VDOT
Virginia Department of Transportation

Inspection Manual

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Construction Division

VDOT GOVERNANCE DOCUMENT

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INTRODUCTION

The purpose of this manual is to define and strengthen the application of construction inspection throughout the Commonwealth. The expected benefits are maximum productivity combined with appropriate inspector staffing.

Adequate quality assurance can be obtained on most contract items by inspection at predetermined stages of completion of the various work activities. Generally, the stages are identified as the point at which contractors can proceed no further without eliminating the opportunity for the inspector to verify that the construction is in conformance with the contract, plans, standards and specifications, or to document a quantity for payment.

Some construction operations where cost is high and consequence of failure is significant require **continuous inspection** at each operation. In this type of inspection an inspector is assigned only to the operation in question for the duration of that operation. Projects with Federal funding on the National Highway System require the minimum number of inspectors identified in the following tables for these critical operations.

Other construction operations which require inspection at appropriate points during the operation, but do not require inspection between these phases, require **intermittent inspection**. An example of this type of operation would be excavation where an inspection would be required before excavation begins and before subbase, base or seeding operations have taken place, but only intermittent checks of the contractor's operation would be necessary between the start of the operation and the beginning of the next major operation.

Construction operations such as fencing may be inspected after the construction is completed without significant risk to the Department. These types of activities are termed **end product inspections**.

Thus, the inspection process really includes end product, intermittent, and continuous inspection depending on the operation being inspected. At the project level, the inspector must blend and shift emphasis of quality assurance based on the resources available as well as the demonstrated abilities or lack thereof by the contractor to perform in specific areas according to the contract, plans, standards and specifications.

This document is intended to provide the methodology to ensure that critical phases and work operations receive sufficient inspection to ensure conformance to plans, contract, standards, and specifications.

DEFINITIONS

Continuous Inspection = operation that requires inspection during the entire operation

Where specified, a minimum number of inspectors on a continuous inspection operation will be required on projects on the National Highway System with Federal funding. For asphalt paving, the minimum number of inspectors may include Quality Control Technicians hired by the contractor. Exceptions to the minimum inspection staffing on these projects will be allowed only under exceptional circumstances such as a family emergency of an inspector. Increased level of contractor's operations will not be an acceptable reason for lack of minimum inspection staffing. On FHWA Projects of Division interest (PODI) , the District Construction Engineer (DCE) shall write an Inspection Certification Letter which will state that that operations requiring continuous inspection on the project were inspected at the minimum staffing level detailed in this manual. Lack of minimum inspection staffing for any operation will be reported as a deficiency in the DCE's letter. An explanation must be provided in the inspection certification letter as to how VDOT assessed the acceptability of the contractor's product without the minimum number of inspectors. FHWA participation for work performed without the minimum inspection staffing specified in this document will be based upon the explanation provided in the inspection certification letter and through discussions with project personnel.

Intermittent Inspection = operation that requires inspection at critical times in the

operation.

End Product Inspection = operation that requires inspection only after completion of the operation and during the construction operation when time permits.

RESPONSIBILITY AND COMMITMENT OF VDOT & CONTRACTOR

In order for the inspection levels set forth in this manual to be effective, proper inspection will require certain commitments by both VDOT personnel and the contractor.

a. VDOT personnel must be knowledgeable, certified in the appropriate Materials certification, and provide or obtain timely decisions regarding the work so that the contractor will not incur a delay.
b. Inspectors must clearly communicate expectations to the contractor concerning inspection of the contractor's activities.
c. Inspectors must maintain a cooperative attitude toward the contractor's prosecution of the work, but be assertive in their efforts and insist on conformance with the contract, plans, standards and specifications.
d. Inspectors must ensure conformity with project specifications and contractual intent.
e. The Inspector shall use the guidelines in the Partnering Guide and CD-2004-01during the project to insure timely and accurate responses to contractor requests.
f. Document acceptance of materials in the Materials Notebook.

The contractor also has an important role in the successful application of proper inspection.

a. The contractor must accept the responsibility to construct the project in accordance with the contract, plans, standards, and specifications without regard to the level of inspection.
b. The contractor must place competent management, engineering, and technical personnel on the project to ensure an effective pursuit of work.
c. The contractor's project representative must keep the inspector informed of schedule changes that may affect the necessary inspection required.
d. The Contractor shall use the guidelines in the Partnering Guide and CD-2004-01during the project to insure timely and accurate requests and responses to the project inspectors.

STAFFING

Staffing projections require a project-by-project evaluation using the inspection level outlined in this document as a guideline. As noted above, there may be a minimum number of inspectors required to perform continuous inspection for certain activities on projects on the NHS with federal funding. For all other projects, the VDOT Area Construction Engineer (ACE) in responsible charge of the project may modify the minimum number of inspectors required to perform continuous inspection in writing. This should be in the form of a memo to the project file that is written prior to any impacted work activities being performed by the contractor. The memo shall clearly state the engineering judgment that was used to determine that the inspection requirements could be modified. In addition, the memo shall clearly identify any deviations from the inspection guidance outlined in the VDOT Construction Manual (such as items that will be eliminated from the Details of Inspection and/or Inspector's Checklist) in order to inspect the work with reduced staff. This will allow VDOT personnel to be flexible in establishing inspection priorities based upon job conditions as well as individual contractor work performance. Proper VDOT project management will ensure an optimum inspection level throughout the life of the project, and monitoring by the District Construction Management team will provide the correct distribution of inspection resources on a District wide basis.

TABLES

The following tables are organized so that inspectors can assess the level of inspection required followed by the objective of inspection for the type of work specified. The column noting inspector activity presents the major activities required of an inspection for this item of work.

NOTE: The inspector activity column is not meant to present all of the activities that an inspector should perform during the specific operation. It is intended only to present the minimum requirements of the major activities.

MOBILIZATION

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
513	**End Product**	Ensure sufficient labor and equipment is on site to begin work.	Obtain listing of contractor's personnel (including emergency contact personnel, work zone responsible party), and equipment for possible use in contract administration activities such as work orders and force accounts.

CLEARING & GRUBBING

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
301	**Intermittent**	Ensure environmental controls are in place prior to land-disturbing activity. Ensure clearing and grubbing operation is confined to proposed construction limits and the excavation is planned to be performed in the next 15 days. Ensure denuding of vegetation confined to areas required for excavation.	BEFORE work begins: Measure any additional area requiring clearing & grubbing and prepare documentation. Measure environmental controls and prepare documentation. Review contractor-employee certification. The contractor must have a person certified through VDOT's Erosion and Sediment Control Contractor Certification (ESCCC) program within the limits of the project during all land disturbing activities. (See Excavation & Embankment)

DRAINAGE STRUCTURES

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
302	**Intermittent**	Ensure pipe layout and placement of pipe bedding material and pipe according to plans and specifications. Ensure correct placement of pipe relative to stream, topography, entrances, outfall, and permit conditions. Ensure uniform foundation and proper line and grade. Ensure placement and depth of bedding material as outlined in specifications. Verify backfill operations, suitability of materials, depth of layers, density, and moisture as defined in the specifications and the Manual of Instructions - Materials Division. Ensure proper compacted cover achieved before contractor begins major grading operation or hauls over pipe.	BEFORE contractor begins excavation: Verify pipe layout. Visually inspect pipe and verify evidence of QC inspection. BEFORE placement of bedding material: Cross-section (including original ground elevations) areas involving minor structure excavation (sketch and compute minor structure excavation), explore (probe) foundation, check line, grade, termini, source of pipe bedding (local, commercial, etc.). BEFORE beginning backfill operation: Inspect installed pipe including line & grade, termini, length, joint treatment. Check for pipe damage during placement. Check bolt torque on applicable pipe. Sketch and measure pipe. Check compaction technique to ensure compaction results are being achieved. Record test results for project documentation.

STYRENE BASED CURE-IN-PLACE PIPE (CIPP) CULVERTS & STORM DRAINS REHABILITATION

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
SPEC. PROV.	**Continuous** **1 Inspector required (Minimum)**	Ensure all preconstruction paperwork has been submitted and approved prior to installation. Ensure required protective measures are followed.	Before contractor begins work on-site: Determine and record contractor submitted design calculations, their installation plan, contractors site specific cure plan, contractor has all required discharge related permits, and contractor give minimum 48-hour notice prior to start of work. Notify the VTRC (Bridget Donaldson and Mike Fitch) when they receive the 48-hour notification from the contractor. Prior to installation: Determine and record the pipe was cleaned to manufacturer's recommendations, pipe inflow been blocked/diverted, all protrusions been removed/cut to within ½ inch, plastic "slip sheets" installed over voids or remnant protrusions, inner and outer film on liner or pre-liner is installed prior to inversion installation, plastic sheet or other acceptable devise is on the ground at outlet and inlet ends of pipe to capture waste resin, the contractor will use a swivel for pull in place installations, and the thermocouples properly installed and functioning. During installation: Determine and record if the contractor is installing liner in accordance with their installation plan, ASTM Specification F 1216, or manufacturer's recommendation, Use the thermocouple to monitor temperature ramp readings to be consistent with cure specifications. Have the contractor provide a log of temperature versus time for the liner cure period Contact the Environmental Section if a hazardous leak occurs. Record how contractor handled all water used in the curing and cleaning of installation. Retain all documentation showing waste materials being shipped off-site for proper disposal. Use Form C-9 for this type of installation.

NON-STYRENE BASED CURE-IN-PLACE PIPE (CIPP) CULVERTS & STORM DRAINS REHABILITATION

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
SPEC. PROV.	**Continuous** **1 Inspector required (Minimum)**	Ensure all preconstruction paperwork has been submitted and approved prior to installation. Ensure required protective measures are followed.	Before contractor begins work on-site: Determine and record contractor submitted design calculations, their installation plan, contractors site specific cure plan, contractor has all required discharge related permits, and contractor give minimum 48-hour notice prior to start of work. Prior to installation: Determine and record the pipe was cleaned to manufacturer's recommendations, pipe inflow been blocked/diverted, and all protrusions been removed/cut to within ½ inch. During installation: Determine and record if the contractor is installing liner in accordance with their installation plan, and by the manufacturer's recommendation,

EXCAVATION & EMBANKMENT

(For Undercut- Go to Undercut Section Below)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
303	**Intermittent**	Ensure proper environmental controls are in place. Ensure area to be excavated as per plans, limit disturbed areas to minimize erosion and siltation. Ensure depth of fill embankment layers as per specifications. Verify contractor's effort in obtaining desired density and moisture content as defined in the specifications and the Manual of Instructions - Materials Division. Ensure cut and fill slopes are constructed on the specified ratio. Ensure slopes intercept ditch line or shoulder line at correct location. Ensure that disturbed areas are covered with proper seeding ingredients. Ensure subgrade and typical section is within specified tolerances.	BEFORE starting grading operation: Confer with contractor about area to be graded using contractor's sequence of operations, discuss environmental concerns, stripping and disposition of topsoil, limiting of disturbed areas, and balance points which are outlined in the plans and specifications. Sketch and calculate topsoil excavation in areas less than 5 feet of fill and ditches and entrances not shown on cross-sections. Verify that Miss Utility has been contacted. Before placement of borrow, ensure material has been tested and approved. Check and document that erosion and siltation control devices are placed as work progresses. Verify that contractor's certified environmental person is on project. Perform tests to determine earth or rock fill embankment in order to ensure placement of material in lift depths defined in the specifications. Measure depth of fill embankment layers. Perform and document density and moisture tests on embankments. Perform and document checks of line and grade, slope ratio, and slope texture. BEFORE starting of seeding operations: Evaluate the extent of grading to determine if temporary or permanent seeding is needed. BEFORE beginning subbase or base operations (also stabilization treatment or placement of select material): Perform density tests and line & grade checks.

UNDERCUT EXCAVATION

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
303	**Intermittent**	Detection of soft, yielding areas that may cause pavement failure or rock outcrop that may cause non-uniform bearing. Define area to be undercut using recommendations of District Materials Engineer. Ensure establishment of firm foundation prior to backfilling. Verify dimensions of undercut and density of backfill material. Verify unsuitable material is disposed of in an approved method.	Confer with the District Materials Engineer prior to undercutting. Define and document undercut excavation area and reason for removal. BEFORE starting backfill operations: Sketch and compute undercut quantities by cross-sectioning or direct measure of undercut area. If a geotextile is used, ensure the fabric has been approved for the application. Perform and document density tests on backfill material.

SOIL STABILIZATION – LIME & CEMENT CEMENTHYDRAULIC CEMENT

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
306 **307**	**Intermittent**	Ensure cross-section meets specified roadway template and elevations. Ensure subgrade soil prepared properly to receive additive in accordance with plans and specifications. Ensure proper percent of lime or cement. Ensure proper mixing and moisture content. Ensure application is uniform. Ensure curing in accordance with plans and specifications.	BEFORE scarifying and adding lime or cement: Approve grade. Check and document application rate and uniformity of additive. Check and document moisture, depth, and mixing effectiveness. Record application rate and uniformity of additive. Check and record proper mixing and moisture content achieved. BEFORE initial set: Check and document that correct design grade, depth and density achieved within the time limitations of the specifications. BEFORE placing subbase, base or load application: Check and document curing process. Record air temperature and moisture during curing operation. AFTER initial set, check to ensure adequate curing is being performed

SELECT MATERIAL, SUBBASE & AGGREGATE BASE COURSE

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
305 **308** **309**	**Intermittent**	Ensure grade and typical section of material below the course to be placed is within specified tolerances and density has been obtained. Ensure placement of material or scarification is performed to the specified depths. Ensure grade, density, confinement of material to proper limits, and that no contamination or segregation takes place.	BEFORE placing subsequent layers of material: Check and document final grade and depth checks (Notify Materials Division to perform depth checks as policy dictates). Perform and record density tests. DURING initial placement, perform roller pattern and control strip.

CEMENT STABILIZED AGGREGATE SUBBASE & BASE COURSE

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
308 **309**	**Intermittent**	Ensure subgrade and typical section is within specified tolerances and uniform density has been attained. Ensure that compacting and finishing operations are completed within the specified time. Ensure that moisture content of surface material is maintained at not less than specified optimum during all finishing operations. Ensure that curing operations are in accordance with specifications to achieve required strength and durability.	BEFORE delivery of cement treated aggregate subbase or base: Approve subgrade. BEFORE placing subsequent layers: Check and document grade and depth of layer. Perform and record density tests. Check that surface is smooth, free of compaction planes, cracks, ridges or loose material. Notify Materials Division of ensuing placement. Check and document that proper protection curing procedures are being followed and are adequate for anticipated conditions.

ASPHALT-STABILIZED OPEN-GRADED MATERIAL

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
313	**Continuous** **Inspector requirements vary per project**	Ensure grade, density and surface of layer below the course to be placed meets specifications. Ensure that a quality, durable, and free draining material is achieved according to contract requirements. Ensure course is not damaged or contaminated in a way which may affect the free draining characteristics of course so that the layer retains its strength and free draining characteristics.	BEFORE placement of open-graded course: Ensure that contractor has one certified asphalt paving technician present continuously at each paving site. Check and document grade, density and surface of underlying layer meets specifications. Ensure the contractor has a safe traffic control operation that will be followed; pay particular attention to safe operation of trucks through the work zone. Confirm and document that traffic control measures are providing a safe work zone to the traveling public throughout the duration of the placement operation. Inspect and document contractor's equipment, material, temperature, depth and consolidation or compaction. Check initial delivery tickets confirming quantity of material placed, verify against weigh sheet. BEFORE subsequent layer placed: Check and document that open-graded course is not damaged or contaminated.

ASPHALT SURFACE TREATMENT

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
312 **313** **314**	**Continuous** **1 Inspector required (Minimum)**	Ensure cross-section of roadway constructed to specified elevations and template. Ensure uniform coverage. Ensure uniform and smooth surface.	BEFORE each day's operation: Ensure that contractor has one certified surface treatment asphalt paving technician present continuously at each paving site. Check and document grade, density, and surface of underlying material. Approve and document contractor's equipment. Ensure the contractor has a safe traffic control operation that will be followed; pay particular attention to safe operation of trucks through the work zone. Confirm and document that traffic control measures are providing a safe work zone to the traveling public throughout the duration of the surfacing operation. Check and document type of material, temperature, and application rate. BEFORE compaction operations: Approve and document contractor's compaction equipment. Check and document surface and edges of each layer by straight edging and have contractor make necessary corrections. Check and document types of cover material, application rate, rolling operation. Check and document proper curing between courses. If one inspector, perform yield calculations and compare calculated yield to truck ticket tonnage, document comparison in project records. Bring any discrepancies to attention of Responsible Charge Engineer. If two inspectors, one inspector should collect and initial tickets confirming quantity of material placed.

ASPHALT CONCRETE PAVEMENT

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
310 **311** **315**	**Continuous** **inspector requirements vary per project *** **NOTE: Continuous with 2 Inspectors required (minimum) for placements over 50 tons. The minimum number of Inspectors may include Quality Control Technicians hired by the contractor.**	Ensure cross-section of roadway constructed to specified elevations and template prior to application. Ensure proper application of a sufficient tack coat and that the existing surface is bonded to new course. Ensure proper density is obtained. Ensure uniform and smooth surface. Ensure pavement markings are placed in timeframe required.	BEFORE each day's operation: Ensure that contractor has one certified asphalt paving technician present continuously at each paving site and has density testing equipment on site. Check and document grade, density, and surface of underlying material. Approve and document contractor's equipment. Ensure the contractor has a safe traffic control operation that will be followed; pay particular attention to safe operation of trucks through the work zone. Review all milled areas for cleanliness prior to placement. Confirm and document that traffic control measures are providing a safe work zone to the traveling public throughout the duration of the paving operation. Oversee establishment of density control strip to establish compaction criteria. Check and document type of mix, truck delivery operation, mix temperature, and laydown operation.Initial tickets confirming quantity of material placed, verify against weigh sheet. BEFORE compaction operations: Approve and document contractor's compaction equipment. Check and document surface and edges of each layer by straight edging and have contractor make necessary corrections. Confirm rolling procedures based on density control strip are being maintained. Check temperature of mat to confirm that density is being obtained before mat cools. Check and document pavement surface smoothness by use of a straightedge and/or string line. Check for proper depth and construction joint operations. AFTER placement, within 30 days, contact Materials Division for RIDE Specification testing, if required.

HYDRAULIC CEMENT CONCRETE PAVEMENT

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
316 **217**	**Continuous** **Inspector requirements vary per project**	Ensure grade, density and surface of underlying layer meets specifications. Ensure paving equipment will place pavement on line and grade specified in plans while maintaining proper reinforcing steel location. Ensure that a quality, durable, and smooth riding hydraulic concrete structure is achieved according to the contract requirements. Ensure saw cutting performed as soon as concrete has hardened sufficiently to prevent spalling or tearing. Ensure joint sealing performed prior to opening to traffic (including contractor's equipment) and as soon after curing period as practical. Ensure concrete pavement is ready to open to traffic.	BEFORE each day's operation: Ensure that contractor has one VDOT certified concrete field technician present continuously at each placement site. Check and document grade, density, and surface of underlying material. Approve and document contractor's equipment. Ensure the contractor has a safe traffic control operation that will be followed; pay particular attention to safe operation of trucks through the work zone. Confirm and document that traffic control measures are providing a safe work zone to the traveling public throughout the duration of the paving operation. Check and document size, location, and grade of reinforcing steel and dowel assemblies. Check and document location, grade, and reinforcing steel placement of approach and anchor slabs. Check and document type of mix, truck delivery operation, and placing, consolidation, texturing, curing and protecting operations. Perform and record slump, temperature, and air content tests. Sample concrete for beam breaks and cast strength specimens at the rate specified. Check that saw cutting operations are not spalling or tearing the concrete.

HYDRAULIC CEMENT CONCRETE PAVEMENT
(CONTINUED)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
316 **217**	**Continuous** **Inspector requirements vary per project**		BEFORE opening to any traffic (including construction traffic): Check and document that sawed joints are proper width, depth and clean before sealed according to specifications. Verify and document that straightedge indicates no areas of deficiencies still in need of correction. Verify that proper time or strength requirement has been met. Contact Materials Division for RIDE Specification testing, if required.

BOX CULVERTS AND RETAINING WALLS

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
302 **506**	**Intermittent** _____ **NOTE: Continuous With 2 * Inspectors required (Minimum) for concrete placement**	Ensure alignment and location staked by contractor will maintain proper drainage. Ensure uniform foundation, and grade will allow desired bedding thickness. Ensure proper bearing capacity and center of gravity has been obtained. Ensure placement of forms and reinforcing steel are in accordance with the plans and specifications. Ensure concrete is placed according to plans and specifications. Ensure uniform backfill compaction.	BEFORE excavation begins: Verify that all environmental permit conditions will be met, and that erosion and sediment control devices have been installed. Verify "plan quantity" excavation with actual field conditions. Ensure the contractor has a safe traffic control operation that will be followed; pay particular attention to safe operation of trucks through the work zone. Confirm and document that traffic control measures are providing a safe work zone to the traveling public throughout the duration of the operation. Verify and document that width, length and height meet field and slope conditions. BEFORE placement of bedding and forms: Measure and record quantitative data and sketch and compute minor structural excavation, if applicable. Check foundation, bedding material, and grades for conformance with specifications. If foundation is questionable, contact District Materials Engineer. Inspect and document all pile driving operations. Verify that proper splicing methods are being used. BEFORE placement of concrete: Check and document line, grade, elevation, dimensions, condition of forms, bracing, ties and location of reinforcing. Ensure that contractor has one certified concrete field technician present continuously at each placement site.

*** Minimum 1 Inspector required for concrete placement operations of less than 25 yards, or for operations in which concrete discharged directly into forms from the truck.**

BOX CULVERTS AND RETAINING WALLS
(CONTINUED)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
302 **506**	**Intermittent** _____ **NOTE:** **Continuous With 2 * Inspectors required (Minimum) for concrete placement**		Check and document data regarding discharging, conveying, spreading, consolidating, screeding, finishing, texturing, curing, and protecting operations. Perform and record slump, temperature, and air content tests. Cast concrete strength specimens at the rate specified. BEFORE beginning backfill operations: Verify that the specified, or greater, concrete strength has been obtained. Check and document suitability of backfill materials, depth of layers, density and moisture. BEFORE opening to construction traffic or allowing major grading operation: Verify that there is sufficient compacted cover.

*** Minimum 1 Inspector required for concrete placement operations of less than 25 yards, or for operations in which concrete discharged directly into forms from the truck.**

RIP RAP

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
414	**Intermittent**	Ensure base material prepared according to plans and specifications. Ensure proper use and anchorage of geotextile, if used. Ensure proper class of rip rap is utilized for the application. Ensure proper rip rap placing techniques are being followed. Ensure placement and depth of bedding material as outlined in specifications. Ensure uniform distribution of stones. Ensure proper line and grade. Ensure payment for quantity placed.	Verify that the base is free of mounds or depressions. NOTE: Rip rap must be placed no later than 15 days after bedding is complete. BEFORE contractor begins placing rip rap: If payment by the ton, measure initial area for placement. Verify and document that correct class of rip rap being used. When geotextile material is used, verify that is approved material for the application and the entire perimeter of material is turned down and buried at least 9 inches. Verify that geotextile is not used on slopes greater than 1:1. Check and document that geotextile is not damaged (patches need to be of the same material and overlap at least 18 inches on all sides). Verify that rip rap is being placed to its full thickness in one operation and is not being dropped from a height of more than 1 foot onto fabric. Verify that finished rip rap does not have pockets of small stones and clusters of large stones. Check and document that tolerance of ± one quarter of the thickness of maximum-size stone from line and grade indicated on the plans is obtained. NOTE: Extremes of ± one quarter thickness of maximum-size stone not continuous over an area of more than 200 square feet. If payment by the ton, obtain unit weight, measure final area of placement, convert cubic yard to tonnage, and compare to truck tickets tonnage.

INCIDENTAL CONCRETE ITEMS

(DROP INLETS, MANHOLES, JUNCTION BOXES, PAVED DITCH, SIDEWALKS, STEPS, MEDIAN BARRIER, CURB, CURB & GUTTER, AND ENTRANCES)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
302 **502** **504** **217**	**Intermittent** _____ **NOTE: Continuous With 2 * Inspectors required (Minimum) for concrete placement**	Ensure alignment and grade according to plans and specifications. Ensure placement of forms and reinforcing steel are in accordance with the plans and specifications. Ensure concrete is placed, finished, cured, and protected according to plans and specifications. Ensure uniform backfill compaction.	BEFORE excavation begins: Verify that all environmental permit conditions will be met, and that erosion and sediment control devices have been installed. Verify “plan quantity” excavation with actual field conditions. Verify and document that width, length and height meet field and slope conditions. BEFORE placement of bedding and forms: Measure and record quantitative data and sketch and compute minor structure excavation, if applicable. Check foundation, bedding material, and grades for conformance with specifications. If foundation is questionable, contact District Materials Engineer. BEFORE placement of concrete: Check and document line, grade, elevation, dimensions, condition of forms, bracing, ties and location of reinforcing. Ensure that contractor has a VDOT certified concrete field the project.

*** Minimum 1 Inspector required for concrete placement operations of less than 25 yards, or for operations in which concrete discharged directly into forms from the truck.**

INCIDENTAL CONCRETE ITEMS

(DROP INLETS, MANHOLES, JUNCTION BOXES, PAVED DITCH, SIDEWALKS, STEPS, MEDIAN BARRIER, CURB, CURB & GUTTER, AND ENTRANCES)

(CONTINUED)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
302 **502** **504** **217**	**Intermittent** _____ **NOTE: Continuous With 2 * Inspectors required (Minimum) for concrete placement**		Check and document discharging, conveying, spreading, consolidating, screeding, finishing, texturing, curing, and protecting operations. Perform and record slump, temperature, and air content tests. Cast concrete strength specimens at the rate specified. BEFORE beginning backfill operations: Verify that concrete strength has been obtained. Check and document suitability of backfill materials, depth of layers, density and moisture. NOTE: Curb and Curb & Gutter must be backfilled within 3 to 7 days. BEFORE opening to construction traffic or allowing major grading operation: Verify that there is sufficient compacted cover.

*** Minimum 1 Inspector required for concrete placement operations of less than 25 yards, or for operations in which concrete discharged directly into forms from the truck.**

WATER AND SANITARY SEWER FACILITIES

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
520	**Intermittent**	Ensure uniform foundation and proper line and grade. Verify pipe layout and placement of pipe bedding material and pipe. Ensure uniform foundation and proper line and grade. Ensure placement and depth of bedding material as outlined in specification. Ensure pipe is of the correct type and size for the application. Ensure pipe joints installed according to contract. Ensure pipe joints and fittings are sealed to the degree needed for the type and purpose of the pipe. Ensure that quality water is provided to the public. Ensure proper compacted cover has been achieved Verify backfill operations, suitability of materials, depth of layers, density, and moisture as defined in the specifications and the Manual of Instructions Materials Division.	BEFORE contractor begins excavation: Verify pipe layout. Verify that Miss Utility has been contacted. BEFORE placement of bedding material: Cross-section (including original ground elevations) areas involving minor structure excavation (sketch and compute minor structure excavation), explore (probe) foundation, check line, grade, termini, source of pipe bedding (local, commercial, etc.). Before installing pipe verify type, size, and evidence of inspection. BEFORE beginning backfill operation: Inspect installed pipe including line & grade, termini, length, joint treatment. Check for pipe damage during placement. BEFORE tie-in into existing system: Verify that contractor has disinfected water mains. Review contractor submitted report of satisfactory test results. BEFORE accepting pipe: Check for correct joining and sealing of pipe. Document testing for pipe leakage. BEFORE allowing construction traffic over pipe: Verify proper cover over pipe.

INCIDENTAL CONSTRUCTION ITEMS

Underdrain

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
501	**Intermittent**	Ensure underdrain conforms to plans, standards, specifications, and contract.	Check and document that underdrain is the proper type and that installation and alignment is per plans and specifications. Record location and quantity. Notify the District Materials Engineer, after installation, for video camera inspection of pavement edge drains.

Fencing

SPEC	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
507	**End Product**	Ensure fencing conforms to plans, standards, specifications and contract requirements.	Verify alignment, gauge, type of wire, spacing of posts, depth of set, tightness and stability of posts, tightness of fabric, grounding and bracing at each location. Record location and quantity. Verify sawn treated wood post received application of end treatment.

Right-of-Way Monuments/Contractor Boundary Surveying

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
503	**End Product**	Ensure right-of-way monuments conform to plans, standards, specifications and contract requirements.	Verify installation, alignment, and type at each location. Record location and quantity.

INCIDENTAL CONSTRUCTION ITEMS
(CONTINUED)

Guardrail

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
505	**End Product**	Ensure guardrail conforms to plans, standards, specifications and contract requirements.	BEFORE installation at each location: Location of guardrail and end terminal sections reviewed with Regional Traffic Engineer. Verify that guardrail materials have been approved. Verify alignment, site grading, height, proper laps, post spacing, galvanization for each location. Record location and quantity.

Demolition of Buildings and Clearing Parcels

SPEC	INSPECTION	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
516	**End Product**	Ensure that right-of-way and environmental sections have released structures, that all hazardous material and debris has been removed and disposed of in accordance with the contract and specifications.	Verify that all hazardous material has been removed and disposed of according to the specifications. BEFORE beginning demolition work: Obtain right-of-way and environmental sections release of structure. Notify the contractor in writing when the structures are ready for demolition.

PATCHING CONCRETE PAVEMENT

SPEC	INSPECTION	INSPECTION OBJECTIVE	INSPECTION ACTTIVITY
217 **316**	**Intermittent** _____ **inspector requirements vary per project ***	Ensure all failed pavement has been defined. Ensure sub-grade is structurally sound and all delaminated concrete is removed. Ensure paving equipment will place pavement on line and grade specified in plans while maintaining proper reinforcing steel location. Ensure that a quality, durable, and smooth hydraulic concrete structure is achieved according to the contract requirements. Ensure saw cutting performed as soon as concrete has hardened sufficiently to prevent spalling or Ensure joint sealing performed prior to opening to traffic (including contractor's equipment) and as after curing period as practical.	BEFORE each day's operation: Verify that the contractor has one VDOT certified concrete field technician present on the project. Check and document grade, density, and surface of underlying material. Approve and document contractor's equipment. Ensure the contractor has a safe traffic control operation that will be followed; especially deal with the operation of trucks through the work zone. Confirm and document that traffic control measures are providing a safe work zone to the traveling public throughout the duration of the patching operation. Check and document size, location, and grade of reinforcing steel and dowel assemblies. Check and document location, grade, and reinforcing steel placement of approach and anchor slabs. Check and document type of mix, truck delivery operation, and placing, consolidation, texturing, curing and protecting operations. Perform and record slump, temperature, and air content. Sample concrete and cast strength specimen beams at the rate specified. Check that saw cutting operations are not spalling or tearing the concrete.

*** Minimum 1 Inspector required for concrete placement operations of less than 25 yards, or for operations in which concrete discharged directly into forms from the truck.**

PATCHING CONCRETE PAVEMENT
(CONTINUED)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
316 **217**	**Intermittent** _____ **inspector requirements vary per project ***	Ensure concrete pavement is ready to open to traffic.	BEFORE opening to any traffic (including construction traffic): Check and document that sawed joints are proper width, depth and clean before sealed according to specifications. Verify that proper time or strength requirement has been met.

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PAVEMENT MARKINGS & MARKERS

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
704 **SPEC. PROV.**	**Intermittent**	Ensure markings and markers conform to the MUTCD, the Virginia Supplement to the MUTCD, the Specifications, the Plans, and as directed by the Engineer.	BEFORE beginning pavement marking operation: Verify that the contractor has one certified Pavement Marking Technician that will be present continuously during pavement marking operations. Verify that pavement surface has been prepared to receive markings and markers. Verify layout and check installation of markings, messages, and markers. At the start of each day and every three hours thereafter: Observe the contractor performing application thickness and bead rate testing, and document. After each days operation: Review daily log and Form C-85 for temporary and permanent markings and markers.

TOPSOIL & SEEDING

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
602 **603**	**Intermittent**	Ensure grade is within tolerance. Ensure that lime has been placed according to specifications, plans, and/or soil test. Ensure uniform roughened surface to accept and retain topsoil until vegetative cover is established. Ensure quality of topsoil. Ensure uniform application of seeding as specified in the plans and specifications.	BEFORE application of lime: Check that grade is within tolerance. Verify proper application of lime according to specifications, plans, and or soil test. NOTE: Soil sample may be needed to determine the pH factor. Verify roughened surface to receive topsoil or seed. Check and document class and depth of topsoil. Check that topsoil is free of lumps, clods, rocks, and debris. Verify seed mixture and rates are in accordance with roadside development requirements. Check and document seeding application rate. Check that application of seeding, fertilizer and mulch is incremental. NOTE: Green tags are required for all seed.

PLANTING

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
605	**Intermittent**	Ensure that each location is in accordance with the plans and does not conflict with underground obstructions or traffic signs. Ensure that pits and beds have been prepared in accordance with the plans and specifications. Ensure that plants are living and have been installed according to the plans and specifications. Ensure that plants, pits, and beds are maintained to achieve healthy growth until the end of the establishment period. Ensure contractor doing the planting shall be personally experienced.	BEFORE digging pits and cultivating beds: Inspect layout of plant locations and beds. NOTE: District Environmental personnel must be included in this inspection. BEFORE installation of plants: Inspect pits and beds for compliance with specifications Obtain approval of District Environmental personnel of all plants. BEFORE establishment period: Inspect all plants to confirm that they are living and have been installed according to the plans and specifications. NOTE: District Environmental personnel must be included in this inspection. Inspect plants, pits, and beds during establishment period to confirm that they are being maintained.

BRIDGES

SPEC	INSPECTION	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
401 **403** **404** **406** **217**	**Intermittent** _____ **NOTE: Continuous With 2 inspectors required (Minimum) for concrete deck placement**	Ensure alignment and location has been staked contractor. Ensure that all environmental permit conditions have been met, and erosion and siltation have been installed. Ensure uniform foundation, and grade will allow desired bedding thickness. Ensure proper bearing capacity and center of gravity has been obtained. Ensure placement of forms and reinforcing steel are in accordance with the plans and specifications. Ensure concrete is placed according to plans specifications. Ensure uniform backfill compaction. Ensure uniform bearing. Ensure beams are installed in accordance with plans, specifications, and shop drawings. Ensure forms and reinforcing steel are correctly placed. Ensure that contractor has checked weather conditions to determine evaporation rate.	BEFORE excavation begins: Verify that all environmental permit conditions will be met, and that erosion and sediment control devices have been installed. NOTE: All permits must be reviewed to ensure that bridge can be constructed within permitted conditions. Verify plan quantity excavation with actual field conditions. Ensure the contractor has a safe traffic control operation that will be followed; pay particular attention to safe operation of trucks through the work zone. Confirm and document that traffic control measures are providing BEFORE placement of bedding and forms: Measure and record quantitative data and sketch and compute minor structural excavation, if applicable. Check foundation, bedding material, and grades for conformance with specifications. If foundation is questionable, contact District Materials Engineer. Inspect and document any pile driving operations. Verify that splicing methods are being used. Check if driving equipment is approved by Engineer. Check and document beam seat bearing areas for line and grade. Check and document proper fit of bearing assemblies, and vertical installation of structural steel and concrete beams. Verify that contractor performs field rotational test and that proper nut, washer, and bolt combination is used, and that bolts have required torque.

BRIDGES
(CONTINUED)

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
401 **403** **404** **406** **217**	**Intermittent** _____ **NOTE: Continuous With 2 inspectors required (Minimum) for concrete deck placement**	Ensure proper curing in order to achieve the required strength and durability.	BEFORE placement of concrete: Check and document line, grade, elevation, dimensions, condition of forms, bracing, ties, bolsters, location of reinforcing steel, screed “set-up”, joints, and deck thickness. Verify that contractor will have one VDOT certified concrete field technician present continuously at each placement site. Determine and record if weather conditions are conducive to concrete placement. Check and document discharging, conveying, spreading, consolidating, screeding, finishing, texturing, curing, and protecting operations. Perform and record slump, temperature, and air content tests. Cast concrete strength and permeability specimens at the rate specified. Verify that concrete curing operations are performed while concrete has “sheen”. Verify concrete protection is adequate for anticipated weather conditions. Complete dry and wet deck check measurements. BEFORE beginning backfill operations: Verify that required concrete strength has been obtained. Check and document suitability of backfill materials, depth of layers, density and moisture.

TRAFFIC SIGNS

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
700 **701** **217**	**Intermittent** NOTE: Continuous with 1 inspector for installation of ground mounted breakaway signs. **NOTE: Continuous With 2 * inspectors required (Minimum) for concrete placement**	Ensure contractor has staked each sign location and that the sign location meets field conditions and does not conflict with underground obstructions or other traffic signs. Ensure footing or caisson conforms to the approved shop drawings or standard for each sign location. Ensure placement of forms, reinforcing steel, conduits, and anchor bolts are in accordance with the plans, standards, and approved shop drawings. Ensure concrete is placed according to plans and specifications. Ensure uniform compaction as required by specifications. Ensure sign panels and support systems are manufactured and assembled in accordance with the plans, standards, specifications, and approved shop drawings. Ensure conduit, wiring, electrical service, and illumination is in accordance with the plans, standards, specifications, and approved shop drawings. Ensure traffic signs conform to the MUTCD and the Virginia Standard Highway Signs Book.	BEFORE beginning construction, ensure that test borings and submission of shop drawings has occurred and that approval of the Regional Traffic Engineer has been obtained for each sign location. BEFORE placement of reinforcing steel, concrete, and anchor bolts: Inspect excavation for footing, bedding material, and grades for conformance with specifications. If footing is questionable, contact District Materials Engineer. BEFORE placement of concrete: Verify that contractor will have one VDOT certified concrete field technician present on the project. Determine and record if weather conditions are conducive to concrete placement. Check and document discharging, conveying, spreading, consolidating, finishing, texturing, curing, and protecting operations. Perform slump, and air content tests. Record temperature. Make concrete cylinders. BEFORE commencement of backfilling operations: Verify and document concrete strength has been obtained. BEFORE erecting signs: Inspect condition of sign panels and supports and any allowable repairs that have been made. Inspect the erection of the sign supports and panels. For ground mounted breakaway signs, ensure the bolts have been torqued as specified in the plans. Perform and document nighttime inspection to verify that sign has proper illumination.

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SIGNALIZATION

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
PROV. **217** **703**	**NOTE: Continuous With 2 * inspectors required (Minimum) for concrete placement**	Ensure contractor has staked each signal pole location and that the pole location meets field conditions and does not conflict with underground obstructions or other traffic signs. Ensure footing or caisson conforms to the approved shop drawings or standard for each sign location. Ensure placement of forms, reinforcing steel, conduits, and anchor bolts are in accordance with the plans, standards, and approved shop drawings. Ensure concrete is placed according to plans and specifications. Ensure uniform compaction as required by specifications. Ensure signal poles, cabinets, and signal heads are manufactured and assembled in accordance with the plans, standards, specifications, and approved shop drawings. Ensure conduit, wiring, electrical service, and illumination is in accordance with the plans, standards, specifications, and approved shop drawings. Ensure signals conform to the MUTCD.	BEFORE beginning construction, ensure that test borings and submission of shop drawings has occurred and that approval of the Regional Traffic Engineer has been obtained for each signal pole location. BEFORE placement of reinforcing steel, concrete, and anchor bolts: Inspect excavation for footing, bedding material, and grades for conformance with specifications. If footing is questionable, contact District Materials Engineer. BEFORE placement of concrete: Verify that contractor will have one VDOT certified concrete field technician present on the project. Determine and record if weather conditions are conducive to concrete placement. Check and document discharging, conveying, spreading, consolidating, finishing, texturing, curing, and protecting operations. Perform and record slump, temperature, and air content tests. Cast concrete strength specimens at the rate specified. BEFORE commencement of backfilling operations: Verify and document required concrete strength has been obtained. BEFORE erecting signals: Inspect condition of the signal poles, cabinets, and signal heads. Inspect the erection of the signal poles, cabinets, and signal heads.

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SOUND BARRIER WALLS

SPEC.	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
519	**Intermittent** **NOTE: Continuous With 2 * inspectors required (Minimum) for concrete placement**	Ensure wall location and height is correct for field conditions. Ensure uniform foundation. Ensure proper bearing capacity and center of gravity has been obtained. Ensure placement of forms and reinforcing steel are in accordance with the plans and specifications. Ensure concrete is placed according to plans and specifications. Ensure uniform backfill compaction. Ensure sound wall barrier wall conforms to contract and approved shop drawings. Ensure that pre-cast elements conform to approved shop drawings and are installed accordingly.	BEFORE excavation begins: Verify that all environmental permit conditions will be met, and that erosion and sediment control devices have been installed. Verify and document that width, length and height meet field and slope conditions. BEFORE placement of bedding and forms: Check foundation and grades for conformance with specifications. If foundation is questionable, contact District Materials Engineer. Inspect and document all pile driving operations. Verify that proper splicing methods are being used. BEFORE placement of concrete: Check and document line, grade, elevation, dimensions, condition of forms, bracing, ties and location of reinforcing. Ensure that contractor has one certified concrete field technician present on the project. Perform and record slump, temperature, and air content tests. Cast concrete strength specimens at the rate specified. Verify and document alignment, height, and spacing of posts and panels.

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INTELLIGENT TRANSPORTATION SYSTEMS

SPEC	INSPECTION LEVEL	INSPECTION OBJECTIVE	INSPECTOR ACTIVITY
801-812	**Intermittent**	Ensure all required approvals and shop drawings are approved within the time frames required. Ensure conduits placed as part of the ITS system meet the requirements of section 812. Ensure that equipment is tested, including Field Acceptance Test (FAT), VDOT Traffic Operations Center Integration Test (TOCIT), and 30-Day System Acceptance Test (SAT). The Contractor shall meet the requirements of all the Department's test plan, unless otherwise approved by the Engineer. Ensure that training is provided by a qualified instructor to Department personnel in the proper operation and maintenance of the equipment. Ensure that any required Operations and Maintenance (O&M) Manuals are supplied for each type of individual component, one of which shall be in a reproducible format. Ensure warranties are provided to VDOT. Ensure Vendor Support Agreements are provided to VDOT.	BEFORE commencement of construction operations: Verify that all required submittals for any materials to be provided as part of this section have been approved and are in conformance with the plans and specifications. BEFORE the commencement of testing: verify with the engineer that all plans have been reviewed and approved. Confirm that any required offsite testing has been done and the results have been submitted to the engineer. Confirm that the required training has been scheduled in accordance with the contract documents and the appropriate notifications, to include the required time lines have been met. Verify that the warranty and support information is provided to the Engineer. Ensure that equipment is installed per the manufacturer specifications.