SUPPLEMENTAL SPECIFICATIONS

To the 2020 Standard Specifications for Construction

September 2022

MINNESOTA
DEPARTMENT OF TRANSPORTATION
ST. PAUL, MINNESOTA

SUPPLEMENTAL SPECIFICATIONS

To the 2020 Standard Specifications for Construction

September 2022

ORDER NUMBER 99828

It is hereby ordered that the Minnesota Department of Transportation *Standard Specifications for Construction, 2020 Edition*, be amended as particularly set forth and provided in these Minnesota Department of Transportation *Supplemental Specifications, September 2022*.

Upon being published and made available for distribution, these Standard Specifications shall become effective by reference in the Contract Plans, Supplemental Specifications, or Special Provisions.

Jean Wallace Digitally signed by Jean Wallace Date: 2022.09.29 09:29:20 -05'00'

Jean Wallace, P.E., PMP
Interim Deputy Commissioner and Chief Engineer

These Minnesota Department of Transportation *Supplemental Specifications, September 2022*, are hereby approved for application on Highway, Street, and related construction Contracts as referenced in the Contract Plans or Special Provisions and they shall apply as noted and amended by those documents.

Thomas Ravn Digitally signed by Thomas Ravn Date: 2022.09.28 13:46:51 -05'00'

Thomas D. Ravn
State Construction Engineer

I hereby certify that the changes contained in these Minnesota Department of Transportation *Supplemental Specifications, September 2022*, were prepared by me or under my general supervision and that I am a duly registered professional engineer under the laws of the State of Minnesota.

Jean Wallace Digitally signed by Jean Wallace Date: 2022.09.29 09:30:02 -05'00'

Jean Wallace, P.E., PMP
Interim Deputy Commissioner and Chief Engineer
Reg. No. 47328

The following specifications were deleted, added, or changed in this *Supplemental Specifications, September 2022*, to the *Standard Specifications for Construction, 2020 Edition*.

Table of Contents

1102 ABBREVIATIONS AND MEASUREMENT UNITS

Add the following to Table 1102.1-1 in 1102, "Abbreviations and Measurement of Units":

Table 1102.1-1 Additions

Acronym or Short Form	Full Name or Meaning
NPT	American National Standard Taper Pipe Thread
RMC	Rigid Metal Conduit
SMC	Schedule of Materials Control

Delete the following from Table 1102.1-1 in 1102, "Abbreviations and Measurement of Units":

Table 1102.1-1 Deletion

Acronym or Short Form	Full Name or Meaning
RSC	Rigid Steel Conduit

1103 DEFINITIONS

Delete and replace the definition for "Unit Day" in 1103, "Definitions" with the following:

Unit Day

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

Delete and replace the definition for "Working Day" in 1103, "Definitions" with the following:

Working Day

Any Calendar Day, exclusive of Saturdays, Sundays, and Holidays, on which weather and other conditions not under the control of the Contractor will permit construction operations to proceed with the normal working force engaged in performing critical work.

Add the following to 1103, "Definitions":

Professional Land Surveyor

The Contract may require that the Contractor provide a Professional Land Surveyor, currently licensed by the State of Minnesota, to perform or supervise certain activities and/or responsibilities related to the Contract.

1206 PREPARATION AND DELIVERY OF PROPOSAL

Delete and replace 1206.1, "Preparation and Delivery," with the following:

1206.1 PREPARATION AND DELIVERY

The Bidder shall use the electronic submittal process. The Bidder shall submit the electronic Proposal in accordance with AASHTOWare Project Bids software and the Bid Express website (www.bidx.com).

The Bidder shall submit its Proposal by the date and time for opening Proposals. Bid Express will not accept Proposals past the date and time of the opening of Proposals.

The Bidder shall submit the Proposal Guaranty electronically through the Project Bids software or via email at biddocsubmittal.DOT@state.mn.us by the due date and time of the opening of Proposals.

If a Bidder fails to provide a Unit Price for any Pay Item on the Bid Schedule, except for "Lump Sum" Pay Items, the Department will reject the Proposal.

If a Pay Item in the Proposal requires the Bidder to choose an alternate Pay Item, the Bidder shall indicate its choice in accordance with the Specifications for that Pay Item.

Add the following to 1206, "Preparation and Delivery of Proposal":

1206.3 RESPONSIBLE CONTRACTOR

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 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 annual verification from each motor carrier with which it has a direct contractual relationship. 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.

1208 PROPOSAL GUARANTY

Delete and replace 1208, "Proposal Guaranty," with the following:

The Bidder shall include with its Proposal a Proposal Guaranty that meets the following requirements:

(1) Equal to 5 percent of the total amount of the Proposal
(2) Made payable to the Department
(3) In the form of a bond

A Proposal Guaranty in the form of a bond must meet the following requirements:

(1) Issued by a corporation authorized by the Minnesota Department of Commerce to contract as a Surety in the State of Minnesota
(2) Conditioned on the execution of the Contract in accordance with 1306, "Execution and Approval of Contract"

1401 INTENT OF CONTRACT

Add the following to 1401, "Intent of Contract":

1401.1 PARTNERING

Partnering is required on this Contract.

The Engineer will send out the pre-construction letter and questionnaire prior to the pre-construction conference. The Contractor must fill out and return the Questionnaire to the Engineer no later than 5 Working Days after receiving the request. An example pre-construction letter and questionnaire can be found in Appendix A, of MnDOT's "Partnering Field Guide".

Pre-activity planning discussions will be held prior to each major construction Activity and prior to any minor Activity when required by the Engineer. An example pre-activity discussion checklist can be found in Appendix G, of MnDOT's "Partnering Field Guide".

Partnering shall be conducted in accordance with MnDOT's "Partnering Field Guide."

All Work associated with partnering is Incidental, except as otherwise provided in the Contract.

1701 LAWS TO BE OBSERVED

Delete and replace the second paragraph of 1701.5B, "Payment of retainage for federal-aid Projects is governed by MN Statutes §337.10, §15.72, and 49 C.F.R. 49 §26.29," with the following:

For purposes of paying out retainage, a Subcontractor's Work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and final documentation is received. Final documentation includes certified payrolls, Material certifications, haul road releases, pit releases, warranties, operating manuals, product literature, verification of final quantities, and Contractor Affidavit (Form IC134). When the Department has made an incremental acceptance of a portion of the prime Contract, the Work of a Subcontractor covered by that acceptance is deemed to be satisfactorily completed.

Add the following to 1701, "Laws to be Observed":

1701.6 EQUAL PAY

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 in Minnesota Statutes Section 363A.44 or at the Department of Human Rights, Equal Pay Certificate website (mn.gov/mdhr/certificates/equalpay).

1701.7 Compliance with Tax Law Requirements

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 and section 270C.66 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 a 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 of Revenue website (www.revenue.state.mn.us).

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. The 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.

Contractor Affidavit requirements and Form IC134 can be found on the Department of Revenue website (www.revenue.state.mn.us).

1701.8 Use of Equipment from Certain Telecommunications Supplier Prohibited

By signing this Contract, Contractor certifies that consistent with section 889 of the John McCain National Defense Authorization Act for fiscal year 2019, Public Law 115-233 (Aug. 13, 2018) the Contractor may not use funding covered by this Contract to procure or obtain, or extend, renew, or enter into any Contract to procure or obtain, any Equipment, system, or service that uses "covered telecommunications Equipment or services" (as that term is defined in section 889 of the Act) as a substantial or essential component of any system, or as critical technology as part of any system. The contractor must include this certification as a flow-down clause in any subcontract related to this Contract.

1706 EMPLOYEE HEALTH AND WELFARE

Add the following to 1706, "Employee Health and Welfare":

A. The Contractor must not use motor vehicle Equipment that has an obstructed rear view unless either of the following is ensured:
   (1) The vehicle has a reverse alarm that is audible above the surrounding noise level
   (2) An observer signals to the operator that it is safe to reverse
B. The Department may assess a Monetary Deduction of $500 per incident for a violation of safety standards that could result in death or serious injury.
C. The areas of special concern include excavation stability protection, fall protection, protection from overhead hazards, vehicle backup protection, confined space safety, blasting operations, and personal safety devices.
D. The Contractor cannot avoid complying with safety standards by paying the deduction.

1707 PUBLIC CONVENIENCE AND SAFETY

Add the following to 1707, "Public Convenience and Safety":

The Contractor shall ensure that employees and Subcontractors do not display items such as, but not limited to, flags, banners, and symbols on the Project Site, that may disrupt the proper prosecution of the Work, impede public safety, or create a distraction for the traveling public.

1807 FAILURE TO COMPLET THE WORK ON TIME

Delete and replace the first paragraph of 1807.1, "Assessment of Liquidated Damages" with the following:

The Department will deduct liquidated damages from money due the Contractor for each Calendar Day that the Work remains incomplete after expiration of the Contract Time, according to the completion requirements of 1516.2, "Project Acceptance". The Engineer will deduct liquidated damages based on the original Contract Amount and Table 1807.1-1.

1901 MEASUREMENT OF QUANTITIES

Delete and replace the first paragraph of 1901.8, "Mass," with the following:

For measuring or proportioning Material by mass, the Contractor shall provide certified weights or weigh Material on calibrated, approved scales. The Contractor shall give the Engineer a copy of the inspection certificate.

Add the following to 1901.8C, "Automated Weighing Device":

The Contractor shall not provide a ticket to truck drivers if the weight of the load is in excess of the legal load limits in place.

Add the following to 1901.8, "Mass":

D. Computerized Loader Bucket Scales

The Contractor may use computerized Loader Bucket Scales to weigh materials when the quantity of material included in the bid item list is 5000 tons or less.

The Contractor shall equip loader bucket scales with an onboard computer that produces weigh tickets.

The Contractor shall load trucks on a level loading area and with the loader scale in dynamic mode and operate the loader scale in accordance with the manufacturer's guidelines.

The computerized loader bucket scale must be accurate to within 1.0 percent of the true weight of the applied load throughout the range of use.

D.1 Computerized Loader Bucket Scales – Comparison Test

Before the first use of the loader bucket scale on the project and any time the scale is recertified, the Contractor shall perform a comparison test using one of the following methods:

(a) Independent Scale Method.

After placing the load in a truck, weigh the loaded truck on a certified scale owned and operated by an entity other than the Contractor. Provide the tare weight of the truck along with the comparison weigh ticket.

(b) Certified Weighted Object Method.

Weigh an object on the project scale and compare its certified weight to the loader bucket scale readout. Use an object that is free of mud and dirt and has a certified weight of at least 60 percent of the capacity of the loader bucket.

Weld a plate onto the object showing its certified weight.

Provide an affidavit affirming the weight of the object, as measured on a certified scale.

Provide a new affidavit when requested by the Engineer or if changes are made to the object that will affect the certified weight.

D.2 Computerized Loader Bucket Scales – Random Comparison Tests

If a comparison test reveals that the scale is out of tolerance, repair and recertify the scale.

At any time, the Engineer may require the scale to be checked for accuracy utilizing any test method in 1908.D.1, “Computerized Loader Bucket Scales – Comparison Test”.

The Engineer may prohibit the use of loader bucket scales if two consecutive tests fail.

D.3 Computerized Loader Bucket Scales – Documentation

The Contractor shall generate weigh tickets using the onboard computer and loader bucket scale printer and provide tickets to the truck driver. The Contractor shall provide daily haul summaries by computer-generated spreadsheet as provided by the Engineer. The Contractor shall provide the fully completed spreadsheet to the Engineer daily.

1902 SCOPE OF PAYMENT

Delete and replace 1902, “Scope of Payment,” with the following:

The Contractor will receive compensation provided for in the Contract as full payment for providing Materials and performing Work in accordance with the Contract requirements. This includes compensation for all risk, loss, damage, and expense incurred by the Contractor for performing the Work required by the Contract. Payment is subject to 1720, “No Waiver of Legal Rights.” The Department prohibits the Contractor from accepting payment from any other party for performing the Work required by the Contract, including any Incentive or bonus payment. The Department does not prohibit the following payments from third parties:

(1) Payments from sureties
(2) Quantity-based rebates or credits from suppliers
(3) Payments under another contract for excess material removed under this Contract

2031 FIELD LABORATORY AND OFFICE

Delete and replace the pay item schedule in 2031.5, "Field Laboratory and Office," with the following:

Item No.	Item	Unit
2031.502	Field Office	each
2031.502	Field Laboratory	each
2031.502	Combination Field Laboratory-Office	each

2108 GEOSYNTHETIC CONSTRUCTION MATERIALS

Delete and replace note (5) in 2108.1, "Description," with the following:

(5) Provide confinement of granular materials.

Add the following to 2108.1"Description":

(6) Provide a geotextile interlayer to concrete pavement.

Delete and replace 2108.3B, "Geotextile," with the following:

B. Geotextile

If multiple pieces of geotextile are required, overlap geotextiles a minimum of 36-inches. In lieu of overlapping, the Contractor may sew the geotextile provided there is a passing Departmental Quality Assurance sewing test prior to installation.

Use a "double spool" machine capable of sewing a Federal Type 401 locking stitch per *ASTM D6193-16, Standard Practice for Stitches and Seams*. Sew a flat, "J," or butterfly seam per *ASTM D6193-16, Standard Practice for Stitches and Seams,* using thread with a minimum strength of 25 pounds, with 1-2 rows of stitching and 5-7 stitches per inch. Meet the required seam strength for the specified geotextile type. Install the geotextile, using the same geotextile, seamstress, thread, and sewing machine as used for the test.

The Contractor may use adhesives listed on the "Geosynthetic products/Adhesive seams" APL in lieu of overlapping or sewing for Types 3, 4, and 5 geotextiles. Apply adhesive per the Adhesive Seams Guidelines found on the "Geosynthetic products/Adhesive seams" APL.

Add the following to 2108.3, "Construction Requirements":

D. Concrete Pavement Geotextile Interlayer

When a geotextile interlayer for concrete pavement is required, install Type 8 geotextile in accordance with 2301.3F, "Placement on Type 8 Non-woven Geotextile Interlayer."

Delete and replace 2108.5, "Basis of Payments" with the following:

The Contract Unit Price for Geosynthetic Construction Materials is compensation in full for Equipment, Materials, and labor required to complete the Work and includes the cost of providing, placing, overlapping, or sewing or gluing, testing, anchoring, and any needed repairs.

The Department will pay for Geosynthetic Construction Material based on the following schedule:

Item No.	Item	Unit
2108.504	Geotextile Fabric Type __*	square yard
2108.504	Geogrid Type __‖	square yard

Notes:

* Specify Type: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, or 13.

‖ Specify Type: 1 or 2

2301 CONCRETE PAVEMENT

Delete and replace 2301.2B.1(1), "Portland Cement," and 2301.2B.1(2), "Portland Cement," with the following:

Use Type I or Type I/II cement complying with total alkalis (Na2Oe) no greater than 3.0 pounds per cubic yard of concrete resulting from the Portland cement.

Delete and replace 2301.2B.3(1), "Blended Hydraulic Cement," and 2301.2B.3(2), "Blended Hydraulic Cement," with the following:

Use Type IL, IS or IP cement complying with total alkalis (Na2Oe) no greater than 3.0 pounds per cubic yard of concrete resulting from the Portland cement content of the blend.

Delete and replace 2301.2D.1(1), "Accelerating Admixtures," with the following:

(1) National Weather Service forecast for the construction area predicts air temperatures of 36°F or less within the next 24 hours.

Delete and replace Table 2301.2-4 of 2301.2L.1, "Concrete Mix Design Requirements," with the following:

Table 2301.2-4: Concrete Mix Design Req 1

Concrete Grade	Estimated Concrete Contract Quantity (yd^3) *	Mix Number	Maximum w/c ratio		Minimum Cement Content (lbs/yd^3)	Cementitious Content (lbs/yd^3) ‖	Air Content %	Gradation Requirements	Minimum Aggregate Size Required	Maximum %SCM (Fly Ash/ Slag/ Ternary) †	Slump Range	3137 Spec.
			Fly Ash	Cement Only/ Slag/ Ternary								
A	≥ 3,500	3A21	0.40	0.42	385	475 – 615	7.0	Job Mix Formula	1 1/2" nominal	33/35/40	½ - 2" ‡	2D.3
		3A41	0.40	0.42							2 – 5"	
	< 3,500 and Minor Work and fill-ins not provided by the primary paving plant #	3A21S	0.42	0.42	385	475 – 615	7.0	3126 and Table 3137-4 Or Job Mix Formula	3/4" nominal	33/35/40	½ - 2" ‡	2D.3
		3A41S	0.42	0.42							2 – 5"	
		3A42 §	0.42	0.42	385	475 – 615	7.0	3126 and Table 3137-4	3/4" nominal	33/35/40 §	2 – 5"	
	Engineer Approved or Plan Allowed High-Early	3A21HE **	0.40	0.42	385	> 475 – 750	7.0	3126 and Table 3137-4 Or Job Mix Formula	3/4" nominal	33/35/40	½ - 2" ‡	2D.3
		3A41HE **	0.40	0.42							2 – 5"	

* Determined by multiplying the planned pavement area by the planned pavement thickness.

‖ Provide additional cementitious material to meet requirements in accordance with this section at no additional cost to the Department.

† Refer to Table 2301.2-2 and Table 2301.2-3 for ASR mitigation requirements.

‡ Adjust slump in accordance with 2301.3E.1, "Consistency."

The 5th digit "S" indicates the concrete is for a small concrete paving Project or delivered from a secondary concrete plant for minor Work or fill-ins. The Concrete Engineer considers minor Work or fill-ins as gaps in concrete pavement, turn lanes, Intersections, or other pavement sections as determined by the Engineer, in conjunction with the Concrete Engineer.

§ The Concrete Engineer will allow a non-Project specific 3A42 mix design provided by a MnDOT certified ready-mix plant submitted in accordance with the first two paragraphs of 2461.2F.3, "Submittal Requirements." If the sand source requires mitigation with a minimum of 30% Class C fly ash in accordance with Table 2301.2-2, the Concrete Engineer will require a minimum of 30% Class C fly ash, 30% Class F fly ash, or 35% slag for all 3A42 mixes.

** The Contractor may use 100% Portland cement for High Early Concrete, provided no mitigation is required for the fine Aggregate and intermediate Aggregate in accordance with Table 2301-2 and coarse Aggregate in accordance with Table 2301.2-3. If mitigation is required, the Contractor is required to use a minimum of 15% of any supplementary cementitious material when designing High Early Concrete. The Contractor may use 100 percent Portland cement for any concrete, provided no mitigation is required for the fine Aggregate or intermediate Aggregate in accordance with Table 2301.2-2 or the coarse Aggregate in accordance with Table 2301.2-3. If mitigation is required, the Contractor is required to use a minimum of 15 percent of any supplementary cementitious Material.

Delete and replace the third and fifth paragraphs of 2301.3B.3, "Concrete Paving Certifications," with the following:

In conjunction with the Engineer, perform a thorough on-site inspection of the concrete plant and complete MnDOT Form 2164, "Contact Report - Paving." Sign the report to certify compliance with the paving requirements and to certify review of the continual maintenance of the plant.

If concrete is provided by a certified ready-mix plant, complete MnDOT Form 2164, "Contact Report - Addendum Ready-mix Paving" in accordance with 2301.3B.3.b "Certified Ready-mix Plant Lab - Office Requirements."

Delete and replace 2301.3B.3.a(12)(e), "Combination Plant Lab – Office Requirements," with the following:

(e) A 4 burner 30-inch standard stovetop or stove and at least 2 additional burners to perform required Aggregate testing per the *Schedule of Materials Control*

Delete and replace 2301.3B.3.b(4), "Certified Ready-mix Plant Lab – Office Requirements," with the following:

(4) At least 6 burners to perform required Aggregate testing per the *Schedule of Materials Control*

Delete and replace 2301.3B.4(2), "Contractor Project Documentation," with the following:

(2) All Contractor plastic air content tests in the Air Content Charting chart

Add the following to 2301.3C.1, "Batching Requirements":

(12) Plant/Unit #

Delete and replace the second and third paragraphs of 2301.3C.2, "Job Mix Formula," with the following:

Test and record the individual gradation results using the QC - JMF Concrete Aggregate Report.

Calculate the moving average of 4 Contractor Aggregate gradation test results during production using the JMF Moving Average Summary workbook.

Delete and replace 2301.3C.2.b, "Department Verification of JMF," with the following:

The Engineer will randomly verify the Contractor combined Aggregate gradation results as defined in the Schedule of Materials Control.

If the individual fraction on any split sample results in a variation between the Contractor and the Engineer greater than that set forth in Table 2301.3-2, the parties shall follow the procedures for test result dispute resolution available from the Laboratory Manual.

Table 2301.3-2 Allowable Variations on Percent Passing Sieves

Sieve Size	Allowable Percentage
2 inch – 1 inch	±8
3/4 inch – 3/8 inch	±6
No. 4 – No. 40	± 4
No. 50	±3
No. 100	±2
No. 200	±0.6

Delete and replace the first sentence of 2301.3C.3, "Optimized Aggregate Gradation," with the following:

The Engineer will use the Contractor's combined Aggregate gradation (JMF) test results (QC and Verification) documented in the QC - JMF Concrete Aggregate Workbook, as verified by the Engineer in accordance with 2301.3C.2.b, "Department Verification of JMF," to determine eligibility for the Incentive in accordance with 2301.5I.1, "Optimized Aggregate Gradation Incentive."

Delete and replace 2301.3C.5, "Water/Cement (W/C) Ratio," with the following:

Provide and place concrete with a water/cement ratio not to exceed 0.40 when using fly ash and 0.42 when using cement only, slag or ternary. Make any adjustments immediately when the water/cement ratio exceeds 0.40 when using fly ash and 0.42 when using cement only, slag or ternary.

Add the following to 2301.3C.6, "Water/Cement (W/C) Ratio Determination":

The Engineer will base the statistical analysis of acceptance for water/cement ratio on a per lot basis representing one day's paving. Each individual water/cement ratio determination is considered a sublot. The lot will represent the cumulative average of the sublot values. The Engineer will start a new lot and test if either of the following occurs:

(1) Mix design change due to a water/cement ratio test result exceeding 0.40 when using fly ash and 0.42 when using cement only, slag or ternary, or
(2) Supplementary cementitious type change from fly ash to slag or ternary mix design, or vice versa.

If the quantities of concrete produced result in no Engineer moisture testing for any given day, include the untested quantity of concrete into the next day's production and include that quantity of concrete in the sampling rate. If the untested quantity is on the last day of production, add that quantity to the previous day's production.

Delete and replace the first sentence of 2301.3F.5, "Constructing Headers," with the following:

Use any approved construction header method as shown in the Standard Plan 5-297.221 when constructing construction headers, temporary headers, and permanent headers as shown on the Plans.

Delete 2301.3F.6.b, "Air Content after Consolidation".

Add the following to 2301.3H, "Dowel Bars":

If dowel bars are not pre-coated with a manufacturer-applied bond breaker material or the coating has rubbed off, coat the dowel bars with a uniform coating of Material in accordance with 3902, "Form Coating Material," with the approval of the Engineer.

Delete the third paragraph of 2301.3H.1, "Dowel Basket Assemblies".

Delete the second paragraph of 2301.3H.2, "Dowel Bar Inserter".

Delete and replace the first paragraph of 2301.3J.4, "Non-conforming Placement," with the following:

If a dowelled contraction joint has dowel bars out of acceptable alignment during placement in accordance with 2301.3J.3, "Alignment Tolerances," and the Standard Plate 5-297.221, scan both upstream and downstream from the misaligned transverse dowelled joints, from concrete placed in the same operation, until at least 3 joints comply.

Delete and replace the second paragraph of 2301.3K.1.a, "Texture Testing," with the following:

Perform surface texture testing of the concrete pavement in the presence of the Engineer and provide the test results to the Engineer no later than 48 hours after pavement placement unless otherwise approved by the Engineer.

Delete and replace the third paragraph of 2301.3L.3.d, "Final Pavement Thickness Core Measurement," with the following:

After Department thickness verification, the Department will test the cores for compressive strength at 60-Calendar Days of age for information only. The Department will test 3 of the cores from the entire Project for transport properties (permeability and/or resistivity) in lieu of compressive strength testing for information only.

Delete and replace the third paragraph of 2301.3O, "Opening Pavement to Traffic," with the following:

Cast and cure the field control specimens in accordance with 2462.3G.5.d, "Strength Specimens for Concrete Paving." Provide moist curing environments in accordance with 2461.3G.5.b(2), "Moist Curing Environment." The Engineer will test the field control specimens for flexural strength in accordance with the Concrete Manual or compressive strength in accordance with 2462.3G.5.d, "Testing Cylinders."

Delete and replace Table 2301.5-2 of 2301.5I.2, "W/C Ratio Incentive/Disincentive," with the following:

Table 2301.5-2 W/C Ratio Incentive/Disincentive

When using fly ash		When using cement only, slag or ternary	
W/C Ratio Lot Result	**Incentive/Disincentive per cubic yard***	**W/C Ratio Lot Result**	**Incentive/Disincentive per cubic yard***
≤ 0.37	+$3.00	≤ 0.39	+$3.00
0.38	+$1.75	0.40	+$1.75
0.39	+$0.50	0.41	+$0.50
0.40	$0.00	0.42	$0.00
0.41	−$0.50	0.43	−$0.50
0.42	−$1.75	0.44	−$1.75
≥ 0.43	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." This may include testing on the hardened concrete.	≥ 0.45	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." This may include testing on the hardened concrete.
*Apply Incentive/Disincentive for Concrete Pavement based on the theoretical volume of concrete used by multiplying the measured square yard of concrete by the thickness shown on the Plans. Apply Incentive/Disincentive for Structural Concrete based on the daily cubic yards batched of Structural Concrete as verified by the computerized batch ticket printouts from the plant, with consideration of any waste.			

2302 CONCRETE PAVEMENT REHABILITATION

Delete and replace the second and fourth notes in Table 2302.3-2 of 2302.3A.2, "3R52 or 3RHE52 Concrete Mixture Requirements for Type C Repairs," with the following:

‖ Use the manufacturer's recommended dosage rate to achieve 2000 psi minimum compressive strength or 350 psi flexural strength at the time of opening.

‡ 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 2000 psi or 350 psi flexural strength.

Delete and replace the first paragraph of 2302.3C.4, "Opening to Construction Equipment and Traffic," with the following:

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:

(1) When MnDOT designed 3U18 concrete or Contractor designed 3R52/3RHE52 concrete attains a minimum age of 7-Calendar Days, or
(2) 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 2302-3.1 are met, or
(3) MnDOT-designed 3U18 concrete attains a minimum age of 12 hours and control strength specimens obtain minimum compressive strength of 3000psi or minimum flexural strength of 500 psi
(4) Contractor designed 3R52 or 3RHE52 concrete attains a minimum age of 12 hours and control strength specimens obtain minimum compressive strength of 2000 psi or minimum flexural strength of 350 psi
(5) For dowel bar retrofits repairs, reached a minimum age of 4 hours and control strength specimens obtain minimum flexural strength of 500 psi or minimum compressive strength of 3000 psi
(6) For (3), (4), and (5) 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, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*. If the Engineer is unable to test the control specimens the Contractor will test the control specimens in accordance with the following:
    a. Supply and operate (in the presence of the Engineer) a calibrated mechanical or hydraulic concrete cylinder testing machine, in accordance with *ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*.
    b. Perform testing at a distance no greater than 30 miles from the control specimen fabrication site
    c. At no additional cost to the Department

Delete and replace the seventh and eighth paragraphs of 2302.3E.2, "Preparation," with the following:

The Engineer may allow sawing for joint re-establishment when the following conditions exist:

(1) Precautions are taken to prevent infiltration of concrete into the underlying joint
(2) Depth of the entire Type B repair remains above dowel bars
(3) In order to prevent compression spalls, saw cut the entire depth of the Type B repair
(4) Green sawing takes place in a timely manner, to prevent random cracks
(5) Green sawing does not produce excessive spalling

Do not saw for joint re-establishment if Type B repair depth extends below the top of the dowel bars or Type B repair is used to repair a random crack.

Delete and replace the second paragraph of 2302.3F.1, "Removals," with the following:

Removal of the concrete pavement must take place within 48 hours of the full-depth saw cutting. On Roadways closed to traffic during construction, the Engineer will allow removals beyond 48 hours as long as the removal process does not damage the in-place concrete.

Delete the following from 2302.5P, "Schedule":

Item No.	Item	Unit
2302.502	Joint Repair (Type A1)	each
2302.502	Joint Repair (Type A2)	each

Add the following to 2302.5P, "Schedule":

Item No.	Item	Unit
2302.503	Joint Repair (Type A1)	linear foot
2302.503	Joint Repair (Type A2)	linear foot

2461 STRUCTURAL CONCRETE

Delete and replace Table 2461.2-6 of 2461.2E.2.b(1), "General Concrete Mix Design Requirements," with the following:

Table 2461.2-6 Concrete Mix Design Requirements (Not applicable to High-Performance Concrete or Mass Concrete)

Concrete Grade	Mix Number	Intended Use *	Maximum W/C Ratio ‖	Maximum Cementitious Content (pounds/ cubic yard)	Maximum percent SCM (Fly Ash/ Slag/Ternary)	Design Slump Range (inches)	Minimum 28-day Compressive Strength, f'c	3137, "Coarse Aggregate for Portland Cement Concrete."
B Bridge Substructure	3B52	Abutment, stems, wingwalls, paving brackets, pier columns, and caps, pier struts	0.45	750	30/35/40	2 - 5	4000 psi	2D.1
F Flatwork	3F32	Curb and gutter	0.42	750	30/35/0	1/2 - 3 #	4500 psi	2D.1
	3F52 3F57EX † 3F52CO ‡	Sidewalk, curb and gutter, slope paving, median Sidewalk, driveway entrances, ADA pedestrian Sidewalk	0.45	750	25/30/0	2 – 5	4500 psi	2D.1
G General Concrete	1G52	Footings and pilecap	0.55	750	30/35/40	2 - 5	4500 psi	2D.1
	3G52	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, cast-in-place wall stems	0.45	750	30/35/40	2 - 5	4500 psi	2D.1
M Median Barrier	3M12	Slipform barrier, Median barrier, non-bridge	0.42	750	30/35/40	1/2 - 1 #	4500 psi	2D.1
	3M52	Barrier, Median barrier, non-bridge	0.45	750	30/35/40	2 – 5	4500 psi	2D.1
P Piling	1P42	MSE and gravity wall leveling pad	0.63	750	30/35/40	2 – 4	3000 psi	2D.1
	1P62	Piling, spread footing leveling pad	0.63	750	30/35/40	3 – 6	3000 psi	2D.1
R Pavement Rehabilitation	3R52	CPR – Full-depth concrete repairs, concrete base	0.45	750	30/35/40	2 – 5	4000 psi	2D.3
S Bridge Superstructure	3S12	Slipform Bridge barrier, parapets, end post	0.42	750	30/35/40	1/2 - 1 #	4000 psi	2D.2
	3S52	Median barrier, raised median, pilaster, curb, Sidewalk, approach panel, formed Bridge barrier, parapet, end post, collar	0.45	750	30/35/40	2 - 5	4000 psi	2D.2
X Miscellaneous Bridge	1X62	Cofferdam seals, rock sockets, drilled shafts	0.45	750	30/35/40	3 – 6	5000 psi	2D.1
	3X62	Drilled shafts above the frost line	0.45	750	30/35/40	3 – 6	5000 psi	2D.1

Concrete Grade	Mix Number	Intended Use *	Maximum W/C Ratio ‖	Maximum Cementitious Content (pounds/ cubic yard)	Maximum percent SCM (Fly Ash/ Slag/Ternary)	Design Slump Range (inches)	Minimum 28-day Compressive Strength, f'c	3137, "Coarse Aggregate for Portland Cement Concrete."
Y Bridge Deck	3Y42-M § 3Y42-S §	Bridge decks, integral abutment diaphragms, pier continuity diaphragms, expansion joint replacement mix	0.45	750	30/35/40	2 - 4	4000 psi	2D.2
	3Y47 **	Deck patching mix	0.45	750	30/35/40	2 – 4	4000 psi	2D.2

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.

† Mix 3F57EX requires the use of Coarse Aggregate Designation "7", "2" or "3" for the 4th digit in accordance with Table 2461.2-3.

‡ Identify the specific color used on the Certificate of Compliance. Colored concrete is only allowed when specified in the Plans or the Contract.

Adjust slump in accordance with 2461.3G.7.a, "Concrete Placed by the Slip-Form Method," for slip-form concrete placement.

§ The "-S" indicates a Bridge deck with a structural slab and "-M" indicates a monolithic Bridge deck.

** Mix 3Y47 requires the use of Coarse Aggregate Designation "7" or "3" for the 4th digit in accordance with Table 2461.2-3.

Delete and replace Table 2461.2-11 of 2461.2E.4, "Contractor Mix Design Adjustments," with the following:

Table 2462.2-11 Mix Design Adjustments/Requirements

	Type of Change or Adjustment	Mix Design Resubmittal Requirements
Level 1 mixes	Cementitious Sources Admixture Sources Admixture Dosage Rate	No resubmittal required
	Aggregate Sources Aggregate Proportions Any cementitious proportion (≤ 15% max fly ash)	Resubmittal of Mix Design
	Any cementitious proportion (> 15% max fly ash)	Resubmittal in accordance with 2461.2E.3.a, "Preliminary Test Data Requirements for Level 2 Mixes"
Level 2 mixes	Cementitious Sources Admixture Dosage Rate	No resubmittal required
	Aggregate Source, no change in Aggregate Class ≤ 5% Total Cementitious ≤ 10% Individual Aggregate Weights	Resubmittal of Mix Design
	Aggregate Source and Class of Coarse Aggregate Supplementary Cementitious Proportion > 5% Total Cementitious > 10% Individual Aggregate Weights Admixture Sources	Resubmittal in accordance with 2461.2E.3.a, "Preliminary Test Data Requirements for Level 2 Mixes"
* Only one (1) increase in total cementitious allowed per mix design, next adjustment requires resubmittal in accordance with 2461.2E.3.a, "Preliminary Test Data Requirements for Level 2 Mixes"		

Add the following to 2461.3F.2, "Certificate of Compliance":

(22) Fibers, brand, and dosage per cubic yard
(23) Approved Ready-Mix (RMX) Sheet Number (XXX-XXX)

Add the following to 2461.3G.2, "Placement Temperatures":

The Contractor and Engineer will perform random sampling and testing in accordance with *ASTM C172, Standard Practice for Sampling Freshly Mixed Concrete*; *ASTM C1064, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete*; and the Schedule of Materials Control.

Delete and replace Table 2461.3-3 of 2461.3G.6.a(1), "Procedures," with the following:

Table 2461.3-3 Chronological Testing Ages of Strength Specimens

Type of Concrete	Testing Ages*
Concrete Pavement as defined in 2301, "Concrete Pavement"	Test at least 2 sets of strength specimens before and the remaining sets after the anticipated opening strength
Normal Strength Concrete as defined in 2461, "Structural Concrete"	1, 3, 7, 14, and 28-Calendar Days
High-early (HE) Concrete as defined in 2461, "Structural Concrete"	12 hours, 1, 2, 7, and 28-Calendar Days
Ultra High-Early (UHE) Concrete as defined in 2302, Concrete Pavement Rehabilitation"	3, 4, and 8 hours, 1 and 14-Calendar Days
* The Contractor may adjust the testing ages if approved by the Engineer, in conjunction with the Concrete Engineer.	

Delete and replace the second sentence of 2461.3G.7, "Consistency," with the following:

The Contractor and Engineer will perform random sampling and testing in accordance with *ASTM C172, Standard Practice for Sampling Freshly Mixed Concrete*; *ASTM C143, Standard Test Method for Slump of Hydraulic-Cement Concrete*; *ASTM C1611, Standard Test Method for Slump Flow of Self-Consolidating Concrete*; and the Schedule of Materials Control.

Delete and replace the second sentence of 2461.3G.8, "Air Content," with the following:

The Contractor and Engineer will perform random sampling and testing in accordance with *ASTM C172, Standard Practice for Sampling Freshly Mixed Concrete*; *ASTM C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method*; and the Schedule of Materials Control.

Delete and replace 2461.5A.2.d, "Moving Average Below f'c," with the following:

If the moving average of 3 consecutive strength tests is less than the required f'c, the Concrete Engineer will review the strength test results and determine if a new mix design is required in accordance with Table 2461.2-6 or Table 2461.2-7.

The Concrete Engineer in conjunction with the Engineer will remove any strength test results from the moving average if the following occurs:

(1) After investigation, the cause for the deficient concrete strength is due to improper handling, curing, or testing of the cylinder
(2) Cylinders kept in the field longer than 7-Calendar Days that negatively impact the moving average calculation
(3) The suspect concrete was removed and replaced
(4) Dispute resolution coring identified the concrete acceptable to remain in place

For the quantity of non-conforming concrete not meeting the moving average of 3 consecutive strength tests, the Engineer will make determinations regarding the disposition, payment, or removal of the concrete in accordance with Table 2461.5-5.

2462 PRECAST CONCRETE

Delete and replace the first and fourth paragraphs of 2462.3G.4, "Test Methods and Specimens," with the following:

Take samples randomly in accordance with *ASTM D3665, Standard Practice for Random Sampling of Construction,* Section 5, at a rate defined in accordance with the Schedule of Materials Control.

Perform random sampling and testing in accordance with *ASTM C172, Standard Practice for Sampling Freshly Mixed Concrete*; *ASTM C1064, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete*; *ASTM C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method*; *ASTM C143, Standard Test Method for Slump of Hydraulic-Cement Concrete*; *ASTM C1611, Standard Test Method for Slump Flow of Self-Consolidating Concrete*; and the Schedule of Materials Control.

Furnish 4-inch by 8-inch cylinder molds, unless the maximum Aggregate size is greater than 1 1/4 inches, then furnish 6-inch by 12-inch cylinder molds.

2501 PIPE CULVERTS

Add the following to 2501.3, "Pipe Culverts, Construction Requirements":

H. Geotextile

Use Geotextile 3733 Type 1 to wrap concrete pipe joints or for other drainage applications.

2503 PIPE SEWERS

Add the following to 2503.3, "Pipe Sewers, Construction Requirements":

G. Geotextile

Use Geotextile 3733 Type 1 to wrap concrete pipe joints or for other drainage applications.

2511 RIPRAP

Delete and replace 2511.3F, "Quality Control (QC)," with the following:

F. Quality Control (QC)

Refer to the requirements in the Schedule of Materials Control for Project specific requirements.

F.1 Gradation and Certification Requirements

For riprap meeting 3601.2A, "Random Riprap," test one gradation per year for each product using either:

(1) FHWA Hydraulic Toolbox, Test method 5-692.212 in the Grading and Base Manual. Record and submit results using form G&B-108a, "Riprap Gradation D85 and FHWA Hydraulic Toolbox," found on the MnDOT Grading and Base website
(2) WipFrag or an alternative image analysis software, approved by the Engineer. Record and submit results using and submit form G&B-108a, "Riprap Gradation D85 and FHWA Hydraulic Toolbox," found on the MnDOT Grading and Base website
(3) Wolman Count Method. Test method 5-692.211 in the Grading and Base Manual. Record and submit results using form G&B-108b, "Riprap Gradation Wolman Method," found on the MnDOT Grading and Base website

For riprap meeting 3601.2B, "Hand placed Riprap," provide certification that the stone meets Contract-required thickness of riprap, following guidance in 2511.3C.2, "Hand-Placed Riprap", and individual stones have a weight of at least 50 pounds.

F.2 Carbonate Quarried Riprap

For riprap meeting 3601.2A, "Random Riprap," or 3601.2B, "Hand-placed Riprap," the supplier is required to have an approved QC Plan, prior to delivery of stone, when either of the following apply:

(1) Quantities are greater than 100 cubic yards
(2) Riprap is used for Bridge protection, as shown in the Plan

The Carbonate riprap QC Plan requirements are found on the MnDOT Geology Web page. Contact the MnDOT Geology Unit a minimum of 60-Calendar Days prior to supplying riprap.

Provide certification, for each product, using form G&B-104b, "Riprap Quality Control Plan," and attach required test(s).

F.3 Riprap meeting 3601.2C, "Gabions and Revet Mattresses," 3601.2D, "Granular Filter under Class I Random Riprap," and 3601.2E, "Granular Filter Under Riprap, Gabion, and Revet Mattress".

Provide certification using form G&B-104, "Certification of Aggregates and Granular Materials," found on the MnDOT Grading and Base website.

Delete and replace 2511.3G.1, "Riprap meeting 3601.2A, "Random Riprap," 3601.2B, "Hand-placed Riprap," or 3601.2C, "Gabions and Revet Mattresses," with the following:

G.1 Riprap meeting 3601.2A, "Random Riprap," or 3601.2B, "Hand-placed Riprap".

For gradation compliance of riprap meeting 3601.2A, "Random Riprap," the Engineer will visually inspect the riprap and perform the D85 test, test method 5-692.210, listed in the Grading and Base Manual and complete form G&B-108a, "Riprap Gradation D85 and FHWA Hydraulic Toolbox," found on the MnDOT Grading and Base website.

If the material fails to meet requirements based on the visual check or the D85 results, the Engineer will test the gradation using one of the following methods:

(1) FHWA Hydraulic Toolbox, 5-692.212 test method, listed in the Grading and Base Manual and form G&B-108a, "Riprap Gradation D85 and FHWA Hydraulic Toolbox"
(2) WipFrag or a similar image analysis software, as approved by the Engineer, and form G&B-108a, "Riprap Gradation D85 and FHWA Hydraulic Toolbox"
(3) The Wolman Count, 5-692.211 test method, listed in the Grading and Base Manual and form G&B-108b, "Riprap Gradation Wolman Method"

For riprap meeting 3601.2B, "Hand-placed Riprap," the Engineer will visually inspect the riprap to ensure it meets the requirements of 2511.3C.2, "Hand-Placed Riprap."

2512 GABIONS AND REVET MATTRESSES

Add the following to 2512.3B, "Filter Material":

Use Geotextile 3733 Type 3 under gabions and revetment mattresses.

2533 CONCRETE MEDIAN BARRIERS

Add the following to 2533.3E, "Concrete Curing and Protection":

Curing requirements for roadside concrete median barriers shall conform to 2401.3G.1, "Minimum Curing Period," Table 2401.3-2.

2545 LIGHTING

Delete and replace 2545.3E.1, "Precast Concrete Foundations," with the following:

Install precast concrete foundations as specified in the Contract and the following:

- Using an appropriate size earth auger bit, excavate a cylindrical drilled shaft into the ground 6 inches to 12 inches larger in diameter than the diameter of the precast concrete foundation
  (a) Use auger drilling Equipment with adequate capacity, including power, torque, and down thrust to auger a cylindrical drilled shaft to the depth specified in the Contract

- Level and firmly compact the bottom of the shaft so it is flat and horizontal while maintaining the required depth of the shaft
- Remove the temporary form from the foundation if it is still attached before placing the foundation into the shaft
- Center, set, and level the foundation in the shaft while maintaining a continuous annular void of at least 3 inches and no greater than 6 inches between the foundation and the drilled shaft
- Before backfilling, place the ground rod electrode in the annular void and install the conduit stub-outs
- Completely backfill the annular void with fine filter Aggregate in accordance with 3149.2I.2, "Fine Filter Aggregate" in compacted lifts of 6 inches
  (a) Use a mechanical pole tamper capable of compacting the fine filter Aggregate in compacted 6-inch lifts for the entire depth of the drilled shaft excavation.

Insert the following between the fourth and fifth paragraph of 2545.3F.1a, "Direct Buried Lighting Cable":

Install individual conductors running from pole to pole in rigid PVC or HDPE conduit if located under bituminous, concrete, or other Material not considered a topsoil. Provide 2-inch conduit if the Contract does not specify size of conduit.

Insert the following as the last paragraph of 2545.3F.1a, "Direct Buried Lighting Cable":

Do not use permanent direct buried lighting cable as temporary wiring.

Delete and replace the seventh paragraph 2545.5, "Lighting Systems, Basis of Payment," with the following:

The Contract Unit Price for concrete foundations includes the cost of excavation, concrete, fine filter aggregate, reinforcement, anchor rods, ground rod, equipment grounding conductor ground lead, grounding and bonding connections, conduit elbows, and bushings, and other miscellaneous items materials required for a complete installation of the light foundation.

2574 SOIL PREPARATION

Add the following to 2574.5, "Soil Preparation, Basis of Payment":

C. Unit Prices

In addition to soil preparation Pay Items included in the Plan, the Engineer may require the items listed below as site conditions warrant (provided the items listed below are not already included in the Plans). Payment for additional items as ordered by the Engineer will be made in accordance with the following schedule:

Subsoiling $400.00/acre
Soil Bed Preparation.....$260.00/acre
Soil Tracking $300.00/acre

2575 ESTABLISHING VEGETATION AND CONTROLLING EROSION

Add the following to 2575.5, "Establishing Vegetation and Controlling Erosion, Basis of Payment":

L. Unit Prices

In addition to the erosion control Pay Items included in the Plans, the Engineer may require the items listed below as site conditions warrant (provided the items listed below are not already included in the Plans).

The Department will pay for additional items as ordered by the Engineer will be made in accordance with the following schedule:

Disc anchoring	$82.00/acre

Seed Mixtures (for temporary use)

21-111 or 21-112	$1.75/pound
21-113	$2.25/pound
22-111	$2.70/pound
32-241 (native construction)	$5.00/pound
34-171 (wetland rehab.)	$7.50/pound

Erosion Control Blanket

Category 25	$2.00/square yard
Category 30	$2.25/square yard
Category 72	$11/square yard

Rapid Stabilization

Method 1	$500/acre
Method 2	$1000/acre
Method 3	$726.00/M gallon
Method 4	$2.50/square yard
Hydraulic Stabilized Fiber Matrix	$1.90/pound
Hydraulic Reinforced Fiber Matrix	$2.00/pound
Temporary Poly (Fiber Reinforced) Covering	$1.10/square yard
Temporary Geotextile Covering	$7.50/square yard
Water	$42.00/M gallon
Mowing (Hand Whip)	$75/hour
Mowing (Machine)	$260.00/acre
Weed Spraying	$60.00/acre

2582 PAVEMENT MARKINGS

Add the following to 2582.2, "Pavement Markings, Materials":

For pavement marking installations between the dates of October 15 and April 1, provide and use pavement marking Materials listed on the "Late Season Pavement Marking Materials" APL.

3105 BAGGED PORTLAND CEMENT CONCRETE PATCHING MIX 3U18 AND 3U58M

Delete and replace Table 3105.2-1 of 3105.2B, "Blending" with the following:

Table 3105.2-1 3U18 Gradation Requirements

Sieve Size	Percent Passing
3/8 inch	100
No. 4	70-90
No. 8	40-80
No. 16	25-50
No. 30	15-35
No. 50	0-18
No. 100	0-8
No. 200	≤ 2.3

3107 MASONRY MORTAR

Delete and replace 3107, "Masonry Mortar," with the following:

3107.1 SCOPE

Provide masonry mortar for use in utility/sewer and other applications.

3107.2 REQUIREMENTS

A. Utility/Sewer Application

Provide a preblended, dry, air-entrained, bagged mortar mix designed for utility/sewer applications from the approved source listed on the *Approved/Qualified Products List*, meeting the requirements of *ASTM C270, Standard Specification for Mortar for Unit Masonry, and ASTM C1714*, *Standard Specification for Preblended Dry Mortar Mix.*

Mix the preblended bagged mortar mixture onsite for the minimum time stated by the manufacturer. Do not exceed the manufacturer allowable mixing water. If the manufacturer does not recommend a minimum mixing time, mix the preblended bagged mortar mixture for a minimum of 5 minutes. The Engineer will not allow retempering the mortar mixture and will reject mortar mixtures not placed within 60 minutes of mixing.

B. Applications Other Than Utility/Sewer

For applications other than for utility/sewer, provide masonry mortar in accordance with *ASTM C270, Standard Specification for Mortar for Unit Masonry*, based on the type of mortar required by the Contract. Mix in accordance with the manufacturer's recommendations.

For site mixed masonry mortar using bagged masonry cement, submit to the Engineer a statement of compliance meeting the requirements of *ASTM C91, Standard Specification for Masonry Cement*. Label the type of masonry cement, either Type S or Type M, on each bag.

3107.3 SAMPLING AND TESTING

Provide samples for site mixed masonry mortar as required by the Contract.

3113 ADMIXTURES FOR CONCRETE

Delete and replace 3113.2A, "Materials" with the following:

Provide Class I admixtures from the Approved Products List meeting the requirements of *ASTM C494, Standard Specification for Chemical Admixtures for Concrete*.

Department identifies the following as Class I admixtures:

(1) Type A — Water reducing
(2) Type B — Retarding
(3) Type C — Accelerating
(4) Type D — Water reducing and retarding
(5) Type E — Water reducing and accelerating
(6) Type F — Water reducing, high range
(7) Type G — Water reducing, high range and retarding
(8) Type S — Specific performance admixtures

Provide Class II air-entraining admixtures from the Approved Products List meeting the requirements of *AASHTO M 154, Standard Specification for Air-Entraining Admixtures for Concrete,* except the tests for bleeding, bond strength, and volume change are not required.

Provide Class III corrosion inhibiting chloride admixtures from the Approved Products List meeting the requirements of *ASTM C1582, Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete*.

3138 AGGREGATE FOR SURFACE AND BASE COURSES

Add the following to 3138.2C, "Recycled Materials":

(3) When mixing recycled Aggregate with virgin Aggregate, the minimum Los Angeles Rattler of Carbonate virgin Aggregate is 40%. Meet all other virgin Aggregate requirements in 3138.2B, "Virgin Materials".

Add the following note under Table 3138.2-3 of 3138.2E, "Gradation Requirements":

For 100% crushed quarried class 5 aggregate, the required passing the number 4 sieve is 30 – 80, the required passing the number 10 sieve is 15 – 65, the required passing the number 40 sieve is 7 – 35, and the required passing the Number 200 sieve is 3.0 – 12.0. The 1-1/2 inch, 3/4 inch, and 3/8 inch requirements for crushed quarried class 5 aggregate are the same as in Table 3138.2-3.

3236 REINFORCED CONCRETE PIPE

Delete and replace Table 3236.3-1 of 3236.3C.2, "Load Bearing Test," with the following:

Table 3236.3-1 1 Minimum Three Edge Bearing Testing Rates

Size Range, inch	Class Range	Test Rates
12 – 15	≤ 5	1 per 1000 pieces
18 – 36	≤ 4	1 per 800 pieces
18 – 36	5	1 per 400 pieces
42 – 60	≤ 3	1 per 400 pieces
42 – 60	4 & 5	1 per 200 pieces
66 – 96	≤ 5	1 per 200 pieces
NOTE: Testing rates for sizes not shown are as required by the Project Specifications. Begin a new schedule of testing after changing the mix design, after shutting down the system for major repairs and renovations, when beginning a new production run, and when beginning a new season. These rates are for testing to the 0.01 in D-load. Testing to failure is required on each combination of pipe size, wall thickness, and class manufactured once per production year. For arch pipe smaller than 88-inches nominal span, one piece per year of each size and class manufactured is required to be tested to failure.		

Delete and replace 3236.2A, "Materials" with the following:

A. Materials

A.1 Aggregate Quality .....3126, 3131 and 3137
A.2 Form Release Agents 3902
A.3 Portland Cement.....3101
The Department will allow admixtures in accordance with 2462, "Precast Concrete."
A.4 Blended Hydraulic Cement 3103
A.5 Fly Ash for Use in Portland cement concrete 3115
A.6 Ground Granulated Blast Furnace Slag Cement 3102
A.7 Precast Concrete.....2462
A.8 Metal Reinforcement.....2472

A.9 Preformed Gasket Seals for Concrete Pipe.....3726
A.10 Precast Concrete Manufacturing.....3240

Add the following to 3236.2D, "Permissible Variations":

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 pre-lubricated pipe seal systems. See MnDOT Standard Plate 3006.

3238 PRECAST CONCRETE BOX CULVERTS

Add the following to 3238.2B, "Materials":

B.3 Welded Wire Reinforcement 3303

Delete and replace 3238.2I, "Tolerances" with the following:

I. Certified Plant Requirement

Provide precast concrete box culverts, end sections, and appurtenances constructed in a precast concrete fabrication plant certified by the American Concrete Pipe Association, the National Precast Concrete Association, or another organization approved by the Materials Engineer. If requested, provide quality control and plant certification records to the Materials Engineer.

Add the following to 3238.2, "Requirements":

J. Tolerances

Dimensional tolerances will be based on *AASHTO M 259, "Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers"*.

3302 DOWEL BARS

Delete and replace 3302.2B, "Alternate Dowel Bars," with the following:

B. Tubular Dowel Bars

Provide welded carbon and alloy steel tubular dowel bar meeting the requirements of *ASTM 513, Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing,* and Table 3302.2-1.

Table 3302.2-1 Tubular Dowel Bar Requirements

Specified Dowel Bar Diameter	Required Tubular Dowel Bar Outside Diameter	Required Tubular Dowel Bar Wall Thickness
1.25 inches	1.3125 inches or 1.375 inches	0.120 inches
1.50 inches	1.625 inches	0.120 inches

Provide a galvanized coating providing a minimum 20-year life. Cap the ends of the tubular dowel bar in a way to prevent intrusion of concrete or other Materials.

Galvanize the exterior and interior of the tubular steel dowel bars using G90 coverage zinc galvanized coating.

Epoxy coat the exterior of the galvanized tubular dowel bars in accordance with *ASTM A1078, Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement,* Type 2 coating (*ASTM A934, Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars,* Annex A1) and as modified:

(1) Apply epoxy coating in a fusion bonded epoxy coating plant certified by the CRSI or another organization approved by the Materials Engineer.
(2) Epoxy coating of the entire dowel bar assembly is not required.
(3) Do not epoxy coat the ends of the dowel bars unless required by the manufacturer.

3491 PRESERVATIVES AND PRESERVATIVE TREATMENT OF WOOD PRODUCTS

Add the following to the last paragraph of 3491.2C, "Method of Treatment":

No field treatment shall be applied within 100 feet of surface water, and any spills must be collected and properly disposed of.

3601 RIPRAP MATERIAL

Add the following to 3601.2, "Riprap Material, Requirements":

F. Geotextile Filter Material

Provide geotextile filter material, meeting the requirements of 3733 and the following:

(1) Type 3 for use under Class I and Class II random riprap
(2) Type 4 for use under Class III and Class IV random riprap and hand-placed riprap on slopes no steeper than 3:1, horizontal to vertical
(3) Type 7 for use under Class III and Class IV random riprap on slopes steeper than 3:1, horizontal to vertical, and under Class V random riprap

Add the following to 3601.3, "Riprap Material, Sampling and Testing":

An approved Quality Control Program is required for riprap derived from Carbonate quarries if used for Bridge protection or quantities greater than 100 cubic yards. The Quality Control program is administered by the MnDOT Geology Unit.

3733 GEOSYNTHETIC MATERIALS

Delete and replace 3733.2B, “Geotextiles” with the following:

Provide geotextiles made from woven, nonwoven, or knit fabric of polymeric filaments or yarns, such as polypropylene, polyethylene, polyester, or polyamide. Except for Type 1b (knit sock), provide geotextiles in compliance with the National Transportation Product Evaluation Program (NTPEP).

For Types 1, 3-13 meet the applicable requirements in Table 3733.2-1 through Table 3733.2-4.

Table 3733.2-1 Geotextile Properties for Types 1, 3, 4, 5, 6, 7

Geotextile Property	ASTM Test Method Units	Type *						
		1		3	4	5	6	7 †
		Fabric	Knit sock ‖					
B1 Grab Tensile Strength minimum, each principal direction	*D4632* Pounds	100	—	100	200	200	‡	300
B2 Elongation minimum, each principal direction	*D4632* Percent	—	—	50	50	—	‡	50
B3 Seam Breaking Strength minimum #	*D4632* Pounds	90	—	90	180	180	‡	270
B4 Apparent Opening Size (AOS) §	*D4751* U.S. Sieve	40	40 as applied	50	50	30	20	50
B5 Permittivity minimum**	*D4491* sec^{-1}	0.7	2.75 relaxed	0.5	0.5	0.05	0.05	0.5
B6 Puncture strength minimum	*D6241* Pounds	—	180	—	—	—	—	—
B7 Wide Width Strip Tensile Strength minimum each principal direction	*D4595* pounds/feet	—	—	—	—	—	‡	—

* Minimum Average Roll Values (MARV) based on an average of at least three tests per swatch.

‖ Provide socks made of knit polymeric Materials and meeting the requirements of *ASTM D6707-06*, *Standard Specification for Circular-Knit Geotextile for Use in Subsurface Drainage Applications*, for Type H as given for properties B4, B5, and B6 fabric. Ensure the sock exhibits minimum snag or run potential, is factory-applied to maintain uniform installed mass, and conforms to the outside diameter of the tubing with a snug fit.

† Needle-punched nonwoven. Do not use thermally bonded (heat-set) fabric.

‡ Requirements are site-specific and will be as specified in the Contract. The property values for B1 and B3 may not be less than shown for Type 5. If the Contract does not specify either B1 or B7, use a default value of 300 pounds for B1. If the Contract does not specify seam strength, use a default value of 270 pounds for B3.

Adhere to this requirement if the Contract requires or allows seams. Strength Specifications apply to factory and field seams. Use thread for sewing that has the strength of at least 25 pounds. Sew seams with a Federal Type 401 stitch (*ASTM D6193-16, Standard Practices for Stiches and Seams*) using a two-spool sewing machine and install seams facing upward. For seaming with adhesives, see the *Approved/Qualified Products List* available on the Department's website.

§ For U.S. Sieve sizes, the AOS Number must be equal to or greater than the Sieve size specified.

** Permittivity: P = K/L, where K = fabric permeability and L = fabric thickness.

Table 3733.2-2 Type 8 Geotextile Properties

Property	Requirements	Test Procedure
Geotextile type	Nonwoven, needle-punched geotextile, no thermal treatment (calendaring or IR)	Manufacturer Certificate of Compliance
Color	Uniform/Nominally same-color fibers	Visual Inspection
Mass per unit area	≥ 14.7 ounce/square yard	*ASTM D5261**
Thickness under load (pressure)	At 0.29 psi: ≥ 0.12 inches At 2.9 psi: ≥ 0.10 inches At 29 psi: ≥ 0.04 inches	*ASTM D5199*‖
Wide-width tensile strength	≥ 685 pounds/feet	*ASTM D4595*†
Wide-width maximum elongation	≤ 130 percent	*ASTM D4595*†
Water permeability in normal direction under load (pressure)	At 2.9 psi: ≥ 3.3×10^{-4} feet/second	*ASTM D5493* MnDOT Modified‡ or *ASTM D4491#*
In-plane water permeability (transmissivity) under load (pressure)	At 2.9 psi: ≥ 1.6×10^{-3} feet/second At 29 psi: ≥ 6.6×10^{-4} feet/second	*ASTM D6574* MnDOT Modified§ or *ASTM D4716***
Weather resistance	Retained strength ≥ 60 percent	*ASTM D4355*‖‖ at 500 hours exposure
Alkali resistance	≥ 96 percent polypropylene/polyethylene	Manufacturer certification of polymer

Table 3733.2-3 Types 9, 10, 11, and 12 Geotextile Properties

Properties	Test Method	Unit	Type 9		Type 11		Type 12	
			Minimum Average Roll Value					
			MD	CD	MD	CD	MD	CD
Tensile Strength at Ultimate	*ASTM D4595*	pounds/foot	3,500	3,200				
Tensile Strength @ 2% Strain	*ASTM D4595*	pounds/foot			600	1,000	480	1,800
Tensile Strength @ 5% Strain	*ASTM D4595*	pounds/foot			1,800	2,200	1,400	4,300
Cyclic Tensile Modulus @ 2% Strain	*ASTM D7556* "Method C"	pounds/foot			50,000	70,000	50,000	120,000
Interaction Coefficient: Ci*	*ASTM D6706*				0.89		0.90	
Properties	Test Method	Unit	Maximum Roll Value					
Apparent Opening Size (AOS)	*ASTM D4751*	U.S. Sieve	30		40		40	
Properties	Test Method	Unit	Typical Roll Value Maximum					
Typical Dynamic Filtration Pore Size O95/O85/O60/O50	*ASTM D6767*	Microns			395/330/245/195		395/330/250/210	
Properties	Test Method	Unit	Design / Calibration Value					
Base Course Improvement Factor: MR‖	*AASHTO R50-09*	--			1.3		1.4	

			Type 9	Type 11	Type 12
Properties	Test Method	Unit	Minimum Average Roll Value		
Permittivity	*ASTM D4491*	sec^{-1}	0.8	0.90	1.0
Flow Rate	*ASTM D4491*	$gal/min/ft^2$	60	75	75
Properties	Test Method	Unit	Minimum Roll Value		
UV Resistance (at 500 hours exposure)	*ASTM D4355*	% Strength Retained	70	90	90
Seam Breaking Strength	*ASTM D4884*	Pounds/ inch	200†		
For Type 10, meet the requirements of *AASHTO M288 Class 4A – Geotextile*.					
* Perform test with a normal pressure of 1.0 psi. Use material in the mold consisting of GW or SP with a maximum internal angle of friction of 34 degrees. ‖ Determine value in accordance with NCHRP Report 512 "Accelerated Pavement Testing: Data Guidelines" and *AASHTO R50-09 Geosynthetic Reinforcement of the Aggregate Base Course of Flexible Pavement Structures."* Multiplier for Unbound Granular Material; for Subgrade Grade Resilient Modulus between 4.5 and 6.9 ksi (31 and 47 MPa). † If required, use thread with a minimum strength of 25 pounds. Sew seams with an *ASTM D6193, Standard Practice for Stitches and Seams,* Federal Type 401 stitch using a two-spool sewing machine and install seams facing upward. For seaming with adhesives, see the *Approved/Qualified Products List* available on the Department's website.					

Table 3733.2-4 Type 13 Geotextile Properties

Properties	Test Method	Unit	Minimum Average Roll Value
			MD and CD
Wide Width Max Elongation	*ASTM D4595*	%	20
Permittivity	*ASTM D4491*	Sec^{-1}	0.4
Minimum wet front movement in vertical direction	*ASTM 1559* (modified for geotextiles)	Inches	4
Minimum wet front movement in horizontal direction:	*ASTM 1559* (modified for geotextiles)	Inches	70
General	Meet the requirements of *AASHTO M288 Class 4A – Geotextile*.		

3801 RIGID STEEL CONDUIT (RSC)

Delete and replace 3801, "RIGID STEEL CONDUIT (RSC)" with the following:

3801 RIGID METAL CONDUIT

3801.1 Scope

Provide rigid metal conduit and fittings for electrical systems.

3801.2 Requirements

A. Rigid Metal Conduit (RMC)

Use RMC constructed of steel listed and labeled by an NRTL, as defined by the U.S. Department of Labor, and meeting the requirements of UL 6 Electrical Rigid Metal Conduit – Steel, and UL 514B Conduit, Tubing, and Cable Fittings. Use an NRTL listed by OSHA in its scope of recognition for the tests required by this Specification.

Hot-dip galvanize the inside and outside surfaces of conduit and fittings.

3801.3 Sampling and Testing

Label each conduit length with the relevant NRTL label.

The Department reserves the right to sample, test, inspect, and accept or reject conduit or fittings based on its own tests.

3802 INTERMEDIATE METAL CONDUIT

Delete 3802, "Intermediate Metal Conduit," and replace with BLANK.

3803 NON-METALLIC RIGID PVC AND HDPE CONDUIT

Delete and replace 3803, "NON-METALLIC RIGID PVC AND HDPE CONDUIT" with the following:

3803 NON-METALLIC CONDUIT

Delete and replace 3803.1, "Non-Metallic Conduit, Scope," with the following:

3803.1 SCOPE

Provide non-metallic conduit and fittings for electrical systems as specified on the plans.

3803.2 REQUIREMENTS

Delete and replace 3803.2A, "Rigid PVC Conduit," with the following:

A. Rigid polyvinyl chloride conduit (PVC)

Use rigid PVC conduit and fittings meeting the following:

(1) NRTL listed meeting *UL 514B, "Conduit, Tubing, and Cable Fittings"* and *UL 651, "Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings,"* for underground use
(2) Gray in color
(3) Smooth interior and exterior surfaces
(4) Schedule 80 unless otherwise Schedule 40 on the Plans
(5) With the following marked on the outside:
    (a) Manufacturer's name
    (b) Conduit size
    (c) Conduit type
    (d) NRTL certification mark

3805 PVC COATED HOT DIPPED GALVANIZED RIGID STEEL CONDUIT (PVC COATED RSC)

Delete and replace 3805 "PVC COATED HOT DIPPED GALVANIZED RIGID STEEL CONDUIT (PVC COATED RSC)," with the following:

3805 PVC COATED RIGID METAL CONDUIT

3805.1 SCOPE

Provide Department approved PVC coated RMC and fittings for electrical systems when specified in the Contract with approved hangers and supports.

3805.2 REQUIREMENTS

A. PVC Coated RMC

Provide PVC coated RMC listed on *Approved/Qualified Products List* under "Lighting".

B. PVC Coated RMC Fittings

Provide PVC coated RMC fittings listed on *Approved/Qualified Products List* under "Lighting".

Use fittings from the same manufacturer of the PVC coated RMC being used on the Project.

See 3839, "CONDUIT EXPANSION AND DEFLECTION/EXPANSION COUPLING FITTINGS," for expansion and deflection/expansion coupling fittings.

C. Hangers and Supports for PVC Coated RMC

Use conduit hangers, clamps, straps, U-bolts, strut, and bar supports, threaded rod, inserts, and miscellaneous hardware for PVC coated RSC in accordance with the NEC and as shown on the Plans or, if not shown, as directed by the Engineer.

3805.3 SAMPLING AND TESTING — BLANK

3838 JUNCTION BOXES

Delete and replace 3838.2A, "Metal Junction Boxes Attached to Bridges and Retaining Walls," with the following:

A. Metal Junction Boxes Attached to Bridges and Retaining Walls

Provide PVC-coated GRFX junction boxes listed on the Approved/Qualified Products List under "Lighting".

Delete and replace 3838.2C, "Junction Boxes in Rigid PVC Conduit Runs Attached to a Bridge," with the following:

C. Junction Boxes in Rigid PVC Conduit Runs Attached to a Bridge

For junction boxes mounted to Bridges, use PVC junction boxes meeting the following:

(1) PVC coated GRFX junction boxes listed on Approved/Qualified Products List under "Lighting"
(2) Equipped with a cover attached by stainless steel screws
(3) At least 6 inches by 6 inches by 6 inches deep
(4) Attached to the Bridge as approved by the Engineer
(5) NEC compliant

3839 CONDUIT EXPANSION AND DEFLECTION/EXPANSION COUPLING FITTINGS

Delete and replace 3839.1, "Conduit Expansion and Deflection/Expansion Coupling Fittings, Scope" with the following:

Provide PVC coated and urethane lined metallic conduit expansion fittings and PVC coated metallic deflection/expansion coupling fittings for PVC coated RMC runs encased in concrete, hanging, or surface mounted.

Delete and replace 3839.2, "Conduit Expansion and Deflection/Expansion Coupling Fittings, Requirements" with the following:

Use fittings from the same manufacturer of the PVC coated RMC used on the Project.

3885 ROLLED EROSION PREVENTION PRODUCTS

Delete and replace Tables 3885.2-1 and 3885.2-2 of 3885.2A, "Temporary Erosion Prevention Blanket," with the following:

Table 3885.2-1 Temporary Straw-based Products

Criteria	Category 10	Category 20	Category 30
Net Number (upper/lower)	1	2	2
Fiber Fill Material	100 percent Straw	100 percent Straw	70 percent Straw, 30 percent Coconut/hemp
Mass, minimum*‡ (pound per square yard)	0.43	0.43	0.42
Reported Fiber Length, 80 percent greater than (inch)	3	3	3
Reported Functional Longevity, 75 percent remaining (month)	3	4.5	9
Reported Target Service Life (month)	4	9	12
Permissible shear, unvegetated# (pound per square foot)	1.50	1.75	2.00
Flow, probable maximum# (feet per second)	4.5	6	8
Machine Direction (MD) Tensile Strength, minimum§ (pounds per foot)	70	160	160
TD Tensile Strength, minimum§ (pounds per foot)	50	110	150
Permissible Anchor Type	Wood or biodegradable ‖ plant-based plastic barbed, glue, U, or round head metal, 11-13 gage	U or round head metal, 11-13 gage, Washer/60D (6 inches) Nail†	Helical twist pin, Washer/60D (6 inches) Nail†
Minimum anchor embedment length	4 inches	6 inches	8 inches

* Dry mass at the time of manufacture following ASTM protocols.
‖ Biodegradable means the product will decompose under ambient soil conditions into carbon dioxide, water, and other naturally occurring materials within one year of installation.
† Winter Utilization.
‡ *ASTM D6475, Mass per Unit Area of Erosion Control Blankets.*
# *ASTM D6460, Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.*
§ *ASTM D6818, Ultimate Tensile Properties of Rolled Erosion Control Products.*

Table 3885.2-2 Temporary, Wood Fiber Based Products

Criteria	Category 15	Category 25	Category 35	Category 45
Net Number (upper/lower)	Netless	2	2	2
Fiber Fill Material	100 percent Cellulose, Agricultural products, hemp, wood	100 percent Wood* Fiber	100 percent Wood* Fiber	100 percent Wood* Fiber
Mass, minimum ‖# (pound per square yard)	0.40	0.57	0.76	1.25
Reported Fiber Length, 80 percent greater than (inch)	Varies, 0.5 to 6	6	6	6
Reported Functional Longevity, 75 percent remaining (month)	1.5	6	12	24
Reported Target Service Life (month)	3	12	24	36
Permissible shear, unvegetated§ (pound per square foot)	1.00	2.10	2.50	3.25
Flow, probable maximum§ (feet per second)	2	7	8	11
MD Tensile Strength, minimum** (pounds per foot)	4	160	160	160
TD Tensile Strength, minimum** (pounds per foot)	4	110	110	110

Criteria	Category 15	Category 25	Category 35	Category 45
Permissible Anchor Type	Wood or biodegradable† plant-based plastic barbed, glue U or round head metal 11-13 gage	U or round head metal, 11-13 gage, Washer/60D (6 inches) Nail‡	Helical twist pin, Washer/60D (6 inches) Nail‡	Helical twist pin, Washer/60D (6 inches) Nail‡
Minimum anchor embedment length	4 inches	6 inches	8 inches	10 inches

* Derived from hardwood (Aspen spp.) or softwoods (pine).

‖ Dry mass at the time of manufacture following ASTM protocols.

† Biodegradable means the product will decompose under ambient soil conditions into carbon dioxide, water, and other naturally occurring materials within one year of installation.

‡ Winter Utilization.

 # ASTM D6475, Mass per Unit Area of Erosion Control Blankets.

§ *ASTM D6460, Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.*

** *ASTM D6818, Ultimate Tensile Properties of Rolled Erosion Control Products.*

3886 SILT FENCE

Delete and replace Table 3886.2-1 of 3886.2A, "Fabric" with the following:

Table 3236.3-1 Silt Fence Requirements

Silt Fence Type	Minimum Width, inches	Grab Tensile (machine direction), pounds *	Apparent Opening Size ‖	Puncture Strength †	UV Stability, 500 hour, percent ‡	MAX Permittivity #	Maximum Flow Rates, GPM/square foot
MS, HI woven geotextile §	36	130	No. 30 Sieve	—	70	1.0 s^{-1}	130
PA woven geotextile	36	100	No. 30 Sieve	—	70	0.1 s^{-1}	5
SD woven or nonwoven geotextile **	36	100	—	—	70	—	—
TB polyester or polyvinyl Fabric	60	200	—	90 pounds	70	0	0

Values in the table are Minimum Average Roll Values (MARV).
* *ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.*
‖ *ASTM D4751, Standard Test Methods for Determining Apparent Opening Size of a Geotextile*, Maximum average roll value.
† *ASTM D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.*
‡ *ASTM D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus.*
# *ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.*
§ Provide MS, HI woven geotextile with monofilament in both directions. Do not make substitutions.
** Meeting 3733, "Geosynthetic Materials," Types 3, 4, 5, or 7, or poly/poly-reinforced sheeting meeting 3888, "Poly Sheeting" of variable width.