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CHAPTER II - METHODS AND FREQUENCIES OF SAMPLING

SECTION 201 GENERAL

It shall be the responsibility of the District Materials Engineer (DME), as representative of the District Administrator (DA), to maintain general supervision over the taking of samples in the field for submission to the laboratory. The DME is also the field representative of the Materials Division and represents the State Materials Engineer (SME) in matters pertaining to sampling. Sampling of materials in the field (from project, plants, or distributors) shall be done only by certified and authorized personnel, as outlined in Sec. 106.02.

When feasible, manufactured material will be sampled as close to the source of manufacture as possible. When beyond Commonwealth boundaries, this will usually be done by a commercial laboratory representative contacted through the Materials Division. Materials composed of several different tested items, will be tested after the materials are combined and before final incorporation into the project.

When Project Inspectors are authorized to take samples, the responsibility of the DAs, Area Construction Engineers (ACE), and DMEs shall not be relieved.

For a test to be valid the sample must be as nearly representative of the material as possible. Material shall be sampled by an employee or an official representative of VDOT when such samples are tested as a basis for acceptance or rejection of the supply.

The sampler must be aware that some materials segregate and, therefore, the sample unless properly taken could give a false impression of the whole. Samples are taken randomly in a preconceived method to reduce bias, either intentional or unintentional on the part of the sampler. There are a number of ways randomness may be accomplished. Such details are contained in other instructions issued by the Materials Division, in the Virginia Test Methods (VTM) or Study Guides for the appropriate material.

The sample for materials that tend to segregate easily, such as aggregates, should be of sufficient size that the laboratory may reduce the material to testing size by one of the methods outlined in AASHTO T 248.

Samples for new products or innovations may be submitted by the Producer or Manufacturer of the product, but the materials represented by such samples must be resampled and tested by an authorized employee or representative of VDOT, and approved, before the material may be accepted in highway construction or maintenance.

It is important to note that the frequencies for sampling outlined herein are the minimums required for materials acceptance. VDOT has the prerogative of taking more samples, should the need be so indicated by questionable or suspect material or test results.

Quite often it is important to increase the frequency of sampling when a production plant initially begins and to decrease as the product approaches an even characteristic. Increased frequency may also be warranted if the source is a new one to VDOT, at least, until such time as the quality control of the product is proven.

It should also be noted that, unless shown otherwise, the frequencies and locations for sampling apply primarily to source sampling. If it is necessary to perform sampling of material at the project site, this will usually be at a lesser frequency than source sampling. See Sec 205 for the normal sampling location.

SECTION 202 DEFINITION OF SAMPLES

In order to properly identify the various types of samples, and in order that the Materials Division may properly distribute the test results to the field, it will be necessary that samples be designated as outlined in the following sections.

Sec. 202.01 Investigation Samples

Investigation samples are those taken by any properly trained representative of the Materials Division, and used for approval of new products, approval of new sources of supply, or for information of the Contractor. Any pertinent information regarding the sample should be recorded on the proper form accompanying the sample to the Laboratory, in order that the material under investigation can be readily tested and identified for future use.

Sec. 202.02 General Samples

General samples are those usually representing large quantities of materials in stock at a Producer's location. These samples ordinarily will be submitted for test by representatives of the Department. After the material is approved for use by the Materials Division, it will later be released from stock to various specific projects in specified amounts. The sum total of all the individual amounts released to different projects should never exceed the total amount originally reported in stock as being tested and approved on any one general report.

Sec. 202.03 Acceptance and Verification Samples

Acceptance samples are those submitted for test during the normal course of construction or maintenance and are used for purposes of routine acceptance or nonacceptance. These samples constitute the principle means of determining, prior to or at the time of the construction or maintenance operations, whether the materials and workmanship are satisfactory or whether corrective action should be taken before the work proceeds. Under ordinary conditions, this will be the type sample most commonly used.

Only properly instructed and trained Department representatives may take this sample. Acceptance samples will normally represent material being used on specific projects, and should be identified with the correct project and section numbers when submitted to the Laboratory for testing. Acceptance samples should be taken in such quantities and at such times as specified in the various sections of this Manual, in specifications, in special provisions, or in letters of instruction from the Engineer, in order to sufficiently maintain proper and normal sampling and acceptance.

These samples and tests are made to determine on a regular basis whether the quality of the materials being used or proposed for use in the construction and maintenance and the quality of the work being produced are in reasonably close conformity with the plans and specifications.

Acceptance samples are described as being of one of the following 5 types:

- (1) Samples of material taken and tested at the site by project personnel. Project personnel will make routine test reports and distribution of these reports, as outlined in other sections of the Manual or instructional memoranda. An example of this would be a soil density test, which would be reported on Form TL-125, etc.
- (2) Samples of materials on work taken at the site by project or laboratory personnel and tested at the District or Central Laboratory, with test results obtained for each of the required tests being reported to the project personnel, as outlined in other sections of the Manual or instructional memoranda. This report may be in the form of numerical test results or in the form of an inspection and release report. An example of this sample would be a concrete cylinder, which would be reported on Form TL-26 (TL-26A and B for computer input and output respectively).
- (3) Samples of materials taken by District or Central Office Laboratory personnel at the production or processing plant, shipping point, or other source of origin remote from the project and tested at the District or Central Office Laboratory, with test results obtained for each of the required tests being reported to the project personnel, as outlined in other sections of the Manual or instructional memoranda. This report either may be in the form of numerical test results or in the form of an inspection and release report. An example of this type would be epoxy, which would be reported on Form TL-109, with the numerical test results kept on file in the laboratory on Form TL-30.
- (4) Samples of Asphalt Mixtures and Central-Mixed, Dense Graded Aggregates will be taken by the Contractor under the Quality Assurance Program and the Department will perform independent assurance sampling and Quality Assurance testing checks to verify the accuracy of the Contractor's testing program. The Contractor will

furnish the test results to the Department on forms furnished by the Department. The routing of the reports will be handled as outlined in other sections of this Manual.

(5) Samples of manufactured materials taken and tested by the Manufacturer or Supplier and accepted by the Department on Mill Analysis, test report, or certification. An example of this type would be hydraulic cement or guardrail.

For frequency of acceptance sampling and testing, see Sec. 205 and other sections covering each individual material.

In the event certain acceptance samples fail, the material represented by the failing sample(s) will be subject to a price adjustment or removal from the road. This applies primarily to such materials as asphalt mixtures and central-mixed aggregate base and subbase materials.

Sec. 202.04 Independent Assurance Samples

Independent Assurance samples are tested to verify the quality of testing that is used in materials acceptance decisions. The IA program covers both project testing and plant testing for materials produced under QA programs.

For details on testing frequencies for project site testing, see Chapter III (Soils and Aggregates), Chapter IV (Hydraulic Cement Concrete), and Chapter V (Asphalt Concrete). For details on testing frequencies for plant testing, see Chapter III (Soils and Aggregates) and Chapter V (Asphalt Concrete).

Sec. 202.05 – DELETED, Reference Manual of Instructions Chapter I, Section 116

Section Deleted.

Sec. 202.06 Materials Notebook Submittal

At the completion of each project, the District Material Engineer will include a statement at the end of the materials notebook to be submitted to the District Administrator certifying that the required number of acceptance and verification samples have been taken on the project and that the acceptance and verification sample test results indicate that all of the materials used on the project were in reasonably close conformity with pertinent approved plans and specification requirements. Any exceptions to the above statements should be noted. Certification to FHWA of materials acceptance will be made by the District Administrator on Form TL-131, as outlined in Sec. 800. Materials notebooks will be audited by the Central Office at random in the District Materials Office

Sec. 202.07 Materials Project Records Retention

With concurrence of the District Contract Administrator the District Materials Engineer's project records shall be kept on file for 5 years after close of project and then destroyed with the exception of Soil survey reports, supplemental soil survey reports (pavement design revisions, special slope reports, special foundation reports, etc.), pipe foundation reports and minor structure foundation reports. These records shall be submitted to the Administrative Services Division's Main File Room for microfilming. Three copies of the microfilm will be made, one copy to be forwarded to the Central Office Materials Division, and one copy to be retained by Administrative Services Division's Main File Room, one copy to be returned to the District Materials Section. The project records may be stored for the five years retention period as on site paper documents, off site paper documents, or as microfilm or electronic format documents as desired by each District Materials Engineer.

SECTION 203 SUBMISSION OF SAMPLES

The submission of samples to the Materials Division for tests shall be in accordance with the instructions given for each type of material. If there is any doubt about the proper procedure to follow, the District Materials Engineer or the Materials Division should be contacted for instructions. Any material that is toxic or flammable should be plainly marked, so that in cases of accident, doubt will not exist with regard to handling. The table shown in Sec. 205 briefly summarizes the requirement for the proper size of sample, the container, and necessary packing when submitting samples to the Materials Division. More detailed instructions are given for specific materials in the following sections.

Sec. 203.01 Packing of Samples

It is essential that the proper type of container be used for submitting samples that require a container. All liquid materials must be shipped in tight containers and packed in sufficient absorbent material such as sawdust, excelsior, etc., to prevent leakage from the package. Samples of water must be shipped in glass or plastic containers. Samples of asphalt emulsions must be shipped in glass or plastic containers with tops that have non-metallic liners. In addition, any liquid asphalt material must also have the container secured in a plastic bag and tied to prevent leakage. All other liquids must be shipped in metal cans with lids securely fastened to prevent leakage. Locking clips to hold tops firmly in place should be used. All such packages must be marked "Liquid" and "Handle with Care". In case of glass containers, the package must be marked "Fragile" and "Glass". Mail sacks are not to be used for shipping samples of liquid, flammable, or toxic chemicals, as this can lead to the sample accidentally spilling onto the handler or other mail. When samples of other materials are shipped in cloth bags, the bags must be securely fastened with cord or wire bag ties. Wire shall not be used for fastening these bags, unless the wire can be mechanically applied and no cut ends are left exposed. Holes shall not be cut in canvas bags for the purpose of tying the tops.

Sec. 203.02 Material Safety Data Sheet

When submitting samples of materials to the Laboratory for test, it is necessary to submit with the sample a Material Safety Data Sheet (MSDS) for any material that requires such. Samples of such material will not be processed unless the MSDS accompanies the sample.

Sec. 203.03 Identification of Samples

Samples must be identified as described in the following paragraphs:

(a) Complete Information Concerning Sample

Complete information must be submitted with each sample. Forms TL-10, TL-11 and TL-13 have been furnished for this purpose. Duplicate copies of the proper form for each sample shall be completed as shown in Sec. 800.

(b) Proper Manner of Tagging Samples

A tag envelope, Form TL-3, containing a copy of the proper notification card, must always be fastened to the OUTSIDE OF THE PACKAGE. Form TL-3 should be addressed to the attention of the particular lab or person to which or to whom the sample or item is being sent. The envelope must not be used for any other purpose. Always place the gummed portion on the outside of the envelope. Placing it inside may cause it to stick to the sample card and obliterate the data thereon. If the sample is forwarded by parcel post, it will be necessary for the shipper to place the required postage stamp on the tag envelope in addition to the postage on the package.

(c) Duplicate Card

Mail duplicate TL card.

(d) Specification Reference

In the following sections, the reference to "Sec---" at the beginning of each material discussion refers to the Section of Road and Bridge Specifications, Virginia Department of Transportation.

Sec. 203.04 Shipment of Samples

Considerable economies can be affected in the transportation of samples by following the practices outlined in this section.

The fullest possible use of State cars and trucks should be made in moving samples. When Engineers are visiting a project or plant, samples should be picked up and carried to the Laboratory designated to conduct the test, or, when this is not practical, the samples should be carried to some central shipping point.

When samples are to be sent by common carrier, separate packages should be grouped to make a composite shipment and sent by the best means available. No general rule can be made as to the best means.

SECTION 204 SAMPLING MATERIALS

Sec. 204.01 Admixtures, Concrete

(Sec. 215) Concrete admixtures normally will not be sampled by the Department. These admixtures instead are approved on an annual list, which is available on the Materials Division website. Manufacturers will certify annually (by mid-December) that their product has not changed in any respect since the original submission. Some admixtures are not compatible with others nor with changes in cement or aggregates. Caution should be exercised and trial mixes are suggested before using new admixtures or changing any ingredient in a mix which has good performance history. This initial approval is gained by submission of independent laboratory test data indicating compliance with the specification. The Central Laboratory will review the submitted test data and determine if the admixture meets specification. If the determination is that the admixture is acceptable for VDOT use, the product will be included on the appropriate Approved List for concrete chemical admixtures. See Sec. 207 for modified acceptance procedure.

Compatibility of water reducing and retarder admixtures with other materials is of vital interest to the contractor and supplier because of the significant changes which can occur in placement and finishing time. Hence, changes in either the composition of materials or the sources of supply, especially admixtures or cement, should, evoke laboratory or field trial work on the part of the contractor or his concrete supplier.

Sec. 204.02 Aggregates

(Secs. 201 through 207 and Chapter 7) The minimum requirements for Independent Assurance samples of aggregates shall be in accordance with Sec. 206. See Sec. 207 for aggregates that may be approved by modified procedure. The following instructions will generally cover acceptance sampling and testing of aggregates.

(a) Sampling at New Sources

In order to avoid any semblance of encroaching in the field of commercial testing laboratories, the testing of aggregate for private interests will be avoided. This policy applies to other materials as well, but primarily applies to noncommercial local deposits. The following basic rules will help to alleviate this condition, and should be followed explicitly in the testing program.

- (1) Samples submitted for investigation tests from new non-commercial sources are to be obtained by a qualified representative of the Department. If at all possible, the aid of a Geologist should be used in order to obtain the fullest information possible.
- (2) Samples are not to be taken and submitted until adequate exploration of the area has been made, that will permit a reasonable evaluation of quantity and uniformity of the deposit to justify sampling and testing.
- (3) Complete identification information as to the source, property owner, quantity, etc., must be submitted with each sample.
- (4) Test results will be sent to the State Materials Engineer for distribution, and if sample is approved for specific uses, the submission of such sample implies it can be made available to any and all Contractors who may be interested in its use in Department work.
- (5) Samples must be submitted for test sufficiently far in advance of their anticipated use to permit completion of the necessary tests. This will permit the making available of positive advice, at time of project showings of its availability.
- (6) Instructions for proper sampling are given in the following sections concerning each of the individual materials.

(1) Stone from Local Ledges and Potential Quarries for Quality

Samples of this material shall generally be taken in accordance with AASHTO T2, except as modified herein.

For the standard quality test, at least 75 lbs. (35 kg) of crushed stone graded from 3/4 in. (19 mm) to 3/8 in. (9.5mm) shall be submitted to the Central Office or District Laboratory from each layer or ledge that appears different in color or structure. Where it is impossible to obtain crushed stone, or when there are no available means of crushing the

sample, 150 lbs. (75 kg) of fresh unweathered material shall be submitted to the Central Office or District Laboratory from each layer or ledge.

All samples shall be packed and marked, in accordance with Sec. 203, using Form TL-11, as outlined in Sec. 800. Special care shall be taken to ship the aggregate in a secure container or sample bag free of contaminants.

(2) Sand and Gravel from Potential Deposits

Samples of this material shall generally be taken in accordance with AASHTO T2, except as modified herein. Potential as used here includes all undeveloped sand and gravel deposits and all developed deposits where the material is not washed or screened.

Samples of material, in which the sand and gravel are combined, shall consist of such a total weight that, on separation, the sample shall yield at least 40 lbs. (20 kg) of the lesser constituent.

All samples shall be packed and marked, in accordance with Sec. 203, using Form TL-11, as outlined in Sec. 800. Special care shall be taken to ship the aggregate in secure containers or sample bags free of contaminants. Samples containing fine sizes shall be shipped in a tight container or closely woven bag.

(b) Sampling at Established Sources

Common courtesy dictates that the Department representative always announce his presence to a company representative. In addition, Mine Safety and Health Administration Regulations require each plant to have explicit safety rules that may not be waived. Usually, this means visits to the pit or quarry face must include accompaniment by an aggregate producer's designated official. These company safety rules must be strictly followed and violation by Department employees could result in administrative action.

The source of aggregates must be reapproved in accordance with the timeframes set forth in the appropriate tables below by the Materials Division/Section for quality or at any other such time that the material quality appears to have changed as deemed necessary by the Department. Sampling for quality will be performed by the District Materials Engineer.

The District monitoring the aggregate source will determine the sampling frequency needed and coordinate the sampling schedule with the Regional or contract testing laboratory. Alternatively, the monitoring District may request that the Regional Lab develop the sampling schedule.

Note that the frequency of testing is determined by using the latest (historical or previous) tested value with the appropriate specification (spec) limit.

If sufficient testing data exists on a given aggregate quality property, the following methodology may be used to determine the frequency of test.

1. Compute the standard deviation using the tested values.
2. Develop a frequency of testing chart using the following criteria:

SL = Specification Limit
 SD = one Standard Deviation

$$A = [SL - (SD \times SL)]$$

$$C = [A - (SD \times A)]$$

$$E = [C - (SD \times C)]$$

$$G = [E - (SD \times E)]$$

Round A, C, E and G to the nearest tenth, then

$$B = A - 0.1$$

$$D = C - 0.1$$

$$F = E - 0.1$$

$$H = G - 0.1$$

0 to H	5 years
G to F	4 years
E to D	3 years
C to B	2 years
A to SL	1 year

Otherwise, the charts below are used to determine testing frequency. The charts are based upon the d2s value for the test method. To develop a chart, a standard deviation was approximated from the d2s value. The method documented above was used to generate the chart. Numbers generated for the chart were adjusted to facilitate ease of use.

Fine Aggregate Quality

AASHTO T104 – Soundness of Aggregate by Use of Magnesium Sulfate

Hydraulic cement concrete	Spec Limit maximum 18% loss
	0.0 to 6.0 5 years
	6.1 to 8.0 4 years
	8.1 to 11.0 3 years
	11.1 to 14.0 2 years
	14.1 to 18 1 year

Bituminous Fine Aggregate Quality

Asphalt concrete surfaces and surface treatments **Spec Limit maximum 25% loss**

0.0 to 10.0	5 years
10.1 to 13.0	4 years
13.1 to 16.0	3 years
16.1 to 20.0	2 years
20.1 to 25	1 year

Asphalt concrete bases **Spec Limit maximum 30% loss**

0.0 to 13.0	5 years
13.1 to 17.0	4 years
17.1 to 21.0	3 years
21.1 to 25.0	2 years
25.1 to 30	1 year

Coarse Aggregate Quality**AASHTO T104 – Soundness of Aggregate by Use of Magnesium Sulfate**

Hydraulic cement concrete **Spec Limit maximum 12% loss**

0.0 to 4.0	5 years
4.1 to 6.0	4 years
6.1 to 8.0	3 years
8.1 to 10.0	2 years
10.1 to 12	1 year

Asphalt surface courses **Spec Limit maximum 15% loss**

0.0 to 5.0	5 years
5.1 to 7.5	4 years
7.6 to 10.0	3 years
10.1 to 12.5	2 years
12.6 to 15	1 year

Asphalt and aggregate bases **Spec Limit maximum 20% loss**

0.0 to 8.0	5 years
8.1 to 11.0	4 years
11.1 to 14.0	3 years
14.1 to 17.0	2 years
17.1 to 20	1 year

Select material (Type I)
and subbase

Spec Limit maximum 30% loss

0.0 to 16.0	5 years
16.1 to 19.0	4 years
19.1 to 22.0	3 years
22.1 to 26.0	2 years
26.1 to 30	1 year

AASHTO T 96 (500 revolutions) – Coarse Aggregate L.A. Abrasion

Grade A stone Spec Limit maximum 40% loss

0.0 to 20.0	5 years
20.1 to 25.0	4 years
25.1 to 30.0	3 years
30.1 to 35.0	2 years
35.1 to 40	1 year

**Grade B stone Spec Limit maximum 45% loss
Slag and Gravel**

0.0 to 22.0	5 years
22.1 to 28.0	4 years
28.1 to 34.0	3 years
34.1 to 39.0	2 years
39.1 to 45	1 year

Grade C Stone Spec Limit maximum 50% loss

0.0 to 24.0	5 years
24.1 to 31.0	4 years
31.1 to 38.0	3 years
38.1 to 44.0	2 years
44.1 to 50	1 year

In addition to source approval sampling performed by the Department, the Producer shall sample and test aggregates for size before shipping to the job site, in accordance with the frequencies outlined in Paragraph (b)(1) herein. See Secs. 109, 110, and 800 and Paragraph (d) herein for additional duties of Weighpersons, instructions for aggregate certifications and use of Form TL-102A.

(1) Modified Acceptance Plan for Fine, Coarse Open-Graded and Crusher Run Aggregates

Aggregate Producers shall be responsible for controlling their product for gradation and Atterberg Limits, in accordance with the plan outlined herein, when producing any type aggregate, other than Type I Select Material or any type subbase or base dense-graded, central-mixed aggregates specified respectively in Secs. 207 and 208 of the Road and Bridge Specifications. Approval of the Producer's Quality Control (QC) Plan shall in no way relieve the Producer or Contractor of responsibility for complying with all of the requirements of the contract or specifications. The QC Plan shall meet the following specific requirements.

Test and Equipment: Test procedures shall be conducted in accordance with the standards referenced as-in the current specifications. Testing for gradation and Atterberg Limits (where required) will be conducted on the Department's verification samples. Only the gradation test is necessary on the Producer's QC samples, unless a known problem exists. To accommodate the testing requirements, a field or plant laboratory shall be furnished and shall contain the following equipment:

- 1 - Motorized screen shaker for fine and coarse aggregate grading analysis.
- 1 - Set of sieves for the motorized shaker. The screen sizes shall include the specification sizes for the type of material being produced.
- 1 - Balance having a capacity of at least 45 lbs. (20 kg), with a sensitivity of one ounce (28 grams) or less.

1 - Balance having a capacity of at least 2.5 lbs. (1 kg), with a sensitivity of 0.1 gram or less.

1 - Drying apparatus.

1 - Set of liquid and plastic limit devices.

Producers shipping only ~~fine~~ coarse open-graded aggregate shall not be required to obtain Atterberg Limit equipment.

Sampling Rate: The QC sampling rate shall be one (1) sample per 1000 tons per size of material produced. It is recognized that due to production schedules, past performance and perhaps other factors, this rate may be changed for a particular operation. Therefore, the actual rate for a specific location shall be at the discretion of the District Materials Engineer.

Sampling Method: With the requirements of quality assurance and Producer certification of aggregate, the method of obtaining aggregate samples for grading tests becomes more critical. Therefore, the only way statistics will be meaningful is for the sampling, by both the Department and the Producer, to be performed in a similar manner.

Samples shall be obtained from each size material produced. These samples shall be selected from barges, conveyor belts, stockpiles or as approved by the Engineer. Sampling and testing shall be performed by qualified personnel.

Sampling of aggregate shall follow the procedures outlined in AASHTO T2 as modified herein. The shovel used for sampling of aggregates shall be a square nose shovel of spade design with slightly built up edges and back, capable of penetrating full depth into the stockpile. A short handle with butt handle grip is needed to obtain the leverage to remove the sample from the stockpile. The sample size should be as outlined in Paragraph (b)(2) herein.

For source approval sampling, segregation of the individual particles is not important, for they will be recombined into the testing sizes needed in the laboratory. Therefore, for coarse aggregate, a sample of approximately 40 lbs. (20 kg) each of No. 8 and No. 57, if available, will generally be sufficient to conduct quality tests. For fine aggregate, a single 40 lbs. (20 kg) sample is sufficient.

To determine gradation compliance, the sampler shall take care to follow the procedures outlined in Paragraph (b) (1) above exactly. When safe to do so, samples shall be taken at a point other than in stockpiles to reduce the error inherent with stockpile segregation. A sample of approximately 10 lbs. (5 kg) is typically sufficient for fine aggregate and one of 30 lbs. (15 kg) for coarse aggregate. Open-graded aggregates and Grading A fine aggregate shall be tested for minus 200 material by washing prior to the dry gradation being performed.

All verification samples shall be packed and marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. Special care shall be taken to ship the aggregate in a secure container or sample bag free of contaminants.

Five (5) types of sampling are permitted as follows:

(1) Truck Bed Sampling: For details of this type of sampling, see the Central-Mix Aggregate Quality Assurance Program (Certification Study Guide).

(2) Belt Sampling: At the request of the Producer, belt sampling may be used. A belt sample shall be a composite of three (3) separately selected samples. It is recommended that each of these samples shall be taken between two (2) templates inserted through the material to isolate the sample area, or by other means which will isolate the sample area on the belt, and all of the material within the sample area shall be collected. The quantity of material contained within the sample area shall be approximately 1/3 of the quantity required for the sample.

(3) Stockpile Sampling: The sample shall be made up of at least six (6) shovelfuls of material secured at approximately equal spacing around the stockpile at approximately the third points of the height of the stockpile. (See instructions above on the proper shovel use.) The area to be sampled shall be opened up to expose the interior material. The shovel should be inserted nearly perpendicular to the face of the exposed material, full depth of the shovel, and raised vertically to prevent segregation. Opening up of the face may be accomplished with the use of a front end loader.

(4) Miniature Stockpile Sampling: The Producer may build a miniature stockpile using a front end loader. The material sampled will then be spread and mixed by the loader bucket and the samples taken from three (3) points within the miniature stockpile.

(5) Sample Tube Sampling: A sampling tube may be used in sampling aggregate sizes smaller than the No. 10 size, and all fine aggregates. The sample tube should be 2 in. (50 mm) minimum diameter by 3 ft. (900 mm) minimum length. Samples shall be obtained from five (5) different locations of the stockpile and the various samples combined to form one (1) composite sample.

The importance of sampling is equivalent to the importance of good quality control. The primary concern of sampling is to take samples that will represent the stockpile as closely as possible and that will determine as accurately as practical the properties of the complete stockpile.

Acceptance of Materials: Materials which fail to meet the specification requirements shall not be shipped to State projects nor for State uses under any circumstances.

All materials meeting the applicable specification requirements may be shipped and accepted based on the Producer's certification, which, among other things, shall state that the required tests by the Producer have been performed and have met the specification requirements of the material. See Paragraph (c) herein and Road and Bridge Specifications Section 200.04 for additional details of the certification.

The Producer shall furnish to the Department a copy of the test results for each size material produced. See Paragraph (f) below for format requirements.

The Producer shall keep all records pertinent to the production for a period of one (1) year, and they shall be available for review by the Engineer.

Verification: The Department through the District Materials Engineer will visually inspect stockpiles of produced materials. When deemed necessary by the Department, verification testing may be performed to verify the adequacy and accuracy of the Producer's quality control plan. When requested by the Materials Representative, samples shall be taken by the Producer in the presence of the Materials Representative, and then either quartered or introduced through a sample splitter, with each party conducting the test on their half. Verification tests shall be conducted in the VDOT Laboratory or by AMRL-accredited consultant laboratories. The verification test results shall be compared to the Producer's test results.

The verification test results shall in no way be used to judge acceptance. The Producer's half of the verification sample may serve as its production sample for that 1000-ton lot. If the comparisons indicate verification test results are not in relatively close agreement with the Contractor's results, an investigation shall be made to determine the reason for the difference. In the event it is determined that the Contractor's test results are not representative of the product, the Contractor shall take corrective action to alleviate any problems identified. If corrective action is not performed in a timely manner or does not alleviate problems identified, the Department may withdraw approval of the Producer's QC Plan.

General: The Producer's quality control plan shall include a system by which the District Materials Engineer shall be advised as to the amount and size of material shipped to each project or order. If the Producer's quality control plan is found to be unsatisfactory, the Department may withdraw approval of the source.

(2) Dense Graded Aggregates

This material shall be accepted under a statistical, system-based quality assurance program where the Producer samples the material for grading, Atterberg limits, cement content and water content, as applicable. The Producer shall sample in accordance with the Department's current Quality Assurance Program. See Section 300 herein and Road and Bridge Specifications Sections 207 and 208.

(3) Dry Riprap

Contractors shall furnish and place the class of dry riprap specified on the plans. Although dry riprap is primarily mechanically sized during production as other aggregates are, the acceptance of riprap relies primarily on visual inspection for size and percentages to meet the Departments Specifications. Thus to avoid project delays and minimize material rejections the Project Inspector is to use the following procedures:

Stockpiled Dry Riprap - Verify the size and acceptability of the material at the quarry prior to shipment.

Dry Riprap to be shipped as it is produced - Establish by visual inspection with the Contractor and the Producer the size and percentages required to meet the Department's Specifications.

The Contractor shall furnish samples of the minimum and maximum size riprap at the project site to be used for visual comparison of riprap delivered to the project and a sample should be maintained at the quarry for the Producers benefit. In the event a shipment is questionable as to specification conformance, the District Materials Engineer shall make the final determination as to acceptability.

(4.) Sizes No. 1, No. 2, No. 3, and Gabion Stone

Except for use in hydraulic cement concrete, aggregate size No. 1, No. 2, No. 3 and Gabion Stone shall be inspected visually for size, cleanliness and general conformance to the specified gradation. Gradation testing shall be performed by the Department in the event of dispute.

(c) Certification of Aggregates

When fine aggregate and open-graded coarse aggregate are shipped to the job site and have been tested and approved at the source, each load of aggregate shall be accompanied by a materials certification statement signed (either handwritten signature, handwritten initials, or computer printout of name or initials) by a responsible company official. This applies to such aggregates as fine aggregate, coarse aggregate for use in hydraulic cement concrete, aggregate for use in surface treatment work, rip-rap bedding stone, porous backfill stone and crusher run aggregate, although crusher run is not an open-graded aggregate. The certification may be stamped or printed on the delivery ticket, invoice, weigh ticket or TL-102A Daily Summary Sheet, or it may be a separate document altogether. This does not apply to aggregate or plant mix materials paid for on a tonnage basis, as outlined in Paragraph (b)(1) above. See Paragraph (d) herein.

(d) Documentation of Weights

A bonded Weighperson employed by the Producer shall be is-responsible for furnishing a daily summary sheet (Form TL-102A) to each order and/or contract. See Sec. 800 for examples of the bond and daily summary sheet. This sheet shall be delivered by the Producer to the Department representative at the project or work area no later than the end of the next working day. On intermittent shipments, this form may be mailed to the appropriate Residency. Recipient of the summary sheet will then reconcile it against the delivery tickets. Any differences must be resolved. See Post-Construction Manual for further requirements.

(f) Reports

Laboratory test reports of aggregate materials shall be made on Forms TL-22, TL-22A and TL-22B respectively, as outlined in Sec. 800. Shipments of aggregate materials paid for on a tonnage basis will be recorded on a daily summary sheet. (See Paragraph (d) above.). Physical tests and shipments of central-

mixed aggregate materials shall be reported on Forms TL-52B (computer test report output form) and TL-102A respectively, as outlined in Sec. 800.

Sec. 204.03 Aluminum Alloys

(Sec. 229) Aluminum alloys (sheet, plate, etc.) are approved for use by the Materials Division from Manufacturer's certified physical and chemical analyses. Inspection, other than visual, is not required by the field, and sampling will not be necessary. See Sec. 207 for modified inspection procedure.

Aluminum which will be in contact with concrete is coated with a bituminous, solvent type, asbestos filled, and aluminum pigmented coating. This coating will be sampled the same as outlined for paint in Sec. 204.24.

Aluminum sign blanks are accepted on visual inspection, with an occasional sample to be checked for dimensional requirements of the specifications (thickness, etc.) For other specific aluminum items, see Fencing, Pipe, and Poles and Posts herein.

Sec. 204.04 Bearing Pads and Bedding Materials

(Sec. 237) See Sec. 207 for materials that may be approved by modified acceptance procedures.

(a) Elastomeric Bearing Pads

A sample shall consist of 1 full size pad sections of each thickness to be selected at random. A sample of 1 pad shall be submitted to the Central Office Laboratory for tests from each shipment of 300 pads or less, with one additional pad being submitted for each additional increment of 300 pads, or fraction thereof.

Each sample shall be marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(b) Sheet Lead and Common Desilverized Lead Bedding Material

This will not require sampling. The material may be approved for use by visual inspection, as outlined in Sec. 207.

(c) Preformed Fabric Bedding Material

(237.02) Samples shall consist of 1 piece 6" by 6"

(150 by 150 mm) by full thickness per lot or batch. The samples are to be submitted to the Central Office Laboratory for testing.

Each sample shall be marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(d) Reports

Laboratory tests and inspections of bearing pads and bedding materials will be reported on Forms TL-23, TL-47, or TL-109 respectively, as outlined in Sec. 800.

Sec. 204.05 Asphalt Material, Liquid

(Specification reference - Sec. 210)

(a) General

Asphaltic materials shall be accepted under the VDOT Asphalt Acceptance Program (VAAP). This program is established to maintain and monitor a list of approved products through the sampling, testing, documentation, and certification of each product by the manufacturer in combination with the Department's monitoring effort. The Department's samples under the VAAP program are referred to as monitor samples since they are used to assess products on Approved Lists 50, 50.1 & 50.1A.

The VAAP will use a system which assigns points for infractions (refer to section 204.05(h) herein, and Appendix Q for point system chart. VDOT reserves the right to discontinue acceptance of asphaltic material in the event that verification test results indicate that non-specification material is being provided or test procedures are not being followed.

The manufacturer must perform the following responsibilities themselves or with the assistance of an AASHTO accredited commercial testing agency. Asphaltic materials must be sampled at appropriate frequencies and tested in accordance with the specified methods. A file of certified test reports representing the asphaltic material must be maintained. A copy of the certified test report must be provided to the VDOT Materials Division Laboratory within 30 days of sampling. . Cooperation with the Department or its representatives during periodic inspections of manufacturer's testing facilities, during collection of monitor samples, and during verification of certified test reports is required.

Each manufacturer shall provide the Department with Quality Control (QC) plans by January 31st of each production year. The manufacturer shall provide a QC plan for each plant that intends to distribute material for VDOT use. All materials for VDOT use shall be approved by the Materials Division and listed on the VDOT Approved Lists 50, 50.1, & 50.1A, as a part of VDOT's Quality Assurance program. All QC plans shall be in accordance with AASHTO R26 or AASHTO R77.

Asphaltic material manufacturing facilities will be inspected by the Department personnel or its representatives on an intermittent basis.

(b) Sampling at the point of manufacture, terminal, or other designated site

Samples are to be taken in accordance with AASHTO R66, as modified herein.

Samples taken for testing of asphaltic materials are to be not less than one quart (one liter) of material or 0.5 gallon (2 liters) for asphalt emulsions. A new sample container that is clean and dry shall be used to avoid sample contamination. Immediately after filling, the sample containers shall be tightly sealed and containers shall be properly marked with identification matching the sample's TL-10 form.

Containers for asphalt PG binder materials shall be double friction top cans or square cans with screw tops, or small mouth cans with screw caps. Containers for emulsified asphalt shall be wide mouth jars or bottles with screw caps made of plastic - never metal containers.

Manufacturer's QC sample as defined in the manufacturer's QC plan shall be conducted at the point of manufacture unless otherwise arranged with the Department. Each company shall submit a proposal of sampling procedures to the Department, detailing sampling frequency, location and quantity represented by each sample. Upon acceptance of this proposal by the Department, the manufacturer shall abide by the procedures accepted, unless other arrangements are made with the Department.

An audit of Manufacturer's testing procedures will be accomplished by monitor sampling and testing of the material at periodic intervals. Monitor samples shall be taken at the terminal under the visual supervision of Department personnel or its representative. The sample taken for monitor acceptance will be a "split" sample, with the manufacturer testing a portion of the sample and Materials Division Laboratory testing the other portion. The planned testing frequency will be at a minimum of one test per month per type or grade of asphaltic material that is on VDOT's Approved lists 50, 50.1, & 50.1A. After collection, containers of monitor samples, for testing by the Department, shall be cleaned on the outside and marked according to Section 203, using form TL-10, as outlined in Section 803.03, and submitted to the Materials Division Laboratory for testing. Packaging shall be such that breakage and leakage of asphaltic material is prevented. Due to the time delay in shipping samples to the Materials Division Laboratory, the portion of the split sample to be tested by the manufacturer should be allowed to cool overnight before testing. The sample shall be labeled with the terminal code number (found from the approved lists 50, 50.1, & 50.1A), tank number, sample number, and A or B. The A portion shall be sent to the Materials Division Laboratory

for testing while the B portion shall be sent to the manufacturer's testing facility. Both samples shall be labeled the same except for the A or B designation. The Department or the Department's representative will be responsible for the shipping of its sample; the Manufacturer will be responsible for the shipping of its sample

A quality assurance (Q.A.) program will be accomplished with independent sampling and testing of the asphaltic material. Q.A. samples will be taken from the plant storage tank at the asphalt plant for asphalt cements, or on the project for cutbacks and emulsions by a VDOT employee. QA samples will be taken at the rate of one sample per district per year per type/grade of asphalt.

(c) Testing of Material

The Manufacturer shall conduct the standard control tests on asphaltic materials as detailed in the appropriate section below. Testing for certified test reports is to be performed by the manufacturer's personnel in the manufacturer's VDOT approved laboratory or by a VDOT approved commercial testing facility. The Department will conduct tests on the monitor samples and on the Q.A. samples at the Materials Division Laboratory.

Laboratories conducting testing on monitor split samples shall be AASHTO accredited and supply VDOT with a copy of their accreditation every 2 years.

All laboratories conducting testing on monitor split samples shall designate a single person to act as liaison with the Department. This person will perform and/or oversee the performance of certification testing.

Certified Test Reports for PG ASPHALT BINDERS shall be based upon the results of tests performed in accordance with section 210 of the current specifications. The manufacturer is not required to perform the Direct Tension Test, AASHTO T 314. If the Manufacturer elects to conduct the Direct Tension Test to help better control production, the results shall be included on the certified test report.

CUTBACK ASPHALTS are accepted by manufacturer certification..

Certified test results for EMULSIFIED ASPHALTS shall be based upon the results of tests performed in accordance with section 210 of the current specifications.

(d) Test Reports

The manufacturer is to maintain a file of certified test reports for all asphaltic materials ultimately shipped to Contractors that perform work for VDOT. These certified test reports will indicate that the material shipped meets the requirements of that type/grade of asphaltic material and will show the test results that were obtained on that material to determine compliance with the applicable specifications. These records are to be kept by the manufacturer for at least 12 months and are to be available for verification by VDOT personnel. A copy of the certified test report is also to be sent to the VDOT Materials Division at Elko.

The certified test report must be a company's standard form containing the following information:

- 1) Manufacturer's name and address
- 2) Type and grade of asphaltic material
- 3) Testing performed (AASHTO or Virginia Test Method designation)
- 4) Test results and date obtained
- 5) Quantity represented
- 6) Tank number

- 7) Unique Report Identifier
- 8) A statement indicating that the manufacturer "certifies that these are the test results obtained on the material tested under the VAAP Program.

(e) Manufacturer's Tracking System

The manufacturer is to submit to the Department a detailed plan of action describing the procedures to be taken to ensure tracking of sample test results and the material represented by these results.

(f) Shipping Documents

All shipping documents shall contain sufficient information such that at any point, the material may be "back tracked" to the original test results. If material is mixed with other approved material for storage, the record system will be such as to assure the traceability of all the material which is being mixed. All shipping documents shall be accompanied by a statement similar to "We certify that all material being shipped on this invoice/bill of lading has been tested and approved under the Virginia Asphalt Acceptance Program and that the material has been loaded under the supervision of our representative into carriers that are suitable for shipment of this material".

All shipping documents shall be kept by the recipient of the material for at least 12 months and shall be available for verification by VDOT personnel.

Only material tested and certified in accordance with the VAAP may be mixed and shipped to VDOT projects.

(g) End-Use Certifications

Asphaltic material for use on VDOT projects, which will be used in the same form as received, e.g., prime, tack, surface treatments, etc., shall be shipped to the project accompanied by a Certification of VAAP Testing. This certification will be submitted to the project inspector for inclusion in project records. These certifications may be stamped or printed on the delivery ticket, invoice, or weigh ticket, or it may be a separate document altogether.

(h) Asphalt Usage

In addition to the required certification, Manufacturers, or other Suppliers as designated by the Engineer, shall submit, to the Materials Division Laboratory, on a yearly basis, a summary sheet of quantities shipped for state work. The supplier shall also submit the oil distillate % tested by AASHTO T59 for products approved under VAAP on Approved list 50.1 and 50.1A. This summary sheet will show the number of gallons (liters) of each type or grade of asphaltic material shipped to Virginia addresses and accumulated by the Districts to which it is shipped.

(i) Virginia Asphalt Acceptance Program Points System

The VAAP point system is in place to fairly evaluate plants and products that have been accepted on the Approved Lists 50, 50.1, & 50.1A. Points are accrued per product and / or per plant. The points accrue over a 24 month period and after that they will reset. The points are broken down by categories² in appendix Q

Point values for action for Products:

- accumulation of 9 points results in Probation
- accumulation of 12 points results in Suspension
- accumulation of 15 points results in Removal

Point values for action for Plants:

- accumulation of 15 points results in Probation

- accumulation of 25 points results in Suspension
- accumulation of 35 points results in Removal

Probation will last at a minimum of 3 months. For those 3 months, suppliers will submit all QC testing data, and update Quality control plans to ensure non-compliance will not occur again. Probation can be extended if necessary

Suspension can be the suspension of the entire plant operation or of production of a specific product depending on the nature of the points accumulated. Suspension will last at a minimum of 3 months. Supplier will not be allowed to sell to VDOT projects during that time. While suspended, supplier shall correct any non-compliance, update their Quality control plan, and meet with the Department to discuss future plans. Once off of suspension, supplier will be on probation for 3 additional months.

Removal from the Approved List can occur for a product or a plant depending on the nature of the points accumulated. Removal from the List will last at a minimum of 6 months. Supplier will be required to go through the VAAP approval process to be readmitted.

Sec. 204.06 Asphalt Mixtures

(Sec. 211) Asphalt mixtures (asphalt concrete) shall be sampled, as outlined in Sec. 500.

Sec. 204.07 Brick

(Sec. 222) See Sec. 207 for acceptance of brick on modified inspection procedures. Brick in orders of 1000 or less may be accepted in this manner. Otherwise brick shall be sampled in accordance with AASHTO T32. At least 10 bricks shall be sampled from each lot of 50,000 brick, or fraction thereof.

For lots of more than 500,000, 5 shall be sampled for each 100,000 or fraction thereof, but not less than 10.

Samples shall be submitted to the District or Central Office Laboratory, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(a) Reports

Laboratory tests, plant inspections, and shipments will be reported on Forms TL-29, TL-109, and TL-9 respectively, as outlined in Sec. 800.

Sec. 204.08 Bronze and Copper Alloy

(Sec. 230) Cast bronze and copper alloy may be accepted on modified inspection procedures, as outlined in Sec. 207, provided the Materials Division has received a Manufacturer's certified physical and chemical analysis representing the material.

Sec. 204.09 Cement, Hydraulic

(VRBS Sec. 214) Hydraulic cement will be accepted by the following; a letter with a notarized signature documenting that each cement type, used on VDOT projects meets the requirements in Section 214 of the VDOT Road and Bridge Specifications. The letter shall include the maximum alkali content that the cement will not exceed for the calendar year. If submitting a letter for blended cement (Type IP or IS), the percent mineral admixture for the types of blended cement with mineral admixture added shall be listed in parentheses, e.g. Type IP(20). A one gallon sample of cement with the corresponding mill certification shall also be submitted for each type of cement.

Once approved, the cement source will be added to Approved List No. 85 for "Cement Manufacturers".

The Mill's control laboratory will be inspected regularly by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. A minimum time between inspections is not established; however, it is expected that the Mill will request an inspection for each tour made by the CCRL team. The Mill will retain a copy of these reports together with any correspondence regarding deficiencies to be reviewed by a State Materials Engineer's representative if requested.

In addition, the Cement Company will furnish the State Materials Engineer a certification letter annually. This letter will contain wording similar to the following:

"Company Letterhead"

Date

Dear Sir:

The cement to be furnished during 20__ will be produced at _____(mill) _____. We certify it will be manufactured under our normal quality controlled processes and will, based on our test results, meet the requirements of Type _____,for Virginia Department of Transportation's Specifications." and the alkali content will not exceed _____ for the year.

This letter is to be signed by a responsible company official, notarized and should be mailed by December each year.

Where cement is paid for by the ton (metric ton) as a bid item in the contract (soil-cement stabilization), weights will be determined by a digital printer scale.

The truck will be weighed before loading and after loading to determine the net amount delivered to the project. Scales will be sealed and approved. Copy of this ticket will be delivered to the Inspector with the shipment of cement. The Inspector will visually inspect each truck after discharge and prior to its leaving the job site. Should the truck not be completely emptied, a corrected weigh ticket must be prepared and supplied to the Inspector.

Sec. 204.10 Snow and Ice Control Materials

(a) Solids

(Sec.239) Solid – snow and ice control materials shall be sampled and approved in the manner outlined herein. This control system is designed to improve the flow into the State of approved snow and ice control materials, so that the delivery and emergency use of nonconforming material will be reduced to a minimum.

1. Sodium Chloride

(a) Sampling

Whenever it is economically feasible and inspection service is available, sampling will be done at the manufacturers' stockpiles, from containers or indoor storage. Sampling will be at the approximate rate of one sample per 10,000 tons (10,000 metric tons) at stockpile locations or one sample per 5,000 tons (5,000 metric tons) if sampled at final destinations. No samples shall be taken from uncovered stockpiles while it is raining. Sampling shall be performed in accordance with ASTM D 632. A minimum of three (3) sample increments shall be selected at random from the lot (10,000 or 5,000 tons) (10,000 or 5,000 metric tons). Each increment shall be obtained by scraping aside the top layer of material to a depth of at least one inch (25 mm) and taking a one-pound (2 kg) quantity of sodium chloride to a depth of at least six inches (150 mm). The sample increments shall be thoroughly mixed and quartered (in accordance with ASTM C702) to constitute a composite sample. The minimum required composite sample size is one quart (one liter).

All samples shall be submitted to the Central Office Laboratory in either a metal paint can with an air-tight cover or a plastic cylindrical concrete mold container with the cover firmly attached and marked, in accordance with Sec. 203 and Sec. 800.

All shipments shall be subject to visual inspection at destination before unloading. Any shipments deemed to be unusable because of excessive water, oversized material or extraneous material maybe rejected at the option of the Engineer. In the case of storm events, the Engineer reserves the right to accept and use any product delivered and to apply price adjustments as defined in the purchase contract. A sample may be taken for analysis to determine the price adjustment.

(b) Shipment

When shipments are made from out of state stockpiles, an inspection service will be provided when the frequency of shipments makes it economically justified. The Supplier shall certify that the material came from an approved stockpile and the stockpile's location shall be on the shipping ticket.

(c) Rejection

Delivered material not conforming to the specification may be subject to a price adjustment or rejected and returned at the Producer's option. Material not conforming and not returned will be subject to the price adjustment schedule in the purchase contract. In no case will the price adjustment of any retained material be over 50%. Inspection Reports (Form TL 109) shall be provided to the residencies.

2. Calcium Chloride and Magnesium Chloride

Calcium chloride and magnesium chloride will be sampled at the rate of one sample per manufacturer per District. Sampling shall be conducted in accordance with ASTM D 345. For bag shipments, select not less than three containers at random. Take 1 lb (0.5 kg) samples by means of a sampling tube penetrating at least 1 ft. (300 mm) into the bag. For small containers with capacity of less than 10 lbs. (5 kg), use the entire contents of the container. For bulk shipments, select increment samples from at least three locations in the shipment. Scrape aside the top layer to a depth of one foot (300 mm). Using a sampling tube, obtain a sample extending from the cleared surface to at least 50% of the depth of the material in the container, or a depth of approximately three feet (one meter), whichever is less. Mix the increment samples together and fill the one-quart (one liter) container. Use caution during the sampling operation to avoid exposing the sample unduly to atmospheric moisture. If more than one sample is taken, immediately and thoroughly mix the individual samples to form a representative composite sample of material and store in a sealed plastic container. Sample shall be submitted to the Central Office Materials Laboratory in a plastic airtight container (plastic cylindrical concrete mold containers are acceptable) in accordance with Sec. 203 and Sec. 800.

3. Calcium Magnesium Acetate

Calcium Magnesium Acetate (CMA) will be sampled at the rate of one sample per manufacturer per District. Three (3) sample increments shall be selected at random from the lot. Each increment shall be obtained by scraping aside the top layer of material to a depth of six inches (150 mm) and taking a half-pound (0.25 kg) quantity to a depth of six inches (150 mm). The sample increments shall be mixed to constitute a composite sample. The sample size shall be one quart (one liter) and shall be submitted to the Central Office Materials Laboratory in a metal paint can with an airtight cover in accordance with Sec. 203 and Sec. 800.

4. Solids with Agricultural Processing Residue

These snow and ice control materials shall be stored undercover and protected from cross contamination from other snow and ice control materials. They will be sampled at the minimum rate of one sample per manufacturer per District. The sample size shall be one quart (one liter) and shall be submitted to the Central

Office Materials Laboratory in an airtight metal paint can or air-tight plastic container in accordance with Sec. 203 and Sec. 800.

(b) Liquids

Liquid snow and ice control materials shall be sampled and approved in the manner outlined herein. This control system is designed to improve the flow into the State of approved liquid snow and ice control materials, so that the delivery and emergency use of nonconforming material will be reduced to a minimum.

Samples taken for testing of liquid snow and ice control materials shall be not less than one quart (one liter) of material. Sample container shall be plastic Nalgene Wide Mouth plastic container with an airtight seal. Sampling shall be done in accordance with ASTM D345 and shall be taken from the storage container during discharge. Before sampling, the solution shall be recirculated in the tank until it is homogenous. Care shall be taken to ensure that the samples are not exposed unduly to atmospheric moisture. Samples shall be taken when the temperature is above 40 °F (4°C). The temperature of the material at sampling shall be recorded on the TL-10 card. Samples shall be submitted to the Central Office Materials Laboratory in accordance with Sec. 203 and Sec. 800. Samples will be taken each year at the time of the first liquid snow and ice control material delivery. The frequency of sampling shall be a minimum of one sample per manufacturer per District.

Sec. 204.11 Concrete, Hydraulic Cement

(Sec. 217) Hydraulic cement concrete will be sampled, as outlined in Sec. 400.

(a) High Strength Grout and Mortar

(218) High-strength grout and mortar may be accepted on any job by means of a letter of certification from the manufacturer, which shall include independent laboratory results showing the following: the grout/mortar develops a 7-day compressive strength of at least 4000 pounds per square inch (28 MPa) when tested in accordance with ASTM C-109, a 7 day bond strength of at least 1000 pounds per square inch (7 MPa) when tested in accordance with VTM-41 except that epoxy was not used to develop the bond, and compliance with ASTM C-1107.

Sec. 204.12 Copper Sheet and Strip

(Sec. 230) Copper sheet and strip shall be accepted on modified inspection procedures, as outlined in Sec. 207, since no testing or certification is required.

Sec. 204.13 Curing Materials and Protective Coatings for Concrete

(a) Curing Materials

(R&B Sec. 220) Materials used for the curing of hydraulic cement concrete shall be sampled as follows:

(1) Waterproof Paper

Waterproof paper shall be sampled by obtaining one sheet 4 ft. in length by full width of roll and submitting this to the Central Office Laboratory for test. One sample shall represent each specific lot, or other unit of production in a shipment.

(2) Polyethylene Film

Polyethylene film shall be accepted based upon the Department's approved List 71.

(3) Burlap

Burlap shall be sampled by obtaining one sheet 4 ft. (1 m) by width of roll and submitting this to the Central Office Laboratory for test. Total number of samples from table below shall represent each specific lot, or other unit of production in a shipment.

Sampling-In deciding how many samples are needed for each shipment, VDOT uses a modified chart from AASHTO M182. Please see below:

Number of Rolls	Number of Samples
8 or less	2
9-15	3
16-40	4
41 or greater	5

A sample will be defined as one piece at least 4 ft. in length by full width of roll.

A packaging envelope may be used for sample shipment. Each sample shall be packed and marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

Inspection—Each of the rolls selected shall be visually inspect for cleanliness and evenly woven. Examine the burlap for visual defects that would impair its suitability for use. Cuts; tears; broken or missing yarns; thin, open, or weak places; uneven weaving; and grease spots or stains shall be noted.

Lot-Unless otherwise specified, for purposes of inspection and tests a lot is the same class of material presented at one time or each shipment.

(4) Liquid Membrane Seal

When sampling liquid membrane seal, the batch number must be on each container and shall be checked to verify the number matches the batch number being sampled. A batch is defined as the amount of material that can be made at one time and kept in one vat. The total quantity of liquid seal shall also be verified to the batch number being sampled. The total quantity cannot be more than can be produced in one vat at a time. Only containers on hand can be used to figure the total quantity. One container must be chosen from the containers on hand. If sampling from a drum or large tote, the liquid seal must be shaken or stirred thoroughly in the container before sampling. If the samples are at a manufacture's facility, the producer may decide the best way to agitate the sample. A one-quart sample shall be taken from the randomly chosen container. This procedure must be done for each batch being sampled. If sampling from five-gallon buckets, one five-gallon bucket may be chosen instead of a quart container to send so there is less of an issue with getting a representative sample. The most current SDS must accompany the sample being sent in for testing.

Each sample shall be packed and marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. A metal container, properly capped, may be used for sample shipment to the Central Office Laboratory.

(5) Monomolecular Film

Chemicals, such as monomolecular film, used in the placement of concrete to prevent or reduce evaporation of curing water from the concrete surface, will require no sampling, testing, or certification. Satisfactory job performance will be considered as proof of acceptance.

(6) Reports

Laboratory tests and inspections of curing materials will be reported on Forms TL-24 and TL-109 respectively, as outlined in Sec. 800.

(b) Protective Coatings

Materials used for the protection of hydraulic cement concrete surfaces shall be accepted as follows:

(1) Silicone Treatment

Silicone spray treatment, applied to hydraulic cement concrete surfaces where unpainted ASTM A588 steel is used, shall be sampled by obtaining a one quart (one liter) sample of the treatment, either at the source or at the job site. The sample shall be submitted to the Central Office Laboratory for test in a clean, airtight, metal or glass container. One sample per job will be sufficient.

The sample shall be packed and marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(2) Spray-On Surface Finish

Materials used as spray-on surface finishes for hydraulic cement concrete surfaces are approved for use by approved list 30. Inspection, other than visual, is not required in the field, and sampling will not be necessary.

(3) Reports

Laboratory tests and inspections of silicone treatments will be reported on Forms TL-47 and TL-109 respectively, as outlined in Sec. 800.

Sec. 204.14 Electrical Conduits, Fittings, and Boxes

(Secs. 238, 703, and 705) See Sec. 207 for materials that may be accepted on modified inspection procedures.

(a) Acrylonitrile-Butadiene-Styrene (ABS) Conduit and Fittings

ABS conduit shall be sampled by obtaining one full length of conduit for each size diameter per shipment. Fittings may be accepted on modified inspection, as outlined in Sec. 207, since these do not require testing or certification. However, these shall be made of the same or equivalent material as the conduit.

All samples shall be submitted to the Central Office Laboratory loose, with Form TL-10 attached. The samples shall be marked and shipped, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(b) Metal Conduit and Fittings

Metal conduit shall be accepted from one of the following: Manufacturer's certification, catalog cut or the Virginia DOT Pre-Approved Traffic Control Device Listing from Mobility Management. At the discretion of the Engineer to determine acceptance, metal conduit shall be sampled by obtaining 2 pieces, one from each end of one length of pipe, for each size diameter per shipment. The lengths of the 2-piece sample shall be a minimum of one 8 in. (200 mm) piece from each end. The samples should be sawed true from the ends of a length picked at random.

Fittings shall be approved by modified inspection, as outlined in Sec. 207, provided that the Materials Division has received a Manufacturer's certified analysis of the test report, which includes the zinc content.

Samples shall be packed, marked, and shipped the same as outlined in Paragraph (a) above.

(c) Plastic and Poly (Vinyl Chloride)(PVC) Conduit and Fittings

Plastic and PVC conduit and fittings may be accepted on a manufacturer or supplier certification stating that only PVC, Schedule 40, UL approved conduit will be used. Verification that Schedule 40 is being used may be made through the District Materials Office. It is not absolutely necessary that the same brand of material be used in the same installation, as long as the parts "mate" and meet the above criteria. Any certification which are incomplete will be denied and sampling will be required. The sample shall be minimum of 2 ft. (0.6 m) in length, and contain the UL label.

(d) Plastic and PVC Telephone Conduit

Telephone conduit may be accepted on Manufacturer or Supplier Certification stating the specifications for and type of conduit.

(e) Boxes

Boxes, except junction boxes, require no sampling, and may be accepted on modified inspection, as outlines in Sec. 207, since these require no testing or certification. For concrete junction boxes, two (2) 6 X 12 in. (150 X 300mm) or three (3) 4 X 8 in. (100 X 200 mm) cylinders will be obtained and tested on a random basis. For metal junction boxes, thickness of coating will be tested on a random basis using a magnetic thickness gauge, in a manner similar to that specified for coated corrugated steel pipe in Sec. 204.26(h).

(f) Other Electrical Components

Electrical materials, supplies, and equipment, other than those noted above, used in traffic signal installations or other types of electrical systems, will usually be accepted on the basis of Manufacturers' certifications, catalog cuts (under certain conditions), and/or, generally in the case of traffic control materials and equipment, accepted on the basis of the Pre-Approved Traffic Control Device Listing published by the Traffic Engineering Division. This includes such items as, electrical wire and cable (conductors and ground wires conforming to ASTM B3 and B8, or B2 respectively, or other specified and approved types), connectors and terminals, controllers, detectors, insulators, junction, splice, and switch boxes, controller cabinets, lamps, switches, relays, and traffic signal heads, among others. See Sec. 207 for additional details of acceptance of these items by modified inspection and certification/catalog cut/Pre-Approved List.

For acceptance of electrical system structural elements, such as wood poles, steel poles (anchor base, mast arm, luminaire, etc.), steel plates, high strength steel bolts, ground clamps, anchor rods and span and guy wire, see Secs. 204.28, 204.33, 204.32, 204.36, and 207 respectively.

(g) Reports

Laboratory tests of acrylonitrile-butadiene-styrene (ABS) and bituminous conduit will be reported on Form TL-29, laboratory tests of cylinders will be reported on Form TL-26,(TL-26 B, if computerized test report output form), laboratory tests of metal conduit will be reported on Form TL-25, and inspection will be reported on Form TL-109, as outlined in Sec. 800.

Sec. 204.15 Epoxy Resins

This section describes acceptance procedures for epoxy-resin systems stated in Road and Bridge Specification 212, 223, and 243.

Powdered epoxy-resin systems must be on Approved List No. 10 for use on VDOT projects.

Liquid epoxy-resin systems, including epoxy loop sealant for use in traffic signals and conforming to R&B Specification 212, are accepted on a project basis and will be sampled, tested, and accepted or rejected on a lot basis. For small quantity use of less than 15 gallons of system on a project acceptance shall be by manufacturer certification as stated in R&B Specification 243.04. The certification shall consist of a statement by the manufacturer that Components A and B have been sampled and tested according to the requirements in section 243 of the Road and Bridge Specifications book. The certification shall be signed by an authorized agent of the manufacturer and contain actual results of tests performed.

A VDOT representative will sample at least one quart (or one liter) of the lesser component and enough of the larger component for proper mixing from vats per lot of epoxy. Epoxy that is packaged in gallon cans can be sent in for testing in the gallon can. A lot shall be the maximum volume the vat can contain. The sample will be submitted to the VDOT Materials Division Central Office Laboratory for testing. The batch number shall be marked with the sample shipment; separate batch numbers for components shall also be

clearly marked. The manufacturer will determine for the sampler which component batches are to be mixed together. Any different epoxy-system combination from different batches will represent a new batch and will require a separate sample. Batch numbers can only be used once for one component. The total quantity of Epoxy shall also be verified to the batch numbers being sampled. The total quantity of batches cannot be more than the total quantity. Only containers on hand can be used to figure the total quantity.

A random container must be chosen from the containers on hand. Contents being sampled should be mixed thoroughly before sampling. Samples shall be shipped in clean cans, each component in a separate can and shall contain the following information clearly labeled on the containers: (1) identity of component, (2) type, (3) mixing ratio, (4) batch number, (5) date sampled. The most current SDS must accompany the sample being sent in for testing.

Samples shall be marked and shipped, in accordance with Sec. 203, using Form TL-10, as outlined in Sec 800. Laboratory tests and inspections of epoxy resins will be reported on Forms TL-30 and TL109 respectively, as outlined in Sec 800.

Sec. 204.16 Fencing

(Sec 242) Fencing products will be accepted based upon certification from the manufacturers that VDOT fence specifications are being met. Fence will be supplied to the project by approved fence suppliers.

(a) Fence Manufacturer's Requirements

To qualify for placement on the Fence Manufacturers Approved List # 69 the manufacturer must:

1. Certify that their products are Made in the USA and meet the applicable ASTM, AASHTO or other VDOT specifications. Certifications must include the following information on company letterhead: Manufacturer Name, Manufacturing Location, Product Description, and the following statement with signature:
 “ We certify that these fence products are Made in America and meet the following VDOT specifications:” (list the applicable specifications)

The manufacturer certifications must be approved by the CO Materials Division Chemistry Lab Program Manager (or designee).

2. Provide approved certifications to VDOT Materials and the fence supplier annually.
3. Provide fence samples to the Chemistry Lab for certification validation, if required.

(b) Fence Supplier's Requirements

VDOT project level acceptance will be based on the requirements of the VDOT Fence Suppliers Quality Assurance Program as outlined below. This involves the documentation and certification of the product by the Supplier in combination with a Department verification sampling and testing program (VST). VDOT reserves the right to discontinue acceptance of fence in the event that VDOT verification efforts indicate that non-specification material is being provided or quality control plans are not being followed.

The following types of fence may be accepted under this program: (1) Chain Link; (2) Tension Wire; (3) Barbed Wire; (4) Lawn Fence; (5) Woven Wire; (6) Brace Wire; (7) Posts; and (8) Snow Fence.

In order to supply fence products to a VDOT project, the fence supplier shall be on the Materials Division Approved List No. 70 and use products “Made in the USA” from Approved List No.69 or wood products treated by companies on Approved List No. 45. To qualify for placement on this list, the fence supplier shall submit a Quality Control (QC) Plan defining their routine business quality control practices. The QC

plan shall be submitted to the Materials Division Central Office Quality Assurance Section. After review for completeness and conformance of the supplier’s QC plan to the Quality Control Fence Suppliers’ Plan Checklist as found in the Appendix J of this chapter, a facility visit will be made to evaluate the supplier’s conformance to his QC Plan. If during the inspection deficiencies are noted, this will be documented in a report with a follow-up visit scheduled. If no deficiencies are found, the fence supplier is probationally approved until one or more successful projects have been completed demonstrating conformance to the QC plan and that a quality product has been consistently supplied. If problems are encountered during supply within this probationary period, then additional projects may be necessary for the producer to work out QC Plan conformance issues. The fence supplier will be added to the Approved List No. 70 with a “p” to denote that the facility is probationally approved. Once the probationary period has been successfully completed, the “p” will be removed. The Department will continue to monitor the facility to ensure conformance to the QC plan and project specifications. Annually, the Department will review the updated QC plan submitted by the supplier and update the Approved List with the latest review date. The approving/ revoking authority is the Quality Assurance Engineer for suppliers and the Chemistry Laboratory Program Manager for Manufacturers. Appeals may be submitted to the State Materials Engineer for final disposition.

Shipping tickets for material sent to VDOT Projects shall include the following information: Contractor information, VDOT Project Number, Material Identification, Material Quantities shipped and the following QC statement along with signature:

“We certify that these fencing items meet VDOT specifications and conform to the VDOT Fence Suppliers Quality Assurance Program”

For fencing that may be approved on modified inspection, see Sec. 207..

Sec. 204.17 Fly Ash

(Sec 241) Fly Ash may be accepted in any job by means of a letter from the Fly Ash Marketing Company certifying it meets specification requirements, as outlined herein, and in the Road and Bridge Specifications.

Class “F” Fly Ash will be approved based on its conformance to the requirements of ASTM C618.

Class “C” Fly Ash will be considered for approval only when the producer submits independent ASTM C441 test data to support the replacement level of fly ash needed to remediate Alkali Silca Reactivity (ASR). The replacement amount must be sufficient as to limit expansion to less than 0.1% (when normalized) with an alkali content of the cement at least equal to the maximum alkali expected to be encountered. This data will be reviewed by the State Materials Engineer and verified by testing before final approval is granted.

The Fly Ash Company will assure the Department of its quality control program by stating in detail its frequency of sampling and testing and other production control. Any changes shall be reported immediately to the State Materials Engineer.

In addition, the Fly Ash Company will furnish the State Materials Engineer a certification letter annually. This letter will contain wording similar to the following:

"Company Letterhead

Project Number _____

Date

Dear Sir:

The fly ash to be furnished during 19__ will be produced at _____(power plant) . We certify it will be monitored under our normal quality controlled processes and will, based on our test results, meet the requirements of Type _____ Fly Ash according to Virginia Department of Transportation's Specifications."

This letter is to be signed by a responsible company official and should be mailed about mid-December each year. Distribution of this certification letter will be made immediately by the State Materials Engineer to the District Materials Engineer.

The Fly Ash Plant will maintain a file of the test results for Fineness, Loss on Ignition, Moisture Content and Specific Gravity on each 400 ton (400 metric ton) lot from which shipments will be made. The Plant will furnish a complete chemical and physical test report on a composite sample representing each 2000 tons (2000 metric ton). This composite sample will be prepared by combining equal parts of five consecutive samples representing the 400 ton (400 metric ton) lots. Lot numbers should be designated in such a manner that the lot can be identified with the date shipped. It will be satisfactory to submit the lab report after the 28 day test results are complete. IT IS NOT DESIRED TO RELATE THIS REPORT WITH A PARTICULAR PROJECT.

Upon shipment of fly ash to a project, the Plant will enter on the delivery tickets the date, lot number, and truck or rail car number. The lot number used will be that of the Plant and not one of an intermediate terminal.

Sec. 204.18 Guardrail, Steel Beam

See Sec. 207 for additional details of modified acceptance. Steel beam guardrail will be accepted based upon visual field inspection and verification of Approved List #12 manufacturers, suppliers, and erectors.

Requirements for being an Approved List #12 Manufacturer, Supplier, or Erector

Guardrail Manufacturers:

- Guardrail steel beam manufacturers shall participate and be in compliance with the annual AASHTO NTPEP Guardrail/Guiderail Audit program.
- Verification samples obtained by District Materials personnel shall conform to Section 221 of the Road and Bridge Specifications.
- Manufacturers shall submit their notarized Certificate of Compliance and Guarantee and Brand Registration to the State Materials Engineer by January 1st of each year. Any additions to the list of material suppliers will require submittal of an updated certificate. A statement indicating acknowledgement and compliance with the provisions of the “Buy America” requirements and “BABA requirements: as per 106.01(a) shall be included. A suggested certificate format is included in Appendix M.

Guardrail Suppliers and Erectors:

- Suppliers – Contractor, Suppliers and Erectors shall submit their notarized Certificate of Compliance and Guarantee with the State Materials Engineer by January 1st of each year. Any additions to the list of material suppliers will require submittal of an updated certificate. A statement indicating acknowledgement and compliance with the provisions of the “Buy America” requirements and “BABA requirements” as per 106.01(a). Act shall be included. A suggested certificate format is included in Appendix M.

- Verification samples obtained by District Materials personnel shall conform to Section 221 of the Road and Bridge Specifications.

District Materials personnel will obtain verification samples consisting of a minimum of two (2) linear feet of beam (no bolts, nuts, nor washers), selected once annually per District, and submit to the Central Office Laboratory for testing. This sample is taken at the project site or at the Erector's/Supplier's materials storage facility.

All samples of guardrail beam shall be marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. Laboratory tests and inspections of guardrail beam will be reported and maintained on file at the Central Office Laboratory.

Associated hardware; such as backup plates, terminal sections, fixed object attachments, etc. shall be accepted based on visual inspection and Approved List #12 verification. (For requirements for accepting guardrail posts, see Sec. 204.28).

Sec. 204.19 Joint Materials

(Sec. 212) Joint fillers, joint sealers, and pipe gaskets shall be sampled as follows:

(a) Hot-Poured Joint Sealer

Asphalt Sealer - Shall be sampled by cutting one piece, of about 10 lbs. from the original container. One sample shall be taken from each shipment or lot. In no case shall a sample be taken from the heating kettle. The sample may be wrapped in paper and shipped, without boxing, to the Materials Division Laboratory (MDL) for tests. In the MDL, test specimens are cut from the inner portion, whether surface contamination is apparent or not. Wrapping paper adhering to the sample is, therefore, not objectionable.

(b) Silicone Sealant

1. *Silicone* – To be included on the approved list for Qualified Silicone Rubber Joint Sealer (Approved List. No. 27), Manufacturer shall supply certification for each lot. Only visual inspection is required at the job site.

2. *Backer Rods* – Visual Inspection

(c) Preformed Expansion Joint Sealer (Bituminous Type)

Visual Inspection

(d) Expanded Rubber Joint Filler

Expanded rubber joint filler shall be sampled by obtaining one sq.ft. of ½" thickness for each lot or shipment received. Samples shall be submitted to the Central Office Laboratory either loose or in a packaging envelope.

(e) Preformed Neoprene (polychloroprene) Seal

Expanded rubber joint filler shall be sampled by obtaining one sq.ft. of each thickness and for each lot or shipment received. Samples shall be submitted to the Central Office Laboratory either loose or in a packaging envelope.

(f) Poly(Vinyl Chloride)(PVC) and Polyethylene (PE) Joint Fillers

PVC and PE joint fillers shall be accepted on certification from the Manufacturer that it conforms to the requirements of ASTM D1667.

(g) Sponge Rubber Joint Filler

This shall be sampled by obtaining on section of full thickness not less than 2 LF. long and the full depth of the joint from each consignment of 1000 SF or less. At least one sample shall be taken for each thickness of joint and one for each type or brand. These samples shall be enclosed in a box or securely tied to a piece of board, so that they may be transported without damage. Nails must not be used to fasten the sample to the board. Samples shall be submitted to the Materials Division Laboratory (MDL) for tests.

When used in conjunction with bridge bearings, samples shall also be obtained and tested in the same manner as outlined above.

(h) Pipe Joints and Connections

Gaskets, bands, and other joint materials, and joint configurations where they are used, shall be submitted to the Materials Division for review and listing on Approved List No. 14. Joint test certifications shall also be submitted to qualify joints as soil-tight, silt-tight or leak-resistant according to their tightness per AASHTO R-82. Any change in joint configuration or material shall require a resubmission of material and joint certifications

(i) Preformed Flexible Joint Sealants

Joint sealants shall be submitted to the Materials Division for review and listing on Approved List No. 14. following the same requirements as (h) above.

(j) Preformed Elastomeric Joint Sealer

1. Compression Seal – One sample of preformed elastomeric joint sealer shall be obtained for each thickness or size and for each lot or shipment received, and submitted to the Materials Division Lab (MDL) for tests. The size of sample should be 2 LF of each thickness or size. No shipping container is necessary.
2. Lubricants – The lubricant adhesive to be used with the seal shall be accepted on certification from the manufacturer that is conforms to the requirements of ASTM D4070.

(k) Elastomeric Expansion Dam and Tooth Expansion Joint

1. Strip Seal and Tooth Expansion – Strip seal shall be sampled by obtaining one piece 2 LF in length for each shipment received. Tooth expansion shall be sampled by obtaining one piece 1 LF in length for each shipment received. Samples shall be submitted to the Materials Division Laboratory (MDL). No shipping container is necessary.
2. Lubricants – The lubricant adhesive to be used with elastomeric strip seal shall be accepted on certification from the manufacturer that it conforms to the requirements of ASTM D4070.
3. Steel/Aluminum/Anchor Bolts – Steel, aluminum, and anchor bolts used in expansion dams will be accepted on certificate of compliance as outlined in 204.32(f)2(i)

(l) Pressure Joint Relief Material

Joint relief material shall be accepted on certification from manufacturer that it conforms to the requirements of ASTM D3204.

(m) Waterstops (for non-pipe applications)

1. Neoprene (chloroprene) shall be sampled by obtaining one piece 1 LF in length for each size per lot. Samples shall be submitted to the Materials Division Laboratory (MDL) for test. No special packaging is required.
2. Elastomeric (polyvinyl chloride / PVC) waterstops will be accepted by manufacturer's certification.
3. Metal waterstops consisting of sheet copper will be accepted on modified inspection, with no testing or certification required, as outlined in Sec. 204.12 and 207

(n) Traffic Loop Sealant

Sample shall be obtained at the Manufacturer's facility. One (1) gallon sample shall be obtained with the Manufacturer's required amount of hardener (to set up 1 gallon) for testing and approval. Samples shall be taken and approved per batch/lot. In no case shall a sample be taken from the heating kettle. The sample shall be shipped to the Materials Division Laboratory (MDL) for testing.

(o) Reports

Laboratory tests and inspections of joint materials will be reported on Forms TL-23 (expanded rubber, preformed neoprene, preformed elastomeric, *elastomeric expansion dam*, waterstop, *and loop sealant*), TL-47 (hot-poured, preformed (bituminous), sponge rubber, and TL-109 respectively, as outlined in Sec. 800.

Sec. 204.20 Landscape Materials (Roadside Development)

(Sec. 244) See Sec. 207 for additional details of acceptance of landscape materials by modified inspection.

(a) Fertilizer

Fertilizer will be accepted on visual inspection, in accordance with Sec. 244.02 of the Road and Bridge Specifications with approval of the Environmental Quality Division.

(b) Herbicides

Herbicides are to be visually inspected to determine that the Manufacturer's container is labeled as required. The label should include the herbicide composition, brand, and name and address of the Manufacturer. Questionable sources will be checked to determine that the material is registered with the Department of Agriculture and Consumer Services.

(c) Lime

Acceptance of lime will be handled, as outlined in Sec. 204.21 (a).

(d) Mulch, Wood Cellulose Fiber, for Hydraulic Seeding

Fiber mulch approval is based upon an annual source/inventory sampling program conducted prior to shipment. Material (sources) meeting specification requirements will be listed on approved lists published periodically. (See Chapter 7 for current approved list.) Visual inspection is all that is required at the point of delivery.

For approval purposes, 3 samples selected randomly will be taken from each source by a designated representative of the Department and submitted to the Central Soils Laboratory. The average results of these test samples will be the basis for determining compliance with VDOT specifications. If in compliance, the source will be placed on the approved list. If the material is found to be unacceptable, the source will be notified by letter that their product is being removed from the approved list. To be reinstated, the Producer either must furnish a product conforming to his/her stated guarantee or adjust the stated guarantee of the dry weight per bag, if this is the deficiency. If the deficiency is in the physical properties of the mulch, conformance and approval shall be determined by additional random samples obtained by a

Department representative. Of course, the Producer has the option to remain off the list and request to be included in the next annual check.

Any additional testing of approved, but questionable, mulch from shipments received at the point of delivery is at the option of the Engineer; however, when tests are run, the moisture/dry weight of the shipment used for price or application adjustments shall be based on a sufficient number of random samples (average of at least 3). If the District Materials Engineer does perform this additional testing, the test results shall be reported to the District Environmental Coordinator or Specialist.

(e) Seed and Sod

Seed and Sod will be accepted on visual inspection, in accordance with Sec. 244.02 of the Road and Bridge Specifications with approval of the Environmental Quality Division.

(f) Geosynthetics

This section covers geosynthetics used in: silt fence, riprap bedding, drainage fabric, subgrade separation, subgrade and embankment stabilization, geocomposite pavement underdrains and wall drains, dewatering bags, pavement interlayer reinforcement, prefabricated vertical drains; and high strength geotextiles and geogrids that require project-specific design and are used in reinforced slopes, base reinforcement, and MSE wall applications. Geomembrane moisture barriers and low permeability liners for stormwater management facilities are also included in this section.

All geosynthetics including geomembrane moisture barrier and low permeability liners that are approved for use on VDOT projects can be found on Approved List No. 63. Products on this list meet VDOT Road and Bridge Specification 245 or Special Provisions as noted and are evaluated through AASHTO's National Transportation Product Evaluation Program (NTPEP) where applicable.

A product and its Manufacturer and Supplier are placed on Approved List No. 63 upon request of the Manufacturer or Supplier. The Manufacturer/Supplier shall submit test results (i.e. NTPEP GTX number) to VDOT Materials Division for review. The geosynthetics must meet VDOT's specification requirements and be current in the NTPEP 3-year product evaluation testing. The Manufacturer must be compliant in the NTPEP audit program, and the Supplier will be annually reviewed by VDOT and thereby listed on VDOT Approved List No. 44 or be audited by NTPEP. The products must be shipped from a local Supplier listed on VDOT Approved List No. 44 or from a source Manufacturer.

AASHTO M288 fabrics on Approved List No. 63 and Manufacturers fall under the Geotextile (GTX) Work Plan of the Geosynthetics Committee of NTPEP, the high strength geosynthetics and geogrids fall under the Reinforcing Geosynthetics (REGEO) work plan of the Geosynthetics Committee. For products for which VDOT requires additional tests over those included in the NTPEP evaluation, or products which are not included in the NTPEP evaluation program, the Supplier / Manufacturer shall submit the required test results provided by a third party laboratory that is accredited by the Geosynthetics Research Institute (GRI-LAP) in the specific test and also accredited by an acceptable body for quality processes.

Below is a list of categories for which VDOT requires additional tests over those included in the NTPEP evaluation or categories that are not included in the NTPEP evaluation.

- Temporary Silt Fence – Additional test results per ASTM D5141 are required every 3 years along with NTPEP product evaluation, run in triplicate as NTPEP Erosion Control Products Committee Work Plan, to obtain flow rate and filtering efficiency.
- Prefabricated Geocomposite Pavement Underdrain (Edgedrain) – The NTPEP program does not include edgedrains, except the fabric which must be evaluated by NTPEP and from a NTPEP-

compliant Manufacturer. Products must meet the material requirements of VDOT Specification (245.03e). For the filter fabric, NTPEP GTX number is required every 3 years, submitted to VDOT Materials Division. For the drainage core, additional test results for compressive strength and water flow rate are required every 3 years, or the Manufacturer/Supplier must submit a letter every 3 years stating that the product has not changed in the material properties since the last approval.

Note: When submitting product request to VDOT for listing on Approved List No. 63, the Manufacturer must also submit connections for underdrain-to-outlet pipe.

- Geocomposite Wall Drains - The NTPEP program does not include wall drains, except the fabric which must be evaluated by NTPEP and from a NTPEP-compliant Manufacturer. Products must meet the material requirements of VDOT Specification 245.03f. For the filter fabric, NTPEP GTX number is required every 3 years, submitted to VDOT Materials Division. For the drainage core, additional test results for compressive strength and water flow rate are required every 3 years, or the Manufacturer/Supplier must submit a letter every 3 years stating that the product has not changed in the material properties since the last approval.
- Geomembrane Moisture Barrier - The NTPEP program does not include geomembrane moisture barriers. Products must meet the material requirements of VDOT Specification 245.03g. Test results are required every 3 years, submitted to VDOT Materials Division, or the Manufacturer/Supplier must submit a letter every 3 years stating that the product has not changed in the material properties since the last approval.
- Dewatering Bag - Additional test results for seam strengths per ASTM D4632 are required every 3 years along with NTPEP product evaluation.
- Pavement Interlayer - The NTPEP program only includes paving fabrics, not other interlayer products. However all products must meet the material requirements of the VDOT Specification 245.03i and come from a NTPEP-compliant Manufacturer. Test results are required every 3 years, submitted to VDOT Materials Division.
- Low Permeability Liners for Stormwater Management Facilities - The NTPEP program does not include low permeability liners. Products must meet the material requirements of VDOT Specification 245.03j. Test results are required every 3 years, submitted to VDOT Materials Division, or the Manufacturer/Supplier must submit a letter every 3 years stating that the product has not changed in the material properties since the last approval for renewal.
- Prefabricated Vertical Drains - The NTPEP program does not include prefabricated vertical drains, except the fabric which must be evaluated by NTPEP and manufactured by a NTPEP-compliant Manufacturer. For the fabric, NTPEP GTX number is required every 3 years submitted to VDOT Materials Division. Products must meet the material requirements of the VDOT Special Provision for Prefabricated Vertical Drains. Additional test results for drainage core and discharge capacity for assembled drain are required every 3 years, submitted to VDOT Materials Division, or the Manufacturer/Supplier must submit a letter every 3 years stating that the product has not changed in the material properties since the last approval.

- High Strength Geotextile and Geogrids - These products must be designed, specified, and approved on a project basis.

Sec. 204.21 Lime

(Sec. 240) See Sec. 207 for acceptance of lime on modified inspection.

(a) Agricultural

(Sec. 244.02) Agricultural grade ground limestone shall be approved for use as follows. The Environmental Quality Division will periodically provide a list that will be forwarded to the District Materials Engineer, showing the results of laboratory tests of agricultural lime from sources supplying Virginia. (See Chapter 7) The District Materials Engineer should compare the source of materials list for each applicable project with the Department of Agriculture list, to see that lime from the proposed project source meets the requirement for calcium carbonate equivalent (not less than 85 percent).

Where doubt exists about the carbonate content or in cases of lime received from sources not on the Agriculture Department list, a sample should be obtained and submitted to the Central Office Chemistry Laboratory.

It should be noted on the Department of Agriculture lists that there may be lime sources listed that do not meet specification requirements, with regard to calcium carbonate equivalent.

(b) Hydrated

Hydrated lime may be accepted on visual inspection, based on receipt of Manufacturer's certification by the Materials Division, as outlined in Sec. 207.

However, if the lime is from a new source, it will be necessary to secure a sample of approximately one qt. (one L) in size for testing. This sample will normally be taken at the point of delivery. Care must be exercised to see that a representative sample is obtained completely free from any contamination. The sample shall be submitted to the Central Office Laboratory in a closed, airtight container, usually a metal container or mason jar, and shall be marked in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(c) Hydraulic

This shall be approved for use, as outlined in Paragraph (b) above.

(d) Reports

Laboratory tests and inspections of lime, when conducted, will be reported on Forms TL-47 and TL-109 respectively, as outlined in Sec. 800.

Sec. 204.22 Masonry Units, Concrete

(Secs. 222 (a)(1), (a)(2), (a)(3), and (b)) Concrete masonry units normally shall be sampled by the Department's representative assigned to the particular plant making shipment. These samples are to be taken at the source of manufacture, if possible, prior to shipment to a project in order that the Materials Division can issue a test report prior to the use of the masonry units in the construction.

(a) Wall Units

Masonry wall units, consisting of hollow load bearing units, hollow non-load bearing units, or solid load bearing units shall be sampled, as outlined herein. A sample shall consist of 10 whole units for lots of 10,000 units, or fraction thereof. For lots of 10,000 to 100,000 units, a sample shall consist of 20 whole units. For lots of more than 100,000 units, 10 whole units shall be sampled from each 50,000 units, or fraction thereof. When the shipment consists of block of various different sizes, only the one minimum rate of sampling specified above will apply, and it will not be necessary to duplicate the size of sample for each size of block

in the shipment. The samples shall be shipped to the District or Central Office Laboratory for testing. No container is necessary for shipment of the sample.

The samples shall be marked and shipped, in accordance with Sec. 203, using Form TL-10, as outlined in Sec 800.

(b) Catch Basins and Manholes

(For sampling of brick used in catch basins and manholes conforming to AASHTO M91, Grade MS or ASTM C55, Grade N-I, see Sec. 204.07.) Masonry units used in catch basins and manholes shall be sampled, marked, and shipped to the Laboratory for tests, as outlined in Paragraph (a) above.

However, care must be exercised in selecting units submitted for tests. At least 1/2 of the number of units submitted in a sample **MUST BE BARREL BLOCKS**. The shape of batter blocks prevents conducting a proper compression test on these particular units. However, batter blocks can be used for absorption tests.

Sec. 204.23 Monuments, Right-of-Way

(Sec. 219 and Road Designs and Standards, RM-2) See Sec. 207 for details of acceptance on modified inspection. Concrete right-of-way monuments are inspected and stamped at the plant when practicable. When monuments are received on the job bearing no inspection mark, or when monuments are made on the job by the Contractor, one whole monument shall be submitted to the District or Central Office Laboratory from each project. No container is necessary for shipment, but all required information should be recorded for the monument.

When RM-2 monuments are used, consisting of steel pins and either U-type galvanized rolled rail steel or aluminum alloy locator posts, it will be necessary to secure a sample of one whole cadmium plated brass or stainless steel cap used therewith per project and submit it to the Central Office Laboratory for test. The sample may be shipped in a packaging envelope. Samples of the pins and posts will not be necessary and they may be accepted on visual inspection, since no tests or certification are required.

Each sample shall be marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. Laboratory tests and inspections of concrete monuments will be reported on Forms TL-29 and TL-109 respectively, as outlined in Sec. 800. Laboratory tests of brass or stainless steel caps will be reported on Form TL-47, as outlined in Sec. 800.

Sec. 204.24 Paint

(Sec. 231) Paint shall be mixed thoroughly by stirring or by agitating before the sample is selected. The mixing may be accomplished by mechanical agitation, stirring with a paddle, or by "boxing" the paint. In "boxing" the paint, a clean container is used, and the paint is poured back and forth between the containers until all lumps are broken up and thoroughly dispersed through the paint. Care must be taken to incorporate in the paint all settled pigment from the bottom of the container. At least one quart (one liter) of paint, System A, and AA of each type used (aluminum paste and varnish sampled separately) shall be submitted to the Central Office Laboratory for examination from each lot or batch. Paint, Systems B and F, will be accepted on approved list, and certification. Clean, widemouth metal cans may be used for shipment.

All samples of paint shall be packed and marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. Laboratory tests and inspections of paint will be reported on Forms TL-47 or TL-47A and TL-109 respectively, as outlined in Sec. 800.

Paint in quantities of 20 gals. (75 liters) or less per project may be accepted on modified inspection, as outlined in Sec. 207.

Sec. 204.25 Piling

(Secs. 217, 226(b), 228, and 236) See Sec. 207 for piling that may be accepted on modified inspection.

(a) Concrete: Cast-In-Place, Precast, or Prestressed

Sampling of cast-in-place, precast, or prestressed concrete piling shall be in accordance with Sec. 400.

(b) Steel, H-Beam

Steel H-beam piling will not require sampling and or mill inspection. It is the responsibility of the Contractor to request 3 copies of the mill analysis, and a packing list showing the number of piles of each length and heat numbers, when placing the order for this material to be delivered directly to the project site. The 3 copies of the mill analysis shall accompany the shipment to the project. The Project Inspector shall compare the heat number on the piles to that stated in the mill analysis, to ensure that the piles are in fact the material represented by the mill analysis. Caution should be exercised to ensure that a mill analysis is present for each heat represented, since many times a shipment will contain several heats. A copy of the packing list shall be transmitted with 3 copies of the mill analysis to the State Materials Engineer by the Project Inspector. See Sec. 207 for additional details on modified inspection.

(c) Steel, Sheet

Steel sheet piling shall be approved by mill analysis and packing list, as outlined in Paragraph (b) above.

(d) Steel, Shell

Type A and D steel pile shells shall be approved by mill analysis and packing list, as outlined in Paragraph (b) above.

(e) Timber

Timber piles will not require sampling, but will require shop inspection. For treated piles, the preservative and treatment are sampled, as outlined in Secs. 204.29 and 204.33. Untreated timber piles may be accepted on modified inspection, in accordance with Sec. 207.

(f) Reports

Laboratory tests of concrete cylinders for concrete piling will be reported on Form TL-26 (TL-26B, if computerized test report output form). Laboratory tests of preservative treatments for treated timber piling will be reported on Form TL-47. Inspections of prestressed concrete and treated piling will be reported on Form TL-109. See Sec. 800 for details of these forms.

Sec. 204.26 Pipe

(Sec. 232) The pipe types listed here follow the order in which they are listed in Section 232 of the VDOT Road and Bridge Specifications. When the quantity of any approved type of culvert pipe is fifty (50) LF or less per project, culvert may be accepted on visual inspection only. Culvert pipe used on rest area and landscape contracts will be accepted as for any other type project.

(a) Concrete

Concrete pipe, conforming to the applicable VDOT Specifications, will be accepted on the manufacturer's certification based on the requirements of the VDOT Concrete Pipe Quality Assurance Program as outlined below. This involves the sampling, testing, documentation and certification of the product by the manufacturer in combination with a Department monitoring program. VDOT reserves the right to discontinue acceptance of concrete pipe in the event that VDOT monitoring efforts indicate that non-specification material is being provided or test procedures are not being followed.

When approving hydraulic cement concrete mix designs for hydraulic cement concrete pipe, the minimum pozzolan additions as outlined in the Virginia Department of Transportation Road and Bridge Specifications, Section 217.02(a) will not be required.

The following types of pipe may be accepted under this program: (1) Concrete Sewer, Storm Drain and Culvert Pipe; (2) Reinforced Concrete Culvert, Storm Drain and Sewer Pipe; (3) Joints for Circular Concrete Sewer and Culvert Pipe using Rubber Gaskets; (4) Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe; and (5) Reinforced D-Load Culvert, Storm Drain, and Sewer Pipe.

In order to supply concrete pipe products to a VDOT project, the concrete pipe producer must be on the Materials Division Approved List No. 26. The concrete pipe producer may qualify for placement on this list in either of the following ways:

1. The concrete pipe producer shall submit a Quality Control (QC) Plan defining its routine business quality control practices. The QC plan is submitted to the Materials Division Central Office Quality Assurance Section. After review for completeness and conformance of the producer's QC plan to the Quality Control Plan Checklist as found in Appendix H of this chapter, a plant visit will be made to evaluate the producer's conformance to its QC Plan. If during the inspection deficiencies are noted, this will be documented in a report with a follow-up visit scheduled. If no deficiencies are found, the precast concrete producer is probationarily approved.
2. Alternatively, a plant can be probationarily approved if they have a current American Concrete Pipe Association or other plant certification approved by the QA Engineer and submit an abbreviated QC plan. The QC plan shall include at a minimum proof of certification, plant contact information and address, raw materials used, patching materials used, testing frequencies and an example shipping ticket. This document is submitted to the Materials Division Central Office Quality Assurance Section.

The concrete pipe producer will be added to the Approved List No. 26 with a "p" to denote that the facility is probationarily approved.

Each approved facility shall have at least one VDOT certified Precast Concrete technician on staff responsible for ensuring that the Quality Control Plan is being followed. VDOT specifications and policies over-ride other plant certifications or specifications denoted in the third-party plant certification.

When one or more successful projects have been completed demonstrating conformance to the QC plan and that a quality product has been consistently supplied, the probationary status will be removed. If problems are encountered during the production and supply within this probationary period, then additional projects may be necessary for the producer to work out QC Plan conformance issues. Once the probationary period has been successfully completed, the "p" will be removed. The Department will continue to monitor the producer's facility to ensure conformance to the QC plan and project specifications. Annually, the Department will review the updated QC plan submitted by the producer and update the Approved List with the latest review date. The approving/revoking authority is the Central Office Quality Assurance Materials Engineer. Appeals may be submitted to the State Materials Engineer for final disposition.

(1) Frequency of Testing

The producer will perform the following minimum quality control procedures, and the statement "We certify that these materials have been tested and conform to the VDOT Concrete Pipe Quality Assurance Program." shall be on each shipping document and signed by a responsible company representative.

Test	Minimum Frequency
a Plant load bearing tests or Compressive strength	One per lot
b Absorption	See note below
c Inspection of manufactured product for visual defects and imperfections.	Each unit

For the purpose of this program, a lot is defined as a single day's production of concrete pipe, all being of like size, material, strength designation, and manufactured by the same process. However, if less than 100 units are produced per day, the lot size may include up to 100 units produced in no more than 5 days. The five days need not be consecutive, as long as they occur within a two week period, and the process used is not altered in any way between production days.

If a manufacturing process is used which produces two or more pipe sizes, styles, or classes simultaneously, one set of material tests (compression and absorption) can be used to represent all sizes, styles, or classes, provided no change in mix design occurs. Individual load bearing tests, if used as a basis of acceptance, will be required for each size, style or class, according to the guidelines described above.

Note: The requirements for absorption testing on concrete pipe are one per lot with no history of test results. If a history is available, then the minimum frequency of absorption testing may be reduced as follows:

Frequency of tests = one randomly selected absorption test per number of consecutive production lots with passing test results or a minimum of one test per 30 consecutive production lots

A random sampling process (as defined in the concrete pipe manufacturer's approved Quality Control Plan on file with the Department) will be used to determine the lot from which a specimen will be tested. If a failing result is obtained or if one or more of the source of materials for a mix designs changes, the frequency of test will resume at one test per lot as if no history was available.

Examples:

No. 1 - If no history is available, the frequency of testing is one per lot. If this test passes, then over the next two lots, one lot is randomly selected and tested for absorption. If the absorption test passes, then the frequency of testing will be one randomly selected lot out of the next 3 lots. The process continues in this manner until 30 consecutive passing results are obtained. Once 30 consecutive passing tests results are obtained, then, as long as subsequent tests pass and there are no changes in the source of materials for the mix design, the frequency of testing will be one test on a randomly selected lot per 30 lots.

No. 2 - If a concrete pipe manufacturer has 10 consecutive passing test results, then the frequency of absorption tests would be one randomly selected lot out of the next 10 lots. If the next random sample test passes, the number of consecutive passing test results increases by one to becomes 11. Once 30 consecutive passing tests results are obtained, then, as long as subsequent tests pass and there are no changes in the source of materials for the mix design, the frequency of testing will be one test on a randomly selected lot per 30 lots.

No. 3 - If the number of consecutive passing test results was 35, the frequency of absorption tests would be one test on a randomly selected lot out of the next 30 consecutive lots, provided there are no changes in the source of materials for the mix design.

If a failure occurs, then the number of tests would reinitialize at one test per lot.

(2) Test Facilities

Producer facilities, equipment and testing personnel shall be adequate to conduct the tests outlined in AASHTO T280, and shall require Department approval. Quality Control Procedures shall be performed under the direction of a VDOT certified Precast Concrete Technician.

If compression cylinders or cores are used in lieu of three edge bearing tests, facilities, equipment and personnel will be sufficient to conduct such tests according to ASTM C39. Compression cylinders may be either 6 inch (150 mm) diameter by 12 inch (300 mm) length, or 4 inch (100 mm) diameter by 8 inch (200 mm) length.

Producers will maintain current calibration certificates on all analytical equipment used in testing.

Producers may elect to use the services of an independent commercial testing laboratory acceptable to the Department in lieu of conducting their own tests.

(3) Shipment

Products may be shipped to VDOT projects under either of the two following conditions:

- (a) All required testing for all product in the lot has been completed with acceptable results and all of the product to be shipped is at least the age of the test specimens at the time of testing.
- (b) Product which otherwise has met all test criteria may be shipped prior to completion of absorption testing if the concrete mix and manufacturing process used have historically produced the required absorption results, and approval is received from the Engineer, with final acceptance pending acceptable results.

(4) Records

All testing and inspection documentation will be maintained at the producing plant for at least five years, and will be made available to Department personnel at their request.

Producers will also collect and maintain conformance certificates and/or mill test reports for aggregates, cement, and reinforcing steel intended for use in products to be used on VDOT projects.

Producers will maintain a Department approved Quality Control Form for all pipe produced for VDOT projects. As a minimum, a form for each lot will contain the following:

Plant identification	Technician Signature
Lot identification	Production dates
Pipe dimensions	Pipe strength class
diameter - required/achieved	Number of units produced each date
length of pipe - required/achieved	Visual inspection
wall thickness - required/achieved	finish/cosmetic
joint style - required/achieved	dimensional tolerances
Reinforcement	wall thickness
style and spacing - required/achieved	diameter
area - required/achieved	length
position of reinforcement - required/achieved	position of reinforcement
adequacy and quality of welds/splices	markings

Compressive strength	Raw materials
cylinder strength - required/achieved	current certifications from vendors
core strength - required/achieved	Absorption - required/achieved
Three Edge Bearing	
0.01" (0.03 mm) crack strength - required/achieved	
ultimate strength - required/achieved	

In addition to date and other required markings, the plant identification and letters “QC” or “QCast” shall be affixed to each piece pipe and end section. Such markings shall be evidence that the required Q-C- procedures have been performed.

(5) Monitoring

The producers’ production and testing facilities, processes, records and product will be monitored by the Department. Checklist of items to be inspected is included as Appendix A. The checklist must be completed in its entirety each quarter. One size and class of pipe should be selected for three-edged bearing test per month, the sample should be taken at random, the test witnessed for load test compliance, and noted on the monitoring checklist, size, load, crack width, etc. The load shall not be taken to ultimate strength, if the sample pipe passes D-Crack Load criteria.

(b) Cast Iron and Ductile Iron

Cast iron and ductile iron culvert pipe shall be accepted on modified acceptance, based on Manufacturer's certification, as outlined in Sec. 207 for a CT number.

See Paragraph (j) herein for instructions on approval of cast iron and ductile iron pipe, fittings, and gaskets for use in municipal sewer and water lines.

(c) Black Seamless Steel and Galvanized Smooth Wall Steel

All seamless black and galvanized smooth wall steel shall be accepted on modified acceptance as outlined in Sec. 207 for a CT number.

Fittings shall be approved on Manufacturer's certified analysis, including zinc coating, as outlined in Sec. 207 for a CT number.

Galvanized steel pipe for handrails shall be accepted by Manufacturer certification, mill test report and visual inspection meeting the standard drawings. Final acceptance is given by the District at the project level.

Smooth wall steel pipe used for jacking or casing for general use shall be accepted based on Manufacturer certification, together with receipt of the physical and chemical analyses, as outlined in Sec. 207 for a CT number.

See Paragraph (j) herein for instructions on approval of steel, galvanized steel, and steel encasement pipe and fittings used in municipal sewer and water lines.

(d) Structural Plate Pipe, Pipe-Arches, and Arches

Structural steel plates and aluminum alloy structural plates for field bolted pipe, pipe arches, and arches shall meet AASHTO M167 or M219 and fall under the corrugated metal pipe program in section (e) below.

See Approved List 14 for joint gaskets and connections. https://www.virginiadot.org/business/resources/Materials/ApprovedLists/Materials_Aproved_Lists.pdf.

(e) Corrugated Metal Pipe

Corrugated metal pipe (CMP) shall be accepted from Fabricators on Approved List No. 25.

(1) Fabricators

Corrugated metal pipe conforming to the applicable specifications will be accepted on the manufacturer's certification based on the requirement that the Fabricator be actively enrolled in either the AASHTO NTPEP (National Transportation and Product Evaluation Program) or the NCSPA (National Corrugated Steel Pipe Association) audit program. Each individual fabricating facility, if more than one are owned by one company, shall be enrolled in an audit program in order to be on Approved List No. 25. The Fabricator shall submit annually, a Quality Control (QC) Plan defining its routine QC practices. A NTPEP/NCSPA plan may be used for the QC Plan, provided other information such as a cover sheet, organizational chart with line of reporting and responsibilities, and VDOT sample ticket are included. Requirements of this plan can be found in Appendix N of this chapter. The QC plan shall be current at all times and submitted annually to the VDOT Industrial Inspector assigned to monitor that specific facility, and it shall be resubmitted at time of any revision. The Department reserves the right to conduct inspections of fabrication facilities and to collect and test Verification Sampling and Testing (VST) samples as part of its owner QA program, and to discontinue acceptance of a Fabricator's CMP in the event that VDOT's inspection or VST results or NTPEP/NCSPA audits or testing indicate that non-specification material is being provided or QC procedures are not being followed. VST samples shall be a minimum of 1 ft. (300 mm) in length by associated coil width cut from the sheets, and marked in accordance with Section 203, using Form TL-10, as outlined in Section 800. Visual inspection of pipe product shall be made by the VDOT Inspector at the project, and may be rejected for damage from fabrication, shipping or handling.

CMP shall denote both steel and aluminum products that may be accepted under this program as follows.

- (1) Corrugated aluminum alloy pipe, including pipe arches, underdrains, and appurtenances, in accordance with AASHTO M196.
- (2) Corrugated steel pipe with a galvanized or aluminized coating, including pipe-arches, underdrains, and appurtenances, in accordance with AASHTO M36
- (3) Corrugated steel pipe with polymer coating, including pipe-arches, underdrains, and appurtenances, in accordance with AASHTO M246.
- (4) Galvanized steel and end sections and coupling bands. Various approved bands and joint materials are listed on Approved List No. 14.

The Fabricator shall issue "We certify that these materials have been tested and conform to the VDOT Corrugated Metal Pipe Quality Assurance Program" on each shipping document, and the statement shall be signed by a responsible company representative. When delivering directly to a VDOT project, shipping documents shall include Contractor, project number and product description. Copies of the shipping documents shall be emailed to the VDOT Industrial Inspector assigned to that facility on a weekly basis.

(2) Supplier:

In order for a Supplier to provide CMP, they shall follow the requirements of Section 112.01 and be included on Approved List No. 44.

(f) Poly(vinyl chloride) Plastic Pipe and Fittings

PVC plastic pipe shall be accepted based on Manufacturer certification.

See Paragraph (j) herein for instructions on approval of pipe and fittings used in municipal water lines.

(g) Glass Fiber Reinforced Epoxy and Centrifugally Cast Fiberglass Polymer Mortar Pipe and Fittings

Glass fiber reinforced epoxy pipe and cast fiberglass polymer pipe and fittings shall be accepted based on Manufacturer certification.

See Paragraph (j) herein for instructions on approval of pipe and fittings used in municipal water lines.

(h) Acrylonitrile-Butadiene-Styrene (ABS)

ABS semi round underdrain pipe shall be accepted based on Manufacturer certification.

(i) Polyethylene (PE) and Polypropylene (PP) Corrugated Culvert and Underdrain Pipe

Corrugated polyethylene and polypropylene pipe shall be accepted from Approved List No. 42.

For a pipe to be included on the approved list, the manufacturer must be on a VDOT approved quality control/quality assurance program, as outlined below and participate in a yearly audit under the AASHTO National Testing and Product Evaluation Program (NTPEP).

See paragraph (l) for instructions on approval of polyethylene sewer pipe used in municipal sewer lines.

VDOT PE and PP Corrugated Pipe Products Quality Assurance Program

Producers of Polyethylene (PE) corrugated underdrain pipe, PE and PP corrugated culvert pipe and fittings conforming to the applicable VDOT specifications or special designs approved by VDOT can be placed on the Materials Division's Approved list of PE and PP suppliers by meeting the requirements of the VDOT PE Corrugated Pipe Products Quality Assurance Program or the VDOT PP Corrugated Pipe Products Quality Assurance Program as outlined below.

Quality Control Plan

The producer shall submit for VDOT's approval a Quality Control Plan. The plan must be site specific. The plan must indicate in detail how the Producer proposes to control the equipment, resins and raw materials, and production methods and finished pipe products to ensure that the specified products are obtained. The plan must list the personnel responsible for production and quality control at the site. The plan must include the following:

- Identification of the physical location of the plant.
- The method of identification of each lot of material during manufacture, testing, storage, and shipment.
- The method of sampling and testing of raw materials and of the finished product, including lot sizes and type of tests performed.
- A plan for dealing with quality control sample failures. This plan must include how the Producer plans to initiate an immediate investigation and how the Producer shall implement corrective action to remedy the cause of the problem.

If a quality control sample indicates the material or pipe does not meet the specification requirements, the Producer shall initiate an investigation to determine the cause of the failure. The investigation shall include a review of the sampling procedures, the equipment used in the production and the testing of the material, and the testing procedures of the technician. If the cause can be attributed to one of the above categories, the Producer shall take corrective action to bring the material equipment, or

procedure into compliance. The Producer shall then record the corrective action on the test report form and take another check sample after the corrections have been made.

If a second quality control sample indicates the material or pipe meets the specification requirements, the Producer may resume normal testing procedures.

If a second quality control sample indicates the material or pipe does not meet the specification requirements, the Producer shall notify VDOT and stop the shipment of the affected pipe. The Producer shall continue the investigation into these failures and work with VDOT to determine the cause.

VDOT will review the Producer's written quality control plan. After approval, an on-site inspection will be scheduled. This on-site inspection using the form in Appendix G will verify that the Producer's quality control plan has been implemented and is being followed. See Appendix G.

Testing

The producer shall perform the following minimum quality control test procedures on the polyethylene resins and the completed pipe as outlined in AASHTO M294 and AASHTO M252 or polypropylene as outlined in M330. In addition the producer shall follow all Quality Management System requirements and quality control testing outlined in AASHTO NTPEP Work Plan for Evaluation of HDPE (High Density Polyethylene) Thermoplastic Drainage Pipe and the NTPEP Polypropylene Work Plan.

TEST

A. Polyethylene Resin

Table 1 Virgin Polyethylene Resin Test Requirements			
Test Property	Test Performed on	Test designation	Test Frequency
Density	Virgin resins and Virgin resin blends	ASTM D1505 or ASTM D792 or ASTM D4883	One test per lot of resin
Melt index	Virgin resins and Virgin resin blends	ASTM D1238	One test per lot of resin
Notched Constant Ligament-Stress (NCLS)	M 294 product, all Resin blends	AASHTO M 294 & ASTM F2136	Once on initial use of a resin Blend and then quarterly with Continued use of blend

Table 2 Recycled Polyethylene Resin Test Requirements			
Test Property	Test Performed on	Test designation	Test Frequency
Density	Recycled HDPE And blends Containing recycled HDPE	ASTM D4883	See Table 3 of NTPEP Work Plan
Melt index	Recycled HDPE And blends Containing recycled HDPE	ASTM D1238	See Table 3 of NTPEP Work Plan

B. Polypropylene Resin

Table 3 Virgin Polypropylene Resin Test Requirements			
Test Property	Test Performed on	Test designation	Test Frequency
Density	Base polypropylene resin	ASTN D1505 or ASTM D792	One test per lot of resin
Melt index	Base polypropylene resin	ASTM D1238	One test per lot of resin
Density	Virgin polypropylene Compound	ASTN D1505 or ASTM D792	One test per quarter
Melt index	Virgin polypropylene Compound	ASTM D1238	One test per quarter
Notched Constant Ligament-Stress (NCLS)	Virgin polypropylene Compound with Blended resins	AASHTO M 330 & ASTM F2136	Once on initial use of a resin Blend and then quarterly with Continued use of blend
IZOD Impact Strength	Virgin polypropylene Compound	ASTM D256	Once on initial use of a resin Blend and then quarterly with Continued use of blend
Oxidative-Induction Time	Virgin polypropylene Compound	ASTM D3895	Once on initial use of a resin Blend and then quarterly with Continued use of blend
Tensile Strength At Yield	Virgin polypropylene Compound	ASTM D638	Once on initial use of a resin Blend and then quarterly with Continued use of blend
Elongation at Yield	Virgin polypropylene Compound	ASTM D638	Once on initial use of a resin Blend and then quarterly with Continued use of blend
Flexural Modulus (1% Secant)	Virgin polypropylene Compound	ASTM D790, Procedure B	Once on initial use of a resin Blend and then quarterly with Continued use of blend

C. PE and PP Pipe/Tubing:

- | | |
|------------------------|-------------------------------|
| Tubing Dimensions | Environmental Stress Cracking |
| Workmanship | Brittleness |
| Perforation Dimensions | Markings |
| Pipe Stiffness | Stub Compression |
| Pipe Flattening | |

Note: The above Quality control tests shall be performed as required by the respective AASHTO or ASTM standard.

Table 4 Test Requirements for Finished Product Containing Recycled HDPE		
Test Property	Test designation	Test Frequency*
Density	ASTM D4883	One finished product sample shall be collected for every 45,000 lbs. of product produced or every 24 hours, or whenever the material blend ratios are changed by more than 5% or the blended constituents are changed, whichever comes first.

Melt index	ASTM D1238	One finished product sample shall be collected for every 45,000 lbs. of product produced or every 24 hours, or whenever the material blend ratios are changed by more than 5% or the blended constituents are changed, whichever comes first.
Un-notched Constant Ligament- Stress (UCLS)	ASTM F3181	One finished product sample shall be collected for every 45,000 lbs. of product produced or every 24 hours, or whenever the material blend ratios are changed by more than 5% or the blended constituents are changed, whichever comes first.
Oxidation Induction Time (OIT)	ASTM D3895	One finished product sample shall be collected for every 45,000 lbs. of product produced or every 24 hours, or whenever the material blend ratios are changed by more than 5% or the blended constituents are changed, whichever comes first.
Notched Constant Ligament- Stress (NCLS)	ASTM F2136	One finished product sample shall be collected for every 45,000 lbs. of product produced or every 24 hours, or whenever the material blend ratios are changed by more than 5% or the blended constituents are changed, whichever comes first.
Break Strain	ASTM D638	One finished product sample shall be collected for every 45,000 lbs. of product produced or every 24 hours, or whenever the material blend ratios are changed by more than 5% or the blended constituents are changed, whichever comes first.

Note – Test frequency is subject to modifications to NTPEP HDPE Work Plan

D. PE and PP Fitting and Coupling:

Traceability related to marking and labeling

MINIMUM FREQUENCY

For the purpose of this program a lot is considered to be the amount of pipe produced as defined in the current NTPEP Work plan which is typically a day or 24 hours of production.

Test Facilities

Producer's facilities, equipment and testing personnel shall be adequate to conduct the applicable test as outlined in AASHTO M294, AASHTO M252 or AASHTO M330 and will be approved by the Department.

Producers shall maintain current calibration certificates on all analytical equipment used in testing.

Producers may elect to use the services of an independent commercial testing laboratory acceptable to the Department in lieu of conducting their own tests.

Shipments

Products shall be shipped to VDOT projects only when all required testing in the lot has been completed with acceptable results. Invoices with the statement, "We certify that these PE or PP pipe and fittings have been tested and conform to the VDOT PE and PP Corrugated Products Quality Assurance Program" shall be on each of the shipping documents and signed by a responsible company representative.

Records

All testing and inspection documentation shall be maintained at the producing and the shipping facility for at least two (2) years, and shall be made available to Department personnel at their request.

Producer shall maintain a Department-approved quality Control Form(s) for each lot, and as a minimum the form(s) shall contain the following:

- Plant Identification
- QC Technician's Signature
- Lot Identification
- Production Dates
- Tubing/Pipe Dimensions
- Workmanship
- Perforation Dimensions
- Pipe Stiffness
- Pipe Flattening
- Elongation
- Environmental Stress Cracking
- Brittleness
- Low Temperature Flexibility
- Markings

Applicable specifications are AASHTO M252, AASHTO M294 AASHTO M 330 and VDOT Road and Bridge Specifications and Standards.

Inspections/Audits - VDOT representatives may randomly conduct plant inspections each year with cooperation and assistance of the fabricator to ensure that specifications and quality control requirements are being met. VDOT representatives may take random Independent Assurance Samples during the inspection at the rate of one sample per size in stock or production. Failure to perform all the program requirements may result in a producer being removed from the Approved List. A NTPEP annual audit will be used by the Materials Division Central Office Quality Assurance Section to determine compliance with VDOT’s PE and PP Corrugated Products Quality Assurance Program. When the pipe is received on the project, the project inspector shall perform a visual inspection.

See Paragraph (j) herein for instructions on approval of pipe and fittings used in municipal water lines.

(j) Pipe for Use in Municipal Sewer and Water Lines

232, 520) Pipe for use in installation, relocation, and or adjustment of municipal sewer and water distribution facilities will not require sampling and testing. This pipe shall be accepted on modified acceptance for a District CT as outlined in Sec. 207.03 (Appendix O) for each Manufacturer/Supplier for all quantities. Pipe and appurtenances to be considered under this provision shall include the following:

VDOT Road & Bridge Specifications – Water & Sanitary Sewer Facilities – Section 520

<u>Type of Pipe or Appurtenance</u>	<u>Specification</u>
Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe -	ASTM D2680
Cast Iron Pipe (Water or Sewer) -	ASTM A888
Cast or Ductile Iron Pipe Fittings -	AWWA C110 (ANSI A21.10)
	AWWA C153 (ANSI A21.53)
Cast or Ductile Iron Pipe Rubber Gaskets -	AWWA C111
Cement Mortar Linings -	AWWA C104 (ANSI A21.4)
Concrete Pressure Pipe (Steel Cylinder Type for Water) -	AWWA C300, C301, C303

Concrete Pipe, Reinforced (Noncylinder Type for Water) -	AWWA C302.
Concrete Sewer Pipe Rubber Gaskets -	ASTM C443.
Copper Pipe or Tubing (Water) -	ASTM B88.
Corporation Stops & Fittings, Bronze or Red Brass -	ASTM B62 & AWWA C800
Ductile Iron Pipe (Water or Sewer) -	AWWA C151
	Flanged joints AWWA C115
Fire Hydrants -	AWWA C502 or C503
Glass Fiber Reinforced Epoxy	ASTM D2996, ASTM 2997
	Or AWWA C950
Plastic Water Pipe & Fittings -	PVC Water – AWWA C900
	PC-150 and Sewer – ASTM D1785
	Polyethylene Water – AWWA C109 Sewer ASTM D2239 Grade P34
Steel Pipe (Water) -	AWWA C200.
Steel Encasement Pipe/jacked or casing general use (Water or Sewer) -	ASTM A139 or ASTM A53.
Steel Pipe, Galvanized (Water) -	ASTM A53, Schedule 40 or 80.
Steel Pipe Fittings (Water) -	AWWA C208.
Steel Pipe Fittings, Galvanized, Malleable Iron (Water) -	ASTM A47.
Steel Pipe Coal Tar Protective Coatings & Linings -	AWWA C203.
Steel Pipe Cement Mortar Protective Coatings & Linings -	AWWA C205.
Valves -	AWWA C 500, C504, C506, C507, C508, C509 or C515.
Water Meters -	AWWA C700, C701, C702, C703, C704, C706, C707, C708 or C710.

Sec. 204.27 Precast Products, Concrete

The following precast products may be accepted on the Manufacturer’s certification based on the requirements of the VDOT Precast Concrete Products Quality Assurance Program detailed in this section:

- Manholes
- Box Culvert Systems
- Temporary Concrete Barrier (shall be an approved product from the VDOT Provisionally Approved MASH Product list and in accordance with the current VDOT specifications)
- Water and Wastewater Drainage Structures
- Retaining Walls (proprietary wall systems must also be on VDOT Structure & Bridge Division list of approved wall systems)
- Sound Wall Components made of concrete (Refer to App List 65 for Sound wall systems)
- R/W monuments
- Other Precast Concrete Products upon approval by VDOT

Concrete pipe and prestressed concrete products are not included in the above list.

When approving hydraulic cement concrete mix designs for precast concrete, the requirements of the Specifications, Section 217.02 must be met with the exception of:

1. Yield – 27 cubic foot does not have to be exact due to aggregate deviations

2. Aggregate – Nominal maximum size aggregate for coarse and fine aggregate shall be waived under Section 217.07 Option 3.
3. Pozzolan – Minimum pozzolan requirements are not applicable in precast concrete products that are installed below the frost line

If all of the above criteria are met, the Concrete Engineer signs and dates the HCC mix design denoting approval. A copy is retained on file in the Central Office Materials Section. The original is sent to the VDOT Industrial Inspector assigned to that facility to be forwarded to the Precaster to be retained in their file and available to VDOT personnel upon request.

After determining the weight for each of the components of the mix, VDOT Industrial Inspector shall request the Precaster to perform a trial batch using the approved mix design.

Precast structure submittal drawings (excluding standard precast item drawings) shall be designed and stamped by a Professional Engineer licensed to practice in the Commonwealth of Virginia. All sheets are to be reviewed and stamped. Approved submittal drawings shall be sent by the Precaster to the Contractor who will be responsible for getting them the Department for review. Fabrication is not permitted to begin until the submittal drawings have been reviewed by the Department. The production drawings should also be reviewed by the Department prior to production. A copy of the production drawings should be emailed to the VDOT Industrial Inspector at least 5 days prior to the start of production. These drawings shall be maintained in the plant office and made available to the VDOT Industrial Inspector to compare to the production drawings used in the fabrication shop.

In order to supply precast concrete products to a VDOT project, the precast concrete Producer must be on the Materials Division Approved List No. 34. Out-of-state producing facilities must be a distance of less than 125 road miles from the nearest Virginia state line crossing. The precast concrete Producer may qualify for placement on this list after the following is verified:

- The precast concrete Producer shall submit a QC plan defining its routine business QC practices.
- The QC plan is submitted to the Materials Division Section. After review for completeness and compliance of the Producer’s QC plan to the Department requirements of the QC Plan Checklist as found in Appendix H of this chapter, a plant visit will be made by a VDOT Industrial Inspector to evaluate the Producer’s compliance to its QC plan. If during the inspection deficiencies are noted, this will be documented in a non-compliance report (NCR) with a follow-up visit scheduled.
- If no deficiencies are found, the Producer will be granted probationary approval.

The miscellaneous precast concrete Producer will then be added to Approved List No. 34 with a “p” to denote the probationary status of the facility.

The probationary status will remain in place for a minimum of six months. After this period, the precast facility may be removed from probationary status if the following conditions have been met: 1) It has successfully completed two VDOT projects, and 2) Has not received more than eight (8) total points in the NCR. The probationary status of the facility may be removed by the VDOT Quality Assurance Section. If problems are encountered during the production and supply within this probationary period, then additional projects may be necessary for the Producer to correct QC plan compliance issues. Once the probationary period has been successfully completed, the “p” will be removed from the precast concrete facility’s listing on the approved list. The Department will continue to monitor the Producer’s facility quarterly or as needed to ensure compliance to the QC plan and project specifications.

Any precast facility that has not supplied two VDOT projects after one year will have its status listed as IDLE on Approved List No. 34. Facilities in IDLE must contact the VDOT Industrial Inspector 2 weeks prior to starting work on an awarded VDOT project.

One of the three regional Industrial Inspectors in the VDOT Materials QA Section shall be assigned to each Producer and shall visit approved, non-idle Producers at least quarterly.

The plant QC Manager shall update the QC plan anytime changes are made such as changes in QC personnel, management, plant ownership, mix designs, or changes in items manufactured. The VDOT Industrial Inspector will be notified by the QC Manager within 3 days of such changes occurring, and the updated QC plan will be sent to the VDOT Industrial Inspector within 2 weeks of the changes occurring. The Industrial Inspector will review the updated plan for approval. The VDOT QA Section Manager has the authority to revoke the QC plan should it not meet approval requirements. Any appeal of revocation shall be made to the State Materials Engineer.

Annually, the Department will review each plant’s QC plan and update Approved List No. 34 with the latest QC plan review date.

Each approved facility shall have at least one Precast Concrete QC Technician certified by VDOT on staff, responsible for ensuring that the QC plan is being followed. To qualify as a VDOT-certified Precast Concrete QC Technician, one must have (1) a current VDOT Concrete Plant Certification and (2) American Concrete Institute’s Concrete Field Testing Technician Grade I certification or a WACEL (Washington Area Council of Engineering Laboratories) Concrete Technician Level I certification. Each VDOT-certified QC Technician must have a unique QC stamp for approval of work and the stamp must be documented in the QC plan. Only a certified VDOT Precast Concrete QC Technician can approve and stamp product for VDOT use. All other facility QC personnel must have, at a minimum, an American Concrete Institute’s Concrete Field Testing Technician Grade I certification or WACEL Concrete Technician Level I certification. Department specifications and policies over-ride other plant certifications or specifications denoted in any third-party plant certification (eg. NPCA).

In extraordinary circumstances, production personnel may be substituted for the QC Technician involved in some QC activities on a limited basis. The substitute QC Technician is only authorized to be used in this capacity no more than five days in a month and only in order to meet the quality objectives. Production personnel acting in this capacity shall not provide the quality audit or review production practices where they are directly involved. These production personnel must be identified on the QC plan along with their current certifications.

(1) Precaster Quality Control Testing

The Producer shall perform the following minimum QC test and inspections, and the statement "We certify that these items have been tested and conform to the VDOT Precast Concrete Products Quality Assurance Program" shall be on each shipping document and signed by a Precast Concrete QC Technician certified by VDOT. The shipping document shall also contain the following information: The plant name, location, telephone number, document number, Contractor’s name, VDOT project number, and all relative product information. A copy of all shipping tickets shall be emailed on a weekly basis to the Industrial Inspector assigned to that facility.

Test	Minimum Frequency	Test Method
Stripping, shipping, and 28-day Compressive Strength	One set, per test, per lot, equaling a minimum of six 6"x12"	

Two 6"x12" or Three 4"x8" cylinders or One 4" core	cylinders, nine 4"x8" cylinder, or three 4" Cores (For max. aggr. Size 1/2", One set, per test, per lot, equaling a minimum of six 4"x8" cylinders)	AASHTO T280
Absorption (Dry Cast only)	See Note below	AASHTO T280
Inspection of manufactured product for visual defects	Each unit.	AASHTO T280
Air Content and Slump (Wet Cast)	*One test per lot produced * One test per day for Box Culverts, Retaining Walls, or other Precast Structural products	ASTM C231 ASTM C143 ASTM 1611
Soundwall structural concrete – temperature, air, slump from same concrete as control cylinders are made		AASHTO T280
Soundwall panel – sound absorptive mixed material that is attached to or within the concrete wall material, see note below. Make one unit weight test per day.		AASHTO T280

Note: The requirements for absorption testing on precast concrete (dry-cast) units are one per lot with no history of test results. If a history of test results is available for a given mix design, then the minimum frequency of absorption testing is as follows:

Frequency of tests = one absorption test per the number of consecutive lots with passing results or a minimum of one test per twenty-five lots of production.

A random sampling process (as defined in the Producer’s approved QC Plan on file with the Department) will be used to determine the lot from which a specimen will be tested. If a failing result is obtained, the frequency of testing will resume at one test per lot as if no history were available.

Examples:

No. 1 – If no history is available, the frequency of testing is one per lot. If this test passes, then over the next two lots, one lot is randomly selected and tested for absorption. If the absorption test passes, then the frequency of testing will be one randomly selected lot out of the next 3 lots. The process may continue in this manner until twenty-five passing results are obtained.

No. 2 – If a precast concrete (dry-cast) Producer has 15 consecutive passing test results, then the frequency of absorption tests would be one per 15 lots. If the next random sample test passes, the number of consecutive passing test results increases by one to becomes 16. The process continues in this manner until twenty-five passing results are obtained.

No. 3 – If the number of consecutive passing test results was 35, the frequency of absorption tests would be a minimum of one per 25 lots so 2 tests would be required if the number of consecutive passing lots is any number between 26 and 50. If a failure occurred, then the number of tests would reinitialize to one test per lot.

For the purpose of this program, a lot is defined as a maximum of 250 cubic yards or no more than three consecutive calendar days of production (whichever is less) of precast concrete from each batching operation, of the same mix design, strength and manufactured by the same process. Variations in lot definition will be governed by applicable specifications and approved by the VDOT QA Section Manager.

If cylinder strength failure occurs, the lot shall be evaluated by core testing. If the core fails, two cores shall be taken to recheck the failed core. Both cores must pass for the lot represented to be acceptable. If both cores do not pass, each precast unit in the lot shall be tested individually by core for acceptance.

(2)

Test facilities Producer facilities, equipment and testing personnel shall be adequate to conduct the applicable tests outlined in AASHTO T280, and shall require Department approval. QC Procedures shall be performed by or under the direction of a VDOT-certified Precast Concrete QC Technician. The requirements to qualify as a VDOT Precast Concrete QC Technician, are given above. The QC person operating the batching equipment (batcher) must pass an annual concrete batching exam given by the Certified Concrete Plant Technician using the Annual Concrete Batcher Exam or similar. Annual exams for each QC Batcher must be included annually with the facility's QC plan. The Annual Concrete Batcher Exam is found in Appendix P of this chapter.

Entrained air will be checked daily with a pressure type meter according to ASTM C231.

Aggregate moisture testing will be checked a minimum of once daily prior to the start of batching, or as changes occur in the condition of aggregates for facilities without moisture probes in their aggregate bins. For facilities with probes in their aggregate bins, moisture checks will be done a minimum of once a week to verify the accuracy of the probes. All probes shall be calibrated within $\pm 1\%$ to be considered accurate.

Compression cylinders or cores shall be tested with facilities, equipment and personnel sufficient to conduct such tests as described in ASTM C39. Compressive strength cylinders may be either 6 inch diameter by 12 inch length, or 4 inch diameter by 8 inch length.

Producers shall maintain current calibration certificates as required by AASHTO R18 on all analytical equipment used in testing.

Producers may elect to use the services of an independent commercial testing laboratory acceptable to the Department in lieu of conducting their own tests.

(3) Shipment

Products may be shipped to VDOT projects under either of the two following conditions:

- a) All required testing for all product in the lot has been completed with acceptable results and all of the product to be shipped is at least the age of the test specimens at the time of testing. Acceptable results for shipping are defined as 85% of design compressive strength. Strength testing shall continue until design compressive strength has been attained.
- b) Product which otherwise has met all test criteria may be shipped prior to completion of absorption testing if the concrete mix and manufacturing process used have historically produced the required absorption results, and approval is received from the Engineer, with final acceptance pending acceptable results.

(4) Records

All testing and inspection documentation will be maintained at the producing plant for at least five years, and will be made available to Department personnel at their request.

Producers will also collect and maintain conformance certificates and/or mill test reports for aggregates, cement, reinforcing steel, frames, grates, collars, lids, steps, steel angles, and other applicable components intended for use in products to be used on VDOT projects. Producers must document compliance with “Buy America” requirements and “BABA” requirements as per 106.01(a).

- Reinforcement – “Buy America” requirements and “BABA” requirement documentation as described above.
- Casting – “Buy America” requirements and “BABA” requirements documentation as described above.

Producers will maintain a Department approved QC form(s) for each lot of precast products, and as a minimum the form(s) will contain the following:

- Plant identification
- QC Technician signature
- Lot identification
- Production dates
- Number of units and cubic yards of concrete produced for each lot.
- Reinforcement per specification or approved drawings
 - Type – Corrosion resistant, galvanized
 - Mill test - Lot number and/or Heat number
 - Buy America documentation as described above
- Castings per specifications
 - Mill test - Lot number and/or Heat number
 - Buy America documentation as described above
- Compressive strength
 - Cylinder strength - required/achieved
 - Core strength (if needed) - required/achieved
- Absorption - required/achieved
- Visual inspection performed
- Markings verified
- Dimensions verified:
- Manholes (AASHTO M199) (ASTM C478)
- Box culverts (AASHTO M259) (ASTM C789) or (AASHTO M273) (ASTM C850)
- Water and wastewater drainage structures (ASTM C913)
(i.e. drop inlets, junction boxes, endwalls, etc.)
- Raw materials
 - current certifications from vendors
- Repair materials - Approved Lists 28, 29 and 31

In addition to cast date and other required markings, the plant identification and letters “QC” shall be affixed to each piece of products. Such markings shall be evidence that the required QC procedures have been performed. These markings shall not be added until final QC inspection has been performed.

(5) VDOT Quality Assurance Monitoring

The producer’s Production and testing facilities, processes, records, and product will be monitored as deemed necessary by the Department based upon the needs of project-related work. A checklist of items to be inspected is provided in Appendix E (Precast Concrete Plant Inspection Report). The checklist will be completed in its entirety each quarter. If during the VDOT Industrial Inspector’s inspection, non-

compliance with specifications, or the checklist in Appendix E, or the Producer's QC plan is observed, the VDOT Industrial Inspector will issue an NCR to the Producer's QC Technician and plant manager. The NCR will list the violation of the QC plan, checklist in Appendix H, or specification, and rate the violation on a scale of one (1) to five (5). A one (1) is considered a small infraction within a category and is equal to one point and a five (5) is considered a major infraction within a category and is equal to 5 points. Typical Precast Concrete QC violation categories and points per category are listed in Appendix L.

The VDOT Industrial Inspector will work with the Producer's QC Technician in making a resolute effort to resolve NCR action items and develop a procedure or process to ensure the violation does not take place again. The accumulation of fifteen non-compliance points or more within a twelve month period will result in the precast facility being placed on probation for six months. While on the first probation period, any accumulation of NCR points exceeding four points, the Producer's probation period will restart to the date of the latest NCR. If any NCR points are issued on the second probation period, the facility will be removed from the Approved List No. 34 immediately. If the precast facility accumulates twenty non-compliance points within a twelve month period the facility will be removed from the approved list immediately. Failure to address the NCR will result in the facility's removal from Approved List 34.

Appeal Process:

A Producer has five business days upon the notification(s) of any NCR issued by the VDOT Industrial Inspector that changes the status of the Producer on Approved List No.34 to appeal to the QA Section Manager. The appeal must be in writing. The QA Section Manager will follow the steps below:

1. The QA Section will review the VDOT Industrial Inspector's NCR and the Producer's documentation within five business days of notification. If the Quality Assurance Section can resolve the matter with the Producer, there will be no need to proceed to Step 2.
2. The - QA Section will issue a written notice of placing the precast facility on probation for a minimum of six months or removing from the approved list. The QA Section's decision on being placed on probation is final.
3. If the decision is to remove the Producer from the approved list, the Producer may appeal the decision in writing to the State Materials Engineer within five business days. The State Materials Engineer (or designated representative) decision is final and will be made within five business days after receiving the Producer's written appeal. If the precast facility is removed from the approved list the facility is not eligible for reinstatement for one year from the date of notification.

(6) Annual Quality Testing

Quality testing will be performed as deemed necessary by the Department for establishing quality of raw materials. The tests may be performed on the aggregates, cement, mineral admixtures, and all types and sizes of reinforcing materials. This is more likely to occur with out-of-state Producers not using aggregate from VDOT approved lists.

(7) Repairs

Repairs will be in accordance with **The Precast Concrete Repair Manual** in Appendix I. Materials used in repairs will come from VDOT Materials Division Approved Lists - 28, 29, or 31.

For structural repairs, the Producer shall submit a repair plan to the QA Section for review and approval before the repairs are made. Once the plan has been approved by the QA Section the repairs can be made. No repair is to begin without written authorization from the VDOT Industrial Inspector Report QA plant monitor.

Sec. 204.28 Poles and Posts

(Secs. 221, 242.02, and 700.02) See Sec. 207 for details of acceptance of poles and posts on modified inspection.

(a) Fence, Chain-Link

Shall be accepted as outlined in Sec. 204.16.

(b) Fence, Standard -

(1) Metal Posts and Braces

Shall be accepted as outlined in Sec. 204.16.

(2) Wood Posts and Braces(Treated)

Treated wood fence posts and braces for standard fence normally will not require sampling on the project. The preservative treatment shall be accepted on certification as outlined in Section 204.29 and Section 204.33. Locust posts require no treatment, testing, or certification. See Sec. 207 for additional details of acceptance of wood posts on modified inspection.

(c) Guardrail

(1) Concrete Posts

Concrete guardrail posts shall be sampled by obtaining a specimen of the concrete during the manufacture of the posts. Three (3) concrete cylinders 4 in. (100 mm) in diameter and 8 in. (200 mm) in height shall be molded at the place of fabrication, in accordance with the procedure outlined in Sec. 400. At least one set of 3 cylinders shall be made each day during which posts are being fabricated. The cylinders shall be submitted to the District or Central Office Laboratory after having been properly cured in the same manner as the concrete posts.

Cylinders should be packed and marked, in accordance with Sec. 203, using Form TL-13, as outlined in Sec. 800.

(2) Steel Posts

Steel guardrail posts will be accepted by visual inspection with annual certifications from the Manufacturers, Suppliers, and Erectors as outlined for steel beam guardrail in Sec. 204.18. See, also, Sec. 207 for additional details of modified inspection and acceptance. It will be necessary that District Materials personnel obtain verification samples consisting of a minimum of one post selected once annually per District, and submit to the Central Office Laboratory for testing. This sample is taken at the project site or the Erector's materials storage facility.

All samples of posts shall be marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. No container is necessary.

(3) Wood Posts

Treated wood guardrail posts will be handled the same, as outlined in Paragraph (b)(2) above.

(d) Lighting Standards, High Mast Lighting Standards, Luminaires, Mast Arm Poles, Combination Mast Arm-Luminaire Arm Poles, Pedestal Poles, and Other

(1) Aluminum

Aluminum poles, including breakaway, for use as any of the above noted types of poles, will be accepted on modified inspection, as outlined in Sec. 207. The Manufacturer shall certify that the product meets the noted AASHTO specification. Also, if poles are required to meet certain alloy specifications, such as

ASTM, then a Manufacturer's certified physical and chemical analysis is required. The above requirements also apply to aluminum alloy breakaway support couplings.

(2) Steel

Steel poles, including breakaway, for use as any of the above noted types of poles, shall be accepted the same, as outlined in Paragraph (d)(1) above. This includes steel shafts and base flanges for high mast lighting standards. See also Sec. 204.32 for additional details of modified acceptance.

(e) Traffic Sign

(1) Aluminum Alloy Poles and Breakaway Supports

Aluminum alloy sign poles, including breakaway supports, are approved on Manufacturers' certified physical and chemical analyses. See Sec. 207 for additional details of acceptance on modified inspection.

(2) Galvanized Steel Sign Poles and Posts

Galvanized steel sign poles and posts shall be approved for use on Manufacturers' mill analyses and shop inspection, as outlined for modified inspection in Secs. 204.32 and 207 herein. If poles or posts are painted, the paint shall be accepted as outlined in Sec. 204.24.

(3) Rolled Rail Steel Poles and Posts

Rolled rail steel sign poles and posts shall be approved for use the same, as outlined in Paragraph (e)(2) above.

(4) Structural Steel Poles and Posts

Structural steel sign poles and posts shall be approved for use the same, as outlined in Paragraph (e)(2) above.

(5) Treated Wood Poles and Posts

Treated wood sign poles and posts shall be accepted as outlined in Section 204.29 and Section 204.33.

(f) Traffic Signal

(1) Steel Poles

Steel traffic signal poles shall be approved for use the same, as outlined in Paragraph (e)(2) above.

(2) Treated Wood Poles

Treated wood traffic signal poles shall be accepted as outlined in Section 204.28(e)5 above.

(g) Reports

Laboratory tests of concrete cylinders for concrete guardrail posts will be reported on Form TL-26 (TL-26B, if computerized test report output form), tests of steel guardrail posts on Form TL-25, and tests of chain-link and metal fence posts and preservative treatments for treated wood posts on Form TL-47. Inspections of all posts will be reported on Form TL-109. See Sec. 800.

Sec. 204.29 Preservatives, Timber

Wood treatment conforming to the applicable VDOT specifications will be accepted on a certification from a wood treatment facility on approved list (#45).

Wood treating facilities must meet the following requirements in order to be placed on the approved list and supply VDOT:

1. The facility shall certify the treatment of their product according to AWWA Standards.

2. The wood treating facility shall allow VDOT or representative to enter facility for the inspection of wood treatment processes, wood testing (wood boring, penetration and retention) and to obtain copies of test results and quality control procedures.

Approved List (#45) Requirements – The wood treating facility must meet the following requirements listed below to be placed on the Approved List. VDOT reserves the right to modify these requirements on a case by case basis.

The facility shall maintain a current AWWA membership and participate in a third party inspection program. (For example: TPI, SPIB, etc.)

Initial Requirements - Samples of wood from 10 separate and varied retentions shall be tested for penetration and retention by the wood treatment facility. Retention shall be tested per AWWA A9 (X-Ray Fluorescence Spectroscopy). These samples and the test documentation shall be sent to VDOT Central Laboratory for analysis. VDOT Central Laboratory may analyze the treated wood samples; compare lab results, and review treatment facility inspection reports and documents. Once approved, the wood treatment facility will be notified and shall be placed on the Approved List (#45).

Annual Monitoring Requirements - Each wood treatment facility on the Approved List (#45) will be evaluated at least annually for the initial requirements listed above. However, boring samples and test results from 2 separate retentions will be tested by the facility and sent to the VDOT Central Laboratory for analysis. If monitoring results are accepted, the treatment facility will remain on the approved list. If problems in the facility or with sample testing are discovered, VDOT will notify the facility of the problems and attempt to resolve them. If resolution cannot be made, the facility will be removed from the approved list. Re-approval of the wood treatment facility will be allowed at VDOT Central Laboratory’s discretion. Records of the monitoring testing shall be kept on file at the wood treating facility for three years.

Batch/Charge Testing Requirements – If the wood treatment facility is not on the Approved List (#45), batch/charge testing is required. VDOT or representative will observe the taking of 10-20 boring samples and the testing for penetration and retention. The ground wood samples will be forwarded to VDOT Central Laboratory. The Central laboratory will test the samples and compare the results with those obtained by the facility. If the specifications are met, that batch/charge will be accepted. VDOT reserves the right to modify these requirements on a case by case basis.

Certification Requirements:

The wood treating facility will furnish a certification on each (Charge, PO, Batch No.) or shipment of material. The certification shall include a description of the wood items being treated, the quantity, type of preservative used, retention and the consumer use category.

Example: 12	10”Butt 40’ Piles	CCA	Retention = 1.0	UC4C
20	4x4x12’ Posts	CCA	Retention = 0.40	UC4A

The certification should also contain the following certification statement.

“Name of Manufacturer certifies that the treated wood products for (Charge, PO and Batch No.) have been treated in accordance with AWWA standards, Section 236 of the VDOT Road & Bridge Specifications and meets the applicable minimum penetration and retention requirements.”

Sec. 204.30 Reflective Materials

(Secs. 231, 234, 235, 246, and 701) See Sec. 207 for acceptance of reflective materials on modified inspection procedures.

(a) Pavement Markings

(1) Sampling, Testing and Approval

Sampling of reflectorized pavement markings, including glass beads, in the field will not normally be necessary. This material is normally pre-sampled and pre-tested. Materials sampled at the point of manufacture should arrive at the job site or storage area with evidence of test as outlined below. If no such evidence is present, then representative samples need to be taken and shipped to the Central Office Laboratory, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(a) Glass Beads

Glass beads are either dropped on or premixed into pavement markings. Drop-on glass beads are accepted under the Glass Bead Batch Sampling/Testing Plan or the Virginia Glass Bead Acceptance Plan (VGBAP). Glass Beads that are pre-mixed in pavement markings are accepted under Glass Beads Pre-mixed in Pavement Marking Material.

1. **Glass Bead Batch Sampling/Testing Plan** - Each batch of glass beads are sampled at the point of manufacture by either a VDOT representative or by the manufacturer and forwarded to the VDOT Central Office, Materials Division, Chemistry Lab for testing and acceptance. Batch sampling methods shall follow VDOT Batch Sampling Guidelines (Section 5) and shall include a composite sample that is representative of the entire batch. The composite sample shall be split with the manufacturer retaining half and the other half being sent to VDOT.

The Manufacturer shall test their split sample and forward their results to VDOT Central Office, Materials Division, Chemistry Lab. VDOT will test their split sample per VDOT Testing Requirements (Section 5), assign a sample number (MS #) to the glass bead sample, and notify the manufacturer of the test results prior to shipment.

In addition to the batch sampling/testing plan, the manufacturer shall comply with AASHTO M247 requirements for lead and arsenic testing and limits as described in MAP-21 Requirements (Section 4).

Each batch shipped to VDOT will be accompanied by a Certified Test Report that contains the following information:

- (a) Manufacturer's name and address
- (b) Batch, pallet, and bag numbers sampled and tested.
- (c) Quantity represented
- (d) Manufacturer's test results
- (e) VDOT, MS #
- (f) Certification statement shall read as follows:

"(Manufacturer Name) certifies that the glass beads produced for VDOT in batch

(batch number) have been sampled, tested, and approved by VDOT, Central Office, Materials Division, Chemistry Lab as indicated by laboratory test number, MS# _____. We also certify that this batch conforms to AASHTO M247 including the total concentration limits for Lead and Arsenic."

Each Certified Test Report shall be forwarded to the following:

1. VDOT, Central Office, Materials Division, Chemistry Lab
2. Striping Contractor

Non-Compliance to Specification

Any discrepancies in sampling, test results, and certifications will be reported to the glass bead manufacturer for resolution. VDOT reserves the right to test glass beads from the field in order to verify quality. If test results from the field or the batch sampling plan are found to be out of compliance with VDOT specifications, VDOT reserves the right to discontinue acceptance of glass beads from any manufacturer.

2. **Virginia Glass Bead Acceptance Plan (VGBAP)** - This plan involves initial testing and verification of glass bead quality. Once approved, the glass bead manufacturer will be placed on the Approved List #76 and will not be required to submit a sample to VDOT from each batch. However, the manufacturer shall continue to test each batch for quality and certification purposes. The manufacturer shall submit a monthly monitor sample and a certified test report for that monitor sample. In addition, a certified test report shall be sent to VDOT Central Office, Materials Division, Chemistry Lab for each batch produced for VDOT.

In addition, the manufacturer shall comply with AASHTO M247 requirements for lead and arsenic testing and limits as described in MAP-21 Requirements (Section 4).

VGBAP Qualification Testing – For initial testing and approval, the manufacturer shall submit 5 separate, non-consecutive batch samples to VDOT for testing. Each batch sample shall be a composite sample selected from the batch per VDOT Batch Sampling Guidelines (Section 5).

From the two, 1 - quart split samples obtained, one quart shall be tested by the manufacturer and the other quart shall be sent to VDOT for testing. VDOT will test their split samples per VDOT Testing Requirements (Section 5).

VDOT will test the 5 batch samples and review the manufacturer's test results. When test results are approved, VDOT will place the glass bead manufacturer on the VGBAP Approved List # 76.

Following approval under the VGBAP, the manufacturer shall certify each batch produced for VDOT by providing a Certified Test Report that contains the following information:

- (a) Manufacturer's name and address
- (b) Batch, pallet, and bag numbers sampled and tested.

- (c) Quantity represented
- (d) Manufacturer's test result
- (e) Certification statement shall read as follows:

"(Manufacturer Name) certifies that the glass beads produced for VDOT in batch (batch number) meet VDOT Road and Bridge Specifications, Section 234. We also certify that this batch conforms to AASHTO M247 including the total concentration limits for Lead and Arsenic."

Each Certified Test Report shall be forwarded to the following:

1. VDOT, Central Office, Materials Division, Chemistry Lab
2. Striping Contractor

The manufacturer shall maintain a file of certified test reports for all glass bead batches shipped to VDOT facilities or batches shipped to contractors that perform work for VDOT. These reports shall be retained by the manufacturer for a minimum of 12 months and are to be readily available for verification by VDOT personnel.

Monitor Sample - When the glass bead manufacturer is approved and added to the Approved List # 76, each batch produced will not need to be sampled and tested by VDOT. Instead, a monthly monitor sample shall be taken by the manufacturer from a random batch produced for VDOT per VDOT Batch Sampling Guidelines (Section 5). One of the split samples shall be tested by the manufacturer and the other split sample shall be sent to VDOT for testing along with a copy of the manufacturer's certified test report. VDOT will test their split of the monitor sample, compare results against the manufacturer's results, and review the certified test report.

Non-Compliance to Specification

Any discrepancies in sampling, test results, and certifications will be reported to the glass bead manufacturer for resolution. VDOT reserves the right to test glass beads from the field in order to verify quality. If test results from the field or the monitor program are found to be out of compliance with VDOT specifications, VDOT reserves the right to remove the manufacturer from the approved list or discontinue acceptance of glass beads entirely.

3. Glass Beads Pre-mixed in Pavement Marking Material

If a pavement marking material contains incorporated glass beads (Example- Thermoplastic, Preformed Tape, Reflective optics containing glass beads) the manufacturer of that pavement marking material shall comply with AASHTO M247 requirements for lead and arsenic testing and limits as described in MAP-21 Requirements, (Section 4).

Batch Certification Requirements – The pavement marking material manufacturer shall provide written certification for each batch that their glass bead materials meet the MAP-21 testing requirements and limits for Lead and Arsenic. The certification statement shall read as follows:

"(Manufacturer Name) certifies that the glass beads used in (Manufacturer's name and Product) (batch number) conform to AASHTO M247 total concentration limits for Lead and Arsenic."

This certification Statement can be combined with other batch certification documentation and shall be forwarded to the following:

1. VDOT, Central Office, Materials Division, Chemistry Lab
2. Striping Contractor

4. MAP-21 Requirements:

The MAP-21 program for glass beads (Section 1504) requires glass beads used in pavement markings to contain no more than 200 ppm Lead or Arsenic, as determined in accordance with EPA testing methods 3052 and 6010B, or 3052 and 6010C.

- (a) Periodic Testing Requirements - VDOT requires glass bead manufacturers or manufacturers of pavement marking products containing glass beads to submit a sample (from a batch being shipped to VDOT) to a VDOT approved, independent, third party lab for lead and arsenic testing as described above. The manufacturer shall provide a 1-quart split of this sample to VDOT for their testing.

The manufacturer shall also allow VDOT or its representative to obtain samples of glass beads per VDOT Batch Sampling Guidelines (Section 5). If VDOT obtains the sample, they will forward the sample to an approved lab for lead and arsenic testing as described above (See Note 1). The split sample may be forwarded to the manufacturer, if requested.

The sampling party (VDOT or Manufacturer), testing frequency and batch sample identification shall be as directed by VDOT.

Results of lead and arsenic testing shall be submitted to VDOT, Central Office Materials Division Chemistry Lab for review within 30 calendar days of sampling.

- (b) Batch Certification Requirements - Additionally, all glass bead manufacturers or manufacturers of pavement marking products containing glass beads shall submit (with each VDOT batch), a written certification that their glass bead materials meets the MAP-21 testing requirements and limits for Lead and Arsenic. The required certification statements are included in the plans listed above (Section 1, 2, or 3).
- (c) Raw Material Change Requirements - If the raw material source for their glass beads should change, the glass bead manufacturer or the manufacturers of pavement marking products containing glass beads shall advise VDOT within 30 calendar days and allow for sampling and testing as described in Section (a) above.

Note 1:

The glass bead manufacturers or manufacturers of pavement marking products containing glass beads shall arrange for payment to the VDOT approved, independent, third party lab for the MAP-21 testing and reporting to VDOT, Central Office Materials Division.

5. VDOT Batch Sampling Guidelines and Testing Requirements

VDOT Batch Sampling Guidelines:

A batch is normally defined as approximately 44,000 pounds of glass beads or 880, 50 pound bags. Standard sampling protocol requires the cube root of the total number of bags to be sampled. The cube root of 880 is approximately 10. Therefore, 10 random bags from a 44,000 lb. batch need to be selected. The 10 bags will be opened, split down using a splitter and combined until two, 1 quart samples are obtained. The two samples shall be labeled with the manufacturer's name, date of sampling, and batch number. While some manufacturers pull sample aliquots of different quantities, it is recommended that the ratio described above be followed.

VDOT Testing Requirements:

VDOT glass beads shall conform to the requirements of AASHTO M 247 which requires testing per AASHTO T 346. This includes - Glass Bead Roundness, ASTM D1155, Procedure B; Glass Bead Sieve (Gradation) Analysis, ASTM D1214; Glass Bead Moisture Resistance, AASHTO T346. If glass bead manufacturers use test methods different from VDOT and testing results are disputed, manufacturers shall meet VDOT specification while being tested per VDOT test methods listed above. VDOT or its representative reserves the right to inspect the manufacturer's test equipment, procedures, and quality control program.

(b) Traffic Paint

Traffic paint shall be sampled the same as "Paint", as outlined in Sec. 204.24.

(c) Thermoplastic

Block type thermoplastic marking materials will require 1 block sampled and tested at the Central Office Chemistry Laboratory. Granular materials will be sampled by splitting to obtain a 1 quart (1 liter) sample for testing by the Chemistry Laboratory.

(d) Preformed Tape

Approved List

(e) Polyester Resin

Polyester shall be sampled the same as "Paint", as outlined in Sec. 204.24, except that the catalyst will not be sampled.

(f) Epoxy Resin

Epoxy resin shall be sampled the same as "Paint", as outlined in Sec. 204.24, except that both components shall be sampled.

(2) Acceptance

(a) After appropriate testing has been completed, the manufacturer of the material will attach a certification to their shipping documents similar to one of the following:

Certification I

We certify that our product (batch or lot number) on invoice number _____ or shipping ticket number _____ has been sampled, tested, and approved by VDOT Materials Division as indicated by Laboratory Test Number, MS _____, or by an approved Quality Control Plan as indicated by its unique test number _____.

Certification II

We certify that our product has been tested, approved, and is currently on a qualified products list. We certify that our (batch or lot number) on invoice number is the same product that was tested and approved. Indicated on the shipping document will be the test number from the approved list.

All related materials such as primers, sealers and adhesives for use with the markings shall be included on a shipping ticket covered by one of these certifications.

The individual pavement marking items will require certifications as indicated below:

A. Construction Pavement Markings	
Type D - Tape (removable)	Certification II
Type E - Tape (Black, removable)	Certification II
Type F – Paint (Temporary)	Certification I
Glass Beads	Certification I
B. Permanent Markings	
Type A – Paint	Certification I
Type B	
Class I – Thermoplastic	Certification I
Class III – Epoxy	Certification I
Class IV – Tape (flat)	Certification II
Class VI – Tape (profiled)	Certification II
Glass Beads	Certification I

(b) Materials shipped directly from the manufacturer for use on a specific project, and materials shipped to a central storage site for use on multiple projects shall be tracked by an inventory tracking program maintained by the contractor. The program shall be under the control of the contractor who will keep a running inventory of all pavement marking materials shipped from that inventory, including all related materials such as primers, sealers and adhesives used in the application.

A Pavement Marking Materials Inventory Ledger form (see sample form Appendix F) shall be used to record all shipments to and from the Contractor's stock. A separate Pavement Marking Inventory Ledger shall be maintained for each type of material and for each manufacturer. All ledger entries shall be substantiated by manufacturer shipping documents which shall include the Certification I or II statements. Ledger entries for materials received into stock shall indicate quantity, units, date of receipt, manufacturer's lot or batch number, VDOT or other appropriate test numbers and balance on hand. When materials are taken from inventory for shipment to a project, ledger entries shall include quantity shipped, units, project number, date shipped, and balance on hand. All ledger entries shall be initialed by the contractor and such initials certify that all entries are accurate and correct.

Contractor’s Daily Log and Quality Control Report (C-85)

The Contractor’s Daily Log and Quality Control Report is used to track the contractor’s pavement marking materials shipped and installed, quantities, certification information, sample test numbers (MS No’s), work completed (locations) and QC test results. The C-85 form shall have the statement "Materials shipped under this certification have been tested and approved by VDOT as indicated by laboratory test numbers listed hereon." The C-85 form shall be reviewed and signed by the Contractor and the VDOT inspector on a daily basis.

Monitoring-The Materials Industrial Technician will perform periodic inspection at the pavement marking contractor's storage site and of project records to ensure that the records are being kept in compliance with the above. For those projects where the material is shipped directly to the project, the inspector shall contact the Materials industrial technician for monitoring the use of material. The Materials industrial technician shall be given free access to all files used in the tracking program and provided with copies of any documents from such files as may be requested. If the Materials industrial technician determines that material is untested or needs to be retested, samples shall be taken at the appropriate rate and forwarded to the Central Office Materials Laboratory. The contractor shall not ship material in question until appropriate test coverage is obtained.

The Materials industrial technician will be responsible for obtaining a copy of each C-85 and making distribution to the receiving District Materials Engineer.

(b) Pavement Markers and Delineators

Pavement markers and delineators will be accepted on approved list.

(c) Retro-reflective Sheeting

Retro-reflective sheeting for use on sign blanks, will not require sampling in the field. Retro-reflective sheeting for use on barricades, and channelizing devices shall be accepted on visual inspection. This is approved upon receipt of Manufacturer's Certification. See also Sec. 207 for additional details on acceptance on modified inspection.

Sec. 204.31 Soils and Granular Materials

(Secs. 207 and 208) Soils and granular materials shall be sampled, as outlined in Sec. 300.

Sec. 204.32 Steel

(a) Castings

(224)Malleable, Gray Iron, Ductile Iron and Steel Castings will be accepted from Approved List No. 61.

For a Casting Manufacturer to be included on Approved List No. 61, the Manufacturer shall be in the VDOT QA program described in the following section. The program involves sampling, testing, documentation, and certification of the product by the Manufacturer in combination with VDOT monitoring.

Quality Control Plan

The Manufacturer shall submit for VDOT’s approval a Quality Control Plan. The plan must be site specific. The plan must indicate in detail how the Manufacturer proposes to control equipment, raw materials,

production methods and finished casting products to ensure that the specified products are obtained. The plan shall include the following:

- Cover sheet for each facility to include
 - Current date (month, date, year)
 - Physical location of the plant
 - Point of contact
 - Phone number
 - Email address
- List products that are manufactured under plan
- Description of how shipping records, inventory records, certifications, test report numbers, and other documents are maintained that are needed to ensure that shipment of castings have the proper acceptance documentation.
- Define all responsible parties
- The method of identification of each lot of material during manufacture, test, storage and shipment
- The method of sampling and testing of raw materials and the finished product, including lot determination and type of test performed.
- A plan for dealing with QC sample failures. This plan shall include how the Manufacturer plans to initiate an investigation and how the Manufacturer shall implement corrective action to remedy the cause of the problem.
- Sample shipping ticket/bill of lading for a VDOT project

The QC plan will be reviewed for content by a VDOT QA Industrial Inspector. The QA Industrial Inspector is responsible for the acceptance of the QC plan in accordance with the Castings Quality Control Plan Checklist found in appendix II-K of this chapter. The VDOT QA Industrial Inspector will be responsible for the Manufacturer's adherence to the approved QC plan. The VDOT QA Manager has the authority to remove non-compliant Manufacturers from Approved List No. 61.

The plant QC Manager shall update the QC plan annually and anytime changes are made such as changes in QC personnel, management, plant ownership or changes in items manufactured. The VDOT QA Industrial Inspector shall be notified by the QC Manager within three days of such changes occurring. Facility visits will be made annually or as needed.

The Manufacturer shall issue "We certify that these materials conform to AASHTO (specify test method) in accordance with the VDOT Specifications Section 224.02 and VDOT Castings Manufacturers Quality Assurance Program. These materials are manufactured in the USA." on each shipping document, and the statement shall be signed by a responsible company representative. When delivering directly to a VDOT project, shipping documents shall include Contractor, project number, and project descriptions. Copies of the shipping documents shall be emailed weekly to the QA Industrial Inspector monitoring the facility.

(b) Grid Flooring

Steel grid flooring will be accepted on the basis of Manufacturer's certification, as outlined in Paragraph (a) above.

(c) Miscellaneous Metals (Timber Connectors)

Steel for timber connectors will be accepted on the basis of Manufacturer's certification, as outlined in Paragraph (a) above.

(d) Prestressing Tendons

Prestressing tendons, consisting of seven-wire stress-relieved strand or stress-relieved wire, shall be sampled in the casting yard by the Department's Representative. One sample shall be submitted to the Central Office Laboratory for each 7 coils used in State work. One sample shall consist of 2 pieces each 6 ft. (2 m) in length and full diameter, and shall be cut from a representative reel in the shipment.

The sample should be attached securely with wire or nails to a straight rigid object, such as a small board of appropriate length, for shipment. DO NOT TIE STRAND OR WIRE IN A TIGHT CIRCULAR LOOP. The specimen shall be marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800. Included on the form, in addition to other pertinent information, should be the reel number from which sample is drawn, the additional reel numbers of all strand represented by the test sample, and the quantity, in lineal feet (meters), represented by these reels. Strand or wire should not be used until the Materials Division has notified the Inspector of the test results.

(e) Reinforcement**(1) Bars, Plain and Deformed**

Plain and deformed steel reinforcing bars will be accepted based on certification provided by the fabricator. The certification shall state that the supplied steel is domestic material, and meets the requirements of the specified ASTM designation, including grade number. Test report coverage will no longer be issued by a plant inspector; therefore, the project inspector must insure that all certifications are in order. A certification shall be provided with each shipping ticket or the certification shall be a part of the shipping ticket. The project inspector will forward to the District Materials Engineer, one copy of the document containing the certification.

When epoxy coated bars are furnished, the fabricator is to also supply an additional certification generated by the coater stating that the bars were coated with an epoxy coating which has been VDOT pre-approved (Manual of Instructions - Approved Epoxy Coatings List) and that the coating was applied, inspected, and protected in accordance with AASHTO M-284.

The fabricator is to maintain a file of mill analyses for all heat numbers of bars supplied to a project. Files of mill analyses and certifications are to be maintained for three years after final shipments to a project. These documents are subject to periodic verification by VDOT authorized representatives.

A Monitor sample will be taken by the project inspector with the contractor's assistance consisting of two specimens, 24 inches (0.6 m) in length, of a selected size per project. The bar size selected will be the predominant size, epoxy coated (if available), utilized on all projects containing 5000 lbs. (2500 kg) or more. Bars must be cut, not burned through. The two pieces from each bar shall be fastened together securely, and a sample card (TL-10) attached to each pair of bars which constitute a sample. Each sample of steel reinforcing bar shall be marked, in accordance with Section 203, using TL-10, as outlined in Section 800. Samples shall be submitted to the Central Office Laboratory, unless the District Laboratory is equipped to perform the test. Epoxy coated bars will be tested for thickness of the epoxy coating, and the bond of the epoxy, in addition to other tests performed on the reinforcing steel. Failures will result in increased testing frequencies as deemed necessary by Central Office Materials.

The District Materials Section or the Central Laboratory will perform inspections of the fabricators at least every six weeks, and the epoxy coating facility at least every six months to verify that the quality control procedures are being followed. The inspections will be performed using the check lists in Appendix C and D.

(2) Bars, Longitudinal, for Continuous Reinforced Concrete Pavement

Longitudinal steel bars for continuous reinforced concrete pavement shall be sampled the same, as outlined in Paragraph (e)(1) above with one monitor sample being taken by the project inspector for each two lane miles (three lane kilometers) of pavement.

(3) Couplers

The project inspector with the contractor's assistance will take one monitor sample consisting of each size bar per manufacturer per project with the coupler installed by the contractor in the field. The overall length of assembly should be at least 4 feet with the coupler being in the center of the assembly. Each sample shall be marked, in accordance with Section 203, using TL-10, as outlined in Section 800. Samples shall be submitted to the Central Office Laboratory for acceptance testing.

(4) Bar Mat

Bar mat may be accepted on certification as outlined in Section 207.02(36)e.

(5) Spiral Wire

Spiral wire may be accepted on manufacturer's certification in accordance with (e)(1) with a minimum of one monitor sample per project being submitted for testing. When used at precast or prestressed plants, semi-annual check samples should be submitted.

(6) Structural Steel

Structural steel for use as reinforcement will be accepted, as outlined in Paragraph (f) below.

(7) Welded Wire Fabric

Welded steel wire fabric (wire mesh) or welded deformed steel wire fabric for use as concrete reinforcement will be accepted by certification as outlined in (e)(1) above with a minimum of one monitor sample submitted when the quantity exceeds 75,000 square feet (7,000 square meters) per project. The sample is to consist of approximately 3 feet square (1 meter square), cut from any part of the roll at random.

The fabric should be securely tied in a flat position between 2 pieces of corrugated cardboard. Each sample shall be marked, according to Sec. 203, using Form TL-10, as outlined in Sec. 800. Samples are to be submitted to the Central Office Laboratory, unless the District Laboratory is equipped to perform the test.

(8) Supports for Reinforcing Steel

In bridge deck slabs and slab spans, the lower mat of reinforcing bars shall be supported by the bolster type support and the upper mat by the high chair type support.

Where the Contractor elects to use stainless or galvanized bar supports, the bar supports may be accepted by a letter of certification from the Manufacturer or Supplier certifying that the bar supports conform to the applicable material and coating specification requirements. If such a letter is not available or if it is determined that further testing is necessary, submit one bar support sample per type and manufacturer to the Central Office Laboratory for testing.

Where the Contractor elects to use bright metal bar supports with plastic coated tips, they may be accepted on visual inspection, provided the reinforcing steel will be maintained at its required location and the plastic coating extends at least 0.5 in. (13 mm) above the form surface as specified. In order that plastic tips will

not be displaced during installation, the premolded, slip-on tips must fit tightly on the support, and dipped plastic coatings must adhere tightly to the metal.

In Continuously Reinforced Concrete Pavements (CRCP), the contractor shall choose supports that will not sink into the drainage layer. Support shall also be able to support reinforcing steel without deflecting and shall be able to maintain proper position of reinforcing steel according to the plans. The Project Inspector shall submit a sample of the support system along with material certification to Central Office Materials Division/Pavement Design Section for approval.

In the event the Contractor requests to use protective coatings other than those specified, approval may be given at the District level, based on evaluation by the District Bridge and Materials Engineers. Careful consideration should be given to the proposed spacing, the structural capacity of the supports to maintain reinforcement in the required location, and the ability of the supports to resist rusting where the tips are exposed. If the durability or structural capacity is questionable, the Central Office Laboratory should be consulted.

(9) Rust

When the use of reinforcing steel is questionable, due to the presence of rust, the following interpretations of the specification will govern:

- (1) The light, powdery red rust coating that initially appears on steel is of no serious consequence and can be safely disregarded.
- (2) Further development of the rusting stage, as described in Item (1) above, leads to a thick, dark colored scale of rust. This scale, as long as it is tight and not loose, is not detrimental to bond, and therefore, the steel may be used in concrete. It would be well at this point, however, to carefully observe to determine whether or not the flake, in fact, is tight and not loose.
- (3) The condition listed in Item (2) above develops to form a loose, flaky scaling which can be detrimental to the bond between the concrete and the reinforcing steel. If this condition occurs, the steel should be cleaned and rechecked for cross-sectional area before use in the concrete. This cleaning operation could be accomplished by brushing either with burlap or steel brushes, or by sand blasting.

The fact that rusted steel, under certain conditions, may be used in concrete should not excuse careless handling and storage of steel.

(10) Verifying Quantity

In order to determine the quantity of reinforcing steel to be used for payment, the following criteria will govern:

Shipping invoice weights may not agree with plan quantities. As long as the test report quantity and the plan quantity agree within the plus or minus one percent, it will not be necessary to correct or check for missing invoice tickets. However, a note should be placed in the project materials notebook which states that the structure has been built in accordance with the plans and that the difference between the pay quantity and the invoice tickets total quantity is assumed to be due to, permissible variations in weight, fabrication tolerances, or in the accuracy of computations.

(f) Structural

Inspection and acceptance of structural steel items generally will be divided into three categories.

(1) Sampling and Testing

The sample shall consist of two bolts, nuts and washers per diameter per project and will be obtained at the source by a representative of the Central Office Laboratory. Manufacturer's Mill Analysis is required to be submitted with sample.

- (a) Anchor bolts for railings.
- (b) High strength bolts (A325-A490).

(2) Mill Analysis

It is the responsibility of the contractor to request the Mill Analysis when placing the order for structural steel. The following materials may be accepted with Mill Analysis and/or certification as indicated.

- (a) Nuts, studs, and washers for use in elastomeric expansion dams.
- (b) Corrugated metal deck form and accessories (include Certificate of Compliance).
- (c) Weld filler metal accepted from approved list of electrodes and wire flux combinations. See Chapter 7.
- (d) Shear studs accepted from approved list of brand names. Chapter 7.
- (e) Lighting standards (low level), mast arm poles, combination mast arm-luminaire arm poles, pedestal poles (including breakaway),. See special certification Section 207.
- (f) Poles, posts for traffic signals and signs.
- (g) Bolts, general use, AASHTO M314 Grade 36 - Visual inspection only. Check for manufacturer's head marking. When quantities exceed 100, sample in accordance with (f)(1) above.
- (h) H-Piling - See Section 204.25(b) for details of acceptance.
- (i) Anchor bolts, nuts, and washers will be accepted on a Certificate of Compliance provided by the fabricator. The Certificate of Compliance shall state that the steel is of Domestic material (if applicable) and meets the requirements of the specified ASTM/AASHTO designation. The fabricator or supplier shall maintain the material certification for a period of five years from the date of shipment. In addition, when galvanized bolts, nuts, and washers are supplied, the fabricator or supplier shall maintain a certification from the galvanizer stating that the bolts, nuts, and washers were galvanized in accordance with ASTM A153. The certification shall state the weight of the coating in oz/ft² (g/m²) or the coating thickness in mils (mm). The certificate of compliance shall be similar to the certificate for high strength bolts.

(3) Shop Inspection:

The fabricating shop shall obtain the mill analysis from the manufacturer and submit one copy to the shop inspector for review and acceptance. The shop inspector shall submit copies of the inspection report as shipments are made. The inspector shall retain the copy of the mill analysis for record. Three (3) copies of the fabrication inspection reports shall be forwarded to the Structures Section, with one of each forwarded to the District Materials Engineer, Project Inspector and one will be retained by the Structures section. (See Section 207 for details of acceptance of electrical and traffic signal structural elements).

Miscellaneous steel, such as sole and gusset plates, may be fabricated from stock material, providing the Fabricator submits to the shop Inspector one copy of the mill analysis for this material and a letter certifying the material used is actually that which is represented by the analysis. In addition, the letter shall state the amount of miscellaneous steel used, and this amount shall never exceed 10 percent of plan quantities. Distribution of the mill analysis and fabrication inspection report will be the same as outlined previously.

The inspector's records will be audited a minimum of semi-annually by the Central Office, Structures Section. Approximately 25 percent of the inspector's records, since previous visit, will be audited.

When placing an order for high strength bolts, the fabricator shall specify the manufacturer to furnish, with each shipment, the test report as indicated in ASTM A325 or A490. Two (2) copies of these reports shall be submitted by the fabricator to the fabricating shop inspector, one of which will be retained by the inspector. Accompanying these test reports will be a Certificate of Compliance, such as the one outlined below, to be submitted by the Fabricator. One (1) copy each of the test reports and certificate of compliance will be submitted by the inspection agency to the Central Office Laboratory Structures Section.

"FABRICATOR'S LETTERHEAD

CERTIFICATE OF COMPLIANCE

We certify that the high-strength bolts:

Furnished to _____ (Name of Contractor)

For use on _____ (Project Number)

In the amount of _____ pcs. _____ (Size) Heavy Hexagon Bolts

_____ pcs. _____ (Size) Heavy Hexagon Nuts

_____ pcs. _____ (Size) Circular Washers

Manufactured by _____

Meet the requirements of the pertinent project plans, special provisions, and specifications of the Virginia Department of Transportation in all respects to the best of our knowledge and belief. The attached test report represents the last completed set of mechanical tests which were performed by the Manufacturer at the time of our order.

(Signed) _____

(Title) _____ "

This certificate is to be signed by a person of authority representing the Fabricator. There will be no necessity for this certificate to be notarized.

The following structures are normally shop inspected at the fabricating site.

(a) Carbon and high strength steel structures:

1. Rolled beam and plate girder bridges, anchors, bearing and diaphragms.
2. High mast lighting standards and anchor bolts.
3. Sign structures and anchor bolts.
4. Building frames.
5. Miscellaneous steel structures involving welding.
6. Corrugated metal pipe.
7. All components of drop inlets (angles,

bars, and/or pipes) shall be accepted by the Department's representative from mill analysis submitted by the Fabricator. The units shall be visually inspected by the Department's Representative for conformance with

specifications. It will be satisfactory for the Manufacturer to furnish a galvanizing certification that the unit conforms to the specification requirements (2 oz./sq.ft.) (600 g/m²). See Section 207 for provisions for acceptance on modified inspection.

(4) Corrugated Metal Bridge Deck Forms:

The Manufacturer shall submit a certificate of compliance with each individual shipment of material delivered to the project. In lieu of the actual certificate of compliance accompanying the shipment a statement noted on the shipping document, stating that the material conforms to the requirements of the Virginia Department of Transportation, will be acceptable. The Contractor shall be responsible to submit one copy of each shipping document and 3 copies of the Manufacturer's certificate of compliance to the Central Office Laboratory Structures Section. The Contractor may delegate this function to the Manufacturer. The Structures Section will review and submit a copy of the approved certificate of compliance to the District Administrator (District Materials Engineer) and Project Inspector as outlined above for mill analysis. This method of acceptance does not alter the requirement that shop drawings be submitted to the Department for review. In addition, the District Materials Engineer should periodically random sample this material and submit for test to the Central Office Physical Laboratory. The Certificate of Compliance should follow the general outline as shown.

"SUPPLIER'S LETTERHEAD

CERTIFICATE OF COMPLIANCE

CORRUGATED METAL DECK BRIDGE FORMS

DATE _____

PROJECT _____

CONTRACTOR _____

SHIPMENT _____

MATERIAL FOR STRUCTURE _____

This material is covered by this Fabricator's certification statement certifying that the materials and methods utilized in the manufacture of the corrugated metal bridge deck forms are in compliance with ASTM A653, Grade SQ40, SQ50, or SQ80, coating designation G165. Supports, closures and other fabricated parts are in compliance with ASTM A653 Grade SQ33, SQ40, SQ50, or SQ80, coating designation G165.

Based on mill certificates, it is certified that representative samples of the listed materials have been tested and that the test results conform to the requirements of noted specifications. Copies of these certified mill test reports are on file and are available to the Virginia Department of Transportation upon request.

Material description covered by this certification statement is as shown:

MATERIAL DESCRIPTION

<u>MATERIAL</u>	<u>SIZE</u>	<u>QUANTITY</u>
_____	_____	_____
_____	_____	_____

(over or attached sheets for additional materials)

SIGNED _____

TITLE _____ "

(5) Weld Testing

Weld testing is performed using nondestructive evaluation methods, such as, radiographic, ultrasonic, or magnetic particle methods, as outlined in pertinent VTM's.

The Contractor shall provide a working space for radiographic examination of welds, and shall permit this area to be free for a minimum of 6 hours per inspection visit.

The Central Office Laboratory should be contacted if there is any question of the quality of groove welds in new construction, or if there is suspicion of fatigue cracks in old structures.

(6) Welder Qualifications

The Contractor shall submit to the inspector, for each Welder, Welding Operator, or Tacker employed on the project, a copy of the certification of qualification and also a certificate stating that the Welder has not exceeded any period of three months since the date of qualification without performing satisfactory welding in the required process. The qualification certification shall state the name of the Welder, Social Security Number, the name and title of the person who conducted the examination, the kinds of specimens, the positions of welds, the results of the tests, and the date of examination. The qualification certification shall be done by a recognized agency which is staffed and equipped for such purposes. Project Inspectors should record the Welder's name, type, and position of weld qualified, and the card number in the project diary for documentation. The Inspector, upon receipt of the certification documents for field welding, shall perform the following procedures:

- (1) Contact the District Representative designated as being responsible for review of welding documents.
- (2) In the event the Welder, has been approved on another project in the District, the District Representative can give immediate approval.
- (3) If the Welder has not been previously approved in the District, the District Representative is to contact, the Central Office Laboratory Structures Section for approval and then advise the Inspector accordingly.
- (4) Upon receipt of verbal approval from the District Representative, the Inspector is to advise the Contractor and welding may proceed.
- (5) The Inspector should then forward the certification along with all other related information to the State Materials Engineer. Written approval for documentation of records will follow through normal channels. The validity of the certification should be established before the welding is performed.

It is suggested that a form similar to the one shown below be given to the Contractors at the preconstruction conference, on which the certificate of qualification can be made. This form can then be completed and submitted to the Inspector at the appropriate time. General outline of the form is as follows:

Date _____

Project _____

FHWA _____

County or City _____

TO: _____, Residency Administrator

SUBJECT: Welder Qualifications

Transmitted herewith is a copy of Welder certificate of qualification for _____ (Name of Welder), (Cert. No. _____), who will be performing the welding on the above noted project. I/we certify that the above Welder has not exceeded any period of three months since the date of qualification without performing satisfactory welding in the required process.

Signed: _____ Title: _____
Company _____

Note: Residency Administrator to send copies of this letter and certificate of qualification to the District Representative responsible for review of welding documents.

(7) Special Welding Procedures

All field weld splices of girder and rolled beam are required to conform to the quality standards of the American Welding Society.

- (a) All flange splices to be ground flush.
- (b) All exterior sides of web splices in exterior members to be ground flush.
- (c) Cope holes are not to be filled. Radius of cope to be ground smooth and in a true radius.
- (d) Temporary erection bolt holes to be filled with high strength bolts and tightened in accordance with Road and Bridge Specifications.

(8) Studs

The first 2 studs welded on each girder or beam shall show 360° flash, and withstand bending 30° from their initial axes by striking the head of the stud with a hammer. If the first 2 studs do not show 360° flash, or fail in the weld during bending, 2 additional studs shall be tested after the welding equipment is adjusted. If these also fail, a separate test piece shall be used until the proper adjustments have been made to the equipment. Once this test has passed, production welding may take place. Any stud that has less than 360° flash shall be bent 15° from its original axis in a direction away from the missing portion of flash and if any failure occurs it shall be replaced.

(9) Electrodes

If low hydrogen 7018 electrodes are used in welding, they shall be stored in ovens at a temperature of at least 250°F (120°C). If the electrodes are out of the oven over 4 hours, they are to be dried as AWS Specifications.

Sec. 204.33 Structural Timber and Lumber

(Sec. 236) See Sec. 207 for details of acceptance on modified inspection. Sampling of structural timber, timber piling, lumber, posts, etc. will not be necessary in the field. The penetration and retention of the preservative treatment is determined at the point of treatment. Acceptance of timber and lumber shall be as stated in Section 204.29. The lumber shall be visually inspected for grade mark.

The lumber shall also be visually inspected for Type of Preservative and Use Category System. These designations may be found on a label affixed to the wood or the certification document.

The Use Category system utilizes letters and numbers to describe the exposure conditions (Ex. UC4A = ground contact)

The four major Use Category System designations encountered in VDOT maintenance and construction work are:

UC4A: Ground contact, fresh water contact or other conditions favorable to wood

- deterioration. (Ex: sign posts, fence posts and gates).
- UC4B: Ground contact in severe environments, critically important components and salt water splash zones (Ex: bridge timbers, bridge decking, guardrail posts and offset blocks).
- UC4C: Ground contact in very severe environments, or climates with an extremely high potential for deterioration of critical structural components. (Ex: foundation pilings).
- UC5B: Wood exposed to salt and brackish water (Ex: piles, bracing and bulk-heads).

The Primary wood preservative used for VDOT maintenance and construction work is CCA.
 Bridge timbers and lumber may be treated with creosote (CR) and pentachlorophenol (PCP).

Table 1 - Pine Treatments & Retentions using the Use Category System					
Commodity Specifications		Use Category	Preservative Retentions		
Designation	Wood Usage		Waterborne (pcf)	Oil borne (pcf)	
			CCA	CR	PCP
A	Sawn Products:				
	Boards, lumber and timber	UC4A	0.40	10.0	0.50
	Lumber and Timber products for bridges	UC4B	0.60	10.0 *	0.50
B	Posts:				
	Round, 1/2 and 1/4 round, building, fence and guide sign posts, poles < 16 feet in length.	UC4A	0.40		
	Guardrail Posts and offset blocks	UC4B	0.50		
E	Round Timber Pilings:				
	Pilings and foundations for land and fresh water use	UC4C	0.80	12.0	0.60
F	Wood Composites:				
	Plywood	UC4A	0.25	10.0	0.50
	**Glue laminated members (post-gluing)	UC4A		10.0	0.60
	**Glue laminated members (pre-gluing)	UC4A	0.40	10.0	0.60
	Laminated veneer lumber	UC4A		10.0	
G	Marine Applications (salt water)				
	Plywood & Solid Sawn	UC5B	2.5	25.0	
	Piles (outer zone/inner zone)	UC5B	2.5/1.5	20.0	
	Sawn - Dual treatment: CCA with CR	UC5B	1.5	20.0	
	Piles - Dual treatment: CCA with CR	UC5B	1.0	20.0	

*Creosote (CR) preservative is not allowed for bridge decks.

**Glue laminated members must certify glue is compatible with treatment

Note: All data from AWPA 2005 Standard
 For any product not listed refer to the latest AWPA Standard
 VDOT allows oilborne preservatives for special projects. These are Creosote (CR) and Pentachlorophenol (PCP).

Construction of handrails, playground equipment and/or picnic tables that are designed for hand contact will be treated with waterborne preservatives (ACQ-B and CA-B) listed in Section 236. These waterborne preservatives are highly corrosive to metal fasteners, connectors and aluminum signs. Consequently, metal fasteners and connectors used with these alternative wood treatments shall be either stainless steel or hot dipped galvanized steel.

Table 2 - Pine Treatments & Retentions for Hand-Contact Surfaces				
Commodity Specifications		Use Category	Preservative Retentions	
Designation	Wood Usage		Waterborne (pcf)	
			ACQ-B	CA-B
	Sawn Products:			
A	Boards, lumber and timber for picnic tables, handrails, playground equipment	UC4A	0.40	0.21
	Wood Composites:			
F	Plywood for picnic tables, handrails, playground equipment	UC4A	0.40	0.21

Note: All data from AWPA 2005 Standard.
 For any product not listed refer to the latest AWPA Standard

Use Category System Procedure and Tables

For VDOT use, the major wood products, “Use Categories” and associated treatment retention quantities are provided in the above tables.

The basic steps in using the 2005 AWPA Standard are listed below:

1. Identify the wood product to be treated – these are listed as Commodity Specifications (A-I).
2. Identify the exposure conditions the wood will be subjected to – these are listed as the “Use Categories” (UC4A, UC4B, etc.)
3. Identify the recommended treatment solution (CCA, ACQ-B, CR, etc.)
1. Locate the required treatment retention quantity from the tables in the AWPA Standard.

Sec. 204.34 Water

(Sec. 216) Water that has been approved for drinking purposes may be used without test in hydraulic cement concrete and cement or lime stabilization, as outlined in Sec. 207. Water from shallow, muddy, brackish, or marshy sources shall not be used.

All other sources shall be approved before using, and a one pint (0.5 liter) sample in a glass or plastic jar shall be submitted to the District or Central Office Laboratory for tests. Samples of water should not be taken from a pond or stream while they are at flood stage.

When necessary to take samples of water for environmental studies, rest areas, including their effluent water, or for other purposes, the Central Office Chemistry Laboratory should be contacted to determine the details of sampling and tests required.

Samples of water shall be packed and marked, in accordance with Sec. 203, using Form TL-11, as outlined in Sec. 800.

Information should be given on the card to show whether the water has been taken from a pond, flowing stream, or other source. Laboratory tests of water will be reported on Form TL-47 and/or TL-33, as outlined in Sec. 800.

Sec. 204.35 Waterproofing and Dampproofing Materials

(Sec. 213) See Sec. 207 for waterproofing materials that may be approved on modified inspection.

(a) Asphalt and Primer

Asphalt and primer shall be sampled the same, as outlined for asphalt material in Sec. 204.05. The size of sample shall be one quart (one liter) of each. One drum lots or less may be accepted on modified inspection, as outlined in Sec. 207.

(b) Fabric

Bituminous saturated cotton fabric and glass fiber shall be sampled by cutting a piece one ft. (0.3 m) long by full width for each shipment. This sample shall be submitted to the Central Office Laboratory in a packaging envelope and marked, in accordance with Sec. 203, using Form TL-10, as outlined in Sec. 800.

(c) Joint Sealers

Horizontal joint sealers shall be sampled the same, as outlined in Paragraph (a) above. The size of sample shall be one quart (one liter). Modified inspection procedure is the same, as outlined in Paragraph (a).

(d) Waterproofing Membranes

Waterproofing membranes, consisting of Systems A, B, C, D, or E of various combinations of primer, mastic, prefabricated laminated membranes of various types, and/or elastomeric expansion films, shall be approved on Manufacturers' certifications. These will require no sampling or testing, and may be accepted on modified inspection, as outlined in Sec. 207.

(e) Reports

Laboratory tests of all waterproofing and dampproofing materials will be reported on Form TL-43, except fabric, which will be reported on Form TL-47. Inspections will be reported on Form TL-109. See Sec. 800 for details.

Sec. 204.36 Wire Rope and Wire Strand

A sample of wire rope shall consist of a piece 10 ft. (3 meters) long and a separate piece 2 ft. (0.6 m) long cut from each spool or coil by means of a hacksaw. Before cutting, the wire rope should be seized on each side of the place where the rope is to be cut. The length of the seizing should be at least the diameter of the wire rope. Any annealed low carbon steel wire of approximately 0.100 in. (2.5 mm) diameter may be used for seizing.

Zinc-coated steel wire strand, for use as span or guy wire for traffic signals or other types of electrical systems, shall be sampled as follows. One sample 6 ft. (2 m) in length, shall be taken from each lot of 5000

ft. (2000 m) or less. For lots of from over 5000 ft. (2000 m) to 30,000 ft. (10,000 m), 2 samples shall be taken; for lots of from over 30,000 ft. (10,000 m) to 150,000 ft. (50,000 m), 3 samples shall be taken; for lots of over 150,000 ft. (50,000 m), 4 samples shall be taken. If a sample fails on first test, 2 additional tests will be made on samples from the same coil or reel. If either of these tests fails, then the lot will be rejected. See Sec. 207 for additional details for acceptance of traffic signal and other electrical components and appurtenances on modified inspection.

All samples shall be wrapped securely and forwarded to the Central Office Laboratory for examination. Form TL-10, filled out in accordance with Sec. 800, should accompany the sample to the Laboratory. Laboratory tests of wire rope and strand will be reported on Form TL-25, as outlined in Sec. 800.

Sec. 204.37 Gravity-Fill Polymers

(Sec 252) Gravity-Fill Polymers are allowed by Approve List No. 28 which is available on the Materials Division website.

To have a product included on Approved List 28 for “Gravity-Fill Polymers for Sealing Cracks in Hydraulic Cement Concrete” the following shall be submitted to Materials Division’s Physical Lab: Safety Data Sheets (SDS), Technical Data Sheets, and a sample of the polymer that will be tested in accordance with VDOT Specifications Sec. 252.02. Upon completion of testing and meeting VDOT specification, the product may be added to the approved list.

A random sample shall be chosen on hand. The two components of the sample shall be in separate containers that are nonreactive with materials. The size of the containers shall be such that the recommended proportions of the final mixture can be obtained by combining one container of Component A with one container of Component B. A minimum quantity of 1 quart of each component is required for testing.

Samples shall be marked and shipped in accordance with Sec. 203, using Form TL-10. Test reports will be reported on Form TL-109, release of materials.

The Manufacturer will certify annually (by mid-December) by notarized letter stating that the product has not changed in formulation since initial approval. Not submitting annual letters will remove a product from the Approved List and the Manufacturer will need to go through the full approval process to be added back on the Approved List.

SECTION 205 SUMMARY OF MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS

Tabulated herein is a schedule of the minimum requirements for acceptance sampling and testing of materials by project or plant personnel and the District or Central Office Laboratory. Although project personnel may not be required to test a material, their aid may be enlisted to obtain representative samples for the District or Central Office Laboratory, provided that they are qualified to take samples of the particular material. Sampling shall be conducted, as outlined in Sec. 204.

Where the location for sampling is shown to be the source, and the material arrives at the job site prior to being sampled, then the same rate of sampling is required at the job site as at the source, and only qualified personnel will be permitted to take this sample.

Where modified inspection is called for, the instructions in Secs. 109.03, 110, and 207 will govern, and the Project Inspector must examine the material for cleanliness, uniformity, and freedom from cracks, flaws, and apparent defects.

Rates given herein are the minimums considered desirable to provide effective control of materials under ideal conditions. When conditions are otherwise, the number of samples and tests should be established as deemed necessary to attain the uniformity and level of workmanship intended by the specifications.

The initial testing should be established at a substantially greater frequency than minimum by the Engineer, until he is satisfied that the type of material and the Contractor's equipment and procedures can consistently produce a finished product well within the specification. At this point, the testing frequency may be progressively reduced, if the test results continue to show uniformly good material and workmanship, until minimum frequency is reached. If a failing sample or test is noted, the testing frequency should be increased, as the process is adjusted, until found to be satisfactory. The frequency of sampling and testing should be flexible enough to assure acceptable construction, reflecting changes in the performance of the Contractor's operations.

Contact the District Materials Engineer for instructions in sampling any new or miscellaneous materials not listed herein.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
1. Admixtures, concrete	215	Visual. Approved on certified analysis and placed on annual list, after submission of independent lab test data.			Trial mixes are suggested before using new admixtures or changing ingredient in satisfactory mixes. See Sec. 207 for modified acceptance and the VDOT Materials Division website for the approved list.
2. Aggregates - (a) Any Type, Other Than Dense Graded, Central-Mixed, Type I, Select Material or Any Type Sub-base or Base Material - (1) Grading...	See Specs.	One 10 lb. (5 kg) sample (F.A.) or 30 lb sample (15 kg) (C.A.) per size per 1000 tons (1000 metric tons), or as directed by District Materials Engineer, to be tested by Producer; supplemented by one monitor sample per week or one per month per size (produced, to be tested in the District or Central Office Laboratory.	At source.	Secure container or sample bag free of contaminants, if shipped to another laboratory. Ship fine sizes in tight container or closely woven bag.	Aggregate Producers responsible for sampling and controlling product for grading. Aggregate may be accepted at job site with certification from Producer stating that required tests have been performed and have met specification requirements for the material. Open graded aggregates for hydraulic cement concrete are to be sampled once per month at the ready-mix concrete plant when production exceeds 100 cubic yards (100 cubic meters) per month to monitor shipping and stockpiling requirements. Open graded aggregate, for hydraulic cement concrete, when used in sign islands, sign footings, culvert joint mortar, or other small incidental items, in quantities of 50 tons (50 metric tons) or less per size

					per project require no testing. See Sec. 207 for acceptance.
MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(2) Quality....		One 40 lb. (20 kg) sample per size (F.A., #8 & #57 C. A., etc.) biennially to District Laboratory.	At source.	Same as Item 2(a)(1).	See Quality Lists in Chapter 7.
(b) Dense Graded, Central-Mixed, Type Material and All Types Subbase and Base Material	207 & 208	See Sec. 300.	See Sec. 300.	See Sec. 300.	See Sec. 300.
3. Aluminum Alloys..	229	Visual. Approved on certified physical and chemical analyses.			Coating for aluminum in contact with concrete will be sampled the same as outlined in. Sec. 204.24. Aluminum sign blanks occasionally checked for dimensional requirements. See Sec. 207 for modified acceptance.
4. Bearing Pads and Bedding Materials- (a)Elastomeric Bearing Pads.	237	One (1) pad full size each thickness per shipment of 300 pads or less. One additional pad per each additional 300 pads, or fraction thereof. Submit to Central Office Laboratory.	From source or job site.	Packaging envelope.	

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(b) Preformed Fabric Bedding Material.	237	Same as Item 4(b).	Same as Item 4(a).	Same as Item 4(a).	
(c) Sheet Lead and Common Desilverized Lead Bedding Material.	237	Visual. No sampling required.			See Sec. 207 for modified acceptance.
5. Asphalt Materials Liquid.	210	Control sampling and testing to be done by manufacturer per approved sampling control plan. Monitor sampling to be one sample per month during construction season, with lesser frequency the rest of the year.	At point of manufacture. Monitor samples and IAS samples to be split samples with the control sample.	Double top cans, oblong cans with screw tops, or small mouth cans with screw caps for liquid material. Wide mouth jars or bottles made of plastic or glass, NEVER METAL CONTAINERS, for emulsified asphalt.	Quality control testing will be performed by the manufacturer, or a VDOT approved commercial laboratory. Quality assurance testing will be performed by VDOT's Central Laboratory. Manufacturer will certify all materials shipped on the shipping documents, and maintain records of lots represented by test results. Copies of test results will be sent to the Central Laboratory. The recipient of the materials shall maintain copies of the shipping documents for twelve months, and have available for VDOT verification.
6. Asphalt Mixtures..	211	See Sec. 500.	See Sec. 500.	See Sec. 500.	See component materials and Secs. 204.02, 204.05, and 500 herein. See Sec. 206 for Independent Assurance Sampling.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
7. Brick...	222	Ten (10) brick for each 50,000 lot, or fraction thereof; and 5 brick from each 100,000, or fraction thereof, for lots of more than 500,000 but not less than 10. Submit to District or Central Office Laboratory. and 5 brick from each 100,000, or fraction thereof, for lots of more than 500,000 but not less than 10. Submit to District or Central Office Laboratory.	At source or delivery point.	No container necessary.	Brick in orders of 1000 or less may be accepted on modified inspection. See Sec. 207.
8. Bronze and Copper Alloy...	230	Visual. Approved on certified physical and chemical analyses.			See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
9. Cement, Hydraulic..	214	Visual. Approved on Manufacturer's certification supplemented with check testing. Check sample of one gal. (4 L) (20 lbs.) (10 kg) for each 5000 yd ³ (5000 m ³) of concrete per project, or one per project for cement stabilization work in excess of one mile (2 km), regardless of number of lanes. Projects having less than 500 yd ³ (500 m ³) of concrete, or less than one mile (2 km) of stabilization work require no sampling. Submit to Central Office Laboratory.	At ready-mix plant, batch plant, or job site.	Airtight, moisture proof glass or metal container. One 1.0 gal. (4 L) container or two 0.5 gal. (2 L) container sufficient.	See Sec. 207 for modified acceptance and the VDOT Materials Division website for the approved list.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
10. Chloride Salts (a) Sodium..	239	One qt. (1 L) per 2000 tons (2000 metric tons) to Central Office Laboratory. In cases of low tonnages and with permission of State Materials Engineer, one sample per District per supplier would be sufficient. When source inspection is impractical or shipment is made from uncovered storage, one sample per 1000 tons (1000 metric tons) will be taken at time of delivery.	At source from container or stockpiles of indoor storage, or otherwise, at destination at time of delivery.	Airtight, moisture proof metal or glass container.	Shipments subject to visual inspection at destination prior to unloading. Any shipment deemed to be unusable, due to excessive water or oversized material, may be rejected. Sample may be taken for moisture test.
(b) Calcium..	239	One qt. (1 L) per order per District.	Same as Item 10(a).	Same as Item 10(a).	Same as Item 10(a).
11. Concrete Hydraulic Cement	217	See MOI Chapter IV.	See MOI Chapter IV.	See MOI Chapter IV.	See component materials and MOI Chapter IV.
12. Copper Sheet and Strip..	230	Visual. No testing or certification required.			See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
13. Curing Materials Protective Coatings for Concrete (a) Curing Materials - (1) Waterproof Paper	220	One qt. (1 L) per lot, batch, or other unit of production, but no less than one qt. (1 L) per 5000 gal. (20,000 L) to Central Office Laboratory.	At source or job site.	Metal container, properly capped.	
(2) Poly-ethylene Film	220	Approved List 71	Same as Item 13(a)(1).	Same as Item 13(a)(2).	
(3) Burlap	220	One sheet 4 ft (1 m) by width of roll per lot or other unit or production per shipment to Central Office Laboratory.	Same as Item 13(a)(1).	Packaging envelope.	
(4) Liquid Membrane Seal	220	Same as Item 13(a)(2).	Same as Item 13(a)(1).	Same as Item 13(a)(2).	
(5) Mono-molecular Film.		Visual. No testing or certification required.			See Sec. 207 for modified acceptance.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(b)Protective Coatings - (1)Silicone Treatment.	404.03	One qt. (1 L) per job to Central Office Laboratory.	At source or job site.	Clean, airtight metal or glass container.	
(2)Spray-On Surface Finish.		Visual. Placed on approved List. No sampling required.			See Sec. 207 for modified acceptance.
14. Electrical Conduits, Fittings, and Boxes - (a) Acrylonitrile-Butadiene-Styrene (ABS) Conduit and Fittings.	238 and 705.	One full length conduit per size diameter per shipment to Central Office Laboratory.	At source or job site.	No container necessary.	Fittings accepted on modified inspection and require no testing or certification, provided made of same or equivalent material as the conduit. See Sec. 207.
(b) Metal Conduit and Fittings...		Two (2) pieces, one from each end of one length of conduit, each 8 in. (200 mm) in length, per size diameter per shipment to Central Office Laboratory.	Same as Item 14(a).	Same as Item 14(a).	Samples to be sawed true from ends of lengths picked at random. Fittings accepted on modified inspection, upon receipt of Manufacturer's certified analysis of test report, including zinc content. See Sec. 207.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(e) Plastic and Poly (Vinyl Chloride) (PVC) Conduit and Fittings..		Approved on Manufacturer's Certification and visual inspection to determine that each section contains letters "UL". No sampling or testing required.			See Sec. 207 for modified acceptance.
(g) Boxes		For concrete junction boxes, 2 - 6 x 12 in. (150 x 300 mm) or 3 - 4 x 8 in. (100 x 200 mm) cylinders on random basis. For metal junction boxes, thickness of coating tested as in corrugated steel pipe. All other boxes visual, and no testing or certification required.			See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
15. Epoxy Resins.	212, 223, & 243	One qt. (1 L) of lesser component and enough of large component for mixing per lot for shipment to the VDOT Materials Division Central Office Laboratory.	At Source or job site.	Each component shipped in separate clean can. See Sec. 204.15 for information to be labeled on cans.	Contents of each component being sampled should be mixed thoroughly before sampling. When quantity is 15 gals. (60 L) or less for any one project, epoxy may be accepted on Manufacturer's certification. See Sec. 207 for modified acceptance. Powdered epoxy resins are accepted by an approved list. See Chapter 7.
16. Fencing - (a) Chain-Link Fencing....	242	One sample from each of 3 rolls from each 50 rolls, or fraction thereof, per shipment, consisting of one woven length including at least 6 vertical wires full width top to bottom, taken from end of each roll sampled, to Central Office Laboratory. Rods, Fittings, and gates accepted on modified inspection, and require no sampling.	At source or job site.	All Fencing samples rolled into tight roll and tied securely, exercising care not to bend or kink wires.	If Contractor secures any fencing directly from source, properly identified and tagged, Department may test at source. See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(1) Tension Wire		One 3 ft. (1 m) strand from end of one spool from each 50 spools, or fraction thereof, per shipment to Central Office Laboratory.	Same as Item 16(a).	Same as Item 16(a).	Same as Item 16(a).
(b) Standard Fencing - (1) Barbed Wire		Same as Item 16(a)(1). Rods, fittings, and gates accepted on modified inspection, and require no sampling.	Same as Item 16(a).	Same as Item 16(a).	Same as Item 16(a).
(2) Lawn....		Visual. No sampling required.			See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(c) Miscellaneous Fencing - (1) Snow Fence.		One 2 ft (0.6 m). x full width per 100 rolls per shipment to Central Office Laboratory.	Same as Item 16(a).	Same as Item 16(a). Projecting wire turned inwardly before rolling.	Sample shall be cut from end of roll that includes 12 in. (300 mm) length of untwisted wire.
16(c)(2) Wood, Treated	242	Visual. No samples required on project.			Usually, penetration and retention approved at point of treatment. See Secs. 204.29 and 204.33. Certification Required.
(d) Posts....		See Item 28. herein.			
17. Fly Ash	241	One 5 lb. (2.5 kg) sample per project for soil stabilization to Central Office Laboratory. For ready-mix concrete use, one gal. (4 L) each fly ash and cement, with which it will be used to Central Office Laboratory. Also, for ready-mix concrete use, one qt. (1 L) of fly ash per shipment to ready-mix plant, to Central Office Laboratory for physical properties.	At source, job site, or ready-mix concrete plant.	Clean can or jar.	Semi-annual quality tests will be performed for each source, after initial approval. Sample size same as initial sample.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
18. Guardrail, Steel Beam....	221	Visual. The Manufacturer, Supplier, and Erector shall be on Approved List #12. One verification sample of two (2) linear feet of beam (no bolts or washers) annually per District to Central Office Laboratory.	At jobsite or at the Erector's or Supplier's storage facility.	No container necessary.	See Sec. 207 for Modified inspection and acceptance.
19. Joint Materials - (a) Asphalt sealer	212	Cut one piece, of about 10 LB, from the original container. One sample shall be taken from each shipment or lot. In no case shall a sample be taken from the heating kettle.	At source or project site.	Wrapped in paper and ship without boxing.	
(b) Silicone... 1.Sealant		Visual accepted on approved list 27			
2.Backer rod		Visual			

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(c) Preformed Expansion Joint Filler (Bituminous Types)		Visual			
(d) Expanded Rubber Joint Filler.....		One 2SF x full thickness per lot or shipment each thickness to MDL	At source or project site.	Loose or in packaging envelope.	
(e) Preformed Chloroprene / Neoprene Seal....		One 2SF x full thickness per lot or shipment each thickness to MDL	At source or project site.	Loose or in packaging envelope.	
(f) PVC / PE Joint Fillers					PVC and PE joint filler accepted on Manufacturer's certification.
(g) Sponge Rubber Joint Filler...		One section 2 LF x full depth and thickness per 1000 SF or less, each thickness and type or brand, to MDL	At source or project site.	Loose or in packaging envelope.	
(h) Pipe Gaskets...		Visual accepted on approved list 14			
(i) Preformed flexible joint sealants		Visual accepted on approved list 14			

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(j) Preformed Elastomeric Joint Sealer... 1.Compression Seal 2. Lubricant		One piece 2 LF x full thickness per lot or shipment, each thickness or size, to MDL.	At source or project site.	No container necessary for sealer.	Lubricant adhesive accepted on manufacturer's certification.
(k) Elastomeric Expansion Dam... 1.Strip Seal/ Tooth Expansion 2.Lubricants 3.Steel/Aluminum/ Anchor bolts		One piece 2 LF in length for each shipment received. Tooth expansion shall be sampled by obtaining one piece 1 LF in length for each shipment received. Samples shall be submitted to the MDL.	At source or project site.	No container necessary for sealer.	Lubricant adhesive accepted on Manufacturer's certification. Steel, aluminum, and anchor bolts accepted by certificate of compliance.

(l) Pressure Joint Relief Material...					Accepted by Manufacturer's certification
(m) Waterstops... 1. Neoprene 2. PVC 3. Metal		One piece per size per lot to MDL. Visual. Approved on Manufacturer's certification	At source or project site	No packaging necessary.	Sheet copper metal waterstops accepted on modified inspection, as outlined in Sec. 207.
(n) Traffic loop sealant		One (1) gallon sample is obtained with the manufacturer's required amount of hardener for testing and approval. Samples are taken per batch/lot	At source		
20. Geotextiles		One piece 10 ft. x full width to VDOT Central Office Laboratory, together with required Manufacturer's and Supplier's certifications	At Supplier	No packaging necessary.	(f) Geotextiles
(b) Herbicides..		Visual. Verification of Manufacturer's container label for composition, brand, etc.			

(c) Lime....		Same as Item 21(a).	Same as Item 21(a).	Same as Item 21(a).	

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(d) Mulch...		Visual. Approval is based on annual source/inventory sampling program and approved sources listed by Materials Division. See details in Sec. 204.20(d).			See Sec. 207 for modified acceptance and Chapter 7 for approved list.
(e) Seed....		Same as Item 20(a).			See Sec. 207 for modified acceptance.
(f) Filter Cloth Fabric...		One piece 10 ft. (3 m) x full width to Central Office Laboratory, together with Manufacturer's certification ultraviolet ray inhibitors and stabilizers, and burst strength, where applicable.	At source or job site.	No packaging necessary.	(f) Filter Cloth Fabric.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
21. Lime - (a) Agricultural	240	One qt. (1 L) per project grading test to District Laboratory.	At source or job site.	Closed, airtight metal container.	Calcium carbonate equivalent determined from Department of Agriculture list of suppliers. If in doubt or source not listed, sample for this test submitted to Central Office Laboratory. See Sec. 207 for modified acceptance.
(b) Hydrated..	240	Visual. Approved on Manufacturer's certification, except from new source, which requires a one qt. (1 L) sample to Central Office Laboratory.	At delivery point.	Same as Item 21(a).	See Sec. 207 for modified acceptance.
(c) Hydraulic..	240	Same as Item 21(b).	Same as Item 21(b).	Same as Item 21(b).	Same as Item 21(b).

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
22. Masonry Units, Concrete - (a) Wall Units...	222	Ten (10) whole units for lots of 10,000 units, or fraction thereof. Twenty (20) whole units per 10,000 to 100,000 units. Ten (10) whole units per 50,000 units, or fraction thereof, for lots of more than 100,000 units. Submit to District or Central Office Laboratory.	At source or job site.	No container necessary.	When shipment contains block of various sizes, do not duplicate size of sample for each size block.
(b) Catch Basins and Manholes..	222	Same as Item 22(a).	Same as Item 22(a).	Same as Item 22(a).	At least 1/2 of number of units in sample MUST BE BARREL BLOCKS.
(c) Miscellaneous Precast Units..	222	Three (3) cylinders from one casting selected on random basis, or two (2) cores per lot size, to Regional or Central Office Laboratory. On temporary barriers shipped from project, Contractor provides certification that units have been inspected and QC approved when shipped.	At source.	Cylinders or cores packed in closed curing cans containing saturated sponges, or in substantial boxes containing saturated sawdust or wood chips.	See component materials and concrete control tests in Sec. 400.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
23. Monuments, Right of Way...	219 and R.D.& S. -RM-2.	Normally tested and stamped at plant. If received untested or made on the job, one whole monument to be submitted to District or Central Office Laboratory. For RM-2 monuments, one whole cadmium plated brass or stainless steel cap per project to Central Office Laboratory.	See previous column.	No container necessary for monuments. Packaging Envelope for brass or steel caps.	For RM-2 monuments, steel pins and U-type galvanized rolled rail steel or aluminum alloy locator posts accepted on visual inspection and require no testing or certification. See Sec. 207 for modified acceptance.
24. Paint (a) Bridge	231	One qt. (1 L), System A, AA, each type per lot or batch to Central Office Laboratory. Systems B and F accepted on approved list.	At source or job site.	Clean, wide mouth metal cans.	Aluminum paste and varnish sampled separately. Paint in quantities of 20 gals. (75 L) or less per project accepted on modified inspection. See Sec. 207. See Chapter 7 for approved lists.
25. Piling - (a) Concrete: Cast-in-Place, Precast, or Prestressed...	217	See Sec. 400.	See Sec. 400.	See Sec. 400.	See component materials and Sec. 400 herein.
(b) Steel, H-Beam	228	Visual. Approved on Manufacturer's mill analysis. No sampling or mill inspection required.			See Sec. 207 for modified acceptance.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(c) Steel, Sheet...	228	Same as Item 25(b).			See as Item 25(b).
(d) Steel, Shell...	228	Same as Item 25(b).			Same as Item 25(b).
25(e) Timber...	236	Visual. No samples required on project.			Penetration and retention approved at point of treatment. See Secs. 204.29 and 204.33. Certification required.
26. Pipe	232				When quantity of any approved type of <u>culvert</u> pipe is 50 ft. (15 m) or less per project, culvert may be accepted on visual inspection. See Sec. 207 for additional details of modified acceptance of pipe. See Sec. 204.26(n) for acceptance of pipe used in municipal sewer and water lines. Culvert pipe used in rest area and landscape contracts sampled and tested same as for any other project.
(a) Acrylonitrile - Butadiene - Styrene (ABS)...		One piece 2 ft. (0.6 m) x full section from one pipe length each size per shipment to Central Office Laboratory.	At source or site.	Ship loose, no packing necessary.	(a) Acrylonitrile - Butadiene - Styrene (ABS)...

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(b) & (c) Previously Asbestos Cement & Bituminous Fiber					
(d) Cast Iron...		Visual. Approved on Manufacturer's certification.			See Sec. 207.
(e) Clay....		One pipe joint equal to 0.5% of total number of pipes each size per day, minimum of one specimen per size. See Remarks.	Strength tests usually performed at plant. Absorption samples submitted to District or Central Office Laboratory.	Same as Item 26(A)	One complete pipe joint for strength tests. One full thickness section from wall of pipe, 12 to 20 in ² (7500 to 15,000 mm ²) in surface area, for absorption tests. Absorption sample taken from same pipe specimen found acceptable in strength requirements.
(f) Concrete - (1) Plain (Nonreinforced), Perforated, and Porous.....		One per lot as defined in Section 204.26 (f)(1)	Strength and absorption testing performed by producer as outlined in Section 204.26(f)		Accept on manufacturers certification of conformance with VDOT QC/QA program. Certification to be stamped on shipping ticket.
(2) Reinforced (Circular or Elliptical)...		Same as 26(f)	Same as 26(f)		Same as 26(f)

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(g) Corrugated Aluminum Alloy.....		Visually accepted by the project inspector based on Corrugated Metal Pipe Quality Assurance Program as outlined in Section 204.26(g) & (h)			
(h) Corrugated Steel, Coated.		Same as Item 26(g)	Fabrication Plant per Section 204.26(h)	Quality Assurance Samples submitted to Central Office Laboratory stacked, wrapped and tied securely.	If bituminous coating is used on pipe, samples of the bitumen will be sampled separately at the dip tank and submitted to the Central Office Laboratory in accordance with the Quality Assurance Plan.
(i) Glass Fiber Reinforced Epoxy Pipe and Fittings		One piece minimum 3 ft. (1 m) x full section from one pipe length each size per shipment.	Same as Item 26(a).	No container necessary.	
(j) Polyethylene (PE) and Polypropylene (PP) Corrugated	232	Visually accepted by the project inspector based on VDOT Corrugated (PE) or (PP) Pipe Quality Assurance Program as outlined in Section 204.26 (h).			

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(k) Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings...		One piece minimum 3 ft. (1 m) x full section from one pipe length each size per shipment. Fittings accepted on modified inspection and require no testing or certification, as outlined in Sec. 207. Semiround PVC plastic underdrain pipe with top shield shall be sampled by cutting one piece minimum 2 ft. (0.6 m) x full section from one pipe length each size per shipment. Samples submitted to Central Office Laboratory.	Same as Item 26(a).	Same as Item 26(a).	(k) Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings...

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(m) Structural Plate Pipe, Pipe-Arches, and Arches.		Visual. Accepted by Project Inspector from Manufacturer's and Fabricator's certificates and guarantees, and mill analysis. Fabricator also furnishes Certificate of Compliance for each shipment and each project. (Normally included on delivery ticket.)	Same as Item 26(g).		See Sec. 204.26(m) for details.
27. RESERVED -					
28 Poles & Posts - (a) Fence, Chain-Link- (1) End, Corner and Gate Posts and Braces....	242	One whole post per 500 posts, or fraction thereof, per shipment to Central Office Laboratory.	At source or job site.	No container necessary.	Aluminum alloy pipe fence posts approved on Manufacturer's certified physical and chemical analyses and require no sampling. See Sec. 207 for modified acceptance.
(2) Line Posts and Braces...		One whole post per 500 posts, or fraction thereof, per shipment to Central Office Laboratory.	At source or job site.	No container necessary.	Aluminum alloy pipe fence posts approved on Manufacturer's certified physical and chemical analyses and require no sampling. See Sec. 207 for modified acceptance.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(b) Fence, Standard (1) Metal Posts and Braces....	242	Same as Item 28(a)(1). Posts for snow fence and miscellaneous small signs accepted on modified inspection, since no testing or certification required.	At source or job site.	No container necessary.	
28(b)(2) Wood Posts and Braces (Treated)....	236	Visual. No samples required on project.			Penetration and retention usually approved at point of treatment. See Secs. 204.29 and 204.33. Certification required. Locust posts require no treatment, testing, or certification. See Sec. 207 for modified acceptance.
(c) Guardrail - (1) Concrete Posts.....	217	Three (3) cylinders, 4 x 8 in. (100 x 200 mm), per day during fabrication to District or Central Office Laboratory.	At fabrication point.	Same as Item 22(c).	See component materials and Sec. 400 herein.
(2) Steel Posts.	221	Visual. The Manufacturer, Supplier, and Erector shall be on Approved List #12. Verification sample of one (1) post annually per District to Central Office Laboratory.	At jobsite or at the Erector's or Supplier's storage facility.	Same as Item 28(a).	See Sec. 207 for Modified inspection and acceptance.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(3) Wood Posts.		Same as Item 28(b)(2).			Same as Item 28(b)(2).
(d) Lighting Standards, High Mast Lighting Standards, Luminares, Mast Arm Poles, Combination Mast Arm - Luminaire Arm Poles, Pedestal Poles, and Other - (1) Aluminum...	705.02	Accepted on modified inspection with Manufacturer's certification. If poles subject to alloy specifications. Manufacturer's certified physical and chemical analysis also required. Also applies to aluminum alloy breakaway support couplings.			See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(2) Steel.....		Same as Item 28(d)(1). Includes steel shafts and base flanges for high mast lighting standards.			Same as Item 28(d)(1). See Sec. 204.32 for additional details of modified acceptance.
(5) Treated Wood Poles and Posts....		Same as Item 28(b)(2).			Same as Item 28(b)(2).
(f) Traffic Signal - (1) Steel Poles.	703, 226, 236	Same as Item 28(e)(2).			Same as Item 28(e)(2).
(2) Treated Wood Poles.....		Same as Item 28(b)(2).			Same as Item 28(b)(2).
29. Preservatives, Timber..	236	One qt. (1 L) per treatment of State work to Central Office Laboratory. See Remarks. Sample same as "Asphalt" in Sec. 204.05(b)(1).	At treatment point only from charge tank.	Metal container with secure top.	If consecutive treatments used on State work, one sample may represent more than one charge, but must be resampled after 5 consecutive treatments.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(e) Traffic Sign - (1) Aluminum Alloy Poles and Break-away Supports	701.02	Approved on Manufacturer's certified physical and chemical analyses.			See Sec. 207 for modified acceptance.
(2) Galvanized Steel Sign Poles and Posts....		Approved on Manufacturer's mill analysis and shop inspection.			See Secs. 204.32 and 207 for details of modified acceptance. if poles are painted, paint shall be accepted as outlined in Sec. 204.24.
(3) Rolled Rail Steel Poles and Posts...		Same as Item 28(e)(2).			Same as Item 28(e)(2).
(4) Structural Steel Poles and Posts....		Same as Item 28(e)(2).			Same as Item 28(e)(2).
30. Reflective Materials (a) Glass Beads.	234	One qt. (1 L) composite sample per lot per shipment to Central Office Laboratory.	At point of Manufacture or job site.	Packed securely in sturdy box with excelsior or other cushioning material to prevent loss of beads.	30. Reflective Materials - (a) Glass Beads.
(b) Reflectorized Pavement Markings	246	No sampling in field required. Material normally presampled and pretested.	(b) Reflectorized Pavement Markings	246	No sampling in field required. Material normally presampled and pretested.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(d) Permanent Pavement Markings		Permanent Pavement Markings to be accepted similar to Traffic Paint. Preformed Tape Accepted on Certification and Approved List.			
(e) Retro-Reflective Sheeting...	701	Encapsulated lens type requires no field sampling. Accepted on Manufacturer's certification, based on prior 2-yr. laboratory/field evaluation.			See Sec. 207 for modified acceptance.
(f) Retro-Reflectors....	235	Field sampling not required. Usually presampled by Materials Division.			
31. Soils and Granular Materials..	207 & 208	See Sec. 300.	See Sec. 300.	See Sec. 300.	See Sec. 300. See Sec. 206 for Independent Assurance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
32. Steel - (a) Castings, Forgings, and Shafting...	224 & 225	Visual. Approved on Manufacturer's certified physical and chemical analyses of tests conducted at point of manufacture, except gray-iron castings, which are sampled by Plant Inspector and submitted to Central Office Laboratory.	At source, for gray-iron castings.	No container necessary.	See Sec. 207 for modified acceptance, and also for exceptions in cases where cast steel and cast iron (gray) are used in rest area construction.
(b) Grid Flooring...	223	Same as Item 32(a).			See Sec. 207 for modified acceptance.
(c) Misc. Metals (Timber Connectors)...	223	Same as Item 32(a).			Same as Item 32(b).
(d) Prestressing Tendons.....	228	Two (2) pieces each 6 ft. (2 m) x full diameter per each 7 coils to Central Office Laboratory.	At prestress casting yard.	Attached securely with wire or nails to straight rigid object, such as board. DO NOT TIE STRAND OR WIRE IN A TIGHT CIRCULAR LOOP.	

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(e) Reinforcement- (1) Bars, Plain and Deformed....	228	Approved on Fabricator's certification. Certification to state domestic material, and compliance to specified grade and designation. If epoxy coated an additional certification stating coating complies with AASHTO M284 and coating material is on VDOT approved list. Project inspector to sample 2 pieces (one sample) from the most prevalent bar size per structure, with no two samples being the same size. Each piece is to be 24 inches (0.6 m) long.	At source and job site.	Fastened together securely.	Bars must be sawed or cut, not burned through. See Sec. 206 for Independent Assurance sampling.
(2) Bars, Longitudinal, for Continuous Reinforced Concrete Pavement....		Same as Item 32(e)(1), except monitor sample to be taken by project inspector at one sample per 2 lane miles (3 lane kilometers).	Same as Item 32(e)(1).	Same as Item 32(e)(1).	Same as Item 32(e)(1).
(3) Bar Mat...		Approved on modified inspection, and requires no sampling.			See Sec. 207 for modified acceptance.

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MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(4) Spiral Wire.		Same as Item 32(e)(1).	Same as Item 32(e)(1).	Same as Item 32(e)(1).	Same as Item 32(e)(1).
(5) Structural Steel..		Same as Item 32(e)(1).	Same as Item 32(e)(1).	Same as Item 32(e)(1).	Same as Item 32(e)(1).
(6) Welded Wire Fabric....		Same as Item 32(e)(1). except one piece 3 x 3 ft. (1 m ²) per project if quantity exceeds 75,000 ft ² (7000 m ²), as monitor to Central Office Laboratory.	Same as Item 32(e)(1).	Securely tied flat between 2 pieces of corrugated cardboard.	
(7) Supports for Reinforcing Steel		Accepted by Manufacturer's or Supplier's certification letter and visual inspection. If certification unavailable or if in doubt, submit one bar support per type and Manufacturer to Central Office Laboratory. See Remarks.	At source or job site, if sampling necessary.	No container necessary.	See Sec. 204.32(e)(7) for additional details of visual inspection of coating.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
(f) Structural..	212, 226, 701, 703, & 705	For stainless steel and bimetallic anchor bolts, one whole bolt per shipment to Central Office Laboratory. Remainder accepted on modified inspection with Plant inspector submitting Manufacturer's mill analysis, fabrication inspection reports and Fabricator's Certificate of Compliance, as required.	Bolts at source.	No container necessary.	See Secs. 204.32(f)(2) and 207 for additional details of modified acceptance of structural steel items.
33. Structural Timber and Lumber....	236	Visual. No samples required on project.		4	Penetration and retention of treatment is determined at point of treatment, as outlined in Sec. 236 Road and Bridge Specs. See also Sec. 207 for modified acceptance. Certification required.
34. Water	216	One pint (0.5 L) per source to District or Central Office Laboratory. (Approved drinking water requires no sampling.)	At source.	Glass or Plastic jar.	Do not secure samples at flood stage. Shallow, muddy, brackish, or marshy sources shall not be used. If necessary to sample water for environmental studies, rest areas, etc., contact Central Office Chemistry Laboratory for instructions. See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
35. Waterproofing and Dampproofing Materials - (a) Asphalt and Primer.....	213	One qt. (1 L) of each, same as Item 5, to Central Office Laboratory.	At source or job site.	Same as Item 5.	See Section 207 for Modified Acceptance details. One drum lots or less accepted on modified inspection. See Sec. 207.
(b) Fabric...	213	One piece 1.0 ft (0.3 m) . x full width per shipment to Central Office Laboratory.	Same as Item 35(a).	Packaging envelope.	
(c) Joint Sealers..	213	Same as Item 35(a).	Same as Item 35(a).	Same as Item 5.	Same as Item 35(a).
(d) Waterproofing Membranes...	213	Accepted on modified inspection and Manufacturer's certification. Requires no sampling or testing.			See Sec. 207 for modified acceptance.

MINIMUM ACCEPTANCE SAMPLING REQUIREMENTS					
MATERIAL AND TEST	ROAD AND BRIDGE SPECIFICATION REFERENCE	RATE OF SAMPLING	LOCATION FOR SAMPLING	PROPER CONTAINER AND PACKING	REMARKS
36. Wire Rope and Wire Strand...		For wire rope, one piece 10 ft. (3 m) long and one piece 2 ft. (0.6 m) long. For zinc-coated wire strand, one piece 6 ft. (2 m) per lot of 5000 ft. (2000 m) or less, 2 pieces per lot of 5000 to 30,000 ft. (2000 to 10000 m), 3 pieces per lot of 30,000 to 150,000 ft. (10000 to 50000 m), and 4 pieces per lot of more than 150,000 ft (50000 m). For failing samples, 2 additional tests will be made on samples from same coil or reel. If either fails, lot is rejected. All samples submitted to Central Office Laboratory.	At source or delivery point.	Wrapped securely and ends seized.	See Sec. 207 for modified acceptance of traffic signal and other electrical components and appurtenances.

SECTION 206 SUMMARY OF MINIMUM INDEPENDENT ASSURANCE SAMPLING REQUIREMENTS

Sec. 206.01 Definitions

Quality Control (QC) – all actions and considerations necessary to assess production and construction processes so as to control the level of quality of the end product. Quality control includes sampling and testing to monitor the process and ensure conformance with the Specifications. Quality control testing and monitoring shall be performed by the Contractor on all processes from the beginning until the final step where the sample is the last stage of quality control; QC test results are compared to the specifications for compliance with material or construction specification limits. Quality control demands that the process be reviewed and updated on a continuing basis; QC shall be performed at a time when corrective action can be taken to substantially decrease the likelihood that appreciable non-conforming material will be incorporated into the project. The Contractor/Producer shall have a means to demonstrate this quality control (i.e. QC test results, control charts).

Acceptance – Sampling, testing, and assessment of test results to determine whether or not the produced material or construction meets specification requirements. Acceptance tests are compared to the specifications for compliance with material or construction specification limits. Acceptance tests are required for materials that do not require QC sampling and testing by the Contractor, and are only performed by the Project Inspector or Materials Section personnel.

Verification Sampling and Testing (VST) – Sampling and/or testing provided by either the Project Inspector or Materials Section personnel to verify material conformance to specifications. VST samples and tests are independent of QC and IA samples/tests, with results compared against the specification requirements. VST is only required where Contractor QC results are used in the acceptance decision.

Independent Assurance (IA) – A management tool that requires an independent party, not directly responsible for QC, VST, or acceptance testing, to provide an independent assessment of the reliability of test results obtained from QC, VST, or acceptance testing. IA is performed primarily on a system basis, where all personnel performing QC, acceptance, or VST testing and equipment used in testing are evaluated on an annual basis (as opposed to performing IA evaluations on each project). Asphalt field density testing and equipment continue to be monitored with periodic IA evaluations on core/plug samples.

IA reviews consist of the following three (3) components:

1. Verification of QC or acceptance tester certification,
2. Verification of QC or acceptance test equipment calibration, and
3. Assessment of QC or acceptance tester accuracy.

IA sampling and testing is generally performed on split samples to eliminate variability of results that would be expected from testing different samples. IA testing is performed with different equipment than QC, VST and acceptance testing.

The results shall be compared with the results from the QC, VST, or acceptance test performed on the split sample to ensure that results are within acceptable tolerances (Table 2-1 below). If a tolerance is not listed in Table 2-1, then the between laboratory D2S tolerance listed in the AASHTO or ASTM test method will be used. The IA results are not compared to the specification limits or used as a basis of material or construction acceptance. 3 Discrepancies discovered during IA evaluations shall be rectified immediately (i.e. equipment or certification issues, re-training). QC, acceptance, or VST results found to be outside tolerance may result in one or more of the following:

1. Re-training of the QC, acceptance, or VST tester,
2. Re-testing to verify that current test results are within acceptable tolerances,

3. Re-calibration of the QC, acceptance, or VST equipment, and
4. In severe cases of operator negligence, invalidating QC, acceptance, or VST tester certification.

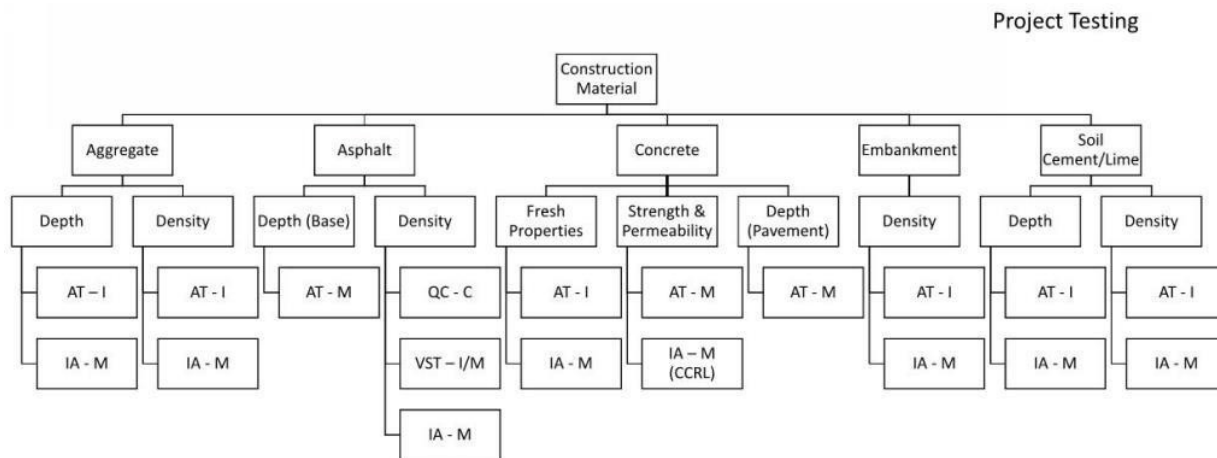
Explanation of actions taken to resolve test results outside of acceptable tolerances will be documented and included in VDOT’s annual QA report to FHWA. Test procedures in VDOT laboratories are monitored by the AASHTO Accreditation Program and participation in the AASHTO Re:Source and the Cement and Concrete Reference Laboratory proficiency testing.

Quality Assurance (QA) – The overall process of determining the accuracy of acceptance decisions by examining acceptance, QC, VST, and IA data and/or providing objective evidence to verify the Contractor’s QC sampling and testing which is used in the agency’s acceptance decision. Only the Materials Section performs quality assurance assessment. QA assessment of asphalt and central mix aggregate plant produced materials is not performed by taking separate samples, but is an interpretation of the data from the IA samples and tests. This interpretation is performed within the asphalt and central mix aggregate database programs – Materials Information Tracking System(MITS)/Producer Lab Analysis and Information Details (PLAID) see VTM-59.

Sec. 206.02 Project Site Testing

(a) Design-Bid-Build Projects

1. Acceptance testing by Project Inspectors includes slump, air, and cylinders for concrete; density for soil and aggregates; and depth for asphalt concrete and aggregate subbase and base. See Chapter III (Soils and Aggregates), Chapter IV (Hydraulic Cement Concrete), and Chapter V (Asphalt Concrete) for minimum frequencies of testing.
2. Verification sampling and testing by the Project Inspector or Materials Section personnel includes density for asphalt, where the Contractor is responsible for QC testing. See Chapter V (Asphalt Concrete) for minimum frequencies of testing.



AT – Acceptance Testing	I – Inspector (VDOT or Consultant)
QC – Quality Control	C – Contractor
VST – Verification Sampling and Testing	M – VDOT Materials
IA – Independent Assurance	CCRL – Cement and Concrete Reference Laboratory

(b) Design-Build Projects

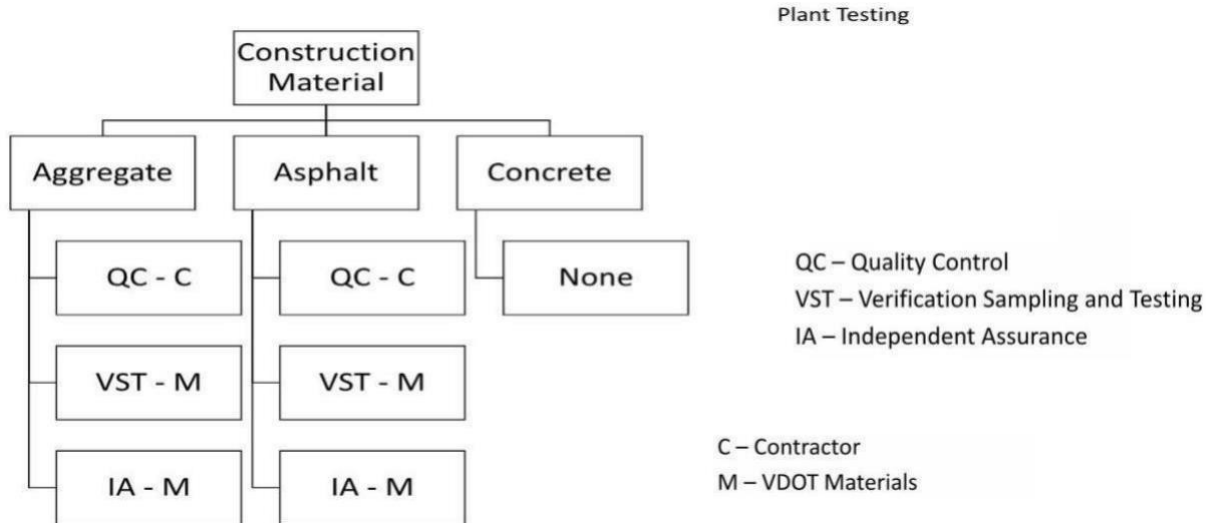
1. Quality Control sampling and testing is performed by the Contractor in accordance with the *Minimum QA/QC Requirements for DB/P3 Projects*.
2. Verification sampling and testing is performed by the Quality Assurance Manager (QAM) and, at a lesser rate, VDOT, in accordance with the *Minimum QA/QC Requirements for DB/P3 Projects*.

Sec. 206.03 Plant Site Testing

(a) Quality Control testing is performed by the Producer for gradation and Atterberg Limits for central mix aggregate; cement content for cement-treated aggregate; and asphalt content and gradation for asphalt mixtures. See Section 311 and 502.06 for minimum frequencies.

(b) Verification sampling and testing of plant-produced materials is not performed on separate samples, but is an interpretation of the data from the IA tests (see VTM-59). This interpretation is performed within the asphalt and central mix aggregate database programs (MITS/PLAID).

(c) Materials using the Producer’s QC results as part of the acceptance decision, such as central mix aggregates and asphalt mixtures, will be evaluated on a plant specific IA program annually rather than on a project specific program. The IA test results will be compared to the Producer’s test results by the computerized database in accordance with Chapter III and V and flag any deviations. These deviations will be investigated, and a report written to show the actions taken.



Sec. 206.04 System-Based IA

VDOT performs IA on a system basis, as opposed to performing IA on each project, for both Design-Bid-Build and Design-Build Projects. Project-based IA is required on Locally Administered projects in accordance with the *Locally Administered Project Manual*. Each calendar year, the system-based IA process includes:

1. In early January, the DME will contact the District Construction Engineer and District staff

responsible for Design Build projects to obtain the names of all VDOT certified Inspectors/Technicians anticipated to be performing testing on VDOT projects.

2. By the end of March, a final list of VDOT certified Inspectors/Technicians will be obtained. Inspectors/Technicians not evaluated on this list that become inactive during the year will be excluded from the evaluation list.
3. As soon as the initial list is available to the DME, the VDOT District Quality Assurance Manager (VDOT QAM), or District staff responsible for Owner IA on Design Build projects, will begin evaluating Inspectors/Technicians on this list.
4. The VDOT QAM will ensure that during each calendar year, a System-based IA Evaluation Form is completed on at least 80% of the Soils and Concrete Inspectors/Technicians and 75% of the Asphalt technicians on the final list obtained in March.
5. At the end of each calendar year, an assessment will be made on the final March list to determine the number of Inspectors/Technicians that were actually performing testing, and an IA evaluation form was filled out for them. Those Inspectors/Technicians not evaluated during the current calendar year will be given priority for IA evaluation the following year. The net goal for VDOT will be to evaluate all active Inspectors/Technicians every two (2) years.
6. A report summarizing technicians examined in each District will be reported to the SME for inclusion into the annual system-based IA report to FHWA. The report should include:
 - a. Number of Inspectors/Technicians evaluated,
 - b. Number of active Inspectors/Technicians performing testing in the District,
 - c. Deficiencies noted during evaluations,
 - d. Corrective actions taken, and
 - e. Any observed trends.

IA for materials sampled and tested in the field (i.e. densities, concrete) shall be performed by the District Materials Section. The sampling and testing should be performed at the rates specified in Chapter III (Soils and Aggregates), Chapter IV (Hydraulic Cement Concrete), and Chapter V (Asphalt Concrete).

Sec. 206.05 Program Specific Independent Audits and Verification Sampling and Testing

The Department performs site specific inspections and audits, and takes independent split samples for testing purposes as well as inspection of plant facilities and testing procedures in several program areas at off-site locations around the country, some aspects of which fall into the category of Independent Assurance. These VDOT Quality Assurance Programs utilize VDOT regional staff, independent third party inspection staff, national audit programs such as NTPEP, PCI and AISC to qualify fabrication facilities, manufacturers and suppliers or a combination of all these methods. These Quality Assurance programs include the following materials: Precast Concrete, Concrete Pipe, Corrugated Metal pipe, Polyethylene Pipe, Polypropylene Pipe, Prestressed Concrete items, Structural Steel, Asphalt binders, Liquid Asphalt and Geosynthetics. Refer to Section 204 of this Manual regarding acceptance requirements to find specific information on other activities which cover some aspects of Independent Assurance.

Table 2-1 Acceptable IA Comparison Tolerance

Test	IA Comparison Tolerance	Source
Soil/Aggregate Wet Density using Nuclear gauge in Direct Transmission	Soil – 2.1 pcf Aggregate – 3.0 pcf	Values adjusted from AASHTO T 310
Soil/Aggregate Density using Sand Cone	2.0 pcf	Values adjusted from ASTM D1556
Soil/Aggregate Water Content using Nuclear gauge	Soil – 2.1 pcf Aggregate – 3.0 pcf	Values adjusted from AASHTO T 310
Soil/Aggregate Moisture determined by oven drying	14%*	ASTM D2216
One Point Proctor – density Lab Proctor – density	4.5 pcf 4.5 pcf	AASHTO T 99
One Point Proctor – water content	15%*	AASHTO T 99
Concrete Slump	0.75 in for 0- to 1.5-in slump 1.0 in for 1.75- to 3.5-in slump 1.25 in for 3.75- to 5-in slump 1.5 in for 5.25- to 6.5-in slump 1.75 in for slump \geq 6.75 in	ASTM C143
Concrete Air Pressure Methods	0.0 to 3.5% 0.5% 3.6 to 4.5% 0.6% 4.6 to 5.5% 0.8% 5.6 to 6.5% 1.0% 6.6 to 7.5% 1.1% 7.6 to 8.5% 1.3%	ASTM C231

Test	IA Comparison Tolerance	Source
	> 8.5% 1.4%	
Concrete Air Volumetric Method	32%*	ASTM C173
Concrete Temperature	2°F	ASTM C1064
Concrete Unit Weight	2.5 pcf	ASTM C138
Concrete Permeability	Same laboratory – 42%* Multiple laboratories – 51%*	VTM-112
Concrete Strength - Single Operator	10.6% difference on the average of three 4x8-in cylinders or 9.0% (average of two 6x12-in cylinders)	Values adjusted from ASTM C39
Concrete Strength - Multiple Operators	15 % difference on the average of 3 cylinders	
Bulk Specific Gravity (Gmb) on Identical plugs/cores taken from Asphalt pavement	Less than 0.015	Values adjusted from AASHTO T 166
<p>*Percent difference calculation shall be $\% \text{ diff} \leq (\text{Absolute Value } [W_1 - W_2] / ((1/2) * (W_1 + W_2))) * 100$</p> <p>Tolerances for asphalt concrete pavement and hydraulic concrete pavement shall be in accordance with Sections 315.07 and 316.05 of the VDOT Road and Bridge Specifications, respectively.</p> <p>Gradation and depth check tolerances for cold central-plant recycling material (CCPRM), full-depth reclamation (FDR), and cold in-place recycling (CIR) are provided in the Contract Documents.</p>		

SECTION 207 MATERIALS SUBJECT TO MODIFIED ACCEPTANCE PROCEDURES AND CERTIFICATION TRACKING ACCEPTANCE PROCEDURES

Listed herein are the materials that may be accepted on VDOT projects on the basis of modified acceptance or certification tracking (CT) procedures, when meeting the criteria outlined in Sec. 111.03 together with the specific acceptance criteria outlined below, and provided that the material has no apparent defects. The materials subject to modified acceptance shall be accepted by the procedures below. These procedures are not all inclusive, but do provide a basic guideline, that should be useful in determining the requirements for acceptance of many of the various miscellaneous materials. See Sec. 702.0 for additional details of and requirements for acceptance of materials on projects administered as a VDOT project, Design-Build projects and Locally Administered Projects. “Buy America” requirements and “BABA” requirements must be met as per 106.01(a).

It should be noted that, in some cases herein, materials are listed that require either full testing or partial testing coupled with some form of certification for acceptance. This is particularly true for electrical materials and the materials are shown this way in an effort to further distinguish between similar miscellaneous materials that may be accepted by modified procedures and those that require testing. If a material is planned to be used that is not listed herein or elsewhere in Sec. 200 of the Manual, the District Materials Engineer should be contacted promptly for instructions for proper acceptance of the material.

Where materials notebooks are required, a record of all material accepted on modified inspection shall be entered in the materials notebook, giving complete information as to the type of material, accurate quantity, source, Manufacturer, and condition as determined by visual inspection. See Sec. 702.01 (c) for details of types of projects not requiring a materials notebook.

Approved shop drawings are not part of the CT process. Contracts, plans and specifications should be followed in addition to the CT process if material is specified as a requirement.

Sec. 207.01 Manufacturer and Producer Certifications

As previously noted, one of the means of modified acceptance of materials is through the use of Manufacturer or Producer certifications, certificates of compliance, mill analyses, shop drawings, catalog cuts (in certain cases), or other similarly approved documentation in lieu of test reports.

In the case of materials accepted on Manufacturer certification (other than signalization/electrical; and water/sewer, which are covered in Sections 207.02 and 207.03, respectively). Materials Division (usually the Quality Assurance Section, Chemistry Lab or Structures Section) will review and approve the certification upon receipt, of a complete CT submittal package or have the CT package reviewed by the appropriate subject matter experts, assign a CT number (which will appear in the lower portion of the cover letter of transmittal), and distribute the necessary copies to the field, the same as routine test reports, except as noted hereafter. See Section 106.01 (b) for details of initial handling and routing of certifications.

The CT number shall be treated the same as a test report number and recorded in the materials notebook by the Project Inspector. Approved and numbered certifications, for materials requiring same, will be issued from the Materials Division within one (1) calendar week of delivery of the CT submittal package, if submittal is complete and has no errors.

Each CT number will cover the specific material from that Manufacturer for the project and quantities for which it was submitted. If project exceeds quantities submitted, the CT shall be revised by the District Materials Section by verifying shipping ticket quantities, revise original transmittal cover page, provide CT number in need of revision and submit to Central Office to complete the CT process. CT numbers with excess quantities submitted on a separate project will need to be reviewed by the District Materials Section for project specification, manufacturer and product by source of material and will require a transfer of material (TL-15).

Sec. 207.02 Materials for Signalization/Electrical Items and Systems

Materials used in traffic signalization and other electrical systems will be accepted as provided in Appendix O.

Some electrical materials can be found on the Pre-Approved Traffic Control Device Listing (TCD) published by Traffic Engineering Division. If these materials are submitted for use, they may be approved using the approval number provided, without obtaining a CT number. Additional testing for some items may be needed as noted on the TCD list. The list can be found at this link: <http://www.virginiadot.org/business/resources/TCD-Pre-Approved-Listing-2019-07-16.pdf> . Otherwise, most traffic signal items shall conform to VDOT Specifications Section 238.

Sec. 207.03 Materials for-Water/Sewer Systems

Materials used for water supply and sanitary sewer systems will be accepted provided in Appendix O.

Water and sewer materials shall comply with VDOT Specification Section 520, project plans, project contract and work drawings.

SECTION 208 - DELETED, Reference Manual of Instructions Chapter 7

SECTION 209 - APPROVED LIST POPULATION REQUIREMENTS

Timeframes for population of the lists will depend on several factors including test period required for material, Departments workload, and etc.

Sec. 209.01 Approved List 14 - Pipe Gaskets and Coatings

To have a gasket product included on the Approved List for "Pipe Gaskets and Coatings" the manufacturer shall submit a notarized letter stating the gasket meets the guidelines established in Section 212(h) of the Road and Bridge Specifications.

Sec. 209.08 Approved List 72 - Detectable Warning Units

To have a product included on the Approved List for "Detectable Warning Units", a notarized letter and sample of product must be submitted to the Materials Division for approval. The letter must certify that the product meets the required specification.

Sec. 209.09 Approved List 8 – Asphalt Release Agents

To have a product included on Approved List for "Asphalt Release Agents", a Vendor shall submit a letter certifying the product has been tested in accordance with AASHTO T 383 by NTPEP and meets the following requirements. The letter shall include the Vendor name, Vendor contact information including address and email, product name, technical data sheet, material safety data sheet (SDS), dilution rate, quality control plan, and NTPEP testing ID.

NTPEP testing requirements:

- Asphalt Stripping Test – Shall show no stripping or discoloration on full strength and diluted samples
- Asphalt Performance Test – Passing at least 3 pours

The asphalt release agents shall meet the following criteria for worker safety and environmental impact:

- As defined in Resource Conservation and Recovery Act (RCRA) Hazardous Waste Code of Federal Regulations (CFR), Title 40, Part 261, Subpart D, List of Hazardous Waste, contain no components that exceed EPA acceptable limits and contain no polychlorinated biphenyls (PCBs)
- Have Globally Harmonized System (GHS) Categories that are nothing more hazardous than:
 - Category 4 Flammable Liquids category
 - Non-reactive Reactivity category
 - Category 5 Acute Toxicity category
 - Category 3 Skin Corrosion/Irritation category
 - Category 2B Eye Effects category
- Do not contain flammable materials such as solvents or petroleum elements
- Have no Flash Point below 400°F (204°C) on the non-diluted product as measured by ASTM D 93. If no Flash Point is observed due to boiling of the material, submit documentation indicating the Test Procedure and equipment used for Flash Point determination.
- Comply with EPA regulations for pH levels (2-12.5)

- Shall not contain any International Agency for Research on Cancer (IARC) class 1 or 2a carcinogens, except where cementitious materials may have a reasonable presence of crystalline silica;
- Shall not contain any Class 1 respiratory sensitizer
- Shall not contain reproductive or germ cell toxicants

Asphalt release agents will expire from Approved List on December 31 five years after the NTPEP test results (e.g. NTPEP submittal and test data is from 2022, the product will expire at 12/31/2026) unless updated NTPEP results are submitted. Vendor shall notify VDOT of any changes to the product formulation, name, or company name. VDOT maintains the right to review any release agent and require samples be tested at a third party lab according to VTM 53.

APPENDICES

Appendix A: DELETED

Appendix B: Corrugated Metal Pipe Plant Monitor Report

Date: _____

Plant Name: _____

Location: _____

Pipe Inspected _____

Diameter: _____

Length: _____

Lot Number: _____

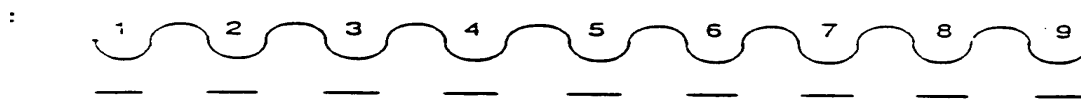
Heat Number: _____

PHYSICAL MEASUREMENTS

Specified Sheet Thickness _____ Measurement _____

Average Zinc Thickness _____ oz./ft.²(g/m²)

Corrugation Depth:



Asphalt Thickness: _____

Asphalt Pavement Width: _____

Asphalt Pavement Depth: _____

Vat Temperature: _____

Date of Asphalt Analysis: _____

Length: _____

Diameter: _____

Arch Radius: _____

"B" Measurement: _____

LOCKSEAM

STRENGTH

TEST

Specified Thickness _____ Actual _____ lbs.(N) Min.Req'd. _____ lbs.(N)

Specified Thickness _____ Actual _____ lbs.(N) Min.Req'd. _____ lbs.(N)

Specified Thickness _____ Actual _____ lbs.(N) Min.Req'd. _____ lbs.(N)

Specified Thickness _____ Actual _____ lbs.(N) Min.Req'd. _____ lbs.(N)

Dents or Bends: _____

End Finish: _____

Coating Repairs: _____

(Zinc/Asphalt)

Plant

Records

Mill Analysis: Yes _____ No _____

Inspection Records: Yes _____ No _____

Are records retained for 2 years? Yes _____ No _____

Appendix C: Reinforcing Steel Fabrication Shop

INSPECTION CHECK LIST

This form shall be used by the VDOT inspector when performing inspection of the reinforcing steel fabricators storage, handling, and fabrication activities. The inspections are to be performed on steel fabricators performing work for Virginia Department of Transportation approximately every 4 - 6 weeks.

Fabricator: _____

Date: _____ Inspector: _____

1. Check mill analyses for the black reinforcing steel and certifications for the epoxy coating used and the application of the epoxy coating.

Mill Analysis Meet Specifications? Yes No.

Comments _____

2. Are padded bundling bars or nylon straps being used during handling of the coated bars? Yes No.

Comments _____

3. Are suitable bands being used to prevent damage to the epoxy coating? Bare wire shall not be used. Yes No.

Comments _____

4. Are bundled bars moved in such a way as to prevent bar-to-bar abrasion due to sagging? Bundle tie wires shall not be used to pick up bundles. Yes No.

Comments _____

5. Are drive rolls on shear beds and back-up barrels on benders protected with a suitable cover to minimize damage during fabrication?

Yes No.

Comments _____

6. Are bars stored above the ground on wooden or padded supports? If coated bars are stored outside, are they protected from sunlight?

Yes No.

Comments _____

7. Is bar identification maintained throughout the fabrication process?

____ Yes ____ No.

Comments _____

8. Is the coating being repaired in the shop? ____ Yes ____ No.

Comments _____

9. How are the bars being cut? (They should not be burned unless fully repaired _____)

Comments _____

10. Are epoxy coated bars being repaired within 8 hours after the bars are cut? If not the bars shall be cleaned and repaired according to AASHTO M284. ____ Yes ____ No.

Comments _____

11. Check certification documents for compatibility of repair material with the epoxy coating. Is the repair material compatible? ____ Yes ____ No.

Comments _____

Appendix D: Reinforcing Steel Epoxy Coating Plant Review

Plant: _____ Date: _____

VDOT Q.A. Inspector (Signature) _____

I. BARS

A. Check for contaminants on bars prior to cleaning and coating

1. Contaminants Observed?

_____ Yes _____ No

2. If Yes, on what number of bars? _____

Approximate surface area: _____ Less than 6" (150 mm) in 6 ft.
(1.8 m)

_____ More than 6" (150 mm) in 6 ft.
(1.8 m)

3. Corrective Action: _____

B. Check for Surface Defects on Uncoated Bars

1. Surface Defects Noted? _____ Yes _____ No

2. Type of Defects: _____

3. Corrective Action: _____

II. BLAST CLEANING

All tests to be performed by plant quality control personnel, and observed by VDOT quality assurance inspector.

A. Comparison to Visual Standards

1. Bar Size: # _____

2. Meets SSPC Vis. 1 degree of cleaning SSPC-SP10?
 - a. Sample 1: _____ Yes ___ No Comments _____
 - b. Sample 2: _____ Yes ___ No Comments _____
 - c. Sample 3: _____ Yes ___ No Comments _____

- B. Copper Sulfate Test
 1. Bar Size: # _____
 2. Percent of Surface Area Unreacted (i.e., not copper-colored)
 - a. Location 1: _____% Location 2: _____%

- C. Chloride Test - Blasted Bar Surface
 1. Bar Size: # _____
 2. Chlorides Present (refer to Visual Standard)
 - a. Location 1: _____ ppm
Location 2: _____ ppm
Location 3 _____ ppm

- D. Backside Contamination
 1. Bar Size # _____
 2. Percent Contamination
 - a. Location 1: _____% Location 2: _____% Location 3: _____%

- E. Anchor Profile
 1. Required _____
 2. Bar Size: # _____
 3. Location A: Depth__mils (μm)
Location B: Depth_____mils (μm)
Location C: Depth_____mils (μm)
Average Depth_____mils(μm)

III. CLEANING ABRASIVE

- A. Check Operation of Blasting Equipment
 - 1. Equipment Functional: _____ Yes ___ No
 - 2. Comments: _____

- B. Check Abrasive Mix for Oil Contamination
 - 1. Time Mix Sampled: _____
 - 2. Oil in Mix: _____ Yes _____ No
 - 3. If Yes, Action Taken: _____
- C. Chloride Test - Abrasive (Required once per Week)
 - 1. Chlorides Present: _____ ppm
- D. Sieve Analysis (Required once per Week)
 - 1. Review Plant Records

IV. HEATING

- A. Check Bar Temperature Prior to Coating
 - 1. Recommended by Epoxy Manufacturer _____
 - 2. Bar Size: # _____
 - 3. Temperature Recorded (1 temperature per bar in the set, i.e., 4-bar line - 4 temperatures should be recorded.)
_____ °F(°C) _____ °F(°C) _____ °F(°C) _____ °F(°C) _____ °F(°C)

V. POWDER APPLICATION

- A. Check for Oxide Formation on Cleaned Bars
- B. Check Electro-Static System Operation
 - 1. System Functional: _____ Yes _____ No

- C. Check Powder Air Supply
 - 1. Air System Functional: _____ Yes _____ No
- D. Inspect Bar Transport System
 - 1. Damage to Coating: _____ Yes _____ No
 - 2. If Yes, Action Taken: _____
- E. Check Line Speed
 - 1. Time from Application Booth to Quench: _____ seconds
 - 2. Manufacturer's Recommended Quench Time _____ seconds
 - 3. Bar Size: #_____

VI. ACCEPTANCE TESTING

- A. Check Operation of In-Line Holiday Detectors
 - 1. Time: _____
 - 2. Detectors Operational: _____ Yes _____ No
 - 3. If No, Action Taken: _____
- B. Check with Hand-Held Holiday Detector

_____ No. of Holidays Bar Length: _____ feet (meters)
- C. Calibrate Thickness Gage
 - 1. Correction for Anchor Profile: _____ mils (μm)
- D. Perform Thickness Measurements for One Bar Once Per Shift and Change of Bar Size

Thickness Measurements (Mils) (μm)

	1	2	3	4	5	6	7	8	9	10
Reading #1	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Reading #2	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Reading #3	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Average of 3 Readings	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

E. Perform Bend Test Per Purchaser's Specification

<u>Bar Size</u>	<u>Degree of Bend</u>	<u>Pin Diameter</u>	<u>Test Results</u>	<u>Bar Temp</u> $\leq 86^{\circ}\text{F}$ $(\leq 30^{\circ}\text{C})$	<u>Bend Rate</u>
_____	_____	_____	_____	_____ °F (°C)	_____ Sec.

VII. HANDLING AND STORAGE (PLANT WALKTHROUGH)

A. Inspect Powder Storage

1. Manufacturer's Recommendation _____ °F (°C)
2. OK? _____ Yes _____ No

B. Check Temperature of Powder Storage Area

1. Temperature: _____ °F (°C)

C. Check Shelf Life of Powder

1. Manufacturer's Recommendation _____
2. Powder Manufacturer's Lot #'s in Use During Shift: _____

D. Inspect Coated Bars Prior to Shipment

1. Damaged: _____ Yes _____ No
2. If Yes, Action Taken: _____
3. Are damaged areas repaired with compatible material?
 _____ Yes _____ No Brand _____

E. Inspect Stockpiles of Coated Bars (if applicable)

1. Bars Properly Bundled? _____ Yes _____ No
2. Bars Properly Stored? _____ Yes _____ No
3. Rejected Bars Identified and Segregated? _____ Yes _____ No

VIII. General Comments

Appendix E: Concrete Pipe / Precast Concrete Quarterly Plant Report

Date _____

Manufacturer _____

Location _____

Producer's Technician _____

Region _____

Type Plant: _____ Concrete Pipe _____ Precast Concrete _____ Both

Raw Materials

1. All materials are from VDOT approved sources? _____ Yes _____ No

2. Stockpiles are properly segregated? _____ Yes _____ No

3. Stock piles are free of debris? _____ Yes _____ No

4. Admixtures are stored according to manufacturer's specifications?
_____ Yes _____ No

5. Is reinforcing steel/wire stored properly? _____ Yes _____ No

6. Are VDOT approved grate, frames, covers and insets stored separate from unapproved items?
_____ Yes _____ No

7. Is VDOT's Are the "Buy America" requirements and "BABA" requirements as per 106.01(a)?
_____ Yes _____ No

Comments: _____

Pre-Pour Inspection

1. VDOT approve shop drawings in use? Yes No
2. Forms are clean and in good condition? Yes No
3. Are forms tight, gap free, square, and within dimensional tolerance?
 Yes No
4. Excessive form oil removed? Yes No
5. Minimum cover for rebar mat checked? Yes No
6. Minimum cover for rebar ends checked? Yes No
7. Front and back depth checked? Yes No
8. Pre-pour inspection documented? Yes No

Comments: _____

Post-Pour Inspection

1. Forms are cleaned after each use? Yes No
2. In service forms are stored in clean and good condition?
 Yes No
3. Out-of-service forms are clearly marked and stored separately?
 Yes No

Comments: _____

Testing

1. Are the Plant QC Technician's certifications current? _____ Yes _____ No
2. Are the following test being performed:
- | | | | |
|--------------------------------|-----|----|-----|
| Temperature | Yes | No | N/A |
| Slump | Yes | No | N/A |
| Air Content | Yes | No | N/A |
| Compressive strength cylinders | Yes | No | N/A |
3. Are all tests performed properly? _____ Yes _____ No
4. Is the laboratory adequately equipped to perform these test?
_____ Yes _____ No
5. Are all equipment calibrations current? _____ Yes _____ No

- *Date compressive cylinder machine calibrated. _____
- *Frequency cement, aggregate & water metering calibrated. _____
- *Date cement, aggregate & water meter calibrated _____
- *Batch plant inspection frequency? _____
- *Air meter calibration frequency? _____

Comments: _____

Pipe Testing

1. Does the product meet dimensional requirements? _____ Yes _____ No
2. Length of pipe _____ Diameter of pipe _____
- *D-Load class of pipe _____
- *Required D-Load reading at .01 _____

*Required D-load reading for ultimate _____

*Reading when .01 crack developed _____

Comments: _____

Workmanship

1. Does the product meet dimensional requirements? _____ Yes _____ No

2. Is the product substantially free of fractures, cracks and surfaces roughness?
 _____ Yes _____ No

3. Is the reinforcing wire/steel exposed? _____ Yes _____ No

4. Is the following information clearly marked on each section of product?

*The specifications Yes No N/A

*The date of manufacture Yes No N/A

*The name or trademark of the manufacturer and identification of plant?
 Yes No N/A

*Is each item given a final inspection by a QA Technician at load out and stamped QC

Signifying it's free of defects and or damage? _____ Yes _____ No

Comments: _____

Storage

1. Is product storage area firm and level? _____ Yes _____ No

2. Are units stored in a manner to minimize damage? _____ Yes _____ No

3. Are unacceptable units stored separately of acceptable units?
 _____ Yes _____ No

Comments: _____

Repairs

1. Are necessary repairs being made? Yes No

2. Are the patching materials used listed on Lists 28,29 or 31?
 Yes No

3. Are repairs properly finished and cured?
 Yes No

Comments: _____

Documentation

1. Are the following documents available?

*Cement mill certifications	Yes	No	N/A
*Aggregate test reports	Yes	No	N/A
*Admixture product data sheets	Yes	No	N/A
*Reinforcing steel mill certifications	Yes	No	N/A
*Grates, frames, covers & inset certs	Yes	No	N/A
*Approved VDOT mix designs	Yes	No	N/A
*Equipment calibrations	Yes	No	N/A
*Technician certifications	Yes	No	N/A
*Water Test Analysis	Yes	No	N/A

2. Do shipping tickets/documents contain a statement certifying that the items shipped have been tested, inspected, and approved under an approved producer QC acceptance program signed by an authorized QC technician. Yes No

Comments: _____

Overall Comments: _____

Monitor Samples

Sample Number	Type Material	Tested for	Results
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Plant Representative

VDOT Plant Monitor

Title

Appendix G: Polyethylene and Polypropylene Pipe Plant Inspection Report

DATE _____

INSPECTION PERIOD _____

MANUFACTURER _____

LOCATION _____

This form is designated to assist those in the review process. A number of questions are provided for this purpose. The applicable specifications contain greater detail than this checklist, and are required to assure that all is in compliance. Use both in this inspection effort.

A. Does the producer have the VDOT Approved QA/QC plan available and is the plan current?

Yes _____ No _____

Remarks _____

B. Does the producer maintain a Department approved Quality Control Form for all products produced for VDOT projects? Yes _____ No _____

Remarks _____

C. Is there written documentation that the following tests are being performed in accordance with AASHTO M252 and M294 for polyethylene or AASHTO M330 for polypropylene?

1. Workmanship Yes _____ No _____

Remarks _____

2. Tubing Dimensions Yes _____ No _____

Remarks _____

3. Perforation Dimensions Yes _____ No _____

Remarks _____

4. Pipe Stiffness Yes _____ No _____

Remarks _____

5. Pipe Flattening Yes _____ No _____
Remarks _____

6. Environmental Stress Cracking Yes _____ No _____
Remarks _____

7. Brittleness Yes _____ No _____
Remarks _____

D. MARKINGS

1. Is the following information clearly marked on each 10 foot (3 m) section of the product?

A. The name or trademark of the manufacturer? Yes ____ No _____

B. Nominal size of the product? Yes ____ No _____

C. The specification designation? Yes ____ No _____

D. Plant designation code? Yes ____ No _____

E. The date of manufacture or an appropriate code? Yes _____ No _____

Remarks _____

2. Do shipping tickets/documents contain a statement that the product shipped has been tested, inspected and approved under an approved VDOT PE or PP Pipe QA Acceptance Program? Yes _____ No _____

Remarks _____

E. INSPECTION SAMPLES

List the VDOT technician Inspection Samples taken during this review.

<u>Sample No.</u>	<u>Type of Material</u>	<u>To Be Tested For</u>	<u>Results</u>

Overall Remarks:

SIGNATURE OF PERSON CONDUCTING
INSPECTION REVIEW

TITLE

Appendix H: Quality Control Plan Review Check List

Plant Name: _____

Location: _____

Date: _____

Reviewer: _____

Reviewer's Section: _____

Description: This Quality Control (QC) Plan Review Check List is to be used by the VDOT Monitor to assess the completeness of the Quality Control Plan submitted by the miscellaneous precast concrete or concrete pipe producer. If the QC Plan is deemed complete, the QC Plan can be approved and the producer can make product for VDOT projects according to the instructions.

Note: N/A = Not Applicable

Does the QC Plan have a:

Cover sheet specific to the Facility with the latest revision date?	Yes	No
This sheet will also include the facility's physical address, mailing address, telephone number and web address. Any time this plan is updated or resubmitted this cover will be updated.		

Statement of Commitment to Quality Control:	Yes	No
Statement shall reflect facility's commitment to their Quality Control plan and VDOT specifications.		

Plant Personnel Organizational Chart:	Yes	No
(Including Plant Manager, QC Technician/Manager/Director and Personnel Qualifications)		

Plant Organization (line of reporting)	Yes	No
QC manager reports directly to plant management		

List of Precast concrete items produced for VDOT projects	Yes	No
--	------------	-----------

Records:

List of Records maintained in plan?	Yes	No
-------------------------------------	-----	----

List of precast concrete items produced for VDOT projects?	Yes	No
--	-----	----

Retention time of records (Min. 5 years)	Yes	No
--	-----	----

Materials Section – Are the location and retention time of the following documentation included?

Source of any concrete not produced on site, must be a VDOT approved source?	Yes	No	N/A
--	-----	----	-----

Cement Supplier's name, location and mill certificates	Yes	No	N/A
--	-----	----	-----

Fine and Coarse Aggregates

Stamped Delivery Tickets or Certifications kept on file?	Yes	No	N/A
Documentation of Aggregate Gradations and Aggregate moisture checks	Yes	No	N/A
Frequency of Visual Inspections of stored Aggregate Materials	Yes	No	N/A
Admixtures: Product Data sheets and types of admixtures used	Yes	No	N/A
Water quality (Sec. 216 of Road & Bridge Spec.) Provide test reports if not local source	Yes	No	N/A
Welded Wire Fabric fabrication procedure and mill certs Certification Mill Report “Buy America” requirements and “BABA” requirements compliant with 106.01(a)	Yes	No	
Steel/Rebar/Epoxy-coated rebar mill certifications Mill Report Buy America Compliant	Yes	No	
Grates, frames and covers Certifications under an approved program AASHTO M105 and/or M306 compliance Mill Report Buy America Compliant	Yes	No	N/A
Materials Storage Does the QC Plan state how each type material will be stored to prevent contamination or degradation?	Yes	No	
Form Work Does the QC Plan provide details of how form are cleaned, stored and prepared for the next pouring operation? How are the forms inspected and removed from service is necessary?	Yes	No	
Prepour Inspection Form set-up Product set-up	Yes Yes	No No	
Postpour Inspection	Yes	No	
Batching Daily Moisture Checks Batcher Passed Exam	Yes Yes	No No	
Curing:	Steam	Air	Other _____

Cold Weather curing procedures: _____

Hot Weather curing procedures: _____

Finished Products Inspection	Yes	No
Does the QC Plan describe how the finished product is inspected?		

Product Storage and Shipping	Yes	No
Does the QC Plan describe how the product is stored and how the product is shipped including any precautions and inspection that is performed?		

Patching

Level of Patching	Yes	No
Brand Name of Patching Material used for Lists 28, 29 & 31	Yes	No
Procedure for patching in hot and cold weather	Yes	No
Cosmetic repair detail and structural repair procedures	Yes	No

Problem Resolution Procedure	Yes	No
Does the QC Plan outline a procedure to follow when problems involving production, testing, product meeting specifications, etc. are encountered?		

Quality Control Testing Frequency and their AASHTO or ASTM designations

Does the QC Plan define the testing performed to ensure product meets specifications?

Making cylinders/curing		ASTM C31
	AASHTO T126	ASTM C192
Temperature of Concrete		ASTM C1064
Slump Test		ASTM C143
Air Content		
Pressure Meter		ASTM C231
Volumetric Meter		ASTM C173
Absorption tests	AASHTO T280	ASTM C497
Strength tests		ASTM C39
	AASHTO T280	ASTM C497
Scale/Balance calibration frequency	Yes	No
Frequency of Hopper/Chute Inspection	Yes	No
Consequences of failing tests	Yes	No
Procedure followed when failing tests Occur?		
Handling of rejected precast products	Yes	No
Identifying products that are damaged?		

Appendix I: Virginia Department of Transportation/Materials Precast Concrete Repair Manual

INTRODUCTION

Precast concrete, as a manufactured material, will not be 100% defect free; however, with proper quality control (QC) repairs can be minimized. Repaired precast concrete can be just as good as structurally sound concrete not needing repairs. The purpose of this manual is to provide guidance in the identification and repair of defects in precast concrete units. The manual will also help identify the precast piece and help one identify the piece as the one ordered.

ACCEPTABLE MATERIALS FOR REPAIR

Materials used in repairs should be listed on the proper VDOT Materials Division Approved List numbers 28, 29 or 31. The lists can be found at

http://www.virginia.gov/business/resources/Materials/Approved_Lists.pdf

Repair materials must be applied and cured in accordance with the manufacturer's recommendations.

DEFINITIONS

Structural Defect – Broken corners, large spalls and defects that expose rebar

Cosmetic Defect – Chips, bug holes, surface defects, fractures and small spalls that do not expose any reinforcement. Defects that do not affect the integrity of the structure, i.e. only affect the look of the structure.

Bug Holes – Entrapped air voids at the surface. The air voids should be small in size less than ¼ inches (6 mm) in diameter.

PRECAST CONCRETE UNITS

Basics – Typically, the design strength of a precast structure is at least 4000 PSI (30 megapascals) at 28 days and $6 \pm 2\%$ air content. Units should not be shipped until 85% design strength is achieved. Some units will have exposed rebar for tying into adjacent cast in place structures.

Endwalls – The basic look of an endwall is rectangular with a thicker base (Photo 1 & 2). There will also be at least one opening for a pipe connection. The opening could be circular, elliptical or arched. Larger endwalls will most likely have wings. The endwall should have neat, clean edges without spalls, cracks or exposed reinforcement. Pipe openings shall not exceed the outside cross sectional dimensions of the pipes by more than a total of 8 inches (200 mm) regardless of the placement of pipes, the angles of intersection, or the shapes of the pipes.



Photo 1 - EW - 12



Photo 2 - Endwall

Box Culverts – There are numerous looks to box culverts. The typical cross section should have a rectangular look to it. The number of boxes in a typical section is the type of culvert. Two boxes make a double box culvert.

The box culvert should be free of visible defects and have neat, clean edges.



Photo 3 - Box Culvert

The top edge needs to be patched before item can be installed.

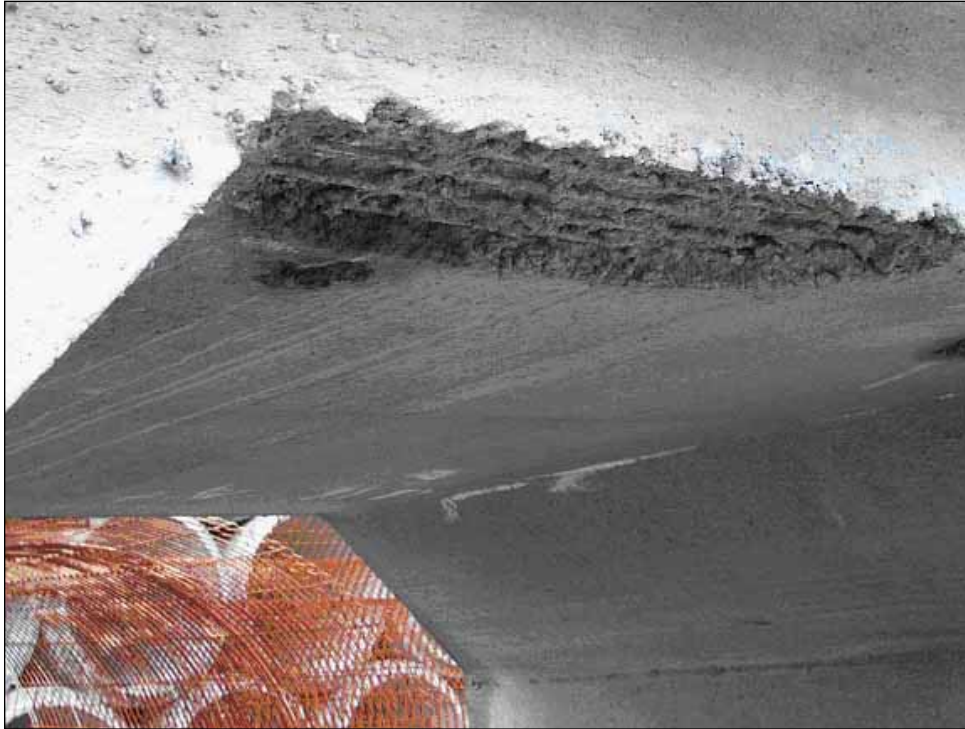


Photo 4 - Close-up of Box Culvert

This box culvert (Photo 4) can be patched to cover the exposed rebar. More severe damage may be cause for rejection or may be repaired in accordance with a procedure approved by the Engineer. Repair procedures may be submitted on a case-by-case basis.

Top Units – The top unit will be circular (Photo 5) or rectangular with various openings or grates. The joint will be of fabricator’s design meeting approval of the Engineer. Joints are to be sealed with mortar, rubber gasket, or butyl rubber. The unit shall be free of visible defects and have neat, clean edges.



Photo 5 - Top Unit

Drop Inlets

DI-2 – Will have a similar look to what is pictured (Photo 6) but can have slight modifications depending on its use.



Photo 6 - DI-2

DI – 3, 4 - The item will come in several pieces. The main section should be a rectangular box. The box will have an IC-2 frame and cover. One side of the box will be open with the bottom having a smaller opening (Photo 7). The main piece will also contain dowel holes used to connect to the curbing. The second piece is the face block (Photo 8). The face block will have at least two loops cast in the face. Face blocks should be sealed with grout or polysulfide from the appropriate approved list. The pieces shall be free of visible defects and have neat, clean



edges.



Photo 7 - DI-4

Photo 8 - Face Block

DI – 5 – This item will be slanted (Photo 9) to fit a ditch. Unit should not be placed in traffic. The unit shall be free of visible defects and have neat, clean edges.



Photo 9 - DI-5

DI – 7 – Grate design can vary depending on if unit will be subject to traffic loading or not.



Photo 10 - DI-7

DI- 10, 14 (Photo 11) – Unit is to be used with median barriers.



Photo 11 - DI-10

DI – 12 – Unit should not be placed in traffic loading conditions. Grate bars should be installed parallel to ditch flow (Photo 12).



Photo 12 - DI-12

Taper units – Circular units that are attached under a manhole frame. The unit will taper from a larger section to a smaller section (Photo 13). The unit shall be free of visible defects and have neat, clean edges.



Photo 13 - Taper Unit

The taper should be flush with its mated surface. This item should be repaired before installation.

Riser – Circular units that are attached under a manhole frame (Photo 14). The unit shall be free of visible defects and have neat, clean edges.



Photo 14 - Riser

Base Units (Photo 15) – Openings for pipe will be a minimum of 4 inches (100 mm) to a maximum of 8 inches (200 mm) larger than the outside diameter of proposed pipe. Joints are to be sealed with mortar, o-ring gasket, or butyl rubber.



Photo 15 – Base Unit

Manhole Tee Bases (Photo 16) – Riser section is to have a minimum wall thickness of 5 inches (125 mm). Base section should be same class and strength as the adjoining pipe culvert. Tongue and groove joints are to be of identical design as adjoining pipe culvert.



Photo 16 - Manhole Tee Base

Flared End Section – The unit will have either a tongue end (Photo 17) or a groove end (photo 18). The unit shall be free of visible defects and have neat, clean edges.



Photo 17 - Tongue Flared End Section



Photo 18 - Grooved Flared End Section

Used Barriers: Delineators and other required reflective materials are to be replaced with new material and the marks/blemishes caused by the removal are to be repaired or acceptably covered.

Used barrier sections should not be expected to look like new. They should be cleaned or coated sufficiently to afford good visibility and uniformity of appearance. The barrier sections must be structurally sound with no concrete missing along the top surface and no through cracks.

Cosmetic Repair: Minor chips, small spalls or bug holes

- Areas that require repair are to be clean, sound and free of contaminants
- Provide an aggregate fractured surface
- When using a water-based repair material, saturate the repair surface to SSD condition
- Follow the manufacturer's instruction for patching for an approved repair material
- Allow repaired unit to cure to at least 85% of design strength before moving.

Structural Repair: Large chips, spalls or exposed reinforcement

- Areas that require repair are to be clean, sound and free of contaminants
- Provide an aggregate fractured surface
- Remove concrete a minimum of 1 inch (25 mm) beyond all exposed reinforcement
- Saturate the repair surface to provide an SSD (Saturated, Surface-Dry) condition, if using a water-based repair material
- Follow the manufacturer's instruction for patching for an approved repair material
- Allow repaired unit to cure at least 85% of design strength before moving.

PIPE

Acceptable non-repaired pipe: Should have neat edges, corners and be free of visible defects.

Determination of Repairs to Precast Units: Edge and Corner spalls are to be repaired to their original, neat lines. The mortar to be used for repair should closely match the color of the concrete unit if the unit is exposed. The manufacturer's directions should be followed when patching the concrete unit. Special precautions should be taken in hot or cold weather.

Cracks of less than 12 inches (300 mm) in length and less than 0.01 inches (.25 mm) in width may be repaired with mortar. Units having full depth cracks or larger than those noted above, shall be rejected or may be repaired in accordance with a procedure approved by the Engineer. Repair procedures may be submitted on a case-by-case basis.

When the effectiveness of a connection is reduced, but involves damage to less than 20% of the longitudinal dimension of that connection, repair may be performed as in the paragraph above. The connection refers to the spigot, bell, tongue or groove of pipe.

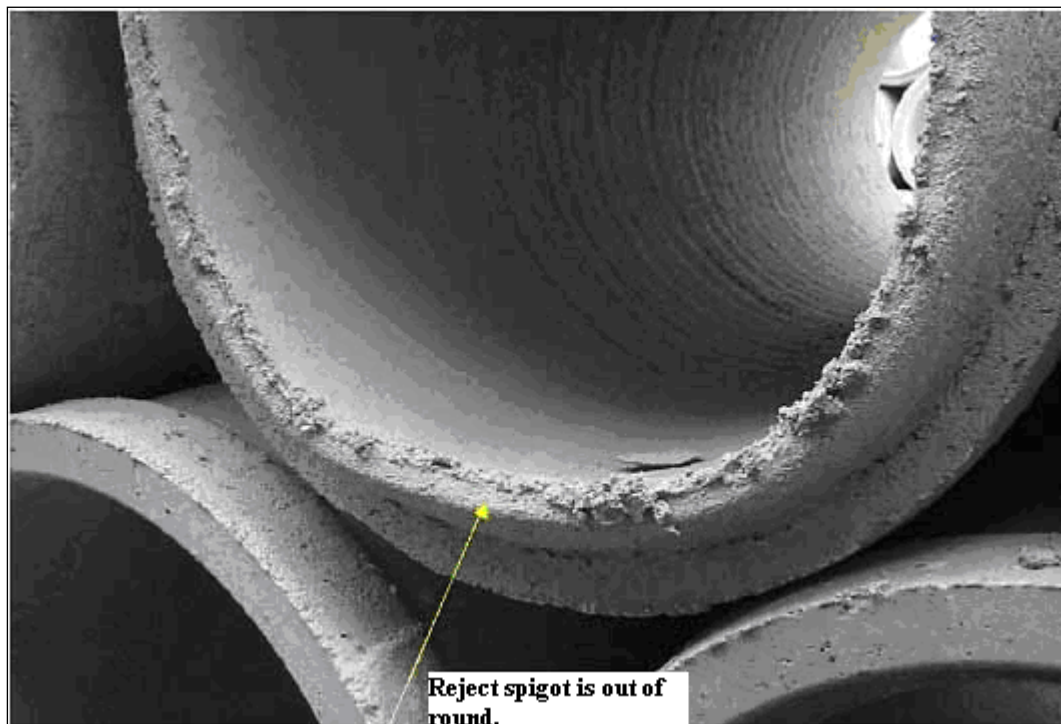


Photo 19 - Spigot out of Round



Photo 20 - Repairable Pipe

The above pipe can be repaired following the proper procedure.



Photo 21 - Non-Repairable Pipe

Pipe that has as much damage as the pipe above shall be rejected and not repaired.

Repair to spalls in the inner barrel will be allowed in the acceptable limits at the male and female ends of joint. Spalls on the inner barrel may be considered cosmetic if reinforcement is not revealed within 1.5 times the joint depth from the end of pipe. Minor spalls at the lift hole may be repaired when the lift hole is plugged. Spalls with a size greater than 2 inches (50 mm) or have exposed rebar shall require structural repairs.

If a pipe section exhibits a through wall crack, it shall be rejected (Photo 22); except that a single end crack that does not exceed the depth of joint will be permitted. On a case-by-case basis, repair procedures for rejected pipe may be submitted for approval by the Engineer. Non-through wall cracks for pipe not tested but part of an approved lot will be accepted according to ASTM C76.

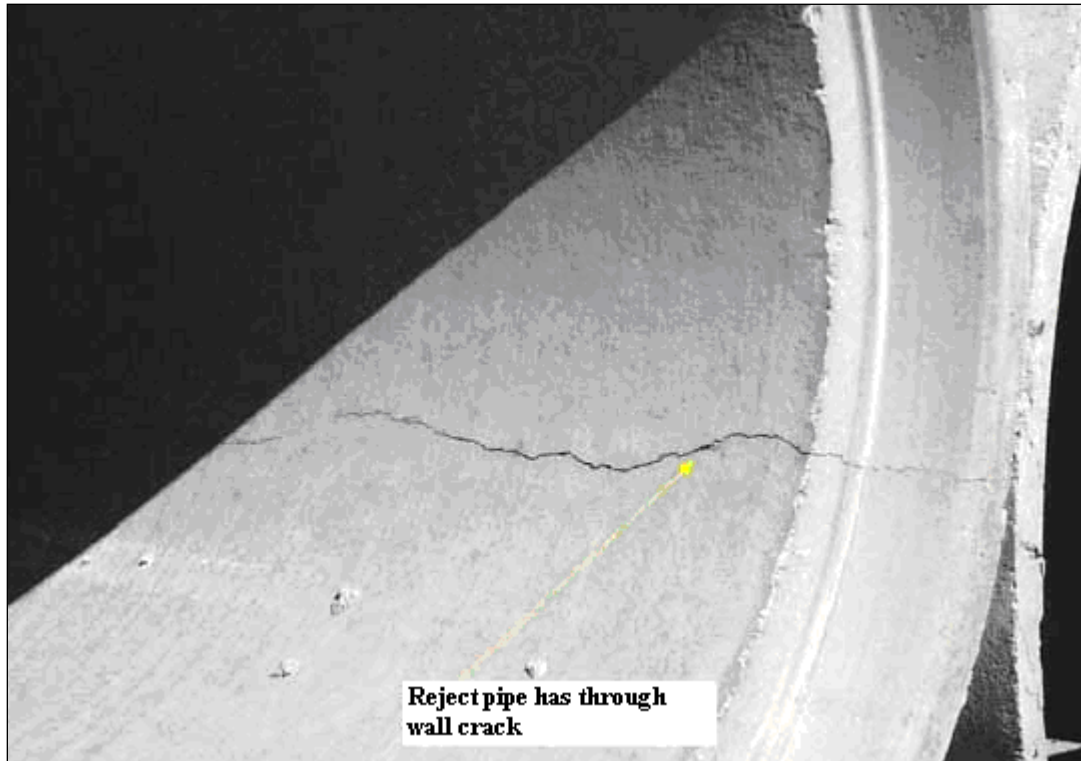


Photo 22 - Throughwall Crack

Pipe sections that exhibit signs of manufacturing defects such as honeycombing (Photo 24) or mixture insufficiencies exposing the reinforcement cage (Photo 23) shall be rejected. This statement does not include exposed end tips (Photo 25). Exposure of end tips shall not be justification for rejection.

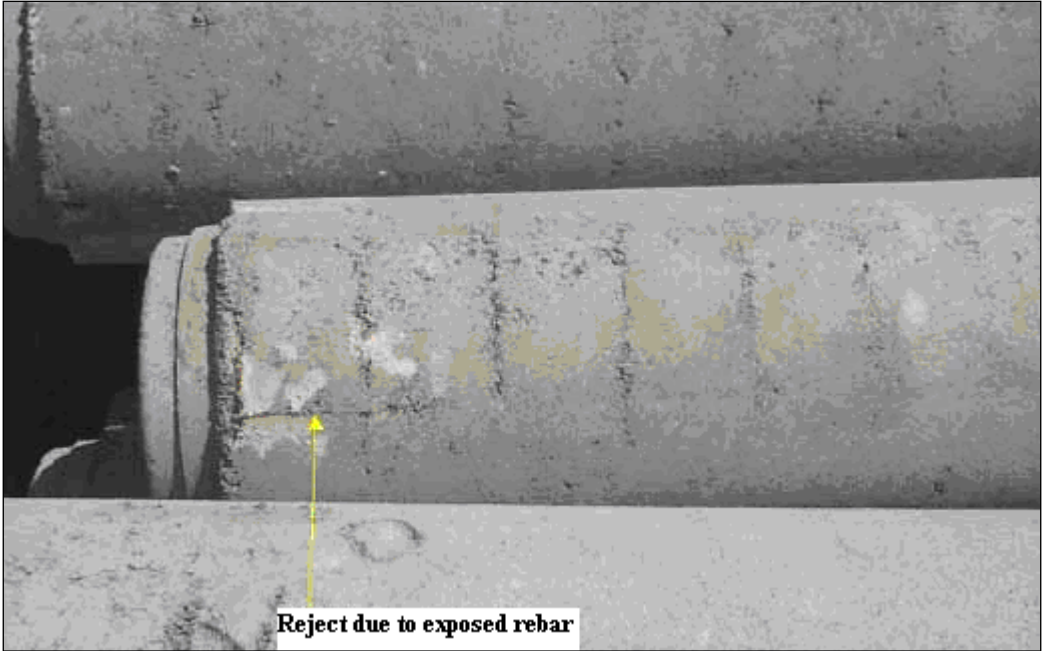


Photo 23 - Exposed Rebar

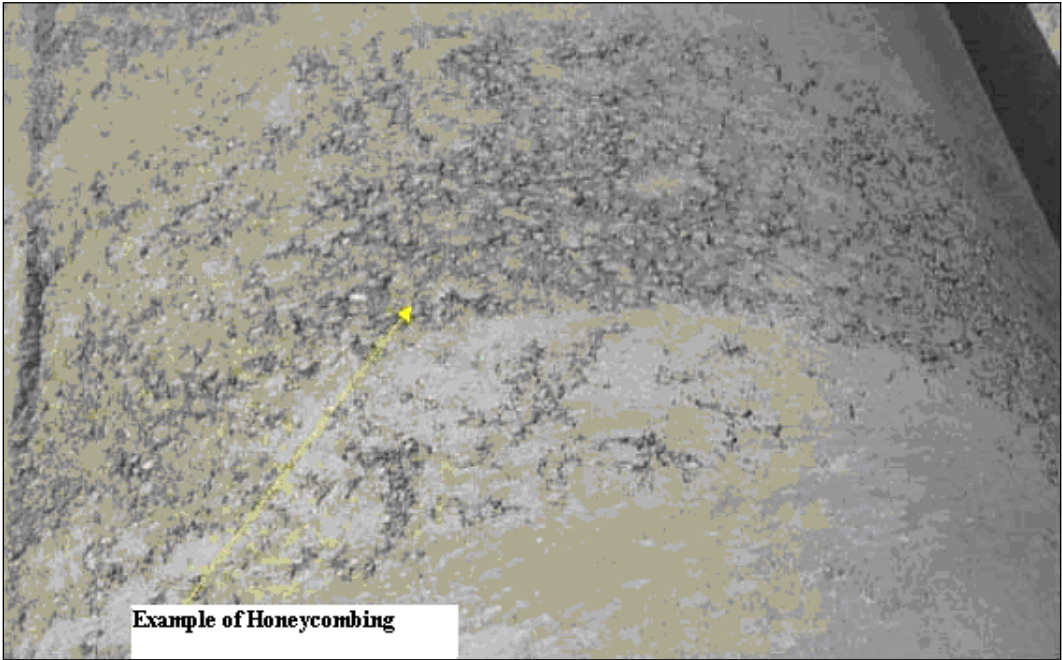


Photo 24 - Honeycombing

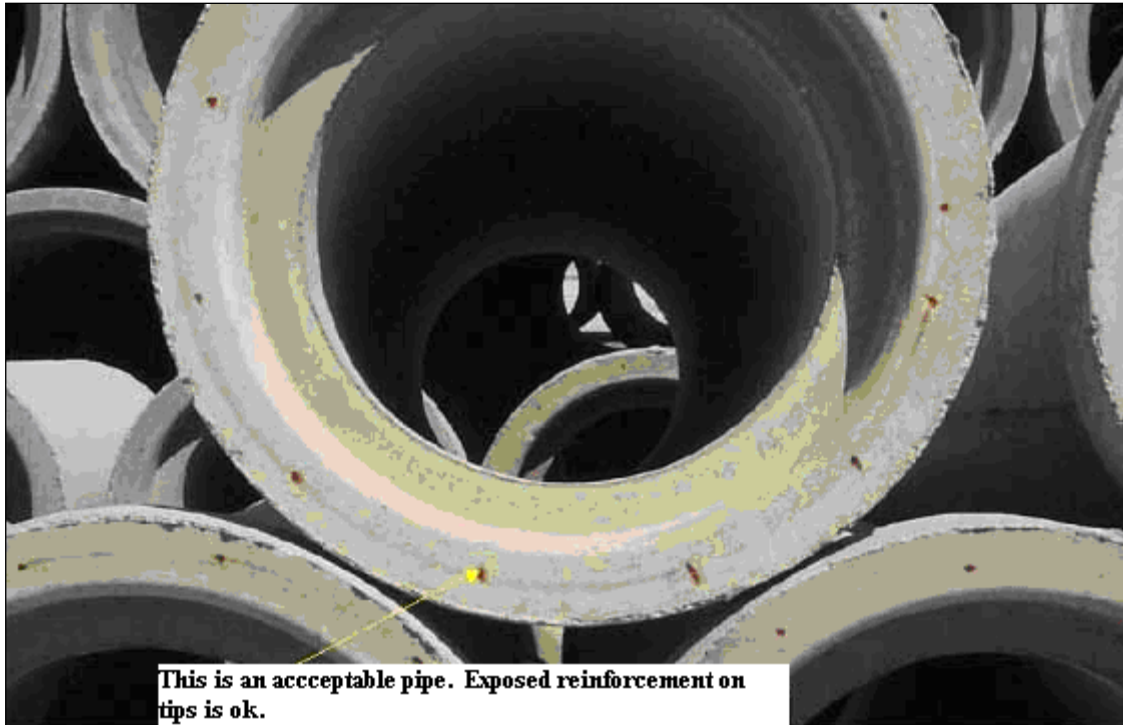


Photo 25 - Exposed Tips

Note: The rejection criteria for length and width of cracks are taken from AASHTO M199. The 20% criteria for keyways is a collective judgment.

Cosmetic Repair: Minor chips, small spalls or bug holes

- Areas that require repair are to be clean, sound and free of contaminants
- Provide an aggregate fractured surface
- Saturate the repair surface to provide an SSD condition, if using a water based repair material
- Follow the manufacturer's instructions for an approved repair material
- Allow repaired pipe to cure to at least 85% of design strength before moving

Structural Repair: Large chips, spalls or exposed reinforcement

- Areas that require repair are to be clean, sound and free of contaminants
- Provide an aggregate fractured surface



Photo 26 - Pipe with Formwork

- Remove concrete a minimum of 1 inch (25 mm) beyond all exposed reinforcement
- When using a water-based repair material, saturate the surface to provide a SSD condition
- Follow the manufacturer's instructions for an approved repair material



Photo 27 - Pipe with Patch

Allow repaired pipe to cure to at least 85% of design strength before moving.

When damage to the tongue or groove involves 20% or more of the longitudinal dimensions, the repair must be doweled into the undamaged portion of the unit using EP-4 epoxy and repaired with hydraulic cement concrete (cured in accordance with the provisions of section 404 of the specifications) or with an approved patching material.

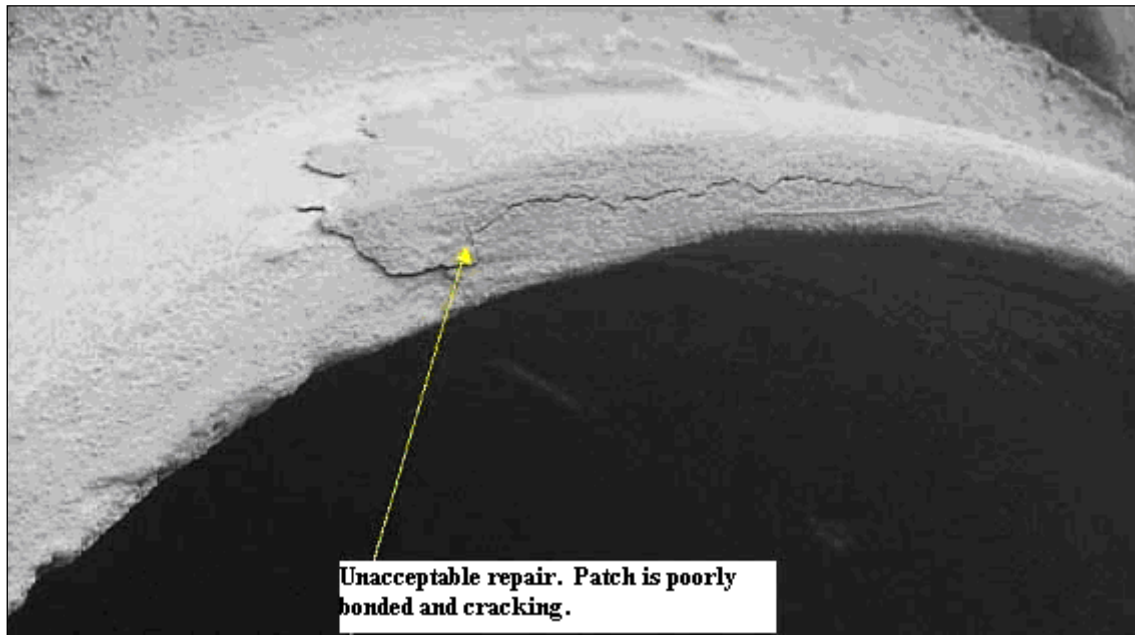


Photo 28 - Bad Patch on Pipe

Special Thanks to Pennsylvania Department of Transportation for use of their manual, Illinois Department of Transportation for use of their manual and the Precast Concrete Association of Virginia.

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Appendix J: Fencing Suppliers QA Plan Outline Checklist

1. Facility location, main phone number, web site, etc.	Yes	No
2. Statement of commitment to program, purpose and mission.	Yes	No
3. Personnel chart or organizational arrangement including assignment of responsibilities.	Yes	No
4. Items supplied under this plan.	Yes	No
5. Statement allowing VDOT access for necessary sampling and inspection.	Yes	No
6. Action taken when new product is received.	Yes	No
7. Summation of product storage.	Yes	No
8. Material documentation process –		
– Certifications/testing of product supplied by manufacturer	Yes	No
– Material handling/movement of approved material	Yes	No
– Labeling passing material	Yes	No
– How failed material is handled	Yes	No
– Information pertaining to size of lot, lot number, batch number, batch quantity and roll numbers, etc. if available.	Yes	No
– Brand name and manufacturer of material.	Yes	No
– Material from Approved List 69 or 45	Yes	No
– Material Made in the USA	Yes	No
– Sample of ticket sent to VDOT projects including the QC statement on the ticket.	Yes	No
– Authorized personnel must sign QC statement.	Yes	No
– Inventory Tracking System	Yes	No
9. Copy of records retained for minimum of five years and a copy made for VDOT Inspector.	Yes	No

Appendix K: Gray Iron and Ductile Iron Casting Manufacturers

Plant Name: _____

Location: _____

Date: _____

Reviewer: _____ Reviewer's Section: _____

Description: This Quality Control (QC) Plan Review Check List will be used by the VDOT QA Industrial Inspector to assess the completeness of the QC Plan submitted by the Casting Manufacturer. If the QC Plan is deemed complete, the QC Plan can be approved and the Casting Manufacturer may fabricate product for VDOT projects according to the instructions.

Does the QC Plan have a:

Cover sheet specific to the Facility with the latest revision date? Yes ___ No ___

This sheet shall also include the facility's physical address, mailing address, telephone number, web address, and current date. Any time there is plan to update or resubmission this cover sheet shall be updated.

Statement of Commitment to Quality Control: Yes ___ No ___

Statement shall reflect Facility's commitment to their QC plan and VDOT Specifications.

Plant Personnel Organizational Chart: Yes ___ No ___

To include Plant Manager, QC Technicians/Manager/Director, Personnel Qualifications, and the line of reporting.)

List of Castings produced for VDOT projects Yes ___ No ___

Records:

List of Records maintained in plan Yes ___ No ___

Retention time of records (Min. 5 years) Yes ___ No ___

Materials Section:

Are the location and retention time of the following documentation included?

Source of any Raw Materials/Scrap (Buy America (or BABA) Compliant) Yes ___ No ___

Certifications of Materials (Raw Materials and Finished Products) Yes ___ No ___

Product Inspection/Verification Procedures Yes ___ No ___

Testing/Frequency performed Yes ___ No ___

Problem resolution procedure, status of out of spec. castings Yes ___ No ___

Storage of product Yes ___ No ___

Shipping of Product

Yes ___ **No** ___

Example of a Stamped Delivery Ticket and Certification Statement which includes the following statement:

Yes ___ **No** ___

“We certify that these items conform to AASHTO (specify test method) in accordance with the VDOT Specifications Section 224.02 and to the VDOT Castings Manufacturers Quality Assurance Program. These materials are manufactured in United States of America”

Status: Approved / Rejected

By: _____

Title: _____

If rejected, what areas were non-compliant: _____

Comments: _____

Appendix L: Non-Conformance Report for Precast/Pipe Facilities

Industrial Plant Monitor Report (NCR)

Date: _____ Time In: _____ Time Out: _____

Plant Name: _____ Location: _____

Q.C. Technician: _____ Certified: _____

Pre-Pour

Yes No N/A

- Approved Shop Drawings
- Forms Clean
- Excessive Form Oil
- Rebar Mat Minimum Cover
- Front/Back Depth Check
- (pipe only) Horizontal Ends (re-bar)
- Vertical Ends (re-bar)

Concrete

Yes No N/A

- Slump
- Air
- Temperature
- Cylinders
- Batch Slip

Workmanship

Yes No N/A

- Concrete Placement
- Vibration
- Embedded Items Secure
- Porosity (pipe only)
- Overburden

Was the problem reported by the field/district?

Yes	No
-----	----

Project #/District _____

Summary of Incident:

Deficiencies/Cause:

Actions taken by VDOT:

Actions taken by manufacturer:

Resolution:

Comments:

Use reverse side for additional comments

Page 2

Summary of Incident:

Deficiencies/Cause:

Actions taken by VDOT:

Actions taken by manufacturer:

Resolution:

Comments:

Plant Q.C. Technician/_____

Received Copy: VDOT

Monitor _____

Appendix M: Guardrail-Certificate of Compliance and Guarantee Template

MANUFACTURER’S, SUPPLIER’S OR ERECTOR’S LETTERHEAD

CERTIFICATE OF COMPLIANCE AND GUARANTEE

Attn: Structures Section

We certify that guardrail material to be erected on Virginia's highway construction and maintenance projects will conform to the current Road and Bridge Specifications and contract documents. It is further certified that all of our material Suppliers will be required to furnish us mill analyses and/or certifications for each shipment of material ordered. These documents shall be on file and made available to the Virginia Department of Transportation upon request.

We will replace, without cost to the Department, any guardrail material that is not in conformance with the Specifications. Guardrail material includes all railing, posts, nuts, bolts, washers, other hardware and coatings indicated in the Road and Bridge Standards or enumerated in the Specifications.

The following is a list of Manufacturers and Suppliers which will be furnishing to our organization guardrail material and associated hardware:

1. (Name of supplier and address)
- 2.
- 3.
- 4.
- 5.

Any additions to the above list will require submittal of an updated Certificate of Compliance and Guarantee.

A new Certificate of Compliance and Guarantee shall be submitted to the State Materials Engineer on an annual basis no later than January 1st of each year.

We certify that we shall only furnish steel and iron and construction materials and manufactured products that are compliant with “Buy America” requirements and “BABA” requirements of 106.01(a) for which all manufacturing processes (melting through coating) have occurred in the United State

Erector's/Manufacturer’s/Supplier’s Name

State of _____

County of _____

Appendix N: Corrugated Metal Pipe QC Plan Checklist

Company: _____

Location: _____

1. Coversheet containing the facility's location, phone number, web address, - point of contact information, and current date.
Yes No
2. Statement of commitment to VDOT's CMP Program, mission, and purpose.
Yes No
3. Personnel or Organizational chart including assignment of responsibilities and the hierarchy of the facility.
Yes No
4. Statement that a copy of any shipping documentation be emailed to the VDOT Industrial Inspector for the facility.
Yes No
5. NTPEP or NCSPA Quality Control Plan included with other information such as a cover sheet, organizational chart with line of reporting and responsibilities, and VDOT sample ticket are included?
Yes No
6. Items supplied under this plan.
Yes No
7. Copies of records, material certifications, and material tests are retained for a minimum of two years and are made available to VDOT upon request.
Yes No
8. Statement allowing VDOT access to the facility for sampling and inspection.
Yes No
9. Product storage and handling procedures including actions taken when new product is received, labeling of products, and how failed material is handled.
Yes No
10. "Buy America" requirements and "BABA" requirements have been met.
Yes No
11. A sample ticket including VDOT project number, Contractor information, accurate description of material and quantity, lot, batch, heat, or roll number, and QA statement with signature.
Yes No
12. A list of employees authorized to sign the QA statement. Include a printed version of their name as well as their signature.
Yes No

Signature: _____
Date: _____
Department: _____

Appendix O: Certification Tracking (CT) Process for Signalization/Electrical Items and Systems; and for Water/Sewer Systems

The District Materials Section issues a certification tracking (CT) number for Signalization / Electrical and Water / Sanitary Sewer systems. A cover sheet will be provided for the submittal pages following it to enter all of the materials that are included in the submittal package. Each District will have their own unique District CT number for the approved package. The District CT number will consist of the first three (3) capital letters of the District name (i.e. “BRI”, “SAL”, “RIC”, “LYN”, “STA”, “CUL”, “HAM”, “FRE”, “NOR”) followed by the year (i.e. 19) and four (4) digit number system starting with “0001”. An example of a completed number would be “BRI-19-0209”.

Role Responsibilities and Checklist:

Project Construction Staff

- Submit Source of Materials (C-25) that represents the material covered by the CT submittal to the District Materials Section.
- Ensure the C-25 matches the catalog cuts submitted.
- Ensure complete and accurate CT package submitted to include: cover page, catalog cuts, corresponding C-25, UPC number, contract identification numbers and quantities submitted.
- Revise CT quantities (for identical materials) if project exceeds original quantity submission to the District Materials Section. (See Section 207.01 on CT revisions or transferring material)
- Support Materials in pre-construction meetings by including discussion of the CT process.

District Materials

- CT acceptance process should be discussed in pre-construction meetings, as part of the Materials Section pre-construction checklist.
- Ensure package has cover sheet provided below listing all materials submitted, to include incidentals and C-25. This cover sheet may require the use of multiple pages.
- Submit the complete package (cover page, C-25, and catalog cuts) to the appropriate Reviewer for final approval with Engineer’s stamp.
- If the District Materials Section receives a rejected submittal by the reviewer, the District shall send the rejected submittal back to the project staff to be addressed and resubmitted.
- Once cover sheet is stamped, signed (full name) and dated, assign the District CT number for the package for the assigned CT number of the related material.
- Keep a spreadsheet of all District CT numbers issued.
- Send assigned CT package to Central Office Materials QA Section.

Central Office Materials

- Provide guidance to districts and vendors for the CT process.
- Maintain Cover sheet in **Appendix O** to include revisions as needed.
- Provide training upon request on the CT process
- Maintain a central file of ALL District approved CT packages.
- Audit the CT process on a monthly basis, simultaneous with Materials Notebook audits.

Approver certifying the materials documentation package:

- **Traffic Engineering** – Regional Operations Section or VDOT Consultant
- **Water and Sanitary Sewer** – Regional Right of Way and Utilities Section or VDOT Consultant
 - ***Local Water Service Authority*** - The Regional Right of Way and Utilities Section or VDOT Consultant will coordinate with the WSA/Owner on any comments or materials in question prior to VDOT’s stamped approval.

Approver’s responsibilities:

- Ensure submittal package conforms to VDOT specifications, contract and project plans and any working drawings.
- Ensure the package has one of the following comments “Review Complete”, “Correct & Resubmit”, or “Reject & Resubmit”.
- Stamp, sign full name and date on the first cover sheet(s) (digital stamp & signature allowed)
- Stamp to include the name and employer of the approver.

The CT Number issued by the District Materials Section only serves to document that the Materials Section has received a stamped, signed, dated, and approved materials documentation package from an approver. The District-issued CT Number becomes the means to reference this materials acceptance document.

Appendix P: Annual Concrete Batcher Exam

Name _____
(Please Print)

Date _____

Facility _____

Location _____

Circle the best answer.

1. Who is permitted to batch concrete?
 - a. Plant Manager
 - b. Any production personnel
 - c. A certified batch technician
 - d. None of the above

2. If a batch of concrete fails testing, the appropriate action is to what?
 - a. Pour it in a non VDOT form
 - b. Pour the product anyway and retest later
 - c. Discard the batch as trash
 - d. None of the above

3. The maximum water/cement ratio for a VDOT 5000 psi mix is?
 - a. 0.30
 - b. 0.40
 - c. 0.45
 - d. 0.55

4. The maximum water/cement ratio for a VDOT 4000 psi mix is?
 - a. 0.30
 - b. 0.40
 - c. 0.45
 - d. 0.55

5. The mixer needs to be thoroughly cleaned when?
 - a. Daily
 - b. Hourly
 - c. Weekly
 - d. Only if time permits

6. Mixer blades/paddles/feet/shoes must not be more than _____ distance from the floor/drum.
 - a. ½ inch
 - b. 1/16 to 1/8 inch
 - c. 1 inch
 - d. It doesn't matter

7. The maximum temperature for a batch of concrete is?
 - a. 80 degrees
 - b. 90 degrees
 - c. 100 degrees
 - d. 140 degree

8. Concrete testing must be performed on which batch of concrete for each mix?
 - a. The 1st
 - b. The 3rd
 - c. Before the last batch
 - d. Whenever it is convenient

9. Free moisture on aggregate is?
 - a. Absorption plus total water
 - b. The amount of water on the surface of the aggregate
 - c. The water in the aggregate pores
 - d. None of the above.

10. The condition of an aggregate when it will neither absorb water from the mix nor contribute water to the mix is called?
 - a. Free Moisture
 - b. Total Moisture
 - c. Saturated Surface Dry (SSD)
 - d. None of the above.

11. Who is permitted to make changes in the VDOT mix design?
 - a. The Batch Technician
 - b. The Production Supervisor
 - c. The VDOT Quality Control Technician
 - d. The Welding Shop Foreman

12. Cement and aggregate scales must be calibrated how often?
 - a. Yearly
 - b. Monthly
 - c. Just before the VDOT inspector arrives
 - d. Every six months

Batcher exam answer key

To pass VDOT's Batcher Exam you must have 9 correct answers. This Exam shall be administered on a yearly basis. Submit the finished, graded exams to your VDOT QA Representative, so they may be added to your Facility's VDOT Quality Control Plans.

1. C
2. C
3. B
4. C
5. A
6. B
7. B
8. A
9. B
10. C
11. C
12. D