VERMONT AGENCY OF TRANSPORTATION

MATERIALS SAMPLING MANUAL

MATERIALS AND RESEARCH SECTION

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INTRODUCTION

This manual has been prepared by the Agency's Materials and Research (M&R) Section to familiarize materials personnel, field inspectors, District Transportation Administrators, Resident Engineers and other Agency representatives with the Agency's adopted practices for sampling, testing, and independently comparing materials. This edition of the Materials Sampling Manual (MSM) introduces the concept of tiered testing requirements based on acceptable levels of risk and service identified for each level. The material and sampling requirements are different for each level. These requirements are outlined in level specific materials sampling and testing frequency tables presented later in this document.

Projects are assigned to a particular level based on the factors outlined in Section 4 of the Agency's Quality Assurance Program (QAP). For the purposes of this manual, the terms Resident Engineer and District Transportation Administrator will be synonymous for projects under the respective authority of each**.** The Resident Engineer is responsible for ensuring that their project's sampling and testing requirements are met based on the material sampling and testing frequency tables.

Material standards reference the specifications of the American Association of State Highway and Transportation Officials (AASHTO), the American Society for Testing and Materials (ASTM), or an Agency developed specification (AOT-MRD). The proper sampling and testing of materials incorporated into Agency projects is required to determine whether or not the materials' properties conform to the Agency's contract or permit requirements. Materials are accepted or rejected by the Resident Engineer for project use by comparing the material test results with applicable Agency specifications or permit requirements.

Each sample must be representative of the material used. Random samples are required whenever feasible. The Resident Engineer is responsible for maintaining a summary of quantities so that the total amount of sampled material represents the final project quantity for any given item. M&R Section personnel, from the Agency's Central Laboratory (Materials & Research Laboratory in Berlin, VT), are available to assist other Agency personnel with any questions or concerns regarding procedures for taking or processing samples.

Acceptability of materials will be based on one or more of the following; material certifications, visual inspections, and chemical and physical test results performed on samples that represent the true nature and quality of the material incorporated into the project. If a sample has not been correctly taken or does not properly represent the material being used, the material could erroneously be accepted or rejected.

The minimum sample size is determined by the tests to be performed. The sample size listed should be large enough to accommodate re-testing, if required. Not all samples are transported to the Agency's Central Laboratory; some materials are transported to the Agency's Regional Laboratories. Resident Engineers are responsible for the timely delivery of applicable samples to the Central Laboratory.

The minimum sampling frequency for each item is listed in the material sampling and testing frequency tables starting on page 6.

Sample identification tags will be provided by the M&R Section. The M&R Section will provide sample report cards for concrete test beams and cylinders instead of sample tags. Sample tags and cards should be completed **with all the indicated information** and attached to the sample container

immediately after the sample is taken. Sample tags and cards should be attached in a manner which will prevent their loss or damage during handling and transport. Examples of properly filled out sample cards for commonly sampled material are included later in the document.

When samples consist of more than one container, each container will have an attached sample tag. With the advent of the Site Manager software program it is increasingly important for the Resident Engineer to include the Site Manager line item on the sample tag or card. If this information is not included in the sample identification it could lead to material testing and reporting delays. If there is not a designated location on the sample card or tag itself for this information then the Resident Engineer shall make sure that it is documented in the upper right hand corner on the front face of the sample card or tag.

It is the responsibility of the Resident Engineer to inform the M&R Section of any change in design or authorization for material specification changes.

For the purposes of this document the definitions of the QAP apply, see Section 3.0 of the QAP. Some additional terms have been added for the convenience of the reader.

CERTIFICATION TO FHWA

Upon final acceptance of any Federal Aid Project, the Materials and Research Engineer is responsible for preparing, on behalf of the Secretary of Transportation, a report that states: "The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications. All independent assurance samples and tests are within tolerance limits of the samples and tests that are used in the acceptance program." Any exceptions to the contract provisions must be noted and explained. Requirements and regulatory information are contained in Title 23 Code of Federal Regulations (23CFR), Part 637, Subpart B.

> It is the responsibility of the Resident Engineer to provide an explanation for any materials permanently incorporated into the work that are not in conformance with the contract provisions. Explanations must include the material involved, quantity involved, reason for nonconformance with specifications, and state why the material was incorporated into the project.

MINOR QUANTITIES

Every effort should be made to acquire at least one sample for each specified item during the time of construction. Circumstances in the construction operation, the quantity of the item used, and the application in which a material is used are important considerations before any item should be considered as minor.

A minor quantity is defined as any <u>total</u> quantity, for the whole project, of one material, which is equal to or less than 300 CY for aggregates and 20% of the <u>minimum</u> sampling frequency for structural concrete and bituminous concrete. Materials which meet the criteria for minor quantities shall be from known, reliable sources, perform satisfactorily, and meet the requirements for the purpose intended.

ACCEPTANCE OF MINOR QUANTITIES

Minor quantities of materials may be accepted without sampling and testing, excepted as noted below. The acceptance of a minor quantity is the sole responsibility of the Resident Engineer. Sampling and testing of minor quantities will be determined on a project-by-project basis. The Resident Engineer must provide written documentation on the "Minor Quantity Declaration Form". This form shall be submitted to the Materials & Research Section's Certification & Independent Assurance (C&IA) Unit of the basis for declaring a quantity a "minor quantity" prior to incorporating the material into the project.

If plant inspection/testing personnel are not available for small project quantities the following conditions apply:

1) The Resident Engineer may waive plant inspection/testing requirements for Structural Concrete with the exception that Class AA and A and Class HPC AA and HPC A Structural Concrete must be from approved concrete plants and concrete cylinders must be fabricated and later transported to the Materials & Research Laboratory for further evaluation.

2) The Resident Engineer may waive plant inspection/testing requirements for Hot Mix Asphalt (HMA) from approved HMA plants with the exception that box samples (as appropriate to the material) are obtained and transported to the Materials & Research Laboratory for further evaluation.

The requirement of P.G. Binder and aggregate samples for Portland Cement Concrete and HMA on projects with minor quantities as noted above may be waived.

MATERIALS CERTIFICATION

A list of materials requiring certification, and certification forms for a given project, will be provided by the C&IA Unit to the Resident Engineer at the preconstruction meeting or sent to the Resident Engineer prior to the start of construction for each new project.

It is the responsibility of the Resident Engineer to ensure that the appropriate certifications are obtained by the Contractor and submitted to the C&IA Unit for review and approval **prior** to incorporating the materials into the project. See Appendix A for list of pay items requiring certification. It shall be the responsibility of the Resident Engineer to verify that the material certification represents the materials incorporated into the project. No payment shall be made on materials requiring certification until such materials have been approved. Materials certifications are further defined in section 700.02 of the Agency's Standard Specifications for Construction.

Certifications should be sent to:

Vermont Agency of Transportation
Materials and Research Section
Certification and Independent Assurance Unit
1 National Life Drive
Montpelier, Vermont 05633-5001

SAMPLING METHODS

1. Random or stratified random sampling is defined as a sampling procedure whereby any sample in a sublot has an equal probability of being selected. The method of obtaining a random sample is specified in ASTM D 3665.
2. Selective sampling is a non-random procedure where a sample is obtained for informational purposes to guide quality control or acceptance actions.
3. A split sample is a single material sample that has been divided into two or more portions. These samples are taken to estimate testing variability. Split samples are intended to eliminate the inherent variability of materials and construction processes.
4. Replicate samples are two or more material samples taken at the same location and time. These samples are taken to estimate sampling and testing variability.

TYPES OF SAMPLES

Sampling and testing is classified as one of five different types:

1. Acceptance (random or stratified random)
2. Quality Control, including process control (random or selective)
3. Independent assurance (split, replicate)
4. Investigative (selective)
5. Verification (split, replicate or selective)

1. ACCEPTANCE SAMPLING AND TESTING

Acceptance sampling and testing is defined as sampling, testing, and the assessment of test results to determine the quality of produced material or construction is acceptable, in terms of the specifications.

It is the intent of 23CFR637.205e that all acceptance sampling performed on Federal-Aid Highway projects shall be obtained randomly. The Agency recognizes that there may be practical limitations to achieving this goal. Therefore, the Agency will employ practical measures to assure adequate numbers of samples are taken.

Acceptance samples will be taken, and tested by qualified Agency personnel or representatives. Laboratories where acceptance testing is performed must be a qualified laboratory as outlined in the Agency's Qualified Laboratory Program. The requirements for personnel and laboratory qualifications are defined in the Agency's Quality Assurance Program (QAP).

The Resident Engineer is responsible for determining whether the quality of the material being incorporated into the work and the quality of the workmanship are in conformity with the Agency specifications.

The acceptance sample location is outlined in the material sampling frequency tables beginning on page 6.

Re-sampling is warranted only if it is determined, by the Agency's representative, that the sampling was not representative, taken from the specified acceptance sample location or that the sample was not properly obtained in accordance with the required sampling procedures.

Re-testing is warranted only if it is determined that the test was not properly performed in accordance with the required procedures, or the equipment was not properly calibrated or not properly functioning.

Proper sampling and testing procedures are outlined in the material sampling frequency tables.

2. QUALITY CONTROL SAMPLING AND TESTING

Quality control, including process control, sampling and testing is defined as sampling and testing performed by the ***Contractor***, ***Producer***, and ***Manufacturer*** in the manufacturing, production, transport and placement to ensure the materials incorporated and work performed on a project meet or exceed contract specification requirements. These activities include material handling, construction/manufacturing procedures, calibration and maintenance of equipment, production process control, sampling and testing, and inspection that are accomplished to complete the work involved in an Agency project.

Quality control, including process control, sampling and testing shall not be used as the sole basis for acceptance of material. Similarly, it is not intended that acceptance sampling and testing be used for process or quality control purposes.

3. INDEPENDENT ASSURANCE SAMPLES

Independent Assurance (IA) sampling and testing is defined as sampling and testing that is conducted by the Certifications and Independent Assurance (C&IA) Unit of the Materials & Research Section to provide an unbiased and independent evaluation of the Acceptance Program.

Independent Assurance is a management tool to provide an assessment of the technician and laboratory compliance, not the material or product. IA comparison sampling and testing shall be performed by Agency personnel who have no direct responsibility for the acceptance samples or tests being compared.

4. INVESTIGATIVE SAMPLES

Investigative samples are selective samples obtained by Agency personnel or representative. These samples are typically obtained for research purposes, forensic purposes, or for other investigatory purposes. Investigative samples are not intended to determine material quality of possible sources for the direct or indirect benefit of the Contractor.

5. VERIFICATION SAMPLES

Verification samples are non-random field samples which, in the opinion of the sampler, represent the quality of the material or an item of construction. Verification samples are performed by the Agency to verify the quality of the material or veracity of the ***material certification***.

MINIMUM SAMPLING REQUIREMENTS

As explained in the introduction this manual has been prepared by the Agency's Materials and Research (M&R) Section to familiarize materials personnel, field inspectors, District Transportation Administrators, Resident Engineers and other Agency representatives with the Agency's adopted practices for sampling, testing, and independently comparing materials. This edition of the Materials Sampling Manual (MSM) introduces the concept of tiered testing requirements based on the degree of risk and desired service identified for each level. Material and sampling requirements are different for each level.

For example, for Level 1 projects structural concrete for bridge superstructure has been assigned to a higher risk level (due to increased sampling frequency) than structural concrete produced for sidewalks. Level 2 projects are those projects that are not governed by Federal Oversight nor are they on the National Highway System; thus these projects have been determined to have slightly lower risk levels associated with them. Applying this logic to materials the sampling of structural concrete for sidewalks is not considered to be a high risk item. Therefore it was determined not to require that structural concrete for sidewalks, curbs, and gutters be sampled for Level 2 projects. See the Agency's Quality Assurance Program for more information.

The Resident Engineer is responsible for ensuring that their project's sampling and testing requirements are met based on the material sampling and testing frequency tables. Minimum sampling requirements for acceptance are given in the material sampling frequency tables presented below. The sampling frequency for a given quantity of a pay item is intended to give general guidance but may be increased for specific project needs. **Sampling frequency should be increased whenever there is uncertainty regarding the quality of the material or workmanship.**

Please note that IA sampling and testing activities are no longer conducted based on project or plant production quantities. Instead, IA activities are conducted on a "systems basis"; personnel and equipment are evaluated independent of the project.

Material Sampling Manual Levels 1 & 2

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size [2]	Procedures	
								Sampling	Testing [1]
Embankments	203.30	703.02	Earth Borrow	Identification	Visual Classification	Stockpile	1	T2	ASTM D2488
				Moisture-Density	1/Soil type	Stockpile	50	T2	T99
				Moisture	1/2000 cy	In place	2		T255 or T310
				Density	1/2000 cy	In place			T191 or T310
	203.31	703.03	Sand Borrow	Gradation	1/3000 cy	In place	22	T2	T27 and T11
				Moisture-Density	1/10,000 cy/source	Stockpile	50	T2	T99
				Moisture	1/2000 cy	In place	20		T255 or T310
				Density	1/2000 cy	In place			T191 or T310
	203.32	703.04	Granular Borrow	Gradation	1/3000 cy	In place	22	T2	T27 and T11
				Moisture-Density	1/10,000 cy/source	Stockpile	50	T2	T99
				Moisture	1/2000 cy	In place	2		T255 or T310
				Density	1/2000 cy	In place			T191 or T310
	203.35	704.07	Gravel Backfill for Slope Stabilization	Gradation	1/5000 cy	In place	see note 2	T2	T27 and T11
				Moisture-Density	1/10,000 cy/source	Stockpile	250	T2	T99
				Moisture	1/5000 cy	In place	20		T255 or T310
				Density	1/5000 cy	In place			T191 or T310
Excavation for Structures	204.30	704.08	Granular Backfill for Structures	Gradation	1/3000 cy	In place	see note 2	T2	T27 and T11
				Moisture-Density	1/10,000 cy/source	Stockpile	250	T2	T99
				Moisture	1/500 cy	In place	30		T255 or T310
				Density	1/500 cy	In place			T191 or T310
Subbase	301.15	704.04	Gravel for Subbase	Gradation	1/3000 cy	Stockpile on project	see note 2	T2	T27 and T11
				Percent of Wear	1/10,000 cy/source	Stockpile	150	T2	T96
				Moisture-Density	See Note 8	Stockpile	250	T2	AOT-MRD 54
				Moisture	1/2000 cy	In place			AOT-MRD 55
				Density	1/2000 cy	In place			AOT-MRD 55
	301.25	704.05	Crushed Gravel for Subbase	Gradation	1/3000 cy	Stockpile on project	see note 2	T2	T27 and T11
	301.26			Percent of Wear	1/10,000 cy/source	Stockpile	150	T2	T96
				Fractured Faces	1/3000 cy	Stockpile		T2	AOT-MRD 23
				Moisture-Density	See Note 8	Stockpile	250		AOT-MRD 54
				Moisture	1/1000 cy	In place			AOT-MRD 55
				Density	1/1000 cy	In place			AOT-MRD 55
	301.35	704.06	Dense Graded Crushed Stone for Subbase	Gradation	1/3000 cy	Stockpile on project	see note 2	T2	T27 and T11
				Percent of Wear	1/source/year	Stockpile	150	T2	T96
				Thin & Elongated Pieces	1/3000 cy	In place		T2	AOT-MRD 22
				Moisture-Density	See Note 8	Stockpile	250		AOT-MRD 54
				Moisture	1/1000 cy	In place			AOT-MRD 55
				Density	1/1000 cy	In place			AOT-MRD 55
Reclaimed Stabilized Base	310.20	310.02	Reclaimed Base	Gradation	1/2500 sy for first 10,000 sy 1/10,000 sy thereafter	In place	165	T2	T27
				Moisture	1/4000 sy for first 10,000 sy 1/10,000 sy thereafter	In place			T310
				Density	1/4000 sy for first 10,000 sy 1/10,000 sy thereafter	In place			T310
Aggregate Surface Course	401.10	704.12	Aggregate for Surface Course and Shoulders	Gradation	1/5000 cy	In place	100	T2	T27 and T11
				Percent of Wear	1/source/year	Stockpile	100	T2	T96
				Moisture-Density	1/15,000 cy/source	Stockpile	100	T2	T99
				Moisture	1/5000 cy	In place			T255 or T310
				Density	1/ 5000 cy	In place			T191 or T310
Aggregate Shoulders	402.10 402.11 402.12 402.13	704.12	Aggregate for Surface Course and Shoulders	Gradation	1/5000 cy	In place	100	T2	T27 and T11
				Percent of Wear	1/source/year	Stockpile	100	T2	T96
Surface Treatments	See Specifications								

Material Sampling Manual Levels 1 & 2

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size [2]	Procedures: Sampling	Procedures: Testing [1]
Bituminous Concrete Pavement	406.25 406.27	406.03	Bituminous Concrete Pavement	AC Content /Gradation	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant	Dependent on mix type - see note 10	T168	T164 or T308 & T30
Mainline Paving and Shoulders		406.03	Medium Duty Bituminous Concrete Pavement	Air voids, VMA & VFA	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant			T166A, T209, T269, PP19
				Marshall Flow & Stability	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant			T245
				Mixing Temperature	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant			
				Density-mat	Project less than 0.5 miles take 4 cores per day production. Project greater than 0.5 miles 6 cores per day production at the rate of 2 per lane mile	In place	6" core		T166
				Density-joint	See Specifications	In place	6" core		
	406.25 406.27	704.10	Aggregates for Bituminous Concrete	Percent of Wear	1/source/year	Stockpile @ plant	Dependent on mix type - see note 9	T2	T96
				Thin & Elongated Pieces	1/10,000 tons/source	Stockpile @ plant			AOT-MRD22
				Fractured Faces	1/10,000 tons/source	Stockpile @ plant			AOT-MRD23
				Soundness	1/source/year	Stockpile @ plant	5	T2	T104
		702.02	PG Binder	Unit weight, Flashpoint, Rotational Viscosity, DSR - Original, Effect of heating mass, DSR - RTFO, DSR - PAV, Creep stiffness, m Value	1/1,000 Tons of Mix	In-line @ plant	2 Quarts	T40	T48, T228, T240, T313, T315, T316
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	1/ 200 CWT	Truck on Project	2 Quarts	T40	Certification T49, T59
	490.30	490.03	Superpave Bituminous Concrete Pavement	AC Content / Gradation	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant	Dependent on mix type - see note 10	T168	T164 or T308 & T30
				Air voids, VMA & VFA	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant			T312,T166,T209,T269, R35
				Mixing Temperature	1/500 tons for first 1,000 tons, 1/1,000 tons thereafter	Truck @ plant			
	490.30	490.03	Superpave Bituminous Concrete Pavement	Density-mat	Project less than 0.5 miles 4 cores per day production. Project greater than 0.5 miles 6 cores per day production at the rate of 2 per lane mile	In place	6" core	T168	T166
				Density-joint	See Specifications	In-place	6" core		
		704.10	Aggregates for Superpave Bituminous Concrete	Percent of Wear	1/source/year	Stockpile @ plant	Dependent on mix type see note 9	T2	T96
				Thin & Elongated Pieces	1/10,000 tons/source	Stockpile @ plant			AOT-MRD22
				Fractured Faces	1/10,000 tons/source	Stockpile @ plant			AOT-MRD23
				Soundness	1/source/year	Stockpile @ plant	5	T2	T104
		702.02	PG Binder	Unit weight, Flashpoint, Rotational Viscosity, DSR - Original, Effect of heating mass, DSR - RTFO, DSR - PAV, Creep stiffness, m Value	1/1,000 Tons of Mix	In-line @ plant	2 Quarts		T48, T228, T240, T313, T315, T316
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	1/ 200 CWT	Truck on Project	2 Quarts	T40	Certification T49, T59
Non Mainline Paving: Side Roads, Traffic Islands, Gutters, Curbs, Side Walks, Handwork, Drives & Aprons	406.25 406.27	406.03	Bituminous Concrete Pavement	AC Content /Gradation	1/1,000 Tons of Mix	Box Sample on Project	Dependent on mix type - see note 10	T168	T164 or T308 & T30
	490.30	406.03	Medium Duty Bituminous Concrete Pavement	AC Content /Gradation	1/1,000 Tons of Mix	Box Sample on Project		T168	T164 or T308 & T30
		490.30	Superpave Bituminous Concrete Pavement	Mixing Temperature	1/1,000 Tons of Mix	Box Sample on Project		T168	
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	1/Project	Truck on Project	2 Quarts	T40	Certification T49, T59
	616.30 616.31	616.13	Bituminous Concrete Gutters and Traffic Islands	AC Content / Gradation	1/1,000 Tons of Mix	Box Sample on Project	Dependent on mix type - see note 10	T168	T164 or T308 & T30
	616.47	406.03	Bituminous Concrete Curb Type A	AC Content / Gradation	1/1,000 Tons of Mix	Box Sample on Project		T168	T164 or T308 & T30
		406.03a	Bituminous Concrete Pavement	AC Content / Gradation	1/1,000 Tons of Mix	Box Sample on Project		T168	T164 or T308 & T30
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	1/Project	Truck on Project	2 Quarts	T40	Certification T49, T59

Material Sampling Manual Levels 1 & 2

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size [2]	Procedures: Sampling	Procedures: Testing [1]
Structural Concrete Superstructure	501.32 501.33 501.34 541.21 541.22	501.03 541.03	HPC Structural Concrete Structural Concrete	Air Slump Temperature Unit weight (light weight) Cylinders	1 per 50 cy (See Note 3)	on project, as close to point of deposit as possible	1 ft^3 for cylinders or wheelbarrow needed for all tests	T141 T141 T141 T23	T152 T119 T309 T196 T22
	541.25 541.40 580.10 580.11 580.12 580.19	704.02A 704.02B 704.14	Coarse Aggregate for Concrete	Gradation Percent of Wear Fractured Faces Thin / Elongated Pieces Soundness Density (for lightweight aggregate)	1 per 400 cy 1/source/year 1 per 1000 cy per source 1 per 1000 cy per source 1/source/year 1 per placement	at plant	see note 9 11 500 grams 500 grams 5 0.5 to 2 ft^3	T2 T2 T2 / T248 T2 / T248 T2 / T248 T2	T27 T96 AOT-MRD22 AOT-MRD23 T104 T19
		704.01	Fine Aggregate for Concrete	Gradation Organic Impurities Comp.Strength of Mortar Soundness	1 per 400 cy 1 per 400 cy new source 1/source/year	at plant	22 1 1 5	T2 T2 / T248 T2 / T248 T2	T27 T21 T106 T104
		701.02 701.05 701.06 701.07	Portland and Pozzolan Cements, Blended Silica Fume Cement, Portland Blast Furnace Slag Cement	Compressive Strength - Mortar Cubes, Autoclave Expansion, Normal Consistency, Time of Set - Vicat, Air Content, Fineness - Blaine Apparatus	1/day (decks only)	at plant	15	T127	Certification T106, T107, T131, T137, T192, ASTM C1437
		725.03(a) 725.03(b) 725.03(c)	Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag	Compressive Strength - Mortar Cubes, Autoclave Expansion, Time of Set - Vicat, Air Content, Fineness - #325 Sieve	1/day (decks only)	at plant	10	T127	Certification T106, T107, T131, T137, T192, ASTM C1437
Substructure/Approach Slabs/Retaining Walls/Drilled Shafts/Mast Arm Supports/Overhead Sign Supports **Note:** For Mast Arm Supports and Overhead Sign Supports the bolt requirements below may also apply.	501.32 501.33 501.34 541.21 541.22 541.25 541.30 541.31 541.40 580.13 580.14 580.15 677.12 677.13 677.22 677.23 678.15 678.17 679.21 679.22	501.03 541.03	HPC Structural Concrete Structural Concrete	Air Slump Temperature Unit weight (light weight concrete) Cylinders	1 per 75 cy (See Note 4)	on project	1 ft^3 for cylinders or wheelbarrow needed for all tests	T141 T141 T141 T23	T152 T119 T309 T196 T22
		704.02A 704.02B 704.14	Coarse Aggregate for Concrete	Gradation Percent of Wear Fractured Faces Thin / Elongated Pieces Soundness Density (for lightweight aggregate)	1 per 400 cy 1/source/year 1 per 1000 cy per source 1 per 1000 cy per source 1/source/year 1 per placement	at plant	see note 9 11 500 grams 500 grams 5 0.5 to 2 ft^3	T2 T2 T2 / T248 T2 / T248 T2 T2	T27 T96 AOT-MRD22 AOT-MRD23 T104 T19
		704.01	Fine Aggregate for Concrete	Gradation Organic Impurities Compressive Strength of Mortar Soundness	1 per 400 cy 1 per 400 cy new source 1/source/year	at plant	22 1 1 5	T2 T2 / T248 T2 / T248 T2	T27 T21 T106 T104
		701.02 701.05 701.06 701.07	Cement, Portland Pozzolan Cement, Blended Silica Fume Cement, Portlant Blast Furnace Slag Cement	Compressive Strength - Mortar Cubes, Autoclave Expansion, Normal Consistency, Time of Set - Vicat, Air Content, Fineness - Blaine Apparatus	1/1000 cy/Type/concrete plant/source	at plant	15	T127	Certification T106, T107, T131, T137, T192, ASTM C1437
		725.03(a) 725.03(b) 725.03(c)	Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag	Compressive Strength - Mortar Cubes, Autoclave Expansion, Time of Set - Vicat, Air Content, Fineness - #325 Sieve	1/1000 cy/Type/concrete plant/source	at plant	10	T127	Certification T106, T107, T131, T137, T192, ASTM C1437

Material Sampling Manual Levels 1 & 2

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size [2]	Procedures: Sampling	Procedures: Testing [1]
Prestress/Precast Concrete/Median Barriers	510.21 510.22 510.23 540.10	510.05	Concrete	Cylinder strength Air content Temperature Slump (specified on approved mix design)	per casting bed (note 6) per casting bed (note 7) per casting bed (note 7) per casting bed (note 7)	point of placement	1 ft^3 for cylinders or wheelbarrow needed for all tests	T23 T141 ASTM C 172 T141	T22 T152 T309 T119
		704.01	Fine Aggregate for Concrete	Gradation Organic Impurities Compressive Strength of Mortar Soundness	1 every other day of production 1 @ beginning of job new source new source	at plant	22 1 1 5	T2 T2 / T248 T2 / T248 T2	T27 T21 T106 T104
		704.02	Coarse Aggregate for Concrete	Gradation Percent of Wear Fractured Faces Thin / Elongated Pieces Soundness Density (for lightweight aggregate)	1 every other day of production 1 @ beginning of job 1 @ beginning of job 1 @ beginning of job 1/source/year 1 per placement	at plant	see note 9 11 500 grams 500 grams 5 0.5 to 2 ft^3	T2 T2 T2 / T248 T2 / T248 T2 T2	T27 T96 AOT-MRD22 AOT-MRD23 T104 T19
		701.02 701.04 701.05 701.06 701.07	Cement, High Early Portland Cement, Portland Pozzolan Cement, Blended Silica Fume Cement, Portland Blast Furnace Slag Cement	Compressive Strength - Mortar Cubes, Autoclave Expansion, Normal Consistency, Time of Set - Vicat, Air Content, Fineness - Blaine Apparatus	1 @ beginning of job	at plant	15	T127	Certification T106, T107, T131, T137, T192, ASTM C1437
		725.03(a) 725.03(b) 725.03(c)	Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag	Compressive Strength - Mortar Cubes, Autoclave Expansion, Time of Set - Vicat, Air Content, Fineness - #325 Sieve	1/day (decks only)	at plant	10	T127	Certification T106, T107, T131, T137, T192, ASTM C1437
			Reinforcing Steel	See Reinforcing Steel Section					
Concrete for Sidewalks/Curbs/Gutters[5] **LEVEL 1 PROJECTS ONLY**	616.27 616.28 616.45 618.10 618.11 621.45	541.03	Structural Concrete	Air Slump Cylinders	1 per 75 cy	on project	1 ft^3 for cylinders or wheelbarrow needed for all tests	T141 T23	T152 T119 T22
Structural Steel	506.50 506.55 506.56 506.57 506.60 506.75	Project Special Provisions 714.05 714.06 714.12 714.13	High Strength Bolts for Structural Steel	Rotational Capacity Test Wedge Test	4 - Each combination of bolt production lot, nut lot, and washer lot (4 - Each combination Tension Control Assembly Bolt production lot or Direct Tension Indicator production lot if used) to be incorporated into the project for main member connections as designated in the Contract.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Rotational Capacity Test Specified in AASHTO M 164 M as modified in 714.05 Wedge Test per ASTM F 606
Bridge Railing	525.22 525.23 525.31 525.33 525.34 525.40 525.41 525.42	Project Special Provisions 714.07 525.43 525.44	Anchor Bolts for Bridge Railing	Wedge Test	2 - Each combination of anchor bolt production lot, nut lot, and washer lot to be incorporated into the project.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Tensile Strength Test ASTM F606 Verification Testing ASTM F606
Reinforcing Steel	507.15 507.17	713.01 713.07	Reinforcing Steel, Epoxy Coated Reinforcing Steel	Tensile testing, elongation	1/100,000 lb/size/grade	Stockpile on Project	5 ft		AASHTO T244
Mechanical Bar Connectors	507.19	713.02	Mechanical Splices for Bar Reinforcement	Tensile testing, elongation	3 per size	Stockpile on Project	connector length plus 12 inches of bar on each end		AASHTO T244

Material Sampling Manual Levels 1 & 2

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size (2)	Procedures: Sampling	Procedures: Testing (1)
Over Head Traffic Sign Supports & Street Lighting **Note:** For Mast Arm Supports and Overhead Sign Supports the concrete requirements above may also apply.	677.12 677.13 677.22 677.23 677.25 679.xx	Project Special Provisions 714.09	Anchor Bolts for Sign and Luminaire Poles	Tensile Proof Load Test Elongation Test	2 - Each combination of anchor bolt production lot, nut lot, and washer lot to be incorporated into the project.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Tensile Strength Test ASTM F606 Verification Testing ASTM F606
			High Strength Bolts for Structural Steel	Rotational Capacity Test Wedge Test	4 - Each combination of bolt production lot, nut lot, and washer lot (4 - Each combination Tension Control Assembly Bolt production lot or Direct Tension Indicator production lot if used) to be incorporated into the project for main member connections as designated in the Contract.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Rotational Capacity Test Specified in AASHTO M 164 M as modified in 714.05 Wedge Test per AASHTO M 164M
Paint for Pavement Markings	646.20 to 646.32	708.08	Waterborne Traffic Paint	Drying time	1 per batch	Original Container (tote)	2 - 1 pint containers		ASTM D711
				Viscosity					ASTM D562
				Density					ASTM D1475
Underdrains	605.10 to 605.23	704.16	Drainage Aggregate	Gradation	1/3000 cy	On Project	55		T27
				Percent of Wear	1/source/year			T2	T96
				Soundness	1/source/year		5		T104

Notes:

(1) Testing procedures are AASHTO procedures unless otherwise noted.

(2) Sample size is in pounds unless otherwise noted. The sample size should be selected based on the maximum nominal aggregate size (See AASHTO T27, Section 7.1). For example, if the material visually passes a 2", 1.5", or 1" sieve then the sample size is 220 lbs, 165 lbs, and 110 lbs, respectively.

(3) Total placement for day split into equal sublots not to exceed 50 CY, test yardage chosen randomly. The test yardage is used to determine which load to test with proper sample collection techniques followed Check first load for temperature, slump and air content, **this will not be counted as the acceptance test for the first sublot**. If the first load is determined to be out-of-specification then the Contractor must test each consecutive load until 3 consecutive passing loads are tested. VTrans will check 4th consecutive load to verify.

(4) Check first load for temperature, slump and air content as an initial check. Acceptance sampling will be done every 75 CY, including the first load in the yardage count. If the first load, or any acceptance test, does not comply with VTrans' specifications then the Contractor must test each load until 3 consecutive passing loads are achieved. VTrans will check 4th consecutive load or last load, which ever happens first, to verify compliance.

(5) These materials are only required to be tested for Level 1 projects. Those items not identified are considered incidental have no materials testing requirements.

(6) Tests are to be performed by qualified plant personnel and witnessed by VTrans personnel. Minimum of six cylinders for determining detensioning, to be cured with the piece. Four specimens to determine 28 day and shipping strengths and are to be cured with the piece until it is stripped and then standard cured.

(7) Tests are to be performed by qualified plant personnel and witnessed by VTrans personnel. As a minimum, the first load as well as the load that the cylinders are fabricated from should be tested.

(8) For projects less than 1250 CY of subbase material the Agency shall be responsible for the testing and projects over 1250 CY the Contractor is responsible for the determination of the target density. For each material source; subbase materials shall be sampled and tested once for the first 1250 CY and then once every 3000 CY thereafter.

(9) Depends upon the mix type. For mixes with 3/4", 1/2", and 3/8" stone the sample size is 165 lbs, 55 lbs, and 22 lbs respectively.

(10) The sample size for HMA depends upon the nominal maximum aggregate in the mix, see following table. Minimum sample sizes are in accordance with AASHTO T168 and are suitable for routine testing. However, actual sample size is dependent upon the type and number of tests to which the material is to be subjected.

Mix Type:	MS	I / IS	II / IIS	III / IIIS	IV / IVS	V / VS
Maximum Nominal Aggregate Size, in:	1 1/2"	1"	3/4"	1/2"	3/8"	3/16"
Minimum Sample Size, lbs:	25	20	16	12	8	4

Material Sampling Manual Level 3

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size [2]	Procedures	
								Sampling	Testing [1]
Embankments[3]	203.30	703.02	Earth Borrow	Identification	Visual Classification	Stockpile/in place	1		ASTM D2488
				Moisture-Density	1/Soil type	Stockpile/in place	50		T99
				Moisture	1/2000 cy	In place	2		T255 or T310
				Density	1/2000 cy	In place			T191 or T310
	203.31	703.03	Sand Borrow	Gradation	1 / Project	In place	22	T2	T27 and T11
				Moisture-Density	1 / Project	Stockpile	50	T2	T99
				Moisture	1 / Project	In place	20		T255 or T310
				Density	1 / Project	In place			T191 or T310
	203.32	703.04	Granular Borrow	Gradation	1 / Project	In place	22	T2	T27 and T11
				Moisture-Density	1 / Project	Stockpile	50	T2	T99
				Moisture	1 / Project	In place	2		T255 or T310
				Density	1 / Project	In place			T191 or T310
	203.35	704.07	Gravel Backfill for Slope Stabilization	Gradation	1 / Project	In place	see note 2	T2	T27 and T11
				Moisture-Density	1 / Project	Stockpile	250	T2	T99
				Moisture	1 / Project	In place	20		T255 or T310
				Density	1 / Project	In place			T191 or T310
Excavation for Structures	204.30	704.08	Granular Backfill for Structures	Gradation	1 / Project	In place	see note 2	T2	T27 and T11
				Moisture-Density	1/10,000 cy/source	Stockpile/in place	250	T2	T99
				Moisture	1/500 cy	In place	30		T255 or T310
				Density	1/500 cy	In place			T191 or T310
Subbase[3]	301.15	704.04	Gravel for Subbase	Gradation	1 / Project	Stockpile on project	see note 2	T2	T27 and T11
				Percent of Wear	1 / Source / Year	Stockpile	150	T2	T96
				Moisture-Density	See Note 10	Stockpile	250	T2	AOT-MRD 54
				Moisture	1 / Project	In place			AOT-MRD 55
				Density	1 / Project	In place			AOT-MRD 55
	301.25 301.26	704.05	Crushed Gravel for Subbase	Gradation	1 / Project	Stockpile on project	see note 2	T2	T27 and T11
				Percent of Wear	1 / Source / Year	Stockpile	150	T2	T96
				Fractured Faces	1 / Project	Stockpile		T2	AOT-MRD 23
				Moisture-Density	See Note 10	Stockpile	250		AOT-MRD 54
				Moisture	1 / Project	In place			AOT-MRD 55
				Density	1 / Project	In place			AOT-MRD 55
	301.35	704.06	Dense Graded Crushed Stone for Subbase	Gradation	1 / Project	Stockpile on project	see note 2	T2	T27 and T11
				Percent of Wear	1 / Source / Year	Stockpile	150	T2	T96
				Fractured Faces	1 / Project	Stockpile		T2	AOT-MRD 23
				Moisture-Density	See Note 10	Stockpile	250		AOT-MRD 54
				Moisture	1 / Project	In place			AOT-MRD 55
				Density	1 / Project	In place			AOT-MRD 55
Reclaimed Stabilized Base	310.20	310.02	Reclaimed Base	Gradation	1/2500 sy for first 10,000 sy 1/10,000 sy thereafter	In place	165	T2	T27
				Moisture	1/4000 sy for first 10,000 sy 1/10,000 sy thereafter	In place			T310
				Density	1/4000 sy for first 10,000 sy 1/10,000 sy thereafter	in place			T310
Aggregate Surface Course	401.10	704.12	Aggregate for Surface Course and Shoulders	Gradation	1/Project	In place	100	T2	T27 and T11
				Percent of Wear	1/source/year	Stockpile	100	T2	T96

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size (2)	Procedures: Sampling	Procedures: Testing (1)
Aggregate Shoulders	402.10 402.11 402.12 402.13	704.12	Aggregate for Surface Course and Shoulders	Gradation Percent of Wear	1/Project 1/source/year	In place Stockpile	100 100	T2 T2	T27 and T11 T96
Surface Treatments				See Specifications					
Bituminous Concrete Pavement									
Mainline Paving and Shoulders	406.25 406.27	406.03	Bituminous Concrete Pavement	AC Content /Gradation	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant	Dependent on mix type - see note 11	T168	T164 or T308 & T30
		406.03	Medium Duty Bituminous Concrete Pavement	Air voids, VMA & VFA	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant			T166A, T209, T269, PP19
				Marshall Flow & Stability	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant			T245
				Mixing Temperature	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant			
				Density-mat	Project less than 0.5 miles 4 cores. Project greater than 0.5 miles 6 cores.	In place	6" core		T166
				Density-joint	See Specifications	In place	6" core		T166
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	1/Project	Truck on Project	2 Quarts	T40	Certification T49, T59
	490.30	490.03	Superpave Bituminous Concrete Pavement	AC Content / Gradation	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant	Dependent on mix type - see note 11		T164 or T308 & T30
				Air voids, VMA & VFA	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant		T168	T312,T166,T209,T269, R35
				Mixing Temperature	1/1000 tons for first 1,000 tons, 1/day thereafter	Truck @ plant			
			`	Density-mat	Project less than 0.5 miles 4 cores per day production. Project greater than 0.5 miles 6 cores per day production at the rate of 2 per lane mile	In place	6" core	T168	T166
				Density-joint	See Specifications	In place	6" core	T168	T166
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	1/Project	Truck on Project	2 Quarts	T40	Certification T49, T59
Bituminous Concrete Pavement **Non Mainline Paving** **Side roads, Traffic Islands, Gutters, Curbs, Side Walks, Handwork, Drives & Aprons**	406.25 406.27 490.30	406.03	Bituminous Concrete Pavement	AC Content /Gradation	Type D Certification	For certification-verification (C-V) purposes: Box Sample on Project	Dependent on mix type - see note 11	T168	T164 or T308 & T30
		406.03	Medium Duty Bituminous Concrete	AC Content /Gradation	Type D Certification				
		490.30	Superpave Bituminous Concrete Pavement	Mixing Temperature	Type D Certification			T168	
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	Type A Certification	For C-V purposes: Truck on Project	2 Quarts	T40	Certification T49, T59

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size (2)	Procedures: Sampling	Procedures: Testing (1)
Bituminous Concrete Pavement **Non Mainline Paving**	616.30 616.31 616.47	616.13	Bituminous Concrete Gutters and Traffic Islands	AC Content / Gradation	Type D Certification	For certification-verification (C-V) purposes: Box Sample on Project	Dependent on mix type - see note 11	T168	T164 or T308 & T30
Side roads, Traffic Islands, Gutters, Curbs, Side Walks, Handwork, Drives & Aprons		406.03	Bituminous Concrete Curb Type A	AC Content / Gradation	Type D Certification				
		406.03a	Bituminous Concrete Pavement	AC Content / Gradation	Type D Certification				
		702.04	Emulsified Asphalt	Distillation, Penetration @ 25 °C	Type A Certification	For C-V purposes: Truck on Project	2 Quarts	T40	Certification T49, T59
Structural Concrete **Superstructure**	501.32 501.33 501.34 541.21 541.22 541.25 541.40	501.03 580.10 580.11 580.12 580.19	HPC Structural Concrete Structural Concrete	Air Slump Temp Unit weight(light weight) Cylinders	1 per 50 cy (See Note 4)	on project, as close to point of deposit as possible	1 ft^3 for cylinders or wheelbarrow needed for all tests	T141 T141 T141 T23	T152 T119 T309 T196 T22
Substructure **Approach Slabs/Retaining Walls/Drilled Shafts/Mast Arm Supports/Overhead Sign Supports** **Note:** For Mast Arm Supports and Overhead Sign Supports the bolt requirements below may also apply.	501.32 501.33 501.34 541.21 541.22 541.25 580.13 580.14 580.15 677.12	501.03 541.03 677.13 677.22 677.23 678.15	HPC Structural Concrete Structural Concrete 678.17 679.21 679.22	Air Slump Temp Unit weight (light weight concrete) Cylinders	1 per 75 cy (See Note 5)	on project	1 ft^3 for cylinders or wheelbarrow needed for all tests	T141 T141 T141 T23	T152 T119 T309 T196 T22
Prestress/Precast Concrete[9]/Median Barriers	510.21 510.22 510.23 540.10	510.05	Concrete	Cylinder strength Air content Temperature Slump (specified on approved mix design)	per casting bed (note 7) per casting bed (note 8) per casting bed (note 8) per casting bed (note 8)	point of placement	1 ft^3 for cylinders or wheelbarrow needed for all tests	T 23 T141 T141 T141	T22 T152 T309 T119
			Reinforcing Steel	See Reinforcing Steel Section					
Structural Concrete **Sidewalks/Curbs/Gutters[6]**	616.27 616.28 616.45 618.10 618.11 621.45	541.03	Structural Concrete	Air Slump	1/Project	on project	wheelbarrow	T141	T152 T119

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size (2)	Procedures: Sampling	Procedures: Testing (1)
Structural Steel	506.50 506.55 506.56 506.57 506.60 506.75	Project Special Provisions 714.05 714.06 714.12 714.13	High Strength Bolts for Structural Steel	Rotational Capacity Test Wedge Test	4 - Each combination of bolt production lot, nut lot, and washer lot (4 - Each combination Tension Control Assembly Bolt production lot or Direct Tension Indicator production lot if used) to be incorporated into the project for main member connections as designated in the Contract.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Rotational Capacity Test Specified in AASHTO M 164 M as modified in 714.05 Wedge Test per ASTM F 606
Bridge Railing	525.22 525.23 525.31 525.33 525.34 525.40 525.41 525.42 525.43 525.44	Project Special Provisions 714.07	Anchor Bolts for Bridge Railing	Wedge Test	2 - Each combination of anchor bolt production lot, nut lot, and washer lot to be incorporated into the project.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Tensile Strength Test ASTM F606 Verification Testing ASTM F606
Reinforcing Steel	507.15 507.17	713.01 713.07	Reinforcing Steel, Epoxy Coated Reinforcing Steel	Tensile testing, elongation	1/100,000 lb/size/grade	Stockpile on Project	5 ft		AASHTO T244
Mechanical Bar Connectors	507.19	713.02	Mechanical Splices for Bar Reinforcement	Tensile testing, elongation	3 per size	Stockpile on Project	Connector length plus 12 inches of bar on each end		AASHTO T244
Over Head Traffic Sign Supports & **Note:** For Mast Arm Supports and Overhead Sign Supports the concrete requirements above may also apply.	677.12 677.13 677.22 677.23 677.25 679.xx	Project Special Provisions 714.09	Anchor Bolts for Sign and Luminaire Poles	Tensile Proof Load Test Elongation Test	2 - Each combination of anchor bolt production lot, nut lot, and washer lot to be incorporated into the project.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Tensile Strength Test ASTM F606 Verification Testing ASTM F606
			High Strength Bolts for Structural Steel	Rotational Capacity Test Wedge Test	4 - Each combination of bolt production lot, nut lot, and washer lot (4 - Each combination Tension Control Assembly Bolt production lot or Direct Tension Indicator production lot if used) to be incorporated into the project for main member connections as designated in the Contract.	Original Manufacturer Shipping Container at the project or at fabrication facility	N/A		Rotational Capacity Test Specified in AASHTO M 164 M as modified in 714.05 Wedge Test per AASHTO M 164M

Type of Construction	Pay Item Number	Materials Specification Number	Material Name	Test	Minimum Acceptance Sampling Frequency	Acceptance Sampling Location	Sample Size (2)	Procedures: Sampling	Procedures: Testing (1)
Paint for Pavement Markings	646.20 to 646.32	708.08	Waterborne Traffic Paint	Drying time Viscosity Density	1 / Batch	Original Container (tote)	2, 1 pint (500ml) containers		ASTM D711 ASTM D562 ASTM D1475
Underdrains	605.10 to 605.23	704.16	Drainage Aggregate		1 / Project	On Project	55	T2	T27

Notes: (1) Testing procedures are AASHTO procedures unless otherwise noted.

(2) Sample size is in pounds unless otherwise noted. The sample size should be selected based on the maximum nominal aggregate size (See AASHTO T27, Section 7.1). For example, if the material visually passes a 2", 1.5", or 1" sieve then the sample size is 220 lbs, 165 lbs, and 110 lbs, respectively.

(3) For projects with more than 200 CY.

(4) Total placement for day split into equal sublots not to exceed 50 CY, test yardage chosen randomly. The test yardage is used to determine which load to test with proper sample collection techniques followed Check first load for temperature, slump and air content, **this will not be counted as the acceptance test for the first sublot**. If the first load is determined to be out-of-specification then the Contractor must test each consecutive load until 3 consecutive passing loads are tested. VTrans will check 4th consecutive load to verify.

(5) Check first load for temperature, slump and air content as an initial check. Acceptance sampling will be done every 75 CY, including the first load in the yardage count. If the first load, or any acceptance test, does not comply with VTrans' specifications then the Contractor must test each load until 3 consecutive passing loads are achieved. VTrans will check 4th consecutive load or last load, which ever happens first, to verify compliance.

(6) These materials are only required to be tested for Level 1 projects. Those items not identified are considered incidental have no materials testing requirements.

(7) Tests are to be performed by qualified plant personnel and witnessed by VTrans personnel. Minimum of six cylinders for determining detensioning, to be cured with the piece. Four specimens to determine 28 day and shipping strengths and are to be cured with the piece until it is stripped and then standard cured.

(8) Tests are to be performed by qualified plant personnel and witnessed by VTrans personnel. As a minimum, the first load as well as the load that the cylinders are fabricated from should be tested.

(9) Non-prestressed precast elements are exempt from acceptance testing and shall be furnished with a Type D certification.

(10) For projects less than 1250 CY of subbase material the Agency shall be responsible for the testing and projects over 1250 CY the Contractor is responsible for the determination of the target density. For each material source; subbase materials shall be sampled and tested once for the first 1250 CY and then once every 3000 CY thereafter.

(11) The sample size for HMA depends upon the nominal maximum aggregate in the mix, see following table. Minimum sample sizes are in accordance with AASHTO T168 and are suitable for routine testing. However, actual sample size is dependent upon the type and number of tests to which the material is to be subjected.

Mix Type:	MS	I / IS	II / IIS	III / IIIS	IV / IVS	V / VS
Maximum Nominal Aggregate Size, in:	1 1/2"	1"	3/4"	1/2"	3/8"	3/16"
Minimum Sample Size, lbs:	25	20	16	12	8	4

MATERIAL SAMPLING FREQUENCY TABLES – LEVEL 4

The following is an excerpt from Section 8.2.4 of the Agency's Quality Assurance Program which represents the materials sampling frequency for Level 4 projects.

8.2.4 Materials List

The acceptance of the materials and corresponding pay items identified in Table 8.1 can be based on an approved source, registration on the Agency's Approved Products List (QPL), acceptable material test results, or compliant material certifications (submitted prior to their use). The Agency Representative should ensure that these material certifications and test results are filed appropriately.

Applicable sections of the 2006 VTrans Standard Specifications for Construction referenced below are included in the chart below in bold type.

Material Identification	VTrans Pay Item No.	Recommended Basis for Acceptance
Aggregates	**varies**	One sample per project is required for each material that possesses a quantity greater than 200 CY.
Bridge Membranes	----	Contract Special Provisions
Cold Patch	----	APL
Culverts (Steel and HDPE)	**601**	Purchasing Contract – must satisfy material specifications in accordance with **710** and **711.**
Cast-in-Place Culvert Liners	----	Contract Special Provisions or APL
Epoxies	----	APL
Geotextiles	**649**	Type D Certification —- **720.04**
Hot Mix Asphalt	**400 series**	Purchasing Contract – Type B Certification with Contractor's Test Results. An Agency Approved Mix Design and batch slips are required.
Precast Concrete Items	**varies**	Purchasing Contract – Type A Certification with Contractor's Test Results. An Agency Approved Mix Design is required.
Reinforcing Steel	**----**	Type B Certification
Retroreflective Pavement Markings	**646**	Must satisfy material specification requirements in Section **708**
Structural Bolts	**506.19**	Type D Certification —- **714.05**
Structural Concrete	**501, 541**	Purchasing Contract – Type B Certification or Contractor's Test Results. An Agency Approved Mix Design and batch slips are required.
Traffic Barriers	**621**	Must satisfy material specification requirements in Section **728**
Traffic Signal Equipment	**678**	Must satisfy material specification requirements in Section **752**
Traffic Signs	**675**	Must satisfy material specification requirements in Section **750**

Table 8.1 – Materials List

MARKING OF SAMPLES

All samples that are to be tested at the Agency's Central Laboratory or other Qualified Laboratory must be properly identified with a sample tag or document containing appropriate information. The sample tag must be filled out completely and must accompany the sample at all times through its delivery to the laboratory. The individual receiving the sample at the laboratory shall date and initial the sample card immediately upon receipt.

Sample tags should be made out as indicated below.

Please clearly indicate the Site Manager Line Item for the sampled material on the card. Examples of where this information can be documented are included below.

SAMPLE TAG EXAMPLE

LABORATORY NO. (1) Date Rcv'd @ Lab. / (2) /

Name of Pay Item (3) Pay Item No. (4) .

Material Name (5) Type Mat. Spec. No. (6)

Quantity Represented (7) Date Sampled / (8) /

Sample Type A = _ (9) _ I = (9)_ Where Sampled (10) Time (10)
(In-Place, Stockpile, Truck etc.) Tank

Sample Source (11)
(Location on Project, Plant Name etc.)

Material Source (12)
(Supplier, Producer, Manufacturer Pit/Quarry, etc.)

Project Name (13) No. (14)

Ident. No. (15) Comparison Sample? (16) X-Ref (17)
(Release, Lot, Cert. For bolts include the separate Lot Nos for the bolts, washers and nuts.)

Sampled by (Print Name) (18)

Comments (19)

INSTRUCTIONS FOR SAMPLE TAGS

(1) To be entered by M&R personnel.

(2) To be entered by M&R personnel.

(3) The pay item name, e.g., bituminous concrete pavement, subbase of gravel, structural steel.

(4) The number that coincides with the pay item name.

(5) The name of the material being submitted, e.g., asphalt cement, stone grits. "Type" is for hot-mix and reinforcing steel.

(6) The specification number assigned to the material submitted (normally a 700 series number.)

(7) The project quantity, including units, that the sample represents, e.g., gal., cwt, yd^3, tons.

(8) The date the sample was taken.

(9) Check appropriate box for type of sample being submitted, e.g., Acceptance or Investigative.

(10) The construction location where the sample was obtained, e.g., stockpile, tank, transport, paver, roadway. Time and condition sample was taken.

(11) The supplier and location where the sample was obtained, e.g., station and offset on the project, Pike - Berlin, Barker Steel.

(12) The name of the manufacturer, producer, or owner of the pit / quarry where the material originated. For rebar samples both the supplier and manufacturer should be specified.

(13) Enter the project name.

(14) Enter the project number.

(15) Enter any available identifying number, e.g., release number, certification number, heat number.

(16) Check this box when an Independent Assurance sample is simultaneously taken with an Acceptance sample.

(17) Number used to cross-reference Independent Assurance samples with Acceptance samples. This number is assigned by VTrans' Independent Assurance personnel

(18) The first initial and last name of the person taking the sample should be printed followed by their signature. District personnel should include their district number. Personnel outside of the VTrans should identify their organization.

Enter special information or notes applicable to the sample, e.g., reinforcing steel grade and release number, hot mix AC content, temperature, etc.

VERMONT AGENCY OF TRANSPORTATION
MATERIALS AND RESEARCH SECTION
REPORT ON SAMPLE OF PORTLAND CEMENT / POZZOLAN

Proj. Name (1) Proj. No. (1) .
Lab. No (2) I.D. Marks (3) Quant. Represented (4) .
Name (5) Pay Item (6) Type (7) .
Sample/Submitted By (8) Title (8) Tested By (9) .
Sampled (10) Received (11) Tested (12) Reported (13) .
Resident (414) Address (14) .
Sample From (15) Plant (16) .
Source (17) .
Location Used/To Be Used (18) Exam. For (19) .

SAMPLE CARD FOR PORTLAND CEMENT AND POZZOLAN, DESCRIPTION OF ENTRIES:

(1) Project name(s) and number(s) represented by the cement or pozzolan sample.

(2) Entered by technician at M&R Section.

(3) The kind of sample: A, I, V or IA.

(4) Cubic yards of concrete represented by the cement or pozzolan sample.

(5) Name of the cementitious product you are submitting; e.g., Portland cement, Fly Ash, Blended Cement, Tercem, Slag.

(6) Pay item number in which the cementitious material is used.

(7) Type of cement or pozzolan. Use Roman Numerals and pozzolan descriptor; e.g., I/II or II for Portland cement, II/SF for blended cement, II/SF/Slag for Tercem, FA for Fly Ash, and S for Slag.

(8) First and last name and title of person submitting sample.

(9) Name of M&R technician testing the sample.

(10) Date sample was taken.

(11) Date sample was received at M&R Section.

(12) Entered by Technician at M&R Section.

(13) Name and address of the Resident Engineer.

(14) Location where the sample was obtained; e.g., weigh hopper, silo, Bucket loader, Tanker.

(15) Ready mix producer's name and plant location.

(16) Name of cement or pozzolan manufacturer, i.e., plant source/location.

(17) Location where concrete is to be used; e.g., bridge abutment, footing.

(18) Materials specification number for which the sample is to be tested; e.g., 701.02.

The reverse side of the card is not filled out at the plant. It is used by M&R personnel to record test results.

REPORT ON CONCRETE TEST BEAMS OR CYLINDERS

A. Front Side:

Laboratory No.....(filled by M&R Lab).....
Pay Item Name.....(1)..... Pay Item No.....(2)..... ....
Material Name.....(3)..... Class.....(4)..... Material Spec. No..... (5)..... . ...
Quantity Rep.....(6)..... Date Sampled.....(7)..... Time Sampled.....(8)..... ....
Sample Type U☐ P☐ A☐ I☐ IA☐ (9) Sampled From..... (10)..... ....
Material Source.....(11).....__ __ __ __
Project Name.....(12)..... No.....(13).....__ __ __ __ __ __
Resident.....(14)..... Field Tested By.....(15)..... .....
Comparison Sample __ (16) X-Ref No.....(17)..... Lab Tested By.....(18).....
Location Used.....(19)..... Coarse Aggregate.....(20)..... ..... __ __ __ __
Fine Aggregate.....(20)..... __ __ __ __ Total Aggregate Dry Mass (Wgt.).....(21).....
Cement Brand.....(22)..... __ __ __ __ Type.....(23)..... Mass (Wgt.)/Vol. .....(24).....
Air Entraining Admixture.....(25)..... __ __ __ __ Dosage.....(26).....
Admixture.....(27)..... __ __ __ __ Dosage.....(28).....
Admixture.....(27)..... __ __ __ __ Dosage.....(28)..... .....

B. Back Side:

TEST RESULTS

Unit Mass (Weight) Fresh Concrete.....(29)..... Air.....(30)..... Slump.....(31).....

Total Water.....(32)..... w/c Ratio....(33).... Temperature, Concrete.....(34)..... Ambient.....(35).....

Specimen No.	Cyl	Date Received	Date Broken	Desired Age At Break	Age at Break	Hour of Break	Cure Type S/F *	Indiv. Break	Avg. Break
(36)				(37)			(38)		

* S = Standard Cure
F = Field Cure

Comments: (39)

Description of fields in the:

REPORT ON CONCRETE TEST BEAMS OR CYLINDERS

A. Front Side:

(1) Pay item name, e.g., Concrete, Class B.

(2) Pay item number, e.g., 501.25, 616.27, etc.

(3) Material name, e.g., Portland cement concrete, silica fume concrete, etc.

(4) Class of concrete, e.g., AA, A, B, HPC-A etc..

(5) Specification reference for the specimen to be tested, e.g., 2006 VTrans Standard Specifications for Construction, Table 501.03A for cylinders, or Supplemental Specification 408.30 for test beams.

(6) Cubic yards of concrete represented by test specimens.

(7) The date the sample was taken.

(8) The time the sample was taken, using "military 24 hour time", e.g., 0845, 1420, etc.

(9) Check appropriate box for type of sample being submitted. See definitions, page 7.

(10) The location where the sample was obtained, e.g., truck, bucket, pump, etc. (Include truck number and/or load number.)

(11) Name and location of ready-mix plant.

(12) Project name that the sample applies to.

(13) Project number assigned to the project name.

(14) Print first initial and last name of the Resident Engineer assigned to the project.

(15) Print first initial and last name of person performing field tests and molding concrete test specimens.

(16) Check this box when an Independent Assurance sample is taken simultaneously with an Acceptance sample.

(17) Number used to cross-reference Independent Assurance samples with Acceptance samples. Assigned by M&R Section Personnel.

(18) Entered by M&R Section personnel.

(19) Specific part(s) of structure represented by test specimens, e.g., abutment, wingwall, drop inlet covers etc. Maximum of 40 characters.

(20) Name and location of coarse aggregate supplier and fine aggregate supplier.

(21) Total dry weight of coarse and fine aggregate per cubic yard in pounds.

(22) The name of the cement manufacturer.

(23) Type of cement (do not use Roman Numerals).

(24) Pounds of cement per cubic yard.

(25) Enter brand name of air entraining admixture, e.g., Microair, Darex II, etc.

(26) Volume in fluid ounces per cubic yard of concrete or per cwt of cementitious material.

(27) Enter brand name of other admixture(s), e.g., WRDA Hycol, Pozzolith 322N, Daratard 17, fly ash, ground granulated blast furnace slag, etc.

(28) Volume in fluid ounces per cubic yard of concrete or per cwt of cementitious material for chemical admixtures. Weight per cubic yard of concrete for mineral admixtures.

B. Back Side:

(29) Unit weight of fresh concrete in pcf.

(30) Air content of fresh concrete in percent (to nearest 0.1%), e.g., 4.5, 5.7.

(31) Slump to the nearest nearest 0.25 inch, e.g., 2.25 in.

(32) Total gallons of water used per cubic yard including water batched, water added on project site and free aggregate moisture.

(33) Water / cementitious material ratio. Total amount of water in gallons per cubic yard multiplied by 8.345 lb. /gal., divided by the weight of cementitious material in lbs. per cubic yard.

(34) Concrete temperature in degrees Fahrenheit.

(35) Ambient temperature in the shade at the project site in degrees Fahrenheit.

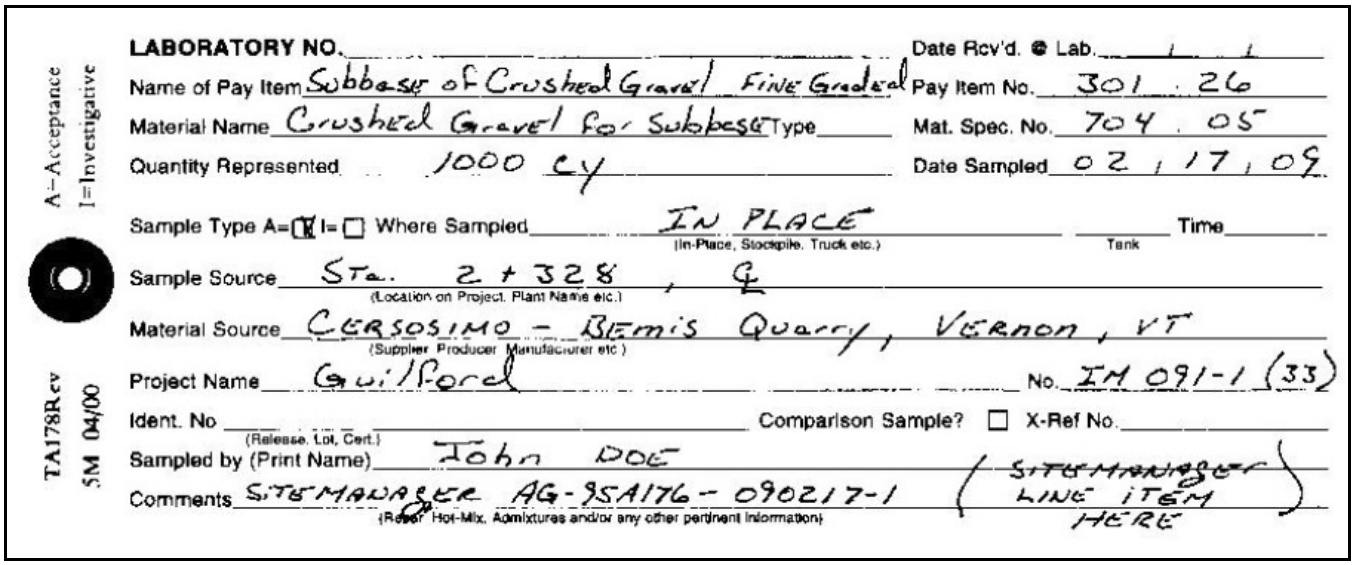
(36) Specimen identification number (six characters maximum).

(37) Desired age at which specimens are to be tested.

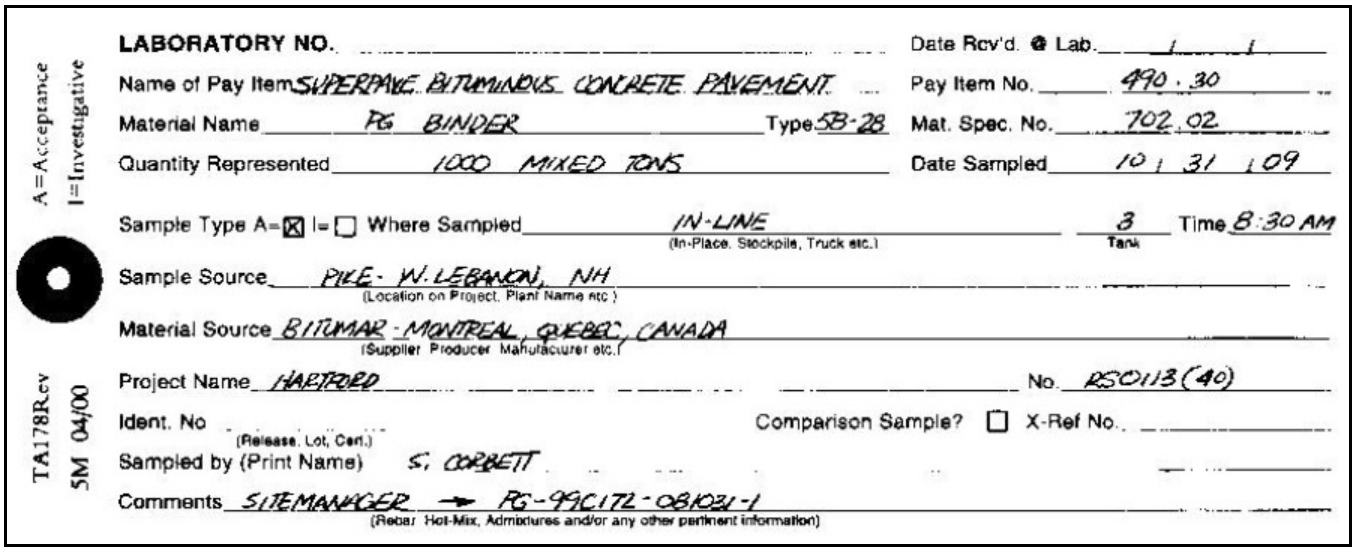
(38) "S" for standard cured or "F" for field cured.

(39) Other information regarding test specimens. Thirty-five characters maximum, e.g., frozen specimens, etc

SAMPLE CARD EXAMPLES

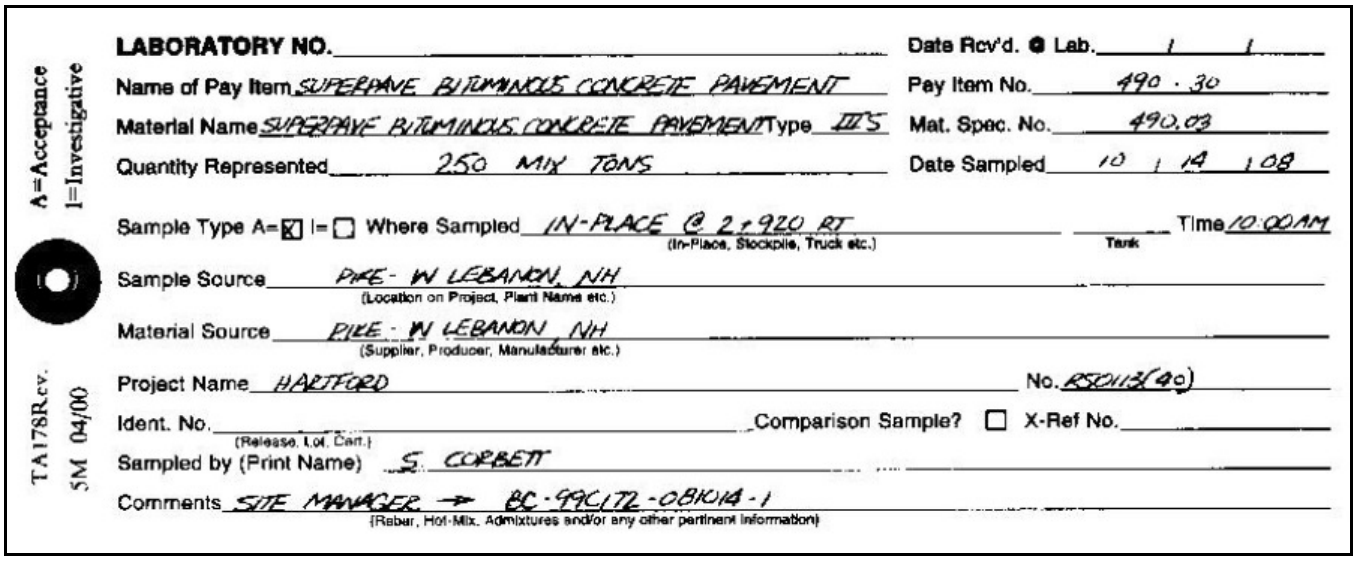


Aggregate Sample Card



Performance Graded Binder Sample Card

Note For PG Binder Samples: In addition to the information required on the sample tag, be sure to include the combined aggregate bulk specific gravity, the mix design number, the load slip number, the computed slip asphalt content, the mix temperature, the asphalt specific gravity, the time batched and the test number. **Do not use the sample container as a sample tag.**



LABORATORY NO. _____ Date Rcv'd. @ Lab. 1 / 1

A=Acceptance I=Investigative

Name of Pay Item SUPERPAVE BITUMINOUS CONCRETE PAVEMENT Pay Item No. 490 . 30

Material Name SUPERPAVE BITUMINOUS CONCRETE PAVEMENT Type III'S Mat. Spec. No. 490.03

Quantity Represented 250 MIX TONS Date Sampled 10 / 14 / 08

Sample Type A=☒ I=☐ Where Sampled IN-PLACE @ 2+920 RT (In-Place, Stockpile, Truck etc.) Tank Time 10:00AM

Sample Source PIKE - W LEBANON, NH (Location on Project, Plant Name etc.)

Material Source PIKE - W LEBANON NH (Supplier, Producer, Manufacturer etc.)

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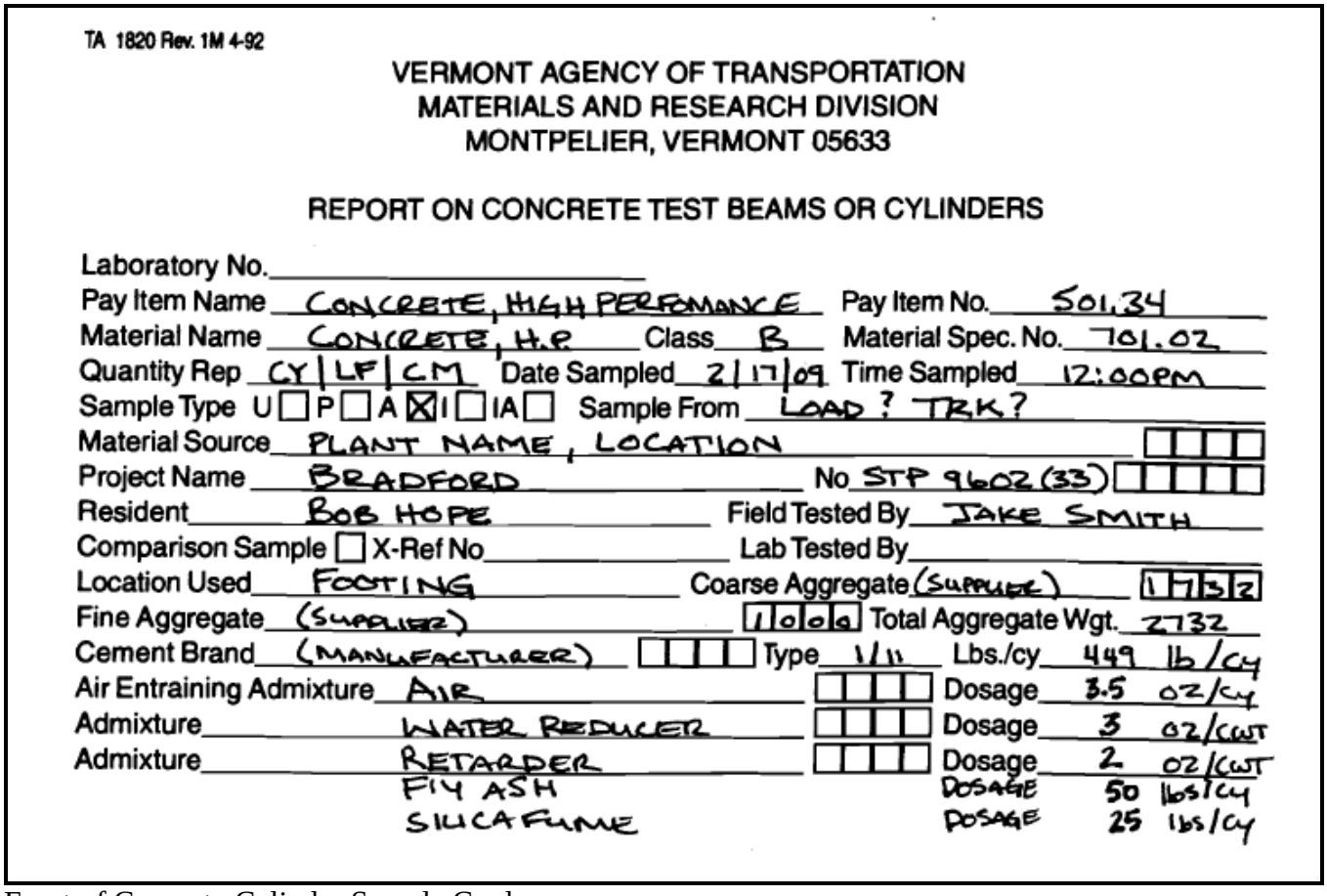
Project Name HARTFORD No. RSO113(40)

Ident. No. _____ (Release, Lot, Cert.) Comparison Sample? ☐ X-Ref No. _____

Sampled by (Print Name) S. CORBETT

Comments SITE MANAGER → BC-99C172-081014-1 (Rebar, Hot-Mix, Admixtures and/or any other pertinent information)

Bituminous Concrete Pavement Sample Card



TA 1820 Rev. 1M 4-92

VERMONT AGENCY OF TRANSPORTATION
MATERIALS AND RESEARCH DIVISION
MONTPELIER, VERMONT 05633

REPORT ON CONCRETE TEST BEAMS OR CYLINDERS

Laboratory No. _____

Pay Item Name CONCRETE, HIGH PERFOMANCE Pay Item No. 501.34

Material Name CONCRETE, H.P Class B Material Spec. No. 701.02

Quantity Rep CY | LF | CM Date Sampled 2/17/09 Time Sampled 12:00PM

Sample Type U☐ P☐ A☒ I☐ IA☐ Sample From LOAD? TRK?

Material Source PLANT NAME, LOCATION

Project Name BRADFORD No STP 9602(33)

Resident BOB HOPE Field Tested By JAKE SMITH

Comparison Sample ☐ X-Ref No _____ Lab Tested By _____

Location Used FOOTING Coarse Aggregate (SUPPLIER) 1732

Fine Aggregate (SUPPLIER) 1000 Total Aggregate Wgt. 2732

Cement Brand (MANUFACTURER) Type I/II Lbs./cy 449 lb/cy

Air Entraining Admixture AIR Dosage 3.5 oz/cy

Admixture WATER REDUCER Dosage 3 oz/cwt

Admixture RETARDER Dosage 2 oz/cwt

FLY ASH DOSAGE 50 lbs/cy

SILICAFUME DOSAGE 25 lbs/cy

Front of Concrete Cylinder Sample Card

TEST RESULTS

Unit Weight Fresh Concrete 147.60 Air 5.9% Slump 6.25
Total Water 30.9 gal/cy w/c Ratio 0.40 Temperature, Concrete 70 °F Ambient 68 °F

Specimen No.	Cyl pcf	Date Received	Date Broken	Desired Age at Break	Age At Break	Hour of Break	Cure Type S/F*	Indiv. Break psi	Avg. Break psi
A2A-1					7				
A2A-2					7				
A2A-3					14.				
A2A-4					14				
A2A-5					28				
A2A-6					28				

* S = Standard Cure; F = Field Cure

Comments: LINE ITEM Nº _____

NOTE: PLEASE CALL (802-) WITH RESULTS

PMS Nº _____

Back of Concrete Cylinder Sample Card

A=Acceptance I=Investigative

LABORATORY NO. _____ Date Rcv'd. @ Lab. 02 / 18 / 09

Name of Pay Item STRUCTURAL STEEL Pay Item No. 506 . 55

Material Name HIGH STRENGTH BOLTS, NUTS, WASHERS Type I / III Mat. Spec. No. 714 . 05

Quantity Represented 1,000 lbs Date Sampled 02 / 17 / 09

Sample Type A=☒ I=☐ Where Sampled PROJECT STOCKPILE (In-Place, Stockpile, Truck etc.) _____ Tank Time 10:00 AM

Sample Source HIGH STEEL STRUCTURES, LANCASTER, PA (Location on Project, Plant Name etc.)

Material Source HOUSE OF THREADS, POTTSTOWN, PA (Supplier, Producer, Manufacturer etc.)

Project Name/No. STOCKBRIDGE STP BRF 013-4(21) S.M. LINE ITEM No. 0110

Ident. No. 7/8" x 2 1/4" BLACK OR GALVANIZED (HD / M) Comparison Sample? ☐ X-Ref No. _____ (Release, Lot, Cert.)

HD = HOT DIPPED AND M = MECHANICAL

Sampled by (Print Name) JOHN DOE

Comments BOLT LOT # 235785 B NUT LOT # 239439A WASHER LOT # 226743 (Rebar, Hot-Mix, Admixtures and/or any other pertinent information)

TA178R cv. 5M 04/00

Bolts/Washers/Nuts Sample Card

A=Acceptance I=Investigative

LABORATORY NO. _____ Date Rcv'd. @ Lab. __ / __ / __

Name of Pay Item EPOXY COATED REINFORCING STEEL Pay Item No. 507 . 17

Material Name COATED BAR REINFORCEMENT Type #8 BAR Mat. Spec. No. 713 . 07

Quantity Represented 1,000 kg(lb) Date Sampled 02 / 17 / 09

Sample Type A=☒ I=☐ Where Sampled STOCK PILE (In-Place, Stockpile, Truck etc.) _____ Tank Time 12:00 PM

Sample Source ON PROJECT (Location on Project, Plant Name etc.)

Material Source BARKER STEEL (Supplier, Producer, Manufacturer etc.)

Project Name GUILFORD No. AC IM 091-1(33)

Ident. No. _____ (Release, Lot, Cert.) Comparison Sample? ☐ X-Ref No. _____

Sampled by (Print Name) BOB HOPE

Comments _____ PMS N°( ) LINE ITEM N°( ) (Rebar, Hot-Mix, Admixtures and/or any other pertinent information)

TA178Rev. 5M 04/00

Reinforcing Steel Sample Card

TA 182H Rev. 1000 8-07

VERMONT AGENCY OF TRANSPORTATION
MATERIALS AND RESEARCH DIVISION
MONTPELIER, VERMONT 05602

REPORT ON SAMPLE OF PORTLAND CEMENT

Proj. Name STOCKBRIDGE Proj. No. STP BRF 013-4(21)

Lab No. _____ I.D. Marks ACC. Quant. Represented 10 CY

Name FLY ASH / SLAG Pay Item 501 / 541 Type FA / SLAG

Sample/Submitted By JOHN DOE Title TECH IV Tested By _____

Sampled 02/17/09 Received 02/18/09 Tested _____ Reported _____

~~Date Ground~~ SM. LINE ITEM 0110 Resident D. BASSETT

Sample From TANKER Plant CARROLL CONCRETE, RANDOLPH, VT

Source LAFARGE

Location Used/To Be Used BRIDGE DECK Exam, For 701.XX

Flyash / Slag Cement Sample Card

TA 182H Rev. 1000 8-07

VERMONT AGENCY OF TRANSPORTATION
MATERIALS AND RESEARCH DIVISION
MONTPELIER, VERMONT 05602

REPORT ON SAMPLE OF PORTLAND CEMENT

Proj. Name STOCKBRIDGE Proj. No. STP BRF 013-4(21)

Lab No. _____ I.D. Marks ACC. Quant. Represented 20 CY

Name BLENDED CEMENT / PORTLAND CEMENT Pay Item 501 / 541 Type I / II SF

Sample/Submitted By JOHN DOE Title TECH IV Tested By _____

Sampled 02/21/09 Received 02/22/09 Tested _____ Reported _____

~~Date Ground~~ SM LINE ITEM 0110 Resident D. BASSETT

Sample From BUCKET LOADER Plant CARROLL CONCRETE, W. LEBANON, NH

Source CIMENT QUEBEC

Location Used/To Be Used BRIDGE ABUTMENT Exam, For 701.XX

Portland / Blended Cement Sample Card

A=Acceptance I=Investigative

LABORATORY NO. [TO BE FILLED IN BY LAB] Date Rcv'd. @ Lab. [TO BE FILLED IN BY LAB] / /

Name of Pay Item 6" YELLOW LINE Pay Item No. 646 . 215

Material Name YELLOW WATERBORNE TRAFFIC PAINT Type — Mat. Spec. No. 708 . 08

Quantity Represented 75,000 FT. Date Sampled 09 / 08 / 08

Sample Type A=☒ I=☐ Where Sampled SPRAYER TRUCK ON PROJECT (In-Place, Stockpile, Truck etc.) 2 Tank Time 13:30

Sample Source L+D SAFETY MARKING (Location on Project, Plant Name etc.)

Material Source FRANKLIN PAINT CO. (Supplier, Producer, Manufacturer etc.)

Project Name SWANTON-HIGHGATE No. IM SURF(5)

Ident. No. LOT # 152055 (Release, Lot, Cert.) Comparison Sample? ☐ X-Ref No. N/A

Sampled by (Print Name) JOHN DOE

Comments _____ (Rebar, Hot-Mix, Admixtures and/or any other pertinent information)

TA178Rev. 5M 04/00

Paint Sample Card

SAMPLING CONSIDERATIONS

SAMPLING REINFORCING BARS / REINFORCING ELEMENTS FOR MSE WALL

Size of Sample

For each size, brand, and grade or type the minimum length of straight bar / element required for testing is 2.5 feet, and the minimum number of test sections required is two. These may be obtained either from a single 5 foot straight section or from two bent bars that also contain at least 2.5 feet, but less than 5 feet, of straight bar.

SAMPLING FRESH CONCRETE

Care and Identification of Concrete Cylinders for Compressive Strength Testing

a. Specimens shall be molded on a level, rigid surface, free of vibration and other disturbances. Test cylinders must be stored on a level surface. Specimens received at the M&R Section with ends which are not cast with a plane perpendicular to the axis will be discarded.

b. Immediately after finishing, move the specimens to their initial curing place. Precautions shall be taken to prevent evaporation and loss of water from the specimens. The outside surfaces of cardboard molds shall be protected from contact with wet burlap or other sources of water.

c. Standard Curing: This refers to test specimens that, after the initial curing period, are stored in a moist environment where free water is maintained on the specimen surfaces at all times. During the initial 24 +/- 8 hours after molding, the temperature immediately adjacent to the specimens for standard curing shall be maintained in the range of 60 to 80 °F. Specimens that are to be transported to the M&R Section testing laboratory within the initial 48 hour curing period shall remain in their molds in a moist environment, until they are received in the laboratory. Standard cured specimens which are not to be transported within 48 hours of molding shall be removed from the molds after the initial 24 +/- 8 hours and stored in a concrete curing box conforming to that described in VTrans Standard Specifications for Construction, Section 631.05.

d. Field Curing: This refers to test specimens that, after the initial curing period, are stored with, and undergo the same curing conditions as, the structure. Field cured specimens shall be stored, after the initial 24 +/- 8 hours, in or on the structure as near to the point of deposit of the concrete represented as possible. With regard to temperature and moisture, the environment in which these specimens are stored shall match, as closely as possible, that of the concrete work represented by the specimens. Specimen molds should be removed at the same time as the form work.

e. During storage and transportation, all specimens must be protected from freezing temperatures, moisture loss, and damage due to jarring.

f. Molds shall be labeled with required identification before the specimens are cast, and this identification shall be transferred to the cylinders immediately after removal from the molds. Each cylinder should be identified by number and/ or letter, which is also entered on the back of the "Report on Concrete Cylinders" card.

g. If the Resident Engineer requires "early breaks" in order to determine when 85% of the required compressive strength, or for the purpose of allowing payment, has been attained, the Resident Engineer shall notify the M&R Section 24 hours in advance of the desired time of the cylinder break.

h. Unless otherwise indicated, the Resident Engineer enters appropriate data in the thirty-nine sections of the card, as described on page 12. The "yellow" cylinder card should be transferred with the first group of cylinders to be tested. Subsequent groups of cylinders from the same batch require an attached photocopy of the original "yellow" cylinder card.

SAMPLING BITUMINOUS MIXTURES

Marking of Samples

Sample tags shall be made out as indicated above0. In addition to the information required on the sample tag, be sure to include the combined aggregate bulk specific gravity, the mix design number, the load slip number, the computed slip asphalt content, the mix temperature, the asphalt specific gravity, the time batched and the test number. Do not use the sample container as a sample tag.

SAMPLING OF LIQUID ASPHALT PRODUCTS INCLUDING PERFORMANCE GRADED BINDERS AND EMULSIONS

Safety Precautions

Bituminous materials may be as hot as 350º F and will cause severe burns if spilled or splashed on the body. The technician performing this operation should inform others (on site) and if possible be observed.

The following safety precautions shall be employed:

a. Gloves and long sleeve shirts with sleeves rolled down shall be worn while sampling and sealing containers.

b. Face shields must be worn while sampling.

c. The person taking the sample shall stand away from the sampling valve as far as practical and upwind of the valve to avoid being splashed with the liquid.

d. The sample shall be taken such that splashing of hot materials is prevented.

e. During sealing, the sample container shall be placed on a firm, level surface to prevent splashing, dropping or spilling of the material.

f. A plug of solidified material can form within the pipe nipple leading from the sampling valve, which could cause a bubble to form and splatter when the sample is drawn off. The nipple should be checked for solidified material prior to sampling. If necessary, **with the valve closed**, the nipple should be reamed or heated to remove any solidified material.

Sample Container – Additional Information

Samples shall be placed in containers that comply with the following:

a. Performance graded binder - 1 quart metal can with double compression lid.

b. Asphalt Emulsion - 1 quart wide mouth plastic jars with screw top containing a fiber board Teflon coated insert.

c. Tar Emulsion - 1 quart wide mouth plastic jars with screw top containing a fiber board Teflon coated insert.

Only new, clean sample containers shall be used. Suitable containers may be obtained from the M&R Section.

Appendix A

Pay Item and Certification Quick Reference

Appendix A: Pay Item and Certification Quick Reference

Pay item no.	Name	Certification Type	Material Specification No.	Material Description
404.45	TAR EMULSION	A	702.05	
404.46	TAR EMULSION	A	702.05	
404.65	EMULSIFIED ASPHALT	A	702.04	
406.25	ASPHALT CEMENT	E	702.02	
417.20	BITUMINOUS CRACK SEALING - "BLOW AND GO"	B	707.04	
417.10	BITUMINOUS CRACK SEALING	B	707.04	
505.15	STEEL PILING, HP 12 X 53	C	730.01	
505.155	STEEL PILING, HP 12 X 63	C	730.01	
505.16	STEEL PILING, HP 12 X 74	C	730.01	
505.165	STEEL PILING, HP 12 X 84	C	730.01	
505.17	STEEL PILING, HP 14 X 73	C	730.01	
505.18	STEEL PILING, HP 14 X 89	C	730.01	
505.19	STEEL PILING, HP 14 X 102	C	730.01	
505.20	STEEL PILING, HP 14 X 117	C	730.01	
505.25	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 12 X 53	C	730.01	
505.255	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 12 X 63	C	730.01	
505.26	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 12 X 74	C	730.01	
505.265	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 12 X 84	C	730.01	
505.27	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 14 X 73	C	730.01	
505.28	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 14 X 89	C	730.01	
505.29	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 14 X 102	C	730.01	
505.30	STEEL PILING FOR INTEGRAL ABUTMENTS, HP 14 X 117	C	730.01	
505.35	PERMANENT STEEL SHEET PILING	C	730.02	
505.36	TEMPORARY STEEL SHEET PILING	C	730.02	
506.50	STRUCTURAL STEEL, ROLLED BEAM	D	714	
506.55	STRUCTURAL STEEL, PLATE GIRDER	D	714	
506.56	STRUCTURAL STEEL, CURVED PLATE GIRDER	D	714	
506.57	STRUCTURAL STEEL, TRUSS	D	714	
506.60	HIGH STRENGTH BOLTS, NUTS, AND WASHERS	D	714.05	
506.60	ANCHOR BOLTS AND BRIDGE RAILING	D	714.07	
506.60	ANCHOR BOLTS, BEARING DEVICES	D	714.08	
506.60	STRUCTURAL STEEL	D	714	
506.75	STRUCTURAL STEEL	D	714	
507.16	DRILLING AND GROUTING DOWELS	APL	707.03	
507.16	DRILLING AND GROUTING DOWELS	A	713.07c	
507.17	EPOXY COATED REINFORCING STEEL	A	713.07c	
507.19	MECHANICAL BAR CONNECTOR	A	713.02	
508.15	SHEAR CONNECTORS	D	714.10	
510.20	PRESTRESSED CONCRETE MEMBER	D	713.06	
510.21	PRESTRESSED CONCRETE BOX BEAMS	D	713.06	
510.22	PRESTRESSED CONCRETE VOIDED SLABS	D	713.06	
510.23	PRESTRESSED CONCRETE GIRDERS	D	713.07	
510.24	GROUTING SHEAR KEYS	APL	707.03	
513.25	STRUCTURAL PAINTING, SHOP APPLIED	A	708.01	
513.30	STRUCTURAL PAINTING, FIELD APPLIED	A	708.01	
514.10	WATER REPELLENT	A	726.02	
		A	726.03	
516.10	BRIDGE EXPANSION JOINT, ASPHALTIC PLUG	APL	707.15	
516.11	BRIDGE EXPANSION JOINT, VERMONT	D	516.04	
516.12	BRIDGE EXPANSION JOINT, FINGER PLATE	D	516.12	
519.20	SHEET MEMBRANE WATERPROOFING, TORCH APPLIED	APL	519.02	
522.20	STRUCTURAL LUMBER AND TIMBER, UNTREATED	A	709.01	
522.25	STRUCTURAL LUMBER AND TIMBER, TREATED	A	709.01	Timber
		D	726.01	Treatment
522.30	NONSTRUCTURAL LUMBER, UNTREATED	A	709.01	
522.35	NONSTRUCTURAL LUMBER, TREATED	A	709.01	Timber
		D	726.01	Treatment
522.40	STRUCTURAL GLUED LAMINATED TIMBER	A	709.03	Timber
		D	726.01	Treatment
524.11	JOINT SEALER, HOT POURED	B	707.04	

Appendix A: Pay Item and Certification Quick Reference

Pay item no.	Name	Certification Type	Material Specification No.	Material Description
524.13	JOINT SEALER, COLD POURED	B	707.04(b)	
524.21	JOINT SEALER, POLYURETHANE	B	707.05	
525.10	REMOVAL OF EXISTING RAILING	D	732.01	
525.15	METAL HAND RAILING	D	732.01	
525.22	BRIDGE RAILING, 3 RAIL ALUMINUM	D	732.02	
525.23	BRIDGE RAILING, ALUMINUM/PEDESTRIAN	D	732.02	
525.31	BRIDGE RAILING, GALVANIZED 2 RAIL BOX BEAM	D	732.03	
525.33	BRIDGE RAILING, GALVANIZED NETC 2 RAIL	D	732.04	
525.34	BRIDGE RAILING, GALVANIZED NETC 4 RAIL	D	732.04	
525.40	BRIDGE RAILING, GALVANIZED HD STEEL BEAM/CURB MOUNTED	D	732.04	
525.41	BRIDGE RAILING, GALVANIZED HD STEEL BEAM/FASCIA MOUNTED	D	732.04	
525.42	BRIDGE RAILING, GALVANIZED HDSB/CURB MOUNTED/HAND RAIL	D	732.04	
525.43	BRIDGE RAILING, GALVANIZED HDSB/FASCIA MOUNTED/HAND RAIL	D	732.04	
525.44	BRIDGE RAILING, GALVANIZED HDSB/FASCIA MOUNTED/STEEL TUBING	D	732.04	
526.15	TREATED TIMBER BIN - TYPE RETAINING WALL (MOD)	D	712.03	Timber
		A	712.03d	Hardware
526.20	CONCRETE BIN - TYPE RETAINING WALL	Special Provisions		
526.30	MECHANICALLY STABILIZED EARTH (MSE) WALL	Special Provisions		
531.10	BEARING DEVICE ASSEMBLY, PREFORMED FABRIC PAD	A	731.01	
531.11	BEARING DEVICE ASSEMBLY, ELASTOMERIC PAD	D	731.03	
531.12	BEARING DEVICE ASSEMBLY, POT	D	731.04	
531.13	BEARING DEVICE ASSEMBLY, STEEL	D	714.01	
531.14	BEARING DEVICE ASSEMBLY, INTEGRAL ABUTMENT	D	714.01	
531.15	BEARING DEVICE ASSEMBLY, HIGH LOAD MULTI-ROTATIONAL	D	714.01	
540.10	PRECAST CONCRETE STRUCTURE	A	705.04	
541.58	MORTAR, TYPE IV	APL	707.03	
580.17	RAPID SETTING CONCRETE REPAIR MATERIAL	APL	780.03	
580.18	OVERHEAD AND VERTICAL CONCRETE REPAIR MATERIAL	APL	780.02	
580.20	RAPID SETTING CONCRETE REPAIR MATERIAL WITH COARSE AGGREGATE	APL	780.04	
601.0000 to 601.0199	CSP	D	711.01	
601.0200 to 601.0399	CAAP	A	711.02	
601.0400 to 601.0599	PCCSP	D	711.03	
601.0600 to 601.0799	PCCSP(PI)	D	711.03	
601.0800 to 601.0899	RCP	A	710.01	
601.0900 to 601.0999	CPEP	APL	710.03	
601.2000 to 601.2199	CSP(SL)	D	711.01	
601.2200 to 601.2399	CAAP(SL)	A	711.02	
601.2400 to 601.2599	PCCSP(SL)	D	711.03	
601.2600 to 601.2799	CPEP(SL)	APL	710.03	
601.3000 to 601.3199	CSPA	D	711.01	
601.3200 to 601.3399	CAAPA	A	711.02	
601.3400 to 601.3599	PCCSPA	D	711.03	
601.3600 to 601.3799	PCCSPA(PI)	D	711.03	
601.4000 to 601.4199	CSPA(SL)	D	711.01	
601.4200 to 601.4399	CAAPA(SL)	A	711.02	
601.4400 to 601.4599	PCCSPA(SL)	D	711.03	
601.5000 to 601.5199	CSP ELBOW	D	711.01	
601.5200 to 601.5399	CAAP ELBOW	A	711.02	
601.5400 to 601.5599	PCCSP ELBOW	D	711.03	
601.5600 to 601.5799	PCCSP Elbow (PI)	D	711.03	
601.5800 to 601.5999	CPEP ELBOW	APL	710.03	
601.6000 to 601.6199	CSPES	D	711.01	
601.6200 to 601.6399	CAAPES	A	711.02	
601.6800 to 601.6899	RCPES	A	710.02	
601.7000 to 601.7099	CPEPES	APL	710.03	
601.8000 to 601.8199	CSPAES	D	711.01	
601.8200 to 601.8399	CAAPAES	A	711.02	
601.98	CONCENTRIC REDUCER SECTION	D	711.01	
604.10	CONCRETE CATCH BASIN WITH CAST IRON GRATE	A	705.04	PCC
		A	715.01	Cast Iron

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Pay item no.	Name	Certification Type	Material Specification No.	Material Description
604.11	CONCRETE MANHOLE WITH CAST IRON COVER	A	705.04	PCC
		A	715.01	Cast Iron
604.18	PRECAST REINFORCED CONCRETE DROP INLET W/ CAST IRON	A	705.04	PCC
		A	715.01	Cast Iron
604.20	PRECAST REINFORCED CONCRETE CATCH BASIN WITH CAST IRON GRATE	A	705.04	PCC
		A	715.01	Cast Iron
604.21	PRECAST REINFORCED CONCRETE MANHOLE WITH CAST IRON COVER	A	705.04	PCC
		A	715.01	Cast Iron
604.22	SANITARY SEWER MANHOLE	A	705.04	PCC
		A	715.01	Cast Iron
604.25	PRECAST REINFORCED CONCRETE PIPE DI WITH CAST IRON GRATE	A	705.04	PCC
		A	715.01	Cast Iron
604.26	PRECAST REINFORCED CONCRETE PIPE DI WITH CONCRETE COVER	A	705.04	
604.30	PRECAST REINFORCED CONCRETE CURB DI WITH CAST IRON GRATE	A	705.04	PCC
		A	715.01	Cast Iron
604.40	CHANGING ELEVATION OF DROP INLETS, CATCH BASINS, OR MANHOLES	A	705.01	
604.412	REHAB. DROP INLETS, CATCH BASINS, OR MANHOLES, CLASS I	A	705.01	Brick
		A	705.04	PCC
		A	715.01	Cast Iron
604.415	REHAB. DROP INLETS, CATCH BASINS, OR MANHOLES, CLASS II	A	705.01	Brick
		A	705.04	PCC
		A	715.01	Cast Iron
604.418	REHAB. DROP INLETS, CATCH BASINS, OR MANHOLES, CLASS III	A	705.01	Brick
		A	705.04	PCC
		A	715.01	Cast Iron
604.42	CHANGING ELEVATION OF SEWER MANHOLES	A	705.01	Brick
604.45	CAST IRON GRATE WITH FRAME, TYPE A	A	715.01	
604.46	CAST IRON GRATE WITH FRAME, TYPE B	A	715.01	
604.47	CAST IRON GRATE WITH FRAME, TYPE D	A	715.01	
604.48	CAST IRON GRATE WITH FRAME, TYPE E	A	715.01	
604.49	CAST IRON GRATE, TYPE C	A	715.01	
604.50	STEEL GRATE	D	604.02	
604.55	CAST IRON COVER WITH FRAME	A	715.01	
604.56	CAST IRON COVER WITH FRAME, SEWER	A	715.01	
605.10	UNDERDRAIN PIPE	APL	710.03	Material Dependent
605.11		A	710.06	
605.12		D	711.01	
605.13		A	711.02	
605.20	6 INCH UNDERDRAIN CARRIER PIPE	APL	710.03	Material Dependent
605.21		A	710.06	
605.22		D	711.01	
605.23		A	711.02	
605.95	UNDERDRAIN FLUSHING BASIN	APL	710.03	Material Dependent
		A	710.06	
		D	711.01	
		A	711.02	
		A	715.01	
616.20	GRANITE SLOPE EDGING	APL	707.03	
616.21	VERTICAL GRANITE CURB	APL	707.03	
616.22	GRANITE BRIDGE CURB	APL	707.03	
616.23	GRANITE BRIDGE CURB, MEDIAN SLOPE EDGE	APL	707.03	
616.25	PRECAST REINFORCED CONCRETE CURB, TYPE A	D	729.04	
616.26	PRECAST REINFORCED CONCRETE CURB, TYPE B	D	729.04	
616.35	TREATED TIMBER CURB	D	729.06	
618.30	DETECTABLE WARNING SURFACE	APL	751.08	
619.17	YIELDING MARKER POSTS	A	751.01(b)	
620.11	CHAIN-LINK FENCE	A	727.02	
620.12				
620.13				

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Pay item no.	Name	Certification Type	Material Specification No.	Material Description
620.15	GATE FOR CHAIN-LINK FENCE	A	727.02	
620.16				
620.17				
620.20	BRACING ASSEMBLY FOR CHAIN-LINK FENCE	A	727.02	
620.21				
620.22				
620.25	WOVEN WIRE FENCE WITH STEEL POSTS	A	727.01	
620.26	WOVEN WIRE FENCE WITH WOOD POSTS			
620.30	DRIVE GATE FOR WOVEN WIRE FENCE			
620.40	STEEL BRACE FOR WOVEN WIRE FENCE			
620.41	WOOD BRACE FOR WOVEN WIRE FENCE			
620.50	REMOVING AND RESETTING FENCE	A	727.01d	
620.75	SNOW BARRIER, GALVANIZED	A	727.02	
621.15	PLANK RAIL	D	728.02a	
621.16	CEDAR LOG RAIL	A	728.02b	
621.17	CABLE GUARDRAIL	A	728.02c	
621.18	STEEL BACKED TIMBER GUARDRAIL	D	728.02a	
621.20	STEEL BEAM GUARDRAIL, GALVANIZED	D	728	
621.205	STEEL BEAM GUARDRAIL, GALVANIZED W/8 FEET POSTS	D	728	
621.206	STEEL BEAM GUARDRAIL, GALVANIZED/NESTED	D	728	
621.207	STEEL BEAM GUARDRAIL, GALVANIZED/NESTED W/8 FEET POSTS	D	728	
621.21	HD STEEL BEAM GUARDRAIL, GALVANIZED	D	728	
621.215	HD STEEL BEAM GUARDRAIL, GALVANIZED W/8 FEET POSTS	D	728	
621.216	HD STEEL BEAM GUARDRAIL, GALVANIZED/NESTED	D	728	
621.217	HD STEEL BEAM GUARDRAIL, GALVANIZED/NESTED W/8 FEET POSTS	D	728	
621.25	THRIE BEAM GUARDRAIL	D	728.02d	
621.30	BOX BEAM GUARDRAIL	D	728.02e	
621.35	STEEL BEAM MEDIAN BARRIER	D	728	
621.40	THRIE BEAM MEDIAN BARRIER	D	728	
621.45	CONCRETE MEDIAN BARRIER	A	713.07	
621.50	MANUFACTURED TERMINAL SECTION, FLARED	APL	728.06	
621.51	MANUFACTURED TERMINAL SECTION, TANGENT	APL	728.06	
621.53	TERMINAL CONNECTOR FOR STEEL BEAM GUARDRAIL	D	728.02	
621.55	MEDIAN BARRIER TERMINAL	D	728.02	
621.60	ANCHOR FOR STEEL BEAM RAIL	A	728.05	
621.61	ANCHOR FOR STEEL TO BOX BEAM TRANSITION	A	728.05	
621.65	ANCHOR FOR CABLE RAIL	A	728.05	
621.66	ANCHOR FOR CABLE RAIL AT OPENINGS	A	728.05	
621.70	GUARDRAIL APPROACH SECTION, GALVANIZED TYPE I	D	728.02	
621.71	GUARDRAIL APPROACH SECTION, GALVANIZED TYPE II	D	728.02	
621.72	GUARDRAIL APPROACH SECTION, GALVANIZED NETC 2 RAIL	D	728.02	
621.73	GUARDRAIL APPROACH SECTION, GALVANIZED NETC 4 RAIL	D	728.02	
621.74	ALUMINUM APPROACH RAILING	D	732.02	
621.75	REMOVE AND RESET GUARDRAIL	A	728.03	
621.76	REPLACE GUARDRAIL POST ASSEMBLY	D	728.01	
621.77	REPLACE GUARDRAIL BEAM UNIT	D	728.02	
621.85	GUIDE POSTS	D	728.01	
622.10	INSULATION BOARD	A	735.01	
625.10	SLEEVE FOR UTILITIES	A	710.01	Material Dependent
		A	710.05	
		D	711.01	
		A	711.02	
		A	710.06	
626.20	WELL CASING PIPE	A	741.01	
628.20	ABS SEWER PIPE SOLID WALL	A	710.05	
628.21	ABS SEWER PIPE COMPOSITE	A	710.05	
628.22	REINFORCED CONCRETE SEWER PIPE	A	710.01	
628.25	CAST IRON SOIL PIPE, EXTRA HEAVY	A	740.07	
628.26	CAST IRON PIPE, CEMENT-LINED	A	740.07	
628.27	VITRIFIED CLAY PIPE, EXTRA STRENGTH	A	710.04	

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Pay item no.	Name	Certification Type	Material Specification No.	Material Description
628.28	DUCTILE IRON PIPE, CEMENT-LINED	A	740.07	
628.35	PVC SEWER PIPE	A	710.06	
629.23	SEAMLESS COPPER WATER TUBE	A	740.04	
629.24	DUCTILE IRON PIPE, CEMENT-LINED	A	740.07	
629.32	PLASTIC WATER PIPE, FLEXIBLE	A	740.01	
629.33	PLASTIC WATER PIPE, RIGID	A	740.02	
629.34	STEEL WATER PIPE, GALVANIZED	A	740.05	
629.44	PIPE INSULATION	A	740.08	
646.20 - 646.32 & 646.214, 646.215	Paint Pavement Markings	A	708.08d	
		A	708.09	
646.400 to 646.519	DURABLE Pavement Markings, THERMOPLASTIC	APL	708.10	
	DURABLE Pavement Markings, POLY UREA	APL	708.08a	
	DURABLE Pavement Markings, MARKING TAPE	APL	708.12	
	DURABLE Pavement Markings, EPOXY PAINT	APL	708.08c	
	DURABLE Pavement Markings, METHYL-METHACRYLATE PAINT	APL	708.08D	
646.76	LINE STRIPING TARGETS	APL	708.14	
646.80	RAISED PAVEMENT MARKERS, TYPE I	APL	708.11	
646.81	PAINTED CURB	APL	708.08	
646.82	PAINTED ISLAND	APL	708.08	
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	D	720	
649.21	GEOTEXTILE UNDER RAILROAD BALLAST	D	720	
649.31	GEOTEXTILE UNDER STONE FILL	D	720	
649.41	GEOTEXTILE FOR UNDERDRAIN TRENCH LINING	D	720	
649.51	GEOTEXTILE FOR SILT FENCE	D	720	
649.515	GEOTEXTILE FOR SILT FENCE WOVEN WIRE REINFORCED	D	720	
649.61	GEOTEXTILE FOR FILTER CURTAIN	D	720	
651.15	SEED	A	755.04	
651.16	WILDFLOWER SEED	A	755.04	
651.17	SEED, WINTER RYE	A	755.04	
651.18	FERTILIZER	A	755.06	
651.20	AGRICULTURAL LIMESTONE	A	755.08	
651.28	HYDRAULIC MULCH	APL	755.10(e)	
651.30	SODDING	A	755.03	
653.10	TACKIFIER	APL	755.10(f)	
653.20	TEMPORARY EROSION MATTING	A	755.11	
653.21	PERMANENT EROSION MATTING	A	755.11	
653.30	PREFABRICATED CHECK DAM	APL	720.05	
653.41	INLET PROTECTION DEVICE, TYPE II	APL	720.06	
653.45	FILTER BAG	APL	720.07	
653.50	BARRIER FENCE	APL	727.03	
653.55	PROJECT DEMARCATION FENCE	APL	727.04	
656.15	EVERGREEN SEEDLINGS	A	755.12	
656.16	DECIDUOUS SEEDLINGS	A	755.12	
656.20	EVERGREEN TREES	A	755.12	
656.25	EVERGREEN SHRUBS	A	755.12	
656.30	DECIDUOUS TREES	A	755.12	
656.35	DECIDUOUS SHRUBS	A	755.12	
656.40	GROUND COVERS AND VINES	A	755.12	
656.41	PERENNIALS	A	755.12	
656.42	TUBELINGS	A	755.12	
675.20	TRAFFIC SIGNS, TYPE A	A	750	
675.21	TRAFFIC SIGNS, TYPE B	A	750	
675.301	FLANGED CHANNEL SIGN POST	D	750.01(a)	
675.31	W-SHAPE STEEL SIGN POST	D	750.01(a)	
675.32	TUBULAR ALUMINUM SIGN POST	A	750.01	
675.33	TUBULAR STEEL SIGN POST	D	750.01(a)	
675.341	SQUARE TUBE SIGN POST AND ANCHOR	D	750.01(a)	
676.10	DELINEATOR WITH STEEL POST	A	751	
676.15	REMOVE AND REPLACE REFLECTOR UNIT	A	751.02	
676.20	DELINEATOR WITH FLEXIBLE POST	A	751	
677.12	OVERHEAD TRAFFIC SIGN SUPPORT, CANTILEVER	D	677.02	
677.13	OVERHEAD TRAFFIC SIGN SUPPORT, MULTI-SUPPORT	D	677.02	
677.22	OVERHEAD TRAFFIC SIGN SUPPORT, CANTILEVER WITH LIGHTING	D	677.02	

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Pay item no.	Name	Certification Type	Material Specification No.	Material Description
677.23	OVERHEAD TRAFFIC SIGN SUPPORT, MULTI-SUPPORT WITH LIGHTING	D	677.02	
677.25	REMOVE AND RESET OVERHEAD TRAFFIC SIGN SUPPORT	D	677.02	
678.15	TRAFFIC CONTROL SIGNAL SYSTEM, INTERSECTION	D	752	
678.16	FLASHING BEACON, GROUND MOUNTED	A	752.07	
678.17	FLASHING BEACON, AERIAL MOUNTED	A	752.07	
678.20	INTERCONNECTING CABLE	A	752.04	
678.21	ELECTRICAL CONDUIT	A	752.08	
678.23	WIRED CONDUIT	A	752.08	
678.25	PULL BOX, STANDARD	A	752.12	
678.26	JUNCTION BOX	A	752.12	
678.27	PULL BOX, DOUBLE	A	752.12	
678.30	ELECTRICAL CONDUIT SLEEVE	A	710.06	
679.16	DIRECT BURIAL CABLE FOR STREET LIGHTING	A	753.04	
679.21	LIGHT POLE BASE	D	753.01	
679.45	LIGHT POLE	A	753.01b	Aluminum
		D	753.01c	Steel
679.47	BRACKET ARM	A	753.01b	Aluminum
679.47	BRACKET ARM	D	753.01c	Steel
679.50	LUMINAIRE	A	753.02	
680.20	TRAVEL INFORMATION SIGN	A	750	
680.25	BUSINESS DIRECTIONAL SIGN	A	750	
680.72	OVERLAY FOR TRAVEL INFORMATION SIGN	A	750.08	