data from the maturity meters or temperature loggers in a comma-delimited (.txt or .csv) file format to the Engineer, which includes at least the project number, date and location of the meters or loggers.
S-175.17 MnDOT 2461.3.G.6.d(2) shall be deleted and replaced with the following:

(2) Increase in the water-cementitious materials ratio by more than 0.02,

S-175.18 Delete the Title of Table 2461-23 of MnDOT 2461.3.G.7.b and replace with the following:

Table 2461-23
All Concrete Grades (Excludes Grade Y)

S-175.19 Delete the Title of Table 2461-24 of MnDOT 2461.3.G.7.b and replace with the following:

Table 2461-24
Bridge Deck Concrete, Grade Y

S-175.20 Delete the Title of Table 2461-27 of MnDOT 2461.3.G.8.a and replace with the following:

Table 2461-27
General Concrete (Target Air Content 6.5%)

S-176 (2462) PRECAST CONCRETE
Use when there any precast concrete products on the job (bridge girders, noisewall posts or panels, box culverts, retaining wall blocks, RC pipe, precast concrete barrier, etc.) Always use SP2016-252 (COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE) with this writeup.

SP2016-152 MnDOT 2462 is hereby modified as follows:

S-176.1 MnDOT 2462.2.A shall be modified to include the following:

A.5 Ternary Mixes
Ternary mixes are defined as portland cement and two other supplementary cementitious materials, or blended cement and one other supplementary cementitious material with a maximum replacement of 40% by weight.

S-176.2 MnDOT 2462.2.F.1 shall be deleted and replaced with the following:

F.1 Classification of Concrete
The Department will classify concrete by mix number to identify type, grade, consistency and aggregate size, if any, in accordance with Table 2462-1.

Table 2462-1
Mix Number Identification

<table>
<thead>
<tr>
<th>First Digit</th>
<th>Second Digit</th>
<th>Third Digit</th>
<th>Fourth Digit</th>
<th>Additional Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Designation</td>
<td>Grade Designation</td>
<td>Maximum Slump</td>
<td>Coarse Aggregate Gradation Designation</td>
<td>Additional Digits Allowed</td>
</tr>
</tbody>
</table>

S-176.3 MnDOT 2462.2.F.1.d shall be deleted and replaced with the following:

F.1.d Coarse Aggregate Designation
Select the appropriate coarse aggregate gradation designation in accordance with Table 2462-3 based on the intended use and the gradation requirements in 3137, “Coarse Aggregate for Portland Cement Concrete.”

<table>
<thead>
<tr>
<th>Designation</th>
<th>Coarse Aggregate Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Job Mix Formula (JMF) combination of fine and coarse aggregate</td>
</tr>
<tr>
<td>1</td>
<td>ASTM #467</td>
</tr>
<tr>
<td>2</td>
<td>ASTM #67</td>
</tr>
<tr>
<td>3</td>
<td>ASTM #7</td>
</tr>
<tr>
<td>4</td>
<td>ASTM #89</td>
</tr>
<tr>
<td>7</td>
<td>CA-70</td>
</tr>
<tr>
<td>8</td>
<td>CA-80</td>
</tr>
</tbody>
</table>

MnDOT 2462.2.F.1.e, 2462.2.F.1.f and 2462.2.F.1.g shall be deleted and replaced with the following:

**F.1.e Additional Concrete Mix Designation Digits**
The Contractor may add additional digits to the right of the required digits in the concrete mix number.

Table 2462-6 of MnDOT 2462.2.F.2.a shall be deleted and replaced with the following:
## Table 2462-6

| Concrete Grade | OLD Mix Number | NEW Mix Number | Intended Use * | Maximum w/c ratio | Maximum %SCM (Fly Ash/ Slag/ Ternary) | Slump Range || Minimum 28-day Compressive Strength, f’c † ‡ | 3137 Spec. |
|----------------|----------------|----------------|----------------|-------------------|---------------------------------------|----------|--------------------------|-------------|
| M              | 3Y32           | 3M82           | Precast concrete barrier | 0.45              | 30/35/40                             | 1 – 8”   | 4500 psi                | 2.D.1       |
| W              | 1W36           | 1W82           | Bridge girders ‡ | 0.42              | 30/35/40                             | 1 – 8”   | Design Strength Per Plan | 2.D.1       |
|                | 3W26           | 3W82           | Noisewall posts, box culverts, bridge girders ‡ | 0.42              | 30/35/40                             | 1 – 8”   | Design Strength Per Plan | 2.D.1       |
|                | 3W36           | 3W82           |                       |                   |                                      |          |                          |             |
|                | 3W46           | 3W82           |                       |                   |                                      |          |                          |             |
| Y              | 3Y43           | 3Y82           | Jumbo retaining wall blocks, MSE walls, noisewall panels | 0.45              | 30/35/40                             | 1 – 8”   | 4300 psi                | 2.D.1       |
|                | 3Y43           | 3Y82           | Thin panel retaining walls | 0.45              | 30/35/40                             | 1 – 8”   | 4300 psi                | 2.D.2       |

* If the intended use is not included elsewhere in the Specification or Special Provisions, design concrete mix 3W82.

† ‡ Slumps exceeding the maximum allowed require approval of the MnDOT State Materials Engineer.

† Requires control cylinders for determining shipping strength.

‡ Review the Plans to determine if the bridge girders require air entrainment.
S-177  (2471) STRUCTURAL METALS

Use for jobs that have structural metals on them. Use S-.1 and S-.2 if there is a Division SB (with no 2471 in it), SL, SS, and/or ST. If there is a Division SB and it has 2471 in it, use our S-.3 ONLY. Do not use on signing only jobs when there are only Type C and/or Type D signs on them.

SP2016-153

The provisions of MnDOT 2471 are modified with the following:

S-177.1 The entire section of MnDOT 2471.3.B.3, "Submittal for Engineer’s Review and Approval," is deleted and replaced with the following:

Designer: Select one of the two sentences depending on who is reviewing shop drawings. For T.H. projects all shop drawings go to Fabrication Methods Engineer. For Local projects shop drawings go to Fabrication Methods Engineer or consultant engineer depending on owner preference. Insert one of the following below:

Submit shop drawings from Fabricators directly to the MnDOT Bridge Office at:
MnDOT Bridge Office
Fabrication Methods Engineer
3485 Hadley Ave. North
Oakdale, MN 55128

- OR -

Submit shop drawings from the Fabricator directly to ____________ at: _____________________

Submit two sets of prints of required shop detail drawings, meeting 2471.3.B.2, “Format,” from the fabricator to the Engineer for review and release for fabrication. Shop drawings must comply with the contract documents. Provide written authorization from the design EOR (Engineer of Record) for any deviation from the contract documents. Incorporate all contractor comments into shop drawings prior to submission to reviewer. The reviewer will return one set of prints of the shop detail drawings to the Fabricator with comments.

Submit only checked drawings, in complete collated sets, from the fabricator for review. The Contractor may submit details such as ice-breakers, anchorages, bearing plates, and castings, separately to facilitate the work.

Fabricator may submit the shop drawings to the Contractor. Stamp these drawings with "For Contractor Use Only". Do not forward these stamped drawings to MnDOT.

Submit a schedule showing the submission dates of shop drawings and anticipated dates for shop fabrication from the fabricator, as directed by the Engineer. Arrange the schedule to avoid delay in completing the work. If constructing a structure composed of several units, consider submitting shop detail drawings of the separate units in proper order to expedite the review and release for fabrication of the details.

If the Engineer requests changes to the submitted drawings or if the fabricator makes additional changes not required by the Engineer, provide revised drawings, with revision control, from the fabricator with circles, underscores, or other marks to distinguish the changes from unchanged details or dimensions.
The Engineer will release shop detail drawings for fabrication after corrections are completed. Provide six sets of corrected drawings and additional copies as required by the contract or requested by the Engineer from the fabricator at no additional cost to the Department. Mark the corrected drawings as Revision 0 and remove all comments and marks to make clean drawings for approval, stamping and distribution for use.

The shop drawings approved by the Engineer will become part of the Contract. Do not make changes on approved drawings unless otherwise approved by the Engineer in writing. Mark changes approved by the Engineer on the approved shop drawings with revision version in sequence next to all changes and resubmit them for approval, stamping as revised sheet and distributing to replace the superseded version of drawings.

The Engineer’s approval of shop drawings will not relieve the Contractor of full responsibility for submission of complete and accurate drawings and for the accurate assembly and fitting of all structural members.

S-177.2 The entire section of MnDOT 2471.3.M.1.d, "Radiographic Testing (RT)," is deleted and replaced with the following:

Provide Computed Radiography (CR) or Digital Radiography (DR) in lieu of conventional radiography. The Department will retain ownership of radiographic images provided by the Contractor. Name image files with bridge number and weld identification shot number.

Electronic Radiography method(s) consist of CR utilizing Storage Phosphor Imaging Plate (SPIP) or DR utilizing a Digital Detector Array (DDA).


Ensure SPIP and DDA widths are sufficient to depict all portions of the weld joint, including the HAZs, and provide sufficient additional space for the required hole-type or wire-type IQIs and radiograph identification without infringing upon the area of interest.

Ensure all radiographs radiographic images are free from mechanical, chemical, or other blemishes to the extent that they cannot mask or be confused with the image of any discontinuity in the area of interest in the radiograph. Such blemishes include, but are not limited to the following:

1. False indications due to defective plates or internal faults; and
2. Artifacts due to non-functional pixels.

Ensure the contrast and brightness range that demonstrates the required sensitivity be considered valid contrast and brightness values for interpretation. When multiple IQIs are utilized to cover different thickness ranges the contrast and brightness range that demonstrates the required IQI image of each IQI is determined. Intervening thicknesses may be interpreted using the overlapping portions of the determined contrast and brightness ranges. When there is no overlap, additional IQI(s) are to be used.

When performing CR or DR, ensure a measuring scale is utilized to serve as a length reference. The scale is to be attached to the SPIP holder or DDA prior to exposure. As an alternative, when using
SPIPs a transparent scale with opaque gradations may be placed on the SPIP prior to processing. In any case, the reference comparator cannot interfere with interpretation of the image.

Provide a work station monitor for evaluating images equipped with a display resolution with a pixel count which is at least equal to the pixel count of the direct imaging plate.

Archive images using a reproducible electronic medium. Provide data file format and storage that comply with ASTM E2339, "Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE)" format. Documented and prove the image archival method (at system installation). Include the image file nomenclature to enable the retrieval of images at a later date. Archived image files must maintain the bit depth and spatial resolution of the original image. Image data compression is not allowed. Preserve (store) the initial image presented by the CR or DR system without altering the original spatial resolution and pixel intensity. Preserve (store) the final image used for disposition when additional image processing is applied (excluding window/level and digital image zoom) to achieve the required image quality level. Store annotations made to the image in a manner which will not mask or hide diagnostic areas of the image.

Only use S-.3 if there is a Division SB and it has 2471 in it.

S-177.3 The Contractor is hereby referred to Section SB-__ (STRUCTURAL METALS) in Division SB which is attached to this Proposal. The provisions in SB-__ (STRUCTURAL METALS) shall be applicable to the entire Contract.

S-178 (2501) PIPE TIES

This work shall consist of furnishing and installing Pipe Ties in accordance with MnDOT 2501 and the following:

S-178.1 The work shall consist of drilling the necessary holes, furnishing and installing the pipe ties and covering the exposed portion of the pipe joints with an 18 inch [460 mm] wide strip of geotextile fabric and mastic on the culverts listed in the Plan.

S-178.2 Measurement will be made in the field by the number of pipe ties furnished and installed as directed. Payment will be made under Item 2501.602 (Pipe Ties) at the Contract bid price per each, which shall be compensation in full for all equipment, material and labor required to complete the work.

S-179 (2501) BULKHEAD CULVERT

This work shall consist of constructing a concrete bulkhead across part of an existing outlet apron as shown on Sheet No. __ of the Plan, in accordance with the applicable MnDOT Standard Specifications and the following:

Measurement will be made by the number of bulkheads constructed complete in place as specified. Payment will be made under Item 2501.602 (Bulkhead Culvert) at the Contract bid price per each, which shall be payment in full for all costs involved.
S-180  **(2501) PLUG FILL AND ABANDON PIPE CULVERT**  
SP2016-156  
This work shall consist of plugging and abandoning in place centerline pipe culverts in accordance with the applicable MnDOT Standard Specifications and the following:

S-180.1 The pipes shown in the Plan to be plugged and abandoned shall be filled with sand and the ends plugged to the satisfaction of the Engineer.

S-180.2 Measurement will be made by the number of pipes plugged and abandoned as specified. Payment will be made under Item 2501.602 (Plug Fill and Abandon Pipe Culvert) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto.

S-181  **(2501) TRASH GRATE FOR BOX CULVERT**  
SP2016-157  
This work shall consist of furnishing and installing a Trash Grate as shown on Sheet No. ___ of the Plans, in accordance with the applicable MnDOT Standard Specifications and the following:

Measurement will be made by the number of grates furnished and installed as specified. Payment will be made under Item 2501.602 (Trash Grate for Box Culvert) at the Contract bid price per each, which shall be payment in full for all costs involved.

S-182  **(2501) SAFETY APRON**  
*Only need to use when have alternates listed on the Plan for safety aprons. When have alternates those pay items will be 2501.602 (__ mm [""] Safety Apron).*  
SP2016-158  
This work shall consist of furnishing and installing safety aprons as shown in the Plan, in accordance with the applicable MnDOT Standard Specifications and the following:

S-182.1 Material options for this Project are listed in the Plan.

S-182.2 Measurement will be made by the number of safety aprons furnished and installed as specified. Payment will be made under Item 2501.602 (__ in [mm] Safety Apron) at the Contract bid price per each, which shall be payment in full for all costs involved.

S-183  **(2501) SAFETY GRATE**  
SP2016-159  
This work shall consist of furnishing and installing safety grates as shown on Sheet No. ___ of the Plans, in accordance with the applicable MnDOT Standard Specifications and the following:

Measurement will be made by the number of safety grates furnished and installed as specified. Payment will be made under Item 2501.602 (Safety Grate for __" ___ Apron) at the Contract bid price per each, which shall be payment in full for all costs involved.
S-184 **(2501) CLEAN PIPE CULVERT**  
SP2016-160  
This work shall consist of cleaning out, removing, and disposing of the earth and debris within the existing culvert. This work shall be done in accordance with the applicable provisions of MnDOT 2104, MnDOT 2501, at the location shown in the Plan, and the following:

S-184.1 The size of the existing culvert is __________.

S-184.2 The culvert shall be cleaned to the satisfaction of the Engineer. MnDOT forces will inspect the structural condition of the culvert after cleanout to determine if any repairs are necessary. The Contractor shall make any repairs necessary to the culvert as directed by the Engineer and such repairs, if required, will be paid for as Extra Work as provided in MnDOT 1402.5.

S-184.3 Measurement will be made by the linear foot [meter] of existing culverts cleaned as specified.

S-184.4 Payment will be made under Item 2501.603 (Clean Pipe Culvert) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs relative thereto.

S-185 **(2501) PIPE CULVERTS**  
SP2016-161  
This work consists of furnishing and installing pipe culverts and fittings in accordance with the Plans, the applicable MnDOT Standard Specifications, Section 12 of the AASHTO LRFD Bridge Design Specifications, the attached detail "PLASTIC PIPE INSTALLATION REQUIREMENTS", and the following:

Use S-.1 if pipe options are allowed or when needed.

S-185.1 Pipe options for this Project are listed in the Plan.

S-185.2 MEASUREMENT  
Measurement will be made by the length of pipe culvert furnished and installed as specified.

S-185.3 PAYMENT  
Payment for pipe culverts will be made in accordance with the schedule set forth below at the appropriate Contract unit bid price for each separate item of work, which shall, in each instance, be compensation in full for the costs of all materials, equipment, and labor required to complete the work as specified, to the satisfaction of the Engineer.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2501.603</td>
<td>__ in [mm] Pipe Culvert</td>
<td>linear foot [meter]</td>
</tr>
</tbody>
</table>

S-186 **(2502) SUBSURFACE DRAINS**  
Do not use S-.2 if the District has modified how the subcut drain will be paid for.

SP2016-162  
MnDOT 2502 is hereby modified as follows:

S-186.1 MnDOT 2502.4D is changed to read:

The CS oversleeves with rodent guards shall be incidental.
**SPECIAL PROVISIONS - SP2016 BOOK**  
*Last Revision by CO Special Provisions: 08/04/16*

**S.186** The provisions of MnDOT 2502.5, “Basis of Payment,” are supplemented as follows:

Regardless of option chosen, payment for Subcut Drain Type will be under Item 2502.541 (4 in [100 mm] Perforated TP Pipe Drain) at the Contract bid price per linear foot [meter].

---

**S-187** *(2502) INTERCEPTOR DRAINS*

*SP2016-163*

Install narrow, aggregate-filledInterceptor Drains, as described herein, and as shown in the Plan, at the end of each pavement joint and at mid-panel cracks, or at other major cracks as designated by the Engineer. These trenches connect into the Subsurface Drains (Permeable Aggregate Base Type) and permit water collecting in the joints and cracks to drain to the adjacent drainage system.

---

**S-187.1** MATERIAL REQUIREMENTS

**(A) Aggregate**

Provide aggregate complying with the following requirements:

1. General

   Provide aggregate for backfilling the drainage trenches composed of naturally rounded sand and gravel. The maximum crushing amount is 15 percent. Recycled materials are not permitted.

2. Gradation

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 inch</td>
<td>100</td>
</tr>
<tr>
<td>3/8 inch</td>
<td>50 - 95</td>
</tr>
<tr>
<td>No. 4</td>
<td>20 - 60</td>
</tr>
<tr>
<td>No. 10</td>
<td>0 - 15</td>
</tr>
<tr>
<td>No. 40</td>
<td>1 - 4</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 - 2.0</td>
</tr>
</tbody>
</table>

3. Quality

   The maximum amount of shale or other soft rock for the portion retained on the No. 4 sieve is 5 percent by weight. The maximum carbonate content is 55 percent by weight.

---

**S-187.2** CONSTRUCTION REQUIREMENTS

Cut trenches for the interceptor drains 4 to 6 inches in width, centered on the joint or crack, cut normal to the pavement edge and installed prior to placing a stress relief layer or any other overlaying work. Cut trenches 2 inches deeper than the adjacent pavement and running the full-depth from the inplace pavement edge to at least 4 inches beyond the edge of the unbonded concrete overlay. (This length will thus extend at least 4 inches into the zone of the subsurface drain and will provide a connection once the drain is installed.)

Clean all soil or debris from the exposed pavement crack or joint prior to backfilling the trench. The Engineer will approve the method and extent of joint/crack cleaning. Vibratory backfill to the satisfaction of the Engineer. Backfill any void space at the top of the trench.
S-187.3  MEASUREMENT AND PAYMENT
Measurement will be by the number of Interceptor Drains satisfactorily installed. Payment will be made under Item 2502.602 (Construct Interceptor Drain) at the Contract bid price per each, and is full compensation for cutting trench, cleaning joint/crack face, furnishing and compacting backfill, and all other associated work.

S-188  BLANK
DELETED 08/28/15
SP2016-164

S-189  (2503) PIPE SEWERS
Use S-.1 and S-.2 if pipe options are allowed or when needed.

SP2016-165
This work shall consist of furnishing and installing pipe sewers and fittings in accordance with the Plans, the applicable MnDOT Standard Specifications, Section 12 of the AASHTO LRFD Bridge Design Specifications, the attached detail "PLASTIC PIPE INSTALLATION REQUIREMENTS", and the following:

Use S-.1 if pipe options are allowed or when needed.
S-189.1  Pipe Sewer options for this Project are listed in the Plan.

Use S-.2 if pipe options are allowed or when needed.
S-189.2  If pipe options are allowed, measurement and payment will be made by the length and type of pipe indicated on the Plan, regardless of the type of material installed. No adjustments for any additional work required by the Contractor choice of material.

S-190  (2503) CONNECT TO EXISTING STORM SEWER

SP2016-166
This work consists of constructing connections into existing storm sewers 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 under Item 2503.602 (Connect to Existing Storm Sewer) 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 connect the proposed drainage structure to the existing storm sewer pipe. Any damage caused to the existing storm sewer pipe shall be repaired at no expense to the Department and to the satisfaction of the Engineer.

S-191  (2503) CONSTRUCT BULKHEAD

SP2016-167
This work shall consist of constructing an 8 inch [200 mm] minimum thickness masonry or concrete bulkhead in the end of an existing sanitary sewer and existing city lines tunnel, as shown on Sheet No. of the Plans, in accordance with the applicable MnDOT Standard Specifications and the following:

Measurement will be made by the number of bulkheads constructed as specified. Payment will be made under Item 2503.602 (Construct Bulkhead) at the Contract bid price per each, which shall be payment in full for all costs involved, including if necessary, temporary pumping.
S-192  **(2503) SLOTTED DRAIN**  
SP2016-168  
This work shall consist of constructing slotted drain in accordance with the provisions of MnDOT 2503, the details shown in the Plans, and the following:

Measurement will be made by the length of slotted drain constructed complete in place as specified. Payment will be made under Item 2503.603 (in [mm] CS Slotted Drain) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved.

S-193  **(2503) PLUG FILL AND ABANDON PIPE SEWER**  
SP2016-169  
This work shall consist of plugging and abandoning in place pipe sewers in accordance with the applicable MnDOT Standard Specifications and the following:

S-193.1 The pipes shown in the Plan to be plugged and abandoned shall be filled with sand and the ends plugged to the satisfaction of the Engineer.

S-193.2 Measurement will be made by the length of pipes plugged and abandoned as specified. Payment will be made under Item 2503.603 (Plug Fill and Abandon Pipe Sewer) at the Contract bid price per linear foot, which shall be compensation in full for all costs incidental thereto.

S-194  **(2503) 18" STEEL CASING PIPE**  
SP2016-170  
This work shall consist of furnishing and installing 18 inch steel casing pipe at Stations ___+___ and ___+___ to allow for the future extension of sanitary sewer and water main.

S-194.1 The casing pipe shall be welded steel pipe (new material) with a minimum yield of 35,000 psi [241 300 kPa]. The wall thickness shall be a minimum of 0.250 inch [6 mm].

S-194.2 Measurement will be made by the length of steel casing pipe installed as specified. Payment will be made under Item 2503.603 (in [mm] Steel Casing Pipe) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto including the brick and mortar bulkheads as specified in the Plan.

S-195  **(2504) CHANGES IN CITY UTILITY SYSTEM**  
*Use S-.5 only with a municipal agreement.*  
SP2016-171  
This work shall consist of furnishing materials, equipment, and labor for modifications of the City of ________ utility systems as required by the Plans, including but not limited to the excavation and subsequent backfill necessary to expose the watermains, sewers, etc. for the purpose of disconnecting or connecting to the new work. The work shall be performed in accordance with: 1) the applicable provisions of MnDOT Standard Specifications; 2) the current standard practices and specifications of the City, and the following:

S-195.1 The work to be done under these pay items are on water facilities owned by the City of ________. The work shall be done in accordance with the specifications and requirements of the City. It shall be the Contractor's responsibility to determine those requirements. Bidders should obtain a copy of the City's Watermain Specifications from the Office of the City Engineer. The Contractor shall notify the Engineer and the City at least 24 hours in advance of doing the work to enable the City to have a representative at the construction site. All work done under these items shall be completed to the satisfaction of the Engineer.
All materials required to complete the revisions to the utility systems included in this Contract shall conform to the respective material specifications of the City.

Completed work shall be subject to inspection by the Engineer at a reasonable time before backfilling. Any deficiencies detected by testing, and/or inspection, shall be corrected by the Contractor at his/her own expense prior to backfilling the excavation, all to the satisfaction of the Engineer.

The carrier pipe (water main) shall be set on cradles within the casing pipe. The annular space around the carrier pipe and within the casing pipe shall be blown full with buckshot gravel and the ends of the casing pipe then bulkheaded with an 8 inch [200 mm] minimum thickness of concrete, all to the satisfaction of the Engineer.

Use S-.5 only with a municipal agreement.

The Contractor is hereby informed that MnDOT has entered into an agreement with the City of_____________ for the City to perform the inspection of the work performed on the City's utilities. The responsibility of the City Inspector shall not extend to modifying the Contract.

The MnDOT Project Engineer will retain the exclusive right to determine if the Contractor has satisfactorily preformed the work covered by this Special Provision.

It is suggested that the Contractor use MnDOT 1516.1 (Partial Acceptance) as work is completed.

MEASUREMENT

(A) Items of work to be paid for by the each will be measured by the number of each separate item constructed complete in place as specified.

(B) Items of work to be paid for by the linear foot [meter] will be measured by the length of each separate size or type of work furnished and installed complete in place as specified.

(C) Items of work to be paid for by the inch [mm] will be measured by the length thereof constructed as specified.

(D) Items of work to be paid for by the pound [kilogram] will be measured by the weight [mass] thereof furnished and installed as specified.

PAYMENT

Payment 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.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
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<tr>
<td>Insert Items here</td>
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(2504) RELOCATE HYDRANT AND VALVE

This work shall consist of relocating hydrants and valves with housings after extending the leads, at a location outside of the roadbed, as directed by the Engineer, in accordance with the following:

All additional materials furnished under this specification shall be new and like in kind to that in place.
S-196.2 Prior to relocation, the hydrant and gate valve shall be cleaned of all foreign matter and after installation shall be disinfected in accordance with the procedures described in paragraphs No.’s 1227 and 1228 of Section XII "Manual of Water Supply Sanitation" of the Minnesota Department of Health.

S-196.3 Hydrant and valve relocation will be measured by the number of hydrants installed complete with gate valve and housing as specified. Payment will be made under Item 2504.602 (Relocate Hydrant and Valve) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto including, but not limited to, any additional water leads, drain pits, concrete blocking, extensions, risers or fittings necessary to complete the relocation.

S-197 (2504) INSTALL HYDRANT

SP2016-173

This work shall consist of installing hydrants after extending the cast iron leads, including appurtenant gate valves and housings, at a new location outside the roadbed as directed by the Engineer.

S-197.1 All materials furnished under this specification shall be new and like in kind to that in place.

S-197.2 Prior to its installation, the hydrant and gate valve shall be cleaned of all foreign matter and after installation shall be disinfected in accordance with the procedures described in paragraphs No.’s 1227 and 1228 of Section XII "Manual of Water Supply Sanitation" of the Minnesota Department of Health.

S-197.3 Hydrant installation will be measured by the number of hydrants installed complete with gate valve and housing as specified. Payment will be made under Item 2504.602 (Install Hydrant) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto including, but not limited to any additional water leads, drain pits, concrete blocking, extensions, risers or fittings necessary to complete the new installation.

S-198 (2504) INSTALL VALVE AND BOX

SP2016-174

This work shall consist of installing a valve and box that was salvaged from an adjacent location in accordance with the applicable MnDOT Standard Specifications, as detailed in the Plan, and the following:

S-198.1 Prior to installation, the valve and box shall be cleaned of all foreign matter and after installation shall be disinfected in accordance with the standard procedures of the Minnesota Department of Health.

S-198.2 Measurement will be made by the number of valves and boxes installed as specified. Payment will be made under Item 2504.602 (Install Valve and Box) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto to install the valve and box complete and inplace.
S-199 (2504) ADJUST VALVE BOX - WATER
SP2016-175

This work shall consist of adjusting existing valve boxes to new surface elevations without changing the elevation of the valves. The work shall be performed to the satisfaction of the Engineer in accordance with the following:

Measurement will be made by the number of boxes adjusted. Payment will be made under Item 2504.602 (Adjust Valve Box - Water) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto including, but not limited to, furnishing extensions as required and replacing any materials damaged by the Contractor's operations.

S-200 (2504) ADJUST CURB BOX
SP2016-176

This work shall consist of adjusting curb boxes to the new surface in accordance with the applicable MnDOT Standard Specifications, as detailed in the Plan, and the following:

S-200.1 The Contractor shall do the work in accordance with the specifications and requirements by the City of ________________. The Contractor shall notify the City in advance of doing this work to determine any additional requirements and to allow the City to have a representative on site as follows:

*Insert name and phone number of city representative here*

S-200.2 Measurement will be made by the number of curb boxes adjusted as specified. Payment will be made under Item 2504.602 (Adjust Curb Box) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto for adjusting curb boxes to the new surface to the satisfaction of the Engineer. Any damage to the items as a result of the Contractor's operations shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

S-201 (2504) 18" STEEL CASING PIPE
SP2016-177

This work shall consist of furnishing and installing 18 inch [450 mm] steel casing pipe at Stations ___+__ and ___+__ to allow for the future extension of sanitary sewer and water main.

S-201.1 The casing pipe shall be welded steel pipe (new material) with a minimum yield of 35,000 psi [241 300 kPa]. The wall thickness shall be a minimum of 0.250 inch [6 mm].

S-201.2 Measurement will be made by the length of steel casing pipe installed as specified. Payment will be made under Item 2504.603 (__ in [mm] Steel Casing Pipe) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto including the brick and mortar bulkheads as specified in the Plan.

S-202 (2504) POLYSTYRENE INSULATION
SP2016-178

This work shall consist of furnishing and installing ___ inch [__ mm] thick insulation board above the __________ at the locations designated in the Plan. This work shall be performed in accordance with the details shown in the Plans, the applicable MnDOT Standard Specifications, and the following:

S-202.1 The insulation board shall be rigid expanded polystyrene conforming to the material requirements of MnDOT 3760. Styrofoam S.M. and Styrofoam TG brand insulation is an approved insulation material.
S-202.2 The insulation material shall be furnished in panels 1 inch [25 mm] thick and shall be placed on a smooth level foundation in a staggered manner that will provide joint overlaps a minimum of 6 inches [150 mm] on the underlying sheets and the edges shall be trim and square. A minimum of two (2) wood skewers per board in each layer driven flush with the surface of the material shall be utilized to hold the insulation material in place during the backfill operations.

S-202.3 The placement of the backfill material over the insulation board and compaction thereof shall be accomplished in a manner that will preclude damage to the insulation material. Construction equipment of any kind shall not operate directly on the insulation board. Sections of insulation board damaged by the Contractor's construction operations shall be replaced at the Contractor's own expense.

S-202.4 Measurement will be made by the area insulated as specified. Payment will be made under Item 2504.604 (___ in [mm] Polystyrene Insulation) at the Contract bid price per square yard [square meter], which shall be compensation in full for all costs incidental thereto.

S-203 (2506) MANHOLES AND CATCH BASINS
Use only when requested/required by the District.

SP2016-179

MnDOT 2506 is hereby modified and/or supplemented with the following:

S-203.1 Adjusting Rings manufactured from High Density Polyethylene (H.D.P.E.) are approved as an alternate to concrete adjusting rings. It is important that the H.D.P.E. adjusting ring be sealed with the product recommended by the manufacturer.

S-204 (2506) INFILTRATION AND FILTRATION SYSTEMS

SP2016-180

This work consists of performing infiltration rate tests and any necessary retesting. This work shall be performed as directed by the Engineer and accordance with the following:

S-204.1 TESTING

(A) Number of tests per basin and location within basin:

The number of tests per basin shall be determined by the size of the basin in question. Five test sites per acre of basin shall be the norm. For sites smaller than 10,000 square feet, a minimum of two tests per basin shall be acceptable. The tests shall be conducted at representative areas of the basin – i.e. spread out within the basin. All tests will be conducted at the finished bottom elevation.

All infiltration basins that are constructed using engineered soil will require testing at two elevations. One set of tests will be conducted at the excavated bottom elevation (immediately before placing the filter media) and one set will be at the finished bottom elevation. Infiltration basins with engineered soils require ten tests, five at each elevation, per acre of basin. For sites smaller than 10,000 square feet, a minimum of four tests, two at each elevation, will be acceptable.

For all basins, the MnDOT Engineer shall concur with the test site locations prior to the testing.

(B) Test methods:

Conduct double ring infiltrometer tests in accordance with ASTM standards (ASTM D3385). Thoroughly wet test areas prior to conducting the infiltrometer tests.
S-204.2 **ACCEPTANCE**

The MnDOT Engineer will accept an infiltration or filtration area after a double ring infiltrometer test demonstrates an acceptable percolation rate. Finished infiltration basin infiltration rates must meet or exceed the greater of the infiltration rate listed in the SWPPP or 2 inches per hour at all locations tested. Finished filtration and engineered soil infiltration basin rates must meet or exceed 4 inches per hour at all locations tested. All infiltration rates must be below 8.3 inches per hour at all locations.

In the event that a site or basin does not meet the acceptable rates, the basin must be reworked until it does meet the acceptable rates. Any site or basin that has been reworked must be retested to verify infiltration rates.

S-204.3 **MEASUREMENT AND PAYMENT**

Measurement and payment will be made by the lump sum. Payment will be made under Item 2506.601 (Infiltration System) at the Contract bid price per lump sum, which shall be compensation in full for the work.

(A) Partial Payments

The lump sum will be paid in partial payment amounts for completion of the work as provided below:

- When initial field testing is completed on all basins ................................................................. 40%
- When retesting is completed after any rework of basins has been performed .......................... 30%
- When MnDOT Engineer approves performance of all basins ................. remainder of lump sum

S-205 **(2506) CLEAN OUT CATCH BASINS**

SP2016-181

This work shall consist of cleaning out catch basins in accordance with MnDOT 2506, and the following:

S-205.1 Measurement will be made by number of catch basins cleaned as specified.

S-205.2 Payment will be made under Item 2506.602 (Clean Out Catch Basin) at the Contract bid price per each, which shall be compensation in full for all costs of cleaning debris and other material out of the catch basins shown in the Plan to be cleaned to the satisfaction of the Engineer. The pipe leads shall also be cleaned if they are clogged. Any costs of cleaning the leads shall be incidental.

S-206 **(2506) CONNECT INTO EXISTING DRAINAGE STRUCTURE**

SP2016-182

This work consist 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-207  (2506) CONSTRUCT CONTROL STRUCTURE
SP2016-183

This work shall consist of constructing a wooden control structure in accordance with the
applicable MnDOT Standard Specifications, the details shown in the Plans on Sheet No. __, and the following:

S-207.1 Steel straps shall be galvanized in accordance with MnDOT 3392.

S-207.2 Carriage bolts, nuts and washers shall conform to the requirements of MnDOT 3391.2C.

S-207.3 The concrete used in Control Structures shall conform to the requirements of MnDOT 2461 and
shall be Mix No. 3A32.

S-207.4 Measurement will be made by the number of control structures constructed as specified. Payment
will be made under Item 2506.602 (Construct Control Structure) at the Contract bid price per each, which shall be
compensation in full for all costs incidental thereto.

S-208  (2514) SLOPE PAVING
Use on all jobs with slope paving.
REVISED 09/25/15

SP2016-184

The provisions of MnDOT 2514 are modified as follows:

S-208.1 Replace MnDOT 2514.2.E “Aggregate” with the following:

E Aggregate

Provide aggregate for stabilized slope paving in accordance with Table 2514-1 for gradation class
CA-1, CA-2, or CA-3, and in accordance with the quality requirements in 3137.2.D, “Quality.”

S-208.2 Replace heading MnDOT 2514.3.B “Aggregate Slope Paving” with the following:

C Stabilized Aggregate Slope Paving

S-209  (2515) REVETMENT SYSTEMS
Use whenever there are any 2515 pay items on the plan.
SP2016-185

The provisions of MnDOT 2515 are modified as follows:

S-209.1 Pay Item 2515.515 (Geotextile Filter, Type ___) is deleted.
S-210 (2521) CONCRETE WALK (ADA)

This work shall consist of constructing Concrete Walk, including necessary Subgrade Preparation, Aggregate Base, and Grading as indicated in the Plan, in accordance with the provisions of MnDOT 2112, 2211, 2521, other Contract provisions, and the following:

S-210.1 CONSTRUCTION REQUIREMENTS

(A) Concrete Walk – The walk shall be constructed as detailed in the Plan and conform to the requirements of MnDOT 2521, Walks.

To avoid corner breaks, all walk edges shall be formed and constructed perpendicular to the back of curb and gutter sections and concrete structures for a one foot minimum distance.

All existing signs shall be salvaged and reinstalled as directed by the Engineer or as indicated in the Plan.

(B) Grading – If not otherwise detailed in the Plan, all fill sections shall be graded flush with the top of walk for a minimum 18 inches from the edge of walk and then down at a maximum 1:3 slope to existing terrain. The Contractor shall blend in the toe of fill slope and adjacent areas so as not to adversely affect drainage.

(C) Landings – An initial landing is the first required landing of a pedestrian ramp. All initial landings required at the top of a ramped sloped surface (>2% longitudinal slope), shall be formed and placed separately in an independent concrete pour. This does not include initial landings placed at roadway grade such as depressed corners, parallel ramps, rural flat landings, or flat cut-throughs. Secondary landings consist of all landings beyond the initial landing. These secondary landings do not require a separate landing pour. All landings adjacent to push buttons shall be formed and placed separately in an independent concrete pour, regardless of ramp type.

Wet casting or drill and grouting of dowel bars will be required in accordance with the details shown in Standard Plan 5-297.250 Sheet 5 of 5. These bars may be either smooth or deformed and shall be installed with 2 inch minimum concrete cover.

When not accounted for in the Plan, payment for these bars will be made under Item 2301.602 (Drill & Grout Reinforcement Bar (Epoxy Coated)) by the Each at the Predetermined Price of $10.00 per bar furnished and installed. All necessary subgrade preparation and aggregate base placement for the entire ramp construction limit shall be done before the initial landing is constructed at each location.

S-210.2 METHOD OF MEASUREMENT

Measurement of Concrete Walk will be made by top surface area.

S-210.3 BASIS OF PAYMENT

Payment will be made under Item 2521.618 (Concrete Walk) at the Contract bid price per square foot, including the area of walk under the truncated domes, which shall be compensation in full for all costs of furnishing, and installing the required material. In areas where Directional Curb is constructed, the triangular area that is behind the projected back of curb line will be paid for as Concrete Walk at the Contract bid price for Item 2521.618 (Concrete Walk). All excavation or borrow including hauling or disposal that is necessary to meet the walk grades shall be incidental unless specifically provided for in the Plan. If common borrow requirements exceed 8 cubic yards (CV) at any individual site/quadrant, than the common borrow required at that location and not specifically accounted for in the Plan will be paid for at $20 per cubic yard (CV).

If the Plan calls for payment of Aggregate Base and/or other Grading items for a pedestrian facility, then payment will only be made for the locations specifically provided for in the Plan. All salvaging and
reinstalling of signs as a result of concrete walk construction shall be incidental unless specifically provided for in the Plan.

S-211 (2531) CONCRETE CURB AND GUTTER (ADA)

Include this writeup in all projects that have ADA work. If pay item 2531.603 Concrete Curb and Gutter is not being used delete measurement and payment sections.

This work shall consist of constructing Concrete Curb and Gutter and the necessary Aggregate Base in accordance with the provisions of MnDOT 2531, other Contract provisions, and the following:

S-211.1 CONSTRUCTION REQUIREMENTS

Concrete Curb and Gutter - The curb and gutter shall be constructed to meet the details in the Plan. The transition from the existing curb and gutter section to the new curb and gutter section should occur within 5-10 feet of the point where the curb and gutter construction begins. The gutter inslope shall be constructed as detailed in the Plans. The gutter inslope transitions shall occur outside of the zero height curb area. The proposed gutter width shall be modified as necessary so as not to protrude into the adjacent travel lane with approval from the Engineer.

At all locations where new curb and gutter meets existing curb and gutter, place saw cut to leave a minimum 3 feet of in place curb and gutter between an existing joint and the proposed saw cut. If the 3 foot minimum cannot be maintained, place the saw cut over the existing joint. At this saw cut location the Contractor shall drill and grout 2 No. 4 x 12 inch long reinforcement bars (Epoxy coated). Reinforcement bars shall be placed a minimum of 3 inches from face and back of gutter section. When not accounted for in the Plan, payment for these bars will be made under Item 2301.602 (Drill & Grout Reinforcement Bar (Epoxy Coated)) by the Each at the Predetermined Price of $ 10.00 per bar furnished and installed.

The Contractor must form, at a minimum, the top 1.5 inches of the gutter face. The Contractor shall not use the existing roadway edge as a form for the top 1.5 inches of the gutter face unless approved by the Engineer.

If the gutter flow line in front of the proposed curb ramps exceeds 2.0% slope, the flow line should be adjusted to allow a flatter slope in front of the curb ramps, but still provide positive drainage. The bituminous patch in front of the truncated domes must not exceed 5% measured perpendicular to the flow line. In no case shall a newly constructed curb and gutter flow line exceed 8% unless the roadway profile exceeds 8%.

The Contractor shall not alter any existing drainage patterns unless called for in the plans or approved by the Engineer.

The Contractor shall construct a contraction joint through the curb and gutter section at the bottom of the curb height transitions where the curb height equals zero inches. If any curb and gutter joints fall within the PAR, they shall meet MnDOT 2521.3C.

When constructing directional curb where truncated domes are placed perpendicular to the path of travel, the concrete between the grade break/edge of truncated domes and the gutter toe shall be constructed integral.

S-211.2 METHOD OF MEASUREMENT

Measurement of Concrete Curb and Gutter will be by the linear foot measured at the face of the curb.
S-211.3 **BASIS OF PAYMENT**
Payment will be made under Item 2531.603 (Concrete Curb and Gutter) at the Contract bid price per linear foot, which shall be compensation in full for all costs of furnishing and installing the required material including Aggregate Base.

S-212 **(2531) CONCRETE CURB DESIGN V (ADA)**
SP2016-188
This work shall consist of constructing Concrete Curb Design V of varying heights up to 8 inches as detailed in the Plan and in accordance with the provisions of MnDOT 2531, other Contract provisions, and the following:

S-212.1 **CONSTRUCTION REQUIREMENTS**
The Concrete Curb Design V shall be constructed as detailed in the Plan. Concrete Curb Design V may be constructed independent of or integral to the adjacent sidewalk. The bottom elevation of the Concrete Curb Design V shall match the bottom elevation of the adjacent sidewalk slab. When the Concrete Curb Design V is constructed independent of the sidewalk, the portion of the Concrete Curb Design V that will have new concrete walk placed against it shall be clean so as to maximize bonding between the walk and Concrete Curb Design V. The joint locations in the curb shall align with the joint locations in the adjacent concrete walk.

The locations requiring the use of Concrete Curb Design V will solely be determined in the Plans or in the field by the Engineer. Any Concrete Curb Design V that is constructed without pre approval of the Engineer will be considered unauthorized work for which no compensation will be made and may be removed at the Engineer’s discretion. The height and length of the Concrete Curb Design V to be constructed shall be recommended by the Contractor and approved by the Engineer before the Concrete Curb Design V is constructed.

S-212.2 **METHOD OF MEASUREMENT**
Measurement will be by the linear foot of Concrete Curb Design V constructed measured at the face of curb. Curb height shall be measured from the top of the adjacent concrete walk to the top of the curb.

S-212.3 **BASIS OF PAYMENT**
Payment will be made under Item 2531.603 (Concrete Curb Design V) at the Contract bid price per linear foot, which shall be compensation in full for all costs of performing the work as specified. All concrete approach noses will be paid as 2 feet of Concrete Curb Design V and 2 feet of roadway curb and gutter design adjacent to the approach nose. Any additional Concrete Curb Design V beyond the quantity provided in the Plan, will be paid for at $20 per linear foot. Lengths of Concrete Curb Design V that never reach 3 inch height will be paid for as Concrete Walk.

S-213 **(2531) TRUNCATED DOMES**
SP2016-189
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-213.1 **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 4 of 5). The Contractor will be allowed to adjust plan locations of zero inch height curb up to 6 inches laterally to make field fit adjustments for radial truncated domes placement.

S-213.2  **METHOD OF MEASUREMENT**
Square or rectangular truncated dome area will be measured by the square foot. Radial Truncated domes will be measured along the long cord and multiplied by 2 feet to compute S.F.

S-213.3  **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. If additional radial domes are required and not called for in the plans they will be paid for at 4 square feet per each additional plate.

S-214  **(2533) PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337**

*Barrier not anchored*  
SP2016-190

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-214.1  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-214.2  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-214.3  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-214.4 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-214.5 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-214.6 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-215 (2533) PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 - ANCHORED

 Barrier anchored
SP2016-191 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-215.1 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-215.2 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-215.3 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](http://www.dot.state.mn.us/products)

S-215.4 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-215.5 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-215.6 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-215.7 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-215.8 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 – Anchored) 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 and subsequent removal, loading, and hauling of the barrier and restoration of the pavement as specified herein.

S-216  **(2533) CONCRETE MEDIAN BARRIER DESIGN 8308 AND 8309**
SP2016-192

MnDOT Standard Plates No. 8308 (non-glare screen type) and No. 8309 (with glare screen) are hereby modified with the following:

Note No. 1 on sheet 2 of 3 shall be changed to read as follows:

(1) End anchorage must be placed at both ends of the barrier and at any expansion joint/open joint. Expansion joints shall be provided in the barriers to match expansion joints in rigid pavement, at bridge approaches, or at other structures, where uncontrolled longitudinal movement may be objectionable. For joint opening more than 2 inches in width, the gap shall be bridged using a steel plate matching the shape of the barrier.

S-217  **(2533) RELOCATE PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337**
SP2016-193

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

S-217.1 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 2533.508 (Relocate Portable Precast Concrete Barrier Design 8337). Payment will be made once for removing the barrier from the roadway and placing it in the stockpile; and again for removing it from the stockpile and installing it in the roadway.

S-218  **(2533) RELOCATE PORTABLE PRECAST CONCRETE BARRIER DESIGN 8337 - ANCHORED**
SP2016-194

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

S-218.1 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 2533.508 (Relocate Portable Precast Concrete Barrier Design 8337 - Anchored). Payment will be made once for removing the barrier from the roadway and placing it in the stockpile; and again for removing it from the stockpile and installing it in the roadway.
S-219  **(2533) INSTALL CONCRETE MEDIAN BARRIER**

*Fill in the blank under S-.1 with the location the barrier is to come from and fill in the blanks under S-.2 & S-.4 where the barrier is to be taken to at the completion of the Project.*

**SP2016-195**

This work shall consist of loading, hauling and installing portable concrete median barrier within the Project limits as directed by the Engineers and the following:

S-219.1 The Contractor shall pick up the portable concrete median barrier from the MnDOT stockpile site located at ________________ and install the barrier within the Project limits as directed by the Engineer.

S-219.2 Upon completion of the Project the Contractor shall load, haul and deposit the barrier back to the ________________ stockpile site as directed by the Engineer. Any barrier damaged by the Contractors operations shall be replaced at the Contractors expense.

S-219.3 The Contractor shall notify the Project Engineer 24 hours in advance of pickup and return of the barrier.

S-219.4 Measurement will be made by the length of concrete median barrier installed. Payment will be made under Item 2533.603 (Install Concrete Median Barrier) 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 loading, hauling and depositing of the barrier back at the MnDOT stockpile site at ________________.

S-220  **(2540) MAIL BOX SUPPORT**

**SP2016-196**

This work shall consist of removing existing mailbox supports and furnishing and installing new Mail Box Supports in accordance with the applicable MnDOT Standard Specifications, Standard Plate 9350A, and the following:

S-220.1 It is the Contractor’s responsibility to coordinate with property owners and the local postal authority as to establishing and installing permanent mailbox location(s).

S-220.2 The inplace mail box, or a new mail box if furnished by the owner, attached distribution box and/or sign, if present, shall be salvaged and installed on the new support. The inplace support shall be removed with as little damage as possible and offered to the property owner. If the owner does not want the support the Contractor shall dispose of it off the Right-of-Way in accordance with MnDOT 2104.3D3. All depressions resulting from removal process shall be filled.

All removal and replacement operations shall be done in such a manner so as to cause no interruption of mail delivery if at all possible. In no case shall the owner or resident be without a mailbox installation for more than 24 hours.

S-220.3 Measurement will be made by the number of Mail Box Supports furnished and installed as specified in the Plan. Payment will be made under Item 2540.602 (Mail Box Support) at the Contract bid price per each, which shall include but not be limited to all items as specified above, except those that the Contract specifically designates as having been included for payment under separate items.
S-221  (2540) RELOCATE MAIL BOX SUPPORT

SP2016-197

This work shall consist of relocating existing mailbox supports in accordance with the applicable MnDOT Standard Specifications, Standard Plate 9350A, and the following:

S-221.1  It is the Contractor’s responsibility to coordinate with the local postal authority as to where the temporary location(s) shall be and to notify the postal patrons of the locations.

S-221.2  The inplace mail box, or a new mail box if furnished by the owner, attached distribution box and/or sign, if present, shall be salvaged and installed at the new location as staked in the field by the Contractor. All depressions resulting from the relocation process shall be filled.

All relocation operations shall be done in such a manner so as to cause no interruption of mail delivery if at all possible. In no case shall the owner or resident be without a mailbox installation for more than 24 hours.

S-221.3  Measurement will be made by the number of Mail Box Supports relocated, as specified in the Plan. Payment will be made under Item 2540.602 (Relocate Mail Box Support) at the Contract bid price per each, which shall include but not be limited to all items as specified above, except those that the Contract specifically designates as having been included for payment under separate items.

S-222  (2554) TRAFFIC BARRIERS

Always use when have any plate beam guardrail installation. DO NOT USE FOR METRO PROJECTS - Use SP2016-199 (TRAFFIC BARRIERS (METRO PROJECTS) instead.

Traffic Barriers shall be constructed in accordance with the provisions of MnDOT 2554 and the following:

S-222.1  Guardrail block-outs of composite or recycled material which meet the criteria of NCHRP 350 or MASH may be substituted for wood block-outs in the construction of Plate Beam Guardrail systems.

S-222.1  MATERIALS

(A)  Delineation

(1)  Provide I-beam post delineators with retroreflective sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI for fluorescent yellow sign sheeting and MnDOT 3352.2.A.2.b Sign Sheeting Type IV for white sign sheeting.

(2)  The contractor shall select I-beam post delineator from the Approved Products List.

S-222.2  CONSTRUCTION REQUIREMENTS

(A)  Delineation

(1)  Install the I-beam delineators at the top of the I-beam post throughout the install at a maximum separation of 50 feet. Attach the delineators as recommended by the manufacturer.

(2)  Apply the retroreflective sheeting measuring at least 3 in by 3 in to the delineators.

(3)  For median installations apply the sheeting to both sides of the post and for roadside installations apply the sheeting only to the side of the post facing traffic.

(4)  The sheeting shall be retroreflective fluorescent yellow or white and shall be the same color as the adjacent edge line.
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▲ DO NOT DELETE THE ABOVE REVISION DATE. This is how we tell which version of the SP2016 book you used when preparing your specs for your job.

S.P. Number of Your Job goes here

S-222.3 METHOD OF MEASUREMENT
The Traffic Barrier will be measured by the linear feet of traffic barrier installed. The guardrail block-outs, retroreflective sheeting and I-beam delineators are included in the pay item.

S-222.4 BASIS OF PAYMENT
Payment for the Traffic Barrier will be made under Item 2554.501 (Traffic Barrier Design B8338) by linear feet, which shall be payment in full for all costs involved to complete the work as specified.

S-223 (2554) TRAFFIC BARRIERS (METRO PROJECTS)
Use this writeup for METRO PROJECTS ONLY if the Plan has this Pay Item.

This work consists of furnishing and installing traffic barrier in accordance with MnDOT 2554, the details in the Plan, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-223.1 MATERIALS

(A) Guardrail Block-Outs
Guardrail block-outs of composite or recycled material that meet the criteria of NCHRP 350 or MASH may be substituted for wood block-outs in the construction of Plate Beam Guardrail systems.

(B) Delineation

(1) Provide I-beam post delineators with retroreflective sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI for fluorescent yellow sign sheeting and MnDOT 3352.2.A.2.b Sign Sheeting Type IV for white sign sheeting.
(2) The contractor shall select I-beam post delineator from the Approved Products List.

S-223.2 CONSTRUCTION REQUIREMENTS

(A) Guardrail Block-Outs
Install guardrail block-outs as recommended by the manufacturer.

(B) Delineation

(1) Install the I-beam delineators at the top of the I-beam post throughout the install at a maximum separation of 50 feet (50'). Attach the delineators as recommended by the manufacturer.
(2) Apply the retroreflective sheeting to the delineators. The sheeting shall provide at least 7 sq. in. when viewed on a line parallel to the roadway centerline.
(3) For median installations apply the sheeting to both sides of the post and for roadside installations apply the sheeting only to the side of the post facing traffic.
(4) The sheeting shall be retroreflective fluorescent yellow or white and shall be the same color as the adjacent edge line.

S-223.3 METHOD OF MEASUREMENT
The Traffic Barrier will be measured by the linear feet of traffic barrier installed. The guardrail block-outs, retroreflective sheeting and I-beam delineators are included in the pay item.

S-223.4 BASIS OF PAYMENT
Payment for the Traffic Barrier will be made under Item 2554.501 (Traffic Barrier Design B8338) by linear feet, which shall be payment in full for all costs involved to complete the work as specified.
S-224  (2554) TRAFFIC BARRIER DESIGN SPECIAL A  
SP2016-200  
This work shall consist of furnishing and installing Traffic Barrier Design Special A in accordance with the applicable MnDOT Standard Specifications, the Plan detail, at the locations shown in the Plan, and the following:

Payment under Item 2554.501 (Traffic Barrier Design Special A) will include the costs of removing existing guardrail if necessary, furnishing and installing additional new posts, furnishing and installing new B8307 Plate Beam Guardrail on the face of the existing guardrail, furnishing and installing C6x8.2 rub rail, and all other materials and work required to reconstruct the guardrail as specified.

S-225  (2554) END TREATMENT - ENERGY ABSORBING TERMINAL  
SP2016-201  
This work shall consist of constructing a commercial type energy absorbing terminal in accordance with the applicable provisions of MnDOT 2554, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-225.1 The energy absorbing terminal shall be a flared terminal utilizing steel posts. The steel posts shall be steel breakaway posts as specified by the manufacturer.

S-225.2 The adhesive marker is sold separately from the terminal and shall be incidental. The object marker to use with the energy absorbing terminal is striped yellow and black.

S-225.3 The Contractor is responsible for obtaining the most current details from the manufacturer. The Contractor shall provide one copy for the Engineer.

S-226  (2554) END TREATMENT - ENERGY ABSORBING TERMINAL  
(FLEAT-350)  
SP2016-202  
This work shall consist of constructing a commercial type energy absorbing terminal in accordance with the applicable provisions of MnDOT 2554, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-226.1 The energy absorbing terminal shall be a FLEAT-350 energy absorbing terminal of the type manufactured by Road Systems, Inc., Big Spring, TX.

S-226.2 The adhesive marker is sold separately from the terminal and shall be incidental. The object marker to use with the FLEAT-350 is striped yellow and black.

S-226.3 The Contractor is responsible for obtaining the most current details from the manufacturer. The Contractor shall provide one copy for the Engineer.
S-227  
**END TREATMENT - SLOTTED RAIL TERMINAL**

This work shall consist of constructing a commercial type Slotted Rail Terminal (SRT) in accordance with the applicable provisions of MnDOT 2554, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-227.1 The slotted rail terminal shall be an SRT-350 Slotted Rail Terminal of the type manufactured by Trinity Highway Products, LLC, Dallas, TX.

S-227.2 The adhesive marker is sold separately from the terminal and shall be incidental. The object marker to use with the SRT-350 is striped yellow and black.

S-227.3 The Contractor is responsible for obtaining the most current details from the manufacturer. The Contractor shall provide one copy for the Engineer.

S-228  
**END TREATMENT - TANGENT TERMINAL**

This work consists of constructing a commercial type energy absorbing terminal in accordance with MnDOT 2554, the details in the Plan, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-228.1 **MATERIALS:**

A. **Energy Absorbing Terminals**

Install the Energy Absorbing Tangent Terminal option indicated in the Plan. For object markers and delineation of any energy absorbing terminal provide retroreflective sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI for fluorescent yellow sign sheeting and MnDOT 3352.2.A.2.b Sign Sheeting Type IV for white sign sheeting.

B. **SKT-350 Sequential Kinking Terminal**

1. Provide SKT-350 Sequential Kinking Terminals manufactured by Road Systems, Inc., Big Spring, Texas.
2. Provide one 18 in x 18 in adhesive object marker striped black and retroreflective yellow.
3. Fabricate one 18 in x 18 in adhesive X4-4 (R, L or C) object marker according to the standard drawings in the MnDOT Standard Signs Manual. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction (R or L design). If traffic can pass to either side of the obstruction, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards (C design).

C. **Delineation**

1. Provide I-beam post delineators with retroreflective sheeting.
2. The Contractor shall select I-beam post delineator from the Approved Products List.

D. **Snowplow Marker and Post**

Provide a snow plow marker (X4-5) with retroreflective sheeting and a 2 lb./ft. delineator post (MnDOT 3401).

S-228.2 **CONSTRUCTION REQUIREMENTS:**

A. **Energy Absorbing Terminals**
B. SKT-350 Sequential Kinking Terminal
   (1) Install the end treatment as specified by the manufacturer.
   (2) Install the X4-4 adhesive object marker to the end treatment head.

C. Delineation
   (1) Install the I-beam delineators at the top of the first five (5) I-beam posts of the upstream end treatment and the last five (5) I-beam posts of the downstream end treatment. Attach the delineators as recommended by the manufacturer.
   (2) Apply the retroreflective sheeting measuring at least 3 in by 3 in to the delineator.
   (3) For median installations apply the sheeting to both sides of the post and for roadside installations apply the sheeting only to the side of the post facing traffic.
   (4) The sheeting shall be retroreflective yellow or white and shall be the same color as the adjacent edge line.

D. Snowplow Marker and Post
   (1) Install the post with marker at the beginning and end of each guardrail run that was furnished and installed in this project.
   (2) Install the marker post a minimum of 42 in into the ground.
   (3) The top of the post shall be 3 ft above the height of the guardrail. The post with marker shall be 6 in behind the end treatment and/or terminal end as shown on the end treatment detail(s) in the Construction Plan.

S-228.3 METHOD OF MEASUREMENT:
The Energy absorbing terminal will be measured by the number of tangent terminals installed. The retroreflective sheeting, I-beam delineators, and snowplow markers are included in the pay item.

S-228.4 BASIS OF PAYMENT:
Payment for the Energy absorbing terminal will be made under Item 2554.523 (End Treatment-Tangent Terminal) by the each, which shall be payment in full for all costs involved to complete the work as specified.

S-229 (2554) END TREATMENT - TANGENT TERMINAL (METRO PROJECTS)
Use this writeup for METRO PROJECTS ONLY if the Plan has this Pay Item.

This work consists of constructing a commercial type energy absorbing terminal in accordance with MnDOT 2554, the details in the Plan, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-229.1 MATERIALS:
A. Energy Absorbing Terminals
   Install the Energy Absorbing Tangent Terminal option indicated in the Plan. For object markers and delineation of any energy absorbing terminal provide retroreflective sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI for fluorescent yellow sign sheeting and MnDOT 3352.2.A.2.b Sign Sheeting Type IV for white sign sheeting.

B. SKT-350 Sequential Kinking Terminal
(1) Provide SKT-350 Sequential Kinking Terminals manufactured by Road Systems, Inc., Big Spring, Texas.
(2) Provide steel hinged breakaway (HBA) posts for posts 1 through 8, as specified by the manufacturer.
(3) Fabricate one 18 in x 18 in adhesive X4-4 (R, L or C) object marker according to the standard drawings in the MnDOT Standard Signs Manual. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction (R or L design). If traffic can pass to either side of the obstruction, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards (C design).

C. Delineation
(1) Provide I-beam post delineators with retroreflective sheeting.
(2) The contractor shall select I-beam post delineator from the Approved Products List.

D. Snowplow Marker and Post
Provide a snow plow marker (X4-5) with retroreflective sheeting and a 2 lb./ft. delineator post (MnDOT 3401).

S-229.2 CONSTRUCTION REQUIREMENTS:

A. Energy Absorbing Terminals
The Contractor is responsible for obtaining the most current details from the manufacturer and providing the Engineer with a copy of the current details.

B. SKT-350 Sequential Kinking Terminal
(1) Install the end treatment as specified by the manufacturer.
(2) Install the X4-4 adhesive object marker to the end treatment head.

C. Delineation
(1) Install the I-beam delineators at the top of the first five (5) I-beam posts of the upstream end treatment and the last five (5) I-beam posts of the downstream end treatment. Attach the delineators as recommended by the manufacturer.
(2) Apply the retroreflective sheeting measuring at least 3 in by 3 in to the delineator.
(3) For median installations apply the sheeting to both sides of the post and for roadside installations apply the sheeting only to the side of the post facing traffic.
(4) The sheeting shall be retroreflective fluorescent yellow or white and shall be the same color as the adjacent edge line.

D. Snowplow Marker and Post
(1) Install the post with marker at the beginning and end of each guardrail run that was furnished and installed in this project.
(2) Install the marker post a minimum of 42 in into the ground.
(3) The top of the post shall be 3 ft above the height of the guardrail. The post with marker shall be 6 in behind the end treatment and/or terminal end as shown on the end treatment detail(s) in the Construction Plan.

S-229.3 METHOD OF MEASUREMENT:
The Energy absorbing terminal will be measured by the number of tangent terminals installed. The retroreflective sheeting, I-beam delineators, and snowplow markers are included in the pay item.
S-229.4 **BASIS OF PAYMENT:**
Payment for the Energy absorbing terminal will be made under Item 2554.523 (End Treatment-Tangent Terminal) by the each, which shall be payment in full for all costs involved to complete the work as specified.

S-230 *(2554) END TREATMENT – FLARED TERMINAL*

This work shall consist of constructing a commercial type energy absorbing terminal in accordance with MnDOT 2554, the details in the Plan, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-230.1 **MATERIALS:**

A. **Energy Absorbing Terminals**
Install one of the Energy Absorbing Flared Terminal options indicated in the Plan. For object markers and delineation of any energy absorbing terminal provide retroreflective sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI for fluorescent yellow sign sheeting and MnDOT 3352.2.A.2.b Sign Sheeting Type IV for white sign sheeting.

B. **FLEAT-350 Energy Absorbing Terminal**

1. Provide FLEAT-350 Energy Absorbing Terminal manufactured by Road Systems, Inc., Big Spring, TX.
2. Provide steel hinged breakaway (HBA) posts for posts 1 through 7, as specified by the manufacturer, unless otherwise stated in the Plan.
3. Fabricate one 18 in x 18 in adhesive X4-4 (R, L or C) object marker according to the standard drawings in the MnDOT Standard Signs Manual. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction (R or L design). If traffic can pass to either side of the obstruction, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards (C design).

C. **SRT-350 Energy Absorbing Terminal**

1. Provide SRT-350 Slotted Rail Terminal manufactured by Trinity Highway Products, LLC, Dallas, TX.
2. Provide the steel post option as specified by the manufacturer.
3. Fabricate one 12 in x 12 in adhesive X4-4 (R, L or C) object marker according to the standard drawings in the MnDOT Standard Signs Manual. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction (R or L design). If traffic can pass to either side of the obstruction, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards (C design).

D. **Delineation**

1. Provide I-beam post delineators with retroreflective sheeting.
2. The contractor shall select I-beam post delineator from the Approved Products List.

E. **Snow Plow Post and Marker**
Provide a snow plow marker (X4-5) with retroreflective sheeting and a 2 lb./ft. delineator post (MnDOT 3401).
S-230.2  **CONSTRUCTION REQUIREMENTS:**

A.  **Energy Absorbing Terminals**  
The Contractor is responsible for obtaining the most current details from the manufacturer and providing a copy of the current details to the Engineer.

B.  **FLEAT-350 Energy Absorbing Terminal**  
(1) Install the end treatment as specified by the manufacturer. 
(2) Install the adhesive X4-4 object marker to the end treatment head.

C.  **SRT-350 Energy Absorbing Terminal**  
(1) Install the end treatment as specified by the manufacturer. 
(2) The first length of guardrail attached to the anchor shall be a “half-section” of 12 ft 6 in. 
(3) Install the adhesive X4-4 object marker to the end treatment head.

D.  **Delineation**  
(1) Install the I-beam delineators at the top of the first five (5) I-beam posts of the upstream end treatment and the last five (5) I-beam posts of the downstream end treatment. Attach the delineators as recommended by the manufacturer. 
(2) Apply the retroreflective sheeting measuring at least 3 in by 3 in to the delineator. 
(3) For median installations apply the sheeting to both sides of the post and for roadside installations apply the sheeting only to the side of the post facing traffic. 
(4) The sheeting shall be retroreflective fluorescent yellow or white and shall be the same color as the adjacent edge line.

E.  **Snowplow Marker and Post**  
(1) Install the post with marker at the beginning and end of each guardrail run that was furnished and installed in this project. 
(2) Install the marker post a minimum of 42 in into the ground. 
(3) The top of the post shall be 3 ft above the height of the guardrail. The post with marker shall be 6 in behind the end treatment and/or terminal end as shown on the end treatment detail(s) in the Construction Plan.

S-230.3  **METHOD OF MEASUREMENT:**  
The Energy absorbing terminal will be measured by the number of tangent terminals installed. The retroreflective sheeting, I-beam delineators, and snowplow markers are included in the pay item.

S-230.4  **BASIS OF PAYMENT:**  
Payment for the Energy absorbing terminal will be made under Item 2554.523 (End Treatment-Flared Terminal) by the each, which shall be payment in full for all costs involved to complete the work as specified.
S-231 (2554) END TREATMENT – FLARED TERMINAL (METRO PROJECTS)
Use this writeup for METRO PROJECTS ONLY if the Plan has this Pay Item.
REVISED 08/04/16
SP2016-207

This work shall consist of constructing a commercial type energy absorbing terminal in accordance with MnDOT 2554, the details in the Plan, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-231.1 MATERIALS:

A. Energy Absorbing Terminals

Install one of the Energy Absorbing Flared Terminal options indicated in the Plan. For object markers and delineation of any energy absorbing terminal provide retroreflective sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI for fluorescent yellow sign sheeting and MnDOT 3352.2.A.2.b Sign Sheeting Type IV for white sign sheeting.

B. FLEAT-350 Energy Absorbing Terminal

(1) Provide FLEAT-350 Energy Absorbing Terminal manufactured by Road Systems, Inc., Big Spring, TX.
(2) Provide steel hinged breakaway (HBA) posts for posts 1 through 7, as specified by the manufacturer.
(3) Fabricate one 18 in x 18 in adhesive X4-4 (R, L or C) object marker according to the standard drawings in the MnDOT Standard Signs Manual. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction (R or L design). If traffic can pass to either side of the obstruction, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards (C design).

C. SRT-350 Energy Absorbing Terminal

(1) Provide SRT-350 Slotted Rail Terminal manufactured by Trinity Highway Products, LLC, Dallas, TX.
(2) Provide the steel post option as specified by the manufacturer.
(3) Fabricate one 12 in x 12 in adhesive X4-4 (R, L or C) object marker according to the standard drawings in the MnDOT Standard Signs Manual. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction (R or L design). If traffic can pass to either side of the obstruction, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards (C design).

D. Delineation

(1) Provide I-beam post delineators with retroreflective sheeting.
(2) The contractor shall select I-beam post delineator from the Approved Products List.

E. Snow Plow Post and Marker

Provide a snow plow marker (X4-5) with retroreflective sheeting and a 2 lb./ft. delineator post (MnDOT 3401).

S-231.2 CONSTRUCTION REQUIREMENTS:

A. Energy Absorbing Terminals

The Contractor is responsible for obtaining the most current details from the manufacturer and providing a copy of the current details to the Engineer.
B. **FLEAT-350 Energy Absorbing Terminal**
   (1) Install the end treatment as specified by the manufacturer.
   (2) Install the adhesive X4-4 object marker to the end treatment head.

C. **SRT-350 Energy Absorbing Terminal**
   (1) Install the end treatment as specified by the manufacturer.
   (2) The first length of guardrail attached to the anchor shall be a “half-section” of 12 ft 6 in.
   (3) Install the adhesive X4-4 object marker to the end treatment head.

D. **Delineation**
   (1) Install the I-beam delineators at the top of the first five (5) I-beam posts of the upstream end treatment and the last five (5) I-beam posts of the downstream end treatment. Attach the delineators as recommended by the manufacturer.
   (2) Apply the retroreflective sheeting measuring at least 3 in by 3 in to the delineator.
   (3) For median installations apply the sheeting to both sides of the post and for roadside installations apply the sheeting only to the side of the post facing traffic.
   (4) The sheeting shall be retroreflective fluorescent yellow or white and shall be the same color as the adjacent edge line.

E. **Snowplow Marker and Post**
   (1) Install the post with marker at the beginning and end of each guardrail run that was furnished and installed in this project.
   (2) Install the marker post a minimum of 42 in into the ground.
   (3) The top of the post shall be 3 ft above the height of the guardrail. The post with marker shall be 6 in behind the end treatment and/or terminal end as shown on the end treatment detail(s) in the Construction Plan.

S-231.3 **METHOD OF MEASUREMENT:**
The Energy absorbing terminal will be measured by the number of tangent terminals installed. The retroreflective sheeting, I-beam delineators, and snowplow markers are included in the pay item.

S-231.4 **BASIS OF PAYMENT:**
Payment for the Energy absorbing terminal will be made under Item 2554.523 (End Treatment-Flared Terminal) by the each, which shall be payment in full for all costs involved to complete the work as specified.

S-232 **(2554) IMPACT ATTENUATOR BARRELS**
*Ask District if these are Contractor owned or permanent installation. If permanent, delete the words and remove from S-.3*
SP2016-208

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:

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-232.1 **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-232.2 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-232.3 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-233 (2554) RELOCATE IMPACT ATTENUATOR BARRELS

S-233.1 The relocated impact attenuator barrels shall be filled with the proper sand content in accordance with the manufacturer's recommendations.

S-233.2 When impact attenuator barrels have to be removed from the Project roadways, but will be needed again in a later phase of the work, the Engineer may direct that they be stockpiled on or near the Project site. When this is done, payment will be made under Item 2554.602 (Relocate Impact Attenuator Barrels). Payment will be made once for removing the impact attenuator barrels from the roadway and placing them in the stockpile; and again for removing them from the stockpile and installing them on the roadway.

S-233.3 Measurement will be made by the number of impact attenuator barrels relocated. Payment will be made under Item 2554.602 (Relocate Impact Attenuator Barrels) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto.

S-234 (2554) CONNECTING PIN

S-234.1 This work shall consist of furnishing and installing connecting pins to tie portable precast median barriers where directed by the Engineer. This work shall be performed in accordance with the current MnDOT Standard Plate No. 8337 - Temporary Portable Precast Concrete Barrier, as directed by the Engineer, and the following:

Measurement will be made by the number of connecting pins furnished and installed as specified. Payment will be made under Item 2554.602 (Connecting Pin) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto.
S-235  (2554) POST ASSEMBLY - PLATE BEAM
SP2016-211
This work shall consist of furnishing and installing plate beam guardrail post assemblies in accordance with the provisions of MnDOT 2554, the Plan detail, and the following:

S-235.1 Guardrail posts shall have a 3.5 foot [1.1 meter] spacing at the end of concrete walls.

S-235.2 Measurement will be made by the number of post assemblies furnished and installed as specified. Payment will be made under Item 2554.602 (Post Assembly - Plate Beam) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto, including but not limited to drilling holes and furnishing and installing the necessary hardware.

S-236  (2554) GUARDRAIL TERMINAL POST
SP2016-212
Guardrail terminal posts shall be furnished and installed in accordance with the applicable provisions of MnDOT 2554, except as modified by the following:

S-236.1 Concrete Terminal Posts - The reinforcement bars shall be deformed epoxy coated bars as shown on the Plan sheet or Standard Plate. The concrete shall be as specified in MnDOT 3101 and approved by the Engineer.

S-236.2 H Pile or Wide Flange Posts - Guardrail terminal posts shall conform to the shape, size and weight per foot [mass per meter], as specified in the Plans, and with the provisions of MnDOT 3306 for wide flange posts or MnDOT 3372 for H pile posts. At least the upper 3 feet [1 m] of the steel posts shall be galvanized in accordance with the provisions of MnDOT 3394.

S-236.3 Guardrail terminal posts will be measured by the number of posts furnished and installed complete in place as specified. Payment will be made under Item 2554.602 (Guardrail Terminal Post) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto.

S-237  (2554) GUARDRAIL POST SEAT
SP2016-213
This work shall consist of constructing guardrail post seats in accordance with the provisions of MnDOT 2554, and the following:

S-237.1 Guardrail Post Seat shall be constructed in accordance with the details shown on the current MnDOT Standard Plate 8316.

S-237.2 Measurement will be made by each installation constructed as specified. Payment will be made under Item 2554.602 (Guardrail Post Seat) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, any cutting of guard rail posts to make the installation at the correct standard height.
S-238  **(2554) T-BARRIER BRIDGE CONNECTION DESIGN 8318**

SP2016-214

This work shall consist of furnishing and installing T-BARRIER Bridge Conn. Terminals in accordance with MnDOT 2554, and the following:

Measurement will be made by the number of terminals furnished and installed as specified. Payment will be made under Item 2554.602 (T-BARRIER Bridge Connection Design 8318) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto.

S-239  **(2554) GUIDE POST TYPE SPECIAL**

SP2016-215

This work shall consist of furnishing and installing flexible delineators for use as guide posts in accordance with the applicable specifications of MnDOT 2554 and the following:

S-239.1 The guide posts shall be furnished in a length sufficient to meet the embedment specified by the manufacturer and the top of post shall extend not less than 4 feet and not more than 5 feet out of the ground.

S-239.2 The posts shall be gray in color and the upper 1 foot of post shall be furnished with a 3 inch wide strip of yellow microprismatic sheeting meeting the requirements of ASTM Type IX.

S-239.3 Only Flexible Delineators from the MnDOT Approved Products List will be allowed. A current copy of this list can be found at the following link: [http://www.dot.state.mn.us/products](http://www.dot.state.mn.us/products).

S-239.4 Measurement will be made by the number of posts furnished and installed as specified. Payment will be made under Item 2554.602 (Guide Post Type Special) at the Contract bid price per each, which will include all costs relative to furnishing and installing the posts.

S-240  **(2554) INSTALL CONCRETE ANCHOR BLOCK**

SP2016-216

This work shall consist of installing concrete anchor blocks, salvaged elsewhere under this Contract, in accordance with the current MnDOT Standard Plate 8319, the provisions of MnDOT 2554, and the following:

Measurement will be made by the number of salvaged blocks installed as specified. Payment will be made under Item 2554.602 (Install Concrete Anchor Block) at the Contract bid price per each, which shall be payment in full for all costs involved.

S-241  **(2554) INSTALL ANCHOR ASSEMBLY - 3 CABLE**

SP2016-217

This work shall consist of installing Anchor Assembly - 3 cable in accordance with the provisions of MnDOT 2554 and the following:

Measurement will be made by the number of anchor assemblies installed complete in place as specified. Payment will be made under Item 2554.602 (Install Anchor Assembly - 3 Cable) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto.
S-242  **(2554) INSTALL ANCHOR ASSEMBLY - PLATE BEAM**
SP2016-218

This work shall consist of installing salvaged plate beam anchor assemblies in accordance with the provisions of MnDOT 2554, and the following:

Measurement will be made by each installation constructed as specified. Payment will be made under Item 2554.602 (Install Anchor Assembly-Plate Beam) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto.

S-243  **(2554) WATER FILLED BARRIER**
SP2016-219

This work shall consist of furnishing, installing, and maintaining water filled barriers in accordance with the applicable MnDOT Standard Specifications and the following:

S-243.1 All barrier shall be placed as shown in the Traffic Control Plans and as directed by the Engineer.

S-243.2 The barrier shall not be removed until the Engineer approves the removal.

S-243.3 The barrier shall remain the property of the Contractor.

S-243.4 Measurement will be made by the length of barrier furnished and installed complete in place as specified.

S-243.5 Payment will be made under Item 2554.603 (Water Filled Barrier) at the Contract bid price per linear foot [meter], which shall be compensation in full for costs relative thereto, including but not limited to moving or removing the barrier as specified when approved by the Engineer, unless the relocation thereto are compensated for separately under this Contract.

S-244  **(2554) RELOCATE WATER FILLED BARRIER**
SP2016-220

This work shall consist of relocating water filled barrier within the Project limits as directed by the Engineer.

Measurement will be made by the length of water filled barrier relocated. Payment will be made under Item 2554.603 (Relocate Water Filled Barrier) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs related thereto.

S-245  **(2554) TENSION CABLE GUARDRAIL**
Designer needs to fill in number of days needed in S-.12.

This work shall consist of constructing High Tension Cable Barrier (HTCB) in accordance with MnDOT 2554, as directed by the Engineer, and the following:

S-245.1 High Tension Cable Barrier systems shall satisfy all the following criteria:

1) Satisfy the requirements for test level 4 (TL-4) as defined by the criteria of NCHRP Report 350 or MASH for 1:6 slopes or flatter.
2) Satisfy the requirements for test level 3 (TL-3) as defined by the criteria of NCHRP Report 350 or MASH on slopes steeper than 1:6, and up to 1:4.

3) Utilize four (4) pre-stretched cables.

4) Unless specified or shown in the Plan, line post socket foundation shall be steel.

5) End anchorage assembly foundations must be concrete.

6) All end anchorage assemblies and intermediate line post foundations shall be designed in accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications, including all interims, herein referred to as “AASHTO LRFD.”

S-245.2 Follow manufacturers’ recommendations for vertical tolerance of cables with respect to the ground level.

S-245.3 The alignment and location of the HTCB shall be according to the Plan. The HTCB shall have a maximum line post spacing of 10 feet, center to center. Line posts shall be plumbed within the sockets. Any socket or foundation that doesn’t produce a plumb post shall be removed and replaced.

S-245.4 Avoid all utilities by adjusting the post spacing longitudinally, without exceeding the maximum line post spacing.

S-245.5 High tension cable systems shall be furnished with cable splices/turnbuckles as a means of adjusting the tension of individual ropes at a maximum interval of 1000 feet.

S-245.6 Use only swage type fittings for all line cable connections. The fitting must be superior in strength to the cable itself. End anchorage assembly cable connections must be per manufacturer’s detail.

S-245.7 Do not locate turnbuckles and cable connections at, on, or abutting any line posts in the assembly, unless such placement is indicated as crash-worthy, in the FHWA eligibility letter (two splices per line post max.).

S-245.8 The Contractor shall replace any edge drains damaged during the drilling or excavation for posts or end anchorage assemblies as per MnDOT 2502. Reroute any edge drains encountered but not damaged around the post location. Payment for such replacement or rerouting (as applicable) will be paid for under MnDOT 1402.5.

S-245.9 Tension the HTCB system according to the manufacturer’s recommendations at the time of installation. The Contractor shall check and adjust the tension approximately three (3) weeks after installation. No additional compensation will be provided for any subsequent tensioning actions.

S-245.10 Design driven sockets within any curved sections to resist the additional lateral component of the tension forces from the cable.

S-245.11 A Minnesota Licensed Professional Engineer will design all end anchorage assemblies and intermediate line post foundations in accordance with the current version and all interims of AASHTO LRFD Bridge Design Specifications. The Plan will contain all the necessary details and design information, including required embedment depth, to construct end anchorage assemblies, line posts, and line post foundations. The soil parameters used in the design will be based on the borings taken at the end anchorage assembly locations during the site investigation except that the soil strengths used in the design will not exceed a friction angle of 35° for the end anchorage assemblies and 30° for the intermediate line posts for cohesion-less soils or 1000 pounds per cubic foot for cohesive soils for the end anchorage assemblies and intermediate line posts. Support or resistance provided by the top 3 feet of soil shall not be included in the design of end anchorage assemblies.

Designer needs to fill in number of days needed in S-.12.

S-245.12 Design of end anchorage assemblies, line posts and line post foundations shall meet the following requirements:
Design load shall be based on the PLASTIC MOMENT CAPACITY of the cable supporting posts.

Maximum lateral deflection, under design load, at the top of end anchorage assembly, concrete foundation, or steel socket foundation to be one inch.

End anchorage assemblies, concrete foundations and steel socket foundations shall be in accordance with the current version and all interims of AASHTO LRFD strength and serviceability requirements under normal load cases. These foundations shall survive the loads due to the vehicular impact induced loads. These loads shall not be treated as extreme loads.

The bottom of the end anchorage assemblies, concrete foundations and steel socket foundations shall be at least 5 feet below the finished grade to meet frost depth requirements.

The acting forces and moments on the end anchorage assemblies and steel sockets shall be derived from the most current version of L-Pile or similar software for analysis of piles under lateral loads in different horizontal directions, based on the true structure configurations, such as socket with soil plate.

Reinforcement bars for all concrete foundations shall be epoxy coated in accordance with MnDOT 3301.

Prior to installing the HTCB system, the Contractor shall have ______ (working days, calendar days) to provide the Engineer with two (2) sets of Manufacturer prepared design calculations and notes in accordance with AASHTO LRFD, shop drawings, and construction specifications certified by a Minnesota Licensed Professional Engineer. The Contractor shall allow at least twenty one (21) calendar days for the review process and shall not begin installation until receiving approval. The shop drawings and calculations shall detail the end anchorage assemblies, and line post Steel Socket and/or Concrete Foundations. The recommended depths for the end anchorage assemblies, line post Steel Socket Foundation and/or Concrete Foundation and the design of the end anchorages assemblies and line post Steel Socket Foundations shall be approved and certified by a Minnesota Licensed Professional Engineer. The Engineer, in concurrence with the MnDOT Bridge and Foundation Offices, will review and comment prior to installation. The time required to get the shop drawings approved will not be allowed as justification for extension in the contract time.

Steel socket foundations shall be designed in accordance with the current version and all interims of AASHTO LRFD Bridge Design Specifications including the lateral soil pressure due to the design loads on the top of the foundation and shall include the use of soil plates to resist foundation tipping or movement on both tangent and curved alignments. Install steel socket foundations with a drop hammer capable of producing plumb post without resulting in damage or mushrooming of the foundation components. The socket for concrete line post foundations shall be installed inside the foundation rebar cage. The top of the rebar cage shall be secured 3 inches below the planned top of concrete, prior to concrete placement. Refer to MnDOT Standard Plate 8342 for additional details. Remove steel or concrete line post foundations not at the proper height or alignment and install a new foundation.

Galvanize socket for cable line post after fabrication per MnDOT 3392 and 3394.

Delineate HTCB installations with retroreflective sheeting. Apply the sheeting to the last five (5) posts at each end of the terminal. Apply the sheeting throughout the remainder of the installation at a maximum of 50 foot intervals. The sheeting shall meet the requirements of MnDOT 3352.2.A.2g Sign Sheetng Type XI for
florescent yellow sign sheeting and MnDOT 3352.2.A.2b Sign Sheeting Type IV for white sign sheeting. The retroreflective sheeting should be on flat surface, perpendicular to traffic and shall have a minimum dimension of 3 inches. Attach the sheeting near the top of the post as recommended by the manufacturer of the cable system. Apply the sheeting to both sides of the post for median installations. Apply the sheeting only to the side of the post facing traffic for roadside installations. The sheeting shall be florescent yellow or white and shall be the same color as the adjacent edge line.

S-245.15  Install snow plow marker (X4-5) with a 2 lb./ft. delineator post 10 feet long driven into the ground a minimum of 48 inches. Extend post a minimum of 5 feet above the ground line and 6 inches adjacent to end anchorage assembly. Install marker at the beginning and end of each run. Snowplow markers and post shall be incidental.

S-245.16  The following High Tension Cable Barrier systems are approved for use, as listed below:

District 1
- Brifen TL-4 (4-Rope) WRSF
- Trinity Highway Products CASS-S3 (1:4 Slope) 4-Cable Guardrail Safety System

District 2
- Brifen TL-4 (4-Rope) WRSF
- Trinity Highway Products CASS-S3 (1:4 Slope) 4-Cable Guardrail Safety System

District 3
- Brifen TL-4 (4-Rope) WRSF
- Gibraltar TL-4, 4 Cable Barrier System

District 4
- Brifen TL-4 (4-Rope) WRSF
- Gibraltar TL-4, 4 Cable Barrier System

Metro
- Brifen TL-4 (4-Rope) WRSF
- Gibraltar TL-4, 4 Cable Barrier System
- Trinity Highway Products CASS-S3 (1:4 Slope) 4-Cable Guardrail Safety System

District 6
- Brifen TL-4 (4-Rope) WRSF
- Gibraltar TL-4, 4 Cable Barrier System

District 7
- Brifen TL-4 (4-Rope) WRSF
- Gibraltar TL-4, 4 Cable Barrier System

District 8
- Brifen TL-4 (4-Rope) WRSF
- Trinity Highway Products CASS-S3 (1:4 Slope) 4-Cable Guardrail Safety System

S-245.17  METHOD OF MEASUREMENT
Each HTCB beginning and end, must be terminated with an end anchorage assembly. The end anchorage assembly shall be as specified by the manufacture of the HTCB system. The Engineer will measure the number of end anchorage assemblies by the number installed.
The Engineer will measure the length of each High Tension Cable Barrier system furnished and installed from end to end, including end anchorage assembly lengths.

S-245.18 BASIS OF PAYMENT
End Anchorage Assemblies payment will be made under Item 2554.521 (Anchorage Assembly – Tension Cable) at the Contract bid price per each, which shall be payment in full for all costs involved necessary to complete the work as specified.

High Tension Cable Barrier payment will be made under Item 2554.603 (Tension Cable Guardrail) at the Contract bid price per linear foot [meter], which shall be payment in full for all costs involved necessary to complete the work as specified.

S-246 (2554) TENSION CABLE GUARDRAIL WARRANTY
Designer needs to make sure that the District has identified who will be responsible for checking the Warranty Work. If HTCB is part of the overall project: use S-2 and indicate the value of the bond.

SP2016-222
The Contractor shall provide a one-year warranty for the Tension Cable Guardrail required in Section S-2554 (TENSION CABLE GUARDRAIL) of these Special Provisions.

S-246.1 DEFINITIONS AND TERMS

Final Construction Acceptance (FCA). The date when the warranted Tension Cable Guardrail is complete and the roadway is open to the public without restrictions. This date constitutes the start of the warranty period.

Warranty Bond. A surety that guarantees that the warranty requirements are met.

Warranty Period. The Warranty Period shall be one (1) year, starting at the Final Construction Acceptance (FCA).

Warranty Work. Corrective actions taken to bring the warranted work into Contract compliance for release of the warranty bond.

S-246.2 WARRANTY BOND

Amount and Term. The Contractor must furnish a single-term warranty bond in the amount of $__, ___. The bond shall be furnished to the Department at the same time as the other Contract Bonds specified in MnDOT 1305. The effective starting date of the warranty bond must be the FCA. The warranty bond will be released at the end of the Warranty Period or after all warranty work has been completed, whichever is last. The form of the warranty bond shall be acceptable to the Contracting Authority.

S-247 (2554) IMPACT ATTENUATOR

SP2016-223
This work shall consist of furnishing, installing, maintaining, replacing if damaged or destroyed, and removing Impact Attenuators as shown in the Plan. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

S-247.1 The Impact Attenuator shall be on the MnDOT Approved Product List for Temporary Crash Attenuators. The list is found on the MnDOT website at http://www.dot.state.mn.us/products/temporarytrafficcontrol/temporarycrasheusions.html. It shall be the responsibility of the Contractor to obtain all required details to install these systems.
S-247.2 The Contractor shall choose an Impact Attenuator that fits the site specific requirements for the Project.

S-247.3 Measurement will be made by the number of impact attenuators furnished, installed, and removed as specified. Payment will be made under Item 2554.615 (Impact Attenuator) at the Contract bid price per assembly, which shall be compensation in full for all costs relative thereto.

S-248 (2554) IMPACT ATTENUATOR (C-A-T)
SP2016-224

This work shall consist of furnishing all materials for, and installing complete and inplace, commercial type energy absorbing impact attenuators in accordance with MnDOT 2554 and the following:

S-248.1 The end protection for the concrete median barrier shall be the Crash-Cushion/Attenuating Terminal, (C-A-T), system manufactured by Trinity Highway Products, LLC, Dallas, TX.

S-248.2 The Contractor shall maintain a sufficient supply of replacement parts on hand during the course of this Contract to maintain or repair the installations. The Contractor shall repair any attenuators 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-248.3 The Contractor is responsible for obtaining the most current details from the manufacturer. The Contractor shall provide one copy for the Engineer.

S-248.4 MEASUREMENT AND PAYMENT
Measurement will be made of the number of Crash-Cushion/Attenuating Terminal (C-A-T) energy absorbing terminal impact attenuator assemblies furnished and installed complete in place.

Payment will be made under Item 2554.615 (Impact Attenuator) at the Contract bid price per assembly, which shall be compensation in full for all costs relative to furnishing and installing the assemblies complete in place as specified.

S-249 (2554) IMPACT ATTENUATOR (QUAD GUARD)
SP2016-225

This work shall consist of furnishing and installing Quad Guard Construction Zone Attenuator Systems for use as temporary impact attenuators at locations tabulated on Sheet No. ___ of the Plan. This work shall be performed in accordance with the applicable MnDOT Standard Specifications and the following:

S-249.1 It shall be the responsibility of the Contractor to obtain all required details to install these systems.

S-249.2 Quad Guard Construction Zone Systems are manufactured by Energy Absorption Systems Inc., One East Wacker Drive, Chicago, Ill. 60601-2076, Telephone: 312-467-6750, or an approved equal.

S-249.3 MEASUREMENT AND PAYMENT
Measurement will be made by the number of impact attenuators furnished, installed, and removed as specified. Payment will be made under Item 2554.615 (Impact Attenuator) at the Contract bid price per assembly, which shall be compensation in full for all costs relative thereto.
S-250  (2554) IMPACT ATTENUATOR (SMART CUSHION)
NEW WRITUP 11/06/15

This work shall consist of furnishing and installing the Impact Attenuator as shown in the Plan. This work shall be performed in accordance with the applicable Mn/DOT Standard Specifications and the following:

S-250.1  MATERIALS

(A) Provide the SMART Cushion impact attenuator as indicated in the Plan.

Manufacturer: Work Area Protection Corporation
Product: SCI100GM Impact Attenuator (SMART Cushion)

(B) For delineation of any impact attenuator provide two 18 in x 18 in adhesive object marker striped black and retroreflective fluorescent yellow. Provide fluorescent yellow sign sheeting meeting the specifications of MnDOT 3352.2.A.2g Sign Sheeting Type XI.

(C) Provide a SMART Cushion delineator panel.

S-250.2  CONSTRUCTION REQUIREMENTS

(A) The Contractor is responsible for obtaining the most current details from the manufacturer and providing a copy of the current details to the Engineer.

(B) Install the impact attenuator as specified by the manufacturer.

(C) Install the delineator panel as specified by the manufacturer. The alternating black and retroreflective fluorescent yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the impact attenuator. If traffic can pass to either side of the impact attenuator, the alternating black and retroreflective fluorescent yellow stripes shall form chevrons that point upwards.

S-250.3  METHOD OF MEASUREMENT

Measurement will be made by the number of impact attenuators installed. The retroreflective sheeting, delineator panel, and concrete pad are included in the pay item.

S-250.4  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-251  (2554) RELOCATE IMPACT ATTENUATOR

This work shall consist of relocating impact attenuator assemblies within the Project site as directed by the Engineer and the following:

S-251.1  CONDITIONS

Payment will be made for relocating the impact attenuator assemblies under any of the following conditions:

(A) Relocating the assemblies within the Project roadways.

(B) Relocating the assemblies from Project roadway to stockpile for later use on Project roadways.
S-252 (2557) FLEXIBLE PLASTIC GLARE SCREEN

SP2016-227

This work shall consist of constructing flexible polyethylene headlight blades on concrete median barrier in accordance with the applicable MnDOT Standard Specifications, the details shown on the Plans, and the following:

S-252.1 MATERIALS
The plastic blades and other components shall conform to the requirements shown on current MnDOT Standard Plate 8326.

S-252.2 CONSTRUCTION REQUIREMENTS
The plastic blades shall be installed in accordance with the manufacturer's recommendations and the following:

(A) All blades shall be installed vertical and true to line.

(B) The base plate brackets shall be installed as level as is possible, to the satisfaction of the Engineer.

(C) After the plastic blades are installed in their final position (vertical and true to line) the nuts shall be drawn up tight on the washers to prevent any movement of the blades.

(D) Any damage to the concrete median barrier which may be caused by installation of the flexible glare screen thereon shall be repaired to the satisfaction of the Engineer, and without direct cost to the State.

S-252.3 MEASUREMENT AND PAYMENT
Measurement will be made by the length of median barrier on which flexible plastic glare screen is constructed as specified. Payment will be made under Item 2557.603 (Flexible Plastic Glare Screen) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto.

S-253 (2557) TEMPORARY GLARE SCREEN

SP2016-228

This work shall consist of constructing modular units of flexible polyethylene headlight blades to be attached to temporary concrete median barrier in accordance with the applicable MnDOT Standard Specifications, and the following:

S-253.1 MATERIALS
The plastic blades and other components shall conform to the requirements shown on current MnDOT Standard Plate 8326, or may be any other temporary glare screen acceptable to the Engineer.

S-253.2 CONSTRUCTION REQUIREMENTS
The temporary modular glare screen shall be installed in accordance with the manufacturer's recommendations and the following:

(A) Base plate brackets for the modular units shall be 10 feet [3 m] long and be bolted to the barrier at three locations. The distance between the end of the bracket and the first bolt shall be 6 inches [150 mm]. Bolt
holes in the base plate brackets shall be slotted to allow for expansion and contraction. Base plate brackets made of timber will not be allowed.

(B) All blades shall be installed vertical and true to line.

(C) The base plate brackets shall be installed as level as possible, to the satisfaction of the Engineer.

(D) After the plastic blades are installed in their final position (vertical and true to line) the nuts shall be drawn up tight on the washers to prevent any movement of the blades.

(E) Any damage to the concrete median barrier which may be caused by installation of the temporary modular glare screen thereon shall be repaired to the satisfaction of the Engineer, and without direct cost to the State.

(F) Shop drawings of the temporary modular glare screen shall be submitted to the Engineer for approval prior to installation of the glare screen.

(G) Plastic blades or base plate brackets damaged by the Contractor during subsequent handling shall be replaced by the Contractor at no cost to the State.

S-253.3 MEASUREMENT AND PAYMENT
Measurement will be made by the length of median barrier on which temporary glare screen is constructed as specified. Payment will be made under Item 2557.603 (Temporary Glare Screen) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto.

Relocation of the temporary glare screen shall be considered incidental.

S-254 (2557) INSTALL CHAIN LINK FENCE
SP2016-229
This work shall consist of installing chain link fence salvaged elsewhere under this Contract in accordance with the following:

Measurement will be made by the length in linear feet [meters] of fence installed complete in place as specified. Payment will be made under Item 2557.603 (Install Chain Link Fence) at the Contract bid price per linear foot [meter], which shall be compensation in full for all costs incidental thereto, including but not limited to: 1) installing fence components removed and salvaged elsewhere under this Contract in the new locations as specified, and 2) furnishing and installing any other new fence components as may be required for the complete installation, in addition to those materials available from the salvage operations.

S-255 (2563) TRAFFIC CONTROL SUPERVISOR
The designer needs to modify Section S-.3 as to when the Traffic Control Supervisor will be required. WHenever you use this writeup, you have to have the pay item for this on the plan. it can not be incidental.
SP2016-230
The Contractor shall provide a Traffic Control Supervisor for all major traffic control modifications to the Project, in accordance with Contract provisions and as directed by the Engineer.

S-255.1 The Contractor shall provide a Traffic Control Supervisor for all major traffic control modifications listed below:

1. Initial startup of the Project
2. Whenever any bypass is placed into operation
3. Winter suspension traffic control adjustment operation
4. Spring start-up traffic control adjustment operation
5. Completion of the Project
6. Any other major changes to the Traffic Control set-up (due to Contractors staging of operations)

The Traffic Control Supervisor shall be on site 3 days prior to all major traffic control modifications listed above until the major traffic control modification is functioning properly allowing for safe, long term accommodations for traveling public.

During the 3 day time period prior to the major traffic control modification, the Traffic Control Supervisor will be expected to be on-site to develop a site plan for the major traffic control modification, to determine and ensure timely delivery of the proper quantity of traffic control devices, and to develop staging plans for the major traffic control modification operation. The Traffic Control Supervisor shall then coordinate and direct the installation of the devices as well as the staging of the traffic control modification to ensure a safe and efficient transition is completed. Following the transition, the Traffic Control Supervisor shall monitor the traffic flow of the site(s) in question and make modifications necessary to provide for the safe and efficient passage of the traveling public.

S-255.2 The Traffic Control Supervisor shall be certified as a worksite supervisor by MnDOT. A copy of the Traffic Control Supervisor’s certification shall be provided to the Engineer at the Project pre-construction conference.

MnDOT certification as a Traffic Control Supervisor can be obtained by attending a 3 day MnDOT Traffic Control Supervisor Course within the last 5 years. Additional information on MnDOT’s certification can be obtained by contacting Leigh Kriewall at 651-366-4217.

The National ATSSA Traffic Control Supervisor Certification will not be accepted.

(A) The Contractor shall, at the pre-construction conference, designate a Traffic Control Supervisor who shall be responsible for and perform the traffic control management. The Traffic Control Supervisor shall be either an employee of the Contractor other than the superintendent, or an employee of a firm which has a subcontract for overall traffic control management for the project. The Traffic Control Supervisor shall be responsible for the management of the traffic control operations of the Project, including those of the Contractor, subcontractors, and suppliers. The primary responsibility of the Traffic Control Supervisor shall be the Traffic Control Management of this Project.

(B) The Traffic Control Supervisor shall have the authority needed to effectively require modifications and maintenance of traffic controls. This includes having the authority necessary to obtain and use all labor, equipment, and materials needed to provide and maintain traffic control in routine and in emergency situations.

(C) The Traffic Control Supervisor shall have an up-to-date copy of the Part VI of the MN MUTCD (Minnesota Manual on Uniform Traffic Control Devices), including the “Field Manual for Temporary Traffic Control Zone Layouts,” and “A Guide to Establishing Speed Limits in Highway Work Zones.”

S-255.3 Traffic control management by the Traffic Control Supervisor includes, but is not limited to:

Choose applicable items which apply to the Project ONLY

1. Ensuring that traffic control devices are functioning as required. This includes the repair or replacement of all signs, barricades, and other traffic devices that become damaged, moved, or destroyed, or lights that cease to function properly, and barricade weights that are damaged or otherwise fail to stabilize barricades.
2. Providing sufficient surveillance of signs, barricades, and other traffic control devices. This includes inspecting traffic control devices on every calendar day that traffic control devices are in use (by the Traffic Control Supervisor or his approved representative). Routine surveillance reports shall be submitted to the Project engineer weekly.

3. The Traffic Control Supervisor will be on the Project every working day, “on call” at all times, and available within 45 minutes of notification, at other than normal working hours. The Contractor shall give the Engineer, the names, addresses, and phone numbers of at least three individuals (one of which is the Traffic Control Supervisor) responsible to provide and ensure immediate attention to the traffic control management. [the designer needs to modify this section as to when the Traffic Control Supervisor will be required].

S-255.4 Traffic Control Supervisor shall be provided by the Contractor during the time periods indicated above. For any period of time the Traffic Control Supervisor is not available to provide traffic control management, the Contractor will be subject to an hourly charge assessed at a rate of $250.00 per hour for each hour or any portion thereof which the Engineer determines that the Contractor has not complied.

**WHENEVER YOU USE THIS WRITEUP, YOU HAVE TO HAVE THE PAY ITEM FOR THIS ON THE PLAN. IT CAN NOT BE INCIDENTAL.**

S-255.5 Measurement for Traffic Control Supervisor will be made by the per day of service (Unit Day) as specified. Payment for Traffic Control Supervisor provided, as directed by the Engineer, and per these Special Provisions, will be made under Item 2563.613 (Traffic Control Supervisor) at the Contract bid price per Unit Day, which shall be compensation for costs incidental thereto.

**OR**

**WHENEVER YOU USE THIS WRITEUP, YOU HAVE TO HAVE THE PAY ITEM FOR THIS ON THE PLAN. IT CAN NOT BE INCIDENTAL.**

S-255.6 No measurement will be made of the various duties of the Traffic Control Supervisor, but all such work shall be construed to be included in the lump sum payment under Item 2563.601 (Traffic Control Supervisor). The lump sum payment shall be compensation for all costs incidental thereto.

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**S-256 (2563) INTELLIGENT WORK ZONE SYSTEM**

**SYSTEM OVERVIEW**

This project will utilize a Stopped Traffic Warning System which will be referred to as the “system”. The system shall be a **fully automated, stand-alone system**, capable of providing real-time warnings for Stopped Traffic Queues.

For the Stopped Traffic Warnings, the system will post static signs with remote actuated warning lights at locations shown in the Plan. Sensors along the roadway will detect traffic queues and activate the appropriate warning signs. **The data collected by the sensors will be aggregated with the system activations and delivered via email at the end of each day to the appropriate personnel to identify system functionality and appropriate set points.**

**SYSTEM REQUIREMENTS**

This Pay Item shall consist of furnishing, installing, relocating, operating, maintaining and removing an automated, portable, real-time system meeting the requirements noted herein, during the duration the
Project is in a single lane operation. Included in the operational responsibilities is the assuming of all communication costs such as cellular telephone, satellite, generating operational data, and internet subscription charges. In addition to these requirements, the Contractor shall assume all responsibility for any damaged equipment due to crashes, vandalism, adverse weather, etc. that may occur during the systems deployment.

The system for this Project shall consist of at least the following components:

(A) Temporary “warning signs”: STOPPED OR SLOW TRAFFIC, WHEN FLASHING (G20-X14). Two signs shall be placed at each location (one left side and one right side). These warning signs may be ground mounted on approved crashworthy sign supports or mounted on trailers. If ground mounted, the solar/battery assembly shall be crashworthy or located outside the clear zone. See the Traffic Control Plan for the proposed sign locations. The signs will be located at the direction of the Engineer. The initial installation will be in advance of the any lane closures. The signs shall remain in place until the completion of the Project.

(B) Sufficient traffic detection device(s) to sequentially activate the stopped traffic flashers as the queue extends. The system shall be capable of identifying stopped/slowed traffic conditions in advance of the lane closure taper. The system shall self-test for communication or sensor failures. All sensors shall be of a type whose accuracy is not degraded by inclement weather or degraded visibility conditions including precipitation, fog, darkness, excessive dust, and road debris. The operational status of the sensors shall be shown in the daily reports.

(C) The system shall have a reliable communication system and provide warnings to the system manager and the Project Engineer when communication or device failures are detected.

(D) The system shall have reporting features to a secure website, and/or text message or email. The website shall, at a minimum, show the current speeds at each detector location and whether the warning flashers are activated. The text messages and/or email notifications shall be generated in real time when the system has detected an event and provide event detail and system operational status. The website shall provide access to archival data for the duration of the Project. This archival data shall be printable.

(E) The system shall provide data logging of system events and key detection data. The data should include the dates and times that the system was activated, which signs were activated, duration of the activation, and average speeds at each detection device. This data shall be provided to the Engineer on a DVD/CD in a CSV format at the close of the Project, or pushed in a selectable daily/weekly report basis, in a graphical representation to the Engineer.

(F) The system shall use 12” LED beacons mounted 12” above the sign display. The flash rate shall be 55 flash cycles per minute, as defined by the MUTCD. The sign panel shall be:
S-256.3 SYSTEM OPERATION AND PERFORMANCE
The system shall be capable of continuous 24/7 operation.

The remote web access shall allow the system manager or Project Engineer to shut-down the system during apparent failures.

The Stopped Traffic Warning System shall activate the warning signs whenever average traffic speeds fall below 40 mph and turn-off when the average speed returns to above 55 mph. These speeds are only suggested and actual field trials will determine the appropriate trigger values to be approved by the Engineer. *The adjustments to set points shall be incidental to the system.* The system shall be configured so that during low volume time periods such as early morning, the lack of traffic does not produce an average speed that activates the stopped traffic flashers.

If during the duration of the Project, it is found that the detectors or warning signs need to be relocated due to a change in the Project’s traffic conditions or queuing patterns, the Contractor shall provide this adjustment *at the system relocation price.* The replacement, repositioning or the addition of detectors to maintain the system’s *designed* operational accuracy may be required throughout the Project duration and will be considered incidental to the system.

S-256.4 SYSTEM TRAINING
Interested *project personnel/partners* shall attend an education and training session at or near the time and place of the construction kick-off meeting. The training shall include at least one representative from each of the following entities:

- Prime Contractor
- Department of Transportation representative (Project Engineer and District Traffic Engineer)
- Others – such as local police, state patrol, local EMS, local media

*The training shall consist of at least a review of the following:*

- In the event of an emergency, instructions on how to override the system flashers.
- In the event of a power failure, instructions detailing how to power cycle the system.
- List of telephone numbers to call to request technical support.
Data Logging, printing reports, and interpreting the reports.

S-256.5  SYSTEM WARRANTY, MAINTENANCE, AND SUPPORT
The system shall be maintained and supported through the duration of the deployment. The Contractor (system provider) shall assign a system manager for the system deployment. The system manager shall respond to system failures.

The Contractor shall be required to respond immediately to any call from the Engineer or his designated representative concerning any request for correcting any deficiency in the system. **If the Contractor is negligent in correcting the deficiency within two hours of notification, the Contractor shall be subject to the hourly charge of $250.00.**

S-256.6  MEASUREMENT
Measurement will be made by the Lump Sum.

S-256.7  RELOCATE
Measurement will be made by the PER EACH DEVICE.

S-256.8  PAYMENT
Payment will be made under Item 2563.601 (Intelligent Work Zone System) at the Contract bid price per Lump Sum, which shall be compensation in full for furnishing, installing, relocating, operating, maintaining and removing the system. The system shall remain the property of the Contractor.

S-257  (2563) ALTERNATE PEDESTRIAN ROUTE
To be used on all projects in which pedestrian movements may be impacted by construction – including sidewalks; intersection pedestrian crossings; as well as access to businesses, residences, schools and other pedestrian destinations. All projects that impact pedestrian movements shall include Alternate Pedestrian Routes (APRs). An APR maintains the existing level of ADA accessibility.

The Designer needs to work with the District Traffic and Construction offices to determine how to meet pedestrian requirements for a particular job. The following write-up or some form of it may be used to help meet these requirements or the District may use their own language. The language may be included in the Time and Traffic or this writeup can be used if the District prefers to use a pay item. Please contact Ken Johnson at 651-234-7386 or Ted Ulven at 651-366-4222 for help with this if needed. **THE SPECIAL PROVISIONS UNIT CAN NOT DO THIS FOR YOU.**

S-257.1  Maintain and guide pedestrian traffic through the Project at all times using continuous Alternate Pedestrian Routes (APRs) per standards set forth in the MN MUTCD Chapter 6D. Provide each APR to the same level of accessibility of each existing access and walkway prior to construction. Incorporate accessible pedestrian signals (APS), temporary curb ramps, pedestrian barricades, pedestrian channelizers, detectable edges, temporary walkway surfaces and other accessible design features as necessary. Provide continuous walkway surfaces that are smooth, stable and slip resistant. Use accessible device standards as shown in Figures 6K-12 and 6K-13 in the Field Manual. For bypasses and detours, utilize Layouts 84 and 85 in the Field Manual. Use 6F.74.1 from the MN MUTCD if using temporary walkway surface devices as part of the continuous walkway surface over short segments of rough, soft or uneven ground.

S-257.2  Minimize disruption to pedestrians to the maximum extent feasible by providing APRs in the following order of preference:

1. Provide the APR on the same side of the street as the disrupted route utilizing bypasses.
2. Where it is not feasible to provide a same side APR, provide an APR on the other side of the street.

3. Where it is not feasible to provide an APR on the other side of the street, provide an APR detour with trailblazing signs.

If existing parking spots are desired to be used for an APR route within the project limits, contact the ____ (name of local agency) for approval and parking banning notification procedures.

S-257.3 Schedule and coordinate the replacement of pedestrian access to accommodate the needs of businesses and residences ___ days prior to the replacement. Leave the existing sidewalks 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. Provide front door access to buildings without alternate public entrances.

S-257.4 Protect the pedestrian route with pedestrian barricades or pedestrian channelizing devices if it is adjacent to construction, excavation drop-offs, traffic, or other hazards. Protect the pedestrian route with portable barrier if it is on the shoulder, in a parking lane, or in a closed lane adjacent to traffic on a multilane road or if the speed limit is greater than 40 mph. When both sides of a pedestrian route require channelizing devices, use similar types, unless portable barrier is used to protect pedestrians from traffic.

Use if pedestrian curb ramp work is included in project

S-257.5 No pedestrian curb ramp or blended transition work shall occur concurrently at adjacent intersections.

Use if needed

S-257.6 No closures for sidewalk or pedestrian curb ramp or blended transition related work are allowed along ___ route ___ between the hours of ___ AM and ___ PM.

Use if needed

S-257.7 The Contractor is advised that the corridor has Transit service. Re-locations of stops can only be made with the approval of the Engineer. The Contractor is hereby directed to Section S-1707 (PUBLIC CONVENIENCE AND SAFETY) of these Special Provisions.

S-257.8 Notify the Engineer in writing at least ___ hours prior to the start of any construction operation that will necessitate a change in pedestrian access.

S-257.9 Furnish the name, address, email, and phone number of at least one individual responsible for the maintenance of the APR. This individual shall be “on call” 24 hours a day, seven days per week during the times any devices, furnished and installed by the Contractor, are in place. Submit the required information to the Engineer at the pre-construction meeting.

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 $500.00 per hour in all other cases that the Engineer determines the Contractor has not complied.

Use without pay item

S-257.10 No measurement will be made of the various items that constitute APRs. Payment for all costs of the APRs, including furnishing, installing, maintaining and removing the individual devices, shall be included in the lump sum payment for traffic control.

OR
Use with pay item

S-257.11 No measurement will be made of the various items that constitute Alternate Pedestrian Route, but all such work shall be construed to be included in the lump sum payment under Item 2563.601 (Alternate Pedestrian Route). The lump sum payment shall be compensation in full for all costs of furnishing, installing, maintaining and removing the individual devices.

S-258 (2563) RAISED PAVEMENT MARKERS TEMPORARY (TRPMS)

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-258.1 The specification TEMPORARY RAISED PAVEMENT MARKERS (TRPM) can be accessed on the MnDOT Office of Traffic, Safety, and Technology website.

S-258.2 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-259 (2563) PORTABLE CONCRETE BARRIER DELINEATOR

This work shall consist of furnishing, installing and maintaining delineators on portable precast concrete barriers in accordance with the provisions of MnDOT 2564, the Plans, and the following:

S-259.1 The size and spacing of the barrier delineators shall be as specified in the Plans. The approved barrier delineators can be found at: http://www.dot.state.mn.us/products/signing/delineationdevices.html.

S-259.2 Measurement will be made by the number of barrier delineators furnished and installed as specified. Payment will be made under Item 2563.602 (Portable Concrete Barrier Delineator) at the Contract bid price per each, which shall be payment in full for all costs involved.

S-260 (2563) MEDIAN BARRIER DELINEATOR

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-260.1 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-260.2 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-261  **(2563) TUBE DELINEATORS**
SP2016-236

This work shall consist of furnishing, installing, and replacing tube delineators in accordance with the Traffic Engineering Manual and the following:

S-261.1 The delineators shall be located as shown in the Plans.

S-261.2 Removal of the post and surface mount assembly shall be done as directed by the Engineer.

Delineators that are fastened to the concrete or bituminous pavement with epoxy cement shall not be placed without the prior approval of the Engineer.

S-261.3 Used materials may be furnished in accordance with the following:

In the event the Contractor elects to utilize used materials, the tubes, bases and reflectorization shall conform to the foregoing requirements and shall be in near new condition at the time of installation. During the progress of work, the Engineer may require the replacement of reflectorized material whose effectiveness has been substantially reduced by traffic damage or other causes.

If there is no pay item for REPLACE TUBE DELINEATORS use the following highlighted paragraphs instead of the following non-bolded paragraphs

S-261.4 The Contractor shall replace damaged or missing tubes and bases on a daily basis with new or used materials (approved by the Engineer), including, but not limited to the high impact plastic tubing, the polyethylene support tubing and the reflective sheeting.

S-261.5 The Contractor shall replace damaged or missing tubes and bases on a daily basis. The work under Item 2563.602 (Replace Tube Delineator) shall consist of replacing a portion of the Delineator with new or used materials (approved by the Engineer), including, but not limited to the high impact plastic tubing, the polyethylene support tubing and the reflective sheeting, in accordance with the following:

The Contractor is cautioned not to order the entire planned quantity of replacement delineators from the supplier at the beginning of the Project. Experience gained as the Project proceeds will indicate the number of replacement delineators required.

S-261.6 **MEASUREMENT AND PAYMENT**

Tube Delineators will be measured by the number of delineators furnished and installed complete in place as specified. Payment therefore will be made under Item 2563.602 (Tube Delineator) at the Contract bid price per each, which shall be compensation in full for furnishing, installing, replacing the portion or portions of any damaged delineators, removing the delineators, and for the filling of the holes in the old concrete pavement as specified.

S-261.7 **MEASUREMENT AND PAYMENT**

(A) Tube Delineators will be measured by the number of delineators furnished and installed complete in place as specified. Payment therefore will be made under Item 2563.602 (Tube Delineator) at the Contract price per each which shall be compensation in full for furnishing, installing, and removing the delineators and for the filling of the holes in the old concrete pavement as specified.

(B) Measurement and payment will be made only for the actual quantity of Delineators replaced as specified. No adjustment of any Contract bid prices will be made for any increased or decreased quantities thereof. Delineators will be measured separately by the number of units furnished and installed as replacements. Payment
therefore will be made under Item 2563.602 (Replace Tube Delineator) at the Contract bid price per each, which shall be compensation in full for replacing the portion, or portions, of the delineator as described above.

S-262 (2563) FLAGGER
The Contractor shall provide qualified flaggers in accordance with the applicable provisions of the MnDOT Standard Specifications, MN MUTCD, as determined by the Engineer, these Special Provisions, and the following:

S-262.1 Qualified flaggers shall be provided to safely provide for traffic control, primarily at intersections, in such numbers and for such items as determined by the Engineer. Flaggers shall not override inplace signals, stop signs or control interchanges without approval of the Engineer.

S-262.2 The flagger shall be properly uniformed and have a STOP/SLOW sign with a five foot minimum staff.

S-262.3 The flaggers shall be equipped with two-way radios.

S-262.4 Except as otherwise authorized by the Engineer, the maximum length of the flagging operation shall be no more than 1 mile [1.6 km].

Use only if the paragraph applies to this Project!
S-262.5 The Contractor shall provide a pilot car and maintain proper lane closures with appropriate delineation. Pilot Car operations shall be in accordance with Technical Memorandum No. 05-15-T-01 that can be found at http://techmemos.dot.state.mn.us/.

S-262.6 Measurement will be made by the length of time flaggers are in service on the Project. Payment will be made under Item 2563.610 (Flagger) at the Contract bid price per hour, which shall be compensation in full for all costs for each flagger provided.

S-263 (2563) POLICE OFFICER
The Contractor shall provide off-duty police officers in accordance with the applicable provisions of the MnDOT Standard Specifications, as determined by the Engineer, these Special Provisions, and the following:

S-263.1 To maintain safety for traffic, Off-Duty police officers shall be provided in such numbers and for such times as determined by the Engineer.

S-263.2 The police officers shall be properly uniformed and fully equipped including police car, and shall be paid for by the hour.

S-263.3 Payment for police officers at the Contract bid price shall be compensation in full for all costs for providing the police officers. Such payments will be measured and paid for in accordance with the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2563.610</td>
<td>Police Officer</td>
<td>Hour</td>
</tr>
</tbody>
</table>
S-264   (2563) WORKERS PRESENT SPEED LIMIT

SP2016-239

A "Workers Present Speed Limit" of ___ MPH will be required on this Project at all times that
lane closures are in use and workers are present in the lane adjacent to through traffic. Provide speed limit signs and
assemblies in accordance with the plan and the "Speed Limits in Work Zones Guidelines." This publication may be
obtained from the Office of Traffic, Safety and Technology; the District Traffic Engineer; or at the following

Install workers present speed limit signs and assemblies when a lane closure is in use and workers
are present in the lane adjacent to through traffic. Remove or cover workers present speed limit signs and
assemblies when workers are not present in the lane adjacent to through traffic. Document the installation and
removal of the workers present speed limit. In place statutory speed limit (30, 55, 65 or 70 mph) signs may be
covered at the start of the Project and remain covered until the Workers Present Speed Limit is no longer needed.
For other in place posted speed limits, uncover the in place speed limit signs at the end of each work shift.

Cover all speed limit signs that are not consistent with the workers present speed limit. The cover
should be a plate of solid material covering the entire legend or all of that part of the legend that is inappropriate.
Attach the cover to the sign and place a minimum of 1/8 inch [3 mm] plastic spacers between the sign face and the
cover. See the Typical Temporary Sign Framing and Installation Details Sheet found in the Plan or at

If the work area is protected by positive protection, such as temporary barrier, a workers present
speed limit shall not be used.

The contractor may use an Electronic Workers Present Speed Limit system any electronic speed
limit system used shall meet the following:

(A) SYSTEM REQUIREMENTS

This Project will utilize changeable Light Emitting Diode (L.E.D.) Speed Limit Panels which will
be used to display speed limits as motorists drive through the work zone and is referred to as the "system". This
system shall be deployed as shown in the traffic control plan.

This work includes furnishing, installing, operating, maintaining, relocating and removing the
L.E.D signs according to the requirements defined herein and in the Traffic Control Plans, and providing the
maintenance and operation of the complete system during the duration of the Project. The Contractor shall assume
all responsibility for any damaged equipment due to crashes, vandalism, adverse weather, etc. that may occur during
the system's deployment.

Each character (number) shall be 18 inches in height and 12 inches in width. The sign shall be
clearly visible and legible from a distance of 1,000 feet under both day and night conditions. The L.E.D. speed limit
signs shall be able to be changed remotely (Hand held remote).

When the system is activated, all signs installed on roads open to traffic that are not consistent
with traffic operations shall be covered or removed as directed by the Engineer. The cover should be a rigid panel
covering the entire legend or all of that part of the legend that is inappropriate. Bolt the cover to the sign and place a
minimum of 1/8 inch [3 mm] spacers (such as plastic or rubber) between the sign face and the cover. See the
Typical Temporary Sign Framing and Installation Details Sheet found in the Plan or at

The system shall operate continuously 24 hours a day, 7 days a week, displaying either the
workers present or 24/7 speed limit as appropriate. The system shall collect and store speed limit data and be
archived into a database with time and date stamps which will be provided to the Engineer upon request, and at
completion of the project.

(B) SYSTEM WARRANTY, MAINTENANCE AND SUPPORT
The system shall be maintained, supported, and warranted against material defects by its supplier
through the duration of the deployment.

Respond immediately to any call from the Engineer or his designated representative concerning
any request for correcting any deficiency in the system. If the Contractor is negligent in correcting the
deficiency within two hours of notification, the Contractor will be subject to the hourly charge of $250.00 per
hour for each hour or any portion thereof with which the Engineer determines that the Contractor has not
complied.

S-264.1 Measurement for Workers Present Speed Limit will be made by the Unit Day.

S-264.2 Payment will be made under Item 2563.613 (Workers Present Speed Limit) at the Contract bid
price per unit day, which shall be compensation in full for all work and material necessary, regardless of number of
set ups and lane closures.

S-265 (2563) TRUCK/TRAILER MOUNTED IMPACT ATTENUATOR (TMA)
NEW WRITEUP 03/01/16 ▲DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE
CONTRACTORS.
SP2016-239.1 The Contractor shall provide Truck Mounted Impact Attenuators in accordance with the applicable
MnDOT Standard Specifications, as directed by the Engineer, and the following:

S-265.1 If the Contractor establishes a lane and or shoulder closure on a high-speed roadway, a vehicle
equipped with a truck mounted attenuator that meets the requirements of NCHRP 350 (or AASHTO’s Manual for
Assessing Safety Hardware (MASH)) shall be placed in the closed lane/shoulder next to traffic prior to the active
work site, as directed by the Engineer. The lane/shoulder closures shall meet the requirements described in the
appropriate Field Manual layout.

S-265.2 Measurement will be made by the number of Truck Mounted Impact Attenuators provided per day
of service (Unit Day) as specified.

S-265.3 Payment for Truck Mounted Impact Attenuators provided, as directed by the Engineer, will be
made under Item 2563.613 (Truck Mounted Impact Attenuator) at the Contract bid price per Unit Day, which shall
be compensation in full for all costs relative thereto. The Truck Mounted Impact Attenuators shall remain the
property of the Contractor.

S-266 (2563) PORTABLE CHANGEABLE MESSAGE SIGN
SP2016-240 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-266.1 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-266.2 (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:
http://www.dot.state.mn.us/products/temporarytrafficcontrol/tcelectronicequipment.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-266.3 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-266.4 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-266.5 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-266.6 Measurement will be made by the number of Portable Changeable Message Signs furnished and installed per day of service (Unit Day) as specified.

S-266.7 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-267 (2563) CONSTRUCTION SIGN - SPECIAL**

SP2016-241

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-267.1 All materials required to furnish and install the special construction signs shall remain the property of the Contractor.

S-267.2 Measurement will be made by the area in square feet of special construction signs constructed as specified.

S-267.3 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-268 **(2571) GEOTEXTILE WEED BARRIER FABRIC**  
SP2016-242

This work consists of furnishing all materials, equipment and labor for the required installation of the geotextile weed barrier fabric and pea gravel landscape mulch in all living snowfence shrub planting beds in accordance with the applicable MnDOT Standard Specifications, the Plans and the following:

S-268.1 **MATERIALS**

All materials for this work shall be new stock, free from defects impairing strength, durability, functionality and appearance.

(A) **Pea Gravel Landscape Mulch** (1/4” washed river rock) shall be used as mulch to prevent weed growth around each plant and keep rodents from crawling under the geotextile weed barrier fabric. This mulch ring shall be applied at a 2 inch depth as per the living snow fence layout detail sheet.

(B) **Geotextile Weed Barrier Fabric**  
Minimum product requirements are:

1. Width: ........................................................... 10 ft.
2. Material: ........................................................ polypropylene
3. Color: ............................................................ black
5. Tensile strength (lbs): ....................................... 100 X 60 (ASTM test method D-4632)
6. Bursts (psi):....................................................... 210 (ASTM test method D-3786)
8. Puncture (lbs): ................................................. 45 (ASTM test method D-4833)
9. Water permeability (gal/min/SF) ................. 12 (ASTM test method D-4491)  
Xenon Arc (ASTM test method D-4355)
10. Ultraviolet Exposure ...................................... >70% strength retained after 2500 Hrs. 
11. Thickness (mils): ............................................. 15 (ASTM test method D-1777)

S-268.2 **SUBMITTALS**

(A) Submit a Geotextile weed barrier fabric technical data sheet and product sample at the Pre-construction meeting for Project Engineer’s approval.

(B) Submit a plan for the shrub planting installation. Plan must include methods and sequencing for bed preparation, plant installation, and Geotextile installation for the Project Engineer’s approval.

S-268.3 **INSTALLATION**

(A) Installation of Geotextile weed barrier fabric prior to the initial installation of plant material is approved provided that the 10 foot wide planting bed has been deeply cultivated and the Grade 2 compost thoroughly incorporated with the spading machine unless an alternative method is approved by the Project Engineer.

(B) If the Geotextile weed barrier fabric is installed after plant installation, the fabric shall not rest on any given plant for a period of time longer than 30 seconds before the Geotextile weed barrier fabric is slit and pulled down over the given plant to the ground.

(C) The Contractor is required to install the Geotextile weed barrier fabric in continuous lengths to the greatest extent practical to minimize fabric joints and prevent damage to newly installed plants.

(D) Prior to the installation of the Geotextile fabric, rake planting bed level and remove all dirt clumps and stones 4 inches or larger.
(E) Install fabric with overlap at all seams as shown on the Plan.

(F) Secure fabric to the ground using staples at spacing interval shown on the Plan.

(G) Soil berm at the outer 1 foot of the Geotextile fabric shall be a minimum of 2 inches deep. Contractor may depress the Geotextile fabric an additional 2 inches below the natural grade to prevent Geotextile fabric from being exposed during the plant establishment period. Maintain the outer limits berm at the edge of the Geotextile fabric for the duration of the Contract and make repairs as directed by the Project Engineer at no additional cost to MnDOT.

(H) Sweep and/or blow any soil, straw mulch, or other debris off the top of the Geotextile weed barrier fabric prior to the placement of the pea gravel (1/4” washed river rock) mulch.

S-268.4 MEASUREMENT
Measurement will be made by the total area of Geotextile fabric installed as specified and will be taken from the outer limits of the Geotextile fabric installed in place. No additional measurement will be made for volume of fabric installed at overlap joints, number of stables, stakes or lathe or volume of pea gravel used in this work.

S-268.5 PAYMENT
Payment will be made under Item 2571.604 (Geotextile Weed Barrier Fabric) at the Contract bid price per square yard, including but not limited to all submittals, labor, and materials, for a complete installation and full maintenance and restoration of damaged work for this item for the duration of the Contract.

S-269 (2573) STORM WATER MANAGEMENT
Use on most jobs.
REVISED 03/01/16

MnDOT 2573 is modified as follows:

S-269.1 The following is added to MnDOT 2573.5:

J Unit Prices

The Department will pay the following unit prices for temporary sediment control items in the absence of a Contract bid price:

Bale Barrier ................................................................................................................................. $4.10 /ln ft ($13.45/meter)
Silt Fence, HI .................................................................................................................................. $3.00/ ln ft ($10/meter)
Silt Fence, Type MS ......................................................................................................................... $2.00/ ln ft ($6.50/meter)
Silt Fence, Type SD .......................................................................................................................... $10.00/ ln ft ($32.80/meter)
Sandbag Barrier .............................................................................................................................. $6.00 square foot ($64.68/ sq meter)
Flotation Silt Curtain, Type: Still Water, 1.2 m (4 foot) depth...................................................... $12.50 / ln ft ($41.00/meter)
Sediment Trap Excavation ............................................................................................................. $5.50/cubic yard ($7.20/cubic meter)
Bituminous Lined Flume .............................................................................................................. $50.00/square yard ($59.52/square meter)
Sediment Removal, Backhoe ......................................................................................................... $175.00/ hour
Sediment Removal, Vacuum truck .............................................................................................. $250.00 /hour
Sediment Control Log, Type Wood Fiber .................................................................................. $4.00/ ln ft ($13.00/meter)
Sediment Control Log, Type Rock .................................................................................................. $5.00/ ln ft ($16.50/meter)
Flocculant Sock .................................................................................................................................. $200 each
S-270  (2574) SOIL PREPARATION
Use on most jobs.
SP2016-244

MnDOT 2574 is modified as follows:

S-270.1 The following is added to MnDOT 2574.5:

C Unit Prices
The Department will pay the following unit prices for Soil preparation items in the absence of a Contract bid price:

- Subsoiling: $350.00 /acre ($853.65/hectare)
- Soil Bed Preparation: $200.00/ acre ($487.87/hectare)
- Soil Tracking: $134.00 /acre ($326.83/hectare)

S-271  (2575) ESTABLISHING TURF AND CONTROLLING EROSION
Use on most jobs.
REVISED 11/06/15

MnDOT 2575 is modified as follows:

S-271.1 The provisions of MnDOT 2575.5(L), “Payment Schedule” are modified as follows:

L Payment Schedule
The Department will pay for establishing and maintaining turf and controlling erosion on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item:</th>
<th>Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2575.501</td>
<td>Seeding</td>
<td>acre [hectare]</td>
</tr>
<tr>
<td>2575.502</td>
<td>Seed, Mixture ___, or (Species)</td>
<td>pound [kilogram]</td>
</tr>
<tr>
<td>2575.505</td>
<td>Sod, Type ___</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.511</td>
<td>Mulch Material, Type ___</td>
<td>ton [metric ton]</td>
</tr>
<tr>
<td>2575.513</td>
<td>Mulch Material, Type ___</td>
<td>cubic yard [cubic meter]</td>
</tr>
<tr>
<td>2575.515</td>
<td>Mulch Material, Type 4</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.518</td>
<td>Temporary Poly Covering</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.519</td>
<td>Disk Anchoring</td>
<td>acre [hectare]</td>
</tr>
<tr>
<td>2575.523</td>
<td>Erosion Control Blanket, Category ___*</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.525</td>
<td>Turf Reinforcement Mat, Category ___</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.526</td>
<td>Compost Blanket</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.527</td>
<td>Shoulder Mulch Overspray</td>
<td>pound [kilogram]</td>
</tr>
<tr>
<td>2575.535</td>
<td>Water</td>
<td>M gallons [cubic meter]</td>
</tr>
<tr>
<td>2575.541</td>
<td>Mowing</td>
<td>acre [hectare]</td>
</tr>
<tr>
<td>2575.545</td>
<td>Weed Spraying</td>
<td>acre [hectare]</td>
</tr>
<tr>
<td>2575.547</td>
<td>Weed Spray Mixture</td>
<td>gallon [liter]</td>
</tr>
<tr>
<td>2575.555</td>
<td>Turf Establishment</td>
<td>lump sum</td>
</tr>
<tr>
<td>2575.560</td>
<td>Hydraulic ___ Tackifier</td>
<td>pound [kilogram]</td>
</tr>
<tr>
<td>2575.560</td>
<td>Hydraulic ___ Matrix</td>
<td>pound [kilogram]</td>
</tr>
<tr>
<td>2575.561</td>
<td>Hydraulic ___ Tackifier</td>
<td>square yard [square meter]</td>
</tr>
<tr>
<td>2575.561</td>
<td>Hydraulic ___ Matrix</td>
<td>square yard [square meter]</td>
</tr>
</tbody>
</table>
S-271.2 The following is added to MnDOT 2575.5:

M Unit Prices

The Department will pay the following unit prices for temporary erosion control items in the absence of a Contract bid price:

- Disc anchoring: $45.00/acre ($110.00/hectare)
- Temporary Seed Mixtures
  - 21-111, 21-112 or 21-113: $1.25/pound ($2.50/kilogram)
  - 22-111: $2.00/pound ($4.44/kilogram)
- Erosion Control Blanket
  - Category 3N: $1.80/square yard ($2.15/square meter)
  - Category 4N: $2.10/square yard ($2.51/square meter)
- Rapid Stabilization
  - Method 1: $465.00/acre ($1162.5/hectare)
  - Method 2: $800.00/acre ($1976.75/hectare)
  - Method 3: $726.00/M gallon ($149.5/cubic meter)
  - Method 4: $1.84/sq yd ($2.20/square meter)
- Hydraulic mulch: $1.86/lb ($3.33/kilogram)
- Hydraulic Stabilized Fiber Matrix: $1.81/lb ($4.4/kilogram)
- Hydraulic Reinforced Fiber Matrix: $1.77/lb ($4.4/kilogram)
- Water: $17.00/M gallon ($0.53/cubic meter)
- Mowing: $160.00/acre ($400.00/hectare)
- Weed Spraying: $60.00/acre ($150.00/hectare)

S-272 (2575) SITE RESTORATION (ADA)

Designer to choose whether sodding or seeding is to be used where noted in this writeup.

SP2016-246

This work consists of site grading adjacent to pedestrian facilities and the establishment of a perennial vegetative cover as detailed in the Plans and in accordance with the provisions of MnDOT 2575 and Designer select either 3876 (if design specifies seed) 3878 (if design specifies sod). Site restoration shall also include the re-establishment of turf in all areas disturbed by Contractor operations and any cleanup of eroded soil. This provision only pertains to grading, topsoil, and turf establishment operations.

This Special Provision is intended for areas where pedestrian ramps are being constructed, thus resulting in multiple site specific disturbed areas throughout the project corridor, typically in a quadrant of two intersecting roadways.

S-272.1 CONSTRUCTION REQUIREMENTS

(A) Site Grading – All areas adjacent to newly constructed walk and top of curb shall be graded flush with the top of walk and top of curb. All stockpiled topsoil must be replaced within the same quadrant from which it...
was stripped. The minimum depth of topsoil shall be 4 inches which shall be achieved using select topsoil borrow if necessary.

If not otherwise detailed in the Plan, all cut section side slopes shall be finished graded flush from the top of concrete surface at a maximum 1:6 slope up to 5 feet from the edge of walk or back of curb, or straight graded to the existing ground elevation 5 feet from the edge of the walk or back of curb. At the Engineer’s sole discretion, Concrete Curb Design V may be utilized along with the above stated grading techniques to reduce excessive ground slopes and better match adjacent surface terrain within the 5 foot incidental grading area.

All sites shall be restored to as good or better condition than the pre-construction condition.

(B) Turf Establishment – All areas that are disturbed as a result of concrete walk and curb and gutter construction including but not limited to curb ramp, curb and gutter, and sidewalk/trail construction shall be

**Designer choose either seeded or sodded** and stabilized in accordance with the Plans, Specifications, and Special Provisions. Each site must be stabilized in accordance with the requirements of MnDOT 1717. Seed bed preparation shall be performed in accordance with MnDOT 2574 utilizing appropriate methods, to include handwork as necessary.

S-272.2 **METHOD OF MEASUREMENT**
Measurement will be made by each site that is restored in accordance with the Plans, Specifications, and Special Provisions. Each site consists of the area that is disturbed as a result of the adjacent walk, trail and/or curb and gutter construction.

S-272.3 **BASIS OF PAYMENT**
Payment will be made under Item 2575.602 (Site Restoration) at the Contract bid price per EACH, which shall be compensation in full for all work described in this Special Provision. Any topsoil borrow that is required and not accounted for in the Plan shall be screened and pulverized Select Topsoil Borrow paid at $40/CY (LV).

S-273 **(2580) INTERIM PAVEMENT MARKING**

This work consists of placing interim pavement markings on those pavements, prior to opening them to traffic, where the inplace surface is to be covered by a subsequent paving course or the permanent lane markings are to be placed at a future date. The Contractor has the option of furnishing the following material, unless the material type is indicated in the Plan:

(A) Removable Preformed Plastic Pavement Marking (4 inch [100 mm] wide) Tape in accordance with MnDOT 3355.

(B) Epoxy Resin Pavement Markings in accordance with MnDOT 3590 and 3592.

(C) Traffic Marking Paint in accordance with MnDOT 3591 and 3592.

(D) Temporary Raised Pavement Markers in accordance with the following specification:

- TEMPORARY RAISED PAVEMENT MARKERS (TRPMs)

The above specifications can be accessed on the MnDOT Office of Traffic, Safety, and Technology website.
S-273.1 When centerline or lane markings (excluding edge lines) are removed, apply the interim pavement markings prior to opening the roadway to traffic. Apply the interim pavement marking on a clean, dry pavement surface, free of dirt and foreign matter as recommended by the material manufacturer and as required by contract.

S-273.2 Use primer prior to the installation of all tape regardless of weather or pavement conditions or Manufacturer’s specifications. Follow the manufacturer’s specifications for all other installation procedures and materials. The primer and application of the primer shall be incidental.

S-273.3 Apply all centerline and lane markings prior to ending work each day. Apply edge lines within 14 calendar days of pavement course installation.

S-273.4 Interim markings shall consist of center line markings including no passing zone markings, painted islands, and lane lines (excluding edge lines) in accordance with the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD). Provide interim markings with a width of 4 inch varying in width by no greater than ¼ in [6 mm] and with a cycle length as indicated in the Plan. Provide interim markings parallel to the direction of traffic flow. Lateral placement of the markings from centerline shall be as directed by the Engineer.

If the Contractor is negligent in adhering to the above provisions, he/she shall be subject to an hourly charge assessed at a rate of $250.00 per hour for each hour or any portion thereof which the Engineer determines that the Contractor has not complied.

OR

S-273.5 Place all interim markings during daylight hours. Conform with the following interim striping tolerances:

A tolerance of plus ¼ in [6 mm] and minus 0 in from the specified width will be allowed for striping provided the variation is gradual and does not detract from the general appearance. Lengths for the broken line segments may vary no more than plus or minus 3 in [76 mm]. Place all longitudinal markings 2 in ± 1 in [50 mm ±25 mm] from the edge of pavement or longitudinal (centerline) joint. Also, pertaining to the cycle length, the total allowance for the broken segment and gap shall be no more than plus or minus 3 in [76 mm]. Establishment of application tolerances shall not relieve the Contractor of their responsibility to comply as closely as practicable with the planned dimensions. Interim markings on the final pavement surface should match the location of the final markings.

In the event the Engineer determines the interim striping is out of tolerance, take corrective action. Remove pavement markings utilizing equipment that is not detrimental to the final surface, as required by the Engineer. All costs associated with removing and restriping the interim markings will be at the Contractor’s expense. This would include any costs associated with repairing damage caused to the wearing course after pavement marking removal.

If the Contractor is negligent in adhering to the above provisions, he/she shall be subject to an hourly charge assessed at a rate of $250.00 per hour for each hour or any portion thereof which the Engineer determines that the Contractor has not complied.

S-273.6 When temporary raised pavement markings are used as interim markings, install per the TRPM specification or as indicated in the Plan. Removal of TRPMs shall be incidental.

S-273.7 Maintain and replace the interim markings without additional compensation until they are covered by the next paving course, are replaced with permanent pavement markings, or final acceptance of the Project is made. Remove all Temporary Raised Pavement Markings used as Interim Pavement markings. Remove any solid line delineations on the final pavement surface marked with Pavement Marking Tape prior to placing the Permanent Pavement Markings. The Engineer may require the removal of any Interim Pavement Markings that will interfere
with the placement of the permanent markings or could cause confusion to the traveling public if left in place. Removal of interim pavement Markings, if required, shall be incidental, and shall be in accordance with MnDOT 2102.

Use S-8.8 & S-9.9 or S-10.

S-273.8 Interim pavement markings will be measured by the actual length in linear feet [meters] of each line marked as indicated in the Plan and will not include the gap between broken lines. No additional quantity will be included for repair or renewal work. Measurement for raised pavement markings will be made according to the length of line being simulated.

S-273.9 Payment for Interim Pavement Marking at the Contract price per unit of measure shall be compensation in full for all costs of furnishing and placing the marking, removal if required, and all necessary maintenance and renewal work.

Payment for Interim Pavement Marking will be made on the basis of the following schedule:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2580.603</td>
<td>Interim Pavement Marking</td>
<td>linear foot [meter]</td>
</tr>
</tbody>
</table>

OR

S-273.10 No measurement will be made of any individual pavement markings placed, maintained and removed but all such work will be construed to be included in the single Lump Sum payment under Item 2580.601 (Interim Pavement Marking). Payment shall be compensation in full for all costs of furnishing, placing, maintaining and removing the pavement markings as required.

S-274 (2580) PAVEMENT MARKINGS – LATE SEASON

This specification is to be used on projects where late season striping is anticipated such as multi-year projects or paving into October. If striping is expected to happen after October 1, this specification should be included. If striping is expected to happen after October 15, this specification and a pay item should be included.

Late Season Pavement Marking will consist of furnishing and applying late season pavement markings, both striping and messages. Perform the work in accordance with the applicable MnDOT Standard Specifications, the details in the Plan and the following:

Consider all pavement marking operations after October 1 or prior to April 1 Pavement Marking – Late Season and this specification will apply.

For Areas that are lower volume, or rural.

S-274.1 MATERIALS

Use a product listed as either “Late Season Epoxy” or “Late Season Latex” on the MnDOT Pavement Marking Qualified Product list issued by the Office of Traffic, Safety and Technology. This list can be found at: http://www.dot.state.mn.us/products/pavementmarkings/lateseasonpavementmarkingmaterials.html

OR for Areas that are higher volume, or urban, or have high turning volumes or have major weaving expected.

S-274.2 MATERIALS

Use a product listed as “Late Season Epoxy” on the MnDOT Pavement Marking Qualified Product list issued by the Office of Traffic, Safety and Technology. This list can be found at: http://www.dot.state.mn.us/products/pavementmarkings/lateseasonpavementmarkingmaterials.html

S-274.3 MEASUREMENT

Measure "Pavement Marking – Late Season" by the length in linear feet. The length will not include any gaps between broken or dotted lines. Measure all stripes as the equivalent 4” width.
Measure "Pavement Message – Late Season" by area of markings furnished and installed as specified.

No additional quantity will be included for repair or renewal work.

S-274.4 PAYMENT

Use the following paragraph and pay item when the pavement marking is expected to be installed between October 15 and March 15.

The Department will pay for "Pavement Marking – Late Season" in accordance with the schedule set forth below at the appropriate Contract bid price for the specified unit of measure. The Contract bid price includes compensation in full for all costs incidental thereto including, but not limited to all costs of preparing the surface, controlling and protecting traffic, furnishing, and applying, the "Pavement Marking - Late Season":

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2580.603</td>
<td>Pavement Marking – Late Season</td>
<td>Linear foot</td>
</tr>
<tr>
<td>2580.618</td>
<td>Pavement Message – Late Season</td>
<td>Square foot</td>
</tr>
</tbody>
</table>

OR use the following paragraph when the pavement marking is expected to be installed between October 1 and October 15 or between March 15 and April 1.

When the Engineer determines that "Pavement Marking – Late Season" are required, in the absence of a Contract item therefore, compensation will be made as Extra Work.

S-275 (2581) REMOVABLE PREFORMED PLASTIC MASK (BLACK)

SP2016-249

This work shall consist of furnishing, placing and removing temporary pavement marking material over inplace pavement markings on bituminous pavement 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-275.1 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-275.2 Measurement will be made by the length in linear feet [meters].

S-275.3 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.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2581.603</td>
<td>Removable Preformed Plastic Mask (Black)</td>
<td>linear foot</td>
</tr>
</tbody>
</table>
S-276  (2582) PERMANENT PAVEMENT MARKINGS

Use the following when MRM is to be used on the project.

SP2016-250

The provisions of MnDOT 2582 are hereby modified and/or supplemented with the following:

S-276.1

The first paragraph of MnDOT 2582.3C.3 is supplemented with:

Initial pavement marking retroreflectivity is defined as the pavement marking retroreflectivity as measured between 14 days and 44 days after pavement marking installation.

S-276.2  Mobile Retroreflectometer Measurements (MRM)

Provide retroreflectivity measurements of longitudinal markings utilizing an independent Contractor using a vehicle-mounted mobile retroreflectometer utilizing 30 meter CEN geometry in accordance with ASTM E 1710-95 (Standard Test Method for Measurement of Retroreflective Pavement Markings Materials with CEN-Prescribed Geometry Reflectometers). The retroreflectometer shall be calibrated no less than twice a day in accordance with the operating manual and calibration guide for the particular machine and vehicle. Measurement shall consist of the average retroreflective readings and standard deviations over 0.1 mile intervals (or over the length of the line if shorter than 0.1 mile) for each type of pavement marking placed under this Contract.

Provide a measurement report that includes:

1. State Project Number,
2. Data collection software version,
3. Date and time of data collection,
4. The highway number with the beginning and ending reference points of data collection rounded to the nearest thousandths of a mile and the beginning and ending coordinates determined by a Global Positioning System receiver with 3 meter accuracy, including the direction of travel in terms of increasing or decreasing reference points,
5. Which line is being read (LEL – Left Edgeline, REL – Right Edgeline, CL, Centerline, LL – Lane Line Skip, 1LL – left most LL in multilane, 2LL – second to left most LL in multilane, etc),
6. The 0.1 mile station averages and standard deviations,
7. An explanation for any intervals that are marked invalid,
8. A summary of the average retroreflective readings in one mile increments,
9. A summary of average retroreflective readings based on 0.1 mile intervals. Base the summary on Table 2582-2.

<table>
<thead>
<tr>
<th>Product</th>
<th>White</th>
<th>Yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pref Tape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Intervals &lt; 300 :</td>
<td>Percent of Intervals &lt; 250 :</td>
<td></td>
</tr>
<tr>
<td>300 &lt;= Percent of Intervals &lt; 419 :</td>
<td>250 &lt;= Percent of Intervals &lt; 349 :</td>
<td></td>
</tr>
<tr>
<td>420 &lt;= Percent of Intervals &lt;= 479 :</td>
<td>350 &lt;= Percent of Intervals &lt;= 399 :</td>
<td></td>
</tr>
<tr>
<td>480 &lt;= Percent of Intervals &lt;= 539 :</td>
<td>400 &lt;= Percent of Intervals &lt;= 449 :</td>
<td></td>
</tr>
<tr>
<td>540 &lt;= Percent of Intervals &lt;= 600 :</td>
<td>450 &lt;= Percent of Intervals &lt;= 500 :</td>
<td></td>
</tr>
<tr>
<td>600 &lt;= Percent of Intervals &lt;= 700 :</td>
<td>500 &lt;= Percent of Intervals &lt;= 600 :</td>
<td></td>
</tr>
<tr>
<td>Epoxy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Intervals &lt; 150 :</td>
<td>Percent of Intervals &lt; 100 :</td>
<td></td>
</tr>
<tr>
<td>150 &lt;= Percent of Intervals &lt; 209 :</td>
<td>100 &lt;= Percent of Intervals &lt; 139 :</td>
<td></td>
</tr>
</tbody>
</table>
Provide the measurement report in the form of an electronic database file, or delimited text file, containing all raw data collected. The electronic file must also contain a summary that is capable of being directly uploaded to the Department’s Pavement Marking Management Tool (PMMT) database. Submit the data to the email address: PMdata.dot@state.mn.us. The format of the required data file can be found at the following website: http://www.dot.state.mn.us/trafficeng/pavement/manual.html under the Heading Pavement Marking Management Tool. Provide a printed record of the summary to the Engineer at the Engineer’s discretion.

Conduct the evaluation of retroreflectivity between 14 days and 44 days after pavement marking installation. Excess beads or reflective elements must not be visible before the retroreflectivity testing is conducted.

Collect the data when pavement and markings are dry, clean and no visible moisture is on the road surface. Note in the report any areas where the pavement markings are obscured. Measure centerline markings in both directions. Measure other longitudinal markings in the direction of intended vehicular travel.

Evaluate any replaced or repaired markings at no additional cost per this Special Provision.

The Mobile Retroreflectometer Measurements, including but not limited to materials, equipment, labor and time, will be measured based on the Linear Foot. The Linear Foot will be measured for the distance travelled by the mobile retroreflectometer as it measures the retroreflectivity of the pavement marking. This assumes one laser instrument on one van that will read one line with each pass. For a one mile section of two-lane, two-way roadway this would need four (4) passes – First Direction: REL and CL, Second Direction: REL and CL - equating to 21120 linear feet.

No payment for pavement markings will be made until the evaluation of retroreflectivity is complete and the work accepted by the Engineer.

S-276.3 The provisions of MnDOT 2582.5 are hereby deleted and replaced with the following:

2582.5 BASIS OF PAYMENT

The contract unit price for permanent pavement markings includes the costs of materials, installation, traffic control, surface preparation, and primers as required by the contract.

The Contract unit price for the retroreflectivity evaluation includes all costs incurred in materials, equipment, labor, traffic control and time as required by the contract.
The Department will pay for pavement markings on the basis of the following schedule:

### TEMPORARY PAVEMENT MARKINGS

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2582.501</td>
<td>Pavement Message * † ‡ β ........................................... square foot (square meter)</td>
<td></td>
</tr>
<tr>
<td>2582.502</td>
<td>___ in [___ mm] ‖ * † ‡ β ........................................... linear foot (meter)</td>
<td></td>
</tr>
<tr>
<td>2582.503</td>
<td>Crosswalk * † ‡ β ........................................... square foot (square meter)</td>
<td></td>
</tr>
<tr>
<td>2582.603</td>
<td>Mobile Retroreflectometer Measurements ................................... linear foot (meter)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified type of line</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Specified material</td>
</tr>
<tr>
<td>† Specified if markings are Ground In</td>
</tr>
<tr>
<td>‡ Specified if markings are WR</td>
</tr>
<tr>
<td>β Specified if markings are Contrast</td>
</tr>
</tbody>
</table>

**S-277** *(2582)* **TEMPORARY PAVEMENT MARKINGS**

NEW WRITEUP 03/01/16  *DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.*

**SP2016-250.1**

Choose one of the following:

**S-277.1**

The Contractor shall be required to supply manpower to assist MnDOT 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. MnDOT personnel shall be given a minimum of 24 hours’ notice to provide this service. 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.

**OR**

The Contractor shall be responsible for pavement marking related activities such as, but not inclusive to, collecting data from in place lane lines and marking permanent pavement marking alignments. This shall also include any lane closures or traffic control necessary to complete these projects safely. MnDOT personnel will assist in the location of gores, messages and tapers for permanent pavement marking alignments. MnDOT personnel shall be given a minimum of 24 hours’ notice to provide this assistance.

The Contractor shall be responsible for the location and placement of temporary pavement markings. MnDOT personnel will be available to assist in the spotting of transition areas, gores, messages and tapers, and shall be given a minimum of 24 hours’ notice to provide this assistance.

**S-277.2**

Payment for said pavement marking related projects shall be incidental with no direct compensation made.
(3105) BAGGED PORTLAND CEMENT CONCRETE PATCHING MIX
GRADE 3U18 AND 3U18M

Use when there is concrete on job (pavement, curb, gutter, sidewalk, barriers, lighting, signing, signals, etc.). (If the job is only signing, then see if there is any concrete on the details. If none is shown, then this write-up is not needed.) (This write-up is not needed for RC pipe.) Use with SP2016-151 (STRUCTURAL CONCRETE).

MnDOT 3105 is deleted and replaced with the following:

3105 BAGGED PORTLAND CEMENT CONCRETE PATCHING MIX GRADE 3U18 AND 3U18M

3105.1 SCOPE
Provide dry, bagged concrete patching mix Grade 3U18 and 3U18M for repairing portland cement concrete pavement.

3105.2 REQUIREMENTS

A  Materials
Provide materials for patching mix meeting the following requirements:

A.1 Cement ....................................................................................................................................... 3101
A.2 Fine Aggregate .......................................................................................................................... 3126
A.3 Coarse Aggregate...................................................................................................................... 3137
A.4 Blank
A.5 Admixtures ................................................................................................................................ 3113

B  Quality Control (QC) Program
Maintain an approved Quality Control Program, including a Quality Plan, for the production of Bagged Portland Cement Concrete Patching Mix.

Prior to producing concrete patching mix each construction season, a Department Representative shall perform a thorough on-site inspection of the plant with a MnDOT Certified Plant Level 1 or Level 2 Technician representing the Producer.

B.1 Quality Plan Requirements
Submit a quality control plan to the Concrete Engineer for review and approval prior to producing Grade 3U18 and Grade 3U18M. The Quality Plan includes the following QC Procedures:

(a) Moisture Content
(b) Batch Weight Verification
(c) Aggregate Gradation Testing
(d) Documentation and Submittals

B.2 Personnel
Provide a MnDOT Aggregate Production Technician to perform moisture content and aggregate gradation testing. Provide a MnDOT Concrete Plant Level 1 or Plant Level 2 Technician to review batch tickets, test results, and oversee all quality control requirements of 3105 and the QC Program.

B.3 Daily Production Requirements
Each day Grade 3U18 or 3U18M is produced:

(a) Perform moisture content and gradation testing on all aggregates each day Grade 3U18 or 3U18M is produced.
(b) Complete MnDOT’s 3U18 Quality Control Worksheet and sign.
(c) The Producer’s Plant Level 1 or Plant Level 2 Technician will review and sign the 3U18 Quality Control Worksheet.
(d) Electronically submit all 3U18 Quality Control Worksheets and batch tickets to MnDOT the day following production.

C Mix Proportioning

Proportion the mix in accordance with Table 3105-1. Use of any other size bag requires approval of the Concrete Engineer.

<table>
<thead>
<tr>
<th>Material</th>
<th>Gradation Requirements</th>
<th>Weight, lb [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>75 lb [34.1 kg] bag</td>
</tr>
<tr>
<td>Type I Cement</td>
<td>-</td>
<td>17.8 [8.1]</td>
</tr>
<tr>
<td>Coarse Aggregate</td>
<td>ASTM #89 or CA-80</td>
<td>28.3 [12.9]</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>MnDOT 3126</td>
<td>28.9 [13.1]</td>
</tr>
</tbody>
</table>

D Blending

Dry the coarse and fine aggregates as approved by the Engineer before blending with the cement. Blend the cement and aggregate before bagging the mix.

Provide a blending device meeting the following characteristics and requirements:

(1) Capable of producing the required mix proportions within ±2 percent,
(2) Containing a proportioning device equipped with a warning device to indicate when the system is out-of-tolerance,
(3) Capable of stopping the flow of cement to allow sampling of the blended coarse and fine aggregate, and
(4) Designed to allow cement and aggregate to run out separately for checking material weights and ensuring that the blending proportions meet mix requirements.

E Bags and Batch Identification

Provide moisture-proof bags resistant to tearing.

Print the following on the bags:

(1) The phrase, “MnDOT GRADE 3U18 CONCRETE PATCH MIX” or “MnDOT GRADE 3U18M CONCRETE PATCH MIX”
(2) Weight of the bag in pounds [kilograms]
(3) Mix date
(4) The instructions for mixing into concrete

3105.3 SAMPLING AND TESTING

Sample individual materials and the aggregate blend in accordance with an approved Quality Control Plan before blending at the bagging site.
The Engineer will sample aggregates for gradation and aggregate quality testing in accordance with the Schedule of Materials Control for Certified Ready-Mix Concrete.

S-279  (3137) COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE
Use when there is concrete on job (pavement, curb, gutter, sidewalk, barriers, lighting, signing, signals, etc.). (If the job is only signing, then see if there is any concrete on the details. If none is shown, then this write-up is not needed.) (This write-up is not needed for RC pipe.) Use with SP2016-151 (STRUCTURAL CONCRETE) and SP2016-152 (PRECAST CONCRETE).

MnDOT 3137 is hereby modified as follows:

S-279.1  The first paragraph of MnDOT 3137.2.D.2 shall be deleted and replaced with the following:

Provide coarse aggregate in accordance with 3137.2.D.1, “Coarse Aggregate for General Use,” except as modified by Table 3137-2.

S-279.2  Table 3137-2 (h) of MnDOT 3137.2.D.2 shall be deleted and replaced with the following:

| h) Absorption for Class B aggregate for all concrete bridge decks and bridge barrier | ≤ 1.10 |

S-279.3  Table 3137-4 of MnDOT 3137.2.E shall be deleted and replaced with the following:

<table>
<thead>
<tr>
<th>Coarse Aggregate Designation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Sizes</td>
<td>ASTM #467</td>
<td>ASTM #67*</td>
<td>ASTM #7*</td>
<td>ASTM #89</td>
<td>CA-70</td>
<td>CA-80</td>
</tr>
<tr>
<td>2 in [50 mm]</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1½ in [37.5 mm]</td>
<td>95 – 100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 in [25.0 mm]</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>¾ in [19.0 mm]</td>
<td>35 – 70</td>
<td>90 – 100</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5/8 in [16.0 mm]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>⅜ in [12.5 mm]</td>
<td>-</td>
<td>-</td>
<td>90 – 100</td>
<td>100</td>
<td>85 – 100</td>
<td>-</td>
</tr>
<tr>
<td>⅜ in [9.5 mm]</td>
<td>10 – 30</td>
<td>20 – 55</td>
<td>40 – 70</td>
<td>90 – 100</td>
<td>50 – 100</td>
<td>100</td>
</tr>
<tr>
<td>No.4 [4.75 mm]</td>
<td>0 – 5</td>
<td>0 – 10</td>
<td>0 – 15</td>
<td>20 – 55</td>
<td>0 – 25</td>
<td>55 – 95</td>
</tr>
<tr>
<td>No.8 [2.36 mm]</td>
<td>-</td>
<td>-</td>
<td>5 – 30</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No.16 [1.18 mm]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0 – 10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No.50 [300 µm]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0 - 5</td>
<td>-</td>
<td>0-5</td>
</tr>
</tbody>
</table>

*ASTM #67 and ASTM #7 Gradations are MnDOT Modified.
S-280  **(3138) AGGREGATE FOR SURFACE AND BASES COURSES**  
*Use when have any 2105, 2106, 2118, 2211, 2221 or 2232 pay items.*  
**NEW WRITEUP 11/20/15**  
▲DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.  
SP2016-252.1

MnDOT 3138 is modified as follows:

S-280.1 Add the following to MnDOT 3138.2D Surfacing Aggregates:

(5) Provide aggregate with a minimum clay content of 3% and a Plasticity Index (PI) of 5 – 12. The requirements for PI and minimum clay content are met, if the bitumen content is 1% or greater, the material is composed of at least 25% recycled materials or is composed of at least 50% crushed quarry aggregate.

S-280.2 Add the following to MnDOT 3138.3:

G Particle Size Analysis Laboratory Manual Method
H Liquid Limit Determination Laboratory Manual Method
I Plastic Limit Determination Laboratory Manual Method

S-281  **(3139) GRADED AGGREGATE FOR FINE GRADED (4.75 mm) ASPHALT MIXTURE**  
*Always use with SP2016-140.1 (FINE-GRADED (4.75 mm) ASPHALT MIXTURE).*  
**NEW WRITE-UP 03/01/16**  
▲DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.  
SP2016-252.2

The provisions of MnDOT 3139 are modified with the following:

S-281.1 Replace MnDOT 3139.2.C.1, “Los Angeles Rattler Test”, limit of “40” percent with “35” percent for any individual source.

S-281.2 Replace Table 3139-2, “Aggregate Gradation Broad Bands (percent passing of total washed gradation)” with the following:

<table>
<thead>
<tr>
<th>Sieve Size, inch (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>½&quot; (12.5)</td>
<td>100</td>
</tr>
<tr>
<td>3/8&quot; (9.5)</td>
<td>95-100</td>
</tr>
<tr>
<td>#4 (4.75)</td>
<td>90-100</td>
</tr>
<tr>
<td>#16 (1.18)</td>
<td>30-55</td>
</tr>
<tr>
<td>#200 (0.075)</td>
<td>6.0-13.0</td>
</tr>
</tbody>
</table>

S-281.3 Replace MnDOT Table 3139-3, “Mixture Aggregate Requirements” with the following:
Table 3139-3
4.75 mm Aggregate Requirements

<table>
<thead>
<tr>
<th>Aggregate Property</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Coarse Aggregate Angularity (ASTM D5821) (one face / two face), %</td>
<td>85 / 80</td>
</tr>
<tr>
<td>Min. Fine Aggregate Angularity (FAA) (AASHTO T304, Method A) %</td>
<td>45</td>
</tr>
<tr>
<td>Flat and Elongated Particles, max % by weight, (ASTM D4791)</td>
<td>10 (5:1 ratio)</td>
</tr>
<tr>
<td>Min. Sand Equivalent (AASHTO T176)</td>
<td>45</td>
</tr>
<tr>
<td>Max. Total Spall in fraction retained on the #4 [4.75mm] sieve</td>
<td>1.0</td>
</tr>
<tr>
<td>Maximum Spall Content in Total Sample</td>
<td>1.0</td>
</tr>
<tr>
<td>Maximum Percent Lumps in fraction retained on the #4 [4.75mm] sieve</td>
<td>0.5</td>
</tr>
<tr>
<td>Class B Carbonate Restrictions</td>
<td></td>
</tr>
<tr>
<td>Maximum% #4 [-4.75mm]</td>
<td>50</td>
</tr>
<tr>
<td>Maximum% +#4 [+4.75mm]</td>
<td>50</td>
</tr>
<tr>
<td>Max. allowable scrap shingles-MWSS(1) &amp; TOSS(1)</td>
<td>0</td>
</tr>
<tr>
<td>RAP must be processed to -3/8”</td>
<td></td>
</tr>
</tbody>
</table>

(1) MWSS is manufactured waste scrap shingle and TOSS is tear-off scrap shingle

S-282 BITUMINOUS MATERIAL – POLYMER MODIFIED BINDER
Use with SP2016-137 (PLANT MIXED ASPHALT PAVEMENT – POLYMER MODIFIED BINDER).

MnDOT 3151 is hereby modified as follows:

S-282.1 MnDOT 3151.2 A shall be modified to include the following:

Asphalt binder grades shown below in Table 3151.2A shall have the minimum percent recovery as noted.

Table 3151.2A
Percent Recovery (R3,2)

<table>
<thead>
<tr>
<th>Asphalt Binder Grade</th>
<th>Minimum Percent Recovery*</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 58-34 (PMB)</td>
<td>30%</td>
</tr>
<tr>
<td>PG 64-28 (PMB)</td>
<td>30%</td>
</tr>
<tr>
<td>PG 64-34 (PMB)</td>
<td>55%</td>
</tr>
<tr>
<td>PG 70-28 (PMB)</td>
<td>55%</td>
</tr>
</tbody>
</table>

*At 3.2 kPa as measured by AASHTO T350 Multiple Stress Creep and Recovery at 58C test temperature.
S-283 **(3151) BITUMINOUS MATERIAL (MSCR)**
This is only to be used with SP2016-130.1 (ULTRATHIN BONDED WEARING COURSE (UTBWC) (MSCR)), SP2016-137.1 (PLANT MIXED ASPHALT PAVEMENT (MSCR)), SP2016-138.1 (PLANT MIXED ASPHALT PAVEMENT (LOCAL AGENCY) (MSCR)), SP2016-139.1 (PLANT MIXED ASPHALT PAVEMENT FOR ALTERNATE BID (MSCR)), SP2016-142.1 (STONE MATRIX ASPHALT - SMA (MSCR)), and SP2016-141.2 (PERMEABLE ASPHALT STABILIZED STRESS RELIEF COURSE (PASSRC) AND PERMEABLE ASPHALT STABILIZED BASE (PASB) (MSCR)).

NEW WRITEUP 01/15/16 ➤DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.

SP2016-253.1

MnDOT 3151 is modified as follows:

S-283.1 Replace MnDOT 3151.2.A with the following:

**Asphalt Binder**

Only use Performance Graded (PG) Asphalt Binder meeting the requirements of AASHTO M 332, Table 3151-1A, and the Combined State Binder Group Method of Acceptance for Asphalt Binder, available on the Asphalt Products page of the Approved/Qualified Products List.

<table>
<thead>
<tr>
<th>Grade*</th>
<th>Binder Code for 2360 Mix Design</th>
<th><a href="mailto:Jnr@3.2kPa">Jnr@3.2kPa</a>, maximum</th>
<th>%R @ 3.2kPa, min.**</th>
<th>Jnr Difference, max***</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 58S-28</td>
<td>B</td>
<td>4.5</td>
<td>N/A</td>
<td>75 %</td>
</tr>
<tr>
<td>PG 58H-28</td>
<td>E</td>
<td>2.0</td>
<td>30 %</td>
<td>75 %</td>
</tr>
<tr>
<td>PG 58V-28</td>
<td>H</td>
<td>1.0</td>
<td>55 %</td>
<td>75 %</td>
</tr>
<tr>
<td>PG58E-28</td>
<td></td>
<td>0.5</td>
<td>75 %</td>
<td>N/A</td>
</tr>
<tr>
<td>PG58S-34</td>
<td></td>
<td>4.5</td>
<td>N/A</td>
<td>75 %</td>
</tr>
<tr>
<td>PG58H-34</td>
<td>C</td>
<td>2.0</td>
<td>30 %</td>
<td>75 %</td>
</tr>
<tr>
<td>PG58V-34</td>
<td>F</td>
<td>1.0</td>
<td>55 %</td>
<td>75 %</td>
</tr>
<tr>
<td>PG58E-34</td>
<td>I</td>
<td>0.5</td>
<td>75 %</td>
<td>N/A</td>
</tr>
<tr>
<td>PG49S-34</td>
<td>M</td>
<td>4.5</td>
<td>N/A</td>
<td>75 %</td>
</tr>
<tr>
<td>PG52S-34</td>
<td>A</td>
<td>4.5</td>
<td>N/A</td>
<td>75 %</td>
</tr>
<tr>
<td>PG64S-22</td>
<td>L</td>
<td>4.5</td>
<td>N/A</td>
<td>75 %</td>
</tr>
</tbody>
</table>

* LTPP Bind temperature for Minnesota is 58°C for the high PG Binder Grade temperature. The bottom three grades are special use binders and are to be tested at the high temperature indicated by the grade (example: PG 49S-34 is tested at 49°C).

** Use in place of Appendix X1 in AASHTO - M332.

*** Jnr Difference is waived for “E” grade binders.

Use asphalt binder supplier recommendations for mixing and compaction temperatures.
S-284  (3236) REINFORCED CONCRETE PIPE
Use this whenever you have (2501) RC Pipe, (2501) RC Dissipater Ring, (2502) RC Pipe, (2503) RC Pipe Sewer, or (2506) RC Pipe
SP2016-254

The provisions of MnDOT 3236 are modified and/or supplemented with the following:

S-284.1 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-285  (3356) PREFORMED THERMOPLASTIC PAVEMENT MARKING
SP2016-255

The provisions of MnDOT 3356.2 are hereby modified with the following:

S-285.1 Delete MnDOT 3356.2.A, and replace with the following:

A General
Provide thermoplastic pavement marking product meeting the following requirements and characteristics:

(1) Made of prefabricated retroreflective, resilient thermoplastic material,
(2) Contains glass beads uniformly distributed through the entire cross sectional area,
(3) Capable of being affixed to bituminous or concrete pavement by heating,
(4) Does not require preheating of the pavement surface,
(5) Resistant to deterioration due to exposure to sunlight, water, salt, and adverse weather conditions.
(6) Under traffic wear, shows no appreciable fading in accordance with the color requirements in 3356.2.C, lifting, or shrinkage throughout the life of the marking,
(7) Capable of conforming to pavement contours, breaks, and faults through the action of traffic at normal pavement temperatures
(8) Possesses resealing characteristics, such that it is capable of fusing with itself and previous thermoplastic markings when heated,
(9) Protected during shipment and in storage.

Apply the preformed thermoplastic pavement marking as recommended by the manufacturer to provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface remains stable. Use equipment and application methods specified by the manufacturer.

Provide precut messages and symbols meeting the requirements of the MN MUTCD and the MnDOT Standard Signs Manual in custom kits. Use separate pieces or segments to form individual letters or symbols only to the extent supplied by the manufacturer. Provide shapes, sizes, and colors as required by the contract.
S-286 (3591) HIGH SOLIDS WATER BASED TRAFFIC PAINT (FOR HIGH BUILD PAINT)

Use for paint markings that are either High-Build Latex Paint that is NOT wet-reflective/recoverable, or whenever the PAINT (WR) item is used.

SP2016-256

The provisions of MnDOT 3591 are hereby modified and/or supplemented as follows:

S-286.1

The provisions of MnDOT 3591.2 B are hereby deleted and replaced with the following:

B Properties of Finished Paint

The exact composition of the paints shall be left to the discretion of the manufacturer, provided the finished paint meets the requirements of this specification.

- Wgt per gal, 25 °C (77 °F), lbs, min: 12.0
- Grind, Hegman, minimum: 3
- Total Solids, % by weight, minimum: 73
- Non-volatile vehicle, % by weight, minimum: 43
- Pigment, % by weight: 45 - 62
- Titanium Dioxide, white paint, lbs/gal, min.: 1.0
- Laboratory Dry Time, ASTM D 711 15 mil, minutes, max: 10
- Laboratory Dry Time, ASTM D 711 25 mil, minutes, max: 25
- Dry Through, @ 90 % RH, minutes, max: 150
- Daylight Directional Reflectance, white, min.: 83
- Daylight Directional Reflectance, yellow, min.: 50
- Contrast Ratio, minimum: 0.98
- Bleeding Ratio, minimum: 0.97
- Flexibility and Adhesion: No cracking or flaking
- Water Resistance: No blistering or loss of adhesion
- Settling: Rating of 6 or better
- Skinning, 48 hrs: None
- Track Free Time, minutes, maximum: 3
- pH, minimum: 9.6
- Lab Retro-reflectivity, white, min., mcd/m2/lux: 300
- Lab Retro-reflectivity, yellow, min., mcd/m2/lux: 200

S-286.2

The first sentence of MnDOT 3591.2 C is hereby deleted and replaced with the following:

The acrylic emulsion polymer used in the manufacture of the paint shall be Rohm & Haas HD-21, Dow DT400 or equal.
S-287  **(3877) TOPSOIL MATERIAL**  
*Use on most jobs.*

**REVISED 01/08/16◀DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.**

MnDOT 3877 is modified as follows:

S-287.1 Delete MnDOT Table 3877-1 “Common Topsoil Borrow Requirements”, and replace with the following:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Range</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material passing No. 4 in [4.75 mm]</td>
<td>≥ 85%</td>
<td>—</td>
</tr>
<tr>
<td>Clay</td>
<td>5% – 35%</td>
<td>ASTM D 422</td>
</tr>
<tr>
<td>Silt</td>
<td>5% - 70%</td>
<td>ASTM D 422</td>
</tr>
<tr>
<td>Sand</td>
<td>10% - 75%</td>
<td>ASTM D 422</td>
</tr>
<tr>
<td>Organic matter</td>
<td>3% – 15%</td>
<td>ASTM D 2974</td>
</tr>
<tr>
<td>pH</td>
<td>6.1 – 7.8</td>
<td>ASTM G 51</td>
</tr>
</tbody>
</table>

Largest material dimension not to exceed 3.0 inches

S-288  **(3882) MULCH MATERIAL**  
*Use on most jobs.*

**NEW WRITEUP 03/01/16◀DO NOT REMOVE THIS. IT NEEDS TO STAY IN FOR THE CONTRACTORS.**

MnDOT 3882 is modified as follows:

S-288.1 The first sentence of MnDOT 3882.2.F, “Type 6,” is deleted and replaced with the following:

Provide Type 6 mulch with the following characteristics:

S-289  **FINAL ESTIMATE AND FINAL PAYMENT**

SP2016-257 The following provisions shall apply to preparation of the Final Estimate and execution of Final Payment under this Contract:

S-289.1 **FINAL ESTIMATE**

State Law provides that the final estimate will be made within 90 days after completion of all work required under this Contract. If, however, the total value of the Contract exceeds $2,000,000.00, the 90 day requirement will not apply and the time allowed for making such final estimate shall be 180 days after the work under this Contract has been, in all things, completed to the satisfaction of the Commissioner.

S-289.2 **FINAL PAYMENT**

If this Contract contains a "Disadvantage Business Enterprise or Targeted Group Business" 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 targeted group business (TGB) and/or veteran-owned small business."