2024

SALT Schedule of Materials Control

Contents

Introduction

This Schedule of Materials Control (SMC) outlines the **MINIMUM** testing requirements for State Aid Funded and/or Federal Aid Projects **OFF** the National Highway and Trunk Highway System. Optional to this SMC is the MnDOT Materials Control Schedule. Usage of either schedule must be defined in the project proposal.

The SMC – LGA serves as a guide for material testing with allowable acceptance "as directed by the Engineer" detailed in Specification 1501.1(1) – Authority of the Engineer. These testing rates are a minimum and additional test may be taken at the Engineer's discretion. A minimal testing rate does not always ensure a quality product; field observations and attention to detail is crucial. Materials not listed on an approved products list may be sampled and tested as directed by the Engineer. Materials listed on a Qualified Products list may be accepted or tested at the discretion of the Engineer.

Federal Aid projects require Independent Assurance Inspection. Contact the MnDOT District IA Inspector when the job starts to provide the proper servicing of your project.

*****Agencies using MnDOT Metro Inspection Services will be sampled at the current MnDOT Schedule of Materials Control rates and will be billed accordingly.**

*****Contact the MnDOT District IA Inspector to provide servicing for your federal aid project.**

Definitions

Schedule of Materials Control

Schedule of Materials Control (SMC) are inserted into project proposals to direct how materials are to be sampled and tested. The SMC is updated yearly. Each SMC is project specific. Therefore, one needs to refer to their specific proposal.

Approved/ Qualified Products List

Products are "approved" when they have been found to routinely meet all applicable standards and specifications. The product is placed on the list based upon established successful manufacturer's quality control and warranties, but the listing may expire or require periodic renewal to verify the product has not changed over time. The approval process for the individual product should specify any expiration requirement. Testing may still be on at the Engineers discretion.

Certified Sources

Certified Sources must comply with each individual product's defined "certification procedure". Acceptance of products from certified sources follows the same sampling and testing as "approved/ qualified" products.

Quality control (QC): The activities performed by the **Contractor/Producer** that have to do with making sure the quality of a product or process meets the relevant contract requirements. All testing shall be performed by a certified tester.

Quality assurance (QA): The activities performed by the **Department/Agency** that have to do with making sure the quality of a product or process meets the relevant contract requirements. All testing shall be performed by a certified tester.

Verification Testing: Sampling and testing performed as called out herein to validate the quality of the product(s). **Part of QA.**

Material Acceptance Summary Instructions

STATE AID FOR LOCAL TRANSPORTATION
MATERIAL ACCEPTANCE SUMMARY

Rev. February 2019

SP/SAP(s)

Bid Item/ Spec No.	Item Description	Approved/ Qualified Product List (date checked)	Certificate of Compliance (date rec'd)	Accepted by Engineer* (date)
2105.604	Geotextile Fabric	5/26/18	5/26/18	6/6/18
2105.604	Soil Stabilized Geogrid	5/30/18	5/30/18	6/6/18
2357.506	Bituminous Material for Tack Coat	6/6/18	6/6/18	6/6/18
2573.503	Silt Fence, Type MS	5/14/18	5/14/18	6/6/18
2582.503	Epoxy Pavement Marking	7/30/18	7/30/18	7/31/18
3592	Drop-on Glass Beads	7/30/18	7/30/18	7/31/18
2574.508	Fertilizer Type 3	---	8/6/18	8/6/18
2575.508	Seed Mixture 22-111	8/6/18	8/6/18	8/6/18

Example Project

Date checked the Approved/Qualified product list. Print and file copy of approved list on acceptance date.

Date the certification was received. See specification 1603.3

Date accepted by the engineer.

* This item is hereby accepted by the Engineer as materially compliant for use on this project per the terms of specification 1501.1, subset (1).

Approved by Project Engineer: _____ Date: _____

Print Name: _____

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Bid Item/ Spec No.	Item Description	Approved/ Qualified Product List (date checked)	Certificate of Compliance (date rec'd)	Accepted by Engineer* (date)

* This item is hereby accepted by the Engineer as materially compliant for use on this project per the terms of specification 1501.1, subset (1).

Approved by Project Engineer: _____ Date: _____
Print Name: _____ Phone: _____

For an electronic Word version of this form, please visit the State Aid Construction webpage at:
https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=19623193

Bituminous Quality Management

The Contractor shall provide and maintain a quality control program as detailed in Specification 2360.2.G. The Engineer shall review the quality control program for compliance. This shall be provided at the precon.

	Type of Test	Spec Section (1)	Contractor / Producer – QC Testing Rates	Agency – QA Testing Rates
Start-Up Testing Rates for the 1st 2000 tons (2)	Bulk Specific Gravity	2360.2.G.7.b	1 test per 500 tons 55 lb. sample 3 full cylinder molds **(7)**	**(3) (10)** 1 Verification Mixture Sample test per day, all Verification samples are from a split (QC/QA) sample.
	Maximum Specific Gravity	2360.2.G.7.c		
	Air Voids (calculated)	2360.2.G.7.d		
	Asphalt Content	2360.2.G.7.a		
	Adj. Asphalt Film Thickness (AFT)	2360.2.E.7.e		
	Gradation	2360.2.G.7.f		
	Fines to Effective Asphalt Ratio (calculated)	2360.2.G.7.a/f		
	Coarse Aggregate Angularity (CAA)	2360.2.G.7.g	1 test per 1000 tons **(4) (5) (6) (7)**	
	Fine Aggregate Angularity (FAA)	2360.2.G.7.h		
	Added AC/Total AC Ratio (calculated)	2360.2.G.7.a		
Production Testing Rates	Bulk Specific Gravity	2360.2.G.7.b	1 test per 1000 tons 55 lb. sample 3 full cylinder molds **(7)**	**(3) (10)** Verification Mixture Sample test per day/ mix type, submit companion to the QC – CAA & FAA test results.
	Maximum Specific Gravity	2360.2.G.7.c		
	Air Voids (calculated)	2360.2.G.7.d		
	Asphalt Content	2360.2.G.7.a		
	Adj. Asphalt Film Thickness (AFT)	2360.2.E.7.e		
	Gradation (minimum of 1 per day)	2360.2.G.7.f		
	Added AC/Total AC Ratio (calculated)	2360.2.G.7.a		
	Coarse Aggregate Angularity (CAA)	2360.2.G.7.g	**(4) (5) (7)**	
	Fine Aggregate Angularity (FAA)	2360.2.G.7.h	**(4) (6) (7)**	
	TSR	2360.2.G.7.i	When directed by the Engineer	
	Aggregate Specific Gravity	2360.2.G.7.j		
	Mixture Moisture Content	2360.2.G.7.k	As directed by the Engineer	
	Asphalt Binder (QA ONLY)	2360	**(8)** 1 qt. steel container for asphalt binder	
	Asphalt Emulsion (QA ONLY)	2357	**(9)** ½ gal plastic container for asphalt emulsion. (Tack)	
	Compaction / Density Requirements	2360.3.D	Review special provisions	
	Small Quantity Requirements	< 500 tons per project may be accepted by the Engineer without testing.		

NOTES: Testing rates are minimum rates; additional testing is encouraged to ensure a quality product.

(1) Review Special Provisions & 2360.2G Mixture Quality Management.

(2) The testing rates apply only to mixtures that have not been tested on previous projects in the current year.

(3) The Agency shall witness a minimum of 1 (one) complete QC mixture sampling, splitting and test per day. The Agency shall take possession of all split QA samples immediately. The Agency shall randomly submit one QA split sample to the District Lab for Verification testing and inform with contractor the following day of test number. Additional verification samples can be taken at any time or location. When additional verification samples are taken, the contractor must test the Verification Companion split of this sample and include the results in the QC program.

(4) The Contractor will retain the extracted gradation samples in containers with field identification numbers for a period of 10 calendar days. The Engineer will identify which extracted gradation sample is the Verification Companion Sample and whether it is to be tested for coarse and fine aggregate angularity.

(5) **At start-up or new Mix Design**: 2 tests/ day for a minimum of 2 days, then 1/day if CAA is met. If CAA > 8% of requirement, 1 sample/ day but test 1/ week. No testing required for Class A and B Aggregates.

(6) **At start-up or new Mix Design**: 2 tests per day for a minimum of 2 days, then 1/day if FAA is met. If FAA > 5% of requirement, 1 sample/ day but test 1/week.

(7) Random number generation and determination of random sample location shall be consistent with Section 5 of ASTM D3665. The Engineer may approve alternate methods of random number generation.

(8) **During Asphalt Mixture Production (Field Verification):** Shall be from a certified supplier. Obtain asphalt binder samples from a sampling valve located between the pump and the drum. Contractor personnel shall obtain samples, under the observation of a department representative, by random selection from shipments of material at the project site. The samples shall be taken from the first load and subsequently 1 per 1000 tons of liquid asphalt binder for each supplier and grade of asphalt binder per contract. For contracts with less than approximately 25 tons (one truck transport) of asphalt binder, sampling may be waived. A minimum of 1 gallon of binder must be drawn and wasted from the sampling valve before the actual sample is drawn. Sample shall be sent in for verification testing.

(9) **During Mixture Production (Field Verification):** Shall be from a certified supplier. The Contractor shall sample first shipment, then submit 1 per 50,000 gallons. Sample emulsified asphalt in clean ½ gallon plastic container with wide screw top and send to MnDOT Chemical Lab within 7 days of sampling. Sample all emulsified asphalt from the distributor. Sample shall be sent in for verification testing. No Samples required unless directed by the Engineer.

(10) Conduct random belt samples and test for aggregate quality as directed by the Engineer.

Bituminous Specialty Items

Type of Test	Spec	Contractor/Producer – QC Testing Rates	Agency- QA Testing Rates
Gradation PASSRC & PASB	2363 3139.3	1 per 1,000 Ton with a minimum 1 per day.	1 per day. 35 lbs.
Micro-Surfacing	2354 3139.5	Stockpile: 1/1,500 Tons (min 1/day) Machine Hopper: 1/500 Ton (min 1/day)	Machine Hopper: 1/day, 30 lbs.
Seal Coat, Underseal & Otta Seal	2356 3137.2B	Stockpile: 1/1,500 Tons (min 1/day) Chip Spreader Hopper: 1/day	1/day from Hopper. 30 lbs.
% Crushing – CAA PASSRC & PASB	2363 3139.3	1 per 1,000 Ton with a minimum 1 per day.	1 per day from gradation test. 35 lbs.
Moisture / Aggregate Micro-Surfacing	2354 3139.5	Machine Hopper: 1/500 Tons (min 3/day)	1/day 2lbs
Sand Equivalence Micro-Surfacing	2354	1/day	Test at Engineer discretion, 25 lbs.
Flakiness Index Bituminous Seal Coat & Bituminous Underseal	2356	Sample taken from first load on first day, submit to Agency: 30 lbs.	Agency will test at their discretion, see Lab Manual 1223
Bituminous Mixture UTBWC	2353 3151.2G	1/500 Tons, min 1/day. %AC, Gradation, Max SpG, Adj.AFT	1/day, 20 lbs. 1 cylinder from truck box.
PASSRC & PASB	3151 2363	Asphalt spot check: min 1/day	-
Stone Matrix Asphalt – SMA Lab Manual 1203, 1204, 1205, 1211, 1214, 1806, 1807, 1808, 1813, 1853, 1854, 1855, AI SP-2 AASHTO T305	2365	**Tests**, %AC,gradation, Gmm, Gmb, Voids, VMA, CAA, Draindown, VCA, fines/effective asphalt. Rate, (1/1000 tons, min.1/day) Agg SpG, mix moisture, TSR to be tested as directed by Engineer. Submit companion 1 per day to agency: 3 full 6" by 12" cylinders	Tests: %AC, Gradation, Gmm, Gmb, Voids, VMA, CAA, VCA, fines/effective asphalt. Agency is not required to do drain down. Copy MDR to Project Engineer and Grading & Base Engineer.
Asphalt Binder Tests		**Asphalt Emulsion List**	**Asphalt Binder List**
UTBWC	2353 3151	**Asphalt Binder:** Sample first load, then 1/250,000 gallons. Sample size of 1 quart metal container. **Emulsified Asphalt:** Sample first load, then 1/50,000 gallons. Sample size of ½ gallon wide screw top plastic container.	
Micro-Surfacing	2354		
Seal Coat, Underseal & Otta Seal	2356		
Tack Coat	2357		
PASSRC & PASB	3151		
Asphalt Binder Rate Micro-Surfacing	2354	Verify Application Rate 3/day	Verify Application Rate 1/day
Fog Seal	2355	Verify Application Rate 1/day	Verify Application Rate 1/day
Seal Coat, Underseal & Otta Seal	2356		
Bit Tack Coat	2357		

Specification 2215 – Cold Inplace Recycling (CIR), Stabilized Full Depth Reclamation (SFDR) and Cold Central Plant Recycling Bituminous (CCPR)

Test Type	Contractor/Producer QC Testing Rates	Agency QA Testing Rates	Grading & Base Manual/Form
Gradation SFDR (Simple) Pre-ground un-stabilized material	1 per mile – report sieves 2" & 3"	Run gradation at the discretion of the Engineer	.215 / 101 report sieve 2" & 3"
Gradation (Entire) (Material to be stabilized)	One per day, give split sample to the Engineer	Run gradation at the discretion of the Engineer	.215 / 101 report sieve 2", 1.5", 1.25", 1", ¾", 3/8",#4, #10, #30.
Gradation (Simple) (Material to be stabilized)	1 per mile for SFDR & CIR. 1 per 2,000 ton for CCPR.	Run gradation at the discretion of the Engineer	.215 & .293 / 101 report sieve 2" & 1.5" for SFDR, 1.5" and 1.25" for CIR
CIR & SFDR Depth Check – Unstabilized and Stabilized	None	1 per day	.284 / 401
SFDR & CCPR Moisture – before injecting with bituminous.	1 per mile of anticipated daily production and after rain. 1 per mile for SFDR after mechanical drying.	Run moisture at the discretion of the Engineer	.245 Speedy tester not allowed.
Penetration Index (DCP) – SFDR only Unstabilized.	2 per mile	1 per mile	.255 / 205
Calibrate: mineral stabilizing agent application rate.	Once using design rate per vane feeder.	Observe contractor calibration	.286 or .287
Moisture: before injecting liquid bituminous material	1 per mile of daily anticipated SFDR & one after rain or mechanical drying out (disking, etc.).	none	.281 / 105
Yield: Mineral Stabilizing Agent and/or Liquid Bituminous Material	1 per transport load each type	1 per day each type	.286 & .287 / 402 & 403
Compaction: Nuclear density for SFDR stabilized and CIR	10 per lane mile, (**see note below**).	Observe the Contractor.	.282
Control Strip: SFDR Stabilized and CIR	Minimum of once per project	Observe the Contractor.	
Bituminous Material Samples		. 1 per 50,000 gallons; sample first load	1 quart each sample
Mineral Stabilizing Agent Samples	None	1 sample	none
Foaming asphalt checks expansion ratio & half life	1 per load	Observe the Contractor.	.285
Moisture (stabilized) – before placement of next layer during curing.	2 per day until moisture stabilizes & placement of HMA.	None	Grading & Base Manual

Note: The Engineer may require a Contractor to perform additional nuclear density tests in areas that the Engineer believes are failing density requirements.

Grading and Base Construction Items (1 of 4)

	Material Type	Spec.	Contractor / Producer QC Testing Rates	Minimum Required Agency QA Testing Rates	Verification Testing Sample
Gradation Testing (2) (3)	Aggregate Surfacing	3138	1 / 1,000 CY (CV) stockpile gradation only required for material on hand.	> 250 yd^3 (CV) or 500 Tons and < 2000 yd^3 (CV) or 4000 tons. Material is a minimum of one lot **(5)**. Test two random samples from each lot and average. > 2000 yd^3 (CV) or 4000 Tons. Divide into lots with lot size **(5)** no greater than 2000 yd^3 (CV) or 4000 Tons. Test two random samples from each lot and average.	1/source 30 lb.
	Aggregate Base	3138			
	Shoulder Base Aggregate	3138			
	Drainable Aggregate Base (OGAB & DSB)	3136			
	Granular and Select Granular Material (borrow/embankment)	3149.2B	1/10,000 CY (CV) only required for material on hand.	1/40,000 yd^3 (CV)	1/source 30 lb.
	Stabilizing Aggregate	3149.2C			
	Reclamation FDR	3135.2B	None	Test at Engineer's discretion. Inspect for oversize chunks (+3"), after the motor grader has overturned the material	None
	Granular Filter	3601.2B	1/source – before delivery on the project. Only required for materials on hand. Spec 1906.2	1/ source	1/source 30 lb.
	Backfill Materials	3149.2D			
	Granular Bedding	3149.2F			
	Aggregate Bedding	3149.2G			
	Coarse Filter Agg.	3149.2H			
	Filter Aggregate	3149.2J			
	Sand Cover	3149.2K			
Proctor	Non-Granular Material Used to determine optimum moisture & maximum density.	2106 3149	None	1 per major soil, subgrade prep specified density requires 100% of proctor density.	1 sample 25 lb.
Sand Cone, Nuclear Density or LWD / Specified Density *	Non-Granular Material For non-granular material, i.e., material that does not meet 3149.2B.1		**AGENCY TESTING**: **Roadway Embankment**: One test per 4,000 yd3 (CV) or if test rolled, One test per 10,000 yd3 (CV) **Transverse culverts & abutments:** 1 test per every 2 feet of fill. **Structures and Longitudinal Trenches:** One test per 300 feet of each structure per 2 feet per fill. **Sidewalks and Trails**: 1 per 500 feet. **Subgrade Preparation:** One per 25 road stations.		

Grading and Base Construction Items (2 of 4)

	Material Type	Spec.	Contractor / Producer QC Testing Rates	Minimum Required Agency QA Testing Rates	Verification Testing Sample
Penetration Index Method (DCP) or LWD *	Aggregate Base	3138 2211.3C	None	1 DCP tests per 500 yd^3 (CV) or 1 per 1000 Tons. If test rolled, 1 test / 1,500 yd3 (CV) or 3000 Tons.	None
	Shoulder Base Aggregate				
	Reclamation FDR	3135.2B 2215.2C		1 DCP test per 3,000 yd^2. If test rolled, 1 test / 10,000 yd^2	
	Walks & Trails	2521		1 per 500 feet of Sidewalk or Trail	
	Granular Materials Subgrade Preparation (for materials meeting 3149.2B1)	3149.2B	**AGENCY TESTING:** **Roadway Embankment:** One test per 2,000 yd3 (CV) or if test rolled, One test per 6,000 yd3 (CV) **Transverse culverts & abutments:** 1 test per every 2 feet of fill. **Structures and Longitudinal Trenches:** One test per 300 feet of each structure per 2 feet per fill. **Sidewalks and Trails**: 1 per 500 feet. **Subgrade Preparation:** One per 25 road stations.		
Moisture Content Test During All Compaction Methods (4)	Aggregate Base, Shoulder, Surfacing & Walks	3138	None	**For 2118, 2211,2221, and 2521:** 1 / 1,000 yd3 up to 10 Maximum **For 2451:** 1 per structure, for multiple adjacent structures, may test once, use judgement **For Quality Compaction:** Test as directed by Engineer.	None
	Drainable Aggregate Base (OGAB & DSB)				
	Reclamation FDR	3135.2B	None	1 / 20,000 yd^2	
	All Embankment Materials	2106 3149	None	1/10,000 yd3 up to 10 Maximum **For Quality Compaction:** Test as directed by Engineer.	
	Subgrade Preparation	2106 3149		1 per 25 road stations **For Quality Compaction:** Test as directed by Engineer.	
Percent Crushing	Particle Count **(1)**	1906.2	1 required for Material on hand	1/source unless directed by Engineer, (required for 3138.2B & C, 3149.2C & G1, 3136.2B).	1 / source
Quality	Aggregate Quality Tests	3138 3149 3601	1 required for material on hand, Spec 1906.2	1/ source unless directed by Engineer	1 / source 30lb
Depth Check	Reclamation FDR	3135.2B	1/Mile.	1 per day unless directed by Engineer	

Material Type		Spec.	Contractor / Producer QC Testing Rates	Minimum Required Agency QA Testing Rates	Verification Testing Sample
Test Rolling	Test Rolling (as directed in the special provisions)	2111	As directed by the Engineer the contractor will perform test rolling at the top of all • Subgrade • Base layers (2211) • Non-Stabilized FDR (2215) • Granular layers not meeting the requirements of 3149.2B2 (2106) • Minimum 12' width and 300' length. Agency to observe test rolling.		

Verification Testing Samples are companion split samples to the QA sample:

- Companion gradation, proctor, QA crushing, aggregate quality samples not required 1,000 tons or less.
- Include the laboratory companion with the first field sample.
- Include the field sample results with the laboratory sample.
- Laboratories with AMRL Accreditation are not required to submit laboratory companion samples.
- Carbonate aggregate materials require 50 lb. samples for the laboratory testing.

NOTES:

(1) Percent crushing test is not required when the material is crushed from a quarry or contains 25% or greater recycled materials.

(2) Submit a laboratory companion to the first Acceptance Gradation sample for a bituminous extraction, see 3138.2C. Full Depth Reclamation samples are not required.

(3) The Certification of Aggregates and Granular Materials procedure and documentation of testing locations is at the discretion of the Engineer.

(4) For quality compaction per spec 2106.3G.2, test at Engineer's discretion.

(5) Lot sizes may be adjusted by the Engineer. This may be good practice if parts of the project are taking place in separate areas or at separate times, such as many turn lane or excavation areas or separate project stages.

* Review the Special Provisions. The Grading and Base Manual allows the nuclear density gauge, see pages 60 and 65.

NOTES:

Conversions: 1 ton = 0.55 yd3 (CV), 1 ton = 0.7 yd3 (LV), 1 yd3 (CV) = 1.8 tons.

Contact the MnDOT District IA Inspector to provide servicing of your Federal Aid Project.

Less than 500 tons (250 CY) may be accepted by the Engineer without testing.

Grading and Base Construction Items (4 of 4)

Guidelines for Required Crushing & Aggregate Quality Tests

	3149 Granular Materials	**3138** Aggregate for Surface and Base	**3136** Drainable Bases
Crushing	Yes, for Stabilizing Aggregate, Fine Aggregate Bedding and Medium Filter Aggregate. Test waived if material contains recycled at twice the minimum crushing requirement. Not required for quarried sources.	**Yes**, for Class 5, 5Q & 6. Test waived if material contains recycled at twice the minimum crushing requirement. Not required for quarried sources. Class 2 must contain 100% crushed quarry rock.	**Yes.** Not required for quarried sources.
Bitumen Content	**At the discretion of the Engineer**	**At the discretion of the Engineer**	Not applicable
LAR	Not applicable	**Yes**, if source is carbonate quarry and does not contain bitumen.	**Yes**
Insoluble Residue	**Yes**, if source is carbonate quarry and does not contain bitumen.	**Yes**, if source is carbonate quarry and does not contain bitumen.	**Yes**, if source is carbonate quarry.
Litho Exam & Shale Float Test	**Yes**, for Medium Filter Aggregate	**Yes**, for Class 3, 4, 5, 5Q & 6, when not from quarried rock, and does not contain bitumen.	**Yes**, when not from a quarried source.

Testing procedures in the Grading & Base Manual.

Forms and worksheets at the Grading & Base website.

Gradation worksheets at the SALT Construction website.

****MAKE SURE TO FILL OUT THE REQUIRED PRELIMINARY AND FINAL GRADING AND BASE REPORTS AND SUBMIT TO PROJECT ENGINEER.****

http://www.dot.state.mn.us/materials/gradingandbasedocs/Forms/form001_08_043019.xlsx

Certified Ready-Mix Concrete (1 of 3)

The Prime Contractor is responsible to assure that all ready-mix concrete used is produced by an annually Certified Ready-Mix plant as detailed in Specification 2461.3F.

Material Spec.	Concrete Plant Production Testing Rates *	Test Type (Concrete Manual)	Contractor / Producer QC Testing Rates				Form
bridge 2406.2 2411.2 2461.2 2461.3 general 2301** 2452.2 2461.2 2461.3 2506.2 2511.2 2514.2 2520.2 2521.2 2531.2 2533.2 2545.2 2554.2 2557.2 2564.2 2565.2		Gradation (5-694.145) (5-694.148) 3126, 3131, 3137	**For all JMF's & Bridge Deck Mix Designs** **Daily Concrete Quantity**: 1 per fraction per source per day between **20 – 400 yd³**. If over 400 yd3 per day, take a second gradation after the **DAILY** total exceeds 400 yd3. **Bridge Deck Concrete** must have passing gradations prior to mixing.				Concrete Agg. Work sheet, Agg. Grad. Control Charts, R-M Plant QC workbook. R-M Plant QA Workbook
			For all other mix designs, **Weekly Concrete Quantity**: 1 per fraction per source per week between **20 – 400 yd³**. If over 400 yd3 produced per week, take a second gradation after the **WEEKLY** total exceeds 400yd3.				
			Department Plant Monitor Testing Rates: Verification only **Verification Sample**: When weekly concrete quantity is ≥ 20 yd³: 1 per fraction per source per week, split and tested by both Agency and Contractor				
		Moisture Content (5-694.142)	**QC rates:**	1 every 4 hours When Daily Concrete Quantity ≥ 20 yd³	**QA rates:**	None	
		Test Type	**Agency QA Testing Rates (1)**				
		Aggregate Quality (5-694.146)	Minimum of 1 per each fraction - use of MnDOT test results for the same 30-day time period is acceptable. For all bridge deck concrete poured during the month: Test monthly quality to 3137.2D2 for each coarse aggregate fraction. Designate 3137.2D2 on the sample card. Gradation results will be included with the monthly quality tests.				
		Coarse Aggregate (% Passing 200) (5-694.146)					
		Minimum Aggregate Sample Size All Aggregate Gradation and Quality samples require companions, double sample size					2410 Sample ID Card
		Aggregate Size	Gradation	Quality	Moisture	% -200 Course.Agg.	
		3/4" Plus, #4	30 lb.	50 lb.	2000 g	5000 g	
		3/4" Minus, #67	10 lb.	30 lb.	2000 g	2500 g	
		#7, CA-70	6 lb.	20 lb.	2000 g	2500 g	
		CIA to meet #67	6 lb.	20 lb.	500 g	500 g	
		CIA to meet JMF, FIA, CS, FS	500 g	20 lb.	500 g	500 g	
		CA-80, #89	1.1 lb. (500 g)	20 lb.	500 g	500 g	
		Fine Aggregate	1.1 lb. (500 g)	20 lb.	500 g	-	

Certified Ready-Mix Concrete (2 of 3)

Spec.		Test Type	Agency QA Testing Rates (1)	Form
bridge 2406.2 2411.2 2461.2 2461.3 general 2301** 2452.2 2461.2 2461.3 2506.2 2511.2 2514.2 2520.2 2521.2 2531.2 2533.2 2545.2 2554.2 2557.2 2564.2 2565.2	**Concrete Field-Testing Rates**	<u>Sampling Locations for Air, Slump (when required), Temperature and Cylinder Testing</u> First load each day per mix - Take sample after discharging approximately 1/4 yd3, stop further discharge until both slump and air content test are completed. The first load of concrete <u>must have passing air content and slump prior to placement.</u> Cast strength specimens from the same load as the air content and slump test. Test whenever adjustments are made to the mix. Take all tests at the point of placement. Subsequent tests - Sample from the middle portion of the load.		
		Air Content - Type 3 Concrete (5-694.541)	1 test per 100 yd3. Test first load each day per mix. Test when adjustments are made to the mix.	
		Slump (5-694.531)	Test first load each day per mix, then as necessary to verify passing slump. For Bridge Concrete: 1 test per 100 yd3. No testing required for slip form placement.	
		Air and Concrete Temperature (5-694.550)	Record temperature each time air content, slump or compressive strength specimen is performed/fabricated.	
		Compressive Strength (5-694.511) Standard cylinder size is 4 x 8, use 6 x 12 with aggregate greater than 1 1/4". Review 2461.3G.5 Test Methods and Specimens.	<u>General Concrete Grades F, G, M, P, and R:</u> 1 set of 3 cylinders per 300 yd3 per mix per day.	**2409** Concrete Cylinder ID Card
			<u>Bridge Concrete Grades B, S, and Y</u>: 1 set of 3 cylinders per 100 yd3, then 1 set of 3 cylinders per 300 yd3 per mix per day	
			Agency will break 1 set of 3 cylinders at 28 days. Agency will cast up to 3 control cylinders, any additional control cylinders are the responsibility of the Contractor.	
			Cellular Concrete: 1 set of 4 cylinders (28 days) per day, fill in 2 equal lifts, *<u>do not rod</u>*, lightly tap the sides, cover and move to area with no vibration. Do not disturb for 24 hours.	

NOTES:

(1) Review the requirements of 2461.3F Certified Ready-Mix Concrete, 2461.3G Concrete Placement and 5-694.010 Inspector's Checklist in the Concrete Manual.

***Small Quantity Requirements** are for less than 20 yd3 per day, Plant Monitoring is not required but **<u>Concrete Field Testing is required</u>**.

****Concrete Pavement:** Use Certified Ready-Mix Concrete testing rates when: a) The entire concrete paving project is less than 3,500 cu. yd. b) When a secondary plant is used to provide minor work.

Certified Ready-Mix Concrete (3 of 3)

The Prime Contractor is responsible to assure that all ready-mix concrete used is produced by an annually Certified Ready-Mix plant as detailed in Specification 2461.3F.

Guidelines

- The testing rates shown in this Schedule of Materials Control are minimums. Take as many tests as necessary to ensure quality concrete. Should circumstances arise on a project which makes the testing rate impractical, contact the Concrete Engineering Unit.
- All samples shall be taken in a random manner using an appropriate number generator.
- The first load of concrete for any pour must have passing air content and slump results, prior to placing.
- If batching or field adjustments are made, test the adjusted load for air content and if suspect, slump, before it gets into the work. The Engineer will determine if additional testing is required after each water adjustment made during slip form placement. Continue to test for air content and slump, if suspect, when test results are inconsistent or marginal.
- If any field test fails, reject the concrete or if the Producer adjusts the load to meet requirements, record the adjustments on the Certificate of Compliance. Retest the air content of the load, slump if required, and record the adjusted test results. Test the next load for air content and slump, if required, before it gets into the work.
- Material not meeting requirements shall not knowingly be placed in the work. If failing concrete inadvertently gets placed in the work, review either the MnDOT Standard Specifications for Construction or contact the Concrete Engineering Unit for monetary deduction recommendations.

Best practices

- It is recommended that the Agency Plant Monitor be present during critical pours, such as superstructure or paving concrete (i.e., 3A21, S mixes, JMF mixes).
- It is recommended that the Agency representative continually monitor the progress of all concrete pours in the field and review Certificate of Compliances. It is not a recommended practice to only perform minimum testing requirements and leave the pour.
- It is recommended to make standard strength cylinders after the first load of concrete unless that is the only load of concrete for that mix that day.
- The Agency is responsible for verification sampling. For safety and consistency in sampling and splitting of the sample, it is recommended that the agency and the producer/contractor obtain the verification sample in tandem. This will allow the producer/contractor to witness the sampling process and take possession of the verification companion.

Concrete Plant and Field Materials

All materials must come from certified or qualified sources. All certified sources must state so on the delivery invoices. The most current list of certified/approved sources can be found at MnDOT Material website. Materials listed on the Approved/Certified Products List are not required to be sampled but need to be listed on the Material Acceptance Summary detailed in the SALT SMC. Samples can be submitted as directed by the Engineer.

	Material	Spec. No.	Agency QA Field Sampling Rate	Form No.
Concrete Plant Batching Materials	Portland Cement	3101	Shall be a Certified Supplier - For certified ready-mix and concrete paving sample rates: 1 sample when the plant is certified. Take additional samples f the plant changes sources or as the contract requires. The producer obtains a 5 lb. sample and stores the sample in a sealed container provided by the Agency and includes the supplier's delivery invoice from which the sample is obtained.	24300 ID Card Cement Samples
	Slag	3102		
	Blended Cement	3103		
	Fly Ash	3115		24308 Fly Ash
	Admixtures (Acceleration, Retarding, Water-Reducing, Air-Entraining, etc.)	3113	For all concrete: 1 sample of Air Entrainment and Type A Water Reducer in a 1/2-pint plastic container provided by the Agency when the plant is certified. Take additional samples if the plant changes sources or as the contract requires. The Producer should agitate the admixture tank prior to obtaining samples form dispensing tubes and store the samples in sealed plastic containers provided by the Agency.	2410 Sample ID Card
	Water	3906	1 Non-Potable Water sample in a 1-gallon clean glass or plastic container from a questionable source. Clarified Water: 1 per month during Department production	
Concrete Field Materials	Preformed Joint Filler	3702	Visual Inspection	2410 Sample ID Card
	Preformed Elastomeric Type	3721	1 per lot. Only materials from a qualified source. Link to Approved Products List.	
	Silicone Joint Sealer	3722		
	Hot Poured Elastomeric Type	3723 3725		
	Burlap	3751	Visual Inspection	
	Colored Concrete Membrane Curing Compound	3752	Visual Inspection - Use only from qualified source.	
	Membrane Curing Compound	3753 3754 3755	Visual Inspection - Use only pre-approved curing compounds.	
	Plastic	3756	Visual Inspection - Must be white opaque and free from holes.	
	Refer to the "Metals" schedule for sampling requirements for concrete reinforcement.			

Concrete Pavement – Agency (1 of 2)

Test Type (concrete manual)	**Spec.**	**Concrete Paving Batch Plant Agency QA Testing**	**Certified Ready-Mix Plant Agency QA Testing**	**Form**
Gradation (1) (5-694.145) (5-694.148)	3126 3131 3137	Daily Concrete Quantity ≥ 500 **Agency QA Testing Rates: Verification only** **Verification Sample**: -, *1 per fraction per source per day, split and tested by both Agency and Contractor	Daily Concrete Quantity ≥ 100 yd3 **Agency QA Testing Rates: Verification only** **Verification Sample**: -, *1 per fraction per source per week, split and tested by both Agency and Contractor	JMF Concrete Aggregate Workbook
Aggregate Moisture - QC Verification **(2)** (5-694.142)	2301	If w/c incentives apply: 1 per 1000 yd3 or every 4 hours, whichever is greater. Take initial sample within the first 250 yd3.	If w/c incentives apply: 1 per 200 yd^3 or every 4 hours, whichever is greater. Take initial sample within the first 100 yd^3.	Concrete W/C Ratio Work sheet
Water Content, Microwave Oven Verification **(3)** (5-694.532)	2301	Take initial sample within the first 250 yd^3. At least one additional verification test should be taken if more than 1000 yd^3 is produced in a day.	Take initial sample within the first 100 yd^3. At least one additional verification test should be taken if more than 400 yd^3 is produced in a day.	
Coarse Aggregate, -200 sieve (5-694.146)	3131 3137	Test Verification sample on the first day of production and each time the Contractor mobilizes the plant, changes the aggregate sources, or the cleanliness of the coarse aggregate is in question, then 1 per week randomly thereafter. -200 test may be performed at the lab instead at the plant at the discretion of the Engineer.		JMF Concrete Aggregate Workbook
Coarse and Fine Aggregate Quality **(4)**	3126 3131 3137	During concrete production: 1 randomly selected test each fraction every 20,000 yd^3 of production. Split the Quality sample 4 ways: 1) Provide 2 quarters of the sample to the producer/contractor. 2) Submit the remaining sample to the lab for quality testing including testing the -200 sieve on the coarse aggregate.		2410 Sample ID Card
Alkali Silica Reactivity (ASR) Testing	2301	1 per paving project per sand source. Provide one 5 lb. sample of: cement, supplementary cementitious material (fly ash or slag), and sand. Write "Project Specific ASR Testing" on all 3 sample cards. **ASR Testing is not required if the entire project is less than 3,500 cubic yards.**		2410 24300 24308
Coarse Aggregate Quality Testing of Incentive / Disincentive	3137	**If coarse aggregate quality incentives apply:** Test the Class B aggregates for % absorption and Class C aggregates for % carbonate including any other test necessary to make those determinations. Sample the 2 largest fractions in accordance with the following table and 2301:		Coarse Agg Quality Incentive / Disincentive Work sheet 2410 Sample ID Card
		Coarse Aggregate Quality Incentive/Disincentive Sampling Rates		
		Plan Concrete Cubic Yards	Samples per fraction	
		3,500 - 7,500	3	
		7,501 - 10,000	5	
		10,001 - 25,000	10	
		25,001 - 50,000	15	
		50,001 +	20	

*Use Certified Ready-Mix Concrete testing rates when: a) The entire concrete paving project is less than 3,500 cu. yd. b) When a secondary plant is used to provide minor work.

Concrete Pavement – Agency (2 of 2)

Test Type	Spec.	Concrete Field Testing - Agency QA Testing	Form
Air Content before consolidation	Review Concrete Manual Website	1 correlation air test per day	
Concrete Temperature		Record temperature each time air content, slump or strength test specimen is performed/fabricated by the Agency.	
Flexural Strength		Supply beam boxes or cylinder molds. Cure and test beams and cylinders MnDOT standard beam box size is 6" x 6" x 20" unless others are approved by the Concrete Engineer.	2162 Test Beam Data
Opening to Traffic Strength		Supply beam boxes or cylinder molds for field control testing. Cure and test beams and cylinders.	
Concrete Pavement Texture		Determine texture testing locations using random numbers. Observe Contractor Testing when possible.	Probing, Coring, Texture and MIT-Scan T2 Report
Thickness		**Determine probing and coring locations using random numbers. Initial pavement at core locations and re-initial the sides of specimens after coring to clearly verify their authenticity.** Field measure cores to the nearest 1/8". Transport to the MnDOT Office of Materials and Road Research for final thickness determination	
Surface Smoothness/ Dowel and Tie Bar Steel Location		Observe Contractor Testing when possible	

NOTES:

(1) All gradation samples shall be taken in the presence of the Agency, unless otherwise authorized by the Engineer. All samples shall be taken off the belt leading to the weigh hopper unless otherwise approved by the Engineer. **All gradations and quality tests require companion samples.** If Coarse Aggregate Quality Incentive / Disincentives apply: The Agency may also use the QA samples for incentive / disincentive testing. Notify the Contractor/Producer to double the QC/QA sample size. If well-graded aggregate incentives apply: Use the Contractor's gradation results for well-graded aggregate incentive calculations as verified by Agency testing. Use the Well-graded Concrete Agg. Worksheet.

(2) If w/c incentives apply: Use aggregate moisture results for determining the water content to calculate the w/c incentive/disincentive. Use the Concrete W/C Ratio Calculation Worksheet and do not leave sample unattended. Microwave oven verification testing to verify the w/c ratio is completed in conjunction with Agency aggregate moisture testing. Do not leave samples unattended.

(3) If w/c incentives apply: Microwave oven verification testing to verify the w/c ratio is completed in conjunction with Agency aggregate moisture testing. Do not leave samples unattended.

(4) Prior to concrete production: Obtain pre-production samples for quality testing at least 16 hours prior to concrete production. Samples may be taken from the stockpile and -200 test may be performed at the lab instead at the plant at the discretion of the Engineer. If the entire project is <3,500 yd3, pre-production sampling is not required.

Minimum Aggregate Sample Size
*companion required, double sample

Aggregate Size	Gradation*	Quality*	Moisture	% -200 C.Agg
3/4" Plus, #4	30 lb.	50 lb.	2000 g	5000 g
3/4" Minus, #67	10 lb.	30 lb.	2000 g	2500 g
#7, CA-70	6 lb.	20 lb.	2000 g	2500 g
CIA to meet #67	6 lb.	20 lb.	500 g	500 g
CIA to meet JMF	500 g	20 lb.	500 g	500 g
FIA, CS, FS	500 g	20 lb.	500 g	-
CA-80, #89	500 g	20 lb.	500 g	500 g
Fine Aggregate	500 g	20 lb.	500 g	-

Concrete Pavement – Producer/Contractor (1 of 2)

Test Type (concrete manual)	**Spec.**	**Concrete Paving Batch Plant Contractor/Producer QC Testing**	**Certified Ready-Mix Plant Contractor/Producer QC Testing**
Gradation **(1)** (5-694.145) (5-694.148)	3126 3131 3137	When > 250 yd^3 produced/ day: 1 per 2500 yd^3 per fraction per source. Take initial samples for aggregate gradation testing within the first 500 yd3. Test the verification companion sample on the day the sample was taken.	When 20-400yd^3 produced/ day: 1 per fraction per source. If over 400 yd3 per day, take a second gradation after the total exceeds 400 yd3. Test the verification companion sample on the day the sample was taken.
Coarse Aggregate -200 sieve (5-694.146)	3131 3137	Test the verification companion sample. Test these samples at the plant.	
Aggregate Moisture QC Verification **(2)** (5-694.142)	2301	If w/c incentives do not apply: 1 per 1000 yd^3, or 1 completed every 4 hours, whichever is the higher sampling rate.	If w/c incentives do not apply: 1 completed every 4 hours.
Water Content, Microwave Oven Verification	Review Concrete Manual 2301	If w/c incentives apply: Obtain the plastic concrete sample at the plant. See Concrete Manual (5-694.532)	
Unit Weight QC		Test one load of concrete per day at the plant. See Concrete Manual (5-694.542)	
Air Content QC (5-694.541)		Test the first load of concrete at the plant	
Coarse Aggregate Quality	3126 3131 3137	Test at Producer/Contractor Discretion	
Unit Weight		Test 1 load of concrete per day at the plant.	
Air Content for Type 3 Concrete (QC)		Test the first load of concrete at the plant.	
Coarse Aggregate Quality Testing for Incentive / Disincentive	3137	Test at the Contractor's discretion.	

* Use Certified Ready-Mix Concrete testing rates when: a) The entire concrete paving project is less than 3,500 cu. yd. b) When a secondary plant is used to provide minor work.

Concrete Pavement – Producer/Contractor (2 of 2)

NOTES:

(1) Performing testing on representative material at the end of the most recent day of production is allowed. If well-graded aggregate incentives apply: Use the Contractor's gradation results for well-graded aggregate incentive calculations as verified by Agency testing. Washing the fine aggregate gradation (QC) sample is not required when the result on the -#200 sieve of the unwashed sample is less than 1.0%. Wash all fine aggregate Verification Companion samples.

(2) Complete the initial moisture content and adjust the batch water prior to the start of concrete production each day. If weather conditions allow, performing moisture testing on representative material at the end of production the prior evening is allowed. Enter results into the batching system in real time.

Test Type	Spec.	Concrete Field Testing - Contractor QC Testing
Air Content before consolidation for Type 3 concrete	Review Concrete Manual Website	1 per 300 yd^3 or 1 per hour, whichever is less. Test first load each day per mix.
Slump		Test slump if concrete is suspected to be outside of required slump range as directed by the Engineer.
Concrete Temperature		Record temperature each time air content, slump or strength test specimen is performed/fabricated by the Contractor.
Flexural Strength		For information only: 1 beam (28-day) per week per mix. 1 cylinder (28-day) per week per mix may be substituted at the discretion of the Engineer. Provide moist curing environments, fabricate beams or cylinders, deliver to curing site, and clean beam boxes
Opening to Traffic		For opening to traffic: Make field control beams within the last hour of concrete poured each day. Substitute field control cylinders for field control beams at the discretion of the Engineer. Maturity testing is allowed in lieu of field control cylinders or beams. Fabricate beams or cylinders, deliver to curing site, and clean beam boxes.
Concrete Pavement Texture		Perform texture testing at locations determined by the Engineer in accordance with the Contract
Thickness		Probe, scan and core at locations determined by the Engineer in accordance with the Contract
Surface Smoothness		Measure smoothness of the final concrete as required by the Contract. Perform all profiling in the presence of the Engineer unless otherwise approved by the Engineer.
Dowel Bar and Tie Bar Steel Location		For Concrete projects greater than 3500 yd3. On the first day and each day of slip form pavement: (1) Verify the adequacy of the dowel bar anchoring by scanning seven random doweled contraction joints in each sublot. (2) Verify the presence and alignment of tie bar steel by scanning 75 lin. Ft. in each sublot. If the Engineer determines the first day's dowel bar anchoring and tie bar placement processes are acceptable, the Engineer may allow a reduction in scanned joints in each sublot as follows: (1) Verify the adequacy of the dowel bar anchoring by scanning four random doweled contraction joints per sublot. (2) Verify the presence and alignment of tie bar steel by scanning 25 lin. ft. out of every sublot.

Concrete Wearing Course for Bridges

Test Type (Concrete Manual)	**Spec.**	**Contractor/Producer QC Testing**	**Agency QA Testing**	**Form**
Gradation, Quality, Coarse Agg -200 QC/Verification (5-694.145) (5-694.146) (5-694.148)	3126 3137	**Prior to production**: The Contractor shall provide the Agency with: Aggregate pit numbers, 1 passing gradation result per fraction per source. Test Agency companion samples are Contractor's discretion. No quality tests are required.	Prior to production and each time aggregate is delivered to site: 1 gradation and quality per fraction prior to concrete production and each time aggregate is delivered to the site. Identify quality samples with a "Q" on the Sample ID Card and the Quality companion sample.	2410 Sample ID Card
Air Content - Type 3 Concrete (Verification) (5-694.541)	2431	None	1 per 15 yd^3, Test at beginning of pour each day.	Weekly Report of Low Slump Concrete
Slump (Verification) (5-694.531)		None	1 per 15 yd^3 Test at beginning of pour each day. For concrete from a concrete mobil, allow mix to hydrate 5 minutes before slump test to assure all cement is saturated.	
Compressive Strength (5-694.511)		None	1 cylinder (28 day) per 30 yd^3, standard cylinder mold size is 4 x 8 inch.	2409 Cyl. ID Card
Cement	3101	None	Each time cement is delivered to site. Obtain a 5 lb. sample. Store sample in a sealed container and include the supplier's delivery invoice from which the sample is obtained.	2430 Sample ID Card
Admixtures	3113	None	Each time new lot/batch admixture is delivered to site: Obtain a ½ pint sample. Store the sample in a sealed plastic container.	2410 Sample ID Card

Test	**Minimum Sample Size** **All gradation and aggregate quality tests require companion samples, double sample size. Samples taken at location identified on Contact Report located at plant.**	
Gradation	6 lb. for # 7, 500 g for CA-80	500 g for Sand
Quality	30 lb. for Coarse Aggregate	20 lb. Fine Aggregate

Concrete Pavement Repair – CPR for 3U18

Test Type	Spec.	Contractor/Producer QC Testing	Agency QA Testing For volumetric batching only.	Forms
Gradation, Quality, Coarse Agg -200	3126 3137	**Prior to production**: The Contractor shall provide the Agency with: Aggregate pit numbers, 1 passing gradation result per fraction per source. No quality test results are required. Test companion samples at Contractor's discretion.	**Gradation:** Prior to concrete production and each time aggregate is delivered to the site. 1 per aggregate fraction prior to production and each time aggregate is delivered to the site. **Quality Testing & Coarse Agg -200:** 1 test per aggregate fraction per source. The Agency may use the gradation results for the Quality Samples as a substitute for 1 required field gradation. Identify quality samples with a "Q" on the Sample ID Card and the Quality companion sample.	2410 Sample ID Card
Air Content - Type 3 Concrete (Verification)	Review Concrete Manual Website	None	1 per 15 yd^3or 1 per 4 hours whichever results in the highest sampling rate. Test at beginning of pour each day.	21412 Weekly Report of Low Slump Concrete
Slump (Verification)		None	1 per 15 yd^3, Test at beginning of pour each day. Allow mix to hydrate 5 minutes before slump test to assure all cement is saturated. Test slump if concrete is suspected to be outside of required slump range.	
Compressive Strength		None	1 set of 3 cylinders (28 day) per 30 yd^3. The Agency will cast up to three (3) field control cylinders, standard cylinder mold size is 4 x 8 inch.	2409 Cyl. ID Card
Type 1 Cement	3101	None	**For Volumetric batching only:** Each time cement is delivered to site. Obtain a 5 lb. sample. Store sample in a sealed container and include the supplier's delivery invoice from which the sample is obtained.	2430 Sample ID Card
Admixtures	3113	None	Each time new lot/batch admixture is delivered to site: Obtain a ½ pint sample. Store the sample in a sealed plastic container.	2430 Sample ID Card

Test	**Minimum Sample Size** **All gradation and aggregate quality tests require companion samples, double sample size. Samples taken at location identified on Contact Report located at plant.**	
Gradation	6 lb. for # 7, 500 g for CA-80	500 g for Sand
Quality	30 lb. for Coarse Aggregate	20 lb. Fine Aggregate

Dowel Bar Retrofit – (DBR)

Test Type	Spec.	Contractor/Producer QC Testing	Agency QA Testing	Form
Gradation Testing (Verification), Quality Testing including, Coarse Agg -200	3137	**Prior to production:** The Contractor shall provide the Agency with: Aggregate pit numbers, 1 passing gradation result per fraction per source. No quality test results are required. Test companion samples are Contractor's discretion.	**Gradation:** Prior to concrete production and each time aggregate is delivered to the site. 1 per aggregate fraction prior to production and each time aggregate is delivered to the site. **Quality Testing & Coarse Agg -200:** 1 test per aggregate fraction per source. The Agency may use the gradation results for the Quality Samples as a substitute for 1 required field gradation. Identify quality samples with a "Q" on the Sample ID Card and the Quality companion sample.	2410 Sample ID Card

Test Type	Spec.	Agency QA Testing	Form
DBR Material Compressive Strength	Review Concrete Manual	**Contractor Testing: Any additional field control cylinders are the responsibility of the Contractor.** **Agency Testing:** 1 set of 3 cylinders (28 day) The Agency will cast up to three (3) field control cylinders, standard cylinder mold size is 4 x 8 inch.	2409 Cylinder ID Card

Test	Minimum Sample Size **All gradation and quality tests require companion samples, double sample size. Samples taken at location identified on Contact Report locates at plant.**	
Gradation	500 g for # 89 & Sand	
Quality	30 lb. Coarse Aggregate	20 lb. Fine Aggregate

Landscaping and Erosion Control Items

Kind of Material	Spec. #	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Manufactured Topsoil Borrow, Salvaged Topsoil (stockpiled)	3877.2	As directed by the Engineer
Plant Stock & Landscape Materials	3861 and 2571.2A1	Materials must be in accordance with the Inspection and Contract Administration Guidelines for MnDOT Landscape Projects of which determines the minimum and maximum criteria thresholds. Certificate of Compliance, Nursery stock certificate registered with MN Dept. of Agriculture. Out of state products subject to pest quarantines must accompanied by documentation certifying all products are free of regulated pests.
Erosion Control Blanket	3885	Visual Inspection and Check approved products or approved vendors list - As directed by the Engineer.
Erosion Control Netting	3885	
Silt Fence	3886	
Erosion Stabilization Mat	3885	
Flotation Silt Curtain	3887	Accepted, based on manufacturers certification of compliance. Check weight of fabric.
Filter Logs	3897	Visual Inspection
Flocculants	3898	Obtain copy of Certificate of Compliance and MSDS
Fertilizer	3881	Obtain copy of invoice of blended material stating analysis.
Agricultural Lime	3879	Contractor must supply amount of ENP (Equivalent Neutralizing Power) for each shipment.
Mulch - Type 3	3882	Certified Weed Free (Certified sources only) Check for Certified Vendor tag from Minnesota Crop Improvement Association (MCIA).
Mulch - Type 6 - Woodchips		All wood chips supplied by a supplier outside the Emerald Ash Borer quarantine area or have an Emerald Ash Borer Compliance Agreement with the MDA
Seeds	3876	(Certified Vendors Only) (Mixes 100-299) Check for Certified Vendor tag from Minnesota Crop Improvement Association (MCIA).
Native Seed		(Mixes 300-399) certified seed only. Check for Certified Vendor tag from Minnesota Crop Improvement Association (MCIA).
Sod	3878	Visual Inspection - Check approved products list - As directed by the Engineer. Check for Certified Vendor tag from Minnesota Crop Improvement Association (MCIA) for salt tolerant sod.
Compost (from Certified Source)	3890	
Compost (from Non-Certified Source)		Visual Inspection - As directed by the Engineer.
Hydraulic Soil Stabilizer	3884	Check Approved/Qualified Products List - As directed by the Engineer.

Chemical Items

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Asphalt Plank	3204	Visual Inspection - As directed by the Engineer.
Calcium Chloride	3911	Review the percentage required as per specification. Check for listing on Qualified Products website.
Magnesium Chloride	3912	
Hot-Pour Crack Sealant (for Crack Sealing/Filling)	3719 3723 3725	Retain Certification of Compliance. Check for listing on Qualified Products website.
Pavement Joint Adhesive	Special Provisions	Retain Certification of Compliance
Waterproofing Materials		
Membrane Waterproofing System	3757	Visual Inspection - Check qualified products list.
Waterproofing Materials - Three Ply System		
Asphalt Primer	3165	Verify supplied material meets ASTM D 41
Waterproofing Asphalt	3166	Verify supplied material meets ASTM D 449
Fabric	3201	Verify supplied material meets ASTM D 41
Paints		
Waterborne Latex - Traffic Paint	3591	Visual Inspection - Check qualified products list - retain Certificate of Compliance.
Epoxy Traffic Paint	3590	
Traffic Marking Paint	Special Provisions	
Non-Traffic Striping Paints	3500 Series	Retain Certification of Compliance
Bridge Structural Steel Paint	3520	Visual Inspection - Check approved products list - retain Certificate of Compliance.
Exterior Masonry Paint	3584	
Noise Wall Stain	Special Provisions	
Drop-on Glass Beads	3592	Visual Inspection - Check qualified products list. Retain Certificate of Compliance.
Pavement Marking Tape	3354	Visual Inspection - Check qualified products list. Retain Certificate of Compliance.
	3355	
	Special Provisions	
Signs and Markers	3352	Visual Inspection - Check qualified products list.

Metals (1 of 2)

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate) *
Guard Rail		
Fittings - Splicers, Bolts, Posts etc.	3381	Visual Inspection - Materials shall be approved before use. Call MnDOT inspector at 218-846-3613 to see if material has been approved.
Structural Plate Beam	3382	
Non-High Tension Guard Rail Cable	3381	
High Tension Guard Rail Cable	Special Provisions	
Steel Posts		
Steel Signposts	3401	Visual Inspection - As directed by the Engineer. Retain Certificate of Compliance in Project file.
Fence Posts, Brace Bars, Rails and others	3403	Visual Inspection - As directed by the Engineer. Retain Certificate of Compliance and certified mill analysis in project file.
	3406	
	3379	
Fence		
Barbed Wire	3376	Visual Inspection Retain Certification of Compliance, As directed by the Engineer.
Woven Wire		
Chain Link Fabric		
Components: cup, cap, nut, bolt, end clamp, tension band, truss rod tightener, hog ring, tie wire, tension stretcher bar, truss rod, clamp & tension wire		
Gates	3379	
Pipe		
Water Pipe and other Piping Materials	3364, 3365, 3366 & Special Provisions	Visual Inspection - As directed by the Engineer.
Reinforcing Steel - Inspected by MnDOT & will be charged back to the Local Agency.		
Uncoated Bars	3301	Retain Certificate of Compliance & Certified Mill Analysis
Epoxy Coated Bars	3301	For Epoxy-Coated bars, steel will be tagged "Inspected" when it has been sampled and tested by Mn/DOT prior to shipment, & it will be tagged "Sampled" when testing has not been completed prior to shipment. If the Epoxy-Coated bars are not tagged "Sampled" or "Inspected", submit samples (1 bar 3ft long for each size for each day's coating production), Certificate of Compliance, & Certified Mill Analysis for testing. Maintain original Cert. of Compliance & Certified Mill Analysis in project file.
Spirals	3305	
Stainless Steel Bars	Special Provisions	Visual Inspection Testing as directed by the Engineer (2 bars 3 ft. long per heat per bar size). Certified Mill Test Reports to be filed.

Metals (2 of 2)

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate) *	
Reinforcing Steel - Inspected by MnDOT & will be charged back to the Local Agency.			
Steel Fabric	3303	2 sq. ft. if epoxy coated.	Visual Inspection - Retain Certificate of Compliance.
Dowel Bars	3302	One dowel bar and basket from each shipment.	
Prestress/Post Tension Strands	3348 Spec Prov	One sample of 2 strands by 6 ft. from each heat/production lot.	
Castings			
Drainage Castings	3321	Visual Inspection - Check approved / qualified list.	
	2471		
Electrical	2565		
Anchor Rods (Cast in Place) and Structural Fasteners	3385 3391	Visual Inspection - Check approved / qualified list. Testing as directed by the Engineer (see notes below)	
Notes: Manufacturer must have one yearly passing test from the Department for each anchor rod or bolt type. Prior to installation, obtain copy of MnDOT passing test report from supplier. Specs 3385.2 A, B, & C require anchor rod markings per ASTM F 1554 S3. The end of each anchor bolt intended to project from the concrete must be die stamped with the grade identification as follows: Grade 36 = AB36, Grade 55 = AB55, Grade 105 = AB105.			
Anchorages (Drilled In)	Special Provisions	Visual Inspection - Check qualified products list.	
Structural Steel	Inspected by MnDOT & will be charged back to the Local Agency.		
Steel Bridge - Beams, Girders, Diaphragms, etc.	2471	Structural Metals Inspection Tag and field inspection for damage/defects, check dimensions for contract compliance. Review approved products list as directed by the Engineer. Note: Structural metals products will be inspected at the plant and will be shipped with a Structural Metals Inspection Tag. An inspection confirmation report will be completed by Structural Metals Inspection staff and sent to the field personnel. Only approved suppliers are allowed to supply Structural Metals products. A list of approved suppliers can be found on the Bridge Office website.	
Concrete Girders-Diaphragms and sole plates			
Expansion Joints			
Steel Bearings			
Railing-Structural tube and ornamental			
Drainage Systems			
Protection Angles			
Overhead Sign structures	2564 2471		
High Mast Lighting Structures	2545 2471		
Monotube Signal Structures	2565 2471		

*Check domestic steel requirement under 1601 Special Provision.

Geosynthetics, Pipe, Tile, Precast/ Prestressed Concrete

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Corrugated Metal Products		
Culvert Pipe Under Drains Erosion Control Structures	3225 thru 3229, 3351, 3399	Make certain pipe is Certified on Invoice, retain certificate of compliance and certified mill analysis in project file.
Structural Plate	3231	
Aluminum Structural Plate	3233	Retain the Certificate of Compliance and mill analysis in project file.
Pipe		
Clay Pipe	3251	Visual Inspection
Reinforced Concrete Pipe and Arches, Precast Cattle Pass Units, Sectional Manhole Units	3236	Field Inspection: Check for damage and defects. Check dimensions and class as required.
Non-Reinforced Concrete Pipe	3253	
Drain Tile (Clay or Concrete)	3276	Visual Inspection - Acceptance as directed by the Engineer.
Thermoplastic (TP) Pipe ABS and PVC	3245	Obtain Certificate of compliance. Check for approved marking printed on pipe. Field Inspect for damage or defects.
Corrugated Polyethylene Pipe	3278	Check for markings (AASHTO M 252) Certificate of Compliance. Field Inspect for damage or defects.
Corrugated Polyethylene Pipe - Dual Wall 12"-48"	3247	Visual Inspection - Check approved products list. Obtain Certificate of Compliance.
Precast/Prestressed Concrete Structures - Inspected by MnDOT & will be charged back to the Local Agency.		
Reinforced Precast Box Culvert	3238	Field Inspection: Check for damage and defects. Check dimensions as required. Check for the "MnDOT" stamp and signature on the certification document.
Precast/Prestressed Concrete Structure (beams, posts, etc.)	2405	
Manholes and Catch Basins	2506 3622	
Sewer Joint Sealing Compound	3724	Visual Inspection - Acceptance as directed by the Engineer.
Preformed Plastic Sealer for Pipe	3726 Type b	Visual Inspection - Acceptance as directed by the Engineer.
Bituminous Mastic Joint Sealer for Pipe	3728	
EPS Geofoam	Special Provisions	Visual Inspection - Acceptance as directed by the Engineer. Check for yellow aged material, uniformity and dimensions.
Geotextile Fabric and Geogrid Reinforcement	3733 and Special Provisions	Obtain Certificate of Compliance stating minimum average roll values (MARV). MARV must meet Project requirements. Fabric must be listed on Geotextile Small Quantity Acceptance List.
Geotextile Small Quantity Acceptance List		
Silt Fence	3886	Visual Inspection - Check approved products list.

Electrical and Signal Equipment Items (1 of 2)

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Lighting Standards (Aluminum or Steel)	3811	Visual Inspection - Obtain Certificate of Compliance. The Fabricator will submit "Certificate of Compliance," on a per project basis, to the Project Engineer.
Hand Holes (Precast, PVC, and LLDPE)	2545 2550 2565	Visual Inspection - Check approved/qualified products list. Traffic signal and street lighting projects require hand holes to be listed on the MnDOT Signals Approved Products List (APL). For cast iron frame and cover: see Metals - Drainage and Electrical Castings
Foundation	2545	Slump as needed, 1 cylinder per 25 cu. yds. Rebar is required in concrete foundations as specified in the Contract documents for all traffic control signals and roadway lighting projects.
Steel Screw In Foundations	2545 2565	See Approved/Qualified Products List for Roadway Lighting and Signals.
Conduit and Fittings		
Metallic	3801 3802	Visual Inspection - Conduit shall be labeled as being listed by a National Recognized Testing Laboratory (NRTL). For traffic signal and street lighting projects, specific requirements are contained in the Special Provisions for each project.
Non-Metallic (Rigid and HDPE)	3803 Special Provisions	
Anchor Rods and Bolts (Cast in Place)	3385	Visual Inspection - Manufacturer must have one yearly passing test from the Department for each anchor rod or bolt type. Prior to installation, obtain copy of Mn/DOT passing test report from supplier. Specs 3385.2 A, B, & C require anchor rod markings per ASTM F 1554 S3. The end of each anchor bolt intended to project from the concrete must be die stamped with the grade identification as follows: Grade 36 = AB36, Grade 55 = AB55, Grade 105 = AB105.
Anchorages (Drilled In)	Special Provision	Visual Inspection - Check qualified products list.
Miscellaneous Hardware	2545 2565	Visual Inspection - Check approved products list. Will carry "Inspected" tag if sampled and tested prior to shipment. No sample necessary if "Inspected". Do not use if not tested. Field sample at sampling rate for laboratory testing. For traffic signal and street light lighting projects, various miscellaneous hardware is required to be listed on the MnDOT Signals and Lighting Approved Products Lists (APL). The Contract documents indicate, which items must be on the Signals and/or Lighting APL.

Electrical and Signal Equipment Items (2 of 2)

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Cable and Conductors		
Power Conductors	3815.2B1	Visual Inspection - Make certain the conductors are the type specified. Submit Field Inspection report showing type and quantities used. Shall be labeled as being listed by a National Recognized Testing Laboratory (NRTL) and type where applicable.
Loop Detector Conductors (No Tubing)	3815.2B2 (a)	
Electrical Cables and Single Conductors with Jacket	3815.2B2(b) 3815.2B3	Visual Inspection - Usually inspected at the distributor. Documentation showing project number, reel number(s), & MnDOT test number(s) will be included with each project shipment. If such documentation is not received from Contractor, submit sample for testing along with material certification from manufacturer. Do not use if not tested. Pre-inspected materials will not be tagged; an inspection report will be sent by the MnDOT inspector for each shipment. Project inspectors should verify that the shipping documents agree with this inspection report. Call Steve Grover at 651-366-5540 or Cindy Schellack at 651-366-5543 with questions. For traffic signal and street lighting projects, the Special Provisions for each project contain electrical cable and conductor specifications.
	3815.2B5	
	3815.2C1 thru .2C8	
	3815.2C14	
	Special Provisions	
Fiber Optic Cables	3815.2C13	Visual Inspection - Check approved products list for Traffic Management Systems.
Ground Rods	2545	Visual Inspection - Check approved products list. Shall be labeled as being listed by a National Recognized Testing Laboratory (NRTL). Detail materials on Materials Acceptance Summary.
	2565	
Luminaires and Lamps	3810	Visual Inspection - Check approved products list. Traffic signal and street lighting projects require luminaries and lamps to be listed on the MnDOT Lighting Approved/Qualified Products List (APL). The conductors shall be labeled as being listed by a National Recognized Testing Laboratory (NRTL) and type, where applicable.
Electrical Systems	2565	Electrical Systems are to be reported as a "System" using the LIGHTING, SIGNAL AND TRAFFIC RECORDER INSPECTION REPORT. To be certified by the Project Engineer.
Traffic Signal Systems	2565	Traffic Signal Systems are to be reported as a "System" using the LIGHTING, SIGNAL AND TRAFFIC RECORDER INSPECTION REPORT. To be certified by the Project Engineer.

Brick, Stone, and Masonry Units

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Brick		
Sewer (clay) and Building	3612 to 3615	Visual Inspection - Acceptance as directed by the Engineer.
Sewer (Concrete)	3616	Visual Inspection - Acceptance as directed by the Engineer. Air entrainment required. Obtain air content statement from supplier.
Concrete Masonry Units		
Sewer Construction	3621	Visual Inspection - Acceptance as directed by the Engineer. Air entrainment required. Obtain air content statement from supplier.
Modular Block Retaining Walls	Review Current Special Provisions	Visual Inspection - Note: All lots of blocks upon delivery shall have Manufacturer or Independent laboratory test results to verify passing both compression and freeze-thaw requirements. * Wall units and cap units are considered separate block types.
Reinforced Concrete Cribbing	3661	Visual Inspection - Acceptance as directed by the Engineer. Will be stamped when inspected prior to shipment.
Stone for Masonry or Rip-Rap	2511, 3601 and Special Provisions	Visual Inspection - Acceptance as directed by the Engineer.

Remarks: each source shall be approved by Project Engineer or supervisor for quality, prior to use. For questions on quality, contact District Materials or Geology Unit.

Miscellaneous Materials

Kind of Material	Spec. No.	Minimum Required Agency QA Acceptance Testing (Field Testing Rate)
Timber, Lumber Piling & Posts	3412 to 3471 & 3491	Visual Inspection - Acceptance as directed by the Engineer. Untreated materials shall be inspected in the field. Treated materials shall be Certified on the Invoice or Shipping Ticket. Material is inspected and stamped by an Independent Agency as per Specification 3491. Contact Laboratory for additional information.
Miscellaneous pieces and Hardware (Galvanized)	3392 3394	Visual Inspection - Acceptance as directed by the Engineer.
Insulation Board	3760	
Elastomeric Bearing Pads - Plain or Laminated	3741 and Special Provisions	Check dimensions. Check repair of tested pad. Obtain copy of Certificate of Compliance. DO NOT USE ANY PADS THAT ARE NOT CERTIFIED.
Cotton Duck Bearing Pads		

Approved/Qualified Products & Resources

Approved/Qualified Products

- Asphalt Products
- Bridge Products
- Concrete Products
- Crack and Joint Material Products
- Drainage
- Erosion Control and Landscaping Products
- Geosynthetic
- Maintenance Shop Supplies
- Paint/Stain/Coating Systems (Non-Pavement)
- Pavement Markings
- Precast Concrete
- Roadside Barriers
- Roadway Lighting Products
- Signals Products
- Signing Products
- Snow and Ice Chemical Products
- Temporary Traffic Control Devices
- Traffic Management Systems/ITS
- Truncated Domes
- Vehicle Safety Lighting
- Walls (Retaining/Noise)

Additional Resources

- SALT Construction webpage
- Bituminous Engineering
    - Asphalt Binder Certified Supplier
    - Asphalt Emulsion Certified Supplier
- Concrete Engineering
    - MnDOT Concrete Manual
    - QC & QA RM Plant Workbooks
    - MnDOT Certified Ready-Mix Program
- Grading & Base Engineering
    - Testing procedures in the Grading & Base Manual
    - Forms and worksheets at the Grading & Base website
    - Gradation worksheets on the SALT Construction website

Contacts

MnDOT Construction and Materials State Aid Contacts

Districts 1, 2, 3, 4

Ross Hendrickson, State Aid Construction Specialist
ross.hendrickson@state.mn.us
218-766-3745

Districts 6, 7, 8

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Metro

Michael Pretel, State Aid Construction Engineer
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MnDOT Specialty Offices Contacts

Grading & Base

Terry Beaudry terry.beaudry@state.mn.us	Grading & Base Engineer	651-366-5456
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Joel Ulring joel.ulring@state.mn.us	Pavement Preservation	651-366-5432
Mike Skurdalsvold	Bituminous Mix Design Specialist	612-499-2998
Ray Betts ray.betts@state.mn.us	Bituminous Trial Mix Lab Tech	651-366-5469
Rich Kane richard.kane@state.mn.us	Bituminous Plant & Lab Testing	612-437-3005

***See website for the contact list by topic**

*Concrete**

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Matt Herbst	Concrete Engineering Specialist	651-283-7127

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Brad Swenson brad.swenson@state.mn.us	Concrete Engineering Specialist	218-232-1012
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Mike Daniels michael.daniels@state.mn.us	Concrete Engineering Specialist	320-293-9421

*See website for the contact list by topic

Contacts for other materials can be found on the Materials and Road Research Contacts webpage.

Contacts for Approved Products can be found at the Approved/Qualified Products Contact webpage.

Materials Lab. Contacts	Independent Assurance
District 1, Duluth Leila DeLuca Phone: 218-725-2738 D1.duluth.lab.dot@state.mn.us	Nadine Miller Phone: 218-725-2737 Cell: 218-348-6297 nadine.miller@state.mn.us
District 2, Bemidji Jason Kissel Phone: 218-755-6542 jason.kissel@state.mn.us Mike Murphy (Concrete & Aggregates) Phone: 218-755-6593 mike.murphy@state.mn.us Dustin Reese (Bituminous) Phone: 218-755-6593 dustin.reese@state.mn.us	Ray Wesley Cell: 218-766-6949 raymond.wesley@state.mn.us
District 3A, Baxter Tom Boser Phone: 218-828-5755 tom.boser@state.mn.us	Matt Miles Cell: 218-232-6748 matt.miles@state.mn.us
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Metro District, Maplewood Lab Brent Sculley Phone 651-366-5409 brent.scolley@state.mn.us	**Waters Edge** Phone: 651-234-7356 West Zachary Lyrek-Hanks Phone: 651-775-1018 zachary.Lyrek-Hanks@state.mn.us Karl Sinclair Phone: 651-775-0998 karl.sinclair@state.mn.us East Kris Westerbur Phone: 651-755-1151 kristopher.westerbur@state.mn.us Kaleb Kollmann Phone: 651-478-0339 kaleb.kollmann@state.mn.us
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District 7, Mankato Lee McLaughlin Phone: 507-304-6189 lee.mclaughlin@state.mn.us	Mitch Jordahl Cell:507-380-9619 mitch.jordahl@state.mn.us
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Sample Sizes

	Lbs.	
Bituminous	35	Aggregate for Gradation QC/QA
	80	for each plus #4 Aggregate Type for Quality Testing
	35	for each minus #4 Aggregate Type for Quality Testing
	80	for each RAP material for Quality Testing
	10	RAS (shingles) for Processed Gradation and Quality Testing
	65	for Mix Properties (QC/QA) 3 full 6" by 12"-cylinder molds for QA
	90	for TSR (QC/QA) 4 full 6" by 12"-cylinder molds for QA
	90	for Aggregate Specific Gravity QC/QA
	-	1 quart of Asphalt Binder QA
	-	1/2 gallon for Asphalt Emulsion QA
Grading & Base	30	Aggregate for Gradation (Companion sample from 60 lb. split).
	25	Moisture Density Test – Proctor (Companion from 50 lb. split).
	30	Aggregate Quality/Percent Crushing Test - 1 per source
Ready-Mix Concrete	25	Gradation 3/4" plus
	10	Gradation 3/4" minus
	6	Gradation CA 70 & #7
	1	Gradation - Sand (500 g), CA 80, #89.
	4.4	Moisture Test Coarse Aggregate (2000 g)
	1.1	Moisture Test Fine Aggregate (500 g)
	50	Quality 3/4" plus - lab sample
	30	Quality 3/4" minus - lab sample
	30	Fine Aggregate - lab sample
	10	3/4" Plus for the -200 Coarse Aggregate Test (5000 grams)
	6	3/4" Minus for the -200 Coarse Aggregate Test (2500 grams)
	5	Cement, Blended Cement, Fly Ash
	-	1/2-pint plastic container for admixtures.