

US CUSTOMARY UNITS

D262100

F.A. PROJECT

PROPOSAL

Proposal Description:

Replacement of (2) I-84 Bridges (precast concrete) over Dingle Ridge Road in the Town of Southeast

Letting of 11/1/2012 @ 10:30 A.M.

Submitted in accordance with Standard Specifications officially adopted May 1, 2008 and the Highway Law.

Book 2 of 3



IMPORTANT BIDDER INFORMATION

1. Familiarize Yourself with the Standard Specifications Book. The Department currently uses Standard Specification books dated May 4, 2006 (Metric Units) and Standard Specifications dated May 1, 2008 (U.S. Customary Units). These may be purchased either in person or by mail for \$25.00 (plus \$8.00 postage if mailed) at the NYSDOT, Plan Sales Office, 50 Wolf Road, 1st Floor, Suite 1PS, Albany, NY 12232, Tel. (518) 457-2124, or accessed on-line at:

<https://www.dot.ny.gov/main/business-center/engineering/specifications>.

2. Upcoming Projects and Letting Results. Construction contract plans and proposals are sold only on compact disk (CD). These may be purchased either in person or by mail at the NYSDOT, Plan Sales Office, 50 Wolf Road, 1st Floor, Suite 1PS, Albany, NY 12232 and at the Regional Office responsible for the project. The cost of the CD is \$10 (plus \$8 postage, if mailed). Checks should be made payable to the "New York State Department of Transportation". Include your Federal Identification Number on each check.

Highway Letting Notices can be accessed at: <https://www.dot.ny.gov/doing-business/opportunities/const-highway>.

Highway Letting Results can be accessed at: <https://www.dot.ny.gov/doing-business/opportunities/const-results>.

Plans, proposals and letting results are also available on-line thru Bid Express at: www.bidx.com.

3. Procurement Lobbying Law Requirements. State Finance Law Sections 139-j and 139-k restrict communications between the Department and a bidder during the procurement process. During the period between advertisement and award, a bidder is generally restricted from making contacts with anyone other than the staff listed below:

1) For technical questions or comments, the Regional Contact as shown on page 1 of the Proposal

2) Maria Tamarkin, Construction Letting & Award Unit, Phone: (518) 457-8403, Email: mtamarkin@dot.state.ny.us

3) The Assistant Director or the Director of the Contract Management Bureau, Phone: (518) 457-3583

Further information may be found at:

<https://www.dot.ny.gov/main/business-center/contractors/contractors-repository/lobbylaw.pdf>.

4. D/M/WBE Goals. Projects may have one goal for participation by Disadvantaged Business Enterprises (DBE) when Federally funded, or two separate goals for participation by Minority Business Enterprises (MBEs) and Women's Business Enterprises (WBE), when Non-Federally funded. If the project you bid has (a) D/M/WBE goal(s), you must document your good faith efforts to obtain D/M/WBE participation. Solicitation of D/M/WBEs must begin prior to the submission of your bid. For projects with goals, the Pre-Award Utilization Package must be submitted to the Office of Construction within 7 calendar days after Letting, in accordance with §102-12 D/M/WBE Utilization, using the current version of Department approved Civil Rights reporting software. Further information may be found at:

<https://www.dot.ny.gov/main/business-center/contractors/construction-division/construction-civil-rights/ebo>

5. You Must Be Bondable. Statutes, including Section 38 of the Highway Law, require that a low bidder file both a PERFORMANCE BOND and a LABOR and MATERIAL BOND for the full amount of the contract. Arrangements should be made with a Surety prior to submitting a bid. Failure to secure bonding could result in the loss of your bid deposit. See §103-03 CONTRACT BONDS of the Standard Specifications.

6. You Must Submit a Bid Security with Your Bid or, if Bidding over the Internet with Bid Express(see www.bidx.com), You Must Submit an Electronic Bid Bond Verification with Your Bid. Every hard copy bid must be accompanied by a bid bond, certified check or bank cashier's check payable to the State of New York. Every internet bid must include an electronic bid bond verification. If you elect to submit a bid bond, it must be on the Department's bond form (CONR 391) and be in the sum of 25% of the total bid. If you elect to submit a check, it must be in the amount specified in the bid proposal. The retention and disposition of such bid bond or certified or cashier's check by the Department shall be pursuant to and in conformity with Section 38(2) of the Highway Law, as amended.

7. Do Not Alter the Bid Proposal Unless Directed to Do So by Amendment. Unauthorized alterations could lead to your bid being declared informal. See §102-05 PROPOSAL SUBMISSION, of the Standard Specifications.

8. Make Sure You Check for and Respond to All Amendments. Amendments are posted on the Bid Express Web Site and at: <https://www.dot.ny.gov/doing-business/opportunities/const-notice>. The Contractor is responsible for ensuring that all Amendments have been incorporated into its bid.

9. Make Sure You Bid on All Items. If it is your intent to bid "0", use numeric and written symbols. Leaving blank spaces can render your bid informal. See §102-05 PROPOSAL SUBMISSION of the Standard Specifications.

10 Before You Hand in Your Bid, Double Check Your Computations. Make sure the figures reflect the intent, and check decimal points. Enter a numeric figure for every unit price, and an extension in the total amount bid column.

11. Make Sure You Sign the Bid. See §102-05 PROPOSAL SUBMISSION of the Standard Specifications.

12. Bids Should Be Submitted through Bid Express or in a Sealed Envelope addressed to NYSDOT Contract Management Bureau, 50 Wolf Road, Suite 1CM, Albany NY 12232. The Company Name, Street Address, Federal Identification Number, Project Number and Project Description Should Be Clearly Marked. Your Federal Identification number on the envelope should be the same number used to buy plans. Any low bidder must have a current New York State Vendor Responsibility Questionnaire – For Profit Construction (CCA-2) on file or submit one within 10 days of receipt of the contract. Questionnaires are available on the NYSDOT website at: <https://www.dot.ny.gov/bids-and-lettings/construction-contractors/general-info> or can be obtained by calling (518) 457-1564. Contact the Contract Management Bureau at (518) 457-3583 if you need a reasonable accommodation for an individual with a disability to participate in the program.

REQUIRED CONTRACT PROVISIONS

ARRA Reporting & Record Keeping Requirements

D/M/WBE Utilization

EEO Goals

D/M/WBE Goals

Form CONR 9k

Electronic Bidding

Federal Aid Contract Provisions

Percentage Bid Items

List of Additional Insured

Railroad Insurance

New York State Uniform Contracting Questionnaire

Empty lines for additional provisions.

NOTE: This form was developed for repetitive use throughout all contract proposals and may identify items not applicable to this specific project.

GOALS FOR EQUAL EMPLOYMENT OPPORTUNITY (EEO) PARTICIPATION

GOALS FOR MINORITY PARTICIPATION

COUNTY	%	COUNTY	%	COUNTY	%
Albany	3.2	Herkimer	2.1	* Richmond	
Allegany	6.3	Jefferson	2.5	Rockland	22.6
Broome	1.1	* Kings		St. Lawrence	2.5
* Bronx		Lewis	2.5	Saratoga	3.2
Cattaraugus	6.3	Livingston	5.3	Schenectady	3.2
Cayuga	2.5	Madison	3.8	Schoharie	2.6
Chautauqua	6.3	Monroe	5.3	Schuyler	1.2
Chemung	2.2	Montgomery	3.2	Seneca	5.9
Chenango	1.2	Nassau	5.8	Steuben	1.2
Clinton	2.6	* New York		Suffolk	5.8
Columbia	2.6	Niagara	7.7	Sullivan	17.0
Cortland	2.5	Oneida	2.1	Tioga	1.1
Delaware	1.2	Onondaga	3.8	Tompkins	1.2
Dutchess	6.4	Ontario	5.3	Ulster	17.0
Erie	7.7	Orange	17.0	Warren	2.6
Essex	2.6	Orleans	5.3	Washington	2.6
Franklin	2.5	Oswego	3.8	Wayne	5.3
Fulton	2.6	Otsego	1.2	Westchester	22.6
Genesee	5.9	Putnam	22.6	Wyoming	6.3
Greene	2.6	* Queens		Yates	5.9
Hamilton	2.6	Rensselaer	3.2		

* The following goal ranges are applicable to the indicated trades in the Counties of Bronx, Kings, New York, Queens and Richmond.

Electricians.....	9.0 to 10.2	Bricklayers.....	13.4 to 15.5
Carpenters	27.6 to 32.0	Asbestos workers.....	22.8 to 28.0
Steam fitters	12.2 to 13.5	Roofers	6.3 to 7.5
Metal lathers.....	24.6 to 25.6	Iron workers (ornamental).....	22.4 to 23.0
Painters.....	26.0 to 28.6	Cement masons.....	23.0 to 27.0
Operating engineers	25.6 to 26.0	Glaziers.....	16.0 to 20.0
Plumbers	12.0 to 14.5	Plasterers	15.8 to 18.0
Iron workers (structural)	25.9 to 32.0	Teamsters.....	22.0 to 22.5
Elevator constructors	5.5 to 6.5	Boilermakers	13.0 to 15.5
		All others	16.4 to 17.5

GOAL FOR PARTICIPATION OF WOMEN

The last publication of a goal for the participation of women was April 7, 1978 (43 FR 14888, 14900). Pursuant to 41CFR 60-4.6, the 6.9% goal published on that date is hereby made the goal for all contracts and grant agreements, until further notice.

**GOALS FOR DISADVANTAGED/MINORITY/WOMEN'S BUSINESS ENTERPRISE
(D/M/WBE) PARTICIPATION**

The Department has established the following utilization goal(s) for this contract, expressed as a percentage of the total contract bid amount. For clarification of Disadvantaged Business Enterprise (DBE) Utilization, Minority Business Enterprise (MBE) Utilization or Women's Business Enterprise (WBE) Utilization requirements refer to §102-12 *D/M/WBE Utilization* of the Standard Specifications.

Disadvantaged Business Enterprise (DBE) Utilization Goal	_ 8 _ % (Federal-Aid Only)
Minority Business Enterprise (MBE) Utilization Goal	_____ % (Non Federal-Aid Only)
Women's Business Enterprise (WBE) Utilization Goal	_____ % (Non Federal-Aid Only)

Directories and/or Information related to the current certification status of Disadvantaged Business Enterprises can be obtained from the NYS Unified Certification Program website at:
<http://biznet.nysucp.net>

Direct questions concerning Disadvantaged Business Enterprise Utilization to:

NYS Department of Transportation
Office of Construction
50 Wolf Road Pod 51
Albany, New York 12232
(518) 457-6472

Direct questions concerning Disadvantaged Business Enterprise Certification to:

NYS Department of Transportation
Contract Audit Bureau
DBE Certification
50 Wolf Road, 6th Floor
Avenue F, 1st Street
Albany, New York 12232
(518) 457-3180

Directories and/or information related to the current certification status of Minority and Women's Business Enterprises, can be obtained by contacting the:

Empire State Development Corporation
Office of Minority and Women's Business Development
30 S. Pearl Street
Albany, NY 12245
(518) 292-5250
<http://www.empire.state.ny.us/MWBE.html>

ALTERNATIVE CONR 9 (11/11) SUPPLEMENTAL INFORMATION AVAILABLE TO BIDDERS

The information checked in the CD/DVD column on this form is included on the bid document CD that was purchased from the Department (also available for download through BidExpress). See the Special Note in this proposal titled "Supplemental Information Availability", for additional information. The bidder's signature on this proposal certifies that they have made themselves aware of the availability, for their inspection and review prior to the letting date, of the information indicated below:

INFORMATION	Hard Copy Only	CD/DVD	Not Available
1. Asbestos Information			
a. Asbestos Blanket Variances	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Asbestos Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. CADD Information			
a. MicroStation DGN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. InRoads DTM and XML format	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. InRoads ALG and XML format	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Cross Sections in ADOBE PDF format	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Quantity Information			
a. Quantity Work-ups – All	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Quantity Work-ups – Partial (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Record Plans	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Rock Cores (available for inspection only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Sign Face Layouts in ADOBE PDF format	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Stormwater Pollution Prevention Plan (SWPPP)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. Subsurface Information			
a. Subsurface Exploration Logs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Undisturbed Sample Logs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Laboratory Test Data from Soil Samples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Tabulated Results of Probing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Tabulated Depth to Bedrock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Rock Core Evaluation Logs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g. Compression Test Data from Rock Samples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Rock Outcrop Maps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Granular Materials Resource Survey Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Terrain Reconnaissance Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Subsurface Information - Other Information			
a. Subsurface information from outside sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Source Information - Granular Material and aggregates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Special Subsurface Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Anticipated Construction Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Special Reports or Other Information:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Design Approval Document	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Wetland Compensation Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Survey Control Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. City of Danbury, Signal Layout	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. ABC-Dingle Ridge Rd demo and crane location	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

NYSDOT Electronic Bidding - Trns•port Expedite and Bid Express

Expedite allows bidders to receive electronic proposal bid item information from the Department's web site and Bid Express to produce an electronic bid. Bidders need to enter unit prices only in the Schedule of Items. Expedite is provided free of charge, and can be used on almost any Windows-compatible PC. It integrates with many existing electronic bid preparation software packages, and has import/export capability for use with database and spreadsheet programs. Benefits may include:

- Bid data import takes seconds allowing users of computer systems that collect item data minimal time to construct bid files from "item libraries".
- Expedite calculates item and overall bid totals on-the-fly, as estimators work through the list, and alerts estimators if an item is accidentally omitted.
- Electronic files of item bid data will be posted to the NYSDOT website to coincide with advertising and contract document sale dates.
- Amended item bid data will be posted as soon as it is available. When it is downloaded, recognition of changes are automatic.
- The Department processes electronic bids much faster than paper bids decreasing the time needed for verification.

Bid Express allows secure, encrypted bid submittal over the internet. It integrates with Expedite and includes electronic bid bond verification. Bid Express is a fee-based service. Benefits may include:

- Real-time bid submittal from any location.
- No concerns about driving bids to Albany or mail services arriving after the deadline.
- Ability to submit a "safety bid" early while continuing to solicit better quotes from subs and suppliers and to overwrite the safety bid with a new bid right up to the submission deadline.
- As data accumulates on Bid Express, there is the ability to search and analyze bids on prior contracts for specific work items, by specific competitors, etc.
- Able to solicit and receive quotes from subcontractors through the Small Business Network on Bid Express.
- Contractors who use Bid Express do not submit a paper bid.

First time electronic bidders should:

- Allow at least five business days to obtain a digital ID and password for bidding through Bid Express.
- Follow the procedures in "Expedite Instructions", which are posted at <http://www.dot.ny.gov/bids-and-lettings/construction-contractors/electronic-bid-system>
- Enter the Agency as NYSDOT.
- Use the appropriate Federal-ID and firm name. Federal-ID must be in the format 12-3456789. Joint ventures must create a new digital ID and send an authenticated copy of evidence of the authority of the agent or attorney-in-fact for the joint venturers to act on behalf of all joint venturers to the Contract Management Bureau prior to the Letting.

All electronic bidders should:

- Enter prices for all bid items in the Schedule of Items.

NYSDOT Electronic Bidding - Trns•port Expedite and Bid Express

- Enter days for the B portion(s) of A + B bids on the Proposal Sites folder (if applicable).
- Enter the required info in the JURAT and Disclosure of Lobbying Activity folders.
- Complete the Contract Document Bid-Ability Survey (optional).
- Enter the required info in the Bid Bond folder if submitting bid through Bid Express and click Verify to verify the bid bond.
- All folders should be green if submitting bid through Bid Express. Submitting a bid through Bid Express with any red folders could lead to your bid being declared informal.

Paper Bid Documents: NYSDOT recommends and encourages contractors to bid electronically with Bid Express because of its many advantages, but contractors are not required to bid electronically. If NYSDOT receives both a Bid Express bid and a paper bid from the same contractor, the Bid Express bid will prevail.

Bidders who do not use Bid Express are encouraged to submit an electronic bid file on a disk/CD included with their paper bid. NYSDOT will not accept electronic bids on disk/CD without a paper bid. If there is any discrepancy between an electronic file and the paper bid, the paper bid will prevail.

When submitting an electronic bid file with your paper bid, include only one file per bid. The disk/CD must be labeled with the following information:

- Firm name
- Letting date
- D number
- A statement as to whether the paper bid does or does not include any handwritten changes from the electronic bid file. Do not mix partial printouts with differing date-time groups.

Amendments: Contractors are solely responsible for recognizing and responding to changes by amendment. If an amendment involves changes to item bid data, an amended Expedite file will be posted to the Department's website and to Bid Express. This file must be applied to your electronic bid. If there is any discrepancy in the itemized proposals published in paper and electronic formats, in either the contract pay items or quantities, the Department will evaluate the bids based only on that portion that is common to all formats. For example, if an item is missing from any format, the bids will be evaluated excluding that item and if item quantities are different in any format, the bids will be evaluated using the lowest item quantity.

Please notify the Department at 888-664-9343 or 518-485-8111 if you find any such discrepancies. However, not all amendments will involve changes to item bid data.

For assistance:

- Bid Express Help Desk (888) 352-2439 or (352) 381-4888
- NYSDOT Information Technology Division Help Desk (888) 664-9343 or (518) 485-8111
- Third-party Software - Contact the vendor of the software. The Department is neither authorized nor able to assist with any software package.

Last Update: February 2, 2012

REQUIRED CONTRACT PROVISIONS FOR FEDERAL AID CONTRACTS

FHWA-1273 -- Revised May 1, 2012

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

REQUIRED CONTRACT PROVISIONS FOR FEDERAL AID CONTRACTS

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

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applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

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will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions

of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

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will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

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(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly

rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

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d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

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VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;
- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

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"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

REQUIRED CONTRACT PROVISIONS FOR FEDERAL AID CONTRACTS

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

REQUIRED CONTRACT PROVISIONS FOR FEDERAL AID CONTRACTS

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**LIST OF ADDITIONAL INSURED PARTIES FOR WHICH THE
CONTRACTOR MUST PROVIDE COVERAGE**

State of New York/New York State Department of Transportation
Putnam County
Town of Southeast
Town of North Salem
State of Connecticut
City of Danbury
Town of Ridgefield

Public Utilities:

New York State Electric and Gas Corporation
American Telephone and Telegraph, Inc. (AT&T)
Comcast Cable
Verizon Communications

Coverage must also be provided for any consultant inspecting engineer or inspector (and their agents) working for or on the project.

The above listing supplements Section 107-06 INSURANCE of the Standard Specifications.

New York State Uniform Contracting Questionnaire (CCA-2)

In accordance with §103-01 of the Standard Specifications, the NYS Department of Transportation requires that a review of a firm's responsibility be performed prior to the award of a contract or approval of a subcontract. A **New York State Uniform Contracting Questionnaire (CCA-2)** is the primary tool used to perform this review. A completed CCA-2 must be on file with NYSDOT to be considered for the award of a contract or for the approval of a subcontract. An approved CCA-2 covers NYSDOT work for 12 months from date of receipt.

Any low bidder who does not have a completed CCA-2 on file within ten days of receipt of a contract for execution may be subject to the forfeiture of the amount of the bid deposit pursuant to §103-02 of the Standard Specifications.

There are three CCA-2 options available on the NYSDOT website <https://www.dot.ny.gov/bids-and-lettings/construction-contractors/general-info>: online filing (VendRep), a Rich Text fillable form, and an Adobe Acrobat fillable form. No previous versions of the form will be accepted.

If a firm chooses to file online at http://osc.state.ny.us/vendrep/popups/vendor_construction.htm (site of the Office of the New York State Comptroller's VendRep repository), please note that the online VendRep System is only a repository of information with the Office of the State Comptroller (OSC). Although there is a certification completed in VendRep, it is only an electronic signature. This certification does NOT mean the CCA-2 has been reviewed and approved by any Agency. The firm **must** notify vendorresponsibility@dot.state.ny.us by sending an e-mail stating that the online filing has been completed. This notification will initiate the review process. The firm cannot begin work for NYSDOT until a responsibility determination has been made by the Contract Management Bureau.

If choosing one of the other options, a firm **must print out and MAIL** its original, notarized CCA-2 to NYSDOT's Contract Management Bureau. Whichever format is used, all Attachments must be completed. A firm may use its own spreadsheets, but must provide all of the information requested. Either of the following may be substituted for an Attachment C: the firm's corporate balance sheet (including any Accountant's Notes or Reports referenced), or a copy of the Schedule L filed with its IRS Form 1120. Once all of the completed paperwork has been received, the approval process will begin. All responsibility checks must be completed by NYSDOT before a firm is approved to begin work.

Questions regarding the CCA-2 may be directed to the Contract Management Bureau, Vendor Responsibility Unit at (518) 457-1564.

ERRATA to 2008 STANDARD SPECIFICATIONS

Make the following change to the *Standard Specifications of May 1, 2008* :
 (Issued with Prop Makeup for 9/4/08)

Page 5, *insert*, in numerical sequence, the following:

“Section 625 - Survey Operations, Row Markers, and Permanent Survey Markers.....609”

Page 12, *insert*, in numerical sequence, the following:

“SECTION 726 - DETECTABLE WARNING UNITS.....1005
 726-01 Surface-Applied Detectable Warning Units.....1005
 726-02 Embedded Detectable Warning Units.....1006
 SECTION 727 - PAVEMENT MARKING MATERIALS.....1006
 727-01 Extruded Thermoplastic.....1006
 727-02 Removable Raised Pavement Markers.....1008
 727-03 Epoxy Paint.....1009
 727-04 Permanent Pavement Tape.....1011
 727-05 Glass Beads for Pavement Markings.....1012
 727-06 Removable Pavement Tape.....1013
 727-07 Removable Wet-Night Reflective Tape.....1015
 727-08 Permanent Wet-Night Reflective Tape.....1016
 727-09 Traffic Paint.....1018”

Make the following change to the *Standard Specifications of May 1, 2008* :
 (Issued with Prop Makeup for 1/8/09)

Page 530, Section 608-3.01 Concrete Sidewalks and Driveways, third paragraph, first sentence,

Delete "When using fiber reinforcement it shall be added to the concrete at a rate of 2 pounds of fibers per cubic yard of concrete".

And *replace* with "When using fiber reinforcement it shall be added to the concrete at a rate of 1.5 pounds of fibers per cubic yard of concrete".

Page 606, Section 623-5 Basis of Payment, *delete* the M from all item numbers.

Page 911, TABLE 715-01-1 Charpy V-Notch Impact Requirements, *replace* the column entries of ENERGY with 15, 15¹, 15¹, 15¹, 20¹, 20

Make the following change to the *Standard Specifications of May 1, 2008* :
 (Issued with Prop Makeup for 5/7/09)

Page 143, Section 201-3.02, second paragraph, first sentence, *replace* “15 feet” with “16 feet”

Page 147, Section 202-3.01, third from the last paragraph, first sentence, *replace* “3 feet” with “42 inches”

Page 148, Section 202-3.02F, third paragraph, first sentence, *replace* “3 feet” with “42 inches”

Page 153, Section 202-3.09, fourth paragraph, *replace* the second sentence with “If excavation support is necessary to support structures or other improvements, or if the alternatives of laying back slopes or benching are not available, the support system shall be as indicated in the contract documents.”

Page 157, Section 203-1.09, last line, *replace* “Analysis” with “Science”

Page 157, Section 203-1.15, last line, *replace* “below 32°F.” with “32°F or less.”

ERRATA to 2008 STANDARD SPECIFICATIONS

Page 158, *replace* Section 203-1.17 with the following:

“203-1.17 Cleaning Culverts, Closed Drainage Systems, Drainage Structures and Manholes. This work shall consist of cleaning and keeping clean, existing culverts, closed drainage systems, drainage structures and manholes indicated in the contract documents or where directed by the Engineer, for the duration of the contract.”

Page 161, Section 203-3.02, second paragraph, *replace* “Analysis” with “Science”

Page 163, Section 203-3.05C, *replace* “215 feet” with “212 feet” throughout

Page 163, Section 203-3.05C, *replace* “a Scaled Distance of 30 feet” with “a Scaled Distance of 30” throughout

Page 163, Section 203-3.05C, between the two equations, *replace* “AND” with “OR”

Page 167, Section 203-3.12B.2., fourth paragraph, first sentence, *replace* “CFR” with “PLI”

Page 168, Figure 203-3 Vibratory Compactors - 800 is missing on the vertical axis of the Figure.

Page 171, Section 203-3.14C, *replace* “Select Granular Subgrade, §203-2.202E,” with “Select Granular Subgrade, §203-2.02E,”

Page 176, Section 203-5, Pay Item list, in numerical sequence *add* the following:

“203.22	Sand Backfill (screenings)	Cubic Yard
203.23	Sand Backfill (Type 1B)	Cubic Yard
203.24	Sand Backfill (Type 1A)	Cubic Yard”

Page 176, Section 203-5, Pay Item list, item 203.51, under Pay Unit, *replace* “Foot” with “Linear Foot”

Page 182, Section 205-3.02A1.&2., 3.02B, *delete* “0.25 millimeter and 0.15 millimeter”

Page 183, Section 205-3.03, third paragraph, third sentence, *delete* “10°C”

Page 184, Section 205-3.04, first paragraph, fifth sentence, *replace* “0.3 meters” with “one foot”

Page 184, Section 205-3.04, first paragraph, third sentence from the end, *replace* “EIC” with “the Engineer”

Page 186, Section 205-5, Note at the end, *replace* “nnn” with “nn”

Page 192, Section 209-2.04, first paragraph, *delete* the second sentence “Strawbale shall be §713-19 Straw.”

Page 198, Sections 209-4.01,.02,.09,.10,.11, *replace* “square feet or square foot” with “square yard”

Page 215, Section 307-3.11, fourth sentence *replace* “0.02 gallons/square yard” with “of 0.2 gal/sy”

Page 218, Section 308-3.07, first paragraph, third sentence *replace* “nine metric tons” with “10 tons”

Page 270, Section 407-4, Volume equation, *replace* “ 0.00045” with “0.00025”

Page 500, Section 605-2.02, second paragraph, *replace* “Soil Control Procedure (SCP)” with “Geotechnical Control Procedure (GCP)”

Page 602, Section 620-2.05, third paragraph, *replace* “Soil Control Procedure (SCP)” with “Geotechnical Control

ERRATA to 2008 STANDARD SPECIFICATIONS

Procedure (GCP)”

Page 603, Figure 620-1 under Medium Stone Size, *replace* “6 inch” with “4 inch”

Page 603, table following Figure 620-1 entitled Approximate Shape, *add* “Figure 620-2” to title

Page 605, Section 620-3.06, last word, *replace* “water” with “weather”

Page 606, Section 623-3, *replace* with the following:

“623-3 CONSTRUCTION DETAILS. Screened gravel, crushed gravel, crushed stone or crushed slag shall be placed as shown on the plans or as directed by the Engineer.”

Page 606, Section 623-5, all Payment Item Numbers, *delete* “M”

Page 609, Section 624-5, all Payment Item Numbers, *delete* “M”, and *replace* “624.020611” with “624.020610”

Page 773, Table 703-2, under Material Designation, 5th and 6th row, *replace* “12.5mm” with “1/2 inch”

Page 774, Table 703-4, at Size Designation 4 and Screen Size 2 in, *replace* “0.15” with “0-15”

Page 780, Section 703-09, under Method of Measurement, *replace* “metric tons” with “tons”

Page 1048, Section 732-09, Material and Fabrication Requirements, first sentence, *replace* “15 3/4 inches” with “16 inches”

On page 1047, under 732-04 SAMPLERS, replace MATERIAL REQUIREMENTS with the following:

“MATERIAL REQUIREMENTS. Samplers shall be equipped with a ball check in the head section and have a minimum inside length of 20 inches. Samplers shall conform to the following sizes:

Sampler Diameter (Inches)	Outside Diameter (Inches)	Cutting Shoe Opening (Inches)
2	2	1 ³ / ₈
2½	2½	1 ⁷ / ₈
3	3	2 ³ / ₈
3½	3½	2 ⁷ / ₈

On page 1048, under 732-10 BOULDER AND ROCK CORE BOXES, replace the *first paragraph* under MATERIAL AND FABRICATION REQUIREMENTS with the following:

“MATERIAL AND FABRICATION REQUIREMENTS. Boxes shall be fabricated of white pine, Grade No. 2 common or better, 1 inch stock (finished ¾ inch) thickness or an approved equal material and conform to the overall box dimensions given below:

Core Box Size	Length (Inches)	Width (Inches)	Height (Inches)
“AX”	61½	9 ⁵ / ₈	2 ³ / ₄
“BX”	61½	10¾	3¼
“NX”	61½	10 ⁷ / ₈	3¾
“HX”	61½	11 ¹ / ₈	4 ⁵ / ₈

Core rows shall be separated by wooden or tempered hardboard, 1/8 inch thick strips recessed to 3/8 inch depth and glued with waterproof glue at the bottom and ends of the box.”

Page 1049, Section 732-12, Material Requirements, *replace* with the following:

“MATERIAL REQUIREMENTS.

Cement. The material shall meet the requirements of §701-01 Portland Cement Type 1 or 2.

ERRATA to 2008 STANDARD SPECIFICATIONS

Water. The water for the mix shall conform to the requirements of §712-01 Water.

Bentonite Powder. There are no material requirements for the bentonite, except it shall be supplied in powder form from a reputable manufacturer and pass a No. 200 sieve."

Make the following change to the *Standard Specifications of May 1, 2008* :

(Issued with Prop Makeup for 9/3/09)

Page 656, Table 645-1 Wind Load Criteria, row 1 column 4 and 5, **replace** "140 ft." with "14.0 ft".

Page 657, Table 645-2 Allowable Sign Areas, under Wooden Post Sections with Embedment of 6.0 ft., **replace** "3.5 x 3.5" with "3.5 x 5.5".

Page 661, Payment Item 645.8XYYZZ Type B Sign Posts, under YY Section, **replace** 01 to 08 with "01 S3x5.7, 02 W6x9, 03 W6x12, 04 W8x15, 05 W10x19, 06 W10x22, 07 W12x26, 08 W14x34"

Make the following change to the *Standard Specifications of May 1, 2008* :

(Issued with Prop Makeup for 1/7/10)

Page 386, Section 565-2.03, Second line, **replace** with the following:

"Type M.R. Bearings 716-06.01 or 716-07.01"

Page 609, Section 624-5, Payment Item Numbers 624.020101 and 624.020601 under Pay Unit, **replace** "Metric Ton" with "Ton"

Make the following change to the *Standard Specifications of May 1, 2008* :

(Issued with Prop Makeup for 5/6/10)

Page 218, Section 308-3.07, **Page 608**, Section 624-4.01, **Page 641**, Sections 638-4 and 638-5, **Page 780**, Section 703-09, Method of Measurement, **replace** "metric ton" with "ton"

Page 769, Table 702-9, under Tact Coat Material Designations, **replace** 702-9000, 702-9001, 702-9002, 702-9003, 702-9004 with 702-9001, 702-9002, 702-9003, 702-9004, 702-9005 respectively.

Page 770, Table 702-10, **replace** Note 1 with XX = 01, 02, 03, 04, or 05

Make the following change to the *Standard Specifications of May 1, 2008* :

(Issued with Prop Makeup for 9/2/10)

Page 702, Section 663-3.23 Hydrostatic Testing, last sentence, **replace** "1035 kPa" with "150 psi"

Page 702, Section 663-4.01 Water Pipe, **replace** "0.1 m" with "1/2 foot"

Make the following change to the *Standard Specifications of May 1, 2008* :

(Issued with Prop Makeup for 1/6/11)

Page 520, Section 606-5, under Payment Item Numbers, **delete** Item 606.36.

Make the following change to the *Standard Specifications of May 1, 2008* :

(Issued with Prop Makeup for 5/5/11)

Page 289, Section 501-2.04 C Mobile Concrete Mixing Units, **replace** Tolerances for Water and Admixtures with the following, "Admixtures $\pm 3\%$, Water $\pm 1\%$ "

ERRATA to 2008 STANDARD SPECIFICATIONS

Page 524, Section 607-2 Materials, Steel and Iron Posts, Rails, Braces and Fittings for Chain-Link Fence, *replace* “710-10.03” with “710-10”

Make the following change to the *Standard Specifications of May 1, 2008* :
(*Issued with Prop Makeup for 9/1/11*) No Errata

Make the following change to the *Standard Specifications of May 1, 2008* :
(*Issued with Prop Makeup for 1/12/12*)

Page 517, Table 606-2 under Heavy Post Blocked Out Corrugated Beam and Payment Factor 1.8, *replace* 3’ 1” with 3’ 1 1/2”

Make the following change to the *Standard Specifications of May 1, 2008* :
(*Issued with Prop Makeup for 5/3/12*) No Errata

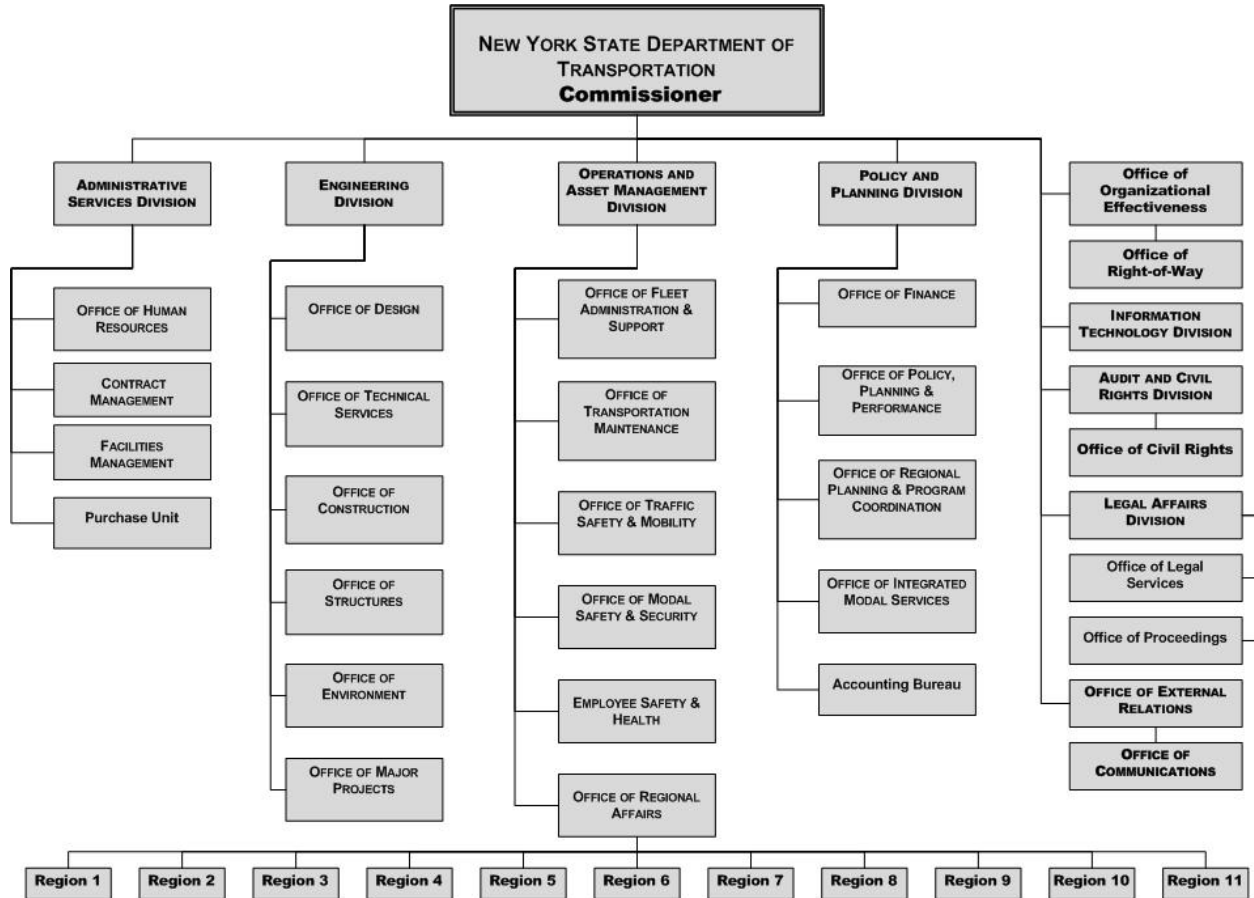
Make the following change to the *Standard Specifications of May 1, 2008* :
(*Issued with Prop Makeup for 9/6/12*)

Section 102-01, Region 1, *delete* Columbia under Counties, *replace* Address with 50 Wolf Road, Albany, NY 12232, (518) 457-3522

Section 102-01, Region 8, *add* Columbia under Counties

OFFICE AND DIVISION NAME CHANGES

The names of the individual Offices and Divisions in the Department have changed. The Office and Division names included in the Standard Specifications shall be referred to as shown in the Organizational Chart below (e.g., Office of Engineering changed to Engineering Division, Design Division changed to Office of Design,...)



REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - ELECTRONIC PLANS AND AMENDMENTS

Make the following changes to the Standard Specifications dated May 4, 2006 and May 1, 2008:

Delete §102-05 *Proposal Submission* and **Replace** it with the following:

102-05 PROPOSAL SUBMISSION.

Each proposal shall be submitted on the proposal form or electronic bid file prepared by the Department for that individual contract. The deadline for submitting a proposal is found in the published notice calling for proposals. Any proposal received after the time specified in the published notice, as modified by any Amendment, will not be accepted. All blank spaces in the proposal form shall be filled in as noted, and no change shall be made in the wording of the proposal or in the items mentioned therein. Bidders shall use dark permanent ink in completing hard copies of the proposal form, and ensure the form is clear and legible. Proposals that are illegible or that contain any omission, erasures, non-permanent ink, alterations, additions, or items not called for in the itemized proposal or that contain irregularities of any kind, may be rejected as informal. Any proposal which does not contain prices opposite each of the items for which there is a quantity exhibited in the itemized proposal, or which shall in any manner fail to conform to the conditions of the published notice inviting proposals, may be deemed informal.

The State is responsible for providing notice of Amendments only to those persons or firms listed as having purchased plans and/or proposals from the Department, and those that made a specific request of the Department for Amendments. Persons or firms that obtain contract documents from sources other than the Department bear the sole responsibility for obtaining any Amendments issued by the Department.

For proposals submitted on the proposal form, the Bidder shall sign in the space provided in the proposal form, with its signature. An officer of a corporation or a member of a partnership signing for the bidder shall place his or her signature and title after the word "By" under the name of the Contractor. The same procedure shall apply to the proposal of a joint venture by two or more bidders with each party of the joint venture submitting a separate signature page. If the signature is by an agent or attorney-in-fact for the joint venturers, then the proposal shall be accompanied by an authenticated copy of the evidence of its authority to act on behalf of all of the joint venturers.

For internet proposals submitted through Bid Express, the Bidder shall submit and digitally sign the electronic bid. For joint ventures submitted electronically, an authenticated copy of the evidence of the authority of the agent or attorney-in-fact for the joint venturers to act on behalf of all of the joint venturers must be submitted to the Contract Management Bureau prior to the Letting.

If the proposal is made by an individual, the individual's address shall be given. If the proposal is made by a corporation, the names and addresses of the president, secretary and treasurer shall be given. If the proposal is made by a partnership, the names and addresses of the partners shall be given.

Delete §102-07 *Modification Or Withdrawal Of Proposal* and **Replace** it with the following:

102-07 MODIFICATION OR WITHDRAWAL OF PROPOSAL.

Permission will not be given to modify or explain by e-mail, telephone, letter or otherwise, any proposal or bid after it has been deposited with the Department. No proposal shall be withdrawn or canceled before the time designated for opening such proposals publicly except upon such conditions as the Commissioner may deem to be necessary.

No proposal shall be withdrawn or canceled after the time designated for opening such proposals publicly, except to exercise the option as provided herein. Any bidder or its duly authorized agent who is physically present at the letting and who has submitted proposals on more than one project of any one letting may, at its option and upon written request to an authorized Department representative at the letting, withdraw any or all of its additional proposals after the person who opens and reads the bids has announced that such bidder has submitted the lowest proposal on a project for which bids have last been read. When this option is exercised, the proposals for other projects in the letting will be returned to the bidder unopened or, if the bid was submitted electronically, the Department will delete the bid(s) and the bid will not be made public. No returned proposals will be considered after the bidder has exercised its privilege to withdraw the same. Any bidder exercising the privilege of so withdrawing its bid or bids waives all claims that may arise should it be found that its opened proposal is informal or for any other reason is unacceptable to the Department. The Department will open and read proposals in the order in which they are drawn and not in the order in which the projects are advertised.

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - ELECTRONIC PLANS AND AMENDMENTS

Delete the first item under the heading “**BY EXECUTING THIS PROPOSAL, THE CONTRACTOR AGREES TO:** of §102-17 and **Replace** it with the following:

1. Perform all work listed in accordance with the Contract Documents including all amendments, (found at <https://www.nysdot.gov/doing-business/opportunities/const-notices>), at the unit prices bid; subject to the Changed Conditions provisions if applicable;

Delete the first paragraph of §103-01 and **Replace** it with the following:

103-01 CONTRACT AWARD. The award of contract will be made only to the lowest responsible bidder as will best promote the public interest as provided by Section 38 of the Highway Law. The lowest bid will be determined by the Commissioner on the basis of gross sum for which the entire work will be performed, arrived at by a correct computation of all contract pay items specified in the proposal, at the unit prices stated in the proposal. If there is any discrepancy between the hard copy and electronic format of the itemized proposals published by the Department, in either the contract pay items or quantities, the Department will evaluate the bids based only on that portion that is common to all formats. The Department reserves the right to reject any or all bids in the best interest of the State pursuant to Section 38 (4) of the Highway Law.

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

Make the following changes to the Standard Specifications of May 4, 2006 and May 1, 2008:
Delete §102-08 and §102-09 in their entirety and **Replace** them with the following:

102-08 SAMPLE STANDARD CLAUSES FOR ALL NYS CONTRACTS. The parties to the attached contract, license, lease, amendment or other agreement of any kind (hereinafter, "the contract" or "this contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party other than the State, whether a contractor, licensor, licensee, lessor, lessee or any other party):

1. EXECUTORY CLAUSE. In accordance with Section 41 of the State Finance Law, the State shall have no liability under this contract to the Contractor or to anyone else beyond funds appropriated and available for this contract.

2. NON-ASSIGNMENT CLAUSE. In accordance with Section 138 of the State Finance Law, this contract may not be assigned by the Contractor or its right, title or interest therein assigned, transferred, conveyed, sublet or otherwise disposed of without the State's previous written consent, and attempts to do so are null and void. Notwithstanding the foregoing, such prior written consent of an assignment of a contract let pursuant to Article XI of the State Finance Law may be waived at the discretion of the contracting agency and with the concurrence of the State Comptroller where the original contract was subject to the State Comptroller's approval, where the assignment is due to a reorganization, merger or consolidation of the Contractor's business entity or enterprise. The State retains its right to approve an assignment and to require that any Contractor demonstrate its responsibility to do business with the State. The Contractor may, however, assign its right to receive payments without the State's prior written consent unless this contract concerns Certificates of Participation pursuant to Article 5-A of the State Finance Law.

3. COMPTROLLER'S APPROVAL. In accordance with Section 112 of the State Finance Law (or, if this contract is with the State University or City University of New York, Section 355 or Section 6218 of the Education Law), if this contract exceeds \$50,000 (or the minimum thresholds agreed to by the Office of the State Comptroller for certain S.U.N.Y. and C.U.N.Y. contracts), or if this is an amendment for any amount to a contract which, as so amended, exceeds said statutory amount, or if, by this contract, the State agrees to give something other than money when the value or reasonably estimated value of such consideration exceeds \$10,000, it shall not be valid, effective or binding upon the State until it has been approved by the State Comptroller and filed in his office. Comptroller's approval of contracts let by the Office of General Services is required when such contracts exceed \$85,000 (State Finance Law Section 163.6.a).

4. WORKERS' COMPENSATION BENEFITS. In accordance with Section 142 of the State Finance Law, this contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

5. NON-DISCRIMINATION REQUIREMENTS. To the extent required by Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

employment because of race, creed, color, sex, national origin, sexual orientation, age, disability, genetic predisposition or carrier status, or marital status. Furthermore, in accordance with Section 220-e of the Labor Law, if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its Subcontractors shall, by reason of race, creed, color, disability, sex, or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, Contractor agrees that neither it nor its Subcontractors shall by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. Contractor is subject to fines of \$50.00 per person per day for any violation of Section 220-e or Section 239 as well as possible termination of this contract and forfeiture of all moneys due hereunder for a second or subsequent violation.

6. WAGE AND HOURS PROVISIONS. If this is a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Contractor's employees nor the employees of its Subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Contractor and its Subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in accordance with the Labor Law. Additionally, effective April 28, 2008, if this is a public work contract covered by Article 8 of the Labor Law, the Contractor understands and agrees that the filing of payrolls in a manner consistent with Subdivision 3-a of Section 220 of the Labor Law shall be a condition precedent to payment by the State of any State approved sums due and owing for work done upon the project.

7. NON-COLLUSIVE BIDDING CERTIFICATION. In accordance with Section 139-d of the State Finance Law, if this contract was awarded based upon the submission of bids, Contractor affirms, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further affirms that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered to the State a non-collusive bidding certification on Contractor's behalf.

8. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with Section 220-f of the Labor Law and Section 139-h of the State Finance Law, if this contract exceeds \$5,000, the Contractor agrees, as a material condition of the contract, that neither the Contractor nor any substantially owned or affiliated person, firm, partnership or corporation has participated, is participating, or shall participate in an international boycott in violation of the Federal Export Administration Act of 1979 (50 USC App. Sections 2401 et seq.) or regulations thereunder. If such Contractor, or any of the aforesaid affiliates of Contractor, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department or any other appropriate agency of the United States subsequent to the contract's execution, such contract, amendment or modification thereto shall be

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

rendered forfeit and void. The Contractor shall so notify the State Comptroller within five (5) business days of such conviction, determination or disposition of appeal (2 NYCRR 105.4).

9. SET-OFF RIGHTS. The State shall have all of its common law, equitable and statutory rights of set-off. These rights shall include, but not be limited to, the State's option to withhold for the purposes of set-off any moneys due to the Contractor under this contract up to any amounts due and owing to the State with regard to this contract, any other contract with any State department or agency, including any contract for a term commencing prior to the term of this contract, plus any amounts due and owing to the State for any other reason including, without limitation, tax delinquencies, fee delinquencies or monetary penalties relative thereto. The State shall exercise its set-off rights in accordance with normal State practices including, in cases of set-off pursuant to an audit, the finalization of such audit by the State agency, its representatives, or the State Comptroller.

10. RECORDS. The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract (hereinafter, collectively, "the Records"). The Records must be kept for the balance of the calendar year in which they were made and for six (6) additional years thereafter. The State Comptroller, the Attorney General and any other person or entity authorized to conduct an examination, as well as the agency or agencies involved in this contract, shall have access to the Records during normal business hours at an office of the Contractor within the State of New York or, if no such office is available, at a mutually agreeable and reasonable venue within the State, for the term specified above for the purposes of inspection, auditing and copying. The State shall take reasonable steps to protect from public disclosure any of the Records which are exempt from disclosure under Section 87 of the Public Officers Law (the "Statute") provided that: (i) the Contractor shall timely inform an appropriate State official, in writing, that said records should not be disclosed; and (ii) said records shall be sufficiently identified; and (iii) designation of said records as exempt under the Statute is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, the State's right to discovery in any pending or future litigation.

11. IDENTIFYING INFORMATION AND PRIVACY NOTIFICATION.

(a) Identification Number(s). Every invoice or New York State Claim for Payment submitted to a New York State agency by a payee, for payment for the sale of goods or services or for transactions (e.g., leases, easements, licenses, etc.) related to real or personal property must include the payee's identification number. The number is any or all of the following: (i) the payee's Federal employer identification number, (ii) the payee's Federal social security number, and/or (iii) the payee's Vendor Identification Number assigned by the Statewide Financial System. Failure to include such number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or Claim for Payment, must give the reason or reasons why the payee does not have such number or numbers.

(b) Privacy Notification. (1) The authority to request the above personal information from a seller of goods or services or a lessor of real or personal property, and the authority to maintain such information, is found in Section 5 of the State Tax Law. Disclosure of this information by the seller or lessor to the State is mandatory. The principal purpose for which the information is collected is to enable the State to identify individuals, businesses and others who have been delinquent in filing tax returns or may have understated their tax liabilities and to generally identify persons affected by the

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

taxes administered by the Commissioner of Taxation and Finance. The information will be used for tax administration purposes and for any other purpose authorized by law. (2) The personal information is requested by the purchasing unit of the agency contracting to purchase the goods or services or lease the real or personal property covered by this contract or lease. The information is maintained in the Statewide Financial System by the Vendor Management Unit within the Bureau of State Expenditures, Office of the State Comptroller, 110 State Street, Albany, New York 12236.

12. EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITIES AND WOMEN. In accordance with Section 312 of the Executive Law and 5 NYCRR 143, if this contract is: (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of \$25,000.00, whereby a contracting agency is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the contracting agency; or (ii) a written agreement in excess of \$100,000.00 whereby a contracting agency is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon; or (iii) a written agreement in excess of \$100,000.00 whereby the owner of a State assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project, then the following shall apply and by signing this agreement the Contractor certifies and affirms that it is Contractor's equal employment opportunity policy that:

(a) The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status, shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on State contracts and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. Affirmative action shall mean recruitment, employment, job assignment, promotion, upgradings, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation;

(b) At the request of the contracting agency, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein; and

(c) The Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the State contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

Contractor will include the provisions of "a", "b", and "c" above, in every subcontract over \$25,000.00 for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon (the "Work") except where the Work is for the beneficial use of the

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State. The State shall consider compliance by a Contractor or Subcontractor with the requirements of any Federal law concerning equal employment opportunity which effectuates the purpose of this section. The contracting agency shall determine whether the imposition of the requirements of the provisions hereof duplicate or conflict with any such Federal law and if such duplication or conflict exists, the contracting agency shall waive the applicability of Section 312 to the extent of such duplication or conflict. Contractor will comply with all duly promulgated and lawful rules and regulations of the Department of Economic Development's Division of Minority and Women's Business Development pertaining hereto.

13. CONFLICTING TERMS. In the event of a conflict between the terms of the contract (including any and all attachments thereto and amendments thereof) and the terms of this Appendix A, the terms of this Appendix A shall control.

14. GOVERNING LAW. This contract shall be governed by the laws of the State of New York except where the Federal supremacy clause requires otherwise.

15. LATE PAYMENT. Timeliness of payment and any interest to be paid to Contractor for late payment shall be governed by Article 11-A of the State Finance Law to the extent required by law.

16. NO ARBITRATION. Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized), but must, instead, be heard in a court of competent jurisdiction of the State of New York.

17. SERVICE OF PROCESS. In addition to the methods of service allowed by the State Civil Practice Law & Rules ("CPLR"), Contractor hereby consents to service of process upon it by registered or certified mail, return receipt requested. Service hereunder shall be complete upon Contractor's actual receipt of process or upon the State's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Contractor must promptly notify the State, in writing, of each and every change of address to which service of process can be made. Service by the State to the last known address shall be sufficient. Contractor will have thirty (30) calendar days after service hereunder is complete in which to respond.

18. PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS. The Contractor certifies and warrants that all wood products to be used under this contract award will be in accordance with, but not limited to, the specifications and provisions of Section 165 of the State Finance Law, (Use of Tropical Hardwoods) which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by the State or any governmental agency or political subdivision or public benefit corporation. Qualification for an exemption under this law will be the responsibility of the contractor to establish to meet with the approval of the State.

In addition, when any portion of this contract involving the use of woods, whether supply or installation, is to be performed by any Subcontractor, the prime Contractor will indicate and certify in the submitted bid proposal that the Subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in §165 State Finance Law. Any such use must

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

meet with the approval of the State; otherwise, the bid may not be considered responsive. Under bidder certifications, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of the State.

19. (VACANT)

20. (VACANT)

21. (VACANT)

22. COMPLIANCE WITH NEW YORK STATE INFORMATION SECURITY BREACH AND NOTIFICATION ACT. Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law Section 899-aa; State Technology Law Section 208).

23. COMPLIANCE WITH CONSULTANT DISCLOSURE LAW. If this is a contract for consulting services, defined for purposes of this requirement to include analysis, evaluation, research, training, data processing, computer programming, engineering, environmental, health, and mental health services, accounting, auditing, paralegal, legal or similar services, then, in accordance with Section 163 (4-g) of the State Finance Law (as amended by Chapter 10 of the Laws of 2006), the Contractor shall timely, accurately and properly comply with the requirement to submit an annual employment report for the contract to the agency that awarded the contract, the Department of Civil Service and the State Comptroller.

24. PROCUREMENT LOBBYING. To the extent this agreement is a "procurement contract" as defined by State Finance Law Sections 139-j and 139-k, by signing this agreement the contractor certifies and affirms that all disclosures made in accordance with State Finance Law Sections 139-j and 139-k are complete, true and accurate. In the event such certification is found to be intentionally false or intentionally incomplete, the State may terminate the agreement by providing written notification to the Contractor in accordance with the terms of the agreement.

25. CERTIFICATION OF REGISTRATION TO COLLECT SALES AND COMPENSATING USE TAX BY CERTAIN STATE CONTRACTORS, AFFILIATES AND SUBCONTRACTORS.

To the extent this agreement is a contract as defined by Tax Law Section 5-a, if the contractor fails to make the certification required by Tax Law Section 5-a or if during the term of the contract, the Department of Taxation and Finance or the covered agency, as defined by Tax Law 5-a, discovers that the certification, made under penalty of perjury, is false, then such failure to file or false certification shall be a material breach of this contract and this contract may be terminated, by providing written notification to the Contractor in accordance with the terms of the agreement, if the covered agency determines that such action is in the best interest of the State.

102-09 SAMPLE STANDARD CLAUSES FOR NON FEDERAL-AID NEW YORK STATE CONTRACTS.

In accordance with §102-14 *Form of Contract and Bid Bond*, the following articles of Appendix A Standard Clauses For New York State Contracts are not applicable to Federal-Aid contracts.

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

19. MACBRIDE FAIR EMPLOYMENT PRINCIPLES. In accordance with the MacBride Fair Employment Principles (Chapter 807 of the Laws of 1992), the Contractor hereby stipulates that the Contractor either (a) has no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles (as described in Section 165 of the New York State Finance Law), and shall permit independent monitoring of compliance with such principles.

20. OMNIBUS PROCUREMENT ACT OF 1992. It is the policy of New York State to maximize opportunities for the participation of New York State business enterprises, including minority and women-owned business enterprises as bidders, subcontractors and suppliers on its procurement contracts. Information on the availability of New York State subcontractors and suppliers is available from:

NYS Department of Economic Development
Division for Small Business
30 South Pearl St -- 7th Floor
Albany, New York 12245
Telephone: 518-292-5220
Fax: 518-292-5884
<http://www.empire.state.ny.us>

A directory of certified minority and women-owned business enterprises is available from:

NYS Department of Economic Development
Division of Minority and Women's Business Development
30 South Pearl St -- 2nd Floor
Albany, New York 12245
Telephone: 518-292-5250
Fax: 518-292-5803
<http://www.empire.state.ny.us>

The Omnibus Procurement Act of 1992 requires that by signing this bid proposal or contract, as applicable, Contractors certify that whenever the total bid amount is greater than \$1 million:

- (a) The Contractor has made reasonable efforts to encourage the participation of New York State Business Enterprises as suppliers and subcontractors, including certified minority and women-owned business enterprises, on this project, and has retained the documentation of these efforts to be provided upon request to the State;
- (b) The Contractor has complied with the Federal Equal Opportunity Act of 1972 (P.L. 92-261), as amended;
- (c) The Contractor agrees to make reasonable efforts to provide notification to New York State residents of employment opportunities on this project through listing any such positions with the Job Service Division of the New York State Department of Labor, or providing such notification in such manner as is consistent with existing collective bargaining contracts or agreements. The Contractor agrees to document these efforts and to provide said documentation to the State upon request; and

REVISIONS TO STANDARD SPECIFICATIONS SECTION 100 - APPENDIX A

(d) The Contractor acknowledges notice that the State may seek to obtain offset credits from foreign countries as a result of this contract and agrees to cooperate with the State in these efforts.

21. RECIPROCITY AND SANCTIONS PROVISIONS. Bidders are hereby notified that if their principal place of business is located in a country, nation, province, state or political subdivision that penalizes New York State vendors, and if the goods or services they offer will be substantially produced or performed outside New York State, the Omnibus Procurement Act 1994 and 2000 amendments (Chapter 684 and Chapter 383, respectively) require that they be denied contracts which they would otherwise obtain. NOTE: As of May 15, 2002, the list of discriminatory jurisdictions subject to this provision includes the states of South Carolina, Alaska, West Virginia, Wyoming, Louisiana and Hawaii. Contact NYS Department of Economic Development for a current list of jurisdictions subject to this provision.

Delete §102-14 in its entirety and **Replace** it with the following:

102-14 FORM OF CONTRACT AND BID BOND. The form of contract and bid bond, if given, shall be that provided by the Department.

All of the following sections which have the word "Sample" in the title are samples of the contract documents executed by the Contractor as a part of the bidding and/or award process. The executed bid documents control and have precedence over the samples presented herein.

A. Federal-Aid Contracts. Federal-Aid contracts are denoted "F.A. Project" on the proposal cover and on the title page. The following subsections of Section 102 apply to all Federal-Aid contracts:

1. §102-01 to §102-07
2. §102-08 (Sample Only)
3. §102-10 to §102-14
4. §102-15 to §102-17 (Samples Only)

B. Non Federal-Aid Contracts. The following subsections of Section 102 apply to all Non Federal-Aid contracts:

1. §102-01 to §102-07
2. §102-08 to §102-09 (Samples Only)
3. §102-10 to §102-14
2. §102-15 to §102-17 (Samples Only)

**METHODS & EQUIPMENT
LAWS, RULES, REGS, & PERMITS**

Make the following changes to the Standard Specifications dated May 4, 2006 and May 1, 2008:

May 4, 2006, Page 82 and May 1, 2008, Page 80;

Delete §105-03 *Methods and Equipment* and **Replace** it with the following:

105-03 METHODS AND EQUIPMENT. Where particular methods or equipment are specifically required, the Contractor may apply in writing to the Regional Director to use alternate methods and equipment to provide the same results. Such alternates may be used only after favorable recommendation by the Regional Director and the written approval of the Deputy Chief Engineer (Construction). When, in the opinion of the Regional Director, satisfactory results are not being obtained using the Contractor's alternate methods and equipment, the methods and/or equipment shall be immediately modified to produce satisfactory results.

The Contractor may use the most efficient equipment that is consistent with conditions at the time of use. It is anticipated that seasonal or weather conditions combined with the nature of the terrain will often require the use of lighter and smaller equipment than might be used under optimum conditions.

Construction operations requiring soil compaction shall not be performed from November 1st thru April 1st except with an approved Winter Earthwork submittal in accordance with §203-3.01 A. *Winter Earthwork Submittal*. In all work incorporated into the final product, the Contractor shall not place material that is frozen, or place fill material on frozen ground regardless of the date.

May 4, 2006, Page 103 and May 1, 2008, Page 102;

Insert the following at the end of §107-01 *Laws, Rules, Regulations and Permits*:

D. Archaeological Salvage. Whenever, during the course of construction, historical or prehistoric objects or human remains are encountered, such objects shall not be destroyed or moved. The Contractor shall stop work to avoid disturbing such areas and notify the Engineer immediately.

The Engineer will notify the appropriate Department personnel and other authorities and arrange to have an immediate inspection of the site conducted.

Removal or salvage of archaeological objects will be considered extra work. Such work will be limited to that performed within the right-of-way, and at any location under direct control of the Contractor used as a source of approved borrow material or a spoil disposal area.

SURVEY AND STAKEOUT

Make the following changes to the Standard Specifications dated May 4, 2006 and May 1, 2008:

May 4, 2006, Page 88 (as modified by EI 06-007) and May 1, 2008, Page 85;

Delete §105-10 *Survey and Stakeout* in its entirety and **Replace** it with the following:

105-10 SURVEY AND STAKEOUT.

Prior to the start of construction work, all right of way markers, property line markers and survey control markers located in or adjacent to areas which may be disturbed during construction shall be properly protected and tied to fixed reference points or located from established contract control. Upon completion of the work, all right of way or property line markers or survey markers that have been disturbed by the Contractor, shall be reset under the direction of a Land Surveyor. Field location notes shall be recorded and made available to the Engineer upon request at no additional cost to the State.

All survey control and boundary location work shall be performed in accordance with the Department's *Land Surveying Standards and Procedures Manual* under the direction of a Land Surveyor.

All survey work performed for quality control by the Contractor and for quality assurance by the Department should both utilize: (1) similar levels of measurement precision and methods to perform positional measurements, (2) the same control network from which measurements are made, and (3) the same survey measurement procedures to ensure consistency of results.

Terrain features are measured and positioned by various methods relative to the contract control network established for each contract. The precision with which an instrument or equipment positions a point is related to the quality of the method by which measurements are made, and the ability to duplicate the same measurement. The local accuracy of a located point is the closeness of the measured or computed value to a standard or accepted value (actual spatial position on the earth). Positional tolerance is the allowable spatial difference between making measurements by two different methods or by the same method at separate times, all of which have the same level of precision.

Horizontal coordinates and vertical elevations of existing features provided as part of the contract are located in the field based on accuracies achievable for each positional point relative to the contract control. Positional accuracies are directly related to the strength of the contract control network, the methods used to make the measurements, the precision of the instruments used to measure to the feature, and how definable the feature is which is being located. Point feature locations represent a single position (for example: property line marker, sign post, utility pole, or fire hydrant) and can be re-identified or verified in the field to within a small variation (high confidence level) from where they were initially positioned. Linear feature locations define the alignment of that feature. That alignment can be verified to within a specific tolerance depending on the spacing or frequency at which the points were originally measured to define that alignment. Straight or uniformly curved linear features (for example: curblines, edge of roadway, or edge of sidewalk) which can be easily defined in the field should have a relatively small positional variation from their designed location when compared to a verified field location. Irregular shaped or not as clearly defined linear features (for example: break lines, ditchlines, treelines, or environmental area perimeters) which are sometimes difficult to define or delineate precisely in the field, could have a larger variation from where they were initially positioned when compared to a field-verified location.

Digital terrain model (DTM) surfaces, when provided by the Department, are made up of a combination of point and linear features. The precision of a data collection instrument does not necessarily indicate what positional tolerance should be expected of any feature verified from an existing DTM. The location or elevation of a feature selected from a DTM surface can, at best, be determined by interpolating the horizontal position or elevation between previously located points. The verification of any specific elevation on the DTM surface is directly related to: (1) the spacing of collected data or breaklines used to produce that surface; (2) the uniformity of the surface being measured; (3) the steepness of the slope of that surface; and (4) how obscured the surface is from the measuring technique used to originally locate the surface. Standardized procedures for determining the spacing/frequency of point and linear features (including break lines), are critical to providing consistent results. Department standardized procedures for determining feature locations are described in both the "Land Surveying Standards and Procedures Manual", and the "Specifications for Photogrammetric Stereocompilation".

Verification of the positional tolerance of the DTM surface elevation requires a comparison of the original

SURVEY AND STAKEOUT

collected point data with recollected point data measured at the same horizontal locations. Field comparisons to interpolated DTM surfaces or recreated surface information (from other information sources) shall not be used for verification of the positional tolerance of a feature. Comparisons of re-measured point data can only be made with the original collected point data, not to interpolated positions. Measurements for verification of DTM point data shall also be made from the same contract control network, and by instruments capable of an equal or greater precision.

D262100
WORKER SAFETY TRAINING

Make the following changes to the Standard Specifications of May 1, 2008:

Page 104, **Delete** §107-05B. *Project Safety and Health Plan* and **Replace** it with the following:

B. Project Safety and Health Plan. The Contractor shall perform all necessary planning, supervision, and training activities to ensure that all of the requirements of 29 CFR 1926 are fully met for all workers employed in the construction of the contract. The Contractor shall provide to the Department prior to the start of work satisfactory evidence that all current requirements of 29 CFR 1926 will be adequately addressed. As a minimum, the Contractor shall provide a written Project Safety and Health Plan which documents the Contractor's company policy relative to safety, and which identifies and addresses specific safety and health concerns to be encountered on the project. Before the work begins and periodically throughout the project, the Contractor's project supervision staff shall meet with the Engineer to review and discuss the status of safety issues on the project. An appropriate notice shall be posted on the contract site that the Project Safety and Health Plan is available for examination by any worker employed on the project. As a minimum this plan shall include the following items:

- Identification of project and company safety officers.
- Hazardous Materials Communications Plan.
- Employee Safety Training Program.
- Company safety policy.
- Procedures to address project safety and health concerns.
- Procedures to address distraught, emotionally disturbed persons and/or homeless persons.
- Procedures for compelling worker compliance with safety and health requirements.

Certain of these items may be submitted in the format of a Company Safety and Health Program, with the Project Safety and Health Plan limited to project-specific issues.

The Contractor shall ensure that each subcontractor employed on the project complies with this requirement. The Contractor shall provide to the Department a Project Safety and Health Plan covering all work to be done by the subcontractor prior to starting work. As an alternative, the Contractor may provide a certification that all activities performed by and workers employed by the subcontractor will be subject to the Contractor's Project Safety and Health Plan.

Submission of the required Project Safety and Health Plan by the Contractor and its acceptance by the Department shall not be construed to imply approval of any particular method or sequence for addressing safety and health concerns, or to relieve the Contractor from the responsibility to adequately protect the safety and health of all workers involved in the project as well as any members of the public who are affected by the project.

In accordance with NYS Labor law §220-h, all laborers, workers, and mechanics shall be certified prior to performing any work on the contract as having successfully completed a course in construction safety and health approved by the US Department of Labor's Occupational Safety and Health Administration (OSHA) that is at least ten hours in duration. The Contractor shall attach proof of completion to first certified payroll for initial workers, and to subsequent payrolls for new or additional workers. The Contractor shall clearly indicate on subsequent payrolls any workers not previously employed on that contract. If no proof of completion has been submitted for a worker listed on a certified payroll, the Engineer will alert the Contractor to this fact. If the Contractor cannot provide proof of completion and the worker continues to work, the Department will notify the Contractor in writing with a copy to the NYSDOL by e-mail at PWAsk@labor.state.ny.us.

DRILLING AND BLASTING

Make the following changes to the Standard Specifications dated May 4, 2006 and May 1, 2008:

§107-05 Safety and Health Regulations **Delete** paragraph *N. Drilling and Blasting* entirely and **Replace** it with the following:

N. Drilling and Blasting. Blasting shall be performed in accordance with the Department publication entitled *Procedures for Blasting*. This publication is available upon request from the Regional Director or the Director, Geotechnical Engineering Bureau.

The Contractor shall submit a written Blast Plan in accordance with *Procedures for Blasting* for approval by the Department a minimum of 10 work days prior to start of blasting operations. A preblast meeting relative to the method, manner and procedure of blasting operations shall be held with the Engineer, the Contractor, the Blaster, a Departmental Engineering Geologist and representatives of all interested agencies prior to the commencement of drilling and blasting operations.

Whenever explosives are used, they shall be of such character and strength and in such amounts as permitted by state and local laws and ordinances and all agencies having jurisdiction over them. The Department reserves the right to specify the maximum size of the charges. Blasting shall be done only when the Engineer and those agencies shall approve and under such restrictions as they may impose.

If a blast causes injury, damage to property, adverse affects upon traffic, or causes gases to migrate and/or accumulate in a potentially harmful manner, all blasting operations shall cease by order of the Engineer for a review of the procedures. The review will be conducted by the Engineer in conjunction with an Engineering Geologist to ensure that proper procedures and practices were used to determine if the approved procedures need to be revised. Should the findings of the review indicate the injury, damage, traffic delay, or migration/accumulation of gases was attributed to improper blasting operations, the blaster of record may be removed at the Department's option.

The Contractor shall meet all the requirements of 12 NYCRR 23, 12 NYCRR 39, and 12 NYCRR 61, which include but are not limited to the licensing for ownership, possession, transportation, or use of explosives, certifications for blasters, and provisions for storage, construction and maintenance of magazines.

USAGE OF CELL PHONES/SMARTPHONES/ENTERTAINMENT DEVICES

Make the following changes to the Standard Specifications of May 1, 2008:

Page 114 **Insert** §107-05U. *Use of Personal Entertainment Devices and Portable Phones.*

U. Use of Personal Entertainment Devices and Portable Phones. The Contractor shall ensure that workers are able to perceive hazards, are not distracted from their tasks, and are not creating hazard(s) through the use of personal entertainment devices. The Contractor shall ensure that portable phones, two-way radios, and other communication devices are used by workers for performing work tasks only. Flaggers shall use portable phones, two-way radios, and other communication devices only to communicate with other flaggers, workers or supervisors regarding flagging operations. Equipment operators shall use portable phones, two-way radios or other communication devices while actively operating equipment only for communicating with workers performing directly related work tasks. Truck drivers shall use hands free technology for all calls while driving within work zones. Portable phones, two-way radios, and other communication devices shall be equipped with hands-free technology whenever practicable. Workers shall not use personal entertainment devices with earphones such as radios, iPods, MP3 players, media players, or other personal listening devices while working.

Page 579, **Delete** §619-3.02L.2, as modified and **Replace** it with the following:

2. Flagger Equipment. Flaggers shall wear orange protective helmets and traffic control apparel in accordance with §107-05A. *High Visibility Apparel.* Flaggers shall be appropriately dressed, including apparel that covers the legs, torso, and arms with sleeves a minimum of 100 mm long and appropriate footwear. Immodest or sloppy dress will not be permitted. Flaggers shall be equipped with an emergency air horn to alert workers of errant vehicles or other dangerous situations. Where flaggers are not within sight of each other, each flagger shall be equipped with a communication device, such as portable phone or two-way radio. The communication device shall only be used to communicate with other flaggers, other workers, or supervisor(s) regarding the flagging operations. Where the distance between flaggers is more than 1 km or where shown in the contract documents, the Contractor may use pilot cars to lead lines of vehicles through the work zone.

The standard signaling device for flagging operations, where one or more flaggers are controlling a single stream of traffic or two alternating streams of traffic in opposite directions, shall be STOP/SLOW signal paddles. Red signal flags may be used where display of the STOP and SLOW faces in opposite directions may be inappropriate or misleading.

INSURANCE

Make the following changes to the Standard Specifications dated May 4, 2006 / May 1, 2008:

Delete §107-06 and **Replace** it with the following:

107-06 INSURANCE. The Contractor shall procure, at its own sole cost and expense, and shall maintain in force at all times during the term of this contract including any extensions or renewals until Contract Final Acceptance, the policies of insurance covering all operations under the contract whether performed by it or its subcontractors as herein below set forth, written by companies authorized by the New York State Insurance Department to issue insurance in the State of New York and that have an A.M. Best Company rating of (A -) or better or approved by the Department. The Department may, at its sole discretion, permit the placement of policies with a non-authorized carrier or carriers upon request by the Contractor accompanied by the documentation required by 11 NYCRR §27.0 *et seq.*; provided that nothing herein shall be construed to require the Department to accept insurance placed with a non-authorized carrier under any circumstances. The Contractor shall deliver to the Department evidence of such policies as the Department deems necessary to verify that the required insurance is in effect.

A. Conditions Applicable to Insurance. All policies of insurance required by this agreement must meet the following requirements:

- 1. Coverage Types and Policy Limits.** The types of coverage and policy limits required from the Contractor are specified in Paragraph B *Insurance Requirements* below. General liability insurance shall apply separately on a per-job or per-project basis.
- 2. Policy Forms.** Except as may be otherwise specifically provided herein or agreed in writing by the Department, policies must be written on an **occurrence** basis. In the event that occurrence-based coverage is not commercially available, claims-made policy forms will be considered provided that, at minimum, it includes provisions that allow for (a) reporting circumstances or incidents that may give rise to future claims and (b) an extended reporting period of not less than three (3) years with respect to events that occurred but were not reported during the term of the policy.
- 3. Certificates of Insurance/Notices.** Contractor shall provide a Certificate or Certificates of Insurance, in a form satisfactory to the Commissioner, before commencing any work under this contract. Certificates or transmittal correspondence shall reference the NYSDOT Contract D Number. Certificates shall be mailed to the:

Office of Contract Management
New York State Department of Transportation
 50 Wolf Rd.
 Albany, NY 12232

Unless otherwise agreed, policies shall be written so as to require that the policy will not be (i) canceled, (ii) materially changed or (iii) permitted to expire or lapse for any reason except upon thirty (30) days' prior written notice to the Department by Certified Mail, Return Receipt Requested at the address stated above. In addition, if required by the Department, the Contractor shall deliver to the Department within forty-five (45) days of such request a copy of any or all policies of insurance not previously provided, certified by the insurance carrier as true and complete. Certificates of Insurance shall:

- a. Be in the form provided by the Department (C218 or successor) unless the Department specifically approves a different form. The ACORD forms of Certificate of Insurance are not acceptable.
- b. Be signed by an authorized representative of the insurance carrier or producer and be acknowledged before a notary public.
- c. Disclose any deductible, self-insured retention, aggregate limit or any exclusion to the policy that materially changes the coverage required by the contract.

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- d. Specify the Additional Insureds and Named Insureds as required herein.
- e. Refer to this Contract by number on the face of the certificate, and
- f. Expressly reference the inclusion of all required endorsements.

If at any time during the term of this contract, it shall come to the attention of the Department that required insurance is not in effect or that adequate proof of insurance has not been provided, the Department may, at its option:

- a. Direct the Contractor to suspend work and not re-enter the premises with no additional payment or extension of time due on account thereof, or
- b. May withhold further contract payments in accordance with Article 8 *No Payment Due to Contractor's Non-Compliance* of the contract agreement, or
- c. Treat such failure as a breach or default of the contract.

4. Additional Insureds. All insurance policies required by these specifications, except workers' compensation and professional liability shall be endorsed to provide coverage to "**The State of New York/New York State Department of Transportation, any municipality in which the work is being performed, any public benefit corporation, railroad, or public utility whose property or facilities are affected by the work, and any consultants working for or on the project, and their agents or employees**" with respect to any claim arising from the Contractor's Work under this contract or as a result of the Contractor's activities. The endorsement shall be effected by endorsement of the applicable policy using ISO form CG 20 10 11 85, CG 20 37 07 04, CG 20 33 07 98 when used in combination with CG 20 37 07 04, or CG 20 33 10 01 or a form(s) that provides equivalent coverage.

5. Primary Coverage. All insurance policies, excepting workers' compensation, shall provide that the required coverage shall be primary as to any other insurance that may be available to the Department for any claim arising from the Contractor's Work under this contract, or as a result of the Contractor's activities.

6. Waiver of Subrogation. As to every type and form of insurance coverage required from the Contractor, there shall be no right of subrogation against **the State of New York/New York State Department of Transportation, its agents or employees.** To the extent that any of Contractor's policies of insurance prohibit such a waiver of subrogation, Contractor shall secure the necessary permission to make this waiver.

7. Policy Renewal/Expiration. At least thirty (30) calendar days prior to the expiration of any policy required by this contract, evidence of renewal or replacement policies of insurance with terms no less favorable to the Department than the expiring policies shall be delivered to the Department in the manner required for service of notice in Paragraph A.3. *Certificates of Insurance/Notices* above.

8. Self-Insured Retention/Deductibles. Contractors utilizing self-insurance programs are required to provide a description of the program for Department approval. Collateralized deductible and self-insured retention programs administered by a third party may be approved. Except as may be specifically provided in the Contract Documents of a particular project, Contractor or third-party-administered insurance deductible shall be limited to the amount of the bid deposit or \$100,000.00, whichever is less. Security is not required if it is otherwise provided to an administrator for an approved risk management program. The Department will not accept a self-insured retention program without security being posted to assure payment of both the self-insured retention limit and the cost of adjusting claims. The Contractor shall be solely responsible for all claim expense and loss payments within any permitted deductible or self-

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insured retention. If the Contractor's deductible in a self-administered program exceeds the amount of the bid deposit, the Contractor shall furnish an irrevocable Letter of Credit as collateral to guarantee its obligations. Such Letter of Credit or other collateral as may be approved by Department must be issued by a guarantor or surety with an AM Best Company rating of (A -) or better. If, at any time during the term of this agreement, the Department, in its sole discretion, determines that the Contractor is not paying its deductible, it may require the Contractor to collateralize all or any part of the deductible or self-insured retention on any or all policies of insurance or, upon failure to promptly do so, the same may be withheld from payments due the Contractor.

9. Waiver of Indemnities. The Contractor waives any right of action it and/or its insurance carrier might have against the Department (including its employees, officers, commissioners, or agents) for any loss that is covered by a policy of insurance that is required by this contract. The Contractor waives any right of action it and/or its insurance carrier might have against the Department (including its employees, officers, commissioners, or agents) for any loss, whether or not such loss is insured.

10. Subcontractor's Liability Insurance. In the event that any portion of the work described in this contract is performed by an approved subcontractor, the insurance requirements of this Article shall be incorporated into the subcontract agreement. Subcontractor insurance requirements shall include the requirements for Workers' Compensation, Commercial General Liability, and, if applicable, Commercial Auto and/or Professional Liability. Excess or umbrella insurance is not required for subcontractors. Contractor shall require that Certificates of Insurance, meeting the requirements of the Department are provided to the Department documenting the insurance coverage for each and every subcontractor employed by them to do work under this contract.

B. Insurance Requirements. The types of insurance and minimum policy limits shall be as follows:

1. Workers' Compensation and Disability Insurance. As required by State Finance Law §142, the Contractor shall maintain in force workers' compensation insurance upon forms required by or acceptable to the Workers Compensation Board for all of Contractor's employees. Contractor shall also maintain disability insurance as required by the Disability Benefits Law of the State of New York.

2. Commercial General Liability Insurance. The Contractor shall maintain an occurrence form commercial general liability policy or policies insuring against liability arising from premises (including loss of use thereof), personal injury or death, advertising injury, liability insured under an insured contract (including the tort liability of another assumed in a business contract) occurring on or in any way related to the premises or occasioned by reason of the operations of Contractor. Such coverage shall be written on an ISO occurrence form (ISO Form CG 00 01 12 07 or a policy form providing equivalent coverage) in an amount of not less than \$1,000,000.00 per occurrence and not less than \$2,000,000.00 aggregate. Unless otherwise provided, the policy or policies of insurance providing the liability coverage shall include:

- a. Coverage for contractual liability assumed by the Contractor insured under an insured contract (including the tort liability of another assumed in a business contract).
- b. All insurance policies required by these specifications except workers' compensation and professional liability shall be endorsed to provide coverage to **"the State of New York/New York State Department of Transportation, any municipality in which the work is being performed, any public benefit corporation, railroad, or public utility whose property or facilities are affected by the work, or any consultant inspecting engineer or inspector working for or on the project, and their agents or employees"** using ISO form CG 20 10 11 85, CG 20 37 07 04, CG 20 33 07 98 when used in combination with CG 20 37 07 04, or CG 20 33 10 01 or a policy form or forms providing equivalent coverage.

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- c. Products-Completed Operations Coverage, as provided in the General Liability Policy, or in certain instances through ISO form CG 26 11 09 99 or suitable equivalent.
- d. Where contract work will be performed by unregistered off-road equipment, Contractor shall provide documentation of a blanket Pollution Liability policy, or an endorsement to cover short-term pollution events, ISO form CG 04 33 10 01 or equivalent.
- e. Coverage for claims for bodily injury asserted by an employee of an additional insured and any Employer Liability Exclusion which may otherwise operate to exclude such coverage shall be voided in this respect.
- f. Explosion, Collapse and Underground Hazards coverage (“XCU”) (*for contracts that call for the performance of excavating, underground work, and/or the use of blasting equipment*).

3. Commercial Automobile Insurance including liability and required coverage for New York (*applicable to any project where automobiles or other vehicles will be employed to complete the work*). In the event that automobiles are used in connection with Contractor’s business or operations with the Department, the Contractor shall maintain a commercial or other automobile policy or policies insuring against liability for bodily injury, death, or damage to property and other mandatory coverages, relating to the use, operation, loading or unloading of any of Contractor’s automobiles (including owned, hired and non-owned vehicles) on and around the project. This should be ISO form CA 00 01 10 01, CA 00 01 01 87 or a policy form providing equivalent coverage along with mandatory New York endorsements. Coverage shall be in an amount of not less than \$1,000,000.00 each accident.

4. Umbrella or Excess Liability Insurance. The Contractor shall maintain an occurrence form umbrella liability policy or policies insuring against liability arising from premises (including loss of use thereof), operations, independent Contractors, products-completed operations, personal injury and advertising injury, and liability insured under an insured contract (including the tort liability of another assumed in a business contract) occurring on or in any way related to the premises or occasioned by reason of the operations of Contractor or arising from automobile liability as described above. Such coverage shall be written on an ISO occurrence form CU 00 01 12 07 or a policy form providing equivalent coverage. In the event that umbrella coverage is unavailable, equivalent excess coverage may be substituted. The minimum required limits for the umbrella/excess coverage shall be sufficient to provide a total of not less than \$5,000,000.00 per occurrence/ aggregate.

5. Special Protective and Highway Liability Policy. The Contractor shall maintain, separate and apart from its umbrella policy, a policy issued to and covering the liability of the People of the State of New York, The State of New York, the Commissioner of Transportation, all employees of the Department of Transportation both officially and personally, any municipality in which the work is being performed, any public benefit corporation, railroad, or public utility whose property or facilities are affected by the work, or any consultant inspecting engineer or inspector working for or on the project, and their agents or employees, against damages that the insureds may be held legally liable to pay for property damage, personal injuries, or death that is caused by any occurrence that takes place within any location where work is to be or is being performed by Contractor, including at the location of any of the work. This should be ISO form CG 00 14 12 or a policy form providing equivalent coverage along with mandatory New York endorsements. Coverage shall be in an amount of not less than \$1,000,000.00 per occurrence and at least \$2,000,000.00 for each aggregate limit.

6. Contractor’s Risks. The Contractor shall be responsible for obtaining any insurance it deems necessary to cover its own risks, including without limitation: (a) business interruption, such as gross earnings, extra expense, or similar coverage, (b) personal property, and/or (c) automobile physical damage and/or theft. In no event shall the Department be liable for any damage to, or loss of, personal property, or

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damage to, or loss of, an automobile that is covered by a policy of insurance that is required by this agreement, even if such loss is caused by the negligence of the Department.

7. Builders' Risks Policy. *(applicable to projects that call for the construction of any "Structure" or building, including, but not limited to pump stations and in connection with such projects, only to the extent of the value associated with such construction).* The Contractor shall procure and maintain a Builder's Risk policy in a form such as ISO form CP 00 20 10 90 or a policy form providing equivalent coverage, covering the perils insured under and including the special causes of loss form, including collapse,. Subject to the allowances stated in Paragraph A.8. *Self-Insured Retention/Deductibles*, above, the deductible not to exceed the amount of the bid deposit or \$100,000.00, whichever is less, covering the total value of work performed and equipment, supplies and materials at the location of the Work as well as at any off-site storage locations. Policy shall cover the total value of structures and buildings, supplies and materials at the location of the Work as well as at any off-site storage locations. Sub-limits for loss caused by Flood and Earthquake are acceptable. The policy shall cover the cost of removing debris, including demolition as may be legally necessary by the operation of any law, ordinance or regulation, and for loss or damage to any owned, borrowed, leased or rented capital equipment, tools, including tools of their agents and employees, staging towers and forms, and property of Department held in their care, custody and/or control. Such policy shall name the Contractor as insured, and The People of the State of New York, and Subcontractors as additional insureds.

8. Professional Liability/ Errors and Omissions. *(applicable to professional services requiring the signature, stamp or certification of a licensed professional, including, without limitation, erection plans, demolition plans, containment plans, coffer dams, and temporary sheeting.)* The Contractor shall maintain at its own expense or shall require to be maintained, such insurance as is customary to compensate Department for any claims or losses that occur because of Contractor's errors, omissions malpractice or breach of professional obligations. Such policy or policies may be written on a claims-made form so long as coverage is maintained to be in effect to cover claims arising from the performance of services under this contract. Said coverage may be subject to a deductible or self-insured retention level of no more than \$250,000.00 subject to approval by Department, such approval not to be unreasonably withheld, except that it is also agreed that Department may withhold payment for services rendered under this contract in the event, and to the extent of any deductible in the event that a claim is asserted. Such coverage shall be written on a claims-made basis (or a policy form providing equivalent coverage) in an amount of no less than \$5,000,000.00 per claim and not less than \$5,000,000.00 in the aggregate.

9. Railroad Protective Liability Insurance. *(applicable to any Work Affecting Railroads as described in §105-09.)* The Contractor shall maintain at its own expense railroad protective liability policy of insurance in the name of the affected railroad and with limits of coverage as specified in the Special Notes on Railroad Insurance, or if no limits of coverage are specified, the limits shall be not less than \$5,000,000.00 combined Bodily Injury Liability and/or Property Damage for each occurrence with a \$10,000,000.00 Aggregate Limit applying separately to each annual period. Said policy shall be subject to the approval of the railroad and comply with 23 CFR 646 Subpart A.

Delete §107-09 and **Replace** it with the following:

107-09 DAMAGE. All damage, direct or indirect, of whatever nature resulting from the performance of the work or resulting to the work during its progress from whatever cause, including omissions and supervisory acts of the State, shall be borne and sustained by the Contractor, and all work shall be solely at its risk until it has been finally inspected and accepted by the State except that:

A. Damage by Public Traffic. Payment shall be made to the Contractor for repair or replacement of any permanent element of the highway which is completed to the stage of serving its intended function and is subsequently damaged by accident by public traffic. The Contractor must supply satisfactory evidence that such damage was caused by a public traffic accident and not by vandalism or by the Contractor's equipment.

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Satisfactory evidence shall generally be limited to: accident reports filed with the NYS Department of Motor Vehicles, police agencies or insurance companies; statements by reliable, unbiased eye witnesses; or identification of the vehicle involved in the accident. Physical evidence that the damage was caused by a motor vehicle (such as tire marks or broken headlight glass) will not be sufficient unless it can be shown that the damage was not caused by the Contractor's vehicles or by vandalism.

Work for which there is a bid item will be paid for at the unit price for that item. Work for which there is no bid item will be paid for at an agreed price or by means of force account. Payment will not be made for repair or replacement in any way connected with untimely failure of any portion of the highway under public traffic, and the determination regarding this matter shall be made by the Regional Director, taking into consideration the normal life and the amount of normal wear of the element involved. This provision does not relieve the Contractor of the responsibility of maintenance and protection of traffic for the contract or the responsibility of having wholly complete and acceptable work at the time of final inspection and contract acceptance. Payment for such damage shall be made only after the Contractor has demonstrated to the satisfaction of the Regional Director that it had made every reasonable effort to collect the costs from the person or persons responsible for damage.

The Contractor shall not be responsible for damages resulting from faulty designs as shown in the contract documents nor damages resulting from willful acts of Department officials or employees and nothing in this paragraph or contract shall create or give to third parties any claim or right of action against the Contractor or State beyond such as may legally exist irrespective of this paragraph or contract.

B. Damage by Occurrence. The term "Occurrence" shall include only those floods, droughts, tidal waves, fires, hurricanes, earthquakes, windstorms or other storms, landslides or other catastrophes when such occurrences or conditions and effects have been proclaimed a disaster or state of emergency by the President of the United States, or the Governor of New York State, or the Federal Highway Administrator, or the chief executive of a county or city.

If damage to the work in progress is caused by an Occurrence, and to the extent that such damage has been determined by the Department to be beyond that which may be anticipated from heavy storms, and also to the extent that such damage is not reimbursable by insurance carried by the Contractor, the Contractor may apply to the State to pay or participate in the cost of repairing the damage to the work, unless such damage is caused by the Contractor's action or inaction or the Contractor's means and methods of construction.

The Contractor's written request for the State to pay or participate in the cost of rebuilding, repairing, restoring or otherwise remedying damage to the work caused by an occurrence shall be submitted to and approved by the Commissioner before performing any work other than emergency work, including emergency work necessary to provide for passage of public traffic.

At the sole discretion of the Department, the contract may be terminated and the Contractor relieved of further obligation to perform the work.

C. Obligation to Indemnify by the Contractor. To the fullest extent permitted by law, the Contractor shall indemnify and save harmless the State, any municipality in which the work is being performed, and/or any public benefit corporation, railroad, or public utility whose property or facilities are affected by the work, from suits, claims, actions, damages and costs, of every name and description arising from the work under its contract during its prosecution and until the final acceptance thereof. The Contractor and any assigns, heirs, or successors in interest shall also indemnify and save harmless, to the fullest extent permitted by law, any consultant working for or on the project from suits, claims, actions, damages and costs involving personal injury and property damage arising from the Contractor's work under the contract during its prosecution and until the final acceptance thereof. The State may retain such monies from the amount due the Contractor as may be necessary to satisfy any claim for damages recovered against the State, any municipality in which the work is being performed, and/or any public benefit corporation, railroad or public utility whose property or facilities are affected by the work, or consultants working for the State on or for the project. The Contractor's obligation under this paragraph shall not be deemed waived by the failure of the State to retain the whole or any part of such monies due the Contractor, nor where such suit, action, damages and/or costs have not been resolved or determined prior to release of any monies to the Contractor under the contract, nor shall such obligation be deemed limited or discharged by the enumeration or procurement of any insurance for liability for damages

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imposed by law upon the Contractor, Subcontractor or the State, any municipality in which the work is being performed, and/or any public benefit corporation, railroad or public utility whose property or facilities are affected by the work, or any consultants working for the State on or for the project.

The Contractor has the obligation, at its own expense, for the defense of any action or proceeding which may be brought against the parties specified in paragraph §107-09 C. *Obligation to Indemnify by the Contractor*. This obligation shall include the cost of attorneys' fees, disbursements, costs and other expenses incurred in connection with such action or proceeding.

Such obligation does not extend to those suits, actions, damages and costs of every name that arise out of the sole negligence of the State, any municipality in which the work is being performed, and/or any public benefit corporation, railroad or public utility whose property or facilities are affected by the contract work, or any consultants working for the State, their agents or employees, relative to the construction, alteration, or repair or maintenance of a building, highway or structure and appurtenances and appliances thereof including moving, demolition and excavating connected therewith.

D. Prompt Response to Claims by the Public. The Contractor's responsibility for the contract site applies to the full limits of the contract regardless of the extent or nature of contract work at a particular location. This obligation begins when the contract is awarded and continues until contract final acceptance. The Contractor shall promptly address all written damage claims of the public and, if not addressed directly, claims shall be promptly turned over to the Contractor's insurance carrier without prejudicing the validity of the claim. There should be an interval of no more than ten (10) work days between receipt of a written claim by the Contractor and receipt by the carrier. The Contractor and/or the Insurance Carrier are expected to investigate, determine and adjust such claims promptly and fairly with notice to the Engineer. The Engineer will monitor claims by the public. If the Contractor fails to provide satisfactory resolution through a timely claims adjustment process or denies the claim without proper cause and justification, the Department may invoke Article 8 *No Payment Due to the Contractor's Non-Compliance* of the contract or utilize other remedies.

SECTION 107-13 RELEASE TO PERFORM CONTRACT WORK ON PRIVATE LAND

Make the following changes to the Standard Specifications of May 1, 2008:

Page 125 Add:**SECTION 107-13 RELEASE TO PERFORM CONTRACT WORK ON PRIVATE LAND**

Use of Adjacent Land for Contract Work: The contractor shall not enter upon any parcel until the proper rights of entry have been obtained as stated in §105-15. Releases may be used for contract work outside of the existing right-of-way that minimizes the construction impacts of the project on a property owner and is not essential for the construction of the project. Work performed under a release may include: plantings; unsound and hazardous tree removal; minor grading; and reconnection of private driveways, walkways and utilities.

The Department will secure all releases prior to the contractor performing contract work on private parcels. The contractor may not secure releases for contract work. If a release is not obtained, the contractor shall not enter upon the parcel and the work will be removed from the contract.

Any damage resulting from the contractor's work on private property shall be satisfactorily repaired or items replaced at the contractor's expense.

The engineer will coordinate with the property owner to determine the disposition of removed trees in accordance with state and federal requirements and guidelines, which may require chipping or other disposal in accordance with §201.

Use of Adjacent Land for Contractor Staging, Access and Office Space: A release letter is not used for property rights acquired by the contractor (e.g., rental of property for equipment staging, office space or material storage). The contractor is responsible to the landowner and the contractor shall provide the Department with a copy of the lease, rental agreement, deed, contract to perform private work in trade for property rights, etc. prior to entering private land.

D262100
PROMPT PAYMENTS BY THE CONTRACTOR

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Make the following changes to the Standard Specification of May 4, 2006 / May 1, 2008:

Delete §109-07 *Prompt Payments by the Contractor* and **Replace** it with the following:

109-07 PROMPT PAYMENTS BY THE CONTRACTOR. In accordance with Section 139-f(2) of the State Finance Law, the Contractor shall pay each Subcontractor and materialman for the value of work performed pursuant to contract no later than seven (7) calendar days from the receipt of each payment the Contractor receives from the State. Payment by the Contractor to Subcontractors or materialmen shall reflect the quantities or percentage of work completed by the Subcontractor or materials furnished by the materialmen, and paid by the State; and such payment shall be based upon the actual conditions of the subcontract or purchase order. The Contractor shall not hold any retainage, but may deduct an amount necessary to satisfy any claims, liens or judgments against a Subcontractor or materialman which have not been fully discharged.

The Contractor shall maintain an accounting system acceptable to the Department to track payments made by the State to the Contractor and payments made by the Contractor to each Subcontractor, Manufacturer, Fabricator or Material Supplier by item and by date. The Contractor shall enter payment data into the current Department approved civil rights reporting system in accordance with §105-21 *Civil Rights Monitoring and Reporting*, with any exceptions noted and explained.

EXCAVATION AND EMBANKMENT

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 153, **Delete** the first paragraph of §202-3.09 and **Replace** it with the following:

The appropriate construction details specified for Section 203 *Excavation and Embankment*, as stated in §203-3.01 *General* through and including §203-3.02 *Unclassified Excavation and Disposal* shall apply. The excavation shall be dewatered and kept free from water, snow and ice when necessary.

Page 186, **Delete** “§203-1.01” in the first paragraph of §206-1.01 and **Replace** it with “Section 203, *Definitions*”.

Page 187, **Delete** the first paragraph of §206-3.01 entirely and **Replace** it with the following:

The appropriate construction details specified for “Excavation and Embankment” in §203-3.01 *General* through and including §203-3.03 *Embankment In Place*, and §203-3.06 *Select Granular Fill* and §203-3.14 *Select Structural Fill* shall apply to the work specified in this section.

Page 187, **Delete** the first paragraph of §206-3.03 entirely and **Replace** it with the following:

The provisions of §203-3.01D *Suitable Materials* and/or §203-3.01E *Unsuitable Materials* shall apply to all material excavated under this section which is not used as backfill.

Page 195, **Delete** “§203-3.08, Disposal of Surplus Excavated Materials” in the second bullet of the third paragraph of §209-3.02 and **Replace** it with “Section 203, *Disposal of Surplus Excavated Material*”.

Page 205, **Delete** “§203-3.16, Borrow” in the first paragraph of §302-2.03 and **Replace** it with “Section 203, *Borrow*”.

Page 212, **Delete** “§203-3.12, Compaction” in the first paragraph of §304-3.03 and **Replace** it with “Section 203, *Compaction*”.

Page 214, **Delete** “§203-3.12, Compaction” in the first paragraph of §307-3.01 D and **Replace** it with “Section 203, *Compaction*”.

Page 215, **Delete** “§203-3.12, Compaction” in the first paragraph of §307-3.10 and **Replace** it with “Section 203, *Compaction*”.

Page 277, **Delete** each use of “§203-3.12, Compaction” in the first paragraph of §411-3.03 and **Replace** it with “Section 203, *Compaction*”.

As modified by EI 08-037, **Delete** “§203-2.02 C Select Granular Fill and Select Structure Fill” in the first paragraph of §554-2.02 A 2 b and **Replace** it with “Section 203, *Select Granular Fill*”.

As modified by EI 08-037, **Delete** “§203-2.02 C Select Granular Fill and Select Structure Fill” in the first paragraph of §554-2.03 B 1 and **Replace** it with “Section 203, *Select Structural Fill*”.

As modified by EI 08-037, **Delete** “§203-2.02 C Select Granular Fill and Select Structure Fill” in the second paragraph of §554-2.03 C 2 and **Replace** it with “Section 203, *Select Structural Fill*”.

As modified by EI 08-037, **Delete** “§203-3.12 B.6. *Compaction Equipment for Confined Areas*” in the first paragraph of §554-3.01 D 3 c and **Replace** it with “Section 203, *Compaction Equipment for Confined Areas*”.

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As modified by EI 08-037, **Delete** “§203-3.12 B.6. *Compaction Equipment for Confined Areas*” in the first paragraph of §554-3.02 D 4 and **Replace** it with “Section 203, *Compaction Equipment for Confined Areas*”.

As modified by EI 08-037, **Delete** “§203-3.12 *Compaction*” in the first paragraph of §554-3.02 F 5 and **Replace** it with “Section 203, *Compaction*”.

As modified by EI 08-037, **Delete** “§203-3.12 *Compaction*” in the first paragraph of §554-3.03 C 4 and **Replace** it with “Section 203, *Compaction*”.

Page 482, **Delete** “§203-3.15, “Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables”” in the second paragraph of §597-3.02 G and **Replace** it with “Section 203, *Select Structural Fill*.”

Page 489, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §603-3.03 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 497, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §604-3.11 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 506, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the fourth paragraph of §606-3.01 D and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 507, **Delete** “§203-3.15” in the first paragraph of §606-3.01 E and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 604, **Delete** “§203-3.12, *Compaction*” in the first paragraph of §620-3.01 and **Replace** it with “Section 203, *Compaction*”.

As modified by EI 08-020, **Delete** the first paragraph of §632-2.02 and **Replace** it with the following:

Backfill material shall conform to the material requirements as specified in Section 203, *Select Structural Fill*.

As modified by EI 08-020, **Delete** the first paragraph of §632-2.03 and **Replace** it with the following:

Unit infill material shall conform to the material requirements as specified in Section 203, *Select Structural Fill*.

As modified by EI 08-020, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the second paragraph of §632-3.02 E and **Replace** it with “Section 203, *Select Structural Fill*.”

Page 648, **Delete** “§203-3.08, Disposal of Surplus Excavated Materials” in the second paragraph of §644-3.04 and **Replace** it with “Section 203, *Disposal of Surplus Excavated Material*”.

Page 648, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the third paragraph of §644-3.04 and **Replace** it with “Section 203, *Select Structural Fill*.”

Page 694, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §659-3.04 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 695, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §660-3.04 and **Replace** it with “Section 203, *Select Granular Fill*.”

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Page 695, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §661-3.04 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 696, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §662-3.04 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 698, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the second paragraph of §663-3.04 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 706, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §664-3.04 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 709, **Delete** “§203-3.12, Compaction” in the first paragraph of §667-3.03 and **Replace** it with “Section 203, *Compaction*”.

Page 711, **Delete** “§203-3.08, Disposal of Surplus Excavated Materials” in the fourth paragraph of §670-3.03 and **Replace** it with “Section 203, *Disposal of Surplus Excavated Material*”.

Page 711, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the fourth paragraph of §670-3.03 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 712, **Delete** the second sentence in the Method B of the sixth paragraph of §670-3.04 and **Replace** it with the following:

The clear area shall be backfilled with Select Granular Fill in accordance with §203-2.06 *Select Granular Fill*, and compacted in accordance with §203-3.06 *Select Granular Fill*.

Page 713, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the second paragraph of §670-3.07 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 714, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the sixth paragraph of §670-3.08 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 723, **Delete** “§203-3.08, Disposal of Surplus Excavated Materials” in the second paragraph of §680-3.09 and **Replace** it with “Section 203, *Disposal of Surplus Excavated Material*”.

Page 723, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the third paragraph of §680-3.09 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 725, **Delete** “§203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables” in the first paragraph of §680-3.13 and **Replace** it with “Section 203, *Select Granular Fill*.”

Page 156-176, **Delete** SECTION 203 entirely and **Replace** it with the following:

SECTION 203 – EXCAVATION AND EMBANKMENT

203-1 DESCRIPTION. This work shall consist of excavation, disposal, placement and compaction of all materials that are not provided for under another section of these Specifications, and shall be executed in conformance with payment lines, grades, thicknesses and typical sections specified in the contract documents.

203-1.01 Definitions.

A. Unclassified Excavation. Unclassified excavation shall consist of the excavation and disposal of all

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materials, of any description, encountered in the course of construction, unless otherwise specified in the contract. Estimated limits and descriptions of subsurface deposits and formations which may be shown in the contract documents are supplied as a part of Base Line Data.

B. Embankment. The embankment is the portion of a fill section situated between the embankment foundation and the subgrade surface, excluding any material placed under another section of these specifications.

C. Embankment Foundation. The embankment foundation is the surface upon which an embankment is constructed after all work required under §203-3.03A. *Embankment Foundation* has been completed.

D. Subgrade Surface. The subgrade surface is the surface of the road section upon which the select materials and/or subbase are placed.

E. Subgrade Area. The subgrade area is that portion of an embankment situated above either of the following, but excluding any material placed under another section of these specifications.

1. A line located 2 ft. below the subgrade surface and extended to the intersection with the embankment side slopes, or

2. The embankment foundation, whichever is higher.

The material and compaction requirements for the subgrade area in embankments are found in §203-2.01A. *Subgrade Area Material* and §203-3.03C. *Compaction*, respectively.

In cut sections, the subgrade area is not defined except where undercut and backfill with a select material item is specified or ordered: in such cases, the payment lines for undercut work shall define the subgrade area.

F. Embankment Side Slope Area. The embankment side slope areas are those cross-sectional areas of an embankment situated outside of lines projected downward and outward on a one on one slope from the edges of the subgrade surface to their intersection with the embankment foundation, but excluding any portion lying within a subgrade area.

G. Topsoil. See Section 613 *Topsoil*.

H. Suitable Material. A material whose composition is satisfactory for use in embankment construction is a suitable material. The moisture content of the material has no bearing upon such designation. In general, any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or man made (i.e. recycled) origin, including mixtures thereof, are considered suitable materials. Determinations of whether a specific natural material is a suitable material shall be made by the Engineer on the above basis.

Recycled materials that the Department has evaluated and approved for general use shall be considered to be suitable material for embankment construction subject to the conditions for use as determined by the Department. The Regional Geotechnical Engineer and Geotechnical Engineering Bureau are available to provide guidance on the use of such materials. In general, the use of recycled materials must be also sanctioned by the Department of Environmental Conservation, usually in the form of a Beneficial Use Determination (BUD).

Glass from recycling facilities meeting the requirements of §733-05 *Glass Backfill* shall be considered suitable material for embankment construction.

Reclaimed Asphalt Pavement (RAP), and Recycled Portland Cement Concrete Aggregate (RCA) shall be considered suitable materials for embankment construction, subject to the following conditions for use:
RAP - The Contractor shall provide and place RAP conforming to the requirements of §733-06 *Reclaimed Asphalt Pavement for Earthwork and Subbase*.

RCA-The Contractor shall provide and place RCA conforming to the requirements of §733-07 *Recycled Portland Cement Concrete Aggregate*.

Pieces of broken up concrete pavement from on-site pavement removal or in-place recycling (i.e. rubblizing, crack and seat, break and seat, etc.) may be used in embankment construction. Refer to §203-3.03A. *Embankment Foundation* and §203-3.03B. *Embankments*.

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I. *Unsuitable Material.* Any material containing vegetable or organic matter, such as muck, peat, organic silt, topsoil or sod, or other material that is not satisfactory for use in embankment construction under §203-1.01H. *Suitable Material* is designated as an unsuitable material. Certain man made deposits of industrial waste, toxic or contaminated materials, sludge, landfill or other material may also be determined to be unsuitable materials, based on an evaluation by the Department's Geotechnical Engineering Bureau and Office of Environment, and the Department of Environmental Conservation.

J. *Borrow.* Borrow is material required for earthwork construction in excess of the quantity of suitable material available from the required grading, cuts and excavations. Borrow may be necessary even though not shown in the contract documents.

K. *Embankment Construction Control Devices.* Embankment construction control devices allow real-time observations of embankment construction to assess the actual performance of the embankment compared to that envisioned in the design phase. Settlement and pore water pressure are common measures of embankment performance. Techniques for monitoring settlement include a settlement rod or a surface settlement gauge. A settlement rod is an optical survey technique to monitor settlement of the embankment surface. The settlement rod(s) establish monitoring point(s) in relation to a reliable bench mark.

A surface settlement gauge is an optical survey technique to monitor settlement of the existing ground surface, below the embankment installation. The surface settlement gauge is installed prior to placing the embankment and extended upwards through the fill.

Pore water pressure monitoring may be used to determine the effective overburden diagrams (the basis of all geotechnical analyses), monitoring consolidation progress of embankments constructed over soft soils, evaluating seepage in natural slopes or earth dams (slope stability), checking the effectiveness of subsurface drainage facilities, or monitoring water well tests.

A piezometer is an instrument which provides measurements of pore water pressure at the elevation of the installed sensor. Pore pressure data is needed in a foundation soil to assess the excess pore water pressure and hence the undrained strength of the soil. Piezometers are used at various depths within cohesive foundation soils. Some piezometers are used in granular foundation soils to assess their drainage behavior.

L. *Proof Rolling.* Proof rolling consists of applying test loads over the subgrade surface by means of a heavy pneumatic-tired roller of specified design, to locate and permit timely correction of deficiencies likely to adversely affect performance of the pavement structure.

M. *Select Granular Fill – Slope Protection.* Select granular fill – slope protection is a material used to protect the grade of a slope from erosion and sloughing from runoff and groundwater seepage. Seepage is the slow movement of water through small openings and spaces in the surface of unsaturated soil into or out of a body of surface or subsurface water. Sloughing is a shallow surface failure caused by erosive removal of supporting material.

Select granular fill – slope protection is highly permeable while also providing sufficient frictional resistance to resist seepage forces and remain in place.

N. *Applying Water.* Under this work, the Contractor shall furnish and apply water for dust control. Moisture control for compaction purposes is the Contractor's responsibility. Water shall not be applied in inclement weather or when the temperature is 32° F or less.

O. *Modifying Cut Slopes and Other Means of Obtaining Borrow.* The Regional Director may approve the modification of cut slopes and other means of obtaining material, which is not part of the contract, so long as provisions are made to prevent unsafe conditions, damage, and nuisances to property, wildlife areas, and haul routes within and outside the contract limits. Such approval may be granted only after review of a written proposal by the Contractor showing the final deposition of the material, the haul route, hauling hours, and provisions necessary to comply with the above. Should unanticipated conditions arise resulting in any unsatisfactory situation, the Engineer shall immediately rescind the approval pending satisfactory correction.

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The following procedure shall apply to areas within the R.O.W. limits which are not designated as available sources of borrow by a Special Note in the contract proposal where the Contractor requests and is granted permission to modify slopes to obtain material for use on State contract work only. The Contractor will be required to reimburse the State with a rebate for the material obtained in these areas. Permission will not be granted to excavate material beyond the design slopes if it is to be used on other than State contract work.

The rebate to be obtained from the Contractor for this material is comprised of 1) A royalty based on the actual value of the excavated material, and 2) A credit for the difference in the Contractor's handling costs if these handling costs have been reduced. The royalty which is to be obtained for the excavated material shall be appropriate for the item for which it is to be utilized and shall be comparable to the current price being paid to purchase similar material in the area.

If the Contractor's handling costs associated with obtaining material from within the R.O.W. limits are greater than those for obtaining material from other acceptable sources, these additional handling costs must be borne by the Contractor. The royalty shall not be reduced to offset any increased handling costs incurred by the Contractor.

If the Contractor's handling costs associated with obtaining materials from within the R.O.W. limits are less than those for obtaining material from other acceptable sources, the differences shall be reimbursed to the State as a credit in addition to the royalty.

The difference in the Contractor's handling cost shall be determined by an analysis based on a comparison of haul lengths, hauling equipment, hauling operation, use of haul roads or public highways, preparation and restoration of the borrow areas, and any other variables involved.

Prior to modifying rock cut slopes, the Geotechnical Engineering Bureau must be consulted. If rock cut slopes are flattened sufficiently to eliminate the need for presplitting, an additional rebate will be necessary.

All special requirements to be fulfilled by the Contractor, at the Contractor's own expense, shall be clearly stated in the agreement. The foregoing requirement of receiving a rebate from the Contractor for material obtained by modification of slopes shall apply only to locations not designated in the Contract Documents.

203-2 MATERIALS

203-2.01 General. The requirements for select materials and subgrade area materials are described below. All processing operations including washing, removal of oversize material, blending, or crushing shall be completed at the source of the material. The procedure for acceptance or rejection of these materials shall be in conformance with the procedures contained in the geotechnical control procedure "*Procedure for the Control and Quality Assurance of Granular Materials*".

A. Subgrade Area Material. Subgrade area material shall consist of any suitable material having no particles greater than 6 in. in maximum dimension, unless Select Granular Subgrade with the well graded rock option is used. In that case, refer to §733-13 *Select Granular Subgrade*. If concrete is used, any exposed mesh or rebar shall not exceed 1 in. in length. RAP is also permitted.

B. Glass Backfill. Provide backfill material meeting the requirements of §733-05 *Glass Backfill*.

C. RAP. Provide backfill material meeting the requirements of §733-06 *Reclaimed Asphalt Pavement for Earthwork and Subbase*.

D. RCA. Provide backfill material meeting the requirements of §733-07 *Recycled Portland Cement Concrete Aggregate*.

E. Miscellaneous. Necessary fill material for cleaning, grading and shaping the existing roadside section shall conform to the requirements of §203-2.01A, *Subgrade Area Material*.

203-2.02 Unclassified Excavation and Disposal. None Specified.

203-2.03 Embankment In Place. Provide backfill material meeting the requirements of §733-08 *Embankment*

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In Place.

203-2.04 Select Borrow. Provide backfill material meeting the requirements of §733-09 *Select Borrow*.

203-2.05 Select Fill. Provide backfill material meeting the requirements of §733-10 *Select Fill*.

203-2.06 Select Granular Fill. Provide backfill material meeting the requirements of §733-11 *Select Granular Fill*.

203-2.07 Select Granular Fill Slope Protection. Provide backfill material meeting the requirements of §733-12 *Select Granular Fill Slope Protection*.

203-2.08 Surface Settlement Gauges. Provide materials for the embankment construction control device surface settlement gauge meeting the requirements of §733-17 *Surface Settlement Gauge*.

203-2.09 Settlement Rods. Provide materials for the embankment construction control device settlement rod meeting the requirements of §733-18 *Settlement Rod*.

203-2.10 Piezometers. Provide materials for the piezometer installation meeting the requirements of §732-11 *Open Well Piezometer*.

203-2.11 Applying Water. Water used for dust control purposes may be obtained from any source.

203-2.12 Select Granular Subgrade. Provide backfill material meeting the requirements of §733-13 *Select Granular Subgrade*.

203-2.13 Select Structural Fill. Provide backfill material meeting the requirements of §733-14 *Select Structural Fill*.

203-2.14 Sand Backfill. Provide backfill material meeting the requirements of §733-15 *Sand Backfill*.

203-3 CONSTRUCTION DETAILS

203-3.01 General. The Contractor shall remove all soil, rock, and other material, and utilize or dispose of these materials as required by the contract documents. All excavation and embankment work shall be executed to payment lines shown in the contract documents.

All graded earth surfaces outside the roadway limits shall be smoothed and trimmed in reasonably close conformity (6± in.) of true grade. After trimming, the area shall be left in a compact and satisfactory condition, free of large stones or other objectionable materials, as determined by the Engineer.

Earthwork construction operations requiring compaction shall not be performed from November 1st thru April 1st except with a Winter Earthwork submittal subject to the provision of this Section and approved by the Regional Director or his designated representative. Winter Earthwork will be subject to the following restrictions:

- Transitioning from the normal construction season to the exempt winter earthwork months between November 1st and April 1st, the use of standard earthwork materials may be permitted only under the conditions where the air temperature, ground temperature and material temperature are all above 32° F at the time of placement. Modifications to compaction procedures, including but not limited to the use of thinner lifts, may be required when the temperatures are above 32° F but below 40° F at the time of placement.
- Between November 1st and April 1st, if the air temperature, ground temperature, or material temperature is at or below 32° F at the time of placement, earthwork may only proceed using material that meets the requirements of §733-16 *Winter Earthwork*.

In all work incorporated into the final product, the Contractor shall not place material that is frozen, or place fill material on frozen ground regardless of the date.

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A. Winter Earthwork Submittal. For Contractors choosing to proceed with earthwork compaction operations between November 1st thru April 1st, provide the Engineer with a Winter Earthwork submittal, with a copy to the Regional Geotechnical Engineer, outlining the modifications to the materials and methods including the following:

- 1. Material Requirements.** The material meets the requirements of §733-16 *Winter Earthwork*. Provide information on material composition and source substitute, if proposed.
- 2. Material Placement.** Provide information on the proposed methods for controlling the weather effects on the material and existing ground conditions (i.e. insulation, enclosures, canvas and framework). Devise a plan to be outlined in the Winter Earthwork Submittal such that all snow, ice, and frozen material shall be removed from the surface of the ground on which embankment or backfill material is to be placed, and from the surface under construction before succeeding lifts are added.
- 3. Transition Period.** Provide acknowledgement of a transition period allowing the use of standard earthwork materials between November 1st and April 1st only under conditions where the air temperature, ground temperature and material temperature are all above 32° F at the time of placement. Acknowledge the transition period ends either when the air temperature, ground temperature or material temperature is at or below 32° F at the time of placement.

Proceed with Winter Earthwork only after receiving written approval by the Regional Director or his designated representative subject to the provisions of this Section.

B. Scheduling of Work to Minimize Soil Erosion and Water Pollution. The Contractor shall ensure effective and continuous soil erosion and sediment control throughout the construction period. The Contractor shall prepare and submit for approval, plans and schedules for all excavation, stripping, embankment, fill and grading operations. Such plans and schedules shall include but are not limited to temporary and permanent erosion control measures specified in Section 209 *Soil Erosion and Sediment Control*, Section 610 *Turf and Wildflower Establishment* and Section 612 *Sodding*.

C. Drainage and Grading. The Contractor shall provide and maintain slopes, crowns and ditches on all excavation and embankments to ensure satisfactory surface drainage at all times. Ditches and other drainage facilities necessary to remove ponded water shall be constructed as soon as practical to have the work area dry during the progression of work. All existing culverts and drainage systems shall be maintained in satisfactory operating condition throughout the course of the work. If it is necessary to interrupt existing surface drainage, sewers or under-drainage, then temporary drainage facilities shall be provided until the permanent drainage work is complete. Top-of-slope interceptor ditches, where shown on the contract documents, shall be completed before adjacent excavation operations are begun. In earth cuts, the Contractor shall progress excavation operations in such a manner that the portion of the cut immediately adjacent to the design slope is at least 5 ft. lower than the general level of the cut at all times until the lower payment line is reached.

The construction of these temporary drainage facilities shall be considered as incidental to the construction of the project and no additional payment will be allowed.

Any portion of an embankment or subgrade which has been damaged by the Contractor's equipment during the course of construction, shall be repaired and re-compacted by the Contractor at no additional cost to the State.

Where seepage causes instability of slopes, excavation and backfill or other corrective measures shall be performed as ordered by the Engineer and paid for under the appropriate item. Excavation for the installation of slope protection may be necessary at any time and location throughout the duration of the contract and may not necessarily coincide with the Contractor's performance of the general excavation work.

D. Suitable Materials. Moisture content has no bearing on the suitability of material to be used for embankment construction, however, the moisture content of a material may be such that its use will require manipulation. It is the Contractor's responsibility to determine the economics of using, or disposing of and replacing, such materials. Material determined by the Contractor to be un-economical for use may be disposed of as specified under §203-3.02B. *Disposal of Surplus Excavated Materials* and replaced with other material at no additional cost to the State.

When a contract includes the item "Unclassified Excavation and Disposal", all excavated suitable

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materials, including the excavation performed under “Structure Excavation” and “Trench and Culvert Excavation,” shall become the Contractor's property for disposal or use under another item of these specifications.

E. Unsuitable Materials. All excavated unsuitable materials shall be the Contractor's property for disposal as surplus materials under the provisions of §203-3.02B. *Disposal of Surplus Excavated Materials.*

F. Borrow. The management of a borrow source and the acceptability of all borrow material shall be subject to the approval of the Engineer at all times. The Contractor shall notify the Engineer at least ten (10) work days in advance of opening any borrow area, and request approval of the source under the pay item involved. Test pits required by the Engineer to evaluate the acceptability and limits of the source, shall be provided by the Contractor at the Contractor's own expense. Concurrent removal of material for more than one pay item from a single source or pit shall be prohibited except with the written permission of, and under such conditions and restrictions as may be imposed by the Engineer. All borrow pits shall be stripped of sod, topsoil and vegetable matter well in advance of any working face. The minimum distance by which stripping shall lead excavation for a given source shall be established by the Engineer to suit local conditions. Where a borrow source is not under direct control of the Contractor or where special conditions exist, the Engineer may waive any of the above requirements and establish alternative provisions for the control and acceptability of borrow.

Ordinary borrow will be accepted for use where the material qualifies under the definition of Suitable Material, §203-1.01H. *Suitable Material.* All borrow placed within the limits of Embankment or the Subgrade Area shall be placed in conformance with §203-3.03B. *Embankments* or §203-3.01G. *Subgrade Area* respectively, as appropriate, or where used for fill or backfill at structures, culverts and pipes, in conformance with §203-3.06 *Select Granular Fill* and §203-3.17 *Select Structural Fill.*

G. Subgrade Area. Where a subgrade area is defined in an embankment by §203-1.01E. *Subgrade Area*, the material placed shall conform to §203-2.01A. *Subgrade Area Material*, placed and compacted in conformance with §203-3.03B. *Embankments* and §203-3.03C. *Compaction.* Where longitudinal and transverse changes from cut to fill are encountered in the work, a subgrade transition section shall be provided in conformance with Standard Sheet *Earthwork Transition and Benching Details.* Where a subgrade area becomes defined by §203-1.01E. *Subgrade Area* in a cut section, the materials placed and other details shall be as specified under §203-3.02C. *Proof Rolling in Cut Sections 3. Procedure*, unless otherwise required by the contract documents. Prior to subbase course placement, the surface on which the subbase is to be placed shall be thoroughly compacted to the satisfaction of the Engineer.

1. Subgrade Surface Tolerance. After compaction, the subgrade surface shall not be above design elevation at any location.

203-3.02 Unclassified Excavation and Disposal.

A. Rock Excavation. Presplitting is required where the design rock slope is 1 vertical on 1 horizontal or steeper and the vertical height of the exposed rock slope exceeds 5 ft. Ripping will not be allowed within 10 ft. of a slope that requires presplitting. Test sections will be required at the outset of presplit drilling and blasting operations for the evaluation of the presplit rock slopes by a Departmental Engineering Geologist. The Contractor will be required to completely expose the presplit rock face in the test section for evaluation prior to any further presplit drilling.

All rock slopes shall be thoroughly scaled and cleaned. For rock excavations involving multiple lifts, scaling of upper lifts shall be completed prior to drilling and fragmenting of lower lifts. Scaled rock slopes shall be stable and free from possible hazards of falling rocks or rock slides that endanger public safety. If, after scaling, such conditions still exist, a determination of the cause will be made by a Departmental Engineering Geologist and if it is determined that the conditions are the result of poor quality work or improper methods employed by the Contractor, the Contractor shall provide approved remedial treatment, at no expense to the State. Such treatment may include, but is not necessarily limited to, laying back the slope, rock bolting, or shotcreting. In no case shall the subgrade be trimmed prior to the completion of the scaling operation at any location.

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1. Presplitting. Prior to drilling presplitting holes, the overburden shall be completely removed to expose the rock surface along the presplitting line. The methods of collaring the holes to achieve required inclination and alignment shall be approved by the Engineer.

The presplitting holes shall be a maximum of 4 in. in diameter, spaced not more than 3 ft. center to center along the slope, and drilled at the designed slope inclination for a maximum slope distance of 60 ft. When excavation operations are conducted in multiple lifts, the presplitting holes for successive lifts may be offset a distance of not more than 3 ft. for a design slope of 1 vertical on 1 horizontal and not more than 1 ft. for slopes of steeper design; however, a presplitting hole shall not be started inside the payment line. The Contractor shall control the presplit drilling operations by using proper equipment and technique to achieve the design slope and maximum bench between lifts. If presplitting is conducted in lifts, each lift shall be of approximately equal depth. All presplitting holes shall be checked and cleared of obstructions immediately prior to loading any holes in a round. All presplitting holes shall be loaded with a continuous column charge manufactured especially for presplitting which contains not more than 0.35 lbs. of explosive per foot. The top of the charge shall be located not more than 3 ft. below the top of rock. A bottom charge of not more than 3 lbs. of packaged explosive may be used; however, no portion of any bottom charge shall be placed against a proposed finished slope. Each presplitting hole shall be filled with No. 1A crushed stone stemming meeting the gradation requirements of §703-02 *Coarse Aggregate*. The presplitting charges shall be fired with detonating cord extending the full depth of each hole and attached to a trunk line at the surface. Detonation of the trunk line shall be with blasting cap(s) and shall precede the detonation of fragmentation charges within the section by a minimum of 25 milliseconds. Presplitting shall extend for a minimum distance equal to the burden plus 3 ft. beyond the limits of fragmentation blasting within the section.

2. Fragmentation Blasting. Fragmentation holes, or portions thereof, shall not be drilled closer than 4 ft. to the proposed finished slope. Where presplitting is required, fragmentation holes adjacent to the presplitting holes shall be drilled parallel to the presplitting holes for the full depth of the production lift at a spacing not exceeding the spacing of the production pattern. Only packaged explosives shall be used 10 ft. or less from a design slope which requires presplitting regardless of the construction sequence.

Fragmentation charges shall be detonated by properly sequenced millisecond delay blasting caps.

3. Explosive Loading Limits. In the absence of more stringent requirements, the maximum quantity of explosives allowed per delay period shall be based on a maximum particle velocity of 2 in./s at the nearest structure to be protected. In the absence of seismic monitoring equipment, the following explosive loading limits shall apply:

DISTANCE EQUAL TO OR LESS THAN 212 ft. FROM THE NEAREST STRUCTURE

- a. When the distance from the proposed blasting area to the nearest structure to be protected is 6 ft. or less, no blasting shall be allowed.
- b. When the distance between the blasting area and the nearest structure to be protected is greater than 6 ft. and equal to or less than 15 ft., a maximum of ¼ lb. of explosives per delay period (minimum of 25 milliseconds) blasting cap shall be allowed.
- c. When the distance between the blasting area and the nearest structure to be protected is greater than 15 ft. and equal to or less than 212 ft., a Scaled Distance of 30 ft. shall be utilized to determine the maximum amount of explosive allowed per delay period (minimum of 25 milliseconds) blasting cap. The Scaled Distance Formula is as described below:

$$SD = \frac{D}{\sqrt{E_{\max}}}$$

where: SD = Scaled Distance
 D = Distance from blasting area to nearest structure to be protected in feet

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or

$E_{\max} = \frac{D^2}{(SD)^2}$
where: E_{\max} = Maximum pounds of explosive per delay period (minimum of 25 milliseconds) blasting cap

DISTANCE GREATER THAN 212 ft. FROM THE NEAREST STRUCTURE

a. When the blaster elects to utilize more than 50 lbs. of explosive per delay period (minimum of 25 milliseconds) blasting cap, a seismograph shall be employed to monitor the blasting vibrations generated. The initial loading shall be computed using a Scaled Distance of 30 ft. The resulting particle velocity measured by the seismograph shall be evaluated by a Department Engineering Geologist. The Geologist's evaluation shall be the basis for adjusting the Scaled Distance.

No separate payment shall be made for this work. The cost shall be included in the appropriate excavation item. The above requirements shall in no way relieve the Contractor of liability for any damage incurred as a result of the blasting operations.

B. Disposal of Surplus Excavated Materials. Only unsuitable materials, or that portion of suitable material excavated in excess of the quantity required to construct all embankments on the project, shall be considered as surplus.

Where disposal of surplus materials cannot be accommodated within the right of way, the excess shall become the Contractor's property for disposal. Surplus material disposed of within the right-of-way shall be placed in accordance with §107-10 *Managing Surplus Material And Waste*.

C. Proof Rolling in Cut Sections. Immediately prior to final trimming of the subgrade surface and placement of subbase materials in cut sections, all areas of the subgrade surface within roadway limits shall be proof rolled according to the requirements of this subsection. This work, and any delays due to this work, shall be considered incidental to the excavation item.

1. Purpose. In cut sections, the purpose of proof rolling is to determine the location and extent of areas below the subgrade surface that require corrective undercutting and are not so specified in the contract documents.

2. Equipment. The proof roller used in embankment sections, as specified in §203-3.03D. *Proof Rolling in Embankment Sections 1. Equipment*, shall be employed for proof rolling in cut sections except that the roller shall be loaded to achieve a single stress level in operation, using a gross ballasted weight of 30 tons and all tires inflated to 40 psi.

3. Procedure. Two complete passes shall be applied over all elements of the area to be proof rolled. Where any portion of the cut subgrade surface other than that which has been damaged by the Contractor's operations fails to provide a satisfactory support for the proof rolling operation, the Engineer may order corrective undercut and backfill work performed. Backfill of undercuts shown in the contract documents or ordered by the Engineer shall be in conformance with §203.3-13 *Select Granular Subgrade*. Where natural soil below this course will not support the weight of the construction equipment, and when ordered by the Engineer, the course shall be placed in one lift. No additional proof rolling shall follow corrective work.

4. Exceptions. Proof rolling of the subgrade surface in cut sections will not be required in any area where the subgrade surface is in a rock cut, or where undercut and backfill has been previously performed.

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The Engineer may order undercutting and backfill without proof rolling of any cut where the need for corrective work, as determined by the Engineer, is obvious without actual proof rolling. The Engineer may also delete proof rolling in any cut section where, based upon a written evaluation by a Departmental Geotechnical Engineer, proof rolling would be detrimental to the work.

203-3.03 Embankment In Place.

A. Embankment Foundation. After completion of the work required under Section 201 *Clearing and Grubbing*, and Section 202 *Removal of Structures and Obstructions*, the embankment foundation shall be prepared. Sod and topsoil shall be removed where the final pavement grade is 6 ft. or less above the existing ground surface and in other areas designated in the contract documents or by the Engineer. Prior to embankment construction and subbase course placement, the surface on which the embankment and/or subbase is to be placed shall be thoroughly compacted to the satisfaction of the Engineer. Unsuitable materials other than sod and topsoil shall be removed to the depths shown in the contract documents or as directed by the Engineer. Underwater areas shall be filled in accordance with §203-3.04 *Select Borrow* or §203-3.05 *Select Fill* and paid for under its appropriate item.

Where embankments are to be constructed over ground that will not adequately support embankment construction equipment, an initial layer of fill may be allowed to form a working platform. The need, manner of construction, and thickness of such a layer shall be subject to approval of the Engineer, and the layer will be permitted only where the lack of support is, as determined by the Engineer, not due to deficient ditching, grading or drainage practices or where the embankment could be constructed in the approved manner by the use of different equipment or procedures. Thicknesses of up to 3 ft. may be permitted for such a layer. Concrete or asphalt slabs may be used at the bottom of such a layer, provided they are placed horizontally.

In locations where embankments are to be constructed on hillsides or against existing embankments with slopes steeper than 1 vertical on 3 horizontal, the slopes shall be benched. Required benches shall be constructed as shown on the Standard Sheet *Earthwork Transition and Benching Details*.

Where old pavement is encountered within 2 ft. of the top of the subbase course, it shall be broken up or scarified.

B. Embankments. The embankment shall be constructed of suitable material as defined by §203-1.01H. *Suitable Material*. Embankment material shall not be placed on frozen earth, nor shall frozen soils be placed in any embankments. Embankment material shall be placed and spread in lifts (layers) of uniform thickness, then uniformly compacted as specified under applicable portions of §203-3.03C. *Compaction*. During embankment construction operations, earth moving equipment shall be routed so as to prevent damage to any compacted lift. Damage to any compacted lift at any time during the course of construction, such as rutting under the loads imposed by earth moving equipment, shall be fully repaired by the Contractor at his/her own expense prior to placement of any overlying materials. At the close of each day's work, the working surface shall be crowned, shaped and rolled with smooth steel wheel or pneumatic tired rollers, for positive drainage.

Particles with a dimension in excess of $\frac{2}{3}$ of the loose lift thickness are designated as oversized particles. Oversized particles shall be removed prior to compaction of the lift and may be placed in the Embankment Side Slope Area.

Pieces of concrete or asphalt may be used provided that the voids between the pieces are completely filled, and the greatest dimension of any piece does not exceed $\frac{2}{3}$ the loose lift thickness. Exposed mesh or rebar shall not exceed 1 in. in length.

Embankments constructed using rock products or pieces of concrete shall be spread by bladed equipment on each lift to minimize the formation of large voids as the work progresses. The top lift of a rock or concrete fill shall be chinked.

When permitted by a note in the contract documents, stumps, logs, and other materials may be placed in the Embankment Side Slope Area, provided that: 1) such matter is deposited and compacted concurrent with the adjacent embankment, and; 2) any stumps or woody material are covered by not less than 2 ft. of soil beneath the exposed side slope surface.

Glass shall not be placed in contact with synthetic liners, geogrids, geotextiles or other geosynthetics.

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C. Compaction

1. General Requirements. It shall be the Contractor's responsibility to properly place and compact all materials in the road section and other locations specified in the contract documents, and to correct any deficiencies resulting from insufficient or improper compaction of such materials throughout the contract period. The Contractor shall determine the type, size and weight of compactor best suited to the work at hand, select and control the lift (layer) thickness, exert control over the moisture content of the material, and other details necessary to obtain satisfactory results. During the progression of the work, the Department will inspect the Contractor's operations and will permit the work to continue where:

- a.** Lift thickness is controlled and does not exceed the maximum allowed according to the equipment classifications in subparagraph 2. *Compaction Equipment*, of this subsection, and the equipment meets all specified class criteria. Thinner lifts and lighter equipment than the maximum allowed may be necessary for satisfactory results on some materials.
- b.** The compactive effort (number of passes and travel speed) is uniformly applied and not less than that specified for the given equipment class and lift thickness. Higher efforts than the minimum allowed may be necessary for satisfactory results on some materials.
- c.** The Engineer concludes from a visual observation that adequate compaction has been attained, with the exception of backfill at structures, culverts, pipes, conduits, and direct burial cables. However, the State reserves the right to perform density tests at any time. When tests are performed, the results shall indicate that not less than 90% of Standard Proctor Maximum Density is attained in any portion of an embankment, or 95% in a subgrade area, or as specified for other items with a percent maximum density requirement.
- d.** Significant rutting under the action of the compactor is not observed on the final passes on a lift.

Whenever the Contractor's operations do not conform to the above criteria, or requirements contained in other subparagraphs of this subsection, the Engineer will prohibit placement of an overlying lift until the Contractor takes effective corrective action.

As part of the Department's Quality Assurance (QA) program, the Engineer or his representative may verify the adequacy of the compaction at any time through QA testing. When the Engineer determines that QA tests are necessary, the Contractor shall provide any assistance requested to facilitate such tests. Such assistance shall include but will not be limited to excavation and backfill of test pits and holes. This work shall be considered to be incidental construction.

Damage to any compacted lift at any time during the course of construction such as rutting under the loads imposed by earth moving equipment, shall be fully repaired by the Contractor at his/her own expense prior to placement of any overlying materials.

2. Compaction Equipment. The selection of compaction equipment is the Contractor's responsibility, but shall be subject to meeting the requirements of this subparagraph and approval by the Engineer with respect to its provisions. All compaction equipment shall be marked by a permanently attached manufacturer's identification plate designating the name of the manufacturer, model number and serial number of the machine as minimum identification. This plate shall be installed in a readily visible location. Compaction equipment lacking such an original manufacturer's identification plate, or with altered or illegible plates, will not be recognized as acceptable compaction equipment. Any equipment not principally manufactured for soil compaction purposes and equipment which is not in proper working order in all respects shall not be approved or used. The Engineer will also withhold approval of any compactor for which the Contractor cannot furnish manufacturer's specifications covering data not obvious from a visual inspection of the equipment and necessary to determine its classification.

The term, "pass," for any type of compactor, shall denote one direct vertical application of compactor effort over all elemental areas of a lift surface. Terms in common parlance, such as "coverage," "trips," etc., have no significance, equivalence, or application under these specifications.

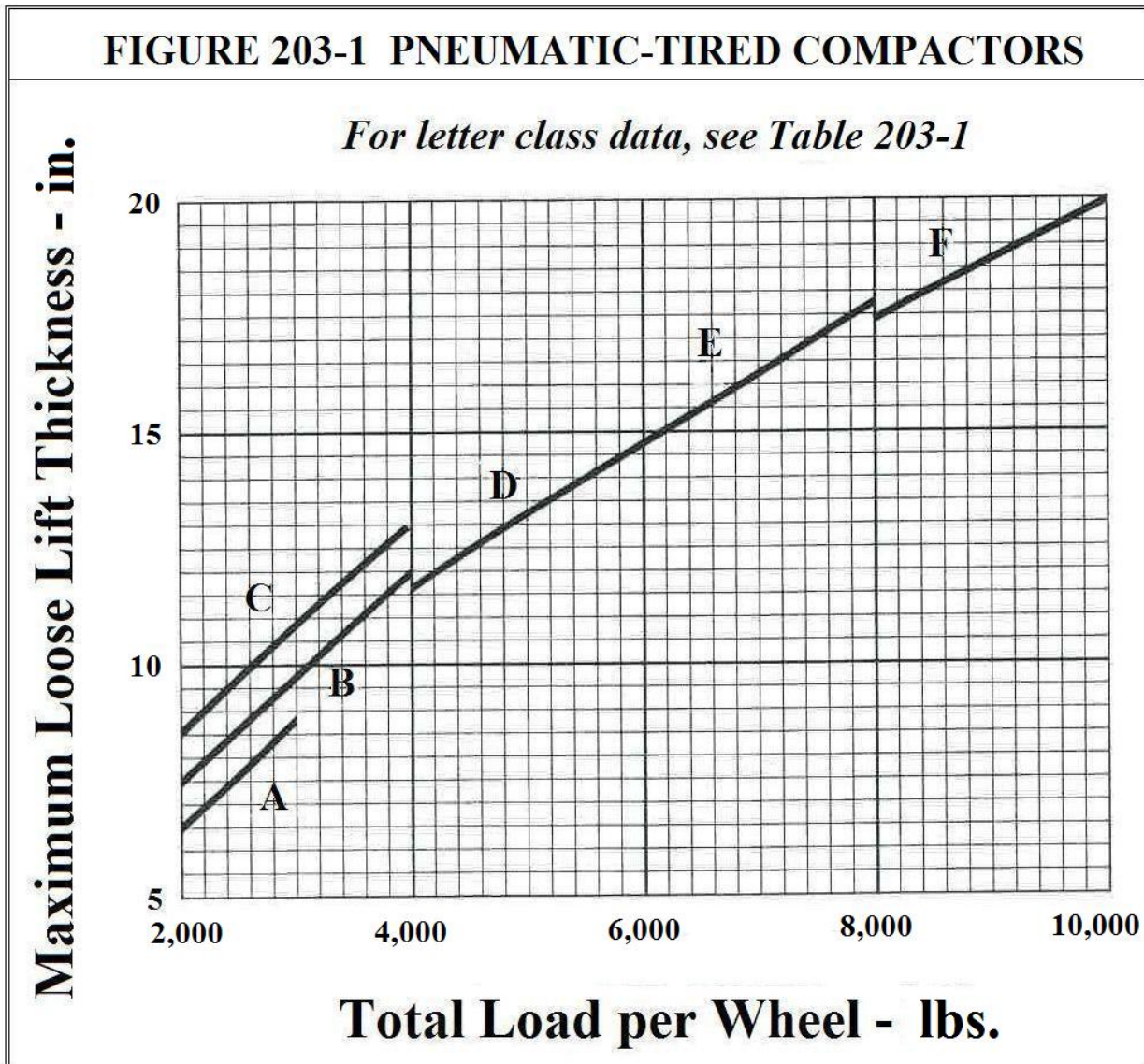
TABLE 203-1 PNEUMATIC-TIRED COMPACTOR CLASSIFICATIONS			
Pneumatic	Tire Requirements		Range of Ballasted Wheel
		Inflation	

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Compactor Class	Tire Size	No. Plys	Pressure (psi)	Loads (lbs. per Wheel)
A	7.50 x 15	4	35	2,000 – 3,000
B	7.50 x 15	6	60*	2,000 – 4,000
		10	90*	
C	7.50 x 15	14	130*	2,000 – 4,000
D	9.00 x 20	10	75*	4,000 – 6,000
		12	90*	
E	11.00 x 20	12	90*	6,000 – 8,000
		18		
F	13.00 x 24	18	100*	8,000 – 10,000

* Inflation pressure for not less than the last two passes on each lift. May be reduced during earlier passes and gradually increased to this level.

a. Pneumatic-Tired Compactors. This type of compactor shall be classified for use according to the requirements of Table 203-1. For the lift thickness selected by the Contractor, the minimum class and wheel load which will be allowed on that lift thickness, shall be as shown in Figure 203-1.



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The minimum effort for all pneumatic compactors shall be 6 passes, at speeds up to 12 ft./sec on no more than the first 2 passes, and all subsequent passes at speeds of 6 ft./sec. or less.

b. Smooth Drum Vibratory Compactors. This type of compactor is defined as a machine which primarily develops its compactive effort from the vibrations created and is classified for use according to the developed compactive force rating (CFR) per linear inch of drum width.

The CFR is defined as follows:

$$\text{CFR} = \frac{\text{Unsprung Drum Weight (lbs.)} + \text{Dynamic Force (lbs.)}}{\text{Drum Width (in.)}}$$

The unsprung drum weight is the static weight of the drum and appurtenances without any reaction transmitted to the drum from the main chassis of the compactor. The dynamic force produced is dependent on the frequency of vibration, and therefore, CFR ratings shall be determined for the actual operating frequency of the compactor. Approval for vibratory compactors shall be confined, however, to equipment operating at not less than 1100 vpm, nor more than 1500 vpm, and those where the actual dynamic force at the actual operating frequency is at least 2.5 times the unsprung drum weight.

Conversion of manufacturer's published ratings, at a given frequency, shall be made with the following equation:

$$F_2 = \frac{F_1(V_2)^2}{(V_1)^2}$$

where: F_1 = Dynamic Force at Rated Frequency
 F_2 = Dynamic Force at Operating Frequency
 V_1 = Rated Frequency
 V_2 = Operating Frequency

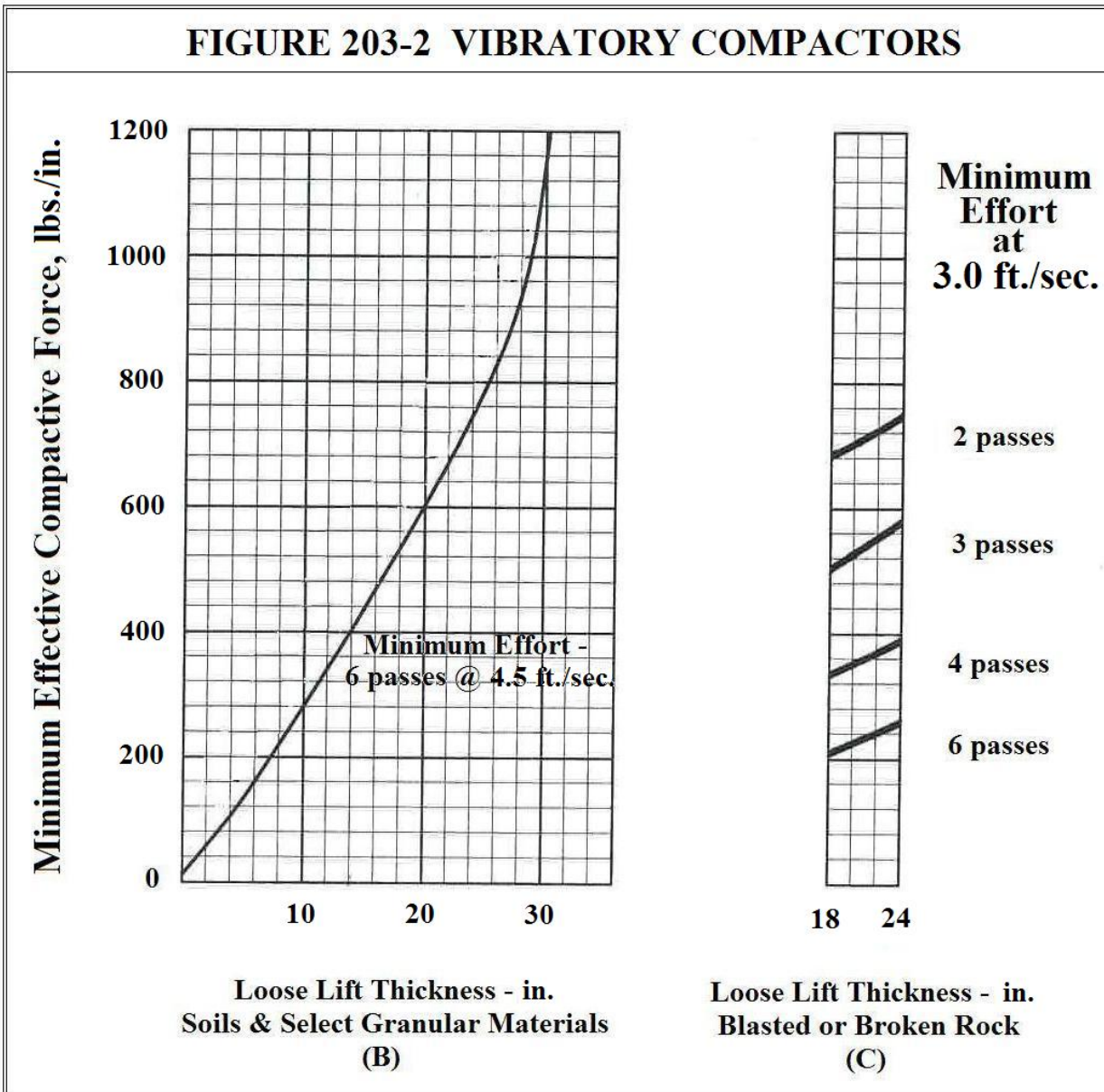
For the lift thickness selected by the Contractor, the minimum CFR rating and minimum effort on such a lift, shall be as shown in Figures 203-2B&C, respectively. Non-Centrifugal (Vertical force only) types of vibratory compactors shall be approved as above, less 175 lbs./in. before using Figures 203-2 B&C as a minimum number of passes at a single specified speed. An equivalent effort, relating varying numbers of passes to other speeds is given by the equation:

$$\text{Speed X} = \frac{(\text{Specified Speed}) (\text{Min. Passes at Speed X})}{(\text{Specified Min. Passes})}$$

The Contractor may choose to alter the specified minimum pass requirement, provided that speed is adjusted to the value given by this equation and does not exceed 6 ft./sec.

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FIGURE 203-2 VIBRATORY COMPACTORS



Where vibratory compactors are used on a project, the Contractor shall furnish for the exclusive use of the Engineer, one vibrating reed tachometer per project, plus one additional tachometer for each group of two vibratory compactors in excess of two per project. Tachometers shall have a frequency range adequate to cover operating frequencies of all vibratory compactors used on the project and shall

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have scale divisions of 50 vpm or less. Tachometers may be placed on the ground surface near the compactor when making readings, or with suitable damping materials interposed, placed directly on the compactor drum frame.

The dispensations permitted under this specification for vibratory compactors are contingent upon proper operation of the equipment at all times during compaction operations. In any instance where the Engineer encounters any problems with operators rolling without vibration, for any reason, and immediate and effective corrective action is not taken by the Contractor, the Engineer will halt the work until the problem is resolved. If continuing problems of this nature occur, the Engineer may suspend all provisions of this subparagraph and consider the vibratory compactors as smooth steel wheel rollers classified according to their gross weight.

c. Sheepsfoot and Segmented Pad Foot Rollers. This type of compactor shall be defined as a machine which is primarily designed to compact a lift from the bottom to the top.

The maximum loose layer thickness of the material to be compacted shall be equal to the length of the feet plus 15%. The end area size and configuration of the feet shall be selected by the Contractor to suit the characteristics of soil being compacted.

Where sheepsfoot and segmented pad foot rollers are used, with or without vibration, the number of passes required for job control shall be determined by a jobsite test in which the feet penetrate into the loose lifts and, with further passes, eventually and substantially “walk out” of the layer. This job control shall then be established for that machine, lift thickness and material, provided that adequate moisture control is continuously maintained per §203-3.03C. *Compaction 3. Moisture Control.* Sheepsfoot and segmented pad foot rollers shall be operated at speeds not exceeding 6 ft./sec., when towed and 15 ft./sec. when self-propelled.

d. Smooth Steel Wheel Rollers. Smooth steel wheel rollers shall be considered as primary compactors on layers whose maximum thickness, after compaction, is 8 in. When so used, the roller shall have a nominal gross weight of not less than 10 tons, exert a minimum force of not less than 300 lbs/in. of width on the compression roll faces, and a minimum of 8 passes shall be applied over each lift with the roller operating at a speed not exceeding 6 ft./sec.

When the Contractor employs smooth steel wheel rollers exclusively for surface compaction, leveling or finishing operations on lifts previously compacted by other types of primary compactors, the above restrictions shall not apply.

This section applies to non-vibratory rollers or vibratory rollers operated in the static mode only.

e. Other Type of Compactors. Compactor types other than those classified above, may be employed by the Contractor, subject to approval by the Engineer of the proposed minimum applied effort (minimum number of passes and travel speed) and maximum lift thickness. Such approval by the Engineer will be based upon the results of appropriate on-site field tests.

f. Compaction Equipment for Confined Areas. In areas inaccessible to conventional compactors, or where maneuvering space is limited, impactor rammers, plate or small drum vibrators, or pneumatic buttonhead compaction equipment may be used with layer thickness not exceeding 6 in. before compaction. Hand tampers shall not be permitted. The Engineer may approve or reject any of the above described mechanical devices based upon the results of appropriate on-site field tests.

3. Moisture Control. All fill or backfill material to be compacted, shall be at a moisture content for adequate compaction of that material using the compactor selected by the Contractor to perform the work. The Contractor shall be responsible for determining the appropriate moisture content, and for controlling it within the proper limits as the work is progressed. When water must be added to a material, it may be added on the lift or in the excavation or borrow pit. Water added on the lift, however, shall be applied by use of an approved pressure distributor. Distributors must be approved and documented by the Engineer. Documentation by the Engineer shall be adequate evidence of approval. Water added shall be thoroughly incorporated into the soil, and the soil shall be manipulated to attain uniform moisture distribution. When

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the moisture content of a lift about to be compacted exceeds the required amount, compaction shall be deferred until the layer has dried back to the required amount. Natural drying may be accelerated by blending in a dry material or manipulation alone, to increase the rate of evaporation. Increased loose lift thickness caused by blending in a dry material, however, may necessitate a change in compaction equipment and/or methods to meet the minimum provisions of subparagraph 2. *Compaction Equipment* of this subsection.

FIGURE 203-3 GUIDE FOR SELECTING THE INITIAL STRESS LEVEL FOR PROOF ROLLING EMBANKMENT SECTIONS

Relative Subgrade Support	Poor	Fair			Good	Excellent	
Well Graded Soils						GRAVEL - SAND Mixtures little to no fines	
					GRAVEL - SAND - SILT - CLAY Mixtures SANDS or GRAVELLY SANDS little or no fines SAND - SILT - CLAY Mixtures, slight plasticity SILTY SANDS OR SAND - SILT Mixtures, slight plasticity		
Poorly Graded Soils				SANDS or GRAVELLY SANDS little or no fines			
			SAND - SILT - CLAY Mixtures, plastic		SILTY GRAVELS or GRAVEL - SAND - SILT Mixtures		
		SAND - SILT - CLAY Mixtures or CLAYEY SANDS, plastic to high pl.					
			SILTS and Very Fine SANDS slight or no plasticity		GRAVELS and GRAVEL - SAND Mixt. little or no fines		
	LEAN CLAYS, SILTY CLAYS, slightly plastic to plastic						
	ELASTIC SILTS, Micaceous or Diatomaceous SILTS						
	FAT CLAYS, SILTY CLAYS highly plastic						
Stress Level	Minimum	1	2	3	4	5	Maximum
Gross Tons	30	34	38	42	46	50	50
Tire psi	40	50	60	70	80	90	130

D. Proof Rolling in Embankment Sections. Immediately prior to final trimming of the subgrade surface and placement of subbase materials in embankment sections, all areas of the subgrade surface within roadway limits shall be proof rolled according to the requirements of this subsection. This work, and any delays due to this work, shall be considered incidental to the embankment item.

1. Equipment. The proof roller shall consist of a chariot type rigid steel frame with a box body suitable for ballast loading up to 50 tons gross weight, and mounted on four pneumatic tired wheels acting in a single line across the width of the roller on its transverse load center line. The wheels shall be equipped with 18.00 x 24 or 18.00 x 25, 24 ply tires, and shall be suspended on articulated axles such that all wheels carry approximately equal loads when operating over uneven surfaces.

2. Determination of Roller Stress. Initially, the gross ballasted weight and tire inflation pressure of the proof roller shall be adjusted to the highest stress level shown in Figure 203-3 based on:

- a. The general description of the subgrade soils.
- b. The estimation of the relative subgrade support within the subgrade soil description range.

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The initial roller stress for embankments constructed of rock shall be the maximum level listed in Figure 203-3 (50 Gross Tons, 130 Tire psi).

The roller shall be operated briefly to establish the acceptability of the initial stress level. Proof rolling of the embankment shall be performed at the next lower stress level whenever operation of the roller at a higher stress level is accompanied by consistent lateral displacement of soil out of the wheel paths.

3. Procedure. After an acceptable stress level is established, two complete passes of the roller shall be applied over all elements of the area to be proof rolled. Any deficiencies disclosed during the proof rolling operation shall be corrected. Subsidence depressions shall be filled with material similar to the subgrade soil and then compacted in a normal manner. After compaction, these areas shall be proof rolled again. Corrective work shall be judged complete and accepted by the Engineer when all elements of the subgrade surface over a given embankment show a satisfactory uniform response to the proof roller.

4. Exceptions. Proof rolling of the subgrade surface in embankment sections will not be required in any area where:

- a. Due to restrictions in available access and/or maneuvering space, use of the proof roller may damage adjacent work;
- b. The proof roller will approach a culvert, pipe or other conduit closer than 5 ft. in any direction.

203-3.04 Select Borrow. The management of a select borrow source and the acceptability of all select borrow material shall be in conformance with §203-3.01F. *Borrow.*

Underwater areas shall be filled with select borrow to 2 ft. above the water surface at the time of placement and in conformance with the details shown on the appropriate Standard Sheet or as noted in the contract documents.

All select borrow placed within the limits of Embankment or the Subgrade Area shall be placed in conformance with §203-3.03B. *Embankments* or §203-3.01G. *Subgrade Area* respectively, as appropriate, or where used for fill or backfill at structures, culverts and pipes, in conformance with §203-3.06 *Select Granular Fill* and §203-3.17 *Select Structural Fill*.

203-3.05 Select Fill. Underwater areas shall be filled with select fill to 2 ft. above the water surface at the time of placement and in conformance with the details shown on the appropriate Standard Sheet or as noted in the contract documents.

All select fill placed within the limits of Embankment or the Subgrade Area shall be placed in conformance with §203-3.03B. *Embankments* or §203-3.01G. *Subgrade Area* respectively, as appropriate, or where used for fill or backfill at structures, culverts and pipes, in conformance with §203-3.06 *Select Granular Fill* and §203-3.17 *Select Structural Fill*.

203-3.06 Select Granular Fill. The type of material to be used in bedding, filling and backfill at culverts, pipes, conduit and direct burial cable shall be in conformance with the details shown on the appropriate Standard Sheet or as noted in the contract documents. Do not use RAP. Do not use slabs or pieces of either concrete or asphalt.

Fill or backfill material at culverts and pipes shall be deposited in horizontal layers not exceeding 6 in. in thickness prior to compaction. Compaction of each layer shall be as specified under §203-3.03C. *Compaction.* A minimum of 95% of Standard Proctor Maximum Density will be required. When placing fill or backfill around culverts and pipes, layers shall be deposited to progressively bury the pipe or culvert to equal depths on both sides. The limits to which this subsection will apply shall be in accordance with the Standard Sheets or as modified in the contract documents.

Fill or backfill for conduit or cable placed in a trench shall be carefully placed in a horizontal layer to a depth of 6 in. over the top of the conduit or cable. This layer of material shall not be compacted, however, the remaining portion of the trench shall be backfilled in accordance with the preceding paragraph. Where cables or conduits are placed and backfilled by a machine in one operation, the above requirements for backfilling do not apply.

Where sheeting has been used for the excavation, and incremental removal of sheeting is not specified in the contract documents, sheeting shall be pulled when the trench has been backfilled to the maximum unsupported trench depth allowed by 29 CFR 1926.

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203-3.07 Select Granular Fill Slope Protection. The Contractor shall perform the excavation in accordance with the requirements for “Unclassified Excavation and Disposal” as described elsewhere in these specifications. The Contractor shall then spread material conforming to the requirements given in §733-12 *Select Granular Slope Protection*, in one layer to its full thickness by a method approved by the Engineer. The work shall be performed where shown in the contract documents or where directed by the Engineer in accordance with the Standard Sheets, and details shown on the contract documents. Compaction of the slope protection is not required. Slope Protection shall be either of two types, as described below:

A. Select Granular Fill, Slope Protection - Type A. Under this type, the Contractor shall furnish and install the slope protection where shown in the contract documents in accordance with the details shown on the Standard Sheets.

B. Select Granular Fill, Slope Protection - Type B. Under this type, the Contractor shall furnish and install the slope protection where directed by the Engineer in accordance with the details shown on the Standard Sheets.

203-3.08 Surface Settlement Gauges. Surface settlement gauges shall be constructed, installed, and maintained where shown in the contract documents and in accordance with the details contained in the geotechnical control procedure “*Settlement Gauges and Settlement Rods*” covering construction, installation, maintenance, and abandonment of these devices.

Where surface settlement gauges are called for, it will be the Contractor's option to install pipe gauges or manometer gauges, unless a definite type is specified in the contract documents. Surface settlement gauges will be accepted for conformance with the specification requirements on the basis of an inspection of the installation by the Departmental Geotechnical Engineer.

203-3.09 Settlement Rods. Settlement rods shall be constructed, installed, and maintained where shown in the contract documents and in accordance with the details contained in the geotechnical control procedure “*Settlement Gauges and Settlement Rods*” covering construction, installation, maintenance, and abandonment of these devices.

Settlement rods will be accepted for conformance with the specification requirements on the basis of an inspection of the installation by the Departmental Geotechnical Engineer.

203-3.10 Piezometers. Piezometers shall be constructed, installed, and maintained at the locations shown in the contract documents and in accordance with the detailed drawings included in the contract documents.

203-3.11 Applying Water. None Specified.

203-3.12 Select Granular Subgrade. The type of material to be used in fill or backfill of undercuts shall be in conformance with the details shown in the contract documents or as ordered by the Engineer.

Fill or backfill material shall be deposited in horizontal layers not exceeding 6 in. in thickness prior to compaction. Compaction of each layer shall be as specified under §203-3.03C. *Compaction*. A minimum of 95% of Standard Proctor Maximum Density will be required.

203-3.13 Select Structural Fill. The type of material to be used in bedding, filling and backfill at structures shall be in conformance with the details shown on the appropriate Standard Sheet or as noted in the contract documents or as ordered by the Engineer. Do not use RAP. Do not use slabs or pieces of either concrete or asphalt.

Fill or backfill material at structures shall be deposited in horizontal layers not exceeding 6 in. in thickness prior to compaction. Compaction of each layer shall be as specified under §203-3.03C. *Compaction*. A minimum of 95% of Standard Proctor Maximum Density will be required. When filling behind abutments and similar structures, all material shall be placed and compacted in front of the walls prior to placing fill behind the walls to a higher elevation. The limits to which this subsection will apply shall be in accordance with the Standard Sheets or as modified in the contract documents.

Where sheeting has been used for the excavation, and incremental removal of sheeting is not specified in the contract documents, sheeting shall be pulled when the trench has been backfilled to the maximum unsupported trench depth allowed by 29 CFR 1926.

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203-3.14 Sand Backfill. The type of material to be used in bedding and filling shall be in conformance with the details shown in the contract documents or as ordered by the Engineer.

Bedding or fill material shall be deposited in horizontal layers not exceeding 6 in. in thickness prior to compaction. Compaction of each layer shall be as specified under §203-3.03C. *Compaction*. A minimum of 95% of Standard Proctor Maximum Density will be required.

203-4 METHOD OF MEASUREMENT

203-4.01 General. Quantities for all items of work with payment units in cubic yards will be computed from payment lines shown in the contract documents. Work performed beyond any designated payment line, including any offset required for the construction of presplit rock slopes in lifts, will not be included in the computation of quantities for the item involved.

For any item paid for in its final position, no additional quantity will be measured for payment to make up losses due to foundation settlement, compaction, erosion or any other cause.

Cross-sectioning, for the purpose of determining quantities for payment, will be employed only where payment lines are not shown in the contract documents or Standard Sheets, and cannot be reasonably established by the Engineer.

Quantities for benching will be computed for payment from the details and instructions shown on the Standard Sheet *Earthwork Transition and Benching Details*.

The excavation of unsuitable materials designated as topsoil under Section 613 *Topsoil*, will be included in the quantity measured for the appropriate unclassified excavation item, without distinction..

Where the item, "Embankment in Place," is designated for the project by the proposal, all borrow of ordinary suitable materials shall be incidental to the work of that item.

203-4.02 Unclassified Excavation and Disposal. Unclassified excavation and disposal will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the original position for all excavation within right-of-way limits. No deduction shall be made for any pipes, culverts, structures, or other obstructions, unless these are measured for payment under another contract item. Excavation for borrow of suitable materials for embankment construction, shall not be included in the computation for this work.

203-4.03 Embankment in Place. Embankment in place will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the final compacted position. Any additional quantity of material required to compensate for embankment settlement shall not be included in the measurement of this item. The quantities of embankment will exclude the total volume of pipes, culverts, other roadway items, and granular backfill within the payment lines for such granular backfill.

203-4.04 Select Borrow. Select borrow will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the original position.

203-4.05 Select Fill. Select fill will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the final compacted position.

203-4.06 Select Granular Fill. Select granular fill will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the final compacted position. A deduction shall be made for pipes (based on nominal diameters) and other payment items when the combined cross-sectional area exceeds 1 ft² unless otherwise shown in the contract documents. No deduction will be made for the cross-sectional area of an existing facility.

203-4.07 Select Granular Fill Slope Protection. Select granular fill slope protection will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the final position.

203-4.08 Surface Settlement Gauges. Surface settlement gauges will be measured by the number of devices satisfactorily installed.

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203-4.09 Settlement Rods. Settlement rods will be measured by the number of devices satisfactorily installed.

203-4.10 Piezometers. Piezometers will be measured by the number of devices satisfactorily installed.

203-4.11 Applying Water. The unit of measurement of water will be one pressure distributor per calendar day, denoted hereafter as one p.d.d., for dust control. Where the Contractor works in more than one separate and distinct shift per calendar day, each shift shall be considered as one p.d.d. A single shift plus overtime work, however, shall be considered as one p.d.d. The quantity thus determined shall be applied directly as the quantity to be paid for where the distributors used have a capacity of 3,000 gal. or less.

Provided that the Engineer determines that the total operating distributor capacity (number and sizes of all distributors) employed is reasonably commensurate with the needs for water application, additional payment will be allowed for distributors exceeding 3,000 gal. in capacity as follows:

Distributor Capacity	Pressure Distributor per Calendar Day Adjustment
3,000 gal. < distributor capacity < 5,000 gal.	p.d.d.'s will be multiplied by 1.5
5,000 gal. ≤ distributor capacity	p.d.d.'s will be multiplied by 2.0

No additional quantity shall be measured for payment for compaction purposes.

203-4.12 Select Granular Subgrade. Select granular subgrade will be measured in cubic yards, measured to the nearest whole cubic yard, computed in the final compacted position.

203-4.13 Select Structural Fill. Select structural fill will be measured in cubic yards, measured to the nearest whole cubic yard, in the final compacted position. A deduction shall be made for pipes (based on nominal diameters) and other payment items when the combined cross-sectional area exceeds 1 ft² unless otherwise shown in the contract documents. No deduction will be made for the cross-sectional area of an existing facility.

203-4.14 Sand Backfill. Sand backfill will be measured in cubic yards, measured to the nearest whole cubic yard, in the final compacted position. A deduction shall be made for pipes (based on nominal diameters) and other payment items when the combined cross-sectional area exceeds 1 ft² unless otherwise shown in the contract documents. No deduction will be made for the cross-sectional area of an existing facility.

203-5 BASIS OF PAYMENT

203-5.01 General-All Items. The unit price bid shall include the cost of furnishing all labor, materials, and equipment as necessary to complete the work, except where specific costs are designated or included in another pay item of work. Incidental costs, such as acquisition of borrow pits or material outside of the right-of-way, rock drilling and blasting, compaction and special test requirements, stockpiling and re-handling of materials, precautionary measures to protect private property and utilities, to form and trim graded surfaces, proof rolling, re-proof rolling, corrective work disclosed by proof rolling and any delays caused by this corrective work, shall be included in the unit price of the pay item where such costs are incurred. The exception is that corrective work ordered in cut sections based on an evaluation of proof rolling will be paid for under the appropriate excavation and backfill items.

Quantities for any additional items of work or substitution of material in accordance with the approved Winter Earthwork submittal shall be furnished at no cost to the State.

203-5.02 Unclassified Excavation and Disposal. The provisions of §203-5.01 *General-All Items* apply including the following:

The unit price bid shall cover all costs of required excavation within the right of way limits, and all costs of disposal if the excavated materials are not used under another pay item.

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203-5.03 Embankment In Place. The provisions of §203-5.01 *General-All Items* apply.

203-5.04 Select Borrow. The provisions of §203-5.01 *General-All Items* apply.

203-5.05 Select Fill. The provisions of §203-5.01 *General-All Items* apply.

203-5.06 Select Granular Fill. The provisions of §203-5.01 *General-All Items* apply.

203-5.07 Select Granular Fill Slope Protection. The provisions of §203-5.01 *General-All Items* apply.

203-5.08 Surface Settlement Gauges. The provisions of §203-5.01 *General-All Items* apply including the following:

The unit price bid shall cover all costs of providing, installing and maintaining each device, including excavation, trenching and backfill during the course of the work. No payment will be made under any other item of the contract for any work associated with these items.

When each installation is completed, 75% of the item unit price will be paid. The remaining 25% will be paid when each device has been properly maintained and is abandoned according to the procedures contained in the geotechnical control procedure “*Settlement Gauges and Settlement Rods*”. Unless otherwise specified in the proposal, the unit price shall also include the costs of removal.

203-5.09 Settlement Rods. The provisions of §203-5.01 *General-All Items* apply including the following:

The unit price bid shall cover all costs of providing, installing and maintaining each device, including excavation, trenching and backfill during the course of the work. No payment will be made under any other item of the contract for any work associated with these items.

When each installation is completed, 75% of the item unit price will be paid. The remaining 25% will be paid when each device has been properly maintained and is abandoned according to the procedures contained in the geotechnical control procedure “*Settlement Gauges and Settlement Rods*”. Unless otherwise specified in the proposal, the unit price shall also include the costs of removal.

203-5.10 Piezometers. The provisions of §203-5.01 *General-All Items* apply including the following:

The unit price bid shall cover all costs of providing, installing and maintaining each device, including excavation, trenching and backfill during the course of the work. No payment will be made under any other item of the contract for any work associated with these items.

When each installation is completed and the device placed in satisfactory operation, 75% of the unit price will be paid. The remaining 25% will be paid when all earthmoving and slope work is completed in the vicinity of each installation. Any installation rendered inoperative due to damage by construction equipment after partial or full payment, shall be immediately repaired or the full amount of such payment shall be deducted from other monies due the Contractor under the contract.

203-5.11 Applying Water. The unit price bid per one operating pressure distributor per calendar day for applying water shall include the costs of furnishing all labor, material and equipment necessary for dust control.

203-5.12 Select Granular Subgrade. The provisions of §203-5.01 *General-All Items* apply.

203-5.13 Select Structural Fill. The provisions of §203-5.01 *General-All Items* apply.

203-5.14 Sand Backfill. The provisions of §203-5.01 *General-All Items* apply.

Payment will be made under:

Item No.	Item	Pay Unit
203.02	Unclassified Excavation and Disposal	Cubic Yards
203.03	Embankment In Place	Cubic Yards

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203.05	Select Borrow	Cubic Yards
203.06	Select Fill	Cubic Yards
203.07	Select Granular Fill	Cubic Yards
203.0801	Select Granular Fill, Slope Protection - Type A	Cubic Yards
203.0802	Select Granular Fill, Slope Protection - Type B	Cubic Yards
203.10	Surface Settlement Gauges	Each
203.12	Settlement Rods	Each
203.13	Piezometers	Each
203.1601	Applying Water	P.D.D.
203.20	Select Granular Subgrade	Cubic Yards
203.21	Select Structural Fill	Cubic Yards
203.25	Sand Backfill	Cubic Yards

FLOWABLE FILL

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 176-178, **Delete** SECTION 204 *Controlled Low Strength Material (CLSM)* entirely and **Replace** it with the following:

SECTION 204 – FLOWABLE FILL

204-1 DESCRIPTION. The work shall consist of mixing and placing flowable fill at the locations shown in the contract documents.

204-1.01. Controlled Low Strength Material. Controlled Low Strength Material (CLSM) is an acceptable alternative to compacted soil backfill in confined spaces. CLSM consists of cement, water and, at the Contractor's option, fly ash, aggregate or chemical admixtures in any proportions such that the final product meets the strength and flow consistency requirements included in the specification. The mix is proportioned to be self leveling and does not require compaction. It is much lower in strength than concrete, making future excavation possible.

204-1.02. Lightweight Concrete Fill. Lightweight Concrete Fill is an engineered geotechnical material with a unique strength / density relationship which can be used to reduce loads on soft foundation soils, buried structures, or against retaining walls. Lightweight Concrete Fill consists of a Portland cement matrix containing uniformly distributed, non-interconnected air voids introduced by a foaming agent. The flowability and cementitious properties provide a product that is self leveling and does not require compaction.

204-2 MATERIALS.

204-2.01 Controlled Low Strength Material. Provide backfill material meeting the requirements for CLSM as stated in §733-01 *Flowable Fill*.

204-2.02 Lightweight Concrete Fill. Provide backfill material meeting the requirements for Lightweight Concrete Fill as stated in §733-01 *Flowable Fill*.

204-3 CONSTRUCTION DETAILS.

204-3.01 Controlled Low Strength Material.

A. CLSM Submittal. Submit to the Engineer (1) a mix design, with certified test results supplied by a qualified independent testing laboratory for the CLSM verifying the unconfined compressive strength meets the requirements of the specification, and (2) the methods of installation to be employed. Include in the CLSM placement sequence, a procedure to account for subsidence during the settling and curing process.

B. CLSM Production. Mix the materials at a stationary mixing plant which is either a continuous or a batch type plant. A batch is defined as the amount of material that can be mixed at one time. Design the mix of materials to accurate proportions, either by volume or by weight, so that when the materials are incorporated in the mix a thorough and uniform mix will result.

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If the CLSM can be placed within 30 minutes of the end of mixing, then open haul units may be used for transport. If it cannot be placed within 30 minutes after the end of mixing, it must be transported by a rotating drum unit capable of 2-6 rpm.

For work involving quantities of CLSM less than 2.5 yd³, the Contractor may use a small portable mixer. Provide a mixer capable of mixing CLSM that has the specified unconfined compressive strength and flow consistency. Mix all components so as to produce a uniform product.

C. CLSM Placement - General. Do not place CLSM that is frozen, or place CLSM on frozen ground. Do not expose CLSM to freezing temperatures until after it has gained its requisite strength, abiding by the *Provisions for Curing in Cold Weather* in Section 555 *Structural Concrete*.

If the CLSM is to be placed via pumps, the placement sequence shall be such that the equipment is able to access the entire volume to be filled without separating the mixture.

Keep CLSM encapsulated with soil or protected by other means so as to prevent erosion and environmental degradation.

D. CLSM Placement – at Structures, Culverts, Pipes, Conduits and Direct Burial Cables. Place the CLSM in accordance with the installation details shown on the Standard Sheet.

When placing CLSM for pipe backfill, discharge the material onto the top and at the center of the pipe.

Do not place CLSM in contact with aluminum pipe, including connections, fixtures, etc., unless the aluminum has been thoroughly coated with Zinc Chromate Primer, §708-04 *Zinc Chromate Primer*, or an equivalent alternative as approved by the Materials Bureau.

Do not place CLSM containing fly ash in direct contact with cast iron or ductile iron pipes, fittings or appurtenances.

In situations where CLSM is used as backfill around pipe, take precautions to counteract the pipe's buoyancy.

E. CLSM – QA Testing. The Department maintains a Quality Assurance (QA) program for CLSM. The Department will sample and test specimens of the CLSM during placement to compare its properties to the specification requirements and verifying the spread diameter and unconfined compressive strength of the in-place material. The QA program provides oversight of the Contractors Quality Control (QC) process, to reveal changes which may occur in the approved mix design.

Several scenarios may develop as a result of the QA testing.

1. The properties are shown to meet the requirements of the specification for the type(s) identified in the contract documents. No action will be taken.
2. The properties are shown to be outside the requirements of the specification for the type(s) identified in the contract documents.
 - a. If the results are within an acceptable margin as determined by the Department through an independent analysis of the site specific conditions, the material may remain in-place contingent upon an agreed credit. If a credit cannot be agreed upon, the scenario reverts to 2.b.
 - b. If the results are not within an acceptable margin as determined by the Department through an independent analysis of the site specific conditions, the entire lift (and all overlying lifts) of material will be removed and replaced at the Contractor's expense.

FLOWABLE FILL**204-3.02 Lightweight Concrete Fill.**

A. Lightweight Concrete Fill Submittal. Submit to the Engineer (1) a mix design, with certified test results supplied by a qualified independent testing laboratory for the Lightweight Concrete Fill verifying the wet cast density and unconfined compressive strength meets the requirements of the specification for the type(s) identified in the contract documents, and (2) the methods of installation to be employed.

B. Lightweight Concrete Fill Production. Generate foam in accordance with the manufacturer's recommendations for inclusion into the mix.

Mix the materials at a stationary mixing plant which is either a continuous or a batch type plant. A batch is defined as the amount of material that can be mixed at one time. Design the mix of materials to accurate proportions, either by volume or by weight, so that when the materials are incorporated in the mix, a thorough and uniform mix will result.

Locate equipment such that the mixed product is capable of being pumped into place properly.

C. Lightweight Concrete Fill - Placement. A representative of the supplier of the foaming agent shall be on site during the initial placement and at such times as requested by the Engineer to advise the Contractor on his operation. The lightweight concrete fill shall be placed in lifts not to exceed 24 in. unless otherwise approved by the Engineer. Subsequent lifts shall be placed only after a minimum 12 hour waiting period has been observed.

At the end of each pour, exposed surfaces shall be roughened with a stiff broom or scored with a tool. The Lightweight Concrete Fill shall be placed on supporting surfaces which have been cleaned of loose debris, sand, dust, or other foreign materials to the satisfaction of the Engineer.

Do not place Lightweight Concrete Fill that is frozen, or place Lightweight Concrete Fill on frozen ground. Do not expose Lightweight Concrete Fill to freezing temperatures until after it has gained its requisite strength, abiding by the *Provisions for Curing in Cold Weather* in Section 555 *Structural Concrete*.

D. Lightweight Concrete Fill – QA Testing. The Department maintains a Quality Assurance (QA) program for Lightweight Concrete Fill. The Department will sample and test specimens of the Lightweight Concrete Fill material during placement to compare its properties to the specification requirements and verifying the wet cast density and unconfined compressive strength of the in-place material. The QA program provides oversight of the Contractors Quality Control (QC) process, to reveal changes which may occur in the approved mix design.

Several scenarios may develop as a result of the QA testing.

1. The properties are shown to meet the requirements of the specification for the type(s) identified in the contract documents. No action will be taken.
2. The properties are shown to be outside the requirements of the specification for the type(s) identified in the contract documents.
 - a. If the results are within an acceptable margin as determined by the Department through an independent analysis of the site specific conditions, the material may remain in-place contingent upon an agreed credit. If a credit cannot be agreed upon, the scenario reverts to 2.b.
 - b. If the results are not within an acceptable margin as determined by the Department

FLOWABLE FILL

through an independent analysis of the site specific conditions, the entire lift (and all overlying lifts) of material will be removed and replaced at the Contractor's expense.

204-4 METHOD OF MEASUREMENT.

204-4.01. Controlled Low Strength Material. CLSM will be measured for payment in cubic yards measured to the nearest 0.1 cubic yard computed from the payment lines shown on the contract documents.

A deduction will be made for pipes (based on nominal diameters) and other features when the combined cross-sectional area exceeds 1 ft².

No additional quantity shall be measured for payment to make up losses due to foundation settlement, compaction, erosion or any other cause.

Cross sectioning, for the purpose of determining quantities for payment, will be employed only where payment lines are not shown on the contract documents or Standard Sheets, and cannot be reasonably established by the Engineer.

204-4.02. Lightweight Concrete Fill. Lightweight Concrete Fill will be measured for payment in cubic yards measured to the nearest 0.1 cubic yard computed from the payment lines shown on the contract documents.

204-5 BASIS OF PAYMENT.

204-5.01 Controlled Low Strength Material. The unit price bid shall include the costs of all labor, material, and equipment necessary to satisfactorily complete the work.

204-5.02. Lightweight Concrete Fill. The unit bid price shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

Payment will be made under:

Item No.	Item	Pay Unit
204.01	Controlled Low Strength Material (CLSM)	Cubic Yard
204.02	Controlled Low Strength Material (CLSM) (No Fly Ash)	Cubic Yard
204.03	Lightweight Concrete Fill (Type A)	Cubic Yard
204.04	Lightweight Concrete Fill (Type B)	Cubic Yard

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NEW STANDARD SPECIFICATION SECTIONS

Make the following changes to the Standard Specifications of May 1, 2008:

Page 192 **Delete** Section 208 (Vacant) and **Replace** it with the following:

“SECTION 208 - STORMWATER MANAGEMENT FACILITIES

208-1 DESCRIPTION. The work in this section shall include work required for stormwater management facilities.

208-2 MATERIALS. Materials shall be as specified in the special specifications.

208-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

208-4 METHOD OF MEASUREMENT. As specified in the special specifications.

208-5 BASIS OF PAYMENT. As specified in the special specifications.”

Page 277 **Delete** SECTIONS 412 THRU 489 (VACANT) and **Replace** it with the following:

“SECTION 412 - CRACK SEALING ASPHALT PAVEMENTS

412-1 DESCRIPTION. The work in this section shall include work required for crack sealing asphalt pavements.

412-2 MATERIALS. Materials shall be as specified in the special specifications.

412-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

412-4 METHOD OF MEASUREMENT. As specified in the special specifications.

412-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTIONS 413 THRU 489 (VACANT)”

Page 483 **Delete** Section 601 (Vacant) and **Replace** it with the following:

“SECTION 601 - ARCHITECTURAL PAVEMENTS AND TREATMENTS

See EI 12-004 Note 02158”

Page 556 **Delete** Section 616 AND 617 (Vacant) and **Replace** it with the following:

“SECTION 616 – SOIL BIOENGINEERING AND STREAM RESTORATION

616-1 DESCRIPTION. The work in this section shall include work required for soil bioengineering and stream restoration.

616-2 MATERIALS. Materials shall be as specified in the special specifications.

616-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

616-4 METHOD OF MEASUREMENT. As specified in the special specifications.

616-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 617 - INVASIVE SPECIES CONTROL

617-1 DESCRIPTION. The work in this section shall include work required for invasive species control.

617-2 MATERIALS. Materials shall be as specified in the special specifications.

617-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

617-4 METHOD OF MEASUREMENT. As specified in the special specifications.

617-5 BASIS OF PAYMENT. As specified in the special specifications.”

Page 641 **Delete** Section 639 (Vacant) and **Replace** it with the following:

“SECTION 639 - CONSTRUCTION CONTRACT MANAGEMENT SYSTEMS

639-1 DESCRIPTION. The work in this section shall include work required for construction contract management systems.

639-2 MATERIALS. Materials shall be as specified in the special specifications.

639-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

639-4 METHOD OF MEASUREMENT. As specified in the special specifications.

639-5 BASIS OF PAYMENT. As specified in the special specifications.”

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NEW STANDARD SPECIFICATION SECTIONS

Page 643 **Delete** Section 641, 642 AND 643 (VACANT) and **Replace** it with the following:

“SECTION 641 - BRIDGE WASHING

641-1 DESCRIPTION. The work in this section shall include work required for bridge washing.

641-2 MATERIALS. Materials shall be as specified in the special specifications.

641-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

641-4 METHOD OF MEASUREMENT. As specified in the special specifications.

641-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 642 - ROADSIDE MAINTENANCE

642-1 DESCRIPTION. The work in this section shall include work required for roadside maintenance. Examples of the type of work are mowing, litter pick up, cleaning and shaping ditches. Work involving slope repair, asphalt patching, culvert repairs, etc shall be specified in other sections.

642-2 MATERIALS. Materials shall be as specified in the special specifications.

642-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

642-4 METHOD OF MEASUREMENT. As specified in the special specifications.

642-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 643 – NOISE BARRIERS

643-1 DESCRIPTION. The work in this section shall include work involved with construction of noise barriers.

643-2 MATERIALS. Materials shall be as specified in the special specifications.

643-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

643-4 METHOD OF MEASUREMENT. As specified in the special specifications.

643-5 BASIS OF PAYMENT. As specified in the special specifications.”

Page 738 **Delete** SECTION 681 THRU 684 (VACANT) and **Replace** it with the following:

“SECTION 681 AND 682 - (VACANT)

SECTION 683 - INTELLIGENT TRANSPORTATION SYSTEMS

683-1 DESCRIPTION. The work in this section shall include work required for intelligent transportation systems.

683-2 MATERIALS. Materials shall be as specified in the special specifications.

683-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

683-4 METHOD OF MEASUREMENT. As specified in the special specifications.

683-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 684 - (VACANT)”

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GEOSYNTHETICS AND SOIL EROSION AND SEDIMENT CONTROL

Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 189 to 192, *replace* Section 207- Geotextiles and Prefabricated Composite Drains for Structures, with the following:

“SECTION 207 - GEOSYNTHETICS

207-1 DESCRIPTION

207-1.01 Geotextiles. The work shall consist of furnishing and installing approved Geotextile of the Class and Type indicated, at the locations, and in the manner shown on the plans or as directed by the Engineer, in writing, prior to performing the work.

207-1.02 Geomembranes. The work shall consist of furnishing and installing approved Geomembrane, including the preparation of the surface upon which the Geomembrane is placed, at the locations and in the manner shown on the plans or as directed by the Engineer, in writing, prior to performing the work.

207-1.03 Prefabricated Composite Drains for Structures. The work shall consist of furnishing and installing an approved Prefabricated Composite Structural Drain (PCSD) or Prefabricated Composite Integral Abutment Drain (PCIAD) as specified at the location (s) shown on the contract documents or as directed by the Engineer, in writing, prior to performing the work.

Prior to installation, the Contractor shall furnish the Engineer with copies of the manufacturer’s literature with details and installation requirements for the PCSD or PCIAD. If not included in the manufacturer’s literature, a letter identifying the geotextile wrap shall also be provided to the Engineer.

207-2 MATERIALS. Materials shall meet the requirements specified in the following subsections of Section 700 – Materials.

Geotextiles	§737-01
Geotextile Bedding	§737-01 A.
Geotextile Separation	§737-01 B.
Geotextile Drainage	§737-01 C.
Geotextile Slope Protection	§737-01 D.
Geotextile Stabilization	§737-01 E.
Turbidity Curtain	§737-01 F.
Silt Fence	§737-01 G.
Geomembranes	§737-02
Prefabricated Composite Structural Drains	§737-04
Prefabricated Composite Integral Abutment Drains	§737-05

Materials shall be subject to the Department’s Quality Assurance (QA) program outlined in Section 737.

207-3 CONSTRUCTION DETAILS

207-3.01 Geotextiles

A. General. The Geotextiles shall be protected from exposure to sunlight during transport and storage. After placement, the Geotextile shall not be left uncovered for more than two (2) weeks.

Traffic or construction equipment will not be permitted directly on the Geotextile. Geotextiles may be joined by either sewing or overlapping. Sewn seams shall be lapped a minimum of 4 inches and double

sewn. The thread used to sew the seam shall be nylon or polypropylene. Overlapped seams shall have a minimum overlap of 20 inches except when placed under water where the overlap shall be a minimum of 3 feet. All seams shall be subject to the approval of the Engineer. Geotextile which becomes torn or damaged due to the Contractor's operations shall be replaced or patched at no cost to the State. The patch shall extend 3 feet beyond the perimeter of the tear or damage.

B. Bedding and Slope Protection. The Geotextile shall be placed and anchored on a prepared surface approved by the Engineer. The Geotextile shall be laid loosely but in intimate contact with the soil so that placement of the overlying materials will not stretch or tear the Geotextile. Where Geotextile is placed above water, the backfill placement shall begin at the toe and proceed up the slope.

Where Geotextile is placed under water, the long dimension (provided that the width dimension is wider than the channel width) shall be placed parallel to the direction of flow. If the width dimension is not wider than the channel width, the long dimension shall be placed perpendicular to the direction of flow. Successive Geotextile sheets shall be overlapped so that the upstream sheet is placed over the downstream sheet. As the Geotextile is placed under water, the backfill material shall be placed on it to the required thickness. The Geotextile placement shall not progress more than 50 feet ahead of the backfill placement.

Rip-rap, stone filling (Heavy) or stone filling (Medium) shall not be dropped onto the Geotextile from a height greater than 1 foot. Slope protection and smaller sizes of stone filling shall not be dropped onto the Geotextile from a height exceeding 3 feet.

C. Separation and Stabilization. The Geotextile shall be placed as directed by the Engineer. The Geotextile shall be laid loosely but in intimate contact with the soil so that placement of the overlying material will not stretch or tear the Geotextile.

D. Drainage. The Geotextile shall be placed to conform loosely to the shape of the trench.

After placing the filter material, the Geotextile shall be folded over the top of the filter material to produce a minimum overlap of 12 inches. The Geotextile shall then be covered with the subsequent course.

207-3.02 Geomembranes. The Geomembrane shall be protected during transport and storage. The surface upon which the Geomembrane is to be placed shall be within reasonable conformity to the proposed grade. Traffic or construction equipment will not be permitted directly on the Geomembrane. Care shall be exercised by workers when walking or working on the Geomembrane.

Seams shall be sealed as per the manufacturer's recommendations and to the satisfaction of the Engineer. The edges of the Geomembrane shall be secured in the manner shown on the contract plans or as directed by the Engineer.

Geomembrane which becomes torn or damaged shall be replaced or patched as ordered by the Engineer. The patch shall extend 3 feet beyond the perimeter of the tear or damage and the seams shall be approved by the Engineer.

207-3.03 Prefabricated Composite Drains for Structures. The Contractor shall install the drain in conformance with the manufacturer's installation procedures. The drain shall be installed so that the backfill, when placed, will be in contact with the geotextile and forms a continuous drainage layer without interruption within the drain's plane. In installations where concrete is to be poured against the prefabricated composite drain, only drains with impermeable cores will be allowed. At all locations, a positive outlet for the water in the drain shall be provided. This may involve making a hole in the core at the weep hole locations for approved drains with an impermeable core. Do not puncture the geotextile. Any damaged geotextile shall be repaired.

Adhesive shall be applied to the wall surface, and not directly to the drain.

During all periods of shipment and storage, the drain shall be wrapped and protected from direct

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exposure to sunlight, mud, dirt and debris.

Care shall be exercised while backfilling to prevent damage to the drain. Repairs or replacements of drain damaged by construction operations shall be performed, as directed by the Engineer, at no cost to the State.

207-4 METHOD OF MEASUREMENT

207-4.01 Geotextiles

A. General. The quantity of Geotextile will be the number of square meters computed from the payment lines shown on the plans or from payment lines established in writing by the Engineer. Measurement will not be made for Geotextile used for repairs, seams, or overlaps. If taken, the amount of quality assurance samples will be added to this quantity.

B. Drainage. The number of square meters shall be computed by multiplying the length of the trench where Geotextile is used by the theoretical perimeter (determined from the typical section).

207-4.02 Geomembranes. The quantity of Geomembrane will be the number of square meters computed from the payment lines shown on the plans or from payment lines established in writing by the Engineer. Measurement will not be made for Geomembranes used for repairs, seams, or overlaps.

207-4.03 Prefabricated Composite Drains for Structures. The quantity of PCSD or PCIAD is the number of square meters satisfactorily installed computed from the payment lines indicated in the contract documents or from payment lines established, in writing, by the Engineer.

207-5 BASIS OF PAYMENT

207-5.01 Geotextiles. The unit price bid per square meter for these items shall include the cost of furnishing all labor, equipment, and materials necessary to complete the work, including the cost of preparing the surface upon which the Geotextile is placed. No payment will be made for replacement or repairs.

207-5.02 Geomembranes. The unit price bid per square meter for this item shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including the cost of preparing the surface upon which the Geomembrane is placed and securing the edges of the Geomembrane. No payment will be made for replacement or repairs.

207-5.03 Prefabricated Composite Drains for Structures. The unit price per square meter for this item includes the cost of furnishing all labor, equipment, and material necessary to complete the work. No payment will be made for repairs or replacement.

Payment will be made under:

Item No.	Item	Pay Unit
207.20	Geotextile Bedding	Square Yard
207.21	Geotextile Separation	Square Yard
207.22	Geotextile Drainage	Square Yard
207.23	Geotextile Slope Protection	Square Yard
207.24	Geotextile Stabilization	Square Yard
207.25	Geomembrane	Square Yard
207.26	Prefabricated Composite Structural Drain	Square Yard
207.27	Prefabricated Composite Integral Abutment Drain	Square Yard

Make the following changes to the Standard Specifications of May 1, 2008.

Replace SECTION 209-EROSION AND SEDIMENT CONTROL in its entirety with:

SECTION 209 - SOIL EROSION AND SEDIMENT CONTROL

209-1 DESCRIPTION. This work shall consist of furnishing, installing, inspecting, maintaining, and removing soil erosion and sediment control measures as shown on the contract documents or as ordered by the Engineer during the life of the contract. This work shall be coordinated with other items of work specified elsewhere in the contract documents to the extent practical to assure effective and continuous soil erosion and sediment control throughout the construction and post construction period.

209-1.01 Erosion Control. See §101-02 *Definitions of Terms*, Erosion and Sediment Control, for the definition of Erosion Control. The following items of work are provided in this section to address soil erosion control - mulch, straw/wood fiber mulch, seed and mulch, seed and straw/wood fiber mulch, all rolled erosion control products, and soil stabilizers. Other items may be included in the contract documents to provide soil erosion control (e.g., turf establishment, bank and channel protection, etc.).

209-1.02 Sediment Control. Sediment control is any action taken or item used as part of a project or as a separate action to minimize suspended solid material transport by water. The following items of work are provided in this section to address sediment control: strawbale dike, sediment trap, turbidity curtain, and silt fence.

209-2 MATERIALS.

209-2.01 Mulch-Temporary. Mulch shall be §713-19 *Straw*, or §713-11 *Wood Fiber Mulch*.

209-2.02 Seed-Temporary. Seed shall be ryegrasses (annual or perennial) or cereal grasses suitable to the area and as a temporary cover which will not compete with the grasses sown later for permanent cover.

209-2.03 Stone. Stone filling shall meet the requirements of §620-2.02 *Stone Filling*, Light and #1 or #2 stone meeting the requirements of Section 703-02 *Coarse Aggregate*.

209-2.04 Strawbale Dike-Temporary. Strawbales shall meet the requirements of §713-19 *Straw*. All bales shall be tightly bound; loose or broken bales will not be accepted. Hardwood stakes shall be at least 1¼" x 1¼" and a minimum of 2' long.

209-2.05 Geotextiles. Geotextiles shall meet the requirements of §737-01 *Geotextiles*. UV sensitive geotextiles shall be protected from exposure to sunlight during transport and storage.

209-2.06 Silt Fence-Temporary. Silt fence shall meet the requirements of §737-01 G. *Silt Fence* and be listed in the Approved List. A silt fence assembly shall consist of silt fence geotextile, posts, and fasteners and may include mesh support consistent with the Approved List.

A. Posts. Posts shall meet the following requirements:

1. Wood, metal, or synthetic posts may be used. Softwood post shall be 1½" x 3½", hardwood post shall be at least 1¼" x 1¼", steel post shall be "T" or "L" shaped in cross section, with a minimum weight of 1.33lbs./ft.
2. Posts shall be a minimum of 4' long and shall be spaced consistent with the material selected and as indicated in the Approved List.

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B. Mesh Support. For those silt fence assemblies on the Approved List that require a mesh support, the support shall consist of 14 gauge (min) welded wire mesh with a max. 6" x 6" opening or polymeric mesh. All mesh support shall be a minimum of 30" in height.

C. Fasteners. Fasteners shall be heavy duty staples, hog rings, tie wires, or any other fastener compatible with the post material.

209-2.07 Sediment Trap-Temporary. The materials used shall be as indicated on the Standard Sheets. The impervious embankment material shall have the following gradation:

IMPERVIOUS EMBANKMENT GRADATION	
SIEVE SIZE	PERCENT PASSING BY WEIGHT
6"	90 - 100
3/4"	50 - 100
1/4"	40 - 90
40	30 - 85
200	25 - 75

209-2.08 Pipe Slope Drain - Temporary. Pipe slope drain materials may consist of new or used material in satisfactory condition and suitable for the intended use. The Engineer will reject used materials determined to be unsatisfactory. Pipe couplings shall be appropriate for the pipe and as recommended by the Manufacturer. End sections may be steel, aluminum, or polyethylene.

209-2.09 Prefabricated Check Dams and Drainage Structure Inlet Protection. The materials used for prefabricated check dams and drainage structure inlet protection shall be triangular shaped in cross section, and have a height of at least 8" - 10" in the center with two equal sides and a 18" - 24" base. The triangular-shaped inner material shall be foam. The outer cover shall be a woven bedding type geotextile placed around the inner triangle and extend 24"-36" beyond each side of the triangle base. Concrete block with holes used for inlet protection shall conform to the requirements of C 90 ASTM. Other materials may be proposed by the Contractor who shall be solely responsible for their performance.

209-2.10 Rolled Erosion Control Products and Soil Stabilizers. These materials shall meet the requirements of §713-07 Rolled Erosion Control Products and Soil Stabilizers and shall be of the Type and Class specified in the contract documents.

209-2.11 Construction Entrance-Temporary. Construction entrances shall consist of a geotextile, crushed stone or gravel and, if necessary, a drainage pipe to maintain ditch flow.

A. Geotextile. Geotextiles shall meet the requirements of §737-01 E. Geotextile Stabilization, Strength Class 1.

B. Crushed Stone or Gravel. Crushed stone or gravel shall have a thickness of not less than 6" of coarse aggregate material meeting the gradation requirements of size designation #3 on Table 703-4.

C. Drainage Pipe. The Contractor shall provide a drainage pipe sized with sufficient capacity to carry ditch flow. The pipe dimension shall be consistent with the modified soil erosion and sediment control plan approved by the Engineer. The drainage pipe may consist of new or used material in satisfactory condition and suitable for the intended use. The Engineer will reject any materials determined to be unsatisfactory.

209-2.12 Gravel Bag. Bags shall be fabricated from reinforced woven geotextile and shall include ties. No burlap bags shall be allowed. Coarse aggregate shall meet the gradation requirements of size designation #1 or

#2 of Table 703-4 and shall be used as the fill material. Each gravel bag shall be individually tied and double bagged. The bag with fill material shall be inversely inserted into the second bag in order to prevent leakage.

209-2.13 Sand Bag. Sand bags shall meet the requirements of §209-2.13 *Gravel Bag* except that sand meeting the gradation requirements of §703-06 *Cushion Sand* shall be used as the fill material.

209-2.14 Turbidity Curtain-Temporary. The Turbidity Curtain shall be a commercially available, pre-assembled system, including a geotextile, flotation system, bottom weight, and anchoring and securing mechanism. If assembled in panels, it shall include a secure mechanism for joining panels together.

Geotextiles shall conform to the requirements specified in §737-01F. *Turbidity Curtain*.

Hemmed pockets shall be sewn or heat bonded to contain flotation material, bottom weights, and for anchor lines. The flotation material shall maintain buoyancy if punctured or cut. The bottom weight shall be sufficient to hold the curtain in a vertical position. For sites not subject to tidal or heavy wave action, the curtain shall be capable of molding to conform to bottom contours so that suspended sediment is prevented from escaping underneath the curtain.

Anchorage lines shall be provided of sufficient strength and number to support the curtain and maintain it in position under normally expected conditions. End anchors shall be provided, with intermediate anchor points (for stakes or anchors) such that unanchored spans do not exceed 100', sufficient to maintain the turbidity curtain in place. Where the turbidity curtain is constructed in panels, anchor-line and shackle connections securing the panels together shall be sufficient for normally expected current, wind, or wave conditions.

209-3 CONSTRUCTION DETAILS.

209-3.01 General. In the event of conflict between these specification requirements and pollution control laws, rules, regulations or permit conditions by other federal or state agencies, the more restrictive shall apply.

Soil Erosion and Sediment Control shall be performed consistent with §107-12 *Water Quality Protection* and included as part of the construction schedule submitted by the Contractor in accordance with §108-01 *Start and Progress of Work*. The Contractor's schedules and methods shall be consistent with the soil erosion and sediment control plan included in the contract documents or the modified plan approved by the Engineer. The Contractor shall begin earthwork only after receiving written approval from the Engineer for the schedule.

The Contractor shall designate to the Engineer an Erosion and Sediment Control Supervisor with adequate training, experience, and authority to implement and maintain all erosion and sediment control measures. The Erosion and Sediment Control Supervisor must demonstrate evidence of having taken a 4- hour course in the principles and practices of erosion and sediment control by April 30, 2010. Subsequent training is required at 3 years intervals for maintaining training certification.

Perimeter sediment controls shall be installed prior to, or simultaneously with, performing grubbing, excavation, and borrow or fill operations. The Contractor shall limit the area of clearing and grubbing, excavation, borrow and embankment operations in progress, commensurate with their capability and progress in keeping the finish grading, mulching, seeding and other temporary and/or permanent control measures current in accordance with the approved schedule. Under no condition shall earth material exposed by grubbing, excavation, borrow or fill or other work be left without application of temporary or permanent erosion controls for a period of greater than 7 days. The Engineer may determine that a potential for erosion or sediment transport exists and order the Contractor to install temporary erosion controls earlier. When permanent soil erosion and sediment control measures can not be installed due to seasonal or other limitations, temporary soil erosion and sediment control measures shall be installed. Prior to removing or disturbing any erosion or sediment control measure that may be required to be reestablished due to continual grading operations, the Contractor shall verify the proposed progression of operations and the reestablishment of control measures with the Engineer to ensure the continuity of erosion and sediment control.

Sediment control measures shall not be removed without the Engineer's approval.

A. Inspection and Maintenance. Soil erosion and sediment control measures shall be inspected and maintained by the Contractor during the life of the project, including winter shutdown, etc. Such inspection

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and maintenance shall continue until after the permanent stabilization measures are in place and the temporary control measures are ordered to be removed by the Engineer. The remaining disturbed area shall be permanently stabilized as indicated in the contract documents.

All temporary controls shall be inspected by the Contractor every seven calendar days and after each rainfall of 1/2" or more within a 24 hour period to determine if the measure is functioning as intended. All inspections shall be completed within one calendar day.

Within 3 calendar days from completion of the inspection, the Contractor shall:

- Repair or rebuild the control measure to function as originally intended.
- Remove sediment deposition which reaches one half the height of the control measure. All sediment deposits shall be considered unsuitable material and disposed of in accordance with §203-3.08 *Disposal of Surplus Excavated Materials*. Material shall be disposed of away from wetlands, water courses or other bodies of water.

Torn or punctured silt fence fabric may be repaired by the placement of a patch, on the upstream side, consisting of an additional layer of fabric over the damaged area, or replacement of the damaged section.

Where erosion control materials have been used on final grade that have been permanently seeded, the Contractor shall care for the areas until acceptance of the Contract or acceptance of the turf, whichever is later. Where necessary, such care may include, but is not limited to providing warning signs or barricades for protection against traffic. Any surfaces that have settled, become gullied, or otherwise damaged due to the Contractor's operations shall be repaired at no additional expense to the state to reestablish the grade and soil conditions that existed prior to placing erosion control materials.

209-3.02 Mulch-Temporary. The Contractor shall have the capability to mulch any disturbed areas on any given day (e.g., those areas where earthwork operations are ongoing, etc.). The Contractor shall apply mulch on disturbed areas consistent with the approved project schedule.

Mulch shall be spread uniformly in a continuous blanket at an approximate rate of 2 tons/acre. Mulch may be spread by hand, mechanical spreaders, or blowers.

209-3.03 Seed and Mulch-Temporary. The Contractor shall apply seed and mulch on disturbed areas consistent with the approved project schedule.

Prior to the application of seed, all areas where compaction has occurred shall be scarified. The seed bed shall be loose and friable for positive seed retention.

Ryegrasses shall be spread at a rate of 30lbs./acre to uniformly cover the ground. Cereal grasses shall be spread at a rate of 100lbs./acre to uniformly cover the ground. Seeds shall be evenly distributed by any method of sowing that does not injure the seeds in the process of spreading.

Mulch shall be spread immediately following application of seed. Mulch shall be spread uniformly in a continuous blanket at an approximate rate of 2 tons/acre. Mulch may be spread by hand, mechanical spreaders, or blowers. Mulch and seed shall not be placed simultaneously, except in the case of hydroseeding.

209-3.04 Strawbale Dike-Temporary. Bales shall be placed with the cut ends vertical as shown in the contract documents. Each bale shall be embedded into the soil a minimum of 4", and be securely anchored. Hardwood stakes shall be installed a minimum of 12" into the ground below the bale. The first stake in each bale shall be driven at an angle toward the previously laid bale to force the bales together.

209-3.05 Check Dam. Check dams shall be constructed where shown in the contract documents and in accordance with the standard sheets. A bedding type geotextile or stone scour protection shall be placed as indicated in the contract documents.

A. Prefabricated Check Dam. The length of each prefabricated check dam shall be as indicated in the contract documents. The dam shall be attached to the ground with wire staples. The staples shall be No. 11 gauge wire and be 6"-8" long. Staples shall be placed as indicated in the contact documents.

The geotextile filter material shall be attached to the triangular frame by using wire ties or staples.

The ties shall be placed evenly 12" on center.

209-3.06 Silt Fence-Temporary. Silt fence shall be installed as follows:

1. Excavate at proposed location of silt fence.
2. Posts shall be driven into the ground.
3. Geotextile and any mesh support (if applicable) shall be placed on the upstream side of the posts. Mesh shall be placed between the geotextile and the post.
4. The geotextile shall be fastened to each post in no less than 4 locations with approved fasteners.
5. The mesh support shall be fastened to each post at the top, bottom, and two additional evenly spaced locations, or by a continuous corded attachment along the top of the assembly.
6. Any geotextile or mesh splices necessary for fence erection shall be continuous between two post sections.
7. Geotextile at the bottom of the fence shall be buried in a trench to a depth of 6". The trench shall be back filled with the excavated soil and the soil compacted by tamping.

209-3.07 Sediment Trap-Temporary. Sediment traps shall be constructed where shown in the contract documents and in accordance with the standard sheets.

A. Sand Bag Berm and Earth Berm.

1. The area under which the sand bag berm or earth berm will be constructed shall be cleared, grubbed and stripped of any vegetation and root mat. The pool area shall be cleared. All work shall be performed consistent with the requirements of Section 201 *Clearing and Grubbing*.
2. The earth berm embankment shall be constructed consistent with the requirements of Section 203 *Excavation & Embankment*, except as herein modified. Immediately prior to placement of the impervious embankment material, the entire earth surface on or against which fill is to be placed, shall be thoroughly scarified to a depth of 6" and compacted to not less than 95 percent of Standard Proctor Maximum Density. Impervious embankment material shall then be deposited in horizontal layers not exceeding 8" in thickness prior to compaction. Each layer shall be compacted to not less than 95 percent of Standard Proctor Maximum Density. The moisture content of all impervious embankment material shall not be greater than 2 percent above Optimum Moisture Content as determined by A.A.S.H.T.O Designation: T-99, Method C at the time of compaction. Sand bag and ditch dam sediment traps shall be constructed as shown on the Standard Sheets.
3. All fill slopes shall be 2:1 or flatter. Cut slopes shall be 1:1 or flatter.
4. Temporary seed and mulch. Rolled erosion control product shall be applied to earth berm side slopes.
5. Excavate and install light stone at emergency spillway.

B. Riser and Outlet Pipe. The section of the riser above the embedment shall be perforated with 1" diameter holes or slits spaced 6" vertically and horizontally and placed in the concave portion of the riser pipe. No holes shall be made within 6" of the outlet pipe.

The riser shall be wrapped with 1/4" to 1/2" hardware cloth wire then wrapped with Class A Geotextile Drainage Fabric. The geotextile shall extend 6" above the highest hole and 6" below the lowest hole. Where ends of geotextile come together, they shall be overlapped, folded and stapled to prevent bypass.

Straps or connecting bands shall be used to hold the geotextile and wire fabric in place. They shall be placed at the top and bottom of the cloth.

The riser shall be anchored with a steel plate base to prevent floatation. A 1/4" minimum thickness steel plate shall be attached and sealed to the riser by a continuous weld around the bottom to form a watertight connection. 24" of suitable material shall be placed on the plate and tamped.

Fill material around the outlet pipe shall be hand compacted in four 6" layers. A minimum of 24" of hand compacted backfill shall be placed over the outlet pipe before crossing it with construction equipment.

All outlet pipe connections shall be watertight.

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C. Sediment Removal. Sediment shall be removed and trap restored to its original dimensions when the sediment has accumulated to ½ the design depth of the trap.

209-3.08 Pipe Slope Drain-Temporary. Pipe slope drain shall be placed where shown in the contract documents and constructed in accordance with the standard sheets.

209-3.09 Drainage Structure Inlet Protection-Temporary. Drainage structure inlet protection shall be placed where shown in the contract documents and constructed in accordance with the standard sheets.

209-3.10 Rolled Erosion Control Products and Soil Stabilizers. The time and method of placement shall be as specified in the contract documents and/or according to Manufacturer's instructions.

For areas at final grade, all loose stones, clods, sticks, or other undesirable material shall be removed in accordance with the manufacturer's recommendations or as specified elsewhere in the contract documents. In addition, those areas at final grade shall be scarified to a minimum depth of 1" immediately prior to installation, unless topsoil is being placed and the erosion control material will be installed within 2 work days of topsoil placement.

A. Rolled Erosion Control Products.

1. Class II, Type A, Jute Mesh. Jute mesh shall be placed without stretching on the freshly prepared surface so that it lays loosely on the soil and in contact with the soil at all points; and then it shall be rolled or tamped firmly into the soil surface. The upper end of each roll shall be turned down and buried to a depth of 6" with the soil firmly tamped against it. Unless otherwise specified in the contract documents, check slots shall be constructed at 50' intervals down the slope. The construction procedure shall consist of placing a fold of material 6" vertically into the ground and tamping soil firmly against it. Jute mesh shall be placed so that all edges shall have a minimum overlap of 6". The ends of rolls shall be placed with the upgrade section on top. Jute mesh shall be held tightly to the soil by anchors driven firmly into the ground. Anchors shall be spaced not more than 40" apart on the sides and along the centerline of all drainage ways. Jute mesh ends and check slots shall have anchors spaced at 24" intervals.

2. Class I and Other Class II, Rolled Erosion Control Products. These products shall be placed and firmly anchored as stated in the manufacturer's instructions.

3. Class III Turf Reinforcement Mat (TRM). Type A and Type B TRMs shall be completely filled with topsoil immediately after installation. Type C and Type D TRMs, which contain a composite, do not need to be filled with topsoil unless recommended by the manufacturer.

To prevent initial soil loss, Type A and Type B TRMs shall be covered with one of the following materials during installation. (These materials will be paid for separately.)

For Slope application:

1. Class IV-Soil Stabilizer
2. An approved RECP (Class I or II)
3. Mulch

For Channels:

1. An approved RECP (Class I or II)

B. Class IV Soil Stabilizers. These materials shall be applied as recommended by the Manufacturer. Type A & B are intended to be applied with hydroseeding equipment. Type B may also be placed through dry spreading. When dry spreading method is used, the Contractor shall apply the material uniformly.

Where applied, Type A shall be minimum of 1/4" thick. When Type A is used in conjunction with turf establishment, seeds must be sown separately and prior to the application of the soil stabilizer.

209-3.11 Construction Entrance-Temporary. Construction entrances shall be placed where shown in the contract documents and constructed in accordance with the standard sheets, or as otherwise approved by the Engineer.

The Contractor shall grade, including excavating or placing fill, to prepare the original ground surface for the placement of a stabilized pad of at least 6" of coarse aggregate material, underlain by a geotextile. If necessary, a drainage pipe shall be installed to maintain the capacity of the ditch. The pipe dimension shall be consistent with the modified soil erosion and sediment control plan approved by the Engineer. All areas cut or filled and not stabilized by the construction entrance material shall be covered with an erosion control treatment (temporary mulch, temporary seed and mulch, etc.) and shall be included in this pay item.

When washing is performed, the washing area within the construction entrance shall be located in an area which will drain into an approved sediment control measure(s).

The construction entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto a paved public roadway. All sediment spilled, dropped, washed or tracked onto paved public roadway shall be removed immediately. In the event the entrance is no longer performing properly (i.e. the entrance aggregate becomes clogged with sediment), the Contractor shall top-dress the entrance with additional coarse aggregate material.

209-3.12 Turbidity Curtain-Temporary.

A. Systems Requirements.

1. For sites not subject to tidal or heavy wave action, the curtain height shall provide sufficient slack to allow the top of the curtain to rise to the maximum expected high-water level (including waves), while the bottom maintains continuous contact with the bottom of the water body. The bottom edge of the curtain shall have a weight system capable of holding the bottom of the curtain down and conforming to the water body, so as to prohibit escape of turbid water under the curtain.
2. For sites subject to tidal or heavy wave action, the curtain height shall provide sufficient slack to allow the top of the curtain to rise to the maximum expected high-water level (including waves), while the bottom remains 24" above the bottom. The weight system shall hold the lower edge of the curtain in place so as to allow 24" of clearance above the bottom at mean low water, so that the curtain does not stir up sediment by repeatedly striking the bottom.
3. If constructed in panels, panels shall be connected in such a manner as to prevent suspended particles passing through joints. Load lines shall be connected so as to develop the full strength of the line across the joint.
4. Flotation material shall be arranged so as to be flexible and to provide continuous support.
5. The flotation and curtain top shall be such as to provide a minimum of 4" of freeboard along the entire length of the curtain, to prohibit escape of turbid water over the top.

B. Installation

1. The turbidity curtain shall be installed as shown in the contract documents in accordance with the manufacturer's instructions. It shall be placed as close to the site of disturbance as possible without interfering with construction activity.
2. Turbidity curtain shall be installed and maintained in a manner that precludes entry of equipment, other than hand-held equipment or boats, to the water body outside the protected area.
3. The fully assembled turbidity curtain shall be prepared for installation by being furled and tied at intervals of 5' for the length of the curtain. It shall be placed and secured in the furled condition, then released to allow the bottom edge to sink.
4. At sites subject to tidal or heavy wave action, adjustment lines may be used to achieve the required height of the curtain.

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5. At sites not subject to tidal or heavy wave action, excess curtain material shall lay on the bottom, away from construction activity.
6. Turbidity curtain shall be placed as nearly as possible parallel to current flow. It shall not be deployed across a flowing water course.
7. The ends of the installation shall be anchored securely well up the bank. Intermediate anchors of a type and number sufficient to hold the curtain in place under expected conditions shall be placed, and firmly fastened to the top of the curtain assembly. Maximum spacing between anchorage points shall not exceed 100'.
8. In situations with flow velocities that exceed 5'/second, use a redirection barrier. The redirection barrier shall be installed prior to installation of the turbidity curtain wherever possible, and care should be exercised in order to minimize disturbance of the bottom of the water body during installation of the redirection barrier.

C. Inspection and Maintenance

1. The turbidity curtain shall be inspected daily, with additional monitoring of performance during storms or significant flow events.
2. Any visible plume of cloudy water passing beyond the curtain from the enclosed construction area shall constitute inadequate performance of the turbidity curtain. The Contractor shall immediately modify, adjust, or repair any portion of the turbidity curtain to correct inadequate performance.
3. The turbidity curtain shall remain in place until the protected construction activities have ceased and there is no visible contrast between the water being contained and the water body being protected.

D. Removal

1. The turbidity curtain shall be removed in such a way so as to minimize release of sediment.
2. Sediment behind the curtain may be removed before removal of the curtain, if directed by the Engineer. If so, any resulting turbidity must be allowed to settle before removal proceeds.

209-4 METHOD OF MEASUREMENT. Measurement will be made for installation or reinstallation of temporary soil erosion and sediment controls shown in the contract documents.

209-4.01 Mulch-Temporary. Measurement will only be made for work directed or approved by the Engineer. This work will be measured as the number of square yards of mulch to the nearest whole square yard.

209-4.02 Seed and Mulch-Temporary. Measurement will only be made for work directed or approved by the Engineer. This work will be measured in square yards to the nearest whole square yard.

209-4.03 Strawbale Dike-Temporary. Bales will be measured in feet of length to the nearest whole foot.

209-4.04 Check Dam. Stone, gravel, and sand bag check dams will be measured by the number of check dams. All other check dams will be measured in feet to the nearest whole foot.

209-4.05 Silt Fence-Temporary. Silt fence will be measured in feet of silt fence to the nearest foot. No measurement will be made for seams or overlaps.

209-4.06 Sediment Trap-Temporary. Sediment traps will be measured by the number of traps.

209-4.07 Pipe Slope Drain-Temporary. Pipe slope drain will be measured by the number of drains.

209-4.08 Drainage Structure Inlet Protection-Temporary. Silt fence geotextile, prefabricated drainage structure, inlet protection measures, and concrete block will be measured by the number of feet to the nearest foot of the perimeter of the drainage structure, as placed. Gravel bag measures will be measured by the number of cubic yards to the nearest cubic yard.

209-4.09 Rolled Erosion Control Products and Soil Stabilizers. Rolled erosion control products and soil stabilizers will be measured as the number of square yards to the nearest square yard.

209-4.10 Construction Entrance-Temporary. Construction entrances shown in the contract documents will be measured by the number of square yards to the nearest square yard. Measurement will not be made for construction entrances associated with the contractor's facilities (e.g., staging areas, storage yards, borrow sites, etc.).

209-4.11 Turbidity Curtain-Temporary. This work will be measured in feet, measured to the nearest whole foot, for turbidity curtain satisfactorily installed or reinstalled.

209-5 BASIS OF PAYMENT.

209-5.01 General. The unit price bid for all work items shall include the cost of furnishing all labor, equipment, and materials necessary to satisfactorily complete the work, including the cost of excavation associated with the removal of accumulated sediment and the installation of erosion and sediment control measures covered by this Section.

Progress payments will be made for all control measures. Fifty percent of the price bid will be paid after installation. The remaining percentage will be paid when the temporary control measure is removed and the remaining area is permanently stabilized.

Payment will not be made for work which is attributed to the Contractor's negligence, carelessness or failure to install temporary or permanent controls in accordance with the contract documents.

209-5.02 Mulch-Temporary. The unit price bid for all work items shall include the cost of furnishing all labor, equipment, and materials necessary to satisfactorily complete the work including the cost of excavation associated with the removal of accumulated sediment. Mulching will only be paid for when directed or approved by the Engineer.

209-5.03 Seed and Mulch-Temporary. The unit price bid for all work items shall include the cost of furnishing all labor, equipment, and materials necessary to satisfactorily complete the work including the cost of excavation associated with the removal of accumulated sediment. Seed and mulch will only be paid for when directed or approved by the Engineer. In addition to the provisions of §209-5.01, the unit price bid for this item shall include water.

209-5.04 Strawbale Dike-Temporary. The unit price bid for all work items shall include the cost of furnishing all labor, equipment, and materials necessary to satisfactorily complete the work including the cost of excavation associated with the removal of accumulated sediment. The unit price bid shall include all bales, posts, and excavation of soil for bale embedment.

209-5.05 Check Dam. Progress payments will be made at fifty percent of the price bid after installation. The remaining percentage will be paid when the temporary control measure is removed and the remaining area is permanently stabilized. The unit price bid shall include stone, gravel bags, sand bags, geotextile bedding, staples, and excavation of cutoff trench.

209-5.06 Silt Fence-Temporary. Progress payments will be made at fifty percent of the price bid after installation. The remaining percentage will be paid when the temporary control measure is removed and the remaining area is permanently stabilized. The unit price bid shall include the silt fence geotextile, posts, mesh reinforcement, and excavation for geotextile embedment.

209-5.07 Sediment Trap-Temporary. Progress payments will be made at fifty percent of the price bid after installation. The remaining percentage will be paid when the temporary control measure is removed and

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the remaining area is permanently stabilized. The unit price bid shall include bags, excavation, impervious embankment material, outlet pipe, riser assembly, light stone filling, and geotextile bedding. Temporary mulch and rolled erosion control product will be paid for under their respective items.

209-5.08 Pipe Slope Drain-Temporary. The unit price bid shall include bales, pipe, pipe end sections, stone, and geotextile bedding.

209-5.09 Drainage Structure Inlet Protection-Temporary. The unit price bid shall include silt fence geotextile, posts, staples, concrete blocks, gravel bags and prefabricated geotextile and foam assembly.

209-5.10 Rolled Erosion Control Products and Soil Stabilizers. The unit price bid shall include all rolled erosion control products, staples, excavation, and soil stabilizers.

209-5.11 Construction Entrance-Temporary. The unit price bid shall include stone, geotextile stabilization, pipe, excavation, fill, and any erosion control treatments (temporary mulch, temporary seed and mulch, etc.) required to stabilize an erodible surface produced by the installation of the construction entrance, periodic top-dressing with additional coarse aggregate material, and washing station provisions.

Additional sediment control measures (silt fence, strawbale, sediment trap, etc.) required to control a washing area will be paid for under their respective item(s).

209-5.12 Turbidity Curtain-Temporary. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including redirection barrier and the cost of removal associated with the removal of accumulated sediment.

Payment will be made under:

Item No.	Item	Pay Unit
209.100101	Mulch-Temporary	Square Yard
209.100102	Seed-Temporary	Square Yard
209.1003	Seed and Mulch-Temporary	Square Yard
209.110101	Check Dam (Ditch Bottom Width 0.0 to 3'), Stone-Temporary	Each
209.110102	Check Dam (Ditch Bottom Width >3' to 6'), Stone-Temporary	Each
209.110103	Check Dam (Ditch Bottom Width >6' to 10'), Stone-Temporary	Each
209.110104	Check Dam (Ditch Bottom Width >10'), Stone-Temporary	Each
209.110201	Check Dam (Ditch Bottom Width 0.0 to 3'), Gravel Bag-Temporary	Each
209.110202	Check Dam (Ditch Bottom Width >3' to 6'), Gravel Bag-Temporary	Each
209.110203	Check Dam (Ditch Bottom Width >6' to 10'), Gravel Bag-Temporary	Each
209.110204	Check Dam (Ditch Bottom Width >10'), Gravel Bag-Temporary	Each
209.110301	Check Dam (Ditch Bottom Width 0.0 to 3'), Sand Bag-Temporary	Each
209.110302	Check Dam (Ditch Bottom Width >3' to 6'), Sand Bag-Temporary	Each
209.110303	Check Dam (Ditch Bottom Width >6' to 10'), Sand Bag-Temporary	Each
209.110304	Check Dam (Ditch Bottom Width >10'), Sand Bag-Temporary	Each
209.1105	Check Dam, Prefabricated-Temporary	Foot
209.1106	Check Dam, Stone-Permanent	Each
209.1202	Strawbale Dike-Temporary	Foot
209.13	Silt Fence-Temporary	Foot
209.1401nn	Sediment Trap, Earth Berm-Temporary	Each
209.1402nn	Sediment Trap, Sand Bag-Temporary	Each
209.1403nn	Sediment Trap, Ditch Dam-Temporary	Each
209.1501	Turbidity Curtain - Temporary	Foot
209.160101	Pipe Slope Drain, 6" -Temporary	Foot
209.160102	Pipe Slope Drain, 8" -Temporary	Foot
209.160103	Pipe Slope Drain, 12" -Temporary	Foot
209.160104	Pipe Slope Drain, 15" -Temporary	Foot

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209.160105	Pipe Slope Drain, 18" -Temporary	Foot
209.160106	Pipe Slope Drain, 24" -Temporary	Foot
209.160107	Pipe Slope Drain, 30" -Temporary	Foot
209.1701	Drainage Structure Inlet Protection, Silt Fence-Temporary	Foot
209.1702	Drainage Structure Inlet Protection, Gravel Bag-Temporary	Cubic Yard
209.1703	Drainage Structure Inlet Protection, Prefabricated-Temporary	Foot
209.1704	Drainage Structure Inlet Protection, Concrete Block-Temporary	Foot
209.1705	Drainage Structure Inlet Protection, Excavated-Temporary	Foot
209.1801	Rolled Erosion Control Product, Class I Type A, Short Term	Square Yard
209.1802	Rolled Erosion Control Product, Class I Type B, Short Term	Square Yard
209.1803	Rolled Erosion Control Product, Class I Type C, Short Term	Square Yard
209.1901	Rolled Erosion Control Product, Class II Type A, Intermediate	Square Yard
209.190201	Rolled Erosion Control Product, Class II Type B, Intermediate	Square Yard
209.190301	Rolled Erosion Control Product, Class II Type C, Intermediate	Square Yard
209.1904	Rolled Erosion Control Product, Class II Type D, Intermediate	Square Yard
209.200101	Turf Reinforcement Mats, Class III Type A, Permanent	Square Yard
209.200201	Turf Reinforcement Mats, Class III Type B, Permanent	Square Yard
209.200301	Turf Reinforcement Mats, Class III Type C, Permanent	Square Yard
209.200401	Turf Reinforcement Mats, Class III Type D, Permanent	Square Yard
209.2101	Soil Stabilizers, Class IV Type A	Square Yard
209.2102	Soil Stabilizers, Class IV Type B	Square Yard
209.2103	Soil Stabilizers, Class IV Type C	Square Yard
209.22	Construction Entrance	Square Yard

NOTE: nn denotes serialized pay item. These items will be paid for within established size groups.

ROCK SLOPE REINFORCEMENT AND CATCHMENT SYSTEMS

Make the following changes to the Standard Specifications dated May 1, 2008 as modified by EI 08-046:

Page 204, **add** the following after Section 211:

SECTION 212 – ROCK SLOPE REINFORCEMENT AND CATCHMENT SYSTEMS

212-1 DESCRIPTION. This work shall consist of furnishing and installing rock slope stabilization techniques or roadside protective measures in conformance with payment lines, type, size, and at the locations specified in the contract documents.

212-1.01 Definitions.

A. General. As outlined in Section 203 *Excavation and Embankment*, all rock slopes shall be thoroughly scaled and cleaned of unsound material and loose masses of rock. This section provides requirements for specific techniques developed to address situations where a hazardous rock slope situation still exists after stripping and scaling in order to control a rockfall within a designated rockfall catchment area.

B. Rock Fall. A rockfall is the movement of rock from a slope that is so steep the rock continues to move down slope. The movement may be by free falling, bouncing, rolling or sliding.

C. Rock Catchment Area. The rockfall catchment area is defined as the area between the edge of roadway pavement and the base of an adjacent rockslope that is used to restrict rockfall from reaching the roadway. The term catchment area is synonymous with ditch, rockfall ditch, rockfall catch ditch and rock fallout area. The catchment area width is the horizontal distance between the roadway edge of pavement and the base (toe) of a rockslope.

D. Rock Catchment Fences. Rock catchment fences are techniques to control rockfalls within the R.O.W. Rock catchment fences are wire or cable mesh draped from support columns situated to define the catchment area. The catchment fence, or impact section, attenuates the rockfall energy to capture the falling rock and maintain it within the catchment area.

E. Rock Mesh Slope Protection. Rock mesh slope protection is a technique to control rockfalls within the R.O.W. Rock mesh slope protection is the placement of wire or cable mesh on a slope face. The mesh controls the descent of falling rock, which accumulates near the base of the slope within the catchment area.

212-2 MATERIALS

212-2.01 Wire Rope Rock Catchment Fence. The rock catchment fence system, as obtained from the manufacturer, shall have a tested capability of retaining a rock impact of 155 kip-ft of kinetic energy. The result of demonstration tests shall be furnished as required by the Engineer.

A. Net Assembly. Provide a fence consisting of a net conforming to §710-06 *Rock Slope Net and Wire Mesh Assemblies*, Net Assembly.

Cover all nets with chain link mesh fencing material of a minimum 11 gauge, 2 in. zinc coated mesh, conforming to the requirements of §710-02 *Galvanized Steel Fence Fabric*.

B. Wire Ropes. Provide the following wire ropes:

1. Net Supporting Wire Rope. Provide net supporting wire rope conforming to §710-27 *Rock Slope Wire Ropes*, Net Supporting Wire Rope.

2. Seam Rope. Provide seam rope conforming to §710-27 *Rock Slope Wire Ropes*, Seam Rope for Wire Rope Rock Catchment Fence.

3. Tieback Restraining Cables. Provide tieback restraining cables conforming to §710-27 *Rock Slope Wire Ropes*, Tieback Restraining Cable.

4. Anchor Cables. Provide anchor cables conforming to §710-27 *Rock Slope Wire Ropes*, Anchor Cable. Braking elements in the tieback restraining cable shall incorporate a protective, crushable sleeve as recommended by the manufacturer.

C. Support Columns. Fabricate the net support columns from W8 x 48 wide flange members conforming to

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the requirements of §715-18 *Soldier Piles*.

D. Miscellaneous Appurtenances. All steel bolts, nuts and washers shall conform to the requirements of §723-60 *Anchor Bolts*. All miscellaneous appurtenances such as wire rope clips, thimbles, bolts, etc., shall be galvanized as supplied by the manufacturer.

212-2.02 Chain Link Rock Catchment Fence.

A. Fence Fabric. Provide aluminum coated steel fence fabric a minimum of 6 gauge, chain link type with twist selvage edges, conforming to the requirements of §710-04 *Aluminum Coated Steel Fence Fabric*, except for gauge.

Vinyl coated steel fence fabric shall be 9 gauge, chain link type with twist selvage edges, conforming to the requirements of §710-03 *Vinyl Coated Steel Fence Fabric*, Class A Wire Diameter, except color. The color shall be black unless otherwise specified in the contract documents.

B. Cables. Provide galvanized guide rail cables a minimum $\frac{3}{4}$ in. in diameter, consisting of 3 strands (7 wires per strand) conforming to the requirements of §710-22 *Cable Guide Railing* and having a minimum tensile strength of 25 kips.

C. Posts. Provide No. 11 steel rebar posts and No. 9 hook bar anchors conforming to the requirements of §709-01 *Bar Reinforcement, Grade 420*. The rebar posts and hook bar anchors shall be galvanized in accordance with the requirements of §719-01 *Galvanized Coatings and Repair Methods*, Type I. Exposed cut ends shall be field repaired in accordance with §719-01 *Galvanized Coatings and Repair Methods*. Hook bar anchors shall have a 180° hook with an outside diameter of 11 in.

No. 11 steel rebar posts shall also conform to the requirements of §709-04 *Epoxy-Coated bar Reinforcement*, except color. The color shall be as specified on the plans or by the Engineer.

D. Grout. Provide grout to fill the annular space around the No. 11 steel rebar posts, No. 9 hook bar anchors and for backfilling below the anchor angle, conforming to the requirements of §701-05 *Concrete Grouting Material*.

E. Anchor Angles. Provide 2 ft. long sections of anchor angles of 8 in. by 6 in. by 1 in. steel angle. The steel shall conform to the requirements of §715-01 *Structural Steel* and shall be galvanized in accordance with §719-01 *Galvanized Coatings and Repair Methods*, Type I. The anchor angle shall have two 2 in. diameter holes (for the bolts) bored through the 8 in. side. The holes shall be centered 4 in. in from each end along a line 3 in. in from the edge opposite the angle. The anchor angle shall also have three $\frac{7}{8}$ in. diameter holes drilled on 4 in. centers along the centerline, with the middle hole located in the center of the 6 in. side for attachment of the steel turnbuckles.

F. Rock Bolt Assembly. Provide 1 $\frac{1}{4}$ in. nominal diameter, 5 ft. long, rock bolt assembly conforming to the requirements of §731-03 *Rock Bolt Assembly*.

Provide galvanized and Epoxy-coated $\frac{3}{8}$ in. x 2 $\frac{1}{2}$ in. throat by 4 $\frac{1}{2}$ in. depth "U" bolts as shown in Detail's C1 & C2 of the Standard Sheet 212-4 *Chain Link Rock Catchment Fence* with $\frac{1}{8}$ in. thread length to clamp $\frac{3}{4}$ in. guide rail cables to No. 11 rebar posts.

G. Miscellaneous Appurtenances.

1. Thimbles. Provide galvanized thimbles for $\frac{3}{4}$ in. guide rail cable conforming to the requirements of §710-22 *Cable Guide Railing* and as shown in Detail F of the Standard Sheet 212-5 *Chain Link Rock Catchment Fence*.

2. Clips. Provide galvanized cable clips for $\frac{3}{4}$ in. guide rail cable conforming to the requirements of §710-22 *Cable Guide Railing* and as shown in Detail F of the Standard Sheet 212-5 *Chain Link Rock Catchment Fence*.

3. Turnbuckles. Provide galvanized steel turnbuckle cable end assemblies conforming to the

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requirements of §710-22 *Cable Guide Railing* and as shown in Detail G of the Standard Sheet 212-5 *Chain Link Rock Catchment Fence*.

4. Cable Splices. Provide galvanized cable splices conforming to the requirements of §710-22 *Cable Guide Railing* and as shown in Detail H of the Standard Sheet 212-5 *Chain Link Rock Catchment Fence*.

5. Wedges. Provide wedges for cable splices and cable ends conforming to the requirements of §710-22 *Cable Guide Railing* and as shown in Detail X of the Standard Sheet 212-5 *Chain Link Rock Catchment Fence*.

6. Wire Ties. Provide galvanized steel wire ties (12 gauge).

212-2.03 Wire Mesh Slope Protection.

A. Wire Mesh. Provide wire mesh conforming to §710-06 *Rock Slope Net and Wire Mesh Assemblies*, Wire Mesh.

B. Cables. Provide galvanized mesh support cables having a minimum diameter of $\frac{3}{4}$ in., 6 x 19 Independent Wire Rope Core (IWRC) construction (or equivalent), conforming to the requirements of §710-22 *Cable Guide Railing*.

C. Anchors. Provide galvanized $\frac{3}{4}$ in. diameter wire rope anchors conforming to the requirements of §710-22 *Cable Guide Railing*.

Furnish anchor centralizers consisting of plastic, steel or any material not detrimental to the anchor. Do not use wood.

D. Grout. Provide grout conforming to the requirements of §701-05 *Concrete Grouting Material*.

E. Miscellaneous Appurtenances.

1. Seam Wire Rope. Provide seam rope conforming to §710-27 *Rock Slope Wire Ropes*, Seam Rope for Wire Mesh Slope Protection.

2. Steel Rings. Provide 1 in. x 4 in. steel rings conforming to the requirements of Federal Specification RR-C71D Type VI.

3. Clips. Provide $\frac{3}{4}$ in. wire rope clips conforming to the requirements of §710-22 *Cable Guide Railing*.

4. Thimbles. Provide $\frac{3}{4}$ in. thimbles conforming to the requirements of §710-22 *Cable Guide Railing*.

212-2.04 Wire Mesh Drape.

A. Wire Mesh Drape. Provide wire mesh drape conforming to the requirements of §710-06 *Rock Slope Net and Wire Mesh Assemblies*, Rock Slope Wire Mesh Drape Assembly.

B. Cables. Provide galvanized mesh support cables a minimum $\frac{3}{4}$ in. in diameter, consisting of 3 strands (7 wires per strand) conforming to the requirements of §710-22 *Cable Guide Railing* and having a minimum tensile strength of 25 kips.

C. Miscellaneous Appurtenances. Provide appurtenances, galvanized as supplied by manufacturer, as follows:

1. Tie Wire. Provide $\frac{1}{12}$ in. minimum diameter steel tie wire.

2. Hog Rings. Provide $\frac{1}{8}$ in. minimum diameter (11 gauge) hog rings or other steel fasteners.

3. Steel Rings. Provide welded forged steel rings with a stock diameter of 1 in. and a maximum inside diameter of 4 in.

D. Rock Bolt Assembly. Provide 1 $\frac{1}{4}$ in. nominal diameter, 6 $\frac{1}{2}$ ft. long (min.), rock bolt assembly conforming to the requirements of §731-03 *Rock Bolt Assembly* except resin packages of one setting time only shall be utilized for installation of the mesh support and cable anchor rock bolts.

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212-2.05 Temporary Rock Catchment Barrier.

A. Precast Concrete Barrier Units. Provide precast concrete barrier units consisting of three (3) components: precast concrete column supports, precast temporary concrete barriers, and precast concrete beams as detailed on the Standard Sheet 212-9 & 10 *Temporary Rock Catchment Barrier*.

1. Precast Concrete Column Supports. Provide precast concrete column supports conforming to the requirements of §704-05 *Precast Concrete Barrier* and to the dimensions and details “F”, “G”, “H”, “I”, and “N” on the Standard Sheet 212-10 *Temporary Rock Catchment Barrier*. Additional joint connection details shall be as shown on Standard Sheet 619-01 *Temporary Concrete Barrier*.

Each column support shall have cast-in-place a 6 in. x 6 in. x ¼ in. structural steel tube to be used for support of the wire rope rock fence. The tube steel shall conform to the requirements of ASTM A500, Grade B or C, and shall conform to the dimensions and detail “N” on the Standard Sheet 212-10 *Temporary Rock Catchment Barrier*.

2. Precast Temporary Concrete Barriers. Provide precast temporary concrete barriers conforming to the requirements of §704-05 *Precast Concrete Barrier* and to the dimensions, joint connections, material details, and anchoring details shown on Standard Sheet 619-01 *Temporary Concrete Barrier*.

3. Precast Concrete Beams. Provide precast concrete beams conforming to the requirements of §704-05 *Precast Concrete Barrier* and to the dimensions and details “K”, and “M” shown on the Standard Sheet 212-10 *Temporary Rock Catchment Barrier*.

The Engineer will inspect all precast concrete barrier unit components upon delivery to the project site for conformance to specifications. Any barrier unit component having damage and/or defects in the concrete and/or joint connections will be rejected.

The precast concrete barrier units shall form a smooth and continuous barrier when joined together. Any sections damaged or misaligned while in service shall be corrected or replaced.

B. Net Support Columns. Fabricate the net support columns from W5 x 16 wide flange members conforming to the requirements of §715-18 *Soldier Piles*

Each support column shall have four (4) pairs (eight holes) of 1 in. diameter holes drilled on the side facing the rock slope. Two (2) holes shall be situated 3 in. from the top of the post and the remaining three (3) pairs spaced equally approximately 40 in. apart.

After any required drilling, welding and/or cutting, all support columns and related hardware shall be hot dipped galvanized in accordance with the requirements of §719-01 *Galvanized Coatings and Repair Methods*, Type I.

C. Net Support Ropes. Provide net support ropes conforming to §710-27 *Rock Slope Wire Ropes*, Net Supporting Wire Rope.

D. Wire Rope Netting. Provide wire rope netting conforming to §710-06 *Rock Slope Net and Wire Mesh Assemblies*, Net Assembly.

Two (2) aluminum stop sleeves shall be used at all locations where two individual wire ropes are joined together.

The 8 in. x 8 in. mesh size shall be fabricated using high strength, hot dipped, galvanized steel clips, which are attached so that they are non-moveable. Nets damaged during clipping shall be rejected by the Engineer.

E. Chain Link Fence Fabric. Provide a minimum of 9 gauge chain link fence fabric conforming to the requirements of §710-02 *Galvanized Steel Fence Fabric*. The galvanized chain link fence fabric shall be 12 ft. high and have a 2 in. mesh size. The chain link fence fabric shall be continuous between wire rope net panels.

F. Synthetic Fabric Layer. Provide a synthetic fabric, 10 ½ ft. in height conforming to the requirements of §737-01A *Geotextile Bedding*.

G. Cushion Sand. Provide sand conforming to the requirements of §703-06 *Cushion Sand*.

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H. Miscellaneous Material. Provide miscellaneous hardware such as shackles, thimbles, wire clips, bolts, etc. which shall be hot dipped galvanized in accordance with §719-01 *Galvanized Coatings and Repair Methods*, Type I.

212-2.06 Move Temporary Rock Catchment Barrier. None Specified.

212-3 CONSTRUCTION DETAILS

212-3.01 Wire Rope Rock Catchment Fence. Assemble the wire rope rock catchment fence as detailed on the Standard Sheet 212-1, 2 & 3 *Wire Rope Rock Catchment Fence*.

Submit to the Engineer for approval not less than two weeks prior to the installation of the wire rope rock catchment fence. Do not begin work prior to approval. Provide the following:

- a) Proposed start date, completion date and detailed construction sequence.
- b) Proposed anchor drilling method and equipment including hole diameter, method of keeping holes open, and hole clean out procedures.
- c) Proposed anchor installation procedure including grout placement procedures, grouting equipment, and the procedure for setting the wire rope anchor centralizers.
- d) Method of verifying anchor capacity and equipment setup including details of the jacking frame and appurtenant bracing. Include the calibration data for the stressing device. The calibration shall be performed by an independent testing laboratory within 60 calendar days of the submittal date.

Install grouted wire rope anchors with accompanying centralizers at the top of the rock slope on 12 ft. centers or as indicated by Engineer. Mix grout per manufacturer's instructions. Wait a minimum of 7 days after grouting before applying any load to the anchors. Proof test each anchor in accordance with §212-3.03 A. *Anchor Testing*.

Fasten all net braiding with high strength, corrosion resistant clips or other fasteners to produce a permanent, non-movable joint. Damage to the wire rope resulting from the installation of the clips, insofar as it affects the integrity of the system, in the opinion of the Engineer, shall be cause for rejection of the net panel.

Cut the chain link material to fit each wire rope netting panel. Attach the chain link mesh fencing material to the inside face of the wire rope nets with clips to extend a minimum of 3 ft. beyond the bottom of the fence.

Provide and install one braking element per top and bottom net supporting rope per 20 ft. net section. Position the braking element not more than 3 ft. from the column.

Use seam ropes to fasten adjacent wire rope nets and the nets to the net support wire ropes, with at least 1 wrap per 16 in.

The column spacing shall be 20 ft.

Install a tie-back restraining cable to extend from the top of each column in a direction perpendicular to the length of the fence and on the slope side of the fence. Install a braking element in each cable not more than 3 ft. from the column.

For a fence whose length is 120 ft. or less, both end columns shall have a lateral restraining cable without the braking element. This cable shall extend from the top of the column at an angle of 60° from the vertical to the ground. For a fence which is longer, install lateral restraining cables at every multiple of 120 ft., or approximately midway for a fence less than 240 ft.

Paint the fence installation where specified, with the appropriate material and color as directed by the Engineer.

212-3.02 Chain Link Rock Catchment Fence. Assemble the chain link rock catchment fence as detailed on the Standard Sheet 212-4 & 5 *Chain Link Rock Catchment Fence*.

Install galvanized No. 11 steel rebar posts in 2 in. diameter vertical holes drilled to a minimum depth of 2 ft. into rock. Post spacing shall be 8 ft. Pour a sufficient amount of concrete grouting material into the hole before inserting the post to allow overflow after insertion.

Install anchor angles for terminal sections. The location of the anchor angles shall be in line with the corresponding fence section and shall be determined by the angle (60° minimum) between the top longitudinal cable and the end post. The angle between any longitudinal cable and the end post shall not exceed 90°. Drill bolt holes for anchor angles into the rock spaced 16 in. on-center to a depth of 4 ft. The bolt hole diameter shall be compatible with the bolt/drill hole/resin cartridge diameter, as recommended by the bolt manufacturer, but in no

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case shall the bolt hole diameter exceed the resin cartridge diameter by more than $\frac{3}{8}$ in. Install the anchor angle within $90^{\circ} \pm 15^{\circ}$ to the axis of the rock bolt and in intimate contact with the rock surface for its entire contact area. Acceptable methods of leveling the rock surface include the following:

- a) Chipping the rock surface.
- b) Applying a special mix supplied by the bolt manufacturer for leveling purposes.
- c) A combination of chipping and leveling.

Clean out the bolt hole to its full depth with air or water. Place the appropriate amount of resin in the hole. Insert the bolt into the hole and rotate at approximately 100 rpm while pushing the bolt down through the resin cartridges to the bottom of the hole by a means approved by the Engineer. Rotate the bolt in this position for 30 to 60 seconds to insure mixing of the resin in the hole. Do not rotate the bolt longer than the setting time of the resin. Leave the bolts undisturbed in the hole for the time required for the resin to harden. Place the anchor angle over the bolts on the prepared surface and add the appurtenances. Tension the bolts to 40 kips by means of hollow-ram hydraulic jack, or as ordered by the Engineer. Support the base of the jack at $90^{\circ} \pm 2^{\circ}$ to the axis of the bolt.

If a failure of the bolt or anchorage occurs, a determination of the cause of failure will be made by a Departmental Engineering Geologist. Correct, as ordered by the Engineer, at no cost to the State, failures attributable to causes other than failure of the rock in the anchorage zone.

The State reserves the right to sample and test delivered materials.

Install No. 9 hook bar anchors on the uphill side of the fence, one hook bar anchor at each post located in a direction normal to the fence alignment. The location of the hook anchor on the ground surface shall be determined by the angle ($60^{\circ} \pm 5^{\circ}$) between the tie-back cable and the post at the top longitudinal cable. Construct hook bar anchorage according to depth of overburden.

Install No. 9 hook bar anchors at intermediate fence sections. The location of the hook bar anchors shall be in line with the corresponding fence section and shall be determined by the angle between the longitudinal cables and the intermediate anchorage post. This angle shall be between a minimum of $60^{\circ} \pm 5^{\circ}$ and a maximum of 90° . Construct hook bar anchorages according to depth of overburden.

Secure longitudinal cables to anchor angles at terminal sections with steel turnbuckle cable end assemblies. Secure longitudinal cables at intermediate fence sections to hook bar anchors with one (1) thimble, and four (4) cable clips per cable loop. The maximum distance between terminal sections, and/or intermediate anchorage sections, shall be 200 ft.

Secure $\frac{3}{4}$ in. longitudinal guide rail cables to rebar posts with "U" bolts so as to have minimum sag without bending posts. Cable splices shall be staggered a minimum of 20 ft. on adjacent cables. Splices shall be spaced a minimum of 100 ft. on the same cable.

Recommended installation sequence:

- a) Start with lowest longitudinal cable working from one terminal anchorage toward another or toward an intermediate anchorage, if used.
- b) Draw cable taut and secure with "U" bolt to posts.
- c) Complete tightening entire length of lower cable between anchorages before starting next higher cable.

Install aluminum fence fabric on uphill side of posts. Attach fence fabric to longitudinal cables with 12 gauge galvanized steel wire ties at 1 ft. intervals. Fence fabric splices shall be overlapped a minimum of four chain link rows. Attach fabric sections by tying both ends of the overlap at 1 ft. intervals, or by a method approved by the Engineer.

Install vinyl coated fence fabric on roadway side of posts. Attach fence fabric to longitudinal cables with 9 gauge vinyl coated steel wire ties at 1 ft. intervals. Fence fabric splices shall be overlapped a minimum of four chain link rows. Attach fabric sections by tying both ends of the overlap at 1 ft. intervals, or by a method approved by the Engineer.

Bottom of fence fabric shall be in contact with the ground surface. Add fence fabric material as necessary. Added material shall be overlapped a minimum of four chain link rows. Tie both ends of the overlap at 1 ft. intervals, or as approved by the Engineer.

Attach tie-back cables on uphill side of rebar posts after longitudinal cables have been tightened and chain link fence fabric has been installed. Tie-back cables shall have a maximum sag of $\frac{3}{4}$ in. measured at the center.

212-3.03 Wire Mesh Slope Protection. Assemble the wire mesh slope protection as detailed on the Standard Sheet 212-6 & 7 *Wire Mesh Slope Protection*.

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Design the grouted wire rope anchors so that the design load (P) is at least equal to 30 kips.

Submit shop drawings to the Engineer for approval not less than two weeks prior to the installation of the wire mesh slope protection. Do not begin work prior to approval. Provide drawings including the following:

- a) Proposed start date, completion date and detailed construction sequence.
- b) Details of the wire mesh and anchor layout on the existing slope.
- c) Proposed anchor drilling method and equipment including hole diameter, method of keeping holes open, and hole clean out procedures.
- d) Proposed anchor installation procedure including grout placement procedures, grouting equipment, and the procedure for setting the wire rope anchor centralizers.
- e) Method of verifying anchor capacity and equipment setup including details of the jacking frame and appurtenant bracing. Include the calibration data for the stressing device. The calibration shall be performed by an independent testing laboratory within 60 calendar days of the submittal date.

Install grouted wire rope anchors with accompanying centralizers at the top of the rock slope on 12 ft. centers or as indicated by Engineer. Mix grout per manufacturer's instructions. Wait a minimum of 7 days after grouting before applying any load to the anchors. Proof test each anchor in accordance with §212-3.03 A. *Anchor Testing*.

Connect vertical wire rope tag lines to the anchors. Connect the horizontal support cable(s) to the vertical tag lines with steel rings as shown on the attached drawing for this specification. Do not draw cable taut. Maintain a minimum cable sag of ¾ in. on the horizontal support cable between vertical tag lines.

Attach the mesh to the horizontal support cable by a continuous weave through each of the mesh openings with galvanized 5/16 in. seam wire rope, as shown on the attached drawing for this specification.

Install the wire mesh in vertical strips. Overlay horizontal and vertical laps a minimum of 1 ft. and connect with a continuous weave through each of the mesh openings with galvanized 5/16 in. seam wire rope along the edge of the upper mesh strip. The mesh shall be installed in such a manner that the end of a roll curls into the rock face.

Install the wire mesh to cover the specified area of rock face.

A. Anchor Testing. Proof test each anchor. Perform the proof test by incrementally loading and unloading the anchors to 1.5 times the design load (P) in accordance with Table 212-1 *Wire Mesh Slope Protection Proof Test Load Schedule*. Record the anchor movements to the nearest 0.025 mm at each load increment.

TABLE 212-1 WIRE MESH SLOPE PROTECTION PROOF TEST LOAD SCHEDULE	
Load ¹	Observation Period
AL	Minimum of 1 minute ²
0.25 P	Minimum of 1 minute ²
0.50 P	Minimum of 1 minute ²
0.75 P	Minimum of 1 minute ²
1.00 P	Minimum of 1 minute ²
1.25 P	Minimum of 1 minute ²
1.50 P (Load Hold) ²	10 minutes (or 60 minutes depending on total movement ³)

¹P = Design Load

AL = Alignment Load. The AL necessary to maintain position of the stressing and testing equipment shall not exceed 0.05 P. Set dial gauges to "zero" after the alignment load has been applied.

²Hold each load increment, except for the 1.5 P load, until the deflection stabilizes.

³The load hold portion of the proof test is a maximum test load of 1.50 P, which shall be held constant for 10 minutes. The load hold time shall start when the pump begins to load the anchor from the 1.25 P load to the test load. A load cell shall be used to monitor the constant load. Total movements with respect to an independent fixed reference point shall be recorded at 1 minute, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between 1 minute and 10 minutes exceeds 1/24 in., the test load shall be held for an additional 50 minutes. Total movements shall be recorded at 15, 20, 25, 30, 45 and 60

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minutes.

No part of the temporary yoke or load frame shall bear within 3 ft. of the anchor.

Plot the movement versus load for each increment.

An anchor will be accepted by the Engineer if the creep rate at 1.5P does not exceed 1/24 in. between the 1 and 10 minute readings or for a load hold time of 60 minutes, the creep rate does not exceed 1/12 in. per log cycle of time. If an anchor fails the proof test, install a new anchor at no cost to the State.

212-3.04 Wire Mesh Drape. Assemble the wire mesh drape as detailed on the Standard Sheet 212-8 *Wire Mesh Drape*.

Install untensioned resin rock bolts at the top of the rockslope on 50 ft. centers (maximum) or as shown in the contract documents. Proof test the first rock bolt per resin lot number to 20 kips in accordance with §212-3.03 A.

Anchor Testing.

Place 3/4 in. diameter guide rail cable horizontally across the top of the rock slope, secured by 1 1/4 in. diameter resin rock bolts. Maintain a minimum cable sag of 2 ft. to 3 ft. between rock bolts. Do not draw cable taut. Splices of the guide rail cable will not be allowed.

Fold the mesh over or under the guide rail cable a minimum of 1 ft. and connect the horizontal lap with galvanized tie wire with a continuous weave through each of the mesh openings.

Install the wire mesh in vertical strips, each lapped over the other by a minimum of 1 ft. Connect the adjacent vertical strips by either a continuous weave of galvanized tie wire along the edge of the outer mesh strips only, or with hog rings or metal ties on a 6 in. staggered pattern along the edges of both panels. When used, overlay horizontal laps a minimum of 1 ft. and connect with a continuous weave of galvanized tie wire along the edge of the upper mesh strip.

Install the wire mesh to cover the area of rock face identified in the contract documents.

Repair all damaged galvanized surfaces in accordance with §719-01 *Galvanized Coatings and Repair Methods*.

212-3.05 Temporary Rock Catchment Barrier. Assemble and maintain the temporary rock catchment barrier as detailed on the Standard Sheet 212-9 & 10 *Temporary Rock Catchment Barrier*.

A. Precast Concrete Barrier Units. Each run, or bay, of precast concrete barrier units (precast concrete column support, precast temporary concrete barrier and precast concrete beam) shall be fastened together to form a continuous chain. After placement, each successive unit shall be moved longitudinally to remove any slack in the connecting joint. The units at each end of a run or bay shall be connected as shown on Standard Sheet 619-01 *Temporary Concrete Barrier*. To reduce movement of the barrier in areas where limited deflection is desired, one of the anchoring methods shown on Standard Sheet 619-01 *Temporary Concrete Barrier* shall be used. Where shown in the contract documents, the ends of the barrier run shall be fitted with an impact attenuation device or a tapered end section and flared back.

The empty space within each concrete barrier unit shall be filled with sand for the full height (32 in.) of the unit. The back of the concrete barrier units shall also be covered with sand to the full height of the unit. The sand shall then be laid back at the angle of repose of the material to a minimum sand thickness of 18 in. as shown in detail "E" on Standard Sheet 212-9 *Temporary Rock Catchment Barrier*. The cost of installing and removing the sand, including the final cleaning of the pavement and shoulder, shall be included in the bid price for this Item.

The Contractor shall provide and maintain delineation of temporary barriers. This delineation shall make the barrier visible to approaching traffic, as well as to traffic which is adjacent to the barrier. The Contractor shall have the choice of using one or more of the following: warning lights, delineators, pavement marking, reflective tape placed on the barrier, reflective paint, or any other device subject to the approval of the Engineer. The delineation devices shall be maintained dirt and snow free, and be visible throughout the term of the contract including shutdown periods.

B. Net Support Columns. The W5 x 16 posts shall be installed in the 6 in. x 6 in. x 1/4 in. structural steel tubes cast in the precast concrete column support units. The columns shall be inserted flush with the bottom of the precast concrete column supports.

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C. Net Support and Lateral Anchor Ropes. The 5/8 in. net support wire ropes shall be installed as shown in detail "B" on Standard Sheet 212-9 *Temporary Rock Catchment Barrier*. The net support wire rope shall have maximum sag of 2 in. At both end sections and at every 125 ft. section of temporary catchment barrier (five precast concrete barrier units) install lateral anchors as shown in detail "C" on Standard Sheet 212-9 *Temporary Rock Catchment Barrier*. The wire rope loop at a 3/4 in. shackle connection shall be secured with three (3) wire rope clips as shown in detail "J" on Standard Sheet 212-10 *Temporary Rock Catchment Barrier*.

D. Rock Catchment Fence Fabric. The rock catchment fence fabric (wire rope net, chain link fence fabric and synthetic fabric) shall be attached to the support rope after the concrete barrier units have been installed.

The wire rope net panels shall be attached to the support ropes with 3/4 in. shackles spaced approximately 3 ft. apart. The chain link fence fabric, 12 ft. in height, shall be attached to the wire rope net with hog rings or twist ties. The area between two adjacent wire rope net panels shall be covered with chain link fence fabric. The layer of synthetic fabric, with a minimum height of 10 1/2 ft., shall be attached to the chain link fence.

212-3.06 Move Temporary Rock Catchment Barrier. Move and reset the temporary rock catchment barrier in accordance with the requirements of §212-3.05 *Temporary Rock Catchment Barrier*.

212-4 METHOD OF MEASUREMENT

212-4.01 Wire Rope Rock Catchment Fence. Wire rope rock catchment fence will be measured as the number of linear feet of fencing, measured from center-to-center of end posts.

212-4.02 Chain Link Rock Catchment Fence. Chain link rock catchment fence will be measured as the number of linear feet of fence, measured along the top of the fence between the terminal posts. An allowance of 10 linear feet will be added for each terminal section anchorage and for each intermediate section anchorage installed.

212-4.03 Wire Mesh Slope Protection. Wire mesh slope protection will be measured as the number of square feet of rock face satisfactorily covered. No measurement will be made of wire mesh used in any overlap.

212-4.04 Wire Mesh Drape. Wire mesh drape will be measured as the number of square feet of rock face satisfactorily covered. No measurement will be made of wire mesh used in any overlap.

212-4.05 Temporary Rock Catchment Barrier. Temporary rock catchment barrier will be measured as the number of linear feet of barrier, measured along the centerline of the uppermost concrete barrier surface, from one end anchor to the other.

212-4.06 Move Temporary Rock Catchment Barrier. Moving temporary rock catchment barrier will be measured as the number of linear feet of barrier moved, measured along the centerline of the uppermost concrete barrier surface, from one end anchor to the other.

212-5 BASIS OF PAYMENT

212-5.01 Wire Rope Rock Catchment Fence. The unit price bid per linear feet for wire rope rock catchment fence shall include the costs of furnishing all labor, material and equipment necessary to complete the work.

212-5.02 Chain Link Rock Catchment Fence. The unit price bid per linear feet for chain link rock catchment fence shall include the costs of furnishing all labor, material and equipment necessary to complete the work.

212-5.03 Wire Mesh Slope Protection. The unit price bid per square feet for wire mesh slope protection shall include the costs of furnishing all labor, material and equipment necessary to complete the work, including anchor testing and disposal of any material removed from the slope.

212-5.04 Wire Mesh Drape. The unit price bid per square feet for wire mesh drape shall include the costs of

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furnishing all labor, material and equipment necessary to complete the work, including anchor testing and disposal of any material removed from the slope.

212-5.05 Temporary Rock Catchment Barrier. The unit price bid per linear feet for temporary rock catchment barrier shall include the costs of furnishing all labor, material and equipment necessary to erect, maintain, and remove the required barrier, including any required connection devices, end treatments, delineation or guiding devices, and devices for pinning and connecting temporary precast concrete barrier units.

After placement, 90% of the item unit price will be paid. The remaining 10% will be paid when the rock catchment barrier has been removed.

212-5.06 Move Temporary Rock Catchment Barrier. The unit price bid per linear feet for moving temporary rock catchment barrier shall include the costs of furnishing all labor, material and equipment necessary to remove, transport, erect, and maintain the required barrier, including any required connection devices, end treatments, delineation or guiding devices, and devices for pinning and connecting temporary precast concrete barrier units.

Movements necessary to maintain, realign, or replace damaged units will not be considered as moving temporary rock catchment barrier and shall be done at no additional cost to the State.

Payment will be made under:

Item No.	Item	Pay Unit
212.0106	Wire Rope Rock Catchment Fence (Medium Impact – 6 ft.)	Feet
212.0108	Wire Rope Rock Catchment Fence (Medium Impact – 8 ft.)	Feet
212.0110	Wire Rope Rock Catchment Fence (Medium Impact – 10 ft.)	Feet
212.0112	Wire Rope Rock Catchment Fence (Medium Impact – 12 ft.)	Feet
212.0201	Chain Link Rock Catchment Fence	Feet
212.0202	Vinyl Coated Chain Link Rock Catchment Fence	Feet
212.03	Wire Mesh Slope Protection	Square Feet
212.04	Wire Mesh Drape	Square Feet
212.0501	Temporary Rock Catchment Barrier (10 ft.)	Feet
212.0502	Move Temporary Rock Catchment Barrier (10 ft.)	Feet

D262100
CONCRETE AND HOT MIX ASPHALT MIX NAMING CONVENTION

Make the following changes to the Standard Specification of May 4, 2006 / May 1, 2008:

Section 501-3.02 D. Delivery Tickets, *add* the following line to the top of the bullet list for delivery ticket requirements:

- “SiteManager Mix ID”

DELETION OF STANDARD SPECIFICATIONS SECTIONS 303, 403, 618 and §703-09

Make the following changes to the Standard Specifications dated May 4, 2006 and May 1, 2008:

Delete Section 303 *Optional Flexible Shoulder* in its entirety.

Delete Section 403 *Hot Mix Asphalt (HMA) Pavements for Municipalities* in its entirety.

Delete Section 618 *Bituminous Material* in its entirety.

Delete §703-09 *Reclaimed Asphalt Pavement (RAP)* in its entirety.

SUBBASE COURSE

Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 209-213, Delete SECTION 304 entirely and **Replace** it with the following:

SECTION 304 – SUBBASE COURSE**304-1 DESCRIPTION**

304-1.01 General. The work consists of furnishing, placing and compacting a subbase course of the specified type in conformity with the lines, grades, thicknesses and typical sections shown in the contract documents.

304-1.02 Optional Type. When the Optional Type subbase item is specified, select any of the four (4) options as follows:

Option A. Subbase construction consisting of two (2) separate layers of Type 4 and Type 3 Subbase Course.

Option B. Subbase construction consisting of a single layer of Type 1 Subbase Course.

Option C. Subbase construction consisting of a single layer of Type 2 Subbase Course.

Option D. Subbase construction consisting of a single layer of Type 4 Subbase Course.

304-1.03 Definitions. Deleterious: Any material that does not consist of concrete, asphalt, glass, brick, stone, sand, gravel, blast furnace slag, or other materials deemed acceptable, when these materials are used in subbase in conformance with the specification requirements, OR any material which will adversely affect the performance of the product either during handling, during construction, or in its final application.

304-2 MATERIALS. Provide subbase material meeting the requirements of §733-04 *Subbase Course*.

Provide a subbase material meeting the specification requirements and is within the Contractor's capabilities to place and fine grade to the required tolerances. Should the subbase course become unstable at any time prior to the placement of the overlying course, correct the unstable condition at no additional cost to the State. Perform any required modification prior to placing the material on the grade.

RAP will not be allowed as an acceptable alternate to Types 1, 3 and 4 at intersection locations or in areas with a high percentage of truck traffic as shown in the contract documents, unless Portland Cement Concrete pavement is to be installed as part of the pavement structure. A high percentage of trucks is defined to be 10% or more. For interstates and other freeways, a DDHV of 250 vph is used to indicate a high percentage of trucks.

Earthwork construction operations performed from November 1st thru April 1st with an approved Winter Earthwork submittal as outlined in §203-3.01 A. *Winter Earthwork Submittal*, allows a transition period where standard earthwork materials can be used only if the air temperature, ground temperature, and material temperature are all above 32° F at the time of placement. This transition stipulation also applies to subbase material. However, when either the air temperature, ground temperature, or material temperature is at or below 32° F at the time of placement, the transition period ends and no subbase shall be placed regardless of material composition.

304-3 CONSTRUCTION DETAILS

304-3.01 General. Notify the Engineer in writing of which placement option, material option (if applicable) and/or material type is proposed for use, at least 14 calendar days prior to performing the work. If it is proposed that more than one option or type is to be used, submit a plan to the Engineer describing where each option or type is proposed for use. This plan must be approved by the Engineer prior to incorporating it into the project. The State reserves the right to disapprove the use of more than one option on a project. Use uniform subbase types and materials within the limits of the roadbed as defined in §101-02 *Definition of Terms*.

304-3.02 Placement

SUBBASE COURSE

- Place the upper course material on the grade in a manner to minimize segregation, using equipment and procedures approved by the Engineer. Do not perform uncontrolled spreading from piles dumped on the grade.
- The maximum compacted layer thickness shall be as shown in the contract documents. In confined areas, the maximum compacted layer thickness is 6 in. The minimum loose lift thickness is 1.5 times the maximum particle size.
- Place Type 1 with a minimum compacted layer thickness of 6 in.
- Do not place Type 3 material within 4 in. of the bottom of a pavement course.
- Do not place materials blended with glass in contact with synthetic liners, geogrids, geotextiles or other geosynthetics. Ensure that glass incorporated into subbase is thoroughly mixed so that glass constitutes no more than 30 percent by weight anywhere in the subbase.
- When placing material under Option A, place and compact each material in a separate lift.

304-3.03 Compaction. When the moisture content is within the limits for proper compaction, compact the material in accordance with the requirements of §203-3.03 C. *Compaction*. Density tests are not required for the acceptance of these courses.

If a subbase course is disturbed by frost action prior to paving, re-compact the subbase.

304-3.04 Traffic and Contamination. The movement of highway traffic over the final surface of the subbase may be permitted at locations designated by, and under such restrictions as shown in the contract documents, provided such movements take place prior to the final finishing of this course to the specified tolerance. Do not allow highway traffic to move over subbase containing glass. The movement of construction equipment on this course may be permitted at locations designated by and under such restrictions as ordered by the Engineer. At locations where permission is granted for such movement, place and maintain the temporary surface of the course, upon which the construction traffic is running, at least 2 in. above the final surface of the course. Just prior to paving and after all construction traffic not required for the removal has ceased, remove the 2 in. protective layer, and prepare and compact the exposed surface of the course to the specified tolerance.

No payment will be made for furnishing, placing, maintaining, removing and disposing of the 2 in. thick protective layer. Include the cost thereof in the price bid for Subbase Course.

If the subbase is damaged or mixed with the subgrade or any other material due to the Contractor's operation, remove such material and replace it with the appropriate subbase material at no additional cost to the State.

304-3.05 Tolerance. Place Types 1, 2 or 4 so that after compaction the top surface of the course does not extend more than ¼ in. above nor more than ¼ in. below true grade for the course at any location. Place Type 3 course so that the finished surface does not extend above the true grade and surface for this course at any location.

304-4 METHOD OF MEASUREMENT

304-4.01 Subbase Course. The quantity is the number of cubic yards of material, computed from payment lines shown in the contract documents.

304-5 BASIS OF PAYMENT

304-5.01 Subbase Course. The unit price bid for this work includes the cost of furnishing all labor, material and equipment necessary to complete the work. Include the cost of adding water in the price bid unless the item for applying water is included in the contract. No direct payment will be made for losses of material resulting from compaction, foundation settlement, erosion, or any other cause. No deductions will be made for the volumes occupied by manholes, catch basins and other such objects.

No additional payment will be made for the protective layer, as stated in 304-3.04.

Progress payments will be made after the subbase course has been properly placed and compacted. Payment will be made at the unit price bid for 75% of the quantity. The balance of the quantity will be paid for after the final finishing to the required tolerance and just prior to the placing of the next course.

Payment will be made under:

SUBBASE COURSE

Item No.	Item	Pay Unit
304.11	Subbase Course, Type 1	Cubic Yards
304.12	Subbase Course, Type 2	Cubic Yards
304.13	Subbase Course, Type 3	Cubic Yards
304.14	Subbase Course, Type 4	Cubic Yards
304.15	Subbase Course, Optional Type	Cubic Yards

SECTION 401 - PLANT PRODUCTION

Make the following changes to the Standard Specifications dated May 1, 2008:

Delete Section 401 – Plant Production entirely and **replace** it with the following:

SECTION 401 - PLANT PRODUCTION

401-1 DESCRIPTION. The contractor is responsible for Quality Control (QC). QC is defined as all activities required to produce HMA that meets all specification requirements. The contractor shall incorporate a Quality Control system for all plant production of hot mix asphalt (HMA) and assume responsibilities for all QC activities at the production facilities.

The contractor shall produce the HMA according to the specifications herein and provide production documentation. Quality Adjustment Factors (QAFs) will be used to assess HMA production quality and these factors will be applied to calculate a quality payment adjustment.

The Department is responsible for Quality Assurance (QA). QA is defined as all activities performed by the Department to assure that HMA production meets the specification requirements. The Department will determine quality payment adjustments for each day's production using a daily QAF obtained from the calculations of the average absolute values for volumetric and non-volumetric mixes in accordance with Materials Procedure (MP) 401, *Quality Control and Quality Assurance Procedures for Quality Control Hot Mix Asphalt Production*. The daily QAFs measure production variation from the mean of the specification limits.

401-2 MATERIALS. The provisions of §402-2, *Materials*, apply and are as modified herein. Produce HMA in accordance with the requirements outlined in this specification, including all applicable Test Methods and Materials Procedures. HMA mixture designs must be accepted by the Department prior to any HMA production.

The Department reserves the right to suspend any mixture design when the mixture produces unacceptable paving results or exhibits properties that will affect the anticipated pavement performance.

401-2.01 Hot Mix Asphalt Designs. Formulate and submit a HMA design to the Regional Materials Engineer (RME) that satisfies all design criteria outlined in MM 5.16, *Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures*. When the submitted HMA design is assigned verification status, the design must be verified during production. Notify the RME at least 24 hours prior to the start of verification status production. When producing under verification status, make necessary adjustments to control the process. Apply daily QAFs to both verification and production status mix designs. Mixtures produced under verification status are allowed for use on State projects.

For any HMA permeable base and shim mixtures required by the contract documents, formulate and submit to the RME a job mix formula that satisfies the General Limits imposed by Table 401-1, *Composition of Hot Mix Asphalt Mixtures*.

401-2.02 Aggregates. Aggregate must be from a source approved by the Department. Use fine aggregate that consists of materials conforming to the requirements of §703-01, *Fine Aggregate*. In addition, fine aggregate may consist of screenings, free from deleterious materials and manufactured from sources of stone, gravel, or slag meeting the requirements of §703-02, *Coarse Aggregate*.

Use coarse aggregate that consists either of crushed stone, crushed gravel, or crushed slag conforming to the requirements of §703-02, *Coarse Aggregate* and MM 5.16.

Use slag aggregate on State projects only when an alternate pay item which takes the mix yield differential into account is included on the plans or in the itemized proposal.

When coarse aggregates for the mixture are from more than one source or of more than one type of material, proportion and blend them to provide a uniform mixture.

SECTION 401 - PLANT PRODUCTION

TABLE 401-1 COMPOSITION OF HOT MIX ASPHALT MIXTURES						
Mixture Requirements	Permeable Base				Shim	
	Type 1		Type 2		Type 5	
Screen Sizes	General Limits % Passing ¹	Job Mix Tolerance %	General Limits % Passing ¹	Job Mix Tolerance %	General Limits % Passing ¹	Job Mix Tolerance %
2 in	100	-	100	-	-	-
1 1/2 in	95-100	-	75-100	±7	-	-
1 in	80- 95	±6	55- 80	±8	-	-
1/2 in	30- 60	±6	23- 42	±7	-	-
1/4 in	10- 25	±6	5- 20	±6	100	-
1/8 in	3- 15	±6	2- 15	±4	80-100	±6
No. 20	-	-	-	-	32- 72	±7
No. 40	-	-	-	-	18- 52	±7
No. 80	-	-	-	-	7- 26	±4
No. 200	0- 4	±2	-	-	2- 12	±2
Asphalt Content, % ^{2,3}	2.0-4.0	NA	2.5-4.5	NA	7.0-9.5	NA
Mixing and Compaction Temperature Range °F ⁴	225-300		225-300		250-325	

NOTES:

- All aggregate percentages are based on the total weight of the aggregate.
- The asphalt content is based on the total weight of the mix. When using slag aggregates in the mix, the asphalt content shall be increased accordingly, a minimum of 25 percent for an all slag mix.
- Use the PG binder listed in the proposal or as designated by the Region Materials Engineer following the guidance specified in the Comprehensive Pavement Design Manual, Chapter 6, Section 6.2.5 – *Performance Graded Binder Selection*.
- Or as recommended by the PG binder manufacturer.

A. Coarse Aggregate Type F1 Conditions. Use one of the following types of coarse aggregate.

- Limestone, dolomite or a blend of the two having an acid-insoluble residue content of not less than 20.0%.
- Sandstone, granite, chert, traprock, ore tailings, slag or other similar noncarbonate materials.
- Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag or other similar materials, meeting the following requirements:
 - 12.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch particles must comprise a minimum of 30.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). A minimum of 95.0% of plus 3/8 inch particles must be non-carbonate.
 - 9.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch particles must comprise a minimum of 30.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). A minimum of 95.0% of plus No. 4 particles must be non-carbonate.

B. Coarse Aggregate Type F2 Conditions. Use one of the following types of coarse aggregate.

- Limestone, dolomite, or a blend of the two having an acid-insoluble residue content of not less than 20.0%.

SECTION 401 - PLANT PRODUCTION

2. Sandstone, granite, chert, traprock, ore tailings, slag or other similar noncarbonate materials.
3. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag or other similar materials, meeting the following requirements:
 - a. 12.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). A minimum of 20.0% of plus 3/8 inch particles must be noncarbonate.
 - b. 9.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). A minimum of 20.0% of plus No. 4 particles must be noncarbonate.

C. Coarse Aggregate Type F3 Conditions. Use one of the following types of coarse aggregate.

1. Limestone or a blend of limestone and dolomite having an acid-insoluble residue content of not less than 20.0%.
2. Dolomite.
3. Sandstone, granite, chert, traprock, ore tailings, slag or other similar noncarbonate materials.
4. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag or other similar materials, meeting the following requirements:
 - a. 12.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). A minimum of 20.0% of plus 3/8 inch particles must be noncarbonate.
 - b. 9.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). A minimum of 20.0% of plus No. 4 particles must be noncarbonate.

D. Coarse Aggregate Type F9 Conditions. Use coarse aggregate meeting the requirements of §703-02, *Coarse Aggregate*.

401-2.03 Mineral Filler. Use mineral filler conforming to the requirements of §703-08, *Mineral Filler*.

401-2.04 Performance-Graded Binder. Use the Performance-Graded Binder (PG Binder) in the production of these mixtures that meets Section 702 – *Bituminous Materials*.

Initial acceptance of the PG Binder is based on the primary source appearing on the Department's Approved List for Bituminous Material Primary Sources, A. Performance-Graded Binders for Paving. Acceptance of the PG Binder is contingent upon satisfactory test results from samples taken, as required by the Department's procedural directives, at the location where the material is incorporated into the work. A primary source is defined as a firm that samples, tests, and certifies by Production Lot that the PG Binder is in conformance with the specifications. The procedural directives for sampling, testing, and certifying the PG Binder, and for achieving and maintaining approved list status, are available from the Materials Bureau.

The temperature of PG Binder delivered to the HMA Production Facility shall not exceed 350°F, unless the PG Binder supplier recommends it.

401-2.05 Reclaimed Asphalt Pavement. Reclaimed Asphalt Pavement (RAP) shall meet the requirements of MM 5.16.

401-3 CONSTRUCTION DETAILS.

401-3.01 Quality Control. Perform all sampling and testing in accordance with Materials Procedure 401. Document all QC test results and records in a legible manner and provide them to the State at the end of each

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production season or when requested by the RME. HMA produced without the required sampling, testing and documentation may be rejected.

401-3.02 Production Facility Laboratory. Maintain an approved production facility site laboratory to perform all required HMA sampling and testing according to MP 401.

401-3.03 Plant Lots and Sublots. Determine plant lots and sublots on a daily basis in accordance with MP 401.

401-3.04 Quality Control Sampling and Testing. Obtain and test QC samples as outlined in MP 401.

401-3.05 Production Control. Produce HMA according to MP 401. Make necessary process control adjustments during production according to MP 401.

401-3.06 Production Quantities. Whenever production is made for the Department, notify the Regional Materials office by 3:00 p.m. the business day before the day of production.

Maintain a record of each day's production quantity for each mix design supplied to the project site daily. Retain these records at the production facility. These records must be available to the Department's representative for review. Ship all production quantities as outlined in §401-3.07 *Documentation*.

401-3.07 Documentation. Record all QC test data for each plant on the appropriate forms provided by the Department according to MP 401. Also, keep a copy of the plant automation printout at the plant facility for each mix type produced and make them available for review at all times. Transmit a summary of all test data weekly to the RME.

Provide a delivery ticket indicating the total quantity in tons being delivered with each delivery vehicle supplying HMA. The method of determining the delivered quantity is subject to the approval of the RME. Make one legible copy of the delivery ticket available to the Department's paving inspector prior to the placement of the mixture showing the following minimum information:

- Ticket number
- Plant identification
- Contract number
- Site Manager Mix ID (as outlined in MP 401)
- Mix Code (as outlined in MP 401)
- Quantity of material in vehicle
- Date and Time

The quality assurance technician (QAT) will determine the quality adjustment factor (QAF) for each day's production in accordance with MP 401.

The Engineer will use the Daily QAF to calculate the payment adjustment for each day's production according to §402-4 *Method of Measurement*.

401-3.08 HMA Mixing Plant. HMA mixing plants must meet the requirements in MP 401.

401-3.09 Hot Mix Asphalt Holding Bins. HMA mixtures may be held in holding bins which meet the requirements in MP 401.

401-3.10 Evaluation of Lots Represented by 0.85 QAF. When any material results in a QAF of 0.85, the Engineer will evaluate the subject material to determine if it will be left in place. The Engineer may require the Contractor to core the pavement to determine if the in-place density is acceptable at no additional cost to the State. When cores are required, the Engineer will divide the pavement area being evaluated into 4 sublots in accordance with the requirements of §402-3.08, *Pavement Density Samples*. The material will be left in-place when either of the following sets of conditions is met.

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- The calculated plant air voids used for payment are greater than 5.5% and less than or equal to 7.0%, the asphalt content, based on automation, is within 0.2% of the production target, the Contractor achieved field density of 92% to 97%, and there are no defects such as, but not limited to, cracking, raveling, rutting, shoving, or bleeding.
- The calculated plant air voids used for payment are greater than or equal to 1% and less than 1.5%, the validated QC and QA plant air void test results, according to MP 401, average 1.5% to 5.5%, the asphalt content, based on automation, is within 0.2% of the production target, the contractor achieved field density of 92% to 97%, and there are no defects such as, but not limited to, cracking, raveling, rutting, shoving, or bleeding.

If the material does not meet the above conditions or it is unknown, such as for mixes accepted based on gradation or if QA testing was not required, the Engineer will determine if the material in question may remain in-place considering, but not limited to, the following:

- Type of material produced
- The layer in which the material was placed
- The location and traffic volume
- Laboratory test results
- Field test results, such as density

If the subject material is left in-place, it will be assigned a QAF of 0.85. If determined the subject material will not be left in-place, the Contractor shall remove and replace the material at no additional cost to the State.

401-4 METHOD OF MEASUREMENT. The quantity will be the number of tons delivered as determined from the automated proportioning system, the delivery vehicle weigh system, or the HMA holding bin weigh system. The measurement or calculation will be the quantity based on the measured amount and reported to the nearest 0.01 of a ton.

SECTION 402 - HOT MIX ASPHALT (HMA) PAVEMENTS

Make the following changes to the Standard Specifications dated May 1, 2008:

Delete Section 402 – Hot Mix Asphalt (HMA) Pavements in its entirety and *replace* it with the following:

SECTION 402 - HOT MIX ASPHALT (HMA) PAVEMENTS

402-1 DESCRIPTION. These specifications apply to all plant mixed Hot Mix Asphalt (HMA) produced at a production facility under Section 401, Plant Production, irrespective of aggregate gradation, type, and amount of HMA material or use.

This work will consist of providing, placing, and performing density monitoring of one or more courses of HMA pavement constructed on the prepared foundation in accordance with the contract documents or as directed by the Engineer.

402-2 MATERIALS

402-2.01 General. Use aggregate and PG binder from a supplier listed in the Department's Approved List of Fine and Coarse Aggregates. Use of mineral filler or any other materials for the production of HMA will be accepted in accordance with the State's written instructions.

A PG Binder grade and the Design Estimated Traffic in 80 kN ESALs will be specified by Special Note in the contract documents.

402-2.02 Composition of Mixtures. Supply HMA for the project meeting the requirements of §401-2 of the Standard Specifications and the mixture design procedure as written in Materials Method (MM) 5.16, *Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures*.

The Contractor will be responsible for the quality and performance of the mixture created from approved components. The Department reserves the right to take samples at any time and location to assure the materials and workmanship incorporated into each Department project are in conformity with the approved plans and specifications.

402-3 CONSTRUCTION DETAILS. The Engineer will conduct a pre-paving meeting prior to any routine HMA placement. The attendance to this meeting will include Regional Materials Engineer, Paving Foreman, Chief Inspector or Paving Inspector(s), HMA plant representative, density gauge operator, if necessary, and traffic protection personnel. Participants will review all aspects of the specifications requirements including, but not limited to, the following:

- HMA mixture delivery temperature
- Equipment and setup
- Mix codes to assure correct mix is delivered to the project
- Gauge operator certification
- Proper construction practice to provide quality product
- Traffic Control Activities

A certified density gauge operator must be present to monitor pavement density using a density gauge for 50 Series (non-mainline areas), 60 Series, and 70 Series compaction methods. The gauge operator must hold a current Density Gauge Inspector Certification from the Associated General Contractors, New York State, or its equivalent, as determined by the Director, Materials Bureau.

Do not place HMA mixture on any wet surface. Wet surface is defined as one that is moistened, covered, or soaked with water.

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402-3.01 Temperature and Seasonal Limitations.

A. Surface Temperature

1. Place HMA only when the pavement surface temperature is equal to or greater than those specified in Table 402-1, *Temperature Requirements*.

TABLE 402-1 TEMPERATURE REQUIREMENTS

Nominal Compacted Lift Thickness	Surface Temperature Minimum
≤ 1 in	50°F
1 in < Thickness ≤ 3 in	45°F
> 3 in	40°F

2. Temperature Measurement: Furnish a surface thermometer capable of reading surface temperature to nearest 1° F for the exclusive use of the Engineer. The Engineer will measure pavement surface temperatures on the surface where the mixture is to be placed. The controlling temperature will be the average of three readings taken at locations 25 feet apart utilizing a surface thermometer covered by insulation for 10 minutes or until a constant temperature is reached. Infra Red (IR) temperature guns may be used in lieu of surface thermometer. When IR gun is used and if there is a dispute with the value obtained, the Engineer will determine the temperature using the surface thermometer.

- B. Seasonal Limits:** Place HMA Top Course on mainline and shoulders between April 1 and November 30 for the counties of Dutchess, Orange, Putnam, Rockland, Westchester, Nassau, Suffolk, and the City of New York. For all other counties, place HMA Top Course between April 15 and October 31. When placing Top Course HMA outside the seasonal limitations, provide a limited warranty against defects in such work. Perform the warranty work in accordance with Materials Procedure (MP) 402-01, *Warranty Requirements for Hot Mix Asphalt (HMA) Top Course*. Unless specified elsewhere in this specification or contract documents, these seasonal limits do not apply for any other HMA layer placement.
- C. Temporary HMA Placements:** HMA placement for temporary detours, which are not and will not become part of the permanent pavement, will not be subject to the temperature and seasonal limitations but must be approved by the Engineer when placed outside temperature and seasonal limits.
- D. Miscellaneous HMA Placements:** The Engineer may allow the placement of HMA mixtures for curbs, driveways, sidewalks, gutters, and other incidental construction below the minimum temperature and outside the seasonal limits to expedite the completion of the project.
- E. Scheduling HMA Placement:** Schedule paving operations such that all HMA placements are completed within the temperature and seasonal limitations, provide safe and adequate work zone traffic control, and protect previously laid courses. Such scheduling will include expediting construction operations to permit paving within the seasonal limitations or by limiting the length of work so that it can be completed before the seasonal shut-down. Should paving operations not be completed within temperature and seasonal limitations, provide, at no additional cost to the state, all temporary materials and work necessary such as shimming of castings and protrusions, drainage of the roadway, providing acceptable rideability, and other work needed for the adequate work zone traffic control. Base or Binder layers which will be permanently incorporated into the work may be left open to traffic over the winter. However, if there is any damage to these layers, repair any damaged areas prior to placing subsequent layer at no additional expense to the State. This requirement also applies to the repairs deemed necessary by the Engineer on the temporary HMA placements. Clean this pavement course in accordance with Section 633, *Conditioning Existing Pavement*, at no additional expense to the State, prior to applying a tack coat and overlaying. Apply tack coat in accordance with Section 407, Tack Coat, immediately prior to HMA overlay.

402-3.02 HMA Pavers. Provide pavers capable of spreading and finishing courses of HMA plant mix material in

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lane widths, shoulders, or similar construction applicable to the specified typical section and thicknesses shown on the plans. Repair or replace immediately any paver found to be worn or defective either before or during its use. Provide HMA pavers that meet the following requirements:

- Self-powered with an activated screed or strike-off assembly.
- Capable of operating at forward speeds consistent with satisfactory placement of the mixtures.
- Have a receiving hopper with sufficient capacity for uniform spreading operation and with automatic flow controls to place the mixture uniformly in front of the screed. Heat the screed or strike-off assembly as necessary to produce a finished surface of the required smoothness and texture without tearing, shoving or gouging the mixture.
- When screed extensions are necessary for placement of mainline pavement, provide extensions of the same design as the main screed.
- Mount auger and tunnel extensions on the paver when the screed is extended more than 1 foot for fixed paving widths wider than 12 feet when mat uniformity is not achieved as determined by the Engineer.
- When used for placing the initial paving layer, Base, Binder, and Top Courses, pavers must be equipped with approved automatic transverse slope and longitudinal grade screed controls. The controls shall automatically adjust the screed and increase or decrease the mat thickness to compensate for irregularities in the existing surface. The controls shall be capable of maintaining the proper transverse slope and be readily adjustable so transitions and super-elevated curves can be satisfactorily paved. The controls shall operate from suitable fixed or moving references as prescribed in §402-3.06, *Spreading and Finishing*.

When paving mainline, provide a paver with functional automatic transverse slope and longitudinal grade screed controls that can be operated from either side of the paver. The transverse slope and longitudinal grade screed controls of the HMA paver may be manually adjusted according to the requirements of §402-3.06, *Spreading and Finishing*.

Engineer will inspect and approve HMA pavers for use prior to the start of paving operations.

402-3.03 Hauling Equipment. Provide HMA transport trucks that have clean, smooth, tight metal beds with waterproof covers for transporting HMA mixtures to the work site. When a flexible cover is used, provide a cover that overlaps the vehicle's sideboards and back by a minimum of 6 inches and is fastened. The inside surface of the vehicle body may be lightly coated with a release agent listed on the Department's Approved List for Release Agents. Petroleum products or solvents are not permitted for use as release agents. All hauling equipment is subject to the approval by the Engineer.

402-3.04 Rollers. Rollers can either be vibratory, static steel wheel type, or pneumatic tire rollers. The Engineer will inspect rollers prior to start of paving operations to determine acceptability. A minimum of two rollers, one for breakdown and one for finish rolling, are required unless the HMA placement is on a bridge deck, bridge approaches, or other areas where a single steel wheel vibratory roller may be sufficient to achieve required density. Rollers must be in good mechanical condition, and capable of operating at speeds slow enough to avoid displacement of the mixture. The use of equipment which results in excessive crushing of aggregate will not be permitted. All rollers for HMA placement must appear on the Department's Approved List for Rollers, available on the Department's website.

A. Vibratory rollers: These rollers shall be specifically designed for the compaction of HMA mixture. Vibratory roller models satisfying the specification requirements contained herein will be evaluated by the Materials Bureau to determine compaction capabilities. If acceptable, the roller model will be placed on the Department's Approved List for Hot Mix Asphalt Vibratory Compaction Equipment. Vibratory roller models appearing on this list will be allowed to be used. Alternate types of rollers may be approved by the Director, Materials Bureau, upon reviewing the specification of the rollers and demonstration that satisfactory results can be achieved.

Provide vibratory rollers that meet the following requirements:

Nominal Amplitude	0.05 in maximum.
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Vibration Frequency	1500 vpm minimum.
Drum Width (dual vibrating drums)	54 inches, minimum
(single vibrating drum)	84 inches, minimum

All vibratory rollers shall be equipped with a speedometer that accurately indicates roller speed in either ½ mph or 50 ft per minute increments (maximum) throughout the specified operating range. Vibratory rollers must also be equipped with a speed control device that can be set to prevent the roller from traveling in excess of 2 ½ mph or 220 ft per minute when the roller is in vibratory mode. The type of speed control device will be subject to the approval of the Director, Materials Bureau. When rollers have pneumatic drive wheels, release agents listed on the Department’s Approved List may be used on the tires to prevent material pickup.

B. Static steel-wheel rollers. These rollers shall be self-propelled and be either 10 to 12 ton three axle types or 8 to 10 ton two axle types.

C. Pneumatic rubber-tired rollers: These rollers shall be self-propelled and consist of two axles on which multiple pneumatic-tired wheels are mounted in such a manner that the rear wheels shall not follow in the tracks of the forward wheels and will be spaced to give essentially uniform coverage with each pass. The axles will be mounted in a rigid frame provided with means for adding ballast. The wheels shall be mounted so as to oscillate individually or in pairs. The tires must be smooth and show no tread pattern, be of equal size and diameter, and be uniformly inflated. Pneumatic rollers shall meet the following requirements unless otherwise approved:

Maximum Wheel Load	5,600 lbs
Tire Compression on Pavement	80±5 psi
Maximum Axle Load	22,400 lbs

402-3.05 Conditioning of Existing Surface. When specified in the contract documents, clean the surface of the existing pavement, fill joints and cracks, and level the surface to a uniform grade and cross slope prior to the application of a new HMA course in accordance with the provisions of Section 633, *Conditioning Existing Pavement*. Clean any foreign material from the pavement resulting from construction operations at no additional cost to the State.

Prior to placing new HMA, apply a thin, uniform tack coat as specified in Section 407, *Tack Coat*, to all contact surfaces of existing HMA and Portland Cement Concrete layers including such areas as adjacent pavement edges, curbing, gutters, manholes, and other structures where the HMA will be in contact.

Fill any depressions and wheelpath ruts prior to paving Truing and Leveling course, as directed by the Engineer. Use Table 402-2, *Mixture Selection for Filling Wheelruts & Depressions*, to select the appropriate mix type.

TABLE 402-2 MIXTURE SELECTION FOR FILLING WHEELRUTS & DEPRESSIONS

Depth Range (in)	Mixture Type
< ¼	No treatment
¼ ≤ Depth < ¾	Shim
≥ ¾	9.5 Top Course

If a Truing and Leveling course is specified in the plans or in the itemized proposal, place the course(s) of a minimum variable thickness of proper plant mix necessary to bring the surface of the existing pavement to the same transverse slope and longitudinal grade required for the finished pavement surface. The surface of this course shall be tested in the same manner prescribed in §402-3.10, *Surface Tolerance*, except that the allowable variation from the true surface after compaction must not exceed ⅜ inch. Unless a mixture type is specified in the plans, use Table 402-3, *Mixture Selection for T&L Course*, to select the appropriate mix type such that dragging of stones is minimized during placement of the mixture.

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TABLE 402-3 MIXTURE SELECTION FOR T&L COURSE

Compacted Thickness Range (in)	Mixture Type
≤ 2	9.5 or 12.5 Top Course
$2 < \text{Thickness} \leq 3$	19.0 or 25.0 Binder Course
$3 < \text{Thickness} \leq 5$	25.0 Binder Course or 37.5 Base Course

Select a mixture such that dragging of stones at the thin edge is minimized when constructing wedges for super-elevation. If dragging is excessive in any T&L course, the Engineer shall disallow the selected T & L mixture for the application.

402-3.06 Spreading and Finishing

- A. Surface Tolerance:** The requirements of §402-3.10, *Surface Tolerance*, shall apply.
- B. Mix Temperature:** For 50, 60, and 70 series compaction methods, select a desired HMA mixture temperature to be delivered within the mixing and compaction range of 250°F and 325°F, or as recommended by the PG Binder manufacturer. Notify the Engineer of the desired delivery temperature. Produce and deliver mixtures to the work site, and incorporate into the work within 20°F of the specified temperature. For 80 Series compaction method, the Contractor will select the desired mix temperature with the concurrence of the Engineer.
- C. Tack Coat:** Apply tack coat on the contact surfaces between all HMA pavement lifts in accordance with Section 407, *Tack Coat*, prior to placing HMA mixture regardless of time period between lifts. Tack coat is not required on the surface of Permeable Base courses. Paving over a tack coat should not commence until the emulsion has broken (goes from brown to black) or is tacky when touched.
- D. HMA Mixture from Multiple Plants:** Supply of HMA mixture from multiple plants to a single paver is prohibited.
- E. Top Course Texture and Color:** Supply Top Course HMA from a single plant for the entire project duration such that the pavement surface has a uniform color and texture as determined by the Engineer. Exception to this requirement is when a contract includes multiple paving sites or the project length is at least 5 miles and supply from multiple plants at discrete points of terminus is practical. In that case, the above requirement will apply to each paving site and locations between discrete points of terminus as approved by the Regional Materials Engineer. Limits of each site will be subject to approval by the Regional Materials Engineer. If a plant breaks down, another plant may supply mixture meeting the requirements of §402-2.02 if the aggregate used for manufacturing of the HMA is from the same source with the concurrence of the Regional Materials Engineer.
- F. Reference Line:** When the initial pavement course is laid with automatic HMA pavers on a new or a reconstruction project, use a taut reference line positioned at or near the pavement centerline or edge to guide the paver. Erect and maintain the reference line to the satisfaction of the Engineer. Support the reference line at approximately 25 feet intervals on tangent sections and at closer intervals on curves. Tension the line sufficiently to remove any sagging. The Engineer may permit a moving reference of at least 30 feet in length in lieu of a reference line. The moving reference may be a floating beam, ski, or other suitable type such that the resulting pavement layer surface is sufficiently even. A short ski or shoe may also be used for the initial course with the approval of the Engineer if a satisfactory fixed reference such as a curb, gutter, or other fixed reference is adjacent to the pavement. In addition, any course in an adjacent lane may be used as the reference for the use of a short ski. When the proposed floating beam or the short ski does not produce the results similar to those

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obtained using a taut reference line, the Engineer shall disapprove the use of these devices. The Engineer has final approval of the method chosen by the Contractor.

The automatic screed controls are not required for shoulders, temporary detours, behind curbs, where existing grades at roadway intersection or drainage structure must be met, or in other areas where its use is impractical.

G. Mix Placement: Use HMA paver(s) to place the mixture either over the entire width or over a partial width that may be practical. Place the mixture on a clean, tack coated surface. Upon arrival at the site, the trucks will deliver the mixture into the paver. Immediately spread and strike off to the required width and appropriate loose depth to established grade, elevation, and to obtain the required compacted thickness at the completion of work. If the areas to be paved are less than 1000 ft² or small and scattered, the HMA mixture may be spread by hand or other method approved by the Engineer. For these areas, dump and spread the mixture such that the compacted thickness meets the thickness specified in the plans.

Place all pavement courses using one of the reference line methods mentioned in §402-3.06 F. Prior to the beginning of rolling, check the loose mat, adjust any irregularities, and remove and replace all unsatisfactory material.

When filling wheel ruts with Shim Course or 9.5 Top Course mixture in an existing pavement, place mixture in each wheelpath rut separately. Use a drag box configuration or approved equal having side forms to shim the ruts. Spread and strike off the Shim Course material to a uniform width of approximately 4 feet. The intent of the operation is to fill the low area only and not to place the material over the pavement's full lane width. The placement equipment wheels and/or other appurtenances must not interfere with the distribution and placement of the Shim Course material.

402-3.07 Compaction. Compact the HMA pavement sufficiently using the appropriate compaction method specified in Table 402-4 *Compaction Methods*, to achieve pavement densities in a range of 92% to 97%, expressed as a percentage of the mixture's maximum theoretical density (MMTD).

When placing HMA mixture using 50, 60, or 70 series compaction method, control all operation of the rollers including speed, amplitude settings, vibration frequency, and the type of rollers.

Immediately compact the HMA using rollers meeting the requirements of §402-3.04, *Rollers*, after the mixture has been placed. Compact the HMA when the mixture is in the proper condition such that the rollers do not cause displacement, cracking, or shoving. Initially, compact all courses with the roller traveling parallel to the centerline of the pavement, beginning at each edge and working toward the center. Compact super-elevated curves starting at the low-side edge and working toward the higher edge.

Correct immediately any displacement occurring as a result of reversing the direction of the roller, or from other causes, using rakes and additional HMA mixture as required. Exercise care in rolling so as not to displace the line and grade of the edges of the HMA mixture. To prevent adhesion of the mixture to the rollers, keep the wheels properly moistened with water, water mixed with small quantities of detergent, or other approved material. Petroleum products or solvents are not permitted.

Upon completion of the HMA placement, there shall be no visible defects in the pavement, such as shallow ruts, ridges, roller marks, cracking, tearing, segregation, bleeding, or any other irregularities. Any defects that become apparent shall be corrected, or the defective pavement replaced, to the satisfaction of the Engineer, at no additional cost to the State.

Along forms, curbs, headers, walls, and other areas not accessible to rollers, compact the mixture thoroughly with mechanical tampers. On depressed areas, use a trench roller or a small vibratory roller with the approval by the Engineer.

Remove any mixture that becomes loose and broken, mixed with dirt, or is in any way defective and replace with fresh HMA mixture. Compact the mixture to conform to the surrounding area. Correct any area showing an excess or deficiency of HMA material.

When Shim Course or 9.5 Top Course is used for filling wheel ruts, make a minimum of three passes of a pneumatic rubber tire roller for compaction. Otherwise, make a minimum of two passes when Shim Course is used as a skim coat. The Engineer may allow the use of other types of rollers.

Do not use vibratory compaction when HMA mixture is placed on structural bridge decks or other structures

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with less than 2 feet of cover over the structure or when specified in contract documents. If vibratory compaction is used, repair all damages which may occur to the highway components and adjacent property, including buried utility and service facilities, at no additional cost to the State.

Monitor density for 60 and 70 Series projects with density gauges specified in §402-3.07 E, *Density Gauges*. The density gauge operator shall possess a current Density Gauge Inspector Certification from The Associated General Contractors, New York State, or its equivalent, as determined by the Director, Materials Bureau. Any pavement section placed under 60 or 70 Series which is monitored by a gauge operator whose certification is revoked for reasons outlined in the New York State Inspector Certification Program manual under “Decertification”, will be evaluated by sampling and testing of pavement cores in accordance with §402-3.08, *Pavement Density Samples*, and subject to payment adjustment in accordance with Table 402-10, *Density Quality Adjustment Factors for 60 Series*. The above requirement also applies when a density gauge is used for monitoring pavement density in the areas other than mainline under 50 Series compaction method.

Table 402-4, *Compaction Methods*, associates specific item being placed to the required compaction method.

TABLE 402-4 COMPACTION METHODS

Compaction Methods	Item Number
A=50 series	402.XX5FQR
B=60 series	402.XX6FQR
C=70 series	402.XX7FQR
D=80 series	402.XX8FQR & other

NOTE: XX = 37, 25, 19, 12, 09, 05, 01

F = Friction requirement (1, 2, 3, 9)

Q = Quality item number (core item = 0, plant = 1, density = 2)

R = Revision number

Below is a detailed requirement for each of the compaction methods:

A. 50 Series Compaction Method. On the first day of mainline paving, construct the pavement under the provisions of “*Option 1 - Test Section*” or “*Option 2 – First Day Routine Paving*.”

1. Option 1 - Test Section. Construct a test section on the project site at a location approved by the Engineer. The purpose of the test section is to determine if the mixture can be compacted uniformly within the 92-97% of MMTD. The test section will be the same depth specified for the construction of the course which it represents. The test section length shall be at least 300 linear feet but not to exceed 1,500 linear feet when the test section is on the mainline. If required by the Engineer, construct full pavement width to close the joint(s). Use the first 150 feet of the test section to stabilize the paving operation. Once the test section is complete, the Engineer will select core locations, excluding the first 150 feet, in accordance with §402-3.08, *Pavement Density Samples*. Before the road is open to traffic, take the cores at the marked locations. Also, take loose mix samples as specified under §402-3.08, *Pavement Density Samples*. In addition to the above requirements, the following shall apply to the test section provision:

- Only one test section will be placed per day. Subsequent test sections are subject to approval by the Engineer.
- The first 200 tons of quantity placed on a test section will be adjusted by a factor of 1.5 as a Test Section Adjustment. The adjusted quantity will be paid based on the Quality Index price. The remaining quantity will be paid at the bid price. A maximum of two test sections per item will be subject to this adjustment.

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- The test section adjustment factor of 1.5 shall not apply for a test section if any HMA of 150 tons or more is placed on the same day, on the same project, other than the quantity required for the construction of the test section.
 - Pavement Density Quality Adjustment Factors (QAF) shall not apply for the first two test sections. Subsequent test section(s) located on the mainline is subject to pavement density QAF.
 - Placing HMA under “*Routine Paving*” provisions for this item is not permitted until the results of the cores from the test section have a minimum pavement density QAF of 1.00.
 - When the pavement density QAF is less than 1.00, the Contractor shall construct another test section in accordance with “*Option 1, Test Section.*”
 - When the calculated QAF is 0.60 or less, the Engineer will evaluate the test section to determine if it can be left in place. The guidance for evaluation can be found under §402-4, *Method of Measurement*. The Test Section Adjustment shall not apply for the test section.
2. **Option 2 – First Day Routine Paving.** It is not necessary to construct a test section on the first day of paving. Any HMA placed under this provision shall meet the following:
- The test section adjustment of 1.5 shall not apply.
 - All material placed will be subject to a pavement density QAF.
 - If the pavement density QAF on the first day of paving is less than 1.00, construct a test section in accordance with the provisions of the “*Option 1 - Test Section*” under this method.
 - Evaluate density in accordance with 3. *Routine Paving*, below.
3. **Routine Paving.** Place all HMA beyond the “*Option 1 - Test Section*” using the provisions described below.

A paving lot is defined as a day’s production of at least 200 tons. Each paving lot will be equally divided into four sublots in accordance with Materials Procedure (MP) 402-02, *Hot Mix Asphalt (HMA) Pavement Density Determination*. The Engineer will select and mark a core location in each subplot in accordance with §402-3.08, *Pavement Density Samples* once the compaction operation is completed. The Engineer will exclude the first 150 feet of the day’s paving. Extract a core at the marked location in each subplot. Take four loose mix samples representing the lot. Pavement cores and loose mix samples will be tested and analyzed by the Department in accordance with MP 402-02 to determine the pavement density QAF. If the quantity placed is less than 200 tons on any day, pavement cores and loose mix samples are not required. The density QAF for that day will be reported as 1.00, provided the density gauge used on previous sections is utilized and the Engineer is satisfied that the procedures used in these areas to obtain pavement densities are similar to previously placed pavement sections. When paving is continuous within a 24-hour period, a new lot will result when a change occurs in the paving crew. When a project includes multiple paving operations, each paving operation will be considered a lot and evaluated separately.

When consecutive lots are found to have a density QAF equal to or less than 0.85, stop paving operations and immediately construct a new test section in accordance with the provisions of “*Option 1 - Test Section*”, described previously in this section.

The density QAF shall not apply to material placed on shoulders, maintenance widening, crossovers, bridges and ramps with a uniform full-width section of less than 1250 feet in length. Payment for these areas shall be based on satisfactory placement and compaction. Placement and compaction procedures will be satisfactory when the procedures used in these areas obtain pavement density similar to that obtained on the mainline pavement sections. When the shoulder shows signs of distress during compaction, decrease the compaction effort until no further damage occurs to the shoulder or subbase. If density gauge(s) is used to monitor mainline paving, use the same gauge(s) to monitor density on the above referenced areas.

- B. 60 Series Compaction Method.** On the first day of mainline paving, construct the pavement under the provisions of “*Option 1 - Test Section*” or “*Option 2 – Test Section and Continue Paving.*” The Engineer will approve the location of the test section. Placement of HMA under this method will not be allowed unless both a

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density gauge and a certified operator are present.

- 1. Option 1 - Test Section Only.** Prior to routine paving operations for this item, construct a test section at a location approved by the Engineer. The purpose of constructing a test section is to determine a Project Target Density (PTD) for this item and correlation of a density gauge(s) to the cores. It is advisable to use the same equipment and procedures to construct the test section which will be used in the construction of the remainder of the course being laid. The test section will be the same depth specified for the construction of the course which it represents. The test section length shall be at least 300 linear feet but no more than 1,500 linear feet. If required by the Engineer, construct full pavement width to close the joint(s). Use the first 150 feet of the test section to stabilize the paving operation. At the conclusion of the test section, the Engineer will randomly select four 6-inch core locations on the test section in accordance with §402-3.08, *Pavement Density Samples* excluding the first 150 feet and mark the locations.

During construction of the test section, take loose mix samples in accordance with §402-3.08, *Pavement Density Samples* such that they represent the material placed on the test section. Take density gauge(s) readings at each core location prior to drilling the cores in accordance with Materials Procedure (MP) 402-02, *Hot Mix Asphalt (HMA) Pavement Density Determination*, based on the type of density gauge used. Take cores at each of the marked core location.

Deliver the cores, loose mix samples, and the four density gauge readings with the gauge type, model, and serial number to the Regional Materials Engineer in accordance with §402-3.08, *Pavement Density Samples*. The Regional Materials Engineer will test the samples and establish a PTD for each density gauge in accordance with Materials Procedure (MP) 402-02 within one business day of the delivery of the samples and density gauge readings. In addition to the above requirements, the following shall apply to the test section provision:

- Only one test section will be placed per day. Subsequent test sections are subject to approval by the Engineer.
 - The first 200 tons of quantity placed on a test section will be adjusted by a factor of 1.5 as a Test Section Adjustment. The adjusted quantity will be paid based on the Quality Index price. The remaining quantity will be paid at the bid price. A maximum of two test sections per item will be subject to this adjustment.
 - The test section adjustment factor of 1.5 shall not apply for a test section if any HMA of 150 tons or more is placed on the same day, on the same project, other than the quantity required for the construction of the test section.
 - Placing HMA under “Routine Paving” provisions for this item is not permitted until a Project Target Density has been established.
 - When the average density of the four cores is less than 88% of the maximum theoretical density, the Engineer may evaluate the test section to determine if it should be left in place. The guidance for evaluation can be found under §402-4, *Method of Measurement*. The Test Section Adjustment shall not apply for the test section.
- 2. Option 2 – Test Section and Continue Paving.** The following shall apply when HMA is placed on the first day under this option:
- Construct a test section as described under “*Option 1 - Test Section Only.*” Establish an Interim PTD as described in Materials Procedure (MP) 402-03 based on the density gauge used. Use this Interim PTD to monitor pavement density until the Actual PTD is established by the Regional Materials Engineer.
 - The test section adjustment factor of 1.5 shall not apply.
 - All material placed after the test section for that day shall be subject to a payment adjustment.
 - Take additional loose mix samples, other than those taken under the “Test Section” provisions, in accordance with §402-3.08 and store these samples at the plant.

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- Take density gauge(s) readings over the entire day’s placement in accordance with Materials Procedure (MP) 402-02.
- When this option is selected and if the density readings at two consecutive locations fall below 96% or above 103% of the Interim PTD or if the moving average of the last 10 nuclear density readings falls below 98% of the Interim PTD, stop routine paving operations and wait for the Actual PTD.
- Submit a copy of the appropriate BR form(s) at the end of the first day’s paving to the Engineer as described in Materials Procedure (MP) 402-02. The Engineer will determine whether the density readings taken using the Interim PTD are acceptable, based on the Actual PTD in accordance with Materials Procedure (MP) 402-02. If not, the Engineer will randomly select four core locations over the entire placement under Interim PTD, excluding the test section, and drill cores at the selected locations. Prior to drilling these cores, take density readings at each core location. Deliver the core samples, density gauge readings, and the loose mix samples to the Regional Laboratory in accordance with §402-3.08, *Pavement Density Samples*. If the average density of the pavement cores is not between 92% and 97% of the mixture’s maximum theoretical density, the Engineer will make a payment adjustment in accordance with Table 402-10, *Density Quality Adjustment Factors for 60 Series*, to the material placed on that day and the subsequent days, excluding the material placed on the test section. Otherwise, continue under “*Routine Paving*”.

3. Routine Paving. Use only the density gauge(s) that has been correlated with cores during the construction of the test section and a PTD has been determined by the Regional Materials Engineer for pavement density monitoring during routine paving operations. Construct a new test section under the provisions of “Test Section” to establish a PTD for other gauge(s). Compact the pavement sufficiently to achieve the PTD value at each test location. Take density gauge readings at each location in accordance with Materials Procedure (MP) 402-02. The test locations will be every 200 feet along the length of the pavement for each paver pass randomly selected by the Engineer in accordance with Materials Procedure (MP) 402-02. Record these density values on the appropriate BR form based on the type of gauge used. The minimum acceptable density reading is 96% and no greater than 103% of the PTD at a single test location and 98% of the PTD calculated as a moving average of the last 10 test locations.

If density gauge readings over two consecutive locations fall below 96% or above 103% of the PTD or if the moving average of the last 10 density gauge readings falls below 98% of the PTD, stop routine paving operations and construct a new test section in accordance with requirements of “*Option 1- Test Section Only*.”

Placement and compaction on shoulders, ramps, maintenance widenings and crossovers, and bridges will be deemed satisfactory by the Engineer when the procedures used in these areas obtain pavement density similar to that obtained on the mainline pavement sections. Monitor and record the density of the above referenced areas with the same density gauge to insure the PTD is achieved. If the shoulder subbase is structurally insufficient to sustain the level of compaction such that the shoulder shows signs of distress, decrease the compaction effort until no damage occurs to the shoulder or subbase.

In addition to the daily density monitoring with a gauge, additional set(s) of pavement cores and loose mix samples are required for pavement density verification at the frequency specified in Table 402-5, *Additional Pavement Samples*. The frequency is based on the days of mainline HMA placement. Take density samples from the same day’s placement. The Engineer will select the day of coring and will notify the Contractor 24 hrs prior to the day of coring. When notified, take these samples in accordance with §402-3.08, *Pavement Density Samples*. Before drilling the cores, take density gauge readings and record on the appropriate forms based on the type of gauge used. Deliver all the samples and the density gauge readings to the Regional Materials Engineer for testing.

TABLE 402-5 ADDITIONAL PAVEMENT SAMPLES

HMA Placement Days	Set of Pavement Samples
2 or Less	None
3 – 5	One Set
More than 5	Two Sets

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Based on the additional Pavement Samples, the Regional Materials Engineer will establish a new PTD if different from the original PTD. The Engineer shall evaluate core density results using Table 402-10, *Density Quality Adjustment Factors for 60 Series*, and make payment adjustment, if necessary. When a contract includes multiple sites, the requirement under Table 402-05 applies to each paving site.

The Engineer may request pavement samples in accordance with §402-3.08, *Pavement Density Samples*, for density verification from HMA placed under the following situations:

- Insufficient number of density readings recorded, either at a specific location or at the required frequency.
- Paving completed after the only correlated density gauge on site breaks down.
- Gauge readings do not seem to accurately represent the HMA density.
- When the plant production QAF is 0.85 and need to evaluate the pavement section in accordance with §401-4.03, *Evaluation of Sublots Represented by 0.85 QAF*, whether to keep it in place.

When pavement samples are requested for the above situation(s), the Engineer will randomly select core locations. Take cores and density gauge readings at each core location in accordance with §402-3.08, *Pavement Density Samples*, and deliver them to the Regional Materials Laboratory. The Regional Materials Engineer may establish a new PTD based on these cores. The material placed under the above situations will be subject to a payment adjustment in accordance with Table 402-10.

The Engineer may also request additional pavement samples to verify PTD used on the project for the situations listed below and the material placed under these situations will not be subject to payment adjustment:

- Changes in condition of existing pavement being overlaid.
- Excessive plant mix variations.
- Using a different Job Mix Formula or a different HMA plant other than the one used to produce mix for the Test Section, as long as the aggregate and PG Binder sources do not change.

- 4. Multiple Paving Sites.** When a project includes multiple paving sites, a test section will be constructed at the initial paving site to establish a PTD. For the rest of the paving sites, the Engineer will require pavement cores, loose mix samples, and gauge readings on the first day to verify PTD unless it is specified in the contract documents to construct a test section.

A test section may be requested by the Engineer when a different HMA plant other than the one used at previous site(s) is supplying the mixture using different aggregate and PG Binder sources. The provisions of 1.5 test section incentive shall apply.

- C. 70 Series Compaction Method.** On the first day of paving, construct a test section on the project site at a location approved by the Engineer using the same equipment and procedures to be used in the construction of the remainder of the course being laid. HMA placement under this method, including the construction of the test section, will not be allowed unless both a density gauge and a certified operator are present. The test section is for determining the Project Target Density (PTD) using the “peak” method. Routine paving operations may begin immediately following the construction of the test section once a PTD has been established by the Engineer based on the evaluation of density readings in accordance with the provisions of “Test Section” below.

- 1. Test Section.** To establish a PTD prior to routine paving, construct a test section of at least 300 linear feet on the mainline which has the same depth specified for the construction of the course it represents. The maximum length is 1,500 linear feet. Use the first 150 feet of the test section to stabilize the paving operation. Use the remainder of the test section length to determine the Project Target Density (PTD). Initially, compact the pavement with a breakdown roller once sufficient HMA is placed in the testable area. Make four vibratory passes or as recommended by the Engineer. If non-vibratory compaction is specified in the contract documents, make four static passes. The Engineer will select three random locations in accordance with Materials Procedure (MP) 402-02 based on the type of density gauge used and mark these sites so that subsequent density testing can be performed at the same locations. Use either the intermediate

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or the finish roller for further rolling the test section. Take density readings at the three selected sites after every additional machine pass until the increase in density is less than 2 lbs/ft³, or until the Engineer stops further compaction because the pavement shows signs of distress.

The Engineer will determine PTD by calculating the average of the highest density reading from each of the random locations. Use the resulting PTD to monitor the pavement density for the project.

- 2. **Routine Paving.** Use only density gauge(s) that is correlated during the construction of the test section and the PTD determined by the Engineer to monitor pavement density during routine paving operations. Construct a new test section under the provisions of "Test Section" to establish a PTD for other gauge(s).

Begin routine paving immediately after the PTD has been established. Compact the pavement sufficiently to achieve the PTD value at each test location. The minimum acceptable density reading will be 96% or maximum of 103% of the PTD in a single test location and 98% of the PTD calculated as a moving average of the last 10 test locations as determined by a density gauge. Take density gauge readings at each location, randomly selected by the Engineer, in accordance with the Materials Procedure (MP) 402-02, approximately every 200 feet along the length of the pavement for each pass of the paver. Record these values on the appropriate BR form based on the type of gauge used.

If density gauge readings over two consecutive locations fall below 96% or above 103% of the PTD or if the moving average of the last 10 density gauge readings falls below 98% of the PTD, stop routine paving operations and immediately construct a new test section in accordance with requirements of the Test Section.

Placement and compaction on shoulders, ramps, maintenance widenings and crossovers, and bridges will be deemed satisfactory by the Engineer when the procedures used in these areas obtain pavement density similar to that obtained on the mainline pavement sections. Monitor the density of areas with the same density gauge to insure the PTD is achieved. If the shoulder subbase is structurally insufficient to sustain the level of compaction such that they show signs of distress, decrease the compaction effort until no damage occurs to the shoulder or subbase.

- D. **80 Series Compaction Method.** Use one of the compaction options listed below for this method. The rollers used for compaction of the HMA mixtures under this method must be on the Department's Approved List for Rollers.

The number of passes listed in Table 402-6, *Number of Passes*, are recommended and may be increased or decreased by the Engineer to obtain adequate density. One vibratory pass is defined as one movement of a single drum of the roller over the pavement section in each direction. One static pass is defined as one movement of the roller over the pavement in each direction. Complete all breakdown roller passes before the mat temperature falls below 250°F. Remove all ruts, ridges, roller marks, or other irregularities from the surface using static rolling. All turning of the rollers must be performed on material which has had a minimum of one roller pass. The Engineer may approve alternate compaction procedures for areas where the specified procedures are not practical.

TABLE 402-6 NUMBER OF PASSES¹

Pavement Courses	Option 1 Three Roller Train (Static)		Option 2 Vibratory Rollers	
	Steel Wheel Rollers	Pneumatic Roller	Vibratory Passes	Static Passes
37.5 Base (Each Lift)	8	3	6	4
25.0 Binder	8	3	6	4
19.0 Binder	6	3	4	2
12.5 Top	6	3	4	2
9.5 Top	4	3	4	2
Permeable Base ²	-	-	-	2

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1. Based on 12-foot lane width.
2. For the Permeable Base course, the mixture shall be compacted between 140°F and 230°F. Up to 2 additional passes may be required to obtain adequate density.

1. **Option 1 - Static Compaction.** Use this option only when the compacted thickness of the finished mat is 4 inches or less. The roller speeds shall not exceed 3 mph and will move at a uniform speed. The roller drive wheel or drum shall be nearest to the paver. When paving multiple lanes simultaneously, increase the required number of rollers proportionately for each additional full lane width unless otherwise approved by the Engineer. Under this option, compact the HMA mixtures with steel-wheel rollers operating in a static mode. Each pass shall overlap the previous roller pass by one-half the width of the roller.

Initially, compact the HMA with a steel-wheel roller immediately followed with a pneumatic rubber-tired roller. A minimum of 3 passes of the rubber-tired roller will be required. One pass is defined as one movement of the roller over any point of the pavement in either direction.

Use a steel-wheel roller for finish rolling the HMA to remove all shallow ruts, ridges, roller marks, and other irregularities from the surface.

When the compaction procedure fails to produce acceptable results, adjust the procedure to obtain the desired results.

2. **Option 2 - Vibratory Compaction.** Furnish a vibrating reed tachometer for the exclusive use of the Engineer. The vibrating reed tachometer must have a frequency range of 1,000 to 4,000 vpm with a minimum reed interval of 50 vpm between 1,000 and 4,000 and a minimum reed interval of 100 vpm between 2,000 vpm and 4,000 vpm.

Operate the vibratory rollers at a uniform speed not to exceed 2 ½ mph (220 ft per minute) on all pavement courses. If satisfactory compaction is not obtained, or damage occurs to highway components and/or adjacent property using vibratory compaction equipment, immediately cease using this equipment and proceed with the work in accordance with compaction procedures stipulated under Option 1 at no additional cost to the State.

E. Density Gauges

1. **Nuclear Density Gauge.** Use a nuclear density gauge to monitor the pavement density in accordance with this sub-section and Materials Procedure (MP) 402-03. Submit a Safety Control plan at least two weeks prior to using the gauge. The nuclear density gauge shall meet the following requirements:
 - The gauge shall consist of a radioactive source, scaler, and other basic components housed in a single backscatter unit.
 - The gauge must be calibrated at least every two years.
 - Must be operated by personnel trained in the principles of nuclear testing and safety practices.
2. **Non-nuclear Density Gauge.** Use a non-nuclear density gauge to monitor the pavement density in accordance with this sub-section. The non-nuclear density gauge shall meet the following requirements:
 - Must be capable of functioning in the temperature and moisture levels experienced during HMA paving.
 - Shall contain the internal circuitry to determine the density of HMA pavements by measuring changes in the electromagnetic field resulting from the HMA compaction process.
 - The gauge must be calibrated at least every two years.

402-3.08 Pavement Density Samples

- A. **Pavement Cores.** The Engineer will select one pavement core location for each subplot in accordance with Materials Procedure MP 402-02, *Hot Mix Asphalt (HMA) Statistical Pavement Density Determination*, to represent each paving subplot. The Engineer will select a total of four 6-inch diameter core locations. The pavement core samples will be taken from within the 6-inch diameter circles outlined. Under no circumstances

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will the Engineer designate the coring locations before the rolling operation is completed. The rolling operation is completed when all compaction equipment has moved off the subplot designated for coring. Obtain the 6-inch diameter pavement core samples no later than a day following placement of the lot. If necessary, cool the pavement so that the core samples are not damaged during coring. If the core sample does not de-bond during coring, do not intentionally separate the pavement core from the underlying material. The Regional Materials Laboratory will separate the pavement core layer required for testing from the underlying material by sawing, if necessary.

Extraction of companion cores is not allowed. Additional cores may be taken under the following:

- As described in §402-3.08 G, *Dispute Resolution*,
- If it is necessary to establish an interim target density on the first day of paving. In that case, take a core at no more than two core locations during the construction of a test section or two cores within the first 150 feet when a test section is not constructed
- To perform a quality control tests during routine paving. A maximum of two cores is allowed with prior permission of the Engineer. Core(s) shall not be adjacent to the project cores.

B. Filling Core Holes. Backfill all core holes with a similar HMA material immediately after extracting the cores or before opening the lane to traffic. Prior to backfilling, wipe the core hole with a cloth to remove any standing water. Place HMA in the core hole in layers of 3 inches or less and compact each layer with 10-18 lb slide hammer with a diameter of at least 4 inches but less than 6 inches. Use of a shovel or similar method is not allowed. The Engineer may approve alternative method if it will provide acceptable results. If core holes are not filled within 2 business days of placement, the Engineer will stop routine paving until the core holes are filled.

C. Loose Mix Samples. On each paving day when pavement cores are required, take four loose mix samples in accordance with AASHTO T168, *Standard Test Method for Sampling Bituminous Paving Mixtures*. Take these samples such that they represent the day's HMA placement. Loose mix maximum theoretical specific gravity values from plant HMA QC/QA testing may be included as part of the required loose mix samples with prior approval of the RME. When HMA placement is less than the anticipated quantities, it is recommended that a minimum of three loose mix samples be obtained before placement is terminated. When operational conditions cause HMA placement to be terminated before the specified number of samples have been taken, the following procedures will be used:

1. If three samples are taken, the loose mix maximum theoretical specific gravity density will be based on the average of the samples taken.
2. When HMA is placed under 50 Series and if only one or two samples are taken, the day's production will be added to the next day's production and sublots determined based on the total quantity placed during the two days. Therefore, a maximum of six loose mix samples will be used to determine the loose mix maximum specific gravity.

D. Securing Cores. The Engineer will secure the cores which will be tested by the Regional Materials Laboratory in accordance with MP 402-02 once they have been extracted from the pavement by the Contractor.

E. Sample Delivery. Deliver the cores, loose mix samples, and gauge density readings, when required, to the Regional Laboratory no later than the end of the following day's placement. Pavement cores and loose mix samples required under 50 Series or 60 Series methods must be submitted together at the end of the day's placement but no later than *a day following placement of the lot*. If these samples are not submitted together for any paving lot, the QAF will be assigned a 1.00 or less for that lot when a QAF is applicable. *If, for any reason, a delay occurs in the delivery of the lot* samples for three consecutive lots, paving operations for the item will not be permitted to continue until the samples are delivered and tested.

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F. Unacceptable Pavement Cores. Cores arriving at the Regional Laboratory for testing that are damaged or with a damaged or missing security seal will not be tested. The Engineer will select new core(s) within a foot from the original core location(s) at the same offset. The provision of selecting new core location also applies to core(s) that get damaged during extraction.

G. Process for Dispute Resolution. The following items may be disputed:

1. When a core(s) is located in the area that is believed not to represent the entire subplot's placement, notify the Engineer immediately.
2. When the test results of the cores and loose mix samples obtained by the Regional Materials Laboratory are in question, notify the Engineer and the Regional Materials Engineer, in writing, within two business days upon receipt of the results. The notification must include details of the dispute such as the specific test result(s) being disputed and the reason. The Main Office Materials Bureau will review the information and advise the Engineer and the Regional Materials Engineer on how to proceed with the resolution.

The dispute resolution must be initiated in a timely manner as described above.

402-3.09 Joints. The finished pavement at all joints must comply with the surface tolerance requirements and exhibit the same uniformity of texture and compaction as other sections of the course. Do not pass rollers over the unprotected edges of a freshly laid mixture unless permitted by the Engineer.

Construct all joints, excluding the tapered wedge joint, such that the exposed edge of the newly placed layer is full thickness of the layer and straight unless the exposed joint will not be part of the joint. If the edge of the newly placed layer is unacceptable to the Engineer, correct the edge by using a power driven saw or other approved tools to cut a neat line. Prior to placing the adjacent layer, apply a light tack coat, in accordance with Section 407, to all pavement edges in order to provide bonding with the newly laid pavement.

Place successive HMA courses over a full depth HMA pavement such that all longitudinal joints are offset no more than 6 inches from the joint of the lower pavement course, unless otherwise approved by the Engineer. Place successive HMA courses on the existing PCC pavement such that all longitudinal joints are stacked on top of the joint of the lower PCC pavement.

A. Transverse. Place the courses as continuously as possible to limit the number of transverse joints. Stagger the transverse joints in adjacent lanes a minimum of 10 feet. Form the transverse joint by cutting back the previous run to expose the full depth of the course.

Set up the paver such that material is laid to overlap the previously placed edge by 2 to 3 inches. The thickness of the overlap material will be approximately one-fourth the compacted thickness of the course. Bump back the overlapped material onto the adjacent hot mat using a rake so that the roller operator can crowd the material into the hot side of the joint resulting in a smooth and well compacted joint after rolling. Broadcasting of the overlap material onto the fresh mat is not allowed. If the overlap is excessive, trim off the excess material so that the material along the joint is uniform. Remove and discard the coarse particles of aggregate in the overlap material if deemed necessary by the Engineer.

Compact the transverse joint in static mode with the roller parallel to the joint and perpendicular to traffic. Place boards of proper thickness at the edge of the pavement for the off pavement movement of the roller. Make the first pass with the roller operating on the previously laid material with 6 to 8 inches of its drum(s) overlapping onto the non-compacted mix. Then make successive passes with the roller drum(s) moving approximately one foot onto the hot material per pass until half the width of the roller is on the hot mat.

If a vibratory roller with pneumatic drive wheels is used, align the first pass with one of the pneumatic wheels directly on the joint and the drum operating in static mode. Then make successive passes with the roller drum moving approximately one foot per pass onto the hot mat until half the width of the roller is on the hot mat.

B. Longitudinal. Ensure that the longitudinal joints in the Top Course will correspond with the edges of the

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proposed traffic lanes. Other joint arrangements will require approval of the Engineer. If a dual-drum vibratory roller is used during construction of a longitudinal joint using either Option 1 or 2, operate the roller in vibratory mode, unless static rolling is required. Rollers must be as close to the paver as practical. Make the first pass with the roller traveling toward the paver and operating on the hot mat with 6 to 8 inches of the roller drum overlapping onto the cold mat. Apply a second pass to the joint as it travels back away from the paver. If a single-drum vibratory roller with pneumatic drive wheels is used, operate the roller in vibratory mode and follow the same procedure except that the roller will be aligned on the joint so that the pneumatic drive wheels travels on the joint. All turning movements of the roller will be done on previously compacted material. After applying two roller passes on the longitudinal joint, proceed with the roller to the low side of the lane and compact as described in §402-3.07, *Compaction*.

For all HMA layers, other than Top Course, place the mixture such that no more than 100 feet of the longitudinal pavement joint is exposed at the end of the working day when traffic is maintained on the roadway during paving operations. For Top Course of 2 inches or less, refer to §402-3.09C, *Exposed Longitudinal Joint*.

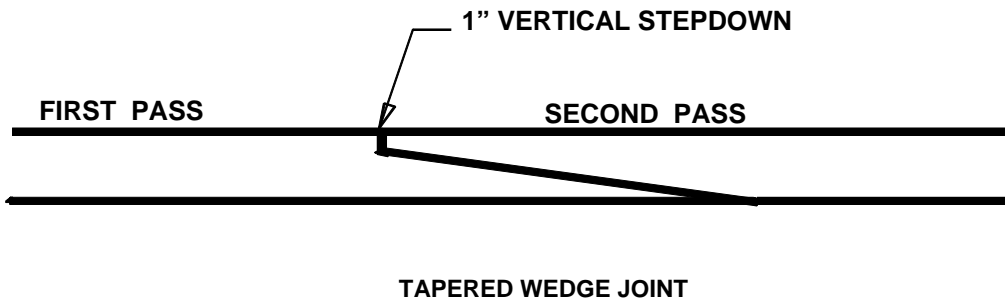
When paving Top Course, select one of the following options to construct the longitudinal joint. Use Option A for all other HMA courses:

1. **Option A - Butt Joint.** Under this option lay the HMA such that it uniformly overlaps the adjacent cold mat 2 to 3 inches. The thickness of the overlap material will be approximately one-fourth the compacted thickness of the course. Bump back the overlapped material onto the adjacent hot lane using a rake so that the roller operator can crowd the material into the hot side of the joint resulting in a smooth and well compacted joint after rolling. Broadcasting of the overlap material onto the fresh mat is not allowed. If the overlap is excessive, trim off the excess material so that the material along the joint is uniform. Remove and discard the coarse particles of aggregate in the overlap material if necessary.

Bumping is not required when the use of a rake is a safety concern, as determined by the Engineer. Instead, place the HMA in a manner such that the thickness of the uncompacted layer is approximately 25% more than the compacted thickness of the adjacent cold HMA layer with a ½ to 1 inch overlap.

2. **Option B - Tapered Wedge Joint.** Use this option when placing Top Course only. Place the HMA mixture for the first mat with an attachment to the paver to provide a sloping wedge with a vertical step-down at the longitudinal pavement joint. Extend a wedge of material from the bottom of the step-down to the existing surface at a slope of 1 on 8 or flatter. Compact the first mat such that the roller compacts up to but does not extend past the step-down. The vertical step-down will be ½ inch minimum after compaction of the mat. Place the second mat such that it uniformly overlaps the adjacent cold mat 1 to 1 ½ inches. The thickness of the overlap material will be approximately one-fourth the compacted thickness of the HMA layer. Bump back the overlapped material onto the adjacent hot lane using a rake so that the roller operator can crowd the material into the hot side of the joint resulting in a smooth and well compacted joint after rolling. Do not broadcast the overlap material onto the lane. If the overlap is excessive, trim off the excess material so that the material along the joint is uniform. Remove and discard the coarse particles of aggregate in the overlap material if deemed necessary by the Engineer.

Bumping is not required when the use of a rake is a safety concern, as determined by the Engineer. Instead, place the HMA in a manner such that the thickness of the uncompacted layer is approximately 25% more than the compacted thickness of the adjacent cold HMA layer with a ½ to 1 inch overlap.



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C. Exposed Longitudinal Joint. The longitudinal joint for the entire day may be exposed to traffic overnight when the HMA placement is Top Course of up to 2 inches. Exposed joints will not be permitted for more than one night, over the weekends, holidays, or when there are other concerns, such as pending wet weather. Leaving exposed joints for any other HMA layers below the Top Course is not allowed. If the exposed joint is left open, the following applies:

1 ON 8 SLOPE OR FLATTER

- Place UNEVEN LANES (W8-11) warning signs posted in advance of the condition, at each ramp, and roadway intersection, and repeated every ½ mile, supplemented with NEXT [X] MILES (W16-4) auxiliary signs to alert drivers of the uneven edge.
- Use Option B, Tapered Wedge Joint, except when the thickness is 1 inch or less where a butt joint is allowed.
- If the exposed longitudinal pavement joint becomes damaged due to rounding of the notched wedge, saw-cut the joint prior to placing the adjacent lane.

402-3.10 Surface Tolerance. Construct each pavement course to a ¼ inch surface tolerance. The Engineer may test the surface with a 16-foot straight edge or string line placed parallel to the centerline of the pavement and with a 10-foot straight edge or string line placed transversely to the centerline of the pavement on any portion of the pavement. Variations exceeding 6 mm will be satisfactorily corrected or the pavement removed and replaced at no additional cost to the State.

402-3.11 Thickness Tolerance. The thickness indicated for each of the various courses of HMA pavement is the nominal thickness. Construct the pavement so that the final compacted thickness is as near to the nominal thickness as is practical, and within the tolerances specified below.

The Engineer may request cores to determine the thickness of the completed pavement layer for final acceptance and payment. Provide work zone traffic control and take cores at no additional cost to the State. Take cores and fill the all core holes in accordance with §402-3.08, *Pavement Density Samples*. The Engineer may use another acceptance method such as yield calculations to determine the final thickness for acceptance and payment.

HMA mixture, placed as a Truing and Leveling course as described in §402-3.05, *Conditioning of Existing Surface*, will not be considered in pavement thickness determinations. The allowable tolerance for HMA specified under a single pay item is as follows:

- ¼ inch or less for a required course whose nominal thickness is 4 inches or less
- ½ inch or less for a course or courses whose nominal thickness is over 4 inches

The tolerance for the total thickness of all HMA mixture courses is as follows:

- ¼ inch or less when the total nominal thickness indicated on the plans is 4 inches or less
- ½ inch or less when the total nominal thickness is over 4 inches but not more than 8 inches
- ⅝ inch or less when the total nominal thickness is more than 8 inches

When the HMA mixture is placed on newly constructed subbase material, an additional tolerance of ¼ inch will be allowed both in the nominal thickness of the course placed directly on the subbase and the total pavement thickness.

No payment will be made for any material placed in excess of the permissible tolerance. Tolerances indicated for the thicknesses of individual layers of multilayer pavements (including composite pavements) are guides which should be met as closely as practical. Tolerance for the total thickness of such pavement is also a guide.

The Regional Director may accept and pay for HMA placed under the following conditions:

- When the individual layer placed does not meet the thickness tolerance but substantially conforms to the plans and specifications, true to line and grade in order to attain a smooth riding pavement.

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- When the total thickness of such pavements is less than the specified thickness including tolerances but substantially conforms to the plans and specifications.
- When the total thickness of such pavements is greater than the specified thickness and the excess thickness is necessary to attain a smooth riding pavement surface.

Payment for excess thickness necessary to achieve a smooth riding surface will be considered only in cases where an existing pavement surface has been resurfaced.

402-3.12 Paver and Equipment Cleaning. Do not clean tools and equipment used for HMA placement on the pavement surface, or near streams, ponds, drainage structures or other areas that are tributaries to waterways. Use an area approved by the Engineer for cleaning all paving equipment and tools. If possible, remove solid pieces of asphalt by scraping or other mechanical means prior to application of a cleaning agent. If a petroleum product is used for cleaning, contain all liquid products during cleaning operations using tarpaulins, sand pads, pails, or other collection methods to prevent spillage or accidental release. Use hand sprayers or other similar devices to minimize the amount of petroleum product applied. Properly dispose of sand and collected petroleum products as petroleum contaminated soil at no additional cost to the State.

402-3.13 Shoulder Edge Wedge. When specified, construct a shoulder edge wedge as detailed in the Contract Documents. Place HMA on the pavement shoulders where the outside edge of Top and Binder Course consist of an angle of 35° or flatter measured from finished grade to the preceding layer surface. Construct the shoulder edge wedge by using a device attached to the screed. Hand work should be minimized. The top of the tapered section shall begin at the end of the shoulder width as specified in contract documents such that the tapered section will be an additional width of material outside of the paved shoulder width. The shoulder edge wedge is optional at locations where guiderails are installed.

402-4 METHOD OF MEASUREMENT. Provisions of §401-4 Method of Measurement, apply, including the following:

The HMA will be measured in tons of compacted mixture. Quality payment adjustments are measured in Quality Units. Quality Units will be determined for each day’s production and placement by using the daily Quality Adjustment Factor (QAF) for plant production, pavement density, longitudinal joint density, pavement smoothness, and the quantity placed.

Quality Units = (Quality Adjustment Factor - 1.00) x HMA Placed (Tons)

Quality Units will be determined for test sections for 50 and 60 Series compaction methods, when applicable, by using a factor of 1.5 for the first 200 tons placed on the test section.

Quality Units = 0.5 x HMA Placed (Tons) (not to exceed 200 tons)

When the pavement density QAF applies, use one of the following methods of measurement in Table 402-7, *Method of Measurement*, corresponding to the item used on the project:

TABLE 402-7 METHOD OF MEASUREMENT

Method Type	Pay Item Number	Description
A=50 series	402.XX5FQR	QAF based on calculated PWL using four cores.
B=60 series	402.XX6FQR	QAF based on average of four core densities.

The quantity of the HMA mixture subject to adjustment will be determined from quantity placed on the mainline and ramps of uniform width longer than 1250 feet. When shoulders and mainline are placed together, the mainline quantity may be determined using typical sections shown in the contract documents.

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The pavement density QAF will not apply to HMA placed on ramps with a uniform full width section less than 1250 feet in length, shoulders, widenings, crossovers, and bridges. Payment in these areas will be a QAF of 1.00 based on satisfactory placement and compaction.

When a QAF of a paving lot for 50 Series or 60 Series is calculated to be 0.60, the lot will be evaluated by the RME to determine if it can be left in place. The type of material produced (i.e. Binder, Top), the layer in which it is used, and the location of use (i.e., mainline or a non-critical area) will be primary considerations in the determination of whether the HMA can be left in place. If the RME determines that the HMA can be left in place, the Engineer will apply a QAF of 0.60. If the HMA cannot be left in place, remove and replace at no cost to the State.

- A. 50 Series Method.** The RME will determine the paving lot's Percent Within Limits (PWL) in accordance with MP 402-02 and determine the density QAF as shown in Table 402-8, *Quality Payment Schedule for 50 Series*. The Engineer will use the QAF to calculate the Quality Units for the accepted HMA quantity.

TABLE 402-8 QUALITY PAYMENT SCHEDULE FOR 50 SERIES

Percent Within Limits (PWL)	Quality Adjustment Factor (QAF)
$PWL_{92-97} > 93$	1.05
$PWL_{92-97} \leq 93$	$\sum (PWL_{Segment} \times Pay\ Factor_{Segment})^1$

1. $PWL_{Segment}$ will be calculated for each of the nine density ranges in Table 402-9, *Density Segment Pay Factors*, using the standard deviation and average density for the lot.

TABLE 402-9 DENSITY SEGMENT PAY FACTORS

Density Segment	Segment Pay Factor
88 – 89	0.60
89 – 90	0.70
90 – 91	0.80
91 – 92	0.90
92 – 93	1.00
93 – 96	1.05
96 – 97	1.00
97 – 98	0.90
98 – 99	0.80

- B. 60 Series Method.** When pavement density samples are taken and if payment adjustment is applicable, the Engineer will make the adjustment in accordance with Table 402-10, *Density Quality Adjustment Factors for 60 Series*. The Engineer shall make full payment when the average density of the four cores is between 92% and 97% of the mixture's average daily maximum theoretical density. If the average density fails to meet this limit, a payment adjustment will be made, based on Index Price, to all the material placed on the mainline for the day the cores represent, excluding the material placed on the test section.

TABLE 402-10 DENSITY QUALITY ADJUSTMENT FACTORS FOR 60 SERIES

Average Core Density	Quality Adjustment Factor
≤ 92 Density ≤ 97	1.00
$91.0 \leq$ Density < 92.0 or $97.0 <$ Density ≤ 98.0	0.95
$90.0 \leq$ Density < 91.0	0.90
$88.0 \leq$ Density < 90.0	0.85
Density < 88.0 or Density > 98.0	0.60

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402-5 BASIS OF PAYMENT. The unit price bid for all pavement courses shall include the cost of all material, labor and equipment necessary to complete the work, including obtaining the pavement cores, filling and compaction of all core holes. Quality Units may apply to the hot mix asphalt items as calculated in §402-4. Payment of Quality Units will be made based on the Index Price listed in the contract documents. The Index Price shown in the itemized proposal for each Quality Unit is considered the price bid. The unit (index) price is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figure will be disregarded and the original price will be used to determine the total amount bid for the Contract.

Payment will be made under:

Item No.	Item	Pay Unit
402.010902	Type 1 F9, Asphalt-Treated Permeable Base Course	Ton
402.010912	Plant Production Quality Adjustment to 402.010902	Quality Unit
402.011902	Type 2 F9, Asphalt-Treated Permeable Base Course	Ton
402.011912	Plant Production Quality Adjustment to 402.011902	Quality Unit
402.017902	True & Leveling F9, Superpave HMA, 70 Series Compaction	Ton
402.017912	Plant Production Quality Adjustment to 402.017902	Quality Unit
402.018902	True & Leveling F9, Superpave HMA, 80 Series Compaction	Ton
402.018912	Plant Production Quality Adjustment to 402.018902	Quality Unit
402.058902	Shim Course F9, Hot Mix Asphalt	Ton
402.058912	Plant Production Quality Adjustment to 402.058902	Quality Unit
402.095102	9.5 F1 Top Course HMA, 50 Series Compaction	Ton
402.095112	Plant Production Quality Adjustment to 402.095102	Quality Unit
402.095122	Pavement Density Quality Adjustment to 402.095102	Quality Unit
402.095152	Test Section Adjustment to 402.095102	Quality Unit
402.095202	9.5 F2 Top Course HMA, 50 Series Compaction	Ton
402.095212	Plant Production Quality Adjustment to 402.095202	Quality Unit
402.095222	Pavement Density Quality Adjustment to 402.095202	Quality Unit
402.095252	Test Section Adjustment to 402.095202	Quality Unit
402.096102	9.5 F1 Top Course HMA, 60 Series Compaction	Ton
402.096112	Plant Production Quality Adjustment to 402.096102	Quality Unit
402.096122	Pavement Density Quality Adjustment to 402.096102	Quality Unit
402.096152	Test Section Adjustment to 402.096102	Quality Unit
402.096202	9.5 F2 Top Course HMA, 60 Series Compaction	Ton
402.096212	Plant Production Quality Adjustment to 402.096202	Quality Unit
402.096222	Pavement Density Quality Adjustment to 402.096202	Quality Unit
402.096252	Test Section Adjustment to 402.096202	Quality Unit
402.096302	9.5 F3 Top Course HMA, 60 Series Compaction	Ton
402.096312	Plant Production Quality Adjustment to 402.096302	Quality Unit
402.096322	Pavement Density Quality Adjustment to 402.096302	Quality Unit
402.096352	Test Section Adjustment to 402.096302	Quality Unit
402.097102	9.5 F1 Top Course HMA, 70 Series Compaction	Ton
402.097112	Plant Production Quality Adjustment to 402.097102	Quality Unit
402.097202	9.5 F2 Top Course HMA, 70 Series Compaction	Ton
402.097212	Plant Production Quality Adjustment to 402.097202	Quality Unit
402.097302	9.5 F3 Top Course HMA, 70 Series Compaction	Ton
402.097312	Plant Production Quality Adjustment to 402.097302	Quality Unit
402.098102	9.5 F1 Top Course HMA, 80 Series Compaction	Ton
402.098112	Plant Production Quality Adjustment to 402.098102	Quality Unit
402.098202	9.5 F2 Top Course HMA, 80 Series Compaction	Ton
402.098212	Plant Production Quality Adjustment to 402.098202	Quality Unit
402.098302	9.5 F3 Top Course HMA, 80 Series Compaction	Ton

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402.098312	Plant Production Quality Adjustment to 402.098302	Quality Unit
402.098902	9.5 F9 Top Course HMA, Shoulder Course, 80 Series Compaction	Ton
402.098912	Plant Production Quality Adjustment to 402.098902	Quality Unit
402.125102	12.5 F1 Top Course HMA, 50 Series Compaction	Ton
402.125112	Plant Production Quality Adjustment to 402.125102	Quality Unit
402.125122	Pavement Density Quality Adjustment to 402.125102	Quality Unit
402.125152	Test Section Adjustment to 402.125102	Quality Unit
402.125202	12.5 F2 Top Course HMA, 50 Series Compaction	Ton
402.125212	Plant Production Quality Adjustment to 402.125202	Quality Unit
402.125222	Pavement Density Quality Adjustment to 402.125202	Quality Unit
402.125252	Test Section Adjustment to 402.125202	Quality Unit
402.126102	12.5 F1 Top Course HMA, 60 Series Compaction	Ton
402.126112	Plant Production Quality Adjustment to 402.126102	Quality Unit
402.126122	Pavement Density Quality Adjustment to 402.126102	Quality Unit
402.126152	Test Section Adjustment to 402.126102	Quality Unit
402.126202	12.5 F2 Top Course HMA, 60 Series Compaction	Ton
402.126212	Plant Production Quality Adjustment to 402.126202	Quality Unit
402.126222	Pavement Density Quality Adjustment to 402.126202	Quality Unit
402.126252	Test Section Adjustment to 402.126202	Quality Unit
402.126302	12.5 F3 Top Course HMA, 60 Series Compaction	Ton
402.126312	Plant Production Quality Adjustment to 402.126302	Quality Unit
402.126322	Pavement Density Quality Adjustment to 402.126302	Quality Unit
402.126352	Test Section Adjustment to 402.126302	Quality Unit
402.127102	12.5 F1 Top Course HMA, 70 Series Compaction	Ton
402.127112	Plant Production Quality Adjustment to 402.127102	Quality Unit
402.127202	12.5 F2 Top Course HMA, 70 Series Compaction	Ton
402.127212	Plant Production Quality Adjustment to 402.127202	Quality Unit
402.127302	12.5 F3 Top Course HMA, 70 Series Compaction	Ton
402.127312	Plant Production Quality Adjustment to 402.127302	Quality Unit
402.128102	12.5 F1 Top Course HMA, 80 Series Compaction	Ton
402.128112	Plant Production Quality Adjustment to 402.128102	Quality Unit
402.128202	12.5 F2 Top Course HMA, 80 Series Compaction	Ton
402.128212	Plant Production Quality Adjustment to 402.128202	Quality Unit
402.128302	12.5 F3 Top Course HMA, 80 Series Compaction	Ton
402.128312	Plant Production Quality Adjustment to 402.128302	Quality Unit
402.128902	12.5 F9 Top Course HMA, Shoulder Course, 80 Series Compaction	Ton
402.128912	Plant Production Quality Adjustment to 402.128902	Quality Unit
402.195902	19 F9 Binder Course HMA, 50 Series Compaction	Ton
402.195912	Plant Production Quality Adjustment to 402.195902	Quality Unit
402.195922	Pavement Density Quality Adjustment to 402.195902	Quality Unit
402.195952	Test Section Adjustment to 402.195902	Quality Unit
402.196902	19 F9 Binder Course HMA, 60 Series Compaction	Ton
402.196912	Plant Production Quality Adjustment to 402.196902	Quality Unit
402.196922	Pavement Density Quality Adjustment to 402.196902	Quality Unit
402.196952	Test Section Adjustment to 402.196902	Quality Unit
402.197902	19 F9 Binder Course HMA, 70 Series Compaction	Ton
402.197912	Plant Production Quality Adjustment to 402.197902	Quality Unit
402.198902	19 F9 Binder Course HMA, 80 Series Compaction	Ton
402.198912	Plant Production Quality Adjustment to 402.198902	Quality Unit
402.255902	25 F9 Binder Course HMA, 50 Series Compaction	Ton
402.255912	Plant Production Quality Adjustment to 402.255902	Quality Unit
402.255922	Pavement Density Quality Adjustment to 402.255902	Quality Unit

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402.255952	Test Section Adjustment to 402.255902	Quality Unit
402.256902	25 F9 Binder Course HMA, 60 Series Compaction	Ton
402.256912	Plant Production Quality Adjustment to 402.256902	Quality Unit
402.256922	Pavement Density Quality Adjustment to 402.256902	Quality Unit
402.256952	Test Section Adjustment to 402.256902	Quality Unit
402.257902	25 F9 Binder Course HMA, 70 Series Compaction	Ton
402.257912	Plant Production Quality Adjustment to 402.257902	Quality Unit
402.258902	25 F9 Binder Course HMA, 80 Series Compaction	Ton
402.258912	Plant Production Quality Adjustment to 402.258902	Quality Unit
402.376902	37.5 F9 Base Course HMA, 60 Series Compaction	Ton
402.376922	Pavement Density Quality Adjustment to 402.376902	Quality Unit
402.376912	Plant Production Quality Adjustment to 402.376902	Quality Unit
402.376952	Test Section Adjustment to 402.376902	Quality Unit
402.377902	37.5 F9 Base Course HMA, 70 Series Compaction	Ton
402.377912	Plant Production Quality Adjustment to 402.377902	Quality Unit
402.378902	37.5 F9 Base Course HMA, 80 Series Compaction	Ton
402.378912	Plant Production Quality Adjustment to 402.378902	Quality Unit

Mix Type – XX	Compaction Series - Y	Friction - Z	Quality Adjustment - Q
9.5 Top - 09	50 series - 5	F1 - 1	HMA Item - 0
12.5 Top - 12	60 Series - 6	F2 - 2	Plant – 1
19.0 Binder - 19	70 Series - 7	F3 - 3	Density – 2
25.0 Binder - 25	80 Series - 8	F9 - 9	Test Section – 5
37.5 Base - 37			

BLANKET VARIANCES

Copies of Blanket Variances are available in PDF format on the NYSDOT website at the following address - <https://www.nysdot.gov/divisions/engineering/environmental-analysis/manuals-and-guidance/epm/repository/13f.pdf>

The following regulatory Applicable Variances (AVs) and Blanket Variances (BVs) are disapproved:

AV 86	AV 106	AV 120	BV 3R1	BV 6R1	BV 9	BV 12
AV 87	AV 108	BV 1	BV 4	BV 7	BV 10	
AV 89	AV 119	BV 2	BV 5	BV 8	BV 11	

The following regulatory Blanket Variance (BV) is approved:

BV 14

A complete set of Blanket Variances is also contained in an appendix of the Environmental Procedures Manual. Copies of the complete Environmental Procedures Manual are available from NYSDOT Plan Sales Office at (518) 457-2124.

“GENERATOR KNOWLEDGE” FOR DISPOSAL OF TREATED WOOD

The U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (NYSDEC) technique for evaluating whether a material is hazardous for toxicity is the Toxicity Characteristic Leaching Procedure (TCLP). TCLP testing of pentachlorophenol (“penta”) and creosote treated wood by the Electric Power Research Institute, Association of American Railroads, and others has conclusively demonstrated that treated wood products are not a hazardous waste. Under EPA’s and NYSDEC’s rules, such “generator knowledge” can be utilized in place of testing to determine that a waste is not hazardous. This information can be used as evidence that treated wood products can be disposed as non-hazardous waste, based on generator knowledge, in lieu of physical testing.

Generator knowledge information, obtained from the American Wood Preservers Institute (AWPI) can be viewed at their web site located at www.awpi.org. AWPI’s information comes from studies conducted by the Electric Power Research Institute (EPRI), the Washington Public Ports Association (WPPA), and the Association of American Railroads (AAR). EPRI test results are for both penta-treated and creosote-treated wood. WPPA and AAR test results are for creosote-treated wood.

NOTE: Arsenically-treated (*e.g.*, chromated copper arsenate [CCA]) wood products disposed by the end user are exempt from classification as a federal hazardous waste regardless of the TCLP results for specified constituents from any individual sample. Also, wood products treated with preservatives that contain no TCLP constituents (*e.g.*, Kodiak Preserved Wood containing Copper Dimethyldithiocarbamate) are not hazardous waste.

Additional questions regarding generator knowledge can be directed to the Hazardous Waste/ Groundwater Section of the Environmental Analysis Bureau at (518) 457-5672.

HMA WITH CRUSHED GLASS

SCOPE. This specification covers the requirements for the addition of crushed glass to hot mix asphalt mixtures. The provisions of Section 402 - Hot Mix Asphalt (HMA) Pavements applies except that the Contractor has the option of blending of the crushed glass in the following mixes:

- 1 1/2 inch Nominal Max. Size
- 1 inch Nominal Max. Size
- 3/4 inch Nominal Max. Size
- Truing and Leveling Course

If the Contractor chooses the crushed glass option, the following modifications to the Standard Specifications shall apply:

MATERIAL REQUIREMENTS

Crushed glass shall be subject to the approval of the Regional Materials Engineer prior to its use. The crushed glass shall contain no more than 1% (by weight) contaminants and shall meet the following gradation:

Sieve Size	Percent Passing
3/8 inch	100
1/4 inch	90 - 100
No. 30	0 - 20

Note: The gradation requirements may be modified upon approval by the Regional Materials Engineer.

Crushed glass may be included in the mixture up to 5%, maximum, of the total aggregate weight. The crushed glass, aggregate, and Performance-Graded Binder (PGB) shall meet the requirements specified in the Standard Specification §401-2.01 Hot Mix Asphalt Designs and §401-2.04 Performance-Graded Binder.

CONSTRUCTION DETAILS

The crushed glass shall be proportioned from a separate feed bin approved by the Regional Materials Engineer. In addition, all requirements pertaining to aggregate shall apply to crushed glass including the equipment requirements for automatic proportioning and recording as stipulated for aggregate in §401-3.08.

METHOD OF MEASUREMENT. The provisions of §401-4 and §402-4, Method of Measurement, shall apply.

BASIS OF PAYMENT. The provisions of §402-5, Basis of Payment, shall apply.

EXTERNALLY STABILIZED CUT STRUCTURES

Make the following changes to the Standard Specifications dated May 1, 2008:

Delete Section 552- Support and Protection Systems entirely and **Add** the following:

SECTION 552 – EXTERNALLY STABILIZED CUT STRUCTURES

552-1 DESCRIPTION

552-1.01 Permanent Sheeting. Under this work, the Contractor shall furnish and install permanent sheeting of the type, at the locations and to the elevation(s) shown in the contract documents or as directed by the Engineer.

All the sheeting and supports will be left in place as a finished structure unless removal of waling and bracing is called for in the contract documents.

552-1.02 Temporary Sheeting. Under this work, the Contractor shall furnish, install, maintain and remove temporary sheeting of the type, at the locations and to the elevation(s) shown in the contract documents or as directed by the Engineer. It may be left in place only with the written permission of the Engineer.

552-1.03 Interim Sheeting. Under this work, the Contractor shall furnish, install, maintain, cut off and remove sheeting of the type, at the locations and to the elevation(s) shown in the contract documents or as directed by the Engineer.

The interim sheeting shall be cut off and removed only to the elevation shown in the contract documents. The remaining material shall be left in place.

552-1.04 Excavation Protection System. Under this work, the Contractor shall design, furnish, place, maintain and remove an excavation protection system (EPS) at locations shown in the contract documents or as directed, in writing, by the Engineer. Details of the EPS must conform to the requirements of 29 CFR 1926 and installation shall be in accordance with the State and Federal Safety Codes. A sloping (layback) option will not be allowed.

Sheeting, shoring, a shield system, i.e. trench box or trench shield or other pre-engineered protective system may be used to prevent cave-ins. The requirements of any protective system shall be as contained in 29 CFR 1926. It may be left in place only with the written permission of the Engineer.

552-1.05 Soldier Pile and Lagging Wall. Under this work, the Contractor shall furnish and place a soldier pile and lagging wall in accordance with the contract documents; cut off walls located within the roadway limits to the elevation shown in the contract documents and leave the remainder in place unless removal is granted, in writing, by the Engineer; completely remove walls outside the roadway limits if noted on the plans; and dispose of removed material.

552-1.06 Alternate Design. The Contractor may submit to the Department a construction alternate other than that presented in the contract documents as a Value Engineering Change Proposal. Slope lay back will not be allowed. A simple material substitution involving a sheeting section modulus or soldier pile designation greater than that shown in the contract documents will be considered for acceptance. However, all proposed changes to details shown in the contract documents must be approved,

EXTERNALLY STABILIZED CUT STRUCTURES

in writing, by the Deputy Chief Engineer for Technical Services.

Any geotechnical analysis for a flexible support system shall be done in accordance with the procedures contained in the geotechnical design procedure “*Geotechnical Design Procedure for Flexible Wall Systems*”.

552-2 MATERIALS

552-2.01 Permanent Sheeting

A. Permanent Timber Sheeting. Permanent timber sheeting shall be new and unused and consist of any acceptable species which can be placed satisfactorily in accordance with the requirements of §712-14 *Stress Graded Timber and Lumber*. Timber sheeting shall be treated in accordance with §708-31 *Wood Preservative - Waterborne* and applied in conformance with American Wood Preservers Association (AWPA) Use Category Designation UC4B. The timbers shall meet or exceed the actual cross section or stress grade shown in the contract documents. The timbers shall be sound and free from any defects which might impair its strength or tightness. The materials shall include all necessary waling and bracing required.

B. Permanent Steel Sheeting. Steel sheeting shall be new and unused conforming to the provisions of §715-17 *Steel Sheeting*. Waling and bracing shall be new and unused conforming to the provisions of §715-01 *Structural Steel*. Stock steel may be used.

552-2.02 Temporary Sheeting

A. Temporary Timber Sheeting. Temporary timber sheeting shall consist of any acceptable species which can be placed satisfactorily in accordance with the requirements of §712-14 *Stress Graded Timber and Lumber*.

Temporary timber sheeting may consist of new or used, treated or untreated material but must be in satisfactory condition and suitable for the intended use. The Engineer will reject unsatisfactory used materials.

B. Temporary Steel Sheeting. The steel sheeting, waling and bracing may consist of new or used material but must be in satisfactory condition and suitable for the intended use. The materials shall include all necessary waling and bracing required. The Engineer will reject unsatisfactory used materials.

552-2.03 Interim Sheeting

A. Interim Timber Sheeting. Interim timber sheeting may consist of new or used, treated or untreated material but shall be in satisfactory condition and suitable for the intended use. The Engineer will reject unsatisfactory used materials.

B. Interim Steel Sheeting. The steel sheeting, waling and bracing may consist of new or used material but must be in satisfactory condition and suitable for the intended use. The materials shall include all necessary waling and bracing required. The Engineer will reject unsatisfactory used

EXTERNALLY STABILIZED CUT STRUCTURES

materials.

552-2.04 Excavation Protection System. The selection of EPS materials shall be the Contractor's option. The Engineer will reject unsatisfactory materials.

552-2.05 Soldier Pile and Lagging Wall.

A. Soldier Pile. Soldier piles shall be as shown on the contract documents and conform to the requirements of §715-18 *Soldier Piles*. Waling and bracing shall be as shown in the contract documents and conform to the requirements of §715-01 *Structural Steel*. Each pile shall consist of one continuous steel section. No pile splices will be allowed unless approved, in writing, by the Deputy Chief Engineer for Technical Services.

Used material is permitted for temporary walls unless otherwise noted on the plans, provided the material is in conformance with the specification and is acceptable to the Engineer.

B. Lagging. Lagging type(s) shall be as shown in the contract documents:

1. Treated Wood. Treated wood shall meet or exceed the full dimension thickness shown in the contract documents and graded for an extreme fiber stress of at least 1000 psi conforming to the material requirements of §712-14 *Stress Graded Timber and Lumber*. Timbers shall be treated in accordance with §708-31 *Wood Preservative - Waterborne*. The treatment shall be applied in conformance with American Wood Preservers Association (AWPA) Use Category Designation UC4B.

2. Untreated Wood. Untreated wood shall be graded for an extreme fiber stress of at least 1000 psi conforming to the provisions of §712-14 *Stress Graded Timber and Lumber* and shall meet or exceed the full dimension thickness shown in the contract documents.

3. Precast Concrete Panels. Precast concrete panels shall conform to the provisions of §704-24 *Precast Concrete Panels*.

4. Steel Sheeting. Steel sheeting shall conform to the provisions of §552-2.01 B. *Permanent Steel Sheeting*.

C. Backfill for Holes. Backfill material shall be as shown in the contract documents:

1. Concrete Backfill. Concrete backfill shall be Class G concrete conforming to the provisions of Section 555 *Structural Concrete*.

2. Grout Backfill. Grout backfill shall be a workable mixture capable of stabilizing the hole being excavated. The Contractor shall use either:

i. Controlled Low Strength Material. Material meeting the requirements for Controlled Low Strength Material as stated in §733-01 *Flowable Fill*.

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ii. Controlled Low Strength Material (No Fly Ash). Material meeting the requirements for Controlled Low Strength Material (No Fly Ash) as stated in §733-01 *Flowable Fill*.

iii. Grout. Cement, concrete sand and water conforming to Table 552-1 *Grout Backfill Requirements*.

TABLE 552-1 GROUT BACKFILL REQUIREMENTS	
Material	Subsection
Portland Cement Type 2	§701-01
Concrete Sand	§703-07
Water	§712-01

552-3 CONSTRUCTION DETAILS

552-3.01 General. The Contractor shall install sheeting having a section modulus not less than that shown in the contract documents. The Contractor shall install soldier piles meeting the size designation shown in the contract documents.

Any material which stops the driving of sheeting or soldier piles within a depth of 10 feet from the ground surface at the time of driving shall be removed by the Contractor. Payment for removal of such material and any backfill required to fill the resulting void will be made under the appropriate pay items. If very compact material or boulders prevent the progression of the sheeting or soldier piles to the design tip elevation at a greater depth, the Contractor shall notify the Engineer.

The Contractor shall perform work in a manner that causes no subsidence of the surrounding ground surface. If subsidence should occur, the Contractor shall cease work and provide a written plan to prevent subsidence for approval by the Engineer. The Contractor shall repair all damage that resulted from the subsidence at no additional cost to the State.

552-3.02 Temporary Sheeting. The Contractor shall install temporary sheeting having a section modulus which meets or exceed that shown in the contract documents.

After its function is no longer required, the Contractor shall remove the sheeting placed under this work, or with the written permission of the Engineer, leave it in place after cutting off the tops at an agreed elevation.

552-3.03 Interim Sheeting. The Contractor shall install interim sheeting having a section modulus which meets or exceed that shown in the contract documents.

The Contractor shall cut off the interim sheeting and remove it to the elevation shown in the contract documents. The remaining material shall be left in place.

552-3.04 Excavation Protection System. The Contractor shall install an Excavation Protection System in accordance with the contract documents.

The EPS installed under this work shall be of sufficient size and strength to meet the requirements of 29 CFR 1926 and the Live Load requirement as contained in the AASHTO Standard Specifications for Highway Bridges. A sloping (layback) option will not be allowed. Prior to use, the Contractor shall

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supply the Engineer with documentation of compliance. The EPS may be left in place only with the written permission of the Engineer.

All damage to the adjacent pavement or ground caused by the use of the chosen EPS (e.g. voids beneath the pavement or shoulder, pavement or shoulder cracking or subsidence, ground settlement) shall be repaired at no additional cost to the State. Severe damage which directly affects the safety of the public shall be immediately repaired. The operation shall be halted until a satisfactory prevention method is instituted.

552-3.05 Soldier Pile and Lagging Wall. The Contractor shall install Soldier Piles meeting the size designation shown in the contract documents either by driving or by placing them in holes as indicated on the plans in accordance with Table 552-2 *Soldier Pile and Lagging Wall Pile Tolerances*. For each pile out of tolerance, provide a satisfactory replacement or provide a modification approved by the Engineer prior to proceeding. No pile splices will be allowed unless approved, in writing, by the Deputy Chief Engineer of the Office of Technical Services.

TABLE 552-2 SOLDIER PILE AND LAGGING WALL PILE TOLERANCES	
Survey Location	Tolerance
Plan	3 inches at the top of pile.
Vertical	Vertical tolerance of 1/8 inch per foot on each axis of the soldier pile shown on the plans. Verify the axis on the top 5 feet of the soldier pile with a straight edge (5 feet minimum length) and a level (4 feet minimum length).

A. Driving Piles. Soldier piles shall be equipped with shoes in conformance with provisions of §551-3.01 C.1.a. *Preparation of Piles, Shoes, Steel Bearing Piles*, and driven in conformance with provisions of §551-3.01 D. *Equipment for Driving Piles*, except that submission of Form BD 138 is not required.

B. Creating Holes for Pile Installation. The Contractor shall provide equipment capable of establishing and maintaining holes of the minimum diameter and to the depth or elevation shown in the contract documents. Temporary sleeves or casings are permitted and may be required as per the plans. Jetting is not permitted.

If the top of socket elevation shown in the contract documents varies by more than 2 feet, the Contractor shall stop work and notify the Engineer. The Engineer will notify the Geotechnical Engineering Bureau and obtain written recommendations prior to allowing the work to proceed.

Upon completion of the hole, the Contractor shall install the soldier pile in accordance with Table 552-2 *Soldier Pile and Lagging Wall Pile Tolerances*.

C. Backfilling. After placing the piles, the Contractor shall backfill holes with the backfill(s) indicated in the contract documents.

1. Concrete Backfill. The Contractor shall place backfill in accordance with the provisions of §555-3.04 *Handling and Placing Concrete* and §555-3.05 *Depositing Structural Concrete Under*

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Water as shown in the contract documents. The Contractor shall allow a minimum curing time of one day before placing any lagging.

2. Grout Backfill. The Contractor shall place backfill in accordance with the provisions of §555-3.04 *Handling and Placing Concrete* and §555-3.05 *Depositing Structural Concrete Under Water*. The Contractor shall allow a minimum curing time of one day before placing any lagging.

D. Lagging. The Contractor shall install horizontal lagging so that the unsupported soil height does not exceed 3 feet at any time. If the method chosen for attaching the lagging to the soldier piles requires reattachment of lagging to the soldier piles due to planned excavation on both sides of the wall, the Contractor shall reattach the lagging at no additional cost to the State.

The Contractor shall fabricate the precast concrete lagging to the shape and size shown in the contract documents.

E. Wall Removal. The Contractor shall cut off soldier piles placed within the roadway limits at the subgrade surface unless otherwise noted in the contract documents. Soldier piles placed outside the roadway limits may be removed or cut off a minimum of 2 feet below final ground surface unless otherwise noted in the contract documents.

If lagging is to be removed, the Contractor shall remove the lagging so that the unsupported soil height does not exceed a maximum of 3 feet at any time. This maximum height may be reduced, based on specific site conditions, in order to prevent collapse and loss of ground.

552-4 METHOD OF MEASUREMENT

552-4.01 General. When the support system is used in stage construction, the quantity of support system will be the maximum number of square feet satisfactorily installed between the payment lines shown in the Contract Documents measured on either, but not both sides, of adjacent construction stages.

552-4.02 Permanent Sheeting. The quantity of sheeting to measure for payment will be the number of square feet, to the nearest square foot, obtained by multiplying the vertical length of sheeting between the payment lines herein described, by the horizontal length of sheeting shown in the contract documents. The vertical length of sheeting is that length measured between the upper and lower payment lines. The upper payment line will be the original ground at the time of commencing work. The lower payment line will be the elevation shown in the contract documents as the minimum embedment depth.

The horizontal length will be measured along a projection of the sheeting on a plane parallel to and midway between the front and rear face of the sheeting wall.

552-4.03 Temporary Sheeting. The quantity of sheeting to measure for payment will be the number of square feet, to the nearest square foot, obtained by multiplying the vertical length of sheeting between the payment lines herein described, by the horizontal length of sheeting shown in the contract documents. The vertical length of sheeting is that length measured between the upper and lower payment lines. The upper payment line will be the original ground at the time of commencing work. The lower payment line will be the elevation shown in the contract documents as the minimum embedment depth.

The horizontal length will be measured along a projection of the sheeting on a plane parallel to and midway between the front and rear face of the sheeting wall.

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552-4.04 Interim Sheeting. The quantity of sheeting to measure for payment will be the number of square feet, to the nearest square foot, obtained by multiplying the vertical length of sheeting between the payment lines herein described, by the horizontal length of sheeting shown in the contract documents. The vertical length of sheeting is that length measured between the upper and lower payment lines. The upper payment line will be the original ground at the time of commencing work. The lower payment line will be the elevation shown in the contract documents as the minimum embedment depth.

The horizontal length will be measured along a projection of the sheeting on a plane parallel to and midway between the front and rear face of the sheeting wall.

552-4.05 Excavation Protection System. The quantity of protection system to measure for payment will be the number of square feet, to the nearest square foot, obtained by multiplying the vertical length between the payment lines herein described, by the horizontal length of EPS shown in the contract documents. The upper payment line will be the ground surface existing at the site prior to the beginning of the work. The lower payment line will be the bottom of the excavation shown on the plans immediately adjacent to the protection system. The horizontal length will be the length of protection system installed measured along the payment lines as shown in the contract documents. Both sides of the excavation will be measured and computed for payment.

552-4.06 Soldier Pile and Lagging Wall.

A. Holes in Earth. The quantity to be measured for payment will be in feet of holes in earth installed. The upper payment limit is the intersected grade or ground line whichever is lower. For holes requiring rock sockets, the lower payment limit is the top of rock. For holes without rock sockets, the lower payment limit is the pile tip elevation.

B. Rock Sockets. The quantity to be measured for payment will be in feet of sockets in rock installed. The upper payment limit is the top of rock as shown on the plans. The lower payment limit is the pile tip elevation.

C. Soldier Piles. The quantity to be measured for payment will be in feet of soldier piles installed. The upper payment limit is the pile top elevation. The lower payment limit is the pile tip elevation.

D. Lagging. The quantity of lagging to measure for payment will be the number of square feet, to the nearest square foot, between the payment lines shown in the contract documents.

552-5 BASIS OF PAYMENT

552-5.01 General. When the support system is used in stage construction, the unit price bid for the support system shall be the maximum number of square feet satisfactorily installed on either, but not both sides, of adjacent construction stages.

552-5.02 Permanent Sheeting. The unit price bid for this work shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including driving equipment, waling, and bracing. The cost of maintaining the excavated area free from earth, water, ice,

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and snow will be included in the price bid for the appropriate excavation item.

552-5.03 Temporary Sheeting. The unit price bid for this work shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including driving equipment, waling, and bracing. The cost of maintaining the excavated area free from earth, water, ice, and snow will be included in the price bid for the appropriate excavation item. Progress payments in the amount of 75% of the bid amount will be made upon installation of the sheeting with the remainder paid upon its satisfactory removal. If the Contractor leaves all or part of the sheeting in place, it will be at no additional cost to the State and the remaining 25% of the bid amount will be paid after its function is no longer required.

552-5.04 Interim Sheeting. The unit price bid for this work shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including driving equipment, waling, and bracing. The cost of maintaining the excavated area free from earth, water, ice, and snow will be included in the price bid for the appropriate excavation item. Progress payments in the amount of 75% of the bid amount will be made upon installation of the sheeting with the remainder paid upon satisfactory removal of that portion specified in the contract documents. If the support system is to be left in place in its entirety, the remainder will be paid after its function is no longer required. The cost of any work necessary to cut off and remove the specified portion shall be included in the unit price bid.

552-5.05 Excavation Protection System. The unit price bid for this work shall include the cost of furnishing all labor materials and equipment necessary to satisfactorily complete the work, including driving equipment, waling, bracing, and design services when employed.

If the Engineer directs, in writing, that the EPS be left in place, this will be classified as extra work.

552-5.06 Soldier Pile and Lagging Wall.

A. Holes in Earth. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including progressing the hole through obstructions.

B. Rock Sockets. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work.

C. Soldier Piles. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including pile driving equipment, pile shoes, backfilling the hole and cutting off the soldier pile where required. No additional payment will be made for complete pile removal, where allowed. Splices approved, in writing, by the Deputy Chief Engineer for Technical Services will be paid for under the appropriate pay item.

D. Lagging. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including waling, bracing, connections and lagging removal, where required. No additional payment will be made when a wall is excavated on both sides. No additional payment will be made if wood lagging is placed behind concrete.

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Payment will be made under:

Item No.	Item	Pay Unit
552.10	Permanent Timber Sheeting	Square Foot
552.11	Permanent Steel Sheeting	Square Foot
552.12	Temporary Timber Sheeting	Square Foot
552.13	Temporary Steel Sheeting	Square Foot
552.14	Interim Timber Sheeting	Square Foot
552.15	Interim Steel Sheeting	Square Foot
552.16	Excavation Protection System	Square Foot
552.20nn	Holes in Earth for Soldier Pile and Lagging Wall	Foot
552.21nn	Rock Sockets for Soldier Pile and Lagging Wall	Foot
552.22nn	Soldier Piles for Soldier Pile and Lagging Wall	Foot
552.2301nn	Treated Wood Lagging for Soldier Pile and Lagging Wall	Square Foot
552.2302nn	Untreated Wood Lagging for Soldier Pile and Lagging Wall	Square Foot
552.2303nn	Precast Concrete Panel Lagging for Soldier Pile and Lagging Wall	Square Foot
552.2304nn	Steel Sheeting Lagging for Soldier Pile and Lagging Wall	Square Foot

Note: nn denotes serialized pay item. Each wall and its associated components will be serialized.

D262100 PILES AND PILE DRIVING EQUIPMENT

Make the following changes to Standard Specifications Construction and Materials of May 1, 2008:

Page 321-326, **delete** SECTION 551 in its entirety and **replace** with the following:

SECTION 551 - PILES AND PILE DRIVING EQUIPMENT

551-1 DESCRIPTION

551-1.01 General. This work shall consist of furnishing and installing piles of the type and size and at the locations indicated in the contract documents, or as directed by the Engineer. Timber piles are not covered under this specification.

551-1.02 Steel H-Piles. This work shall consist of furnishing and installing steel H-Piles of the type and size and at the locations indicated in the contract documents, or as directed by the Engineer.

551-1.03 Cast-In-Place Concrete Piles. This work shall consist of furnishing and installing cast-in-place concrete piles of the type and size and at the locations indicated in the contract documents, or as directed by the Engineer.

551-1.04 Furnishing Equipment for Driving Piles. This work shall consist of furnishing equipment at the site for driving piles.

551-1.05 Dynamic Pile Load Testing. This work shall consist of furnishing equipment and personnel for dynamic pile tests conducted by the Department.

551-1.06 Splices. These are contingent items and shall apply only when the Engineer directs the Contractor to drive a pile more than 10 feet beyond the estimated length provided in the Contract Plans.

551-2 MATERIALS

551-2.01 General. Materials for piling shall conform to the requirements of the following subsections of Section 700 *Materials and Manufacturing*:

Bar Reinforcement, Grade 60	709-01
Casings for Cast-in-Place Concrete Piles	720-03
Steel H-Piles	720-04
Pile Shoes	720-05
Mechanical Pile Splices	720-06

551-2.02 Steel H-Piles. Steel H-Piles shall meet the requirements of §720-04 *Steel H-Piles*.

551-2.03 Cast-In-Place Concrete Piles

A. Casings for Cast-In-Place Concrete Piles. Casings for Cast-In-Place Concrete Piles shall meet the requirements of §720-03 *Casings for Cast-In-Place Concrete Piles*.

B. Concrete for Cast-In-Place Piles. Concrete placed in the Cast-In-Place Piles shall comply with requirements specified for Class A Concrete in Section 501 *Portland Cement Concrete*.

C. Cast-In-Place Concrete Pile Dimensions. Pile dimensions, including the rate of taper for tapered piles, shall be as shown in the contract documents, or as approved by the DCES. In no case, however, shall the outside diameter at the toe be less than 8 inches nor shall the outside diameter at the section to be cut off be less than 12 inches.

The Contractor shall furnish the type of pile casing shown in the contract documents. No used pipe or shell

will be permitted.

551-2.04 Furnishing Equipment for Driving Piles. None Specified

551-2.05 Dynamic Pile Load Testing. None Specified

551-2.06 Splices. Mechanical Pile Splices shall meet the requirements of §720-06 *Mechanical Pile Splices*

551-3 CONSTRUCTION DETAILS

551-3.01 General. The method of storing and handling of piles shall be such as to avoid damage to the piles. Piles shall not be driven until after the excavation is completed to the elevation required for the bottom of the footing or bottom of tremie. Unless otherwise shown on the Plans, any material forced up or depressions made by the driving shall be removed or filled and the correct elevation of foundation established before any concrete is placed.

The driving of piles shall be done with an air/steam, diesel, or hydraulic hammer. Piles shall be driven starting from the center of the foundation and proceeding outward from this point, or starting at the outside row and driving progressively across the foundation.

The length of piles will be determined in the field by driving to the driving criteria determined by the DCES. Piles may be completely driven in one operation or, if directed by the DCES, be partially driven and allowed to set from 2 to 24 hours (or as indicated on the Plans) before driving is resumed.

Piles shall be vertical or accurately battered as indicated on the Contract Plans. The top of any pile driven its full length into the ground shall not vary from the plan location by more than 4 inches, unless otherwise shown on the Plans. The top of any pile partially exposed or included in an integral abutment shall not vary from the plan location by more than 1 inch, unless otherwise shown on the Plans. Piles may have a variation at their tip of not more than ¼ inch per foot from the vertical or from the batter shown on the Plans or permitted by the DCES.

All piles forced up by any cause shall be driven again, at no additional cost to the State.

The following shall be causes for rejection of a pile:

- Pile location or batter is incorrect.
- Pile damaged from any cause whatsoever.
- Pile fails to attain the driving resistance determined by the DCES, or the driving resistance set forth in the contract documents.
- Pile tip elevation is not within the limits called for in the contract documents.
- Pile is unserviceable for other reasons related to the furnishing and installing of the pile.
- Cast-In-Place Concrete Pile Casing not free from water.

No footing concrete shall be placed until all piles within the footing are inspected by the Engineer. The Contractor shall remove rejected piles, or at the option of the Department, a second pile may be driven adjacent thereto, if this can be done without impairing the structure.

The tops of all piles and pile casings shall be cut off at the elevation indicated on the Plans, or as established by the Engineer. The cut shall be clean, level, and to a true plane, in accordance with the detail shown on the Plans.

All cavities left by the pile driving operation shall be backfilled.

551-3.02 Steel H-Piles. Steel H-Piles shall be furnished with a shoe, fabricated as detailed on the Plans, or as approved by the DCES. Substitution of commercial shoes for those detailed on the Plans may be permitted subject to the approval of the DCES. Unless shown on the Plans, the shoes shall be attached by a NYSDOT Certified Welder with a 5/16 inch minimum fillet weld along the entire outside edge of the flanges.

551-3.03 Cast-In-Place Concrete Piles. Pile casings which do not hold their original form during driving, which fracture, or fail during driving due to manufacturer defect, fabrication, or Contractor's operations, unless otherwise directed, shall be replaced at no additional cost to the State. If, at any time during the driving or placing of the pile casings, the DCES determines from the results of the driving that the pile casings of the type or thickness being used cannot be satisfactorily placed, the Contractor shall remove the casings, and replace them with casings

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of the type and thickness directed at the expense of the State.

All pile casings shall be equipped with a toe treatment as shown on the Plans.

Cast-in-place concrete piles shall be reinforced as shown on the Plans and the reinforcement secured in such a manner as to ensure its proper location in the finished piles.

Cast-in-place concrete pile casings shall be inspected immediately prior to placing concrete in the casing. All casings in the footing shall be satisfactorily placed and dry before concrete is placed. Each casing shall be filled with a continuous pour of Class A concrete, mixed and placed in accordance with Section 555 *Concrete for Structures*, except that the slump of the concrete shall not exceed 5 inches.

Care shall be exercised in filling the piles to prevent honeycomb and air pockets from forming in the concrete. Internal vibrators and other means shall be used to the maximum depth practicable to consolidate the concrete.

All exposed pile or pile casing surfaces not embedded in concrete shall be painted in accordance with the Contract Documents.

551-3.04 Furnishing Equipment for Driving Piles. The Contractor shall submit to the DCES for approval Form BD 138 *Pile Driving Equipment Data* a minimum of 21 calendar days prior to beginning pile driving work. Each separate combination of pile and pile driving equipment proposed by the Contractor shall require the submission of a corresponding Form BD 138.

Piles shall be driven only with equipment which has the prior approval of the DCES. All malfunctioning equipment shall be removed from the site and be replaced with equipment which is satisfactory to the DCES. The minimum rated striking energy of the hammer to be used in driving Steel H-Piles and Cast-In-Place Concrete Piles shall be 13 kip-feet per blow.

Hammers having greater striking energy may be used upon approval by the DCES. These hammers shall produce a minimum of 20 blows/foot and a maximum of 120 blows/foot at the Nominal Pile Resistance shown on the Contract Plans. However, if, in the opinion of the DCES, satisfactory results are not obtained with the hammer furnished by the Contractor, a hammer meeting the approval of the DCES shall be furnished and used.

Water jets and vibratory hammers shall not be used in driving any pile, unless written approval is given by the DCES. Piles installed with a water jet or vibratory hammer shall be impact driven to secure the final penetration.

A. Air/Steam Hammers. Sufficient boiler or compressor capacity shall be provided at all times to maintain the rated speed of air/steam hammers during the full time of pile driving. The valve mechanism and other parts of a single or double-acting hammer shall be maintained such that the number of blows per minute for which the hammer is designated, is satisfied.

B. Diesel Hammers. Single acting hammers' valves, pumps, ports, rings, and other hammer parts shall be maintained such that the length of stroke, or blows per minute is satisfied.

All diesel hammers shall be provided with an acceptable means of measuring hammer energy.

C. Hydraulic Hammers. Hydraulic hammers that have enclosed rams, shall be equipped with an electronic printout. Those which have exposed rams, shall be visually inspected.

D. Hammer Cushion. An approved hammer cushion block shall be used to transfer pile hammer energy to the pile. Each hammer shall be equipped with a helmet/drive head to fit the type of pile to be driven.

The hammer cushion will be inspected for compliance with the description in the BD 138 prior to driving the first pile, and thereafter every 100 hours of driving. The hammer cushion will be re-inspected if a hammer with a different serial number is brought to the project.

E. Pile Driving Leads. Pile driving leads shall be constructed in such a manner as to afford freedom of movement of the hammer. The use of either swinging or hanging leads will be permitted provided the pile or leads are properly supported during driving and the required final position and batter of pile is achieved. If the use of swinging or hanging leads produces unsatisfactory results, the Contractor shall hold the leads in position with guys or braces to give the required support or use equipment having fixed leads.

Pile driving leads shall be of sufficient length so that the use of a follower will not be necessary. The driving of piles with followers will generally not be permitted and shall be done only with written permission and direction of the DCES.

When directed by the Engineer, approved steel spuds shall be used to penetrate consolidated material or obstructions in the upper 10 feet in order to assist in driving the piles to the required depth and resistance. Augers may be used for this purpose with written approval from the DCES.

551-3.05 Dynamic Pile Load Testing. Dynamic pile load tests will be conducted by the Department under the direction of the DCES. The Contractor shall furnish a source of electrical power, a suitable test enclosure to perform field testing of piles and evaluate pile hammer efficiency and all incidental labor and material necessary to make the work area accessible.

Tests shall be performed at the locations indicated on the Contract Plans and where directed by the Engineer. A Dynamic Pile Load Testing Procedure, known as the "Impact Driving Method", will be used. This procedure entails the following steps:

1. Prior to being struck with the pile driving hammer, each pile to be tested will be instrumented with strain and acceleration transducers by State personnel, aided by the Contractor's forces.
2. Dynamic measurements resulting from the pile hammer blows will be automatically recorded on a pile driving analyzer supplied by the State and operated by State personnel.
3. Upon determination by the Engineer that valid data has been recorded, State personnel, assisted by the Contractor's forces, will remove the instrumentation.

The Contractor will schedule equipment movements to ensure that testing is done as part of the normal driving schedule, insofar as it is possible.

551-3.06 Splices. Full length piles shall always be used where practicable. Pile splices shall be constructed as shown in the contract documents, or as approved by the DCES. Where splices are unavoidable, their number, locations, and details will be subject to the approval of the DCES. Pile splices at less than 10 feet beyond the estimated length shall be installed at no additional cost to the State. A second splice may be used at 30 feet beyond the estimated length, subject to DCES approval.

Splices to steel H-Piles, and steel pile casings shall be welded in conformance with the provisions of the Steel Construction Manual (SCM) These requirements include, but are not limited to, a NYS certified welder and a DCES approved welding procedure.

Where design considerations and soil characteristics permit, the DCES may approve the use of a mechanical splice in lieu of a welded splice. The mechanical couplings used for such splices shall be subject to the provisions of §715-01 *Structural Steel*. A seal weld shall be provided completely around the pile casing.

551-4 METHOD OF MEASUREMENT

551-4.01 General. The length of piles will be determined in the field by driving to the resistance required by the Contract Documents, or DCES at the time of driving. The pile lengths indicated on the Plans are for estimating purposes only.

551-4.02 Steel H-Piles. The quantity of Steel H-Piles to be measured for payment will be in feet of acceptable piles driven, measured to the nearest 1 foot below the cut off elevation.

551-4.03 Cast-In-Place Concrete Piles. The quantity of Cast-in-Place Concrete Piles to be measured for payment will be in feet of acceptable piles driven, measured to the nearest 1 foot below the cut off elevation.

551-4.04 Furnishing Equipment for Driving Piles. The work under Furnishing Equipment for Driving Piles will be measured on a lump sum basis.

551-4.05 Dynamic Pile Load Testing. The quantity of Dynamic Pile Tests to be measured for payment will be the number of pile tests performed. If the pile requires re-driving within 28 hours after the initial test, this shall be considered as one Dynamic Pile Test. If re-driving is more than 28 hours after the initial test, this shall be considered as an additional test.

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551-4.06 Splices. The quantity of splices to be measured for payment will be the number of splices installed, which meet the requirements of §551-1.06 and §551-3.06.

551-5 BASIS OF PAYMENT

551-5.01 General. The unit price bid per foot for piles shall include the cost of removal of any material forced up above the bottom of footing by the driving of piles, backfilling of all cavities left by the extraction of damaged piles or from auger holes or soil deformations necessary to place piles, and furnishing and using pile shoes, followers, augers, or spuds.

No payment will be made for piles rejected in accordance with requirements under §551-3.01.

551-5.02 Steel H-Piles. The unit price bid per foot for steel H-Piles shall include the cost of furnishing all labor, including the manipulation of pile driving equipment, materials and equipment necessary to satisfactorily complete the work.

551-5.03 Cast-in-Place Concrete Piles. The unit price bid per foot for cast-in-place concrete piles shall include the cost of furnishing all labor, including the manipulation of pile driving equipment, materials and equipment necessary to satisfactorily complete the work, including concrete, reinforcement, and steel casings. Progress payments will be made, at the unit price bid, for 60% of the quantity after the casings have been satisfactorily driven. The balance of the quantity will be paid for after completion of the work, including cutting off piles, placing concrete in the pile, and painting of exposed pile and pile casings.

551-5.04 Furnishing Equipment for Driving Piles. The lump sum price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work.

Progress payments will be made at seventy-five percent (75%) of the lump sum bid when the equipment for driving piles is furnished and driving of satisfactory piles has commenced. The remainder will be paid when pile driving is completed.

551-5.05 Dynamic Pile Load Testing. The unit price bid shall include the cost of furnishing labor, materials and equipment necessary to satisfactorily support the performance of Dynamic Pile Load Tests.

551-5.06 Splices. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work.

Payment will be made under:

Item No.	Item Description	Pay Unit
551.010042	Steel H-Piles (HP 10x42)	Foot
551.010057	Steel H-Piles (HP 10x57)	Foot
551.012053	Steel H-Piles (HP 12x53)	Foot
551.012063	Steel H-Piles (HP 12x63)	Foot
551.012074	Steel H-Piles (HP 12x74)	Foot
551.012084	Steel H-Piles (HP 12x84)	Foot
551.014073	Steel H-Piles (HP 14x73)	Foot
551.014089	Steel H-Piles (HP 14x89)	Foot
551.014102	Steel H-Piles (HP 14x102)	Foot
551.014117	Steel H-Piles (HP 14x117)	Foot
551.016088	Steel H-Piles (HP 16x88)	Foot
551.016101	Steel H-Piles (HP 16x101)	Foot
551.016121	Steel H-Piles (HP 16x121)	Foot
551.016141	Steel H-Piles (HP 16x141)	Foot
551.016162	Steel H-Piles (HP 16x162)	Foot
551.016183	Steel H-Piles (HP 16x183)	Foot
551.018135	Steel H-Piles (HP 18x135)	Foot
551.018157	Steel H-Piles (HP 18x157)	Foot

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551.018181	Steel H-Piles (HP 18x181)	Foot
551.018204	Steel H-Piles (HP 18x204)	Foot
551.11	Cast-In-Place Concrete Piles	Foot
551.12	Splices for Steel H-Piles	Each
551.13	Furnishing Equipment for Driving Piles	Lump Sum
551.14	Dynamic Pile Load Testing	Each
551.15	Splices for CIP Piles	Each

Page 956, **delete** all of §720-04 and **replace** with the following:

720-04 STEEL H-PILES

SCOPE. This specification covers the material requirements for steel H-Piles.

GENERAL. All steel H-Piles shall be rolled HP sections of standard dimensions. Steel for bearing piles shall be new and unused and shall conform to the requirements of 715-01 *Structural Steel*. Stock steel may be used.

BASIS OF ACCEPTANCE. Material acceptance will be by material certification. The certifying statement must accompany each heat and must verify that the material and workmanship comply with the current ASTM standards for ASTM A709 Grade 50, or A992 Grade 50. Two copies shall be furnished to the Engineer. *Buy America requirements apply.*

Page 956-957, **delete** all of §720-06 and **replace** with the following:

720-06 MECHANICAL PILE SPLICES

SCOPE. This specification covers the requirements for mechanical splices for steel H-Piles.

GENERAL. Steel used in the mechanical pile splices shall meet the requirements of §715-01 *Structural Steel*.

BASIS OF APPROVAL. The material will be evaluated for conformance with the material requirements, and product samples may be required to be submitted for testing.

Manufacturers may submit their product for evaluation to the DCES. The submission shall include copies of installation drawings, specifications, welding procedures meeting the requirements of the Steel Construction Manual, engineering calculations, test results, and quality control procedures for the splice manufacturer.

Stamped engineering calculations, performed by a New York State Licensed Professional Engineer with current registration, shall show that the spliced pile has a theoretical bending capacity of at least 95% of the unspliced pile.

Test results by an independent testing agency shall show that the bending strength on both the strong and weak axes of the spliced pile is at least as great as the calculated capacity of the splice. The tests shall be third point loadings of a spliced pile with the splice in the middle of the span. The tests shall be continued to failure. A minimum of two pile sizes shall be tested in each direction to prove the engineering calculations.

If the submission is acceptable, the installation drawings will be stamped approved, returned to the manufacturer and the product will be placed on the Approved List. Any changes to the product, product manufacturing, or installation procedure will require re-submission and re-approval.

BASIS OF ACCEPTANCE. The Contractor shall provide the Engineer with an installation drawing approved by the DCES showing the sizes and types of welds that are required. Mechanical pile splices will be accepted based on the product appearing on the Approved List and a material certification that the supplied product has the same chemical composition and mechanical properties as the product used in the testing. *Buy America requirements apply.*

Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 332 through 338, **Delete** SECTION 554 in its entirety and **Replace** it with the following:

SECTION 554 – FILL TYPE RETAINING WALLS

554-1 DESCRIPTION. This work shall consist of furnishing and installing a fill type retaining wall at the location(s) and to the elevation(s) shown in the contract documents.

554-1.01. General. The fill type classification refers to the construction method used for the installation of the wall. Fill type retaining walls are retaining structures constructed from the base of the wall to the top (i.e. “bottom-up” construction).

The fill type retaining walls are further classified according to the basic mechanism of lateral load support. These classifications include internally stabilized fill structures and externally stabilized fill structures.

The specification is supplemented with an Approved List which provides a listing of available designers and their corresponding fill type retaining walls. Fill type retaining walls are further defined in the pertinent subsequent section. For proprietary fill type retaining wall systems, approved designers, wall systems, and the components of each wall system appear on the Approved List, available on the Department’s web site. Designers wishing to have their wall systems reviewed for placement on the Approved List shall follow the procedural directives of the Geotechnical Engineering Bureau as contained in Highway Design Manual Appendix 9A.

554-1.02 Definitions. Internally stabilized fill structures are structures which rely on friction developed between closely-spaced reinforcing elements and the backfill to resist lateral soil pressure and are subcategorized in the retaining wall subsections of this specification. Externally stabilized fill structures are structures which utilize the weight of the wall system elements and the weight of the infill to resist lateral soil pressure.

A. Wall System. A wall system is either a series of open top face units assembled to form bins which are connected in unbroken sequence or a combination of specific solid face units with a characteristic alignment and connection method, which utilize the weight of the wall system elements and the weight of the infill to resist lateral soil pressure. As indicated, the bin volume is infilled with backfill material to supplement the face unit geometry, adding to the stability of the system.

B. Internally Stabilized Wall System. A wall system which, when constructed beyond wall heights exceeding the maximum allowable unreinforced height per the Approved List, relies on reinforcing elements within the backfill to provide stability.

C. Internally Stabilized Earth System. A series of tensile reinforcing elements which, when placed in multiple layers within the backfill volume, improves the strength such that the vertical face of the stabilized earth volume is essentially self supporting.

D. Internally Stabilized Fill Structures.

1. Fill Structure. A fill type retaining wall as described in §554-1.01 *Fill Type Retaining Walls* which consists of either an internally stabilized wall system or an internally stabilized earth system.

i. Mechanically Stabilized Earth System (MSES). An MSES is an internally stabilized fill structure comprised of an unreinforced concrete leveling pad, precast concrete face panel units and coping units, earth backfill, subsurface drainage system, and reinforcing elements used to stabilize the backfill. Only MSES designers appearing on the Approved List will be acceptable for use. All necessary materials, except backfill, leveling pad, and subsurface drainage system, are obtained from the approved wall system designer.

ii. Mechanically Stabilized Wall System (MSWS). An MSWS is an internally stabilized fill structure comprised of an unreinforced concrete or compacted granular fill leveling pad, face units (solid or open top) and coping units, earth backfill, subsurface drainage system, and reinforcing

elements used to stabilize the backfill. Only MSWS designers with face units appearing on the Approved List will be acceptable for use. All necessary materials, except backfill, face unit infill, leveling pad material, backfill drainage materials, and cast-in-place concrete, are obtained from the designer.

iii. Geosynthetically Reinforced Soil System (GRSS). A GRSS is an internally stabilized fill structure comprised of earth backfill, geosynthetic reinforcing elements used for internal stabilization and surface protection to resist erosion.

a. GRSS Wall. For wall applications, the surface protection is the permanent facing elements (excluding precast units) or a geotextile face wrap which typically includes welded wire forms remaining from the installation operation.

b. GRSS Slope. For slope applications, the surface protection consists of a secondary reinforcing element to aid in stability of the slope face between primary reinforcing layers. To protect against erosion, the GRSS slope is covered by either a non-degradable erosion control mat or a granular fill slope protection blanket.

Although GRSS is a fill type retaining wall, it is not a part of the selection process outlined in §554-3.01A. *Fill Type Retaining Wall Selection* or supplemented by the Approved List for Fill Type Retaining Walls, as it is not a proprietary system. A GRSS will be designed and detailed in the contract documents by the Department or its representatives.

2. Leveling Pad. A compact surface which serves as a flat, level area for placing the initial course of face units.

i. Concrete. An unreinforced concrete slab.

ii. Granular. A compacted granular fill pad.

3. Face Unit. A structural unit incorporating a means for attaching the backfill reinforcing element, which restrains the alignment of the wall system during installation compaction operations and provides support for the front edge of the backfill for the life of the wall system.

i. Panel Unit. A precast concrete panel incorporating a means for attaching the backfill reinforcing element, forming part of the face area of the MSWS.

ii. Solid Unit. A face unit which has a solid mass and incorporates a means for attaching the backfill reinforcing element, forming part of the face area of the MSWS.

iii. Open Top Unit. A face unit which has an open structure, to allow placement of infill material, and incorporates a means for attaching the backfill reinforcing element, forming part of the face area of the MSWS.

iv. Corner Unit. A corner unit is a face unit having two faces.

v. Geotextile Face Wrap. A layer of geotextile used to prevent loss of backfill, typically employed in a temporary wall application in conjunction with welded wire forms. In applications where a geotextile is used as the primary reinforcing element, it may be designed to also function as the face wrap.

a. Welded Wire Forms. A non-structural system used in temporary walls to aid in compaction near the face of the wall.

vi. Geocells. A three-dimensional, permeable polymeric honeycomb or web structure expandable panels used to confine fill materials to create structural stability.

vii. Timbers. A dressed piece of wood used as a building material.

viii. Gabions. A partitioned, wire fabric container filled with stone to form a flexible and permeable structure.

4. Alignment and Connection Device. Any device that is either built into or specially manufactured for the face units, such as shear keys, leading/trailing lips, or pins. The device is used to provide alignment and maintain positive location for a face unit and also provide a means for connecting the reinforcing elements.

5. Fastener. Hardware used to connect the reinforcing element to the attaching device.

6. Coping. A precast or cast-in-place element placed on and attached to the top of the finished wall system to form a protective cap against the weather.

7. Joint Filler. Material used to fill the joints between face units.

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- 8. Slip Joint.** A vertical joint specific to the wall system used as a stress relief at wall step locations.
- 9. Geotextile.** A permeable, planar polymeric textile material used to promote drainage, prevent infill and/or backfill material from releasing through the joints, or separating dissimilar granular materials.
- 10. Reinforcing Element.** An inclusion connected to the face unit and extending into the backfill for the purpose of backfill stabilization.
 - i. Inextensible Reinforcement.** A metal strip typically incorporating ribs on the top and bottom, or metal grids with design specific mesh openings.
 - ii. Extensible Reinforcement.** Geogrid or geotextile sheets typically made from high density polyethylene/ polypropylene geogrids or high tenacity polyester geogrids, or high strength geotextiles.
- 11. Unit Infill.** Granular material placed within the open structure of an open top face unit or contiguous to the bevel sides of a solid face unit.
- 12. Backfill.** Granular material placed and compacted in conjunction with the reinforcing elements and face units.
- 13. Subsurface Drainage System.** A system for removing water from behind the wall and channeling it to a point of positive drainage.
- 14. Identification Markers.** Signs and marking tape, buried near the finished grade, to identify and prohibit excavation of the reinforced backfill.

E. Externally Stabilized Fill Structures.

- 1. Fill Structure.** A fill type retaining wall as described in §554-1.01 *Fill Type Retaining Walls* which consists of a prefabricated face unit.
 - i. Prefabricated Wall System (PWS).** A PWS is an externally stabilized fill structure comprised of prefabricated face units & coping units, including leveling pads, unit infill, earth backfill, joint filler material and geotextile, and a subsurface drainage system to reduce hydrostatic pressure on the wall system. Only PWS designers appearing on the Approved List will be acceptable for use. All necessary materials, except backfill, unit infill, backfill drainage materials, and cast-in-place concrete, are obtained from the designer.
When reinforcement is introduced to a PWS, they shall be reclassified as Mechanically Stabilized Wall Systems and the pertinent sections of the specification shall apply.
- 2. Leveling Pad.** A compact surface which serves as a flat, level area for placing the initial course of face units.
 - i. Concrete.** An unreinforced concrete slab.
 - ii. Granular.** A compacted granular fill pad.
- 3. Face Unit.** A prefabricated concrete element, incorporating alignment and connection devices, that is able to be arranged, stacked, placed, combined, or interchanged easily into an assembled wall system.
 - i. Solid Unit.** A face unit which has a solid mass, utilizing the weight of the wall system elements to resist lateral soil pressure. A solid unit may require some infill material depending on the geometric bevel of the units.
 - ii. Open Top Unit.** A face unit which has an open structure to allow placement of infill material, utilizing the weight of the wall system elements and the weight of the infill to resist lateral soil pressure.
- 4. Bin.** Any volumetric space which is designated to be infilled, as defined in this section, and is encompassed within the dimensions of the open top unit.
- 5. Alignment and Connection Device.** Any device that is either built into or specially manufactured for the face units, such as shear keys, leading/trailing lips, or pins. The device is used to provide alignment and maintain a positive location.
- 6. Coping.** A precast or cast-in-place element placed on and attached to the top of the finished wall system to form a protective cap against the weather.
- 7. Joint Filler.** Material used to fill the joints between face units.
- 8. Slip Joint.** A vertical joint specific to the wall system used as a stress relief at wall step locations.
- 9. Geotextile.** A permeable, planar polymeric textile material used to promote drainage, prevent infill and/or backfill material from releasing through the joints, or separating dissimilar granular materials.

10. Unit Infill. Granular material placed within the bin, such as the open structure of an open top face unit or contiguous to the bevel sides of a solid face unit.

11. Backfill. Granular material placed directly behind and/or above the bins in conjunction with the wall assembly.

12. Subsurface Drainage System. A system for removing water from behind the wall and channeling it to a point of positive drainage.

F. Aesthetic Treatment. A treatment applied to the face either during or after the manufacture of the face units to modify the appearance of the units and of the wall as a whole. Aesthetic treatment can include modifications to color, texture, architectural pattern, the addition of exposed surface aggregate (real or artificial), the addition of simulated joints or cracks, or any other treatment or material that modifies the appearance, provided that the structural integrity, function, or life span of the wall is not negatively impacted.

554-2 MATERIALS.

554-2.01. Fill Type Retaining Walls. Provide materials for the selected fill type retaining wall as outlined in the pertinent subsequent section.

554-2.02. Mechanically Stabilized Earth System. Not all materials listed below are required for each MSES. Ensure that the proper materials are supplied for the chosen system design. Provide materials meeting the following requirements:

A. MSES Leveling Pad. Provide leveling pad material meeting the requirements of Section 501 *Portland Cement Concrete - General*, Class A concrete.

1. Leveling Pad Placement. For precast leveling pad installations, a substitution of cushion sand, meeting the requirements of §703-06 *Cushion Sand*, in lieu of MSES backfill material directly beneath the leveling pad may be made to facilitate placement of the pad.

B. MSES Facing Panel Units. Fabricate precast concrete face panel units and incidental precast units in accordance with the requirements of §704-14 *Precast Concrete Panel Units*. The default aesthetic treatment for an MSES facing panel is a plain, smooth concrete finish of natural concrete (gray) color.

1. Coping Unit. Fabricate precast concrete coping units, and incidental precast units in accordance with the requirements of §704-14 *Precast Concrete Panel Units*.

C. MSES Fasteners and Attaching Devices. The fasteners and attaching devices are specific to each wall system and provided by the wall system manufacturer. The fasteners and attaching devices associated with each approved wall system appear on the Approved List under wall system components.

D. MSES Joint Fillers. Fill joints with material approved by DCES and approved by the wall system designer.

E. MSES Geotextile. Provide a geotextile meeting the requirements of §737-01B *Geotextile Separation*.

F. MSES Slip Joints. The type of slip joints are specific to each wall system and are designed and supplied by the wall system manufacturer.

G. MSES Metal Reinforcing Strips. Provide reinforcing strips of ASTM Designated metal grades and galvanize in accordance with the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*. The reinforcing strips associated with each approved wall system appear on the Department's Approved List under wall system components.

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H. MSES Metal Reinforcing Mesh. Fabricate the reinforcing mesh from cold drawn steel wire conforming to the requirements of §709-09 *Cold Drawn Wire for Concrete Reinforcement*, and weld into the finished mesh fabric in accordance with the requirements of §709-02 *Wire Fabric for Concrete Reinforcement*. Galvanize in accordance with §719-01 *Galvanized Coatings and Repair Methods, Type I*. The reinforcing mesh associated with each approved wall system appears on the Department's Approved List under wall system components.

I. MSES Geogrid Reinforcing Element. Provide geogrid reinforcing elements meeting the requirements of §737-07 *Geogrids*. The grid(s) associated with each approved wall system appear on the Approved List under wall system components.

J. MSES Backfill. Provide backfill material meeting the requirements of §733-02 *Mechanically Stabilized Earth System Backfill Material*.

K. MSES Subsurface Drainage System. Provide underdrain and geotextile material for a backfill drainage system as shown in the contract documents or conforming to the designers Installation Manual:

1. Underdrain Pipe. Provide optional underdrain pipe conforming to Section 605 *Underdrains*.

2. Geotextile Drainage. Provide geotextile conforming to the requirements of §737-01 *Geotextiles, Geotextile Drainage, Strength Class 2, Drainage Class B*.

L. MSES Identification Markers

1. Signs. These will be 7 in. x 10 in. (minimum) fiberglass. Include warning information as follows:

WARNING
Internally Stabilized Fill Structure
DO NOT EXCAVATE
Call Regional Office of NYS DOT

For signs installed on concrete units, provide ¼ in. diameter by 1 ½ in. long stainless steel nail drive expansion anchors meeting GSA Specifications FF-S-325.

For signs installed on timbers, provide ¼ in. diameter by 1 ½ in. long stainless steel wood screws.

2. Marking Tape. This will be polyethylene material 3 in. wide, 4 mil. thick. Include warning markings.

554-2.03. Mechanically Stabilized Wall System. Not all materials listed below are required for each MSWS. Ensure that the proper materials are supplied for the chosen system design. Provide materials meeting the following requirements:

A. MSWS Leveling Pad. MSWS height is measured from the top of the leveling pad to the top of the face coping unit.

1. Wall Heights Taller Than or Equal to 15 ft. For MSWS taller than or equal to 15 ft. in total height, provide a leveling pad of unreinforced Class A concrete - Section 501 *Portland Cement Concrete – General*.

2. Wall Heights Shorter Than 15 ft. For MSWS shorter than 15 ft. in total height, provide a leveling pad conforming to one of the following:

i. Concrete. Unreinforced Class A concrete - Section 501 *Portland Cement Concrete – General*, or

ii. Granular. Select Granular Fill - §733-11 *Select Granular Fill*, or Crushed Stone - §501-2.02, B.1.b. *Coarse Aggregate Type CA-2* in Table 501-2 Coarse Aggregate Gradations.

3. Leveling Pad Placement. For precast leveling pad installations, a substitution of cushion sand, meeting the requirements of §703-06 *Cushion Sand*, in lieu of MSWS backfill material directly beneath the leveling pad may be made to facilitate placement of the pad.

B. MSWS Facing System. Provide a facing system in accordance with the requirements below.

1. Solid Face Units. Provide face units fabricated and conforming to §704-07 *Dry Cast Concrete Wall Units* or §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*. The default treatment for a MSWS face unit is a split face finish of natural concrete (gray) color.

i. Coping Unit. Provide coping units fabricated and conforming to §704-07 *Dry Cast Concrete Wall Units* or §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*.

2. Open Top Face Unit. Provide face units meeting the requirements of §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*. The default treatment for a MSWS face unit is a plain, smooth concrete finish of natural concrete (gray) color.

i. Coping Unit. Provide coping units meeting the requirements of §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*.

C. MSWS Alignment and Connection Devices. Provide devices conforming to the designers Installation Manual.

D. MSWS Joint Fillers. Fill joints with material meeting the requirements of §705-07 *Premoulded Resilient Joint Filler* and approved by the wall system designer.

E. MSWS Geotextile. Provide a geotextile meeting the requirements of §737-01B *Geotextile Separation*.

F. MSWS Slip Joints. The type of slip joints are specific to each wall system and are designed and supplied by the wall system manufacturer.

G. MSWS Reinforcing Element. Provide geogrid or geotextile reinforcing elements meeting the requirements of §737-07 *Geogrids*.

H. MSWS Unit Infill. Provide infill material meeting the requirements of §733-02 *Mechanically Stabilized Earth System Backfill Material*.

I. MSWS Backfill. Provide backfill material meeting the requirements of §733-02 *Mechanically Stabilized Earth System Backfill Material*.

J. MSWS Drainage System. Provide underdrain, geotextile material, and prefabricated structural drain for a backfill drainage system as shown in the contract documents or conforming to the designers Installation Manual:

1. Underdrain Pipe. Provide optional underdrain pipe conforming to Section 605 *Underdrains*.

2. Geotextile Drainage. Provide geotextile conforming to the requirements of §737-01 *Geotextiles*, Geotextile Drainage, Strength Class 2, Drainage Class B.

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3. Prefabricated Composite Structural Drain. Provide structural drain conforming to the requirements of §737-04 *Prefabricated Composite Structural Drain*.

K. MSWS Identification Markers. Provide identification markers conforming to §554-2.02 L. *MSES Identification Markers*.

554-2.04. Geosynthetically Reinforced Soil System. Not all materials listed below are required for each GRSS. Ensure that the proper materials are supplied for the chosen system design. Provide materials meeting the following requirements:

A. GRSS Geosynthetic Reinforcing Element. Provide a geogrid or geotextile primary and secondary reinforcing elements meeting the requirements of §737-07 *Geogrids*.

B. GRSS Backfill. Provide backfill material conforming to the following:

1. Walls. Provide backfill material meeting the requirements of §733-14 *Select Structural Fill* with the exception that the pH requirements are waived.

2. Slopes. Provide backfill material meeting the requirements of §733-03 *Geosynthetically Reinforced Soil System Slope Backfill Material*.

C. GRSS Wall Facing Foundation. Provide a pad of material meeting the requirements of §703-02 *Crushed Stone, Size Designation 2*.

D. GRSS Facing System. Provide a facing system shown in the contract documents and in accordance with the requirements below.

1. Welded Wire Forms. Provide welded wire forms and wire struts as shown in the contract documents, conforming to the material requirements of §709-02 *Wire Fabric for Concrete Reinforcement*. For applications other than staging walls, provide galvanization to the forms in accordance with the requirements of ASTM A 641 Class 3 for zinc coating (including the zinc coating on the Style 2 fabric), ASTM A 856M Class 3 for Zn-5Al-MM coating, or ASTM A 809 for aluminum coating.

Provide geotextile face wrap material meeting the requirements of §737-01B *Geotextile Separation* and as shown in the contract documents.

Proposed alternate, non-structural facing systems used to aid in compaction near the face of the wall shall be included in the submittal outlined in §554-3.03 A. *GRSS Submittal*.

2. Geocells. Provide geocells, anchoring devices, and staples as shown in the contract documents, conforming to the material requirements of §737-08 *Geocells*.

Provide infill material conforming to §733-14 *Select Structural Fill*, with the added stipulation that the maximum particle size is 2 in. Where a vegetated face is called for, the outermost cells are to be filled with topsoil meeting the material requirements of §713-01 *Topsoil*.

3. Timbers. Provide timbers as shown in the contract documents, graded for an extreme fiber stress of at least 1000 psi conforming to the material requirements of §712-14 *Stress Graded Timber and Lumber*. Treat timbers in accordance with §708-31 *Wood Preservative - Waterborne* and applied in conformance with American Wood Preservers Association (AWPA) Use Category Designation UC4B.

4. As Shown in the Contract Documents. Provide materials in accordance with the contract documents. Precast units are excluded as a design-specific GRSS facing system,

E. GRSS Surface Protection. Provide erosion resistant covering of the finished GRSS slope surface meeting the requirements of §713-07 *Rolled Erosion Control Products and Soil Stabilizers Class III Type C*.

F. GRSS Drainage System. Provide underdrain and geotextile material for a backfill drainage system conforming to §554-2.02 K. *MSES Drainage System*.

G. GRSS Identification Markers. Provide identification markers conforming to §554-2.02 L. *MSES Identification Markers*.

554-2.05. Prefabricated Wall System. Not all materials listed below are required for each PWS. Ensure that the proper materials are supplied for the chosen system design. Provide materials meeting the following requirements:

A. PWS Leveling Pad. Provide a leveling pad conforming to the following:

1. Open Top Face Units. For PWS utilizing open top face units, provide a leveling pad of unreinforced Class A concrete - Section 501 *Portland Cement Concrete – General*.

For precast leveling pad installations, a substitution of cushion sand, meeting the requirements of §703-06 *Cushion Sand*, in lieu of PWS backfill material directly beneath the leveling pad may be made to facilitate placement of the pad.

2. Solid Face Units. For PWS utilizing solid face units, provide a leveling pad conforming to the requirements of §733-11 *Select Granular Fill* or §501-2.02, B.1.b. *Coarse Aggregate Type CA-2* in Table 501-2 Coarse Aggregate Gradations.

B. PWS Face Unit. Provide face units meeting the following:

1. Open Top Face Units. For PWS utilizing open top face units, provide units meeting the requirements of §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*. The default treatment for a PWS open top face unit is a plain, smooth concrete finish of natural concrete (gray) color.

i. Coping Unit. Provide coping units meeting the requirements of §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*.

2. Solid Face Units. For PWS utilizing solid face units, provide units meeting the requirements of §704-07 *Dry Cast Concrete Wall Units* or §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*. The default treatment for a PWS solid face unit is a split face finish of natural concrete (gray) color.

i. Coping Unit. Provide coping units fabricated and conforming to §704-07 *Dry Cast Concrete Wall Units* or §704-06 *Precast Concrete Wall Units and Precast Concrete Cribbing*.

C. PWS Joint Fillers. Fill joints with material meeting the requirements of §705-07 *Premoulded Resilient Joint Filler* and approved by the wall system designer.

D. PWS Geotextile. Provide a geotextile meeting the requirements of §737-01B *Geotextile Separation*.

E. PWS Slip Joints. The type of slip joints are specific to each wall system and are designed and supplied by the wall system manufacturer.

F. PWS Backfill. Provide backfill material meeting the requirements of §733-14 *Select Structural Fill*.

G. PWS Unit Infill. Provide unit infill material meeting the requirements of §733-14 *Select Structural Fill*.

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For systems which allow plantings to integrate the structure into the surrounding environment, the front pocket of the unit shall be filled with a minimum of 8 in. of topsoil conforming to the material requirements as specified in §713-01 *Topsoil*.

H. PWS Drainage System. Provide underdrain, geotextile material, and prefabricated structural drain for a backfill drainage system as shown in the contract documents or conforming to the designers Installation Manual:

1. Underdrain Pipe. Provide optional underdrain pipe conforming to Section 605 *Underdrains*.

2. Geotextile Drainage. Provide geotextile conforming to the requirements of §737-01 *Geotextiles*, Geotextile Drainage, Strength Class 2, Drainage Class B.

3. Prefabricated Composite Structural Drain. Provide structural drain conforming to the requirements of §737-04 *Prefabricated Composite Structural Drain*.

554-2.06 Fill Type Retaining Wall Aesthetic Treatment. The requirements for color, texture and pattern will be described in the contract documents using industry-standard descriptions and terminology. Other requirements will be vividly described in the contract documents using special notes and sketches, as needed.

554-3 CONSTRUCTION DETAILS

554-3.01. General.

A. Fill Type Retaining Wall Selection. Approved designers of proprietary Fill Type Retaining Walls, wall systems, and the components of each wall system appear on the Approved List, available on the Department's web site. Proprietary Fill Type Retaining Walls include Mechanically Stabilized Earth Systems, Mechanically Stabilized Wall Systems, and Prefabricated Wall Systems.

Select a designer appearing on the Approved List for Fill Type Retaining Walls. The selection shall be based on the maximum wall height shown in the contract documents.

B. Fill Type Retaining Wall Submittal. Obtain from the chosen designer a Fill Type Retaining Wall design stamped by a Professional Engineer. Submit the design package, including working drawings of the wall design, design calculations, and the designers Installation Manual at least 30 work days before starting work to the following:

1. Mechanically Stabilized Earth System. Submit the design package to the Deputy Chief Engineer Technical Services (DCETS) Attn: Materials Bureau in accordance with the requirements for Drawing in §704-03 *Precast Concrete – General*. The design shall be consistent with the design methods employed in obtaining acceptance to appear on the Department's Approved List. The design package shall also include identification of backfill material gradation type(s) (outlined in §733-02B *Gradation*) suitable for the construction of the wall system, fabrication drawings for precast panels and coping and, for treatments applied to the face panel units other than the default treatment, a face panel unit sample for color and texture approval by the Regional Landscape Architect.

2. Mechanically Stabilized Wall System. Submit the design package to the Deputy Chief Engineer Technical Services (DCETS) Attn: Geotechnical Engineering Bureau. The design shall be consistent with the design methods employed in obtaining acceptance to appear on the Department's Approved List. The design package shall also include identification of backfill material gradation type(s) (outlined in §733-02B *Gradation*) suitable for the construction of the wall system and, for treatments applied to the face units other than the default treatment, a face unit sample for color and texture approval by the Regional Landscape Architect.

3. Prefabricated Wall System.

i. Open Top Face Units. For PWS utilizing open top face units, submit the design package to the Deputy Chief Engineer Technical Services (DCETS) Attn: Materials Bureau in accordance with the requirements for Drawing in §704-03 *Precast Concrete – General*. The design shall be consistent with the design methods employed in obtaining acceptance to appear on the Department’s Approved List. The design package shall also include fabrication drawings for the face units and, for treatments applied to the face units other than the default treatment, a face unit sample for color and texture approval by the Regional Landscape Architect.

ii. Solid Face Units. For PWS utilizing solid face units, submit the design package to the Engineer for approval. For solid face units consisting of units manufactured via the wet-casting process, submit the design package in accordance with the requirements for Drawing in §704-03 *Precast Concrete – General*. The design shall be consistent with the design methods employed in obtaining acceptance to appear on the Department’s Approved List. For treatments applied to the face units other than the default treatment, the design package submittal shall also include a face unit sample for color and texture approval by the Regional Landscape Architect.

After receipt of all pertinent information, the Department requires 10 work days or 2 work days per drawing sheet, whichever is greater, to review the submission.

554-3.02. Mechanically Stabilized Earth System.

A. Pre-Operation Meeting. A Pre-Operation Meeting will be held between the Engineer, Contractor, Regional Geotechnical Engineer, Geotechnical Engineering Bureau and other appropriate Department representatives to discuss the Contractors proposed construction methods. Begin work only after receiving the DCES written approval and holding the Pre-Operation Meeting.

Supply on-site technical assistance from a representative of the designated designer during the beginning of the installation until such time as outside consultation is no longer required.

B. MSES Excavation and Disposal. Excavation shall be conducted in accordance with the applicable requirements of Section 206 *Trench, Culvert and Structure Excavation* and the details specified in the contract documents.

C. MSES Foundation. Prior to erection of the wall system, the foundation shall be inspected and approved by the Engineer.

1. Placement Area. Grade the area under the MSES, level for a width equal to, or in excess of, the reinforcing element length. Prior to wall system construction, compact this area to a minimum of 90% of Standard Proctor Maximum Density. Treat all soils found to be unsuitable, or incapable of being satisfactorily compacted because of moisture content, in a manner directed by the Engineer, in conjunction with the recommendations of the Regional Geotechnical Engineer.

D. MSES Subsurface Drainage System. Install the subsurface drainage system simultaneously with the erection and backfill of the MSES to ensure a continuous, uninterrupted system to prevent the accumulation of destabilizing water pressure on the wall. In all cases, the subsurface drainage system will be installed to drain all intercepted water to a point of positive drainage.

E. MSES Facing Panel Unit Inspection, Storage, and Handling

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1. Face Panel Units. An inspection will be made prior to installation to determine if any damage has occurred to the panel unit(s). Handle and store the panel units with care to prevent damage.

2. Damaged Panel Units. Repair damaged panel units in a manner approved by the Engineer. Replace panel units that are not repairable at no additional cost to the State.

F. MSES Leveling Pad. Provide an unreinforced concrete leveling pad as required by the contract documents. Cast the concrete, in accordance with the requirements Section 555 Structural Concrete, or place the precast leveling pad for the foundation of the MSES to ensure a flat surface for placing the initial course of precast facing panel units. Step the leveling pad to conform to grade changes as shown in the contract documents or approved Shop Drawings.

G. MSES Erection

1. Methods and Equipment. Install panel units in accordance with the designers approved shop drawings and Installation Manual, unless otherwise modified by the contract documents. Prior to installation of the panel units, furnish the Engineer with detailed information concerning the proposed construction method, as well as the equipment planned for use.

2. Panel Unit Installation

i. Place panel units such that, after completion of compaction, the tolerances of Table 554-1 *MSES Facing Panel Unit Alignment and Joint Offset Tolerances* are not exceeded. After placement, maintain each panel unit in position. If wedges are used, do not allow them to remain in place below three panel unit heights during installation, and compaction. Remove all wedges remaining in the top three panel unit heights upon completion of the MSES. External braces may be required for initial placements. Install joint fillers in the manner indicated by the Installation Manual.

ii. Correct all misalignments of installed panel units in excess of the tolerances allowed by Table 554-1 *MSES Facing Panel Unit Alignment and Joint Offset Tolerances*, at no additional cost to the State.

TABLE 554-1 MSES FACING PANEL UNIT ALIGNMENT AND JOINT OFFSET TOLERANCES	
Horizontal Alignment	± ¾ in./ 10 ft.
Joint Offset per Panel Unit	± ¾ in.
Overall Vertical Plumbness (Top to Bottom of Wall System)	± ½ in./ 10 ft.

H. MSES Backfill. Do not mix backfill material from different sources behind any wall without the written permission of the Director, Geotechnical Engineering Bureau.

1. Moisture Content. Place backfill materials, other than Type B and Type D, at or within 2% dry of the Optimum Moisture Content. Rework or replace all backfill material which is at a moisture content in excess of the Optimum Moisture content. Determine the Optimum Moisture Content in conformance with the latest Geotechnical Test Methods for compaction that incorporate moisture content determination. Rework or replace backfill material at no additional cost to the State.

2. Backfill Placement. Prior to placement of the reinforcing element, backfill and compact the area within 3 ft. of the panel units horizontally to 2 in. above the required reinforcing element elevation. Roughly grade the backfill beyond the 3 ft. line to the reinforcing element elevation.

i. Place granular backfill material in uniform layers not exceeding 12 in. loose lift thickness per layer. Compact each layer to a minimum of 95% of Standard Proctor Maximum Density.

- ii.* Place Type B and Type D backfill in uniform layers not exceeding 16 in. loose lift thickness. Compact in accordance with requirements determined by the Engineer.

3. Surface Drainage Control. Provide positive control and discharge of all surface drainage that will affect the installation of the MSES throughout the construction of the wall. Maintain all vertical drains, weeps, ditches, pipes, or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost.

4. QA Program. The Department will sample and test backfill from the grade in accordance with the Quality Assurance Program outlined in §733-02 *Mechanically Stabilized Earth System Backfill Material*. If the material is determined to not meet the specification requirements, the material will be rejected.

I. MSES Reinforcing Elements. Place reinforcing elements in accordance with the designer's recommendations or as described in the designers Installation Manual. Before attaching the reinforcing elements to the panel units, repair all damage to the zinc coating in accordance with the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

1. Placement. Place reinforcing elements normal to the panel units unless indicated otherwise by the contract documents or approved shop drawings. Take care to avoid breaking, distorting, or disturbing the reinforcing elements. Replace reinforcing elements which are broken or distorted.

2. Connections. Prior to the attachment of the reinforcing elements, as required, fill all openings, or attachment locations, with grease, or other protective material. Obtain the grease or other protective materials from the chosen designer. Connect reinforcing elements to the face panel unit before placement of subsequent face panel units, or as directed by the approved shop drawings.

J. MSES Identification Markers. Install MSES identification markers.

Place the marking tape at the highest possible elevation that will not damage the tape. For walls supporting a pavement section, install the tape 6 in. below top of subbase elevation. For walls supporting earth, install the tape 6 in. below finished grade. Install the marking tape on top of the reinforced backfill area, parallel to the wall face in rows at 5 ft. intervals until the back edge of the reinforced backfill area is reached.

Drill two, $\frac{5}{16}$ in. diameter, holes for mounting, located $\frac{1}{2}$ in. from the ends of the sign and 3 $\frac{1}{2}$ in. from the top of the sign. Secure the sign using anchorage appropriate for the supporting material.

K. Equipment Movement. Movement of construction equipment and all other vehicles and loads over and adjacent to MSES shall be done at the Contractor's risk. Govern the operations and procedures to prevent misalignment of the installed panel units. Precautionary measures include, but are not limited to, keeping vehicular equipment a minimum of 3 ft. from the panel units. Within 3 ft. of the panel units use compaction equipment meeting the requirements of *Compaction Equipment for Confined Areas* in Section 203 Excavation and Embankment. Operate rubber tired equipment on top of reinforcing elements only at low speeds (less than 5 mph) and without making sharp turns or braking sharply. Do not operate tracked equipment directly on reinforcing elements. Cover reinforcing elements with a minimum 6 in. thick soil layer prior to operating tracked equipment over reinforced areas. Repair or replace damaged reinforcing elements in strict accordance with the designers written instructions at no additional cost to the State.

554-3.03. Mechanically Stabilized Wall System.

A. Pre-Operation Meeting. A Pre-Operation Meeting will be held between the Engineer, Contractor, Regional Geotechnical Engineer, Geotechnical Engineering Bureau and other appropriate Department representatives to discuss the Contractors proposed construction methods. Begin work only after receiving the DCETS written approval and holding the Pre-Operation Meeting.

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Supply on-site technical assistance from a representative of the designated designer during the beginning of the installation until such time as outside consultation is no longer required.

B. MSWS Excavation and Disposal. Excavation shall be conducted in accordance with the applicable requirements of Section 206 *Trench, Culvert and Structure Excavation* and the details specified in the contract documents.

C. MSWS Foundation. Prepare the foundation in accordance with the requirements of §554-3.02 C. *MSES Foundation*.

D. MSWS Subsurface Drainage System. Install the subsurface drainage system simultaneously with the erection and infill/backfill of the MSWS to ensure a continuous, uninterrupted system to prevent the accumulation of destabilizing water pressure on the wall. In all cases, the subsurface drainage system will be installed to drain all intercepted water to a point of positive drainage.

E. MSWS Leveling Pad. Provide an unreinforced concrete leveling pad or compacted granular fill leveling pad as shown in the contract documents to ensure a flat surface for placing the initial course of face units. Step the leveling pad to conform to grade changes as shown in the contract documents or approved Shop Drawings.

1. Concrete. Cast the concrete leveling pad, in accordance with the requirements of Section 555 Structural Concrete, or place the precast leveling pad, for the foundation of the MSWS.

2. Granular. Place and compact granular fill in conformance with Section 203 Excavation and Embankment.

F. MSWS Facing Unit Erection

1. Solid Face Unit Erection

i. Methods and Equipment. Install face units in accordance with the designers approved shop drawings and Installation Manual, unless otherwise modified by the contract documents. Prior to installation of the face units, furnish the Engineer with detailed information concerning the proposed construction method, as well as the equipment planned for use.

ii. Face Unit Installation.

a. Install by placing, positioning, and aligning face units in conformance with the designers Installation Manual and within the tolerances in Table 554-2 *MSWS Solid Face Unit Alignment Tolerances*.

b. Correct all misalignments of installed face units that exceed the tolerances allowed in Table 554-2 *MSWS Solid Facing Unit Alignment Tolerances*.

TABLE 554-2 MSWS SOLID FACE UNIT ALIGNMENT TOLERANCES	
Vertical Control	± ¼ in. over a distance of 10 ft.
Horizontal Control	± ½ in. over a distance of 10 ft.
Rotation from established plan wall batter	± ½ in. over a distance of 10 ft.

2. Open Top Face Unit Erection. During erection, any face unit damaged beyond repair shall be removed and replaced by the Contractor with approved face units at no additional cost to the State.

i. All face units shall be assembled and handled in accordance with the designer's instructions and the contract documents. Erect the face units conforming to the lines, grades, and typical sections shown on the contract documents and in accordance with the designated manufacturer's installation manual.

- ii.* Place the face units side by side and in full contact with the installed leveling pad.
- iii.* Maintain the minimum face unit tolerances shown in Table 554-3 *MSWS Open Top Face Unit Tolerances*. Correct all misalignments of installed face units that exceed the tolerances allowed in a manner satisfying the Engineer:

TABLE 554-3 MSWS OPEN TOP FACE UNIT ALIGNMENT TOLERANCES	
Vertical control (plumbness)	± ¾ in. over a distance of 10 ft.
Horizontal location control (alignment)	± ¾ in. over a distance of 10 ft.
Vertically overall (plumbness from top to bottom)	± ½ in. over a height of 10 ft.

- iv.* Adjust face unit spacing for curved sections according to the manufacturer's installation recommendations.

G. MSWS Facing Unit Bin Infill

1. Solid Face Unit Bin Infill

- i. Placement.* Place unit infill to the limits indicated in the contract documents. Before installing the next course of face units, compact the unit infill and brush the tops of the face units clean to ensure an even placement area.
- ii. Protection.* Protect unit infill from contamination during construction.

2. Open Top Face Unit Bin Infill.

- i. Placement.* Place and compact backfill and face unit infill simultaneously with the erection of the PWS and in accordance with *Compaction* in Section 203 Excavation and Embankment. Placement of infill in the wall and backfill behind the wall shall closely follow the erection of successive courses of face units.
- ii. Protection.* Protect unit infill from contamination during construction.

H. MSWS Backfill. Do not mix backfill material from different sources behind any wall without the written permission of the Director, Geotechnical Engineering Bureau.

- 1. Moisture Content.** Place backfill materials (other than Types B and D) at or within 2% dry of the Optimum Moisture Content. Rework or replace all material which is at a moisture content exceeding the Optimum Moisture Content. Determine Optimum Moisture Content in conformance with Geotechnical Test Methods (excluding GTM-6) for compaction that incorporates moisture content determination. Rework or replace backfill material at no additional cost to the State.
- 2. Backfill Placement.** Prior to placement of the reinforcing element, backfill and compact the area within 3 ft. of the face units horizontally to 2 in. above the required reinforcing element elevation. Roughly grade the backfill beyond the 3 ft. line to the reinforcing element elevation.
 - i.* Place granular backfill material in uniform layers so that the compacted thickness of each layer does not exceed 10 in. or one unit height, whichever is less. Compact each layer to a minimum of 95% of Standard Proctor Maximum Density.

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ii. Place Types B and D backfill in uniform layers so that the compacted thickness of each layer does not exceed 10 in. or one unit height, whichever is less. Compact each layer in conformance with *Compaction* in Section 203 Excavation and Embankment.

3. Separation Geotextile. Place the geotextile separation, if required, loosely but in intimate contact with the soil so that placement of the overlying material will not stretch or tear the geotextile.

4. Surface Drainage Control. Provide positive control and discharge of all surface drainage that will affect the installation of the MSWS throughout the construction of the wall. Maintain all vertical drains, weeps, ditches, pipes, or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost.

5. QA Program. The Department will sample and test backfill from the grade in accordance with the Quality Assurance Program outlined in §733-02 *Mechanically Stabilized Earth System Backfill Material*. If the material is determined to not meet the specification requirements, the material will be rejected

I. MSWS Reinforcing Element

1. Reinforcing Element Placement. Place the reinforcing element normal to face units unless otherwise indicated in the contract documents. Replace all broken, damaged or distorted reinforcing elements at no additional cost to the State.

2. Reinforcing Element Connection. Install the reinforcing element within/between courses of face units conforming to the designers Installation Manual. Pull taut and secure the reinforcing element before placing the backfill.

J. MSWS Identification Markers. Install MSWS identification markers in accordance with the requirements of §554-3.02 *J. MSES Identification Markers*.

K. Equipment Movement. Movement of construction equipment and all other vehicles and loads over and adjacent to MSWS shall be done at the Contractor's risk. Control all operations and procedures to prevent misalignment of the face units. Precautionary measures include, but are not limited to, keeping vehicular equipment at least 3 ft. behind the back of the face units. Compaction equipment used within 3 ft. of the back of the face units must conform to *Compaction Equipment for Confined Areas* in Section 203 Excavation and Embankment. Operate rubber tired equipment on top of reinforcing elements only at low speeds (less than 5 mph) and without making sharp turns or braking sharply. Do not operate tracked equipment directly on reinforcing elements. Cover reinforcing elements with a minimum 6 in. thick soil layer prior to operating tracked equipment over reinforced areas. Repair or replace damaged reinforcing elements in strict accordance with the designers written instructions at no additional cost to the State.

554-3.04. Geosynthetically Reinforced Soil System.

A. GRSS Submittal. Submit the geogrid or geotextile reinforcing element certifications, verifying that the material meets the requirements of §737-07 *Geogrids* for the specified long term design tensile strength shown in the contract documents, to the Engineer prior to start of work. Begin work only after receiving the Engineer's approval.

Supply on-site technical assistance from a representative of the geosynthetic reinforcing element manufacturer until such time as outside consultation is no longer required.

B. GRSS Storage of Geosynthetic. Store and protect geosynthetic materials in accordance with the manufacturer's recommendations prior to installation.

C. GRSS Excavation and Disposal. Excavation shall be conducted in accordance with the applicable requirements of Section 206 *Trench, Culvert and Structure Excavation* and the details specified in the contract documents.

D. GRSS Foundation. Prior to erection of the GRSS system, the foundation shall be inspected and approved by the Engineer.

Grade the area under the GRSS level for the width shown in the contract documents. A minimum of 90% of Standard Proctor Maximum Density will be required.

For GRSS wall systems, a pad of crushed stone shall be incorporated into the foundation directly below the wall facing.

E. GRSS Subsurface Drainage System. Install the subsurface drainage system simultaneously with the erection and backfill of the GRSS to ensure a continuous, uninterrupted system to prevent the accumulation of destabilizing water pressure on the wall. In all cases, the subsurface drainage system will be installed to drain all intercepted water to a point of positive drainage.

F. GRSS Placement of Materials.

1. Geosynthetic Reinforcing Element. Place and secure the primary and secondary reinforcing element in accordance with the manufacturer's recommendations, in continuous strips without joints, seams or connections throughout the embedment length, to the line, grade and orientation shown in the contract documents. Place reinforcing elements to lay flat with no creases and pull taut to remove any slack prior to placement of backfill.

2. Welded Wire Forms. Place welded wire forms where required, as shown in the contract documents. Position and connect the welded wire forms to overlap 2 in. with adjacent forms and connect with wire ties. Install wire struts as shown in the contract documents and as required to stiffen the welded wire forms.

3. Geotextile Face Wrap. Place geotextile face wrap as shown in the contract documents. If used in conjunction with welded wire forms, place the geotextile face wrap so as to conform closely to the welded wire forms.

4. Backfill. Replace any damaged geosynthetic prior to placement of any overlying material at no cost to the State. Place the backfill onto the geosynthetic reinforcing elements in such a manner that no damage occurs. Progress placement of backfill materials so as to minimize the development of slack in the reinforcing element. The thickness of a compacted lift of backfill is not to exceed 12 in. or the measured vertical distance between geosynthetic layers, whichever is less. Compact the backfill to a minimum of 95% of Standard Proctor Maximum Density in accordance with the requirements contained in *Compaction* in Section 203 Excavation and Embankment. Only hand operated equipment is allowed within 3 ft. of the face. Lift thickness may have to be reduced to achieve required compaction.

5. Surface Protection. Place and secure erosion control material in accordance with Section 209 *Soil Erosion and Sediment Control* and as shown in the contract documents.

6. Permanent Facing. Place and connect permanent facing as shown in the contract documents.

7. Surface Drainage Control. Provide positive control and discharge of all surface drainage that will affect the installation of the GRSS throughout the construction of the wall. Maintain all vertical drains, weeps, ditches, pipes, or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost.

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G. GRSS Construction Monitoring. Monitor the system face during fill placement and compaction. If verticality or the required batter of a system is not being maintained, stop work until compaction equipment and/or operational procedures are modified.

H. GRSS Identification Markers. For applications other than staging walls, install GRSS identification markers in accordance with the requirements of §554-3.02 J. *MSES Identification Markers*.

I. Equipment Movement. Movement of construction equipment and all other vehicles and loads over and adjacent to GRSS shall be done at the Contractor's risk. Operate rubber tired equipment on top of reinforcing elements only at low speeds (less than 5 mph) and without making sharp turns or braking sharply. Do not operate tracked equipment directly on reinforcing elements. Cover reinforcing elements with a minimum 6 in. thick soil layer prior to operating tracked equipment over reinforced areas. Repair or replace damaged reinforcing elements in accordance with the manufacturer's written instructions at no additional cost to the State.

554-3.05. Prefabricated Wall System.

A. PWS Excavation and Disposal. Excavation shall be conducted in accordance with the applicable requirements of Section 206 *Trench, Culvert and Structure Excavation* and the contract documents.

B. PWS Foundation. Prior to erection of the wall system, the foundation shall be inspected and approved by the Engineer.

Grade the area under the PMWS level for the width shown in the contract documents. A minimum of 90% of Standard Proctor Maximum Density will be required.

Construct the wall system to meet the line and grade shown in the contract documents.

C. PWS Subsurface Drainage System. Install the subsurface drainage system simultaneously with the erection and infill/backfill of the PWS to ensure a continuous, uninterrupted system to prevent the accumulation of destabilizing water pressure on the wall. In all cases, install the subsurface drainage system to drain all intercepted water to a point of positive drainage.

D. PWS Leveling Pad. Provide an unreinforced concrete leveling pad or compacted granular fill leveling pad as shown in the contract documents to ensure a flat surface for placing the initial course of face units. Step the leveling pad to conform to grade changes as shown in the contract documents or approved Shop Drawings.

1. Concrete. Cast the concrete leveling pad, in accordance with the requirements of Section 555 Structural Concrete, or place the precast leveling pad, for the foundation of the PWS.

2. Granular. Place and compact granular fill in conformance with Section 203 Excavation and Embankment.

E. PWS Erection. During erection, remove and replace any face units damaged beyond repair with approved face units at no additional cost to the State.

1. Assembly. All PWS shall be assembled and handled in accordance with the designer's instructions and the contract documents. Erect the PWS conforming to the lines, grades, and typical sections shown on the contract documents and in accordance with the designated manufacturer's installation manual.

2. Placement. Place the PWS side by side and in full contact with the installed leveling pad.

3. Tolerances. Maintain the minimum PWS tolerances shown in Table 554-2 *MSWS Solid Face Unit Alignment Tolerances* or Table 554-3 *MSWS Open Top Face Unit Alignment Tolerances* as appropriate.

Correct all misalignments of installed face units that exceed the tolerances allowed in a manner satisfying the Engineer:

4. Adjustments. Adjust PWS spacing for curved sections according to the manufacturer's installation recommendations.

5. Coping. Apply the coping unit to the top of the wall using mastic adhesive, in accordance with, and conforming to the unit manufacturer's installation recommendations.

F. PWS Infill and Backfill. Immediately prior to backfilling, the Engineer will inspect the face units for damage. Face units which are damaged beyond repair shall be removed and replaced by the Contractor with approved face units at no additional cost to the State.

Place and compact backfill and unit infill simultaneously with the erection of the PWS and in accordance with *Compaction* in Section 203 Excavation and Embankment. Placement of infill in the wall and backfill behind the wall shall closely follow the erection of successive courses of face units.

G. Equipment Movement. Movement of construction equipment and all other vehicles and loads over and adjacent to PWS shall be done at the Contractor's risk. Control all operations and procedures to prevent misalignment of the PWS. Precautionary measures include, but are not limited to, keeping vehicular equipment at least 3 ft. behind the back of the face units. Compaction equipment used within 3 ft. of the back of the face units must conform to the *Compaction Equipment for Confined Areas* in Section 203 Excavation and Embankment. Any damage to face units from any cause shall be repaired or replaced by the Contractor at no additional cost to the State.

554-3.06 Fill Type Retaining Wall Aesthetic Treatment. Provide aesthetic treatment as specified in the contract documents. Any damage to the treatment shall be repaired to the satisfaction of the Engineer at no additional cost to the State.

554-4 METHOD OF MEASUREMENT.

554-4.01. General. Vacant.

554-4.02. Mechanically Stabilized Earth System. A MSES will be measured in square feet of face area, measured to the nearest square foot from the payment lines shown in the contract documents.

554-4.03. Mechanically Stabilized Wall System. A MSWS will be measured in square feet of face area, measured to the nearest square foot from the payment lines shown in the contract documents.

554-4.04. Geosynthetically Reinforced Soil System. A GRSS will be measured in square feet of vertical face area, measured to the nearest square foot from the payment lines shown in the contract documents.

554-4.05 Prefabricated Wall System. A PWS will be measured in square feet of vertical face area, measured to the nearest square foot from the payment lines shown in the contract documents.

554-4.06 Fill Type Retaining Wall Aesthetic Treatment. Aesthetic treatment will be measured in square feet of treated face area, measured to the nearest square foot from the payment lines shown in the contract documents. Include only those visual standards incorporated into the finished wall into the measurements.

554-5 BASIS OF PAYMENT

554-5.01. General. Vacant.

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554-5.02 Mechanically Stabilized Earth System. Include in the unit price bid the cost of all labor, materials, and equipment, including backfill, reinforcing elements, leveling pads, fasteners, joint fillers, geotextiles, face panel and coping units, subsurface drainage system, and the cost of adding water for backfill compaction, unless items for Furnishing Water Equipment and Applying Water are included in the contract, necessary to satisfactorily complete the work.

554-5.03 Mechanically Stabilized Wall System. Include in the unit price bid the cost of all labor, material, and equipment, including backfill, infill, reinforcing elements, leveling pads, fasteners, geotextiles, face units and coping units, subsurface drainage system, and the cost of adding water for backfill compaction, unless items for Furnishing Water Equipment and Applying Water are included in the contract, necessary to satisfactorily complete the work.

554-5.04 Geosynthetically Reinforced Soil System. Include in the unit price bid the cost of all labor, materials, and equipment, including backfill, geosynthetic reinforcing elements, facing system, subsurface drainage system, and the cost of adding water for backfill compaction, unless items for Furnishing Water Equipment and Applying Water are included in the contract, necessary to satisfactorily complete the work.

554-5.05 Prefabricated Wall System. Include in the unit price bid the cost of all labor, materials, and equipment, including backfill, leveling pads, joint fillers, geotextiles, face units and coping units, subsurface drainage system, and the cost of adding water for backfill compaction, unless items for Furnishing Water Equipment and Applying Water are included in the contract, necessary to satisfactorily complete the work.

554-5.06 Fill Type Retaining Wall Aesthetic Treatment. Include in the unit price bid the cost of all labor, material, and equipment needed to provide aesthetic treatment for the wall and the cost of production and transportation of visual standards from the precast facility to the project site for Region approval and back to the precast facility for use during production.

Payment will be made under:

Item No.	Item	Pay Unit
554.30XX	Geosynthetically Reinforced Soil System Wall	Square Feet
<u>XX</u>	<u>Facing System</u>	
01	Welded Wire Forms	
02	Geocells	
03	Timbers	
04	Other; As Shown in the Contract Documents	
554.31	Geosynthetically Reinforced Soil System Slope	Square Feet
554.40	Fill Type Retaining Wall (0 – 6 ft.)	Square Feet
554.41	Fill Type Retaining Wall (Greater than 6 ft. – 12 ft.)	Square Feet
554.42	Fill Type Retaining Wall (Greater than 12 ft. – 18 ft.)	Square Feet
554.43	Fill Type Retaining Wall (Greater than 18 ft. – 24 ft.)	Square Feet
554.44	Fill Type Retaining Wall (Greater than 24 ft. – 30 ft.)	Square Feet
554.45	Fill Type Retaining Wall (Greater than 30 ft.)	Square Feet
554.5001	Fill Type Retaining Wall Aesthetic Treatment - Textured Surface (Hand Tooled, Raked, etc.), No Color	Square Feet
554.5002	Fill Type Retaining Wall Aesthetic Treatment - Textured Surface (Hand Tooled, Raked, etc.), Integral Color	Square Feet
554.5101	Fill Type Retaining Wall Aesthetic Treatment - Exposed Aggregate Finish, No Color	Square Feet
554.5102	Fill Type Retaining Wall Aesthetic Treatment - Exposed Aggregate Finish, Integral Color	Square Feet
554.5201	Fill Type Retaining Wall Aesthetic Treatment - Architectural Pattern, No Color	Square Feet

554.5202	Fill Type Retaining Wall Aesthetic Treatment - Architectural Pattern, Integral Color	Square Feet
554.53	Fill Type Retaining Wall Aesthetic Treatment - Other; As Shown in the Contract Documents	Square Feet

Make the following changes to the Standard Specifications dated May 1, 2008 as modified by EI 08-020:

Delete SECTION 632 – Precast Modular Walls entirely and **Replace** it with the following:

SECTION 632 (VACANT)

Delete the Title and Scope of Section 704-06 and **Replace** it with the following:

SECTION 704-06 PRECAST CONCRETE WALL UNITS AND PRECAST CONCRETE CRIBBING

Scope. This specification covers the material and fabrication requirements of precast concrete wall units and precast concrete cribbing for prefabricated wall systems.

Make the following changes to the Standard Specifications dated May 1, 2008 as modified by EI 10-022:

Delete the Title of Section 704-07 and **Replace** it with the following:

SECTION 704-07 DRY CAST CONCRETE WALL UNITS

Delete the term “segmental retaining wall blocks” in the Scope, Material Requirements, and Basis of Acceptance sections of Section 704-07 and **Replace** it with “dry cast concrete wall units”.

Delete the term “concrete retaining wall block units” in the Physical Properties section of Section 704-07 and **Replace** it with “dry cast concrete wall units”.

Make the following changes to the Standard Specifications dated May 1, 2008 as modified by EI 09-027:

Delete the Title and Scope of Section 733-03 and **Replace** it with the following:

Section 733-03 GEOSYNTHETICALLY REINFORCED SOIL SYSTEM SLOPE BACKFILL MATERIAL

SCOPE. This specification covers the material requirements and methods of testing backfill material generally used for the construction of over steepened slopes utilizing Geosynthetically Reinforced Soil System (GRSS).

STAINLESS STEEL REINFORCEMENT

Make the following changes to Standard Specifications Construction and Materials of May 1, 2008.

Page **352**, **Replace** 556-1 DESCRIPTION with the following:

556-1 DESCRIPTION. The work will consist of furnishing and placing reinforcing steel for concrete structures, or stud shear connectors, in accordance with the contract documents, and in a manner satisfactory to the Engineer.

Reinforcing steel for concrete structures may be uncoated, epoxy-coated, galvanized, or stainless steel, as indicated in the contract documents.

Page **352**, **Remove** from 556-2 Materials:

Stainless-Steel-Clad Bar Reinforcement 709-12

Page **352**, **Replace** the second paragraph of 556-2.01 with:

When forms are to be removed in their entirety, uncoated steel chairs equipped with snug-fitting, high-density, polyethylene tips which provide 1/4" clearance between the metal and any exposed surface may be used, except that uncoated steel chairs shall not be used in contact with stainless steel.

Page **352**, **Replace** the title of 556-3.01 B with the following:

B. Handling and Storage

Page **353**, **Add** the following under Section 556-3.01 B:

3. Stainless Steel Bar Reinforcement. Stainless Steel Bar Reinforcement shall be stored separately and shall be handled using tools that are not used on carbon steel.

Page **354**, **Remove** 556-3.03 A.4. Stainless-Steel-Clad Bar Reinforcement.

Renumber Section 5. *Stainless Steel Bar Reinforcement* as Section 4.

Page **355**, **Add** the following to the end of the second paragraph of 556-3.03.C:

Mechanical connectors for stainless steel shall be stainless. Welding stainless steel will not be permitted unless the proposed welding technique is submitted to and approved by the DCES.

Page **355**, **Add** the following to the end of the second paragraph of 556-3.03.D:

Stainless steel reinforcement shall not be in direct contact with uncoated steel reinforcement, nor with galvanized reinforcement. This does not apply to stainless steel wires and ties.

Page **356**, Payment Section, **Remove:**

556.0204 Stainless-Steel-Clad Bar Reinforcement for Structures Pound

Page **849**, §709-10 – Mechanical Connectors for Reinforcing Bar Splices, General, **Replace** the third paragraph with the following:

“Mechanical connectors for Stainless Steel Reinforcement shall be fabricated from any alloy of stainless steel that is on the Approved List for 709-13. Connectors must be made from the same alloy of stainless steel as the bars they are connecting.”

Page **849**, §709-10 **Replace** the “Basis of Acceptance” paragraph with the following:

BASIS OF ACCEPTANCE. Mechanical connectors for Reinforcing Bar Splices will be accepted on the basis of the manufacturer’s name and location appearing on the Department’s Approved List and a material certification that states the product conforms to this specification or, at the discretion of the Department, based on sampling and testing in accordance with the procedural directives of the Materials Bureau. *Buy America requirements apply.*

Page **850 - 851**, **Replace** §709-12 and §709-13 with the following:

STAINLESS STEEL REINFORCEMENT

709-12 VACANT

709-13 STAINLESS STEEL BAR REINFORCEMENT

SCOPE. This specification covers the material requirements for stainless steel reinforcing bars used in portland cement concrete.

MATERIAL REQUIREMENTS

Material Properties. The stainless steel shall meet the requirements of ASTM A955 and its designated grade, either 60 or 75. Alloys of stainless steel which meet all the testing and process requirements of ASTM A955 but are not listed in ASTM A955 Table 2 are acceptable if they meet the chemical requirements of ASTM A276, are either austenitic or austenitic-ferritic, and have a UNS designation beginning with either 'S2' or 'S3'.

- A) Deformed Bar Reinforcement - Steel reinforcement shall be deformed billet stainless steel bars or deformed billet stainless steel coils meeting the requirements of ASTM A955 and its designated grade, either 60 or 75.
- B) Plain Rounds - Reinforcement when specified for dowels, structural ties, and supports shall be plain billet stainless steel bars or coils meeting the requirements of ASTM A955 and its designated grade, either 60 or 75.
- C) Spirals - Spirals shall be plain or deformed stainless steel bars in coils or cut lengths meeting the requirements ASTM A955 and its designated grade, either 60 or 75.

BASIS OF ACCEPTANCE. Stainless steel bar reinforcement will be accepted on the basis of the manufacturer's name and location and the fabricator's name and location (where required) appearing on the Department's Approved List and a material certification that states the product conforms to this specification or, at the discretion of the Department, based on sampling and testing in accordance with the procedural directives of the Materials Bureau. *Buy America requirements apply.*

PROVISIONS FOR STRUCTURAL CONCRETE CURING IN COLD WEATHER

Make the following changes to the Standard Specifications of May 1, 2008:

Page 299, Section 502 – PORTLAND CEMENT CONCRETE PAVEMENT, 502-2 MATERIALS AND EQUIPMENT, **Delete**: “Form Insulating Materials for Winter Concreting 711-07”, and **Replace** it with “Form Insulating Materials for Cold Weather Concreting 711-07”.

Page 338, Section 555 – STRUCTURAL CONCRETE, 555-2 MATERIALS, Section 555-2.01 General, **Delete**: “Form Insulating Materials for Winter Concreting 711-07”, and **Replace** it with “Form Insulating Materials for Cold Weather Concreting 711-07”.

Page 347, **Delete** Section 555 – STRUCTURAL CONCRETE, 555-3.08 Curing – C. Provisions for Curing in Cold Weather, and **Replace** it with the following:

“ C. Provisions for Curing in Cold Weather. If the ambient air temperature falls, or is expected to fall below 45°F, the requirements of Table 555-2 shall apply.

TABLE 555-2 COLD WEATHER CURING REQUIREMENTS	
Ambient Temperature (AT) at time of concrete placement and as anticipated during curing duration	Curing requirements
32°F < AT < 45°F for less than 24 consecutive hours	Contractor proposed/Engineer approved method for maintaining temperatures used
32°F < AT < 45°F for more than 24 consecutive hours	Heated enclosure required
AT < 32°F	Heated enclosure required

Prior to use, all proposed methods must meet the approval of the Engineer. If the curing temperature falls below 32°F at any time during the curing period, the concrete will be rejected.

To provide assurance of the curing temperatures, the Contractor shall supply thermometers meeting the requirements of §555.3.08A. Temperature measurements will be taken by the Engineer and a record will be maintained for the curing period. As a minimum, thermometers shall be placed adjacent to forms at the bottom, middle, and top of a placement. Additional thermometers may be placed in areas where extreme cold or heat, from external sources, can be expected.

If the existing method employed by the Contractor to maintain the curing temperature fails, the Contractor shall modify the existing method immediately to reestablish an acceptable curing temperature.

The length of the curing period will be extended until the required number of curing days are accumulated.

- 1. General.** When approval is granted in writing by the Engineer for cold-weather concreting, the curing temperature shall be maintained between 45°F and 85°F for the curing durations stated by provision of external heat or utilization of heat of hydration retained by insulated forms. Only when temperatures are maintained between 45°F and 85°F will the time be considered acceptable curing hours.
- 2. Provision of External Heat.** If the Contractor is required, or elects, to maintain curing temperatures by this method, the Contractor shall furnish sufficient canvas and framework, or other type of housing, to enclose and protect the structure. The enclosure and heat source(s) shall be established in such a way that the air surrounding the fresh concrete, on all sides, be kept at a temperature between 45°F and 85°F for the specified curing period. At the end of the curing period, the heat shall be gradually reduced at a rate not to exceed 1 degree F per hour until the temperature within the enclosure equals the temperature outside the enclosure. Materials and equipment necessary to erect the enclosure and provide external heat shall be present on the job site and approved by the Engineer before any concrete is placed.

External heat shall be provided by means of stoves, salamanders, heated hoses, steam equipment, warmed curing water, or other equipment supplied by, operated by the Contractor. Heating appliances shall not be placed in such a manner as to endanger formwork, centering, or expose any area of concrete

PROVISIONS FOR STRUCTURAL CONCRETE CURING IN COLD WEATHER

to drying out or damage due to excessive temperatures. Sufficient equipment shall be supplied to continuously maintain the specified temperature with a reasonable degree of uniformity in all parts of the enclosure. The enclosures shall be properly vented to prevent surface disintegration of fresh concrete due to an accumulation of carbon dioxide gas. All exposed concrete surfaces within the heated area shall be protected from drying by one of the following methods:

- Use of live steam.
- Continuous wet burlap or wet burlap used with curing covers.
- Curing compounds used with curing covers.

TABLE 555-3 INSULATION REQUIREMENTS FOR CONCRETE WALLS, PIERS AND ABUTMENTS ABOVE GROUND				
Wall Thickness (Inches)	Minimum ambient air temperatures (°F) allowable for concrete placed at 50°F (Thermal Resistance Values (R): hr·ft ² ·F/Btu)			
	R = 2	R = 4	R = 6	R = 8
Portland Cement Content: 400 lb/cy				
6	47	44	40	36
12	43	35	26	17
18	39	25	11	-2
24	34	16	-2	-20
36	25	-1	-27	-53
48	18	-10	-38	*
60	18	-10	-38	*
Portland Cement Content: 500 lb/cy				
6	47	43	38	33
12	42	31	20	9
18	36	19	2	-15
24	30	7	-16	-39
36	18	-15	-46	-79
48	10	-25	-60	*
60	10	-25	*	*
Portland Cement Content: 600 lb/cy				
6	46	41	35	29
12	40	28	14	0
18	33	13	-7	-29
24	26	-1	-28	-55
36	12	-27	-66	*
48	4	-40	*	*
60	4	-40	*	*
Portland Cement Content: 700 lb/cy				
6	45	39	32	25
12	38	24	8	-8
18	30	7	-16	-42
24	22	-9	-41	-74
36	5	-40	-85	*
48	-4	-54	*	*
60	-4	-54	*	*
Portland Cement Content: 800 lb/cy				

PROVISIONS FOR STRUCTURAL CONCRETE CURING IN COLD WEATHER

6	45	38	30	22
12	37	20	2	-16
18	28	1	-26	-55
24	18	-18	-54	-91
36	-2	-54	*	*
48	-11	-68	*	*
60	-11	-68	*	*

* < - 60 °F

When using concrete containing pozzolans, do not consider the pozzolons as part of the cement content. Use values given for a Portland cement content that are equal to or less than the actual cement content of the mix, due to a lower heat of hydration when using pozzolans.

3. Heat Retention by Insulated Forms. Insulated forms may be used to maintain acceptable curing temperatures in accordance with the provisions of Table 555-2, when ambient temperatures will not drop below 32°F. If the Contractor elects to maintain curing temperatures by this method, sufficient insulation shall be furnished to protect and maintain the temperature between the insulation and formwork within the range of 45°F to 85°F for the specified curing period.

Discontinuance of protection shall be accomplished in such a manner that the drop in temperature of any portion of the concrete shall be gradual. The surface temperature of concrete sections more than 2 feet in thickness shall not drop faster than 18°F in a 24-hour period. The surface temperature of concrete sections less than 2 feet in thickness shall not drop faster than 36°F in a 24 hour period.

Forms may be removed without restriction, providing the temperature difference between the air and the surface of the concrete is not more than 30°F. If possible, forms shall be removed about the middle of the day to take advantage of the generally higher afternoon temperatures.

Form insulating material shall be installed on the forms in such a manner so as to achieve the full benefit of its insulating properties and at the same time provide against the infiltration of wind and water. All portions of steel forms shall be covered by insulating material so that no steel is exposed to the air. Any tears or damaged areas in the insulating material shall be repaired. Special attention shall be given to ensure that all corners and angles are properly insulated and protected against wind damage.

Where tie rods extend through the form insulating material, a plywood washer (¾ x 6 x 6 inches approx.) shall be placed over the tie rod and secured against the insulating material.

After placement of the concrete, the exposed concrete surfaces shall be covered with insulating blankets, except for areas where protruding reinforcing bars make the use of blankets impracticable. These areas may be covered with hay or other acceptable insulating material. Tarpaulins shall be used to protect the insulating material.

Insulating material shall be insulating blankets, solid foam, or sprayed foam meeting the requirements of §711-07, Form Insulating Materials for Cold Weather Concreting. The appropriate R value of material shall be used to insulate the concrete according to Table 555-3.

Multiple layers of insulation may be used to attain the desired level of insulation (R value), to maintain the required curing temperatures. Extra care shall be taken in insulating edges and corners where additional layers or overlaps are required.

PROVISIONS FOR STRUCTURAL CONCRETE CURING IN COLD WEATHER

TABLE 555-4 MINIMUM TIME FOR FORM REMOVAL/FORMING/LOADING LIMITATIONS -SUBSTRUCTURES ⁽¹⁾			
SUBSTRUCTURE ELEMENT	STRIPPING ⁽²⁾	FORMING NEXT PLACEMENT	LOADING
All Footings	2 days	2 days	4 days before next placement
Abutment stems, backwalls	2 days if less than 10 feet (avg.). Add 1 day for each additional 5 feet to 5 days, maximum.	2 days	5 days before placing backwall on stem. 7 days before backfilling, 14 days before placing superstructure loads. ⁽³⁾
Pier Columns, Pier Plinths	2 days if less than 10 feet high (avg.). Add 1 day for each additional 5 feet.	4 days – columns 2 days if forming pedestal	Columns – 7 days before placing cap beam. Plinth- 2 days before pedestal placement. 21 days before placing superstructure loads. ⁽³⁾
Pier cap beams	8 days (bottom) 3 days (sides)	2 days	5 days before pedestal placement. 21 days before placing superstructure loads. ⁽³⁾
All pedestals	2 days	—	7 days (class A) 3 days (class F) ⁽⁴⁾
Wingwalls or Retaining walls	Same as abutment stems.	—	14 days before backfilling ⁽³⁾
Arch centers Centering under beams	8 days	—	14 day ⁽³⁾

Notes:

1 The minimum times for loading in this table are NOT applicable when using concrete that contains fly ash or ground, granulated blast furnace slag that is placed and/or cured when ambient temperatures are 60°F or less. The provisions in Note 3 are required for casting, curing, and testing of compressive strength cylinders for concrete that contains fly ash or ground, granulated blast furnace slag that is placed and/or cured when the ambient temperature is 60°F or less. The compressive strength results will be the basis of determining when loading can occur.

2 All concrete shall be cured for a minimum of seven curing days. A “Day” is a curing day as defined in Subsection 555-3.08A. Concrete surfaces being cured using forms, covers, or blankets from which the covers are removed for any purpose prior to the full cure period shall be sprayed with an approved clear (fugitive dye) curing compound within ten minutes of cover removal.

3 When early loading is requested, the minimum time requirements for loading may be reduced (or extended) based on test cylinder compressive strength results. The DCES will establish requirements for early loading upon request. The Contractor shall notify the Engineer, in writing, at least 10 days prior to placement, that early loading is being requested, so that arrangements for test cylinders can be made. Test cylinders shall be prepared in accordance with Materials Method 9.2 – Field Inspection of Portland Cement Concrete. Two test cylinders shall be prepared for each anticipated testing period. These cylinders shall be cured in the same manner as the substructure element which they represent. After the first compression test, the Engineer shall determine subsequent testing periods based on the results of the first test. No more than three tests for each substructure element shall be allowed.

4 Minimum time for loading pedestals shall not compromise minimum loading times specified for other placements. ”

PROVISIONS FOR STRUCTURAL CONCRETE CURING IN COLD WEATHER

Make the following changes to the Standard Specifications of May 1, 2008.

Page 872, *Delete* Section 711-07 FORM INSULATING MATERIALS FOR WINTER CONCRETING, in its entirety and ***Replace*** it with the following:

“711-07 FORM INSULATING MATERIALS FOR COLD WEATHER CONCRETING

SCOPE. This specification covers the material requirements for form insulating materials used for cold weather concreting operations.

GENERAL. Insulating materials shall be:

- Impervious to moisture penetration and absorption
- Uniform in thickness
- Durable
- Easy to apply
- Capable of maintaining consistent concrete temperature
- Be in good condition with no ragged or open edges, cracks or holes

MATERIAL REQUIREMENTS.

Insulation Blankets: Shall be clearly labeled with the manufacturer’s name and the material’s thermal resistivity (R value).

Foam Boards: Boards must be made of Expanded Polystyrene and shall be clearly labeled with the manufacturer’s name and the material’s thermal resistivity (R value).

Sprayed Foam: This product must meet the requirements of ASTM C1029.

BASIS OF ACCEPTANCE. The Contractor shall provide a material certification from the manufacturer that the insulating material meets the requirements of this specification and that the product R value is the same as labeled on the product.”

BRIDGE PEDESTAL REPAIR AND REPLACEMENT CONCRETE

Make the following changes to the Standard Specifications dated May 1, 2008:

Add the following text after the first sentence of **Section 555-2.02 Concrete for Structures**:

“Mixtures using a CA2 gradation shall be used when the minimum placement dimension is 5 inches or greater, except for pedestal repairs, where Class D or DP concrete may be used when placement dimensions are greater than 1½ inches but do not exceed 12 inches.”

Add the following sentence after the first sentence of the second paragraph of **Section 555-3.04B. Conveyance**:

“Concrete pumps with smaller hose diameters may be used for small placements, where mixtures using a CA1 gradation (smaller aggregates) are allowed, and where access is limited.”

Delete the content of **Section 582-3.01 A. Horizontal or Essentially Horizontal Locations** in its entirety and **replace** it with the following:

“Class A, Class D or Class DP concrete shall be used. Class A concrete shall be placed only at locations where removal depths average greater than 5 inches. Class D concrete shall be placed only at locations where removal depths average between 1 ½ and 5 inches. Class D or DP may be used for pedestal repairs when access is limited and where placement dimensions are greater than 1½ inches but do not exceed 12 inches. Average depth shall be determined by a measurement procedure acceptable to the Engineer”

Delete the content of **Section 582-3.01 C. Overhead** in its entirety and **replace** it with the following:

“Class A, Class D or approved patching material shall be used when formwork is provided. Concrete classes shall be restricted to the depth limitations noted for horizontal locations. Approved patching material may be used without formwork provided lift thicknesses do not exceed 1 inch. Anchoring devices shall be used when patching material is used for repair depths of 1½ inches or greater.”

PROVISIONS FOR CONCRETING IN COLD WEATHER

Make the following changes to the Standard Specifications of May 1, 2008

Page 359

Under §557-3.05 *Handling and Placing Concrete*, **delete** line 5 and **replace** it with the following: For placements proposed between October 1st and April 1st the Preplacement Meeting should additionally review cold weather concreting operations including, but not limited to, the following:

Line 8; under §557-3.05 *Handling and Placing Concrete*, **delete** the 3rd bullet that begins “Engineers permission...”

Line 11; under §557-3.05 *Handling and Placing Concrete*, **delete** “September 15” and **replace** it with “October 1”.

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Delete §557-3.12. *Provisions For Concreting In Cold Weather* and **replace** it with the following:

557-3.12 Provisions for Concreting in Cold Weather. Cold-weather concreting provisions shall apply when the ambient air temperature below 45°F for 24 consecutive hours, or drops below 32°F at any time, during the curing or drying periods of the concrete.

When cold-weather concreting of superstructure slabs is progressed, curing shall be maintained in accordance with §555-3.08C *Provisions for Curing in Cold Weather*, except as modified here:

A. Superstructure Slabs.

The curing duration shall be 14 days (336 hours). Conditions may occur which prevent an entire 24 hour day from qualifying as a curing day, but do not prevent portions of that day from reaching temperatures that qualify as curing temperatures. If these conditions occur the Contractor may aggregate curing hours. An aggregation of 24 curing hours will be credited as one curing day based on the Engineer’s acceptance of monitored temperature data. Any aggregations of less than 24 curing hours will not be credited as a curing day. A curing hour is defined as any hour during which the curing temperature remains at, or above 45°F. Curing temperature is defined as the temperature of the air measured at the surface of the curing concrete.

Curing temperatures shall be maintained in accordance with the requirements of Table 555-2, *Cold Weather Curing Requirements*. If ambient air temperatures are expected to fall below 45°F, materials and equipment necessary to maintain required curing temperatures shall be present on the site or readily available. The contractor shall provide protection in a timely manner to maintain acceptable curing.

External heat and enclosures to maintain curing temperatures may be required, as determined by the contractors proposed curing methods documented at the Preplacement Meeting. Enclosures are defined as those materials, combinations of materials, or systems that provide for uniform temperature and curing management of the concrete. If enclosures are required, they shall be constructed in such a way that all surfaces of the fresh concrete shall be maintained between 45°F and 80°F for the curing period. On structures where bottom formwork is not required, the existing superstructure materials may be considered for their insulating values provided all curing temperature requirements are maintained. If the Contractor expects to, or will, perform work when ambient temperatures are below 45°F, the enclosure shall be constructed in such a manner that work can be performed inside the enclosure without exposing any concrete to a temperature below 45°F. All concrete surfaces within heated areas shall be protected from drying by the use of live steam or use of continuously wetted burlap. All concrete surfaces within heated areas shall be protected from surface disintegration of fresh concrete due to an accumulation of carbon dioxide gas by properly venting the enclosure or use of non-combustion type heating systems.

Continuously recording thermometers shall be placed on both the top and underside of the deck to monitor areas where extreme cold or heat can be expected. Multiple thermometers may be required as directed by the Engineer. On structures where bottom formwork is not required and the existing superstructure materials are

PROVISIONS FOR CONCRETING IN COLD WEATHER

considered for their insulating value, temperatures shall be monitored at the interface between the existing superstructure materials and new concrete using continuously recording thermocouples and thermometers.

A maximum temperature differential of 30° F between any two locations within any form of enclosure, heated or otherwise, shall be maintained at all times.

When the ambient temperature is 45°F or greater, an enclosure may be removed for access to progress additional work providing there is a temperature difference of 30 Fahrenheit degrees or less between the air and the surface of the concrete. If the temperature difference between the air and the surface of the concrete is greater than 30 Fahrenheit degrees, temperatures shall be gradually reduced at a rate not to exceed 1°F/hr until the temperature difference is equal to or less than 30 Fahrenheit degrees. If an enclosure is removed, all heating in other areas shall cease until such time that the enclosure is replaced. Upon completion of the incidental work and replacement of the enclosure, the Contractor shall reestablish acceptable curing temperature differentials, with a maximum temperature differential not more than 30 Fahrenheit degrees between any two locations within the enclosure.

After seven (7) curing days, the Contractor may perform work on the structure to complete sidewalks, safety walks, curbs, and barriers. Work shall progress only when ambient temperatures are 45°F or greater or within an enclosure as described above. Incidental work shall not cause damage to the structure.

For all incidental work, the requirements of §557-3.14, *Loading Limitations for Superstructure Slabs*, shall apply.

B. Structural Approach Slabs, Curbs, Sidewalks and Safety Walks on Bridges.

The provisions of 557-3.12 A *Superstructure Slabs* shall apply except the curing duration shall be 7 days (168 hours). After three (3) curing days, the Contractor may perform work on approach slabs to complete sidewalks, safety walks, curbs, and barriers. Work shall progress only when ambient temperatures are 45°F or greater or within an enclosure as described above. Incidental work shall not cause damage to the structure.

For structural approach slabs, the requirements of §557-3.15 *Loading Limitations for Structural Approach Slabs, Sidewalks, and Safety Walks on Bridges*, shall apply.

C. Saw Cut Grooving.

When concrete is placed, cured, or dried under cold weather provisions, and a surface treatment option requiring saw cut grooving is used, saw cut grooving may be commenced after 7 curing days and shall be completed prior to commencing the drying period. Work shall progress only when ambient temperatures are 45°F or greater or within an enclosure as described in §557-3.12 A. Care shall be taken to prevent damage to the structure and no chipping or spalling of concrete shall occur at the sawcut edges.

D. Winter Surface Treatment - Superstructure Slabs and Structural Approach Slabs.

Upon completion of the curing period, the Contractor shall progress one of the following two options:

1. **Option 1.** The top surface and fascias of the superstructure slab shall be air dried for 10 days before being sealed with a penetrating sealer or exposed to freezing temperatures. Saw cut grooving shall be completed, as described above, prior to application of penetrating sealer. External heat and enclosures to maintain drying temperatures may be required. Drying shall be achieved by the following:
 - a. Providing free air flow and maintaining temperatures between 45°F and 80°F to the top surface and fascias (vertical faces) of the superstructure slab. Fascia forms shall be removed to allow for free air flow.
 - b. Drying of the underside of the structure, and of the fascias when a concrete barrier is to be placed on the superstructure slab, will not be required. However, ambient temperatures shall be maintained between 45°F and 80°F in these areas for the duration of the drying period.
 - c. The drying period shall be continuous except that aggregate drying hours may be allowed when a contractor ceases free air flow for any reason but protects the drying concrete from exposure to any additional water. Exposure to any additional water, beyond minor leakage thru an enclosure in limited

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areas, will require the drying period to re-commence for 10 days. Any 3 hour period of time, or fraction thereof, when the concrete is exposed to minor leakage shall not be counted as part of the drying period. Minor leakage shall be defined as water that dries or evaporates in 3 hours or less. Limited areas are defined as areas less than 100 ft². The total area of allowable minor leakage shall not exceed 5% of the concrete area under drying conditions. The same area of concrete shall not be exposed to minor leakage more than twice. Areas that exceed 100 ft² or are exposed to additional water that does not dry or evaporate in less than 3 hours, may be dried independently to accommodate removal of the original enclosure. Any independent enclosures shall be maintained under the same temperature and air flow requirements as the original enclosure for 10 days.

d. Means of accelerating the drying process will be considered by the Director, Materials Bureau, to achieve an internal moisture content of 85% relative humidity or less, measured at a depth of 1 inch from any concrete surface.

Once the drying period is complete, temperatures shall be gradually reduced at a rate not to exceed 1°F/hr until the temperature within the enclosure equals the temperature outside the enclosure. Application of a penetrating sealer, in accordance with other items shall be completed before opening the superstructure slab to traffic.

2. Option 2. The top surface and fascias of the superstructure slab shall be air dried for 24 hours before being sealed with an interim application of penetrating sealer or being exposed to freezing temperatures. No saw cut grooving will be performed. External heat and enclosures to maintain drying temperatures may be required. Work shall be progressed by doing the following:

a. Providing free air flow and maintaining temperatures between 45°F and 80°F to the top surface and fascias of the superstructure slab. Fascia forms shall be removed to allow for free air flow.

b. Drying of the underside of the structure, and of the fascias when a concrete barrier is to be placed on the superstructure slab, will not be required. However, ambient temperatures shall be maintained between 45°F and 80°F in these areas for the duration of the 24 hour drying period. Application of interim penetrating sealer shall be completed before opening the superstructure slab to traffic.

c. After April 1st the contractor shall clean the deck of debris and provide necessary site access. The Department will inspect the superstructure slab for freeze / thaw or scaling damage. Damage shall be defined as:

(1) Delaminations

(2) Surface defects as follows:

- Total combined area greater than 50 ft² with a scaling rating of 3 or greater as defined by ASTM C-672.
- Total combined area greater than 10 ft² where the surface distress is greater than 3/16 inch deep.

(3) Pop-outs – surface imperfections greater than 3/4 inch in diameter

d. If the above described damage exists, the Contractor shall repair any damaged or defective concrete greater than 3/16 inch deep by saw cutting the perimeter of the area to a depth of 3/4 inch, chipping any unsuitable material to 1-1/2 inch or sound concrete (whichever is deeper) with light, hand held, pneumatic tools, at a 45 degree angle into the repair area. Clean all repair area surfaces thoroughly by blast cleaning. Repair small areas 3 ft² or less using approved concrete repair material that provides a permeability less than 1200 coulombs, Item 701-04, preparing the surface according to the material manufacturer's recommendations. Repair larger areas using Class DP concrete, preparing the surface according to §584-3.02 and 584-3.03. Cure Class DP concrete for 7 days.

e. After all necessary repairs are completed, the Contractor shall perform diamond grinding to the

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entire superstructure slab and approach slabs, to within 1 foot of any curb or barrier. Diamond grinding shall be performed as follows:

- (1) The depth of the grinding shall be approximately 3/16 inch to obtain a smooth texture.
- (2) In all travel lanes, use equipment having gang-mounted diamond saw blades on a multi-blade arbor specifically designed for PCC pavement or superstructure production grinding. Using equipment capable of producing a 3 ft wide (minimum) grinding pass that is equipped with a vacuum system capable of removing slurry from the bridge deck surface, such as the Target 3800, Boart-Longyear (Kushion Kut) PC5000 or PC600, or equal as approved by the Director, Materials Bureau. Smaller diamond grinding equip shall be used as necessary to complete grinding adjacent to curbs or barriers. The Contractor shall submit requests to use other equipment at least 7 days prior to the start of grinding operations.
- (3) Begin and end diamond grinding lines normal to the bridge deck centerline. Grind the bridge deck longitudinally such that at least 95% of the bridge deck surface is ground and the bridge deck is in the same plane across a joint or crack when measured with a 3 ft (minimum) straightedge. When steel joints are specified, joints shall be placed to allow for the required grinding of 3/16 inch. Feathering of the grinding operation at steel joints shall be kept to a minimum. Provide surface drainage by maintaining the proper cross-slope on the finished surface and by blending adjacent passes. Regrind the bridge deck if an acceptable surface is not being obtained.
- (4) Continuously remove slurry from the bridge deck using the vacuum system on the grinding equipment. If required, provide equipment capable of transporting the slurry from the job site to an acceptable waste area or facility, without spilling.
- (5) Traffic may be allowed on ground areas after slurry removal is complete or on decks where only partial diamond grinding is complete.
- (6) After diamond grinding is complete, concrete shall be saw cut grooved according to contract documents and specifications for saw cut grooving, followed by penetrating sealer application placed in accordance with contract documents and specifications for penetrating sealers.

E. Winter Surface Treatment –Curbs, Sidewalks and Safety Walks on Bridges.

Upon completion of the curing period, concrete shall be air dried for 24 hours by providing free air flow and maintaining temperatures between 45°F and 80°F to all concrete surfaces. The drying period shall be continuous. Upon completion of drying, curbs, sidewalks and safety walks shall be sealed with a penetrating sealer in accordance with contract documents.

Page 366 Under §557-3.15, *Loading Limitations for Structural Approach Slabs, Sidewalks, and Safety Walks on Bridges*, **add the following before the first sentence:**

During the curing period, approach slabs may be subjected to a vehicle load not to exceed 10 tons, or a wheel load not to exceed 3 tons.

Page 367 Delete §557-4, METHOD OF MEASUREMENT, and **replace it with the following:**

557-4 METHOD OF MEASUREMENT. The work will be measured for payment in square yards of superstructure slab, approach slab, or sidewalk and safety walks installed, measured to the nearest 0.1 square yards.

Winter surface treatment of superstructure and approach slabs will be measured for payment in square yards of superstructure and approach slab, measured to the nearest 0.1 square yard.

Page 367 Delete §557-5, BASIS OF PAYMENT and **Replace it with the following:**

557-5 BASIS OF PAYMENT. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work. Unless otherwise provided, the unit price bid shall include the cost of

PROVISIONS FOR CONCRETING IN COLD WEATHER

furnishing and placing bar reinforcement, wire fabric for concrete reinforcement, copper flashing, flexible water stops, mechanical connectors where specified, sheet packing, water for wetting, joint sealing compounds, joint fillers, concrete curing materials, including any materials for temperature management during the curing period and the cost of screed rail supports and other brackets or braces necessary to support finishing machines.

If permanent metal forms are used, the cost of furnishing all facilities required for access, removing the permanent forms for inspection or repair purposes, painting the cut edges of the forms and repairing the concrete as required herein shall be included in the price bid for this work.

No extra compensation for corrective finishing or repairs to damaged or defective concrete will be paid.

Progress payments will be made on a per-span basis as follows:

Forty (40) percent of the area will be paid for after all reinforcing is properly placed. Forty (40) percent of the area will be paid for after the concrete has been properly placed and proper curing applications have been instituted.

The remainder will be paid for after completion of all curing, and necessary corrective work.

The unit price bid for Surface Treatment of Superstructure and Approach Slabs shall include all labor, materials and equipment necessary to satisfactorily complete the work including work zone traffic control for work associated with deck cleaning, evaluation, and diamond grinding. The cost for interim penetrating sealer applied under §557-3.12C.2., prior to the concrete being exposed to freezing conditions, shall be included in this item. The cost for saw cut grooving and final application of penetrating sealer will be paid for under separate items and paid for only once.

Winter Surface treatment – Superstructure Slabs and Structural Approach Slabs shall only be paid when environmental conditions related to temperature and moisture protection during the drying period require use of enclosures

Page 367 Add the following contract pay item to the list:

557.29	Winter Surface Treatment – Superstructure Slabs and Structural Approach Slabs	Square Yard
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DISPOSAL OF PAINT REMOVAL WASTE

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 422, **Delete** Section 571 *Treatment and Disposal of Paint Removal Waste* in its entirety and **Replace** it with the following:

SECTION 571 - DISPOSAL OF PAINT REMOVAL WASTE

571-1 DESCRIPTION. The work shall consist of managing, accumulating, packaging, labeling, loading, transporting, treating, and disposing paint removal waste.

571-1.01 Paint Removal Waste. Paint removal waste consists of removed paint particles combined with material used to remove the paint and any organic or inorganic materials from bridge surfaces, by either bridge washing or blast cleaning operations, without use of any added chemical solvents. All testing of the paint removal waste necessary to satisfy the requirements of the waste transporter or disposal facility shall be the responsibility of the contractor.

Paint removal waste does not include used tyvek suits, respirator filters, tarpaulins or incidental trash. These incidental wastes generated by the Contractor in completing the work are covered by §107-10 *Managing Surplus Material and Waste*.

A. Hazardous Paint Removal Waste Containing Lead. This shall apply to spent abrasives, coatings and paint chips removed from steel substrates on bridges designated in the contract documents as being lead-based. This does not include waste containing a mixture of lead and asbestos. Waste containing a mixture of lead and asbestos shall be disposed of in accordance with Section 210 *Removal and Disposal of Asbestos-Containing Material (Buildings, Bridges and Highways)*.

B. Non-Hazardous Industrial Solid Paint Removal Waste. This shall apply to spent abrasives and coatings removed from steel substrates on bridges designated in the contract plans as being non-lead-based.

571-2 MATERIALS. The Contractor shall use containers or roll-offs acceptable to the Waste Disposal Facility. The capacity of each container shall be clearly marked on each container in an easily visible location.

571-3 CONSTRUCTION DETAILS.

571-3.01 General. The Engineer will provide the Contractor with the Generator site identification number(s) issued by the USEPA. All paint removal waste shall be deposited and sealed in containers or roll-offs concurrent with generation. The paint removal waste shall be accumulated in clean, dry, weatherproof, watertight containers or roll-offs furnished by the Contractor and shall not be left exposed to the elements at the end of the working shift. All equipment and containers or roll-offs shall meet the requirements of USDOT for transport.

Paint removal waste shall be accumulated, handled, packaged, documented, loaded, transported, treated and disposed in accordance with all applicable Federal and State laws, rules, and regulations.

DISPOSAL OF PAINT REMOVAL WASTE

571-3.02 Paint Removal Waste Composition.

A. Hazardous Paint Removal Waste Containing Lead. Paint chips are known to contain lead and the combined paint removal waste stream is therefore categorized as hazardous waste. The Department has presumed that the waste will test as hazardous. The Contractor shall ensure that only solid paint removal waste is deposited into the containers or roll-offs. The determination has been made that such waste contains less than 2% by weight of organic material. Disposal facilities may refuse to accept paint removal waste that is different than the Typical Paint Waste Composition. Paint removal waste containing additional contaminants added by the Contractor or by the Contractor's operations shall be the responsibility of the Contractor. All testing of the paint removal waste necessary to satisfy the requirements of the chosen Disposal Facility or Transporter shall be the responsibility of the Contractor.

Provided is typical lead-based paint waste information which provides typical chemical and physical properties of paint removal waste based on previous testing, as follows:

Lead-Based Paint Waste Profile: Lead-based paint waste generated by the removal of paint consists of a mixture of abrasive blast media such as boiler slag or steel grit and paint chips. This supplemental information about the waste is provided in accordance with Resource Conservation and Recovery Act (RCRA) regulations. This composition profile does not include waste resulting from removal by chemical strippers for which the resulting waste will contain components of the stripper. Based on the knowledge of the process and the resulting waste material, and on previous testing of typical waste by independent laboratories approved by the NYS Department of health, this composition waste material information has been developed for typical lead-based paint waste.

Process Generating Waste: The waste results from removal of lead-based coatings from painted structures, typically steel bridges, by abrasive blasting, manual, shrouded mechanical, or high-pressure (hp) water methods. The North American industry Classification System Code (NAICS) typically assigned for the site is 23731-Highway, Street, and Bridge Construction.

Composition: To the Department's knowledge, the waste does not contain PCBs, pesticides, cyanides, organic TCLP constituents, dioxins, asbestos, ozone depleting substances, volatile organics or greater than 1000 ppm halogenated organic compounds. The waste is not a RCRA reactive, corrosive or ignitable, or source-listed or chemical product-listed waste. It is not radiological, etiological, explosive, water reactive, or shock sensitive. The specific composition will vary based on the removal method used, abrasive used, the proportion of paint chips to abrasives and other variables determined by the Contractor's operation. For wastes resulting from any chemical stripping of paint, the Contractor shall consider the components and properties of the stripper and the resulting waste mixture to characterize the waste.

The waste typically contains the following:

<u>Removal Method</u>	Approximate %	
	<u>Abrasive</u>	<u>Paint Chips</u>
Boiler Slag (an amorphous mixture of Fe, Al and Ca silicates)	90-95%	5-10%
Steel Grit (% varies by degree of grit recycling)	40-90%	10-60%

DISPOSAL OF PAINT REMOVAL WASTE

No Abrasive (manual, shrouded mechanical and water methods) 0% 100%

Paint Chips: Paint chips contain basic lead silico chromate, titanium dioxide, chromate dioxide, magnesium silicate, linseed oil, alkyd resin, fillers, driers, and other miscellaneous materials.

Other Components: Water may be present from water used during removal. Iron oxide (rust, mill scale) may be present. Animal waste (i.e., feces, guano, nesting materials, etc.) and dirt/miscellaneous debris may also be potentially present.

RCRA Metals: The waste is presumed to contain lead at levels exceeding the regulatory limit of 5 milligrams per liter (approximately 5 ppm) by the Toxicity Characteristic Leaching Procedure (TCLP) test for lead (unless contract documents provided for testing to determine lead toxicity characteristic). Chromium is considered present as an underlying characteristic.

Typical Physical Characteristics:

Physical State – Solid

Color – Black for boiler slag component, or metallic grey/black for steel grit component.

Color varies for paint chips.

Odor – None

pH – Not Applicable

Liquid Flash Point – Not Applicable

Specific Gravity – Approximately 2.7 (boiler slag) and Approximately 7.5 (steel grit)

Bulk Density – Approximately 1.2 kg/l (boiler slag)

Approximately 3.6 kg/l (steel grit)

Free Liquids – None (moisture may be present from water added during removal)

Consolidated Hazardous Waste Information: The following consolidated information for hazardous lead-based paint waste can be used in completing the required items needed for its proper shipment and disposal:

- USDOT Shipping Description – RQ Hazardous Waste, Solid, n.o.s. (D008); 9; NA3077; PG III
n.o.s. = Not Otherwise Specified, PG = Packing Group
- Hazard Label on containers – Class 9
- Placard for shipments exceeding 455 kg or bulk – Class 9
- Hazardous Waste due to the Characteristic Lead Toxicity, Waste Code D008
- Constituents of Concern – Lead and Chromium
- Treatability Group – Non-wastewater
- Treatment Standard – 0.75 mg/L Lead and 0.06 mg/L Chromium by TCLP test
- Reportable Quantity – 4.54 kg or greater
- Markings on Container –
Hazardous waste, solid, n.o.s. (D008); NA3077
HAZARDOUS WASTE – Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the Environmental Protection Agency.
Generator's Name: NYSDOT Region ()
EPA ID Number ()
Manifest Document Number ()

DISPOSAL OF PAINT REMOVAL WASTE

Accumulation Start Date ()
 USDOT Emergency Response Guidebook Guide: 171, Substances (Low to Moderate Hazard)

B. Non-Hazardous Industrial Solid Paint Removal Waste. The Contractor shall ensure that only solid paint removal waste is deposited into the containers or roll-offs. All testing of the paint removal waste necessary to satisfy the requirements of the disposal facility or transporter shall be the responsibility of the Contractor.

571-3.03 Hazardous Paint Removal Waste Containing Lead - Management Requirements.

Employees handling hazardous paint removal waste shall be trained in accordance with 6 NYCRR Part 373-3.2(g) in hazardous waste management procedures including hazardous waste accumulation, preparedness and prevention, contingency and emergency procedures. The Contractor's Preparedness and Prevention Plan, Contingency Plan and Emergency Procedures, and Personnel Training Records, as required by 6 NYCRR Part 373-1.1(d)(1)(iii), shall be submitted to the Engineer for acceptance prior to the generation of any hazardous waste. Containers in storage shall be inspected on at least a weekly basis in accordance with 6 NYCRR Part 373-3.9(b)-(d).

571-3.04 Containers and Labeling. No roll-off shall be filled to a capacity in excess of that marked on the roll-off as the maximum capacity. Once the Engineer determines the quantity within a specific container or roll-off, that container or roll-off shall be properly sealed and not thereafter be tampered with. No additional waste shall be placed in it, nor shall any be removed from it (except for analytical sampling). All containers or roll-offs shall be located in a place secured from traffic and in a manner acceptable to the Engineer. The Contractor shall take measures to prevent the blowing or dispersion of the waste during each loading operation and while being transported.

The Contractor shall label, mark, and placard all containers or roll-offs prior to shipment in accordance with USDOT and NYSDEC regulations. Each container shall have an appropriate label prior to filling with the applicable words identifying its contents as paint removal waste and providing the presumed waste classification of hazardous or non-hazardous industrial waste. The accumulation start date shall be completed at the time when waste is first deposited into each container. All label markings shall be permanent, printed in English, and displayed on a background of contrasting color un-obscured by other labels or attachments. Labeling shall be located away from other markings that could substantially reduce its effectiveness.

571-3.05 Document Preparation.

A. Hazardous Paint Removal Waste Containing Lead. The Contractor shall prepare and distribute all documentation including the Uniform Hazardous Waste Manifest. The Engineer will sign the Generator's Certification on the Uniform Hazardous Waste Manifest. The LDR (Land Disposal Restricted) certification shall be completed and attached to the manifest, as required by 40 CFR Part 268 *Land Disposal Restrictions*.

B. Non-Hazardous Industrial Solid Paint Removal Waste. The Contractor shall prepare and distribute all documentation, including the disposal record forms.

DISPOSAL OF PAINT REMOVAL WASTE

571-3.06 Paint Removal Waste Transport. All paint removal waste shall be in transit to the disposal site from the site of generation no later than 45 calendar days unless otherwise approved by the Engineer, but no longer than 90 days. Any additional required shipment information, including manifest number, shall be entered on the container label(s) prior to shipment offsite. The Contractor shall present evidence that the vehicle that will be used for the shipment is permitted to transport the designated waste in accordance with 6NYCRR Part 364.

Conditions for hazardous paint removal waste transporting vehicles to pick up paint waste debris, in bulk, from one or more bridge sites (multiple collection) for delivery to an authorized Treatment, Storage and Disposal Facility (TSDF) include the following:

A. Hazardous Paint Removal Waste Containing Lead.

- The materials picked up at each site shall be essentially identical in physical and chemical characteristics. No materials, other than paint waste debris, may be included if wastes from several individual generating sites are to be combined on the same truck.
- All of the component shipments are presumed to be D008 hazardous wastes, and disposed as such.
- A manifest is prepared for each generating bridge site. Each manifest shall reflect a bulk shipment, and all manifests being carried by the same transporting vehicle must express the quantity in pounds. In sum total, the manifests accompanying the shipment shall account for the entire quantity transported.
- All component shipments are intended to be conveyed to the same TSDF, and the TSDF has agreed to accept consolidated bulk loads.
- All component shipments shall have originated at sites where the Department is the waste generator. No loads may be included that were generated at a site for which another agency is the waste generator.
- Measures shall be taken to prevent the blowing or dispersion of the paint removal waste during each loading operation and while being transported.
- The weight of waste from each individual site (BIN) shall be provided by the disposal facility.

B. Non-Hazardous Industrial Solid Paint Waste. Conditions for non-hazardous waste transporting vehicles to pick up paint waste debris, in bulk, from one or more bridge sites (multiple collection) for delivery to an authorized disposal facility include the following:

- The materials picked up at each site shall be essentially identical in physical and chemical characteristics. No materials, other than paint waste debris, may be included if wastes from several individual generating sites are to be combined on the same vehicle.
- All component shipments are intended to be conveyed to the same disposal facility, and the disposal facility has agreed to accept consolidated bulk loads.
- All component shipments shall have originated at sites where the Department is the waste Generator. No loads may be included that were generated at a site for which another agency is the waste Generator.
- Measures shall be taken to prevent the blowing or dispersion of the waste during each loading operation and while being transported.
- The weight of waste from each individual site (BIN) shall be provided by the disposal facility.

DISPOSAL OF PAINT REMOVAL WASTE

571-3.07 Conditionally Exempt Small Quantity Generator (CESQG) Exemption. Shipments of non-hazardous paint removal wastes of less than 500 pounds shipped in a single load may be transported without a waste transporter permit as allowed by the Small Quantity Waste Transporter Exemption at 6 NYCRR Part 364.1(e). For activities with generation of hazardous paint removal wastes that meet Conditionally Exempt Small Quantity Generator (CESQG) status (generate less than 220 pounds in any month and store less than 2205 pounds on site at any time), no USEPA ID number is required, the waste can be shipped without a manifest, and a CESQG can self-transport up to 220 pounds of waste in any calendar month to a disposal facility. CESQGs can dispose of their waste at a permitted hazardous waste facility or municipal or industrial solid waste facilities that are permitted to accept that type of waste.

571-3.08 Hazardous Paint Removal Waste Containing Lead Stabilization. Treatment of hazardous paint removal waste, as required by Federal regulations, is presumed to require stabilization of the waste such as mixing it with portland cement and water at a permitted Hazardous Waste Treatment or Disposal Facility. The stabilized waste shall meet the treatment standards of the Federal regulations prior to disposal in a permitted Hazardous Waste Disposal Facility.

571-3.09 Non-Hazardous Industrial Solid Paint Waste Sampling and Analysis. The Contractor shall conduct all sampling and analysis as required by the designated authorized disposal facility as soon as feasible upon waste generation at each non-hazardous designated bridge. Sampling shall be conducted by individuals thoroughly trained in sampling protocols, handling and chain of custody procedures, and laboratory requirements. Accepted sampling practices shall be used to obtain representative composite sample(s) as required for the specific analysis to be completed. Each composite sample shall include a minimum of four distinctly different sampling points. Analyses shall be completed at a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory using NYSDEC Analytical Services Protocols (ASPs). The analysis must include, at a minimum, the RCRA heavy metals analysis using the Toxicity Characteristic Leaching Procedure (TCLP) and a total weight analysis. If analytical results indicate that the waste is hazardous, the waste shall be disposed of as such and the hazardous waste pay item shall be used.

571-3.10 Waste Disposal Facility.

A. Hazardous Paint Waste Containing Lead. Prior to generating any hazardous paint removal waste, the Contractor shall provide the Engineer with a letter from a permitted Hazardous Waste Disposal Facility, stating that the Facility has agreed to accept the hazardous waste generated by the work requirements of this contract; is authorized to accept the hazardous waste under the laws of the State of residence; has the required capacity to treat and dispose of the material; and will provide, or assure the ultimate disposal method indicated on the Uniform Hazardous Waste Manifest. The letter shall be signed by a representative of the Disposal Facility who is legally authorized to sign such an agreement.

B. Non-Hazardous Industrial Solid Paint Waste. Prior to generating any non-hazardous paint removal waste, the Contractor shall provide the Engineer, in writing, the name and location of the permitted solid waste management facility selected for disposal.

DISPOSAL OF PAINT REMOVAL WASTE

571-4 METHOD OF MEASUREMENT.

571-4.01 Hazardous Paint Waste Containing Lead. The quantity of paint removal waste to be measured for payment will be in net pounds of waste disposed of, based on disposal facility weight tickets of the waste as manifested, not including the weight of the containers.

571-4.02 Non-Hazardous Industrial Solid Paint Waste. The quantity of paint removal waste to be measured for payment will be in net pounds of waste disposed of, based on disposal facility weight tickets, not including the weight of the containers.

571-5 BASIS OF PAYMENT.

571-5.01 Hazardous Paint Waste Containing Lead. The unit price bid per pound of paint removal waste shall include the cost of all labor, materials, equipment, sampling, testing, and fees necessary to complete the work based on the assumption that treatment by stabilization will satisfy the applicable Federal regulations. Only waste for which manifest copies (not applicable for CESQG exemption) and weight ticket(s) are returned to the Engineer by the Contractor and Disposal Facility will be authorized for payment. If the Department is fined or penalized as a result of the Contractor's performance or lack thereof, in addition to other remedies the Department may possess, said fine or penalty will be deducted from monies due the Contractor.

571-5.02 Non-Hazardous Industrial Solid Paint Waste. The unit price bid per pounds of paint removal waste shall include the cost of all labor, materials, equipment, sampling, testing, and fees necessary to complete the work. Only waste for which weight ticket(s) are returned to the Engineer by the Contractor and Disposal Facility will be authorized for payment. If the Department is fined or penalized as a result of the Contractor's performance or lack thereof, in addition to other remedies the Department may possess, said fine or penalty will be deducted from monies due the Contractor.

Payment will be made under:

Item No.	Item	Pay Unit
571.03	Disposal of Hazardous Paint Removal Waste Containing Lead	Pound
571.04	Disposal of Non-Hazardous Industrial Solid Paint Removal Waste	Pound

BRIDGE (BIN) PLATE

One Bridge Identification Number (BIN) plate will be required for each bridge in this contract. For each bridge there may, or may not, be an existing BIN plate.

Therefore, one of the following conditions will exist with regard to BIN plates for any particular structure:

Condition No. 1. A BIN plate is attached to the structure but the nature of the work to be done does not require its removal.

Condition No. 2. A BIN plate is attached to the structure and the nature of the work to be done requires its removal.

Condition No. 3. A BIN plate is attached to the structure and is defaced, or otherwise damaged or incorrect.

Condition No. 4. A BIN plate is not attached to the structure.

Under Condition No. 1. the Contractor's sole obligation shall be to protect the plate from damage during the course of the work.

Under Condition No. 2. the Contractor shall be required to remove and store the BIN plate until such time as the BIN plate may be reinstalled without danger of damage. This requirement shall also apply if the BIN plate is being transferred from an existing abandoned bridge to a new in-service bridge. The Contractor shall furnish all necessary expansion anchors.

Under Condition No. 3. the Contractor shall be required to furnish and install a new BIN plate, and remove the damaged BIN plate. The Contractor shall furnish the panel with reflective background, numerals and expansion anchors. IF the BIN number cannot be deciphered the Engineer will supply the number.

Under Condition No. 4. the Contractor shall be required to furnish and install a BIN plate on the completed structure. The Engineer will supply the Bridge Identification Number. The Contractor shall furnish the panel with reflective background, numerals and expansion anchors.

Regardless of which condition governs the BIN plate installation, should damage occur to the BIN plate and the Engineer determines it cannot be repaired, the Contractor shall furnish a new plate consisting of the panel with reflective background, numerals, and expansion anchors at no expense to the State. If the Engineer determines the BIN plate may be repaired, repair shall be done at no expense to the State. This requirement applies to all four conditions.

The material requirements for the three parts of the BIN plate are:

Panel with reflective background. The aluminum panel and reflective background shall conform to the material and fabrication requirements of Material Specification 730-01, Aluminum Sign Panels. The

BRIDGE (BIN) PLATE

background material shall be green reflective sheeting conforming to Materials Specification 730-05.01 (Class A Sheeting). The size of the panels shall be 1/8 inch thick by 3 inch by 12 inch. The panels shall have two 5/16 inch drilled or punched holes for mounting, located 1/2 inch from the ends of the panel and 1 1/2 inch from the top or bottom of the panel. The reflective sheeting used to form the background shall be a minimum of 3 inches wide by 10 inches long, or may be a full 12 inches long.

Numbers. The numbers shall be reflective sheeting conforming to Materials Specification 730-05.01 (Class A Sheeting), except that the adhesive shall be pressure-sensitive such that the numbers can be applied to the background in the field. The numbers shall be 2 inches high and silver-white in color conforming to FHWA series C dimensions.

Prior to placing the cutout numbers on the panel, the reflective background shall be clean and free of dirt and oil which may adversely affect proper adhesion. The numbers shall be placed on the reflective background, perpendicular to the longitudinal axis of the panel, and vertically centered. The reflective background and numbers shall be coated and/or edge sealed in accordance with the recommendations of the sheeting manufacturer.

Expansion Anchors. 1/4 inch diameter by 1 1/2 inch long stainless steel nail drive expansion anchors meeting GSA Specification A-A-1922 shall be used to attach the BIN plates to concrete and masonry surfaces.

The BIN plates shall be attached to the beginning abutment of the bridge using expansions anchors. The plate shall be placed high on the abutment, near the fascia of the bridge.

The cost of this work shall be included in the various items of the contract.

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SECTION 605 - UNDERDRAINS

Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 499 through 502, **Delete** SECTION 605 and **Replace** it with the following:

SECTION 605 – UNDERDRAINS

605-1 DESCRIPTION. The work shall consist of constructing underdrain installations in accordance with these specifications and in conformity with the lines, grades, and cross-sections shown in the contract documents.

605-2 MATERIALS

605-2.01 Underdrain Pipe. Underdrain pipe shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing* for the type of pipe specified in the contract documents:

Corrugated Steel Pipe - Type III, 16 gage	707-02
Porous Concrete Pipe Underdrain	706-05
Extra Strength Porous Concrete Pipe Underdrain	706-05
Perforated Corrugated Polyethylene Underdrain Tubing	706-13
Corrugated Aluminum Pipe - Type III, 16 gage	707-13
Perforated Polyvinyl Chloride Underdrain Pipe	706-18

Optional underdrain pipe shall meet the requirements of any of the above at the Contractors option except that porous concrete pipe shall not be used in an edge of pavement underdrain installation.

605-2.02 Underdrain Filter. The requirements for Underdrain Filter materials are described below. The procedure for acceptance or rejection of Underdrain Filter materials shall be in conformance with the procedures contained in the geotechnical control procedure “*Procedure for the Control and Quality Assurance of Granular Materials*”. Underdrain Filter material shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing* for the type of underdrain filter material specified in the contract documents:

A. Underdrain Filter Type I. Provide material meeting the requirements of §733-20 *Underdrain Filter, Type 1*.

B. Underdrain Filter Type II. Provide material meeting the requirements of §733-20 *Underdrain Filter, Type 2*.

C. Underdrain Filter Type III. Provide material meeting the requirements of §703-07 *Concrete Sand*.

605-3 CONSTRUCTION DETAILS

605-3.01 Underdrain Pipe. The construction details of Section 603 *Culverts and Storm Drains* shall apply. The type of filter material to be used at any location will be as shown in the contract documents. A carefully leveled and compacted bed of this material shall be prepared just prior to the placement of the underdrain pipe. The upgrade end of corrugated polyethylene underdrain pipe shall be closed with a solid plastic cap; the upgrade end of all other types of underdrain pipe shall be closed with a suitable plug. Unless otherwise shown in the contract documents, the underdrain pipe shall be placed with the perforations down. In the event that the semi-circular option of the Steel Pipe underdrain is utilized, the pipe shall be placed such that the flat surface is on the top.

A. Perforated Corrugated Polyethylene Underdrain Tubing and Perforated Polyvinyl Chloride (PVC) Underdrain Pipe. When these underdrains are daylighted through the side slope they shall be protected from sunlight by shielding with a minimum 3 ft. long section of corrugated steel or aluminum pipe at the outlet. The metal pipe for shielding the underdrain shall be of such internal diameter to easily slip over

the underdrain. For 4 in. and 6 in. diameter underdrains, the metal pipe shielding the underdrain shall extend a minimum of 6 in. into the ground and overlap the underdrain by 6 in. For underdrains from 8 in. through 12 in. in diameter, the metal shielding pipe shall extend at least 12 in. into the ground and overlap the underdrain by 12 in. In no case shall the outlet end of the underdrain be exposed or extend beyond the end of the metal pipe shielding it. To prevent intrusion of the filter material into the joint between the metal and underdrains, a reducer fitting shall be placed over the joint, roofing felt shall be wrapped around the joint, or another method shall be approved by the Engineer.

Perforated corrugated polyethylene underdrain tubing and perforated PVC underdrain pipe will melt and burn when exposed to flame. Flame damage or damage by deterioration, crushing or stretching will be cause for rejection.

B. Corrugated Aluminum Pipe. Do not place grout in contact with aluminum pipe, such as at drainage inlet structures, including connections, fixtures, etc., unless the aluminum has been thoroughly coated with Zinc Chromate Primer, §708-04 *Zinc Chromate Primer* or an equivalent alternative as approved by the Materials Bureau.

C. Optional Underdrain Pipe. The Contractor shall not intermix types of underdrain in the same run of pipe.

605-3.02 Underdrain Filter. After the pipe installation has been inspected and approved, Underdrain Filter shall be loosely placed around and over the pipe to such a depth that, after compaction, Underdrain Filter shall extend to a level 6 in. above the underdrain pipe or to the next course, whichever is less. Subsequent lifts of Underdrain Filter shall be no more than 6 in. thick prior to compaction and shall be compacted by two passes of a vibrating pad or drum type compactor. The remainder of the installation shall be in accordance with the applicable standard sheet or as indicated in the contract documents.

If the excavation for the underdrain extends outside the payment lines, it shall be backfilled with Underdrain Filter material installed at the Contractor's expense.

Any contaminated underdrain filter material shall be replaced by the Contractor at no additional cost to the State.

For corrugated polyethylene underdrain tubing, the filter material shall be placed around and over the tubing to such a depth that, after compaction, the underdrain filter material shall extend to a level 12 in. above the underdrain tubing or to the next course, whichever is less. After placement, the surface of the filter material shall be compacted by three passes of a vibrating pad or drum type compactor. The remainder of the backfill shall be placed in maximum 2 ft. loose lift thicknesses and compacted by three passes of a vibrating pad or drum type compactor after the placement of each lift.

In the event that a pipe is not included in this installation, the filter shall be placed in horizontal layers not exceeding 6 in. in thickness prior to compacting. Each lift shall be compacted by two passes of a vibrating pad or drum type compactor.

No compaction control tests will be required.

A. Underdrain Filter at Structures. Underdrain filter at structures denotes the installation of Underdrain Filter, Type I placed behind bridge abutments, walls, and other major structures requiring positive drainage to relieve large lateral pressures resulting from a saturated backfill. Underdrain Filter, Type I material shall be placed adjacent to structures in accordance with the contract documents. The lift thickness for the loose Type I material shall not exceed 6 in. and shall precede the placement of each lift of the adjacent backfill material. A physical barrier may be used to facilitate placement of the Underdrain Filter and adjacent backfill. This barrier shall not be left in place and shall be removed prior to compaction of the material. Each lift of filter material and backfill material located within a minimum distance of the footing heel projection plus 3 ft. shall be compacted simultaneously. Compactive effort for this material shall be provided by two passes of a vibratory or drum type compactor. Placement and compaction operations shall be conducted in a manner so as to ensure that the top surface of each lift of Type I filter material shall not be contaminated by the adjacent backfill materials. No compaction control tests will be required for the Type I filter material.

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SECTION 605 - UNDERDRAINS

605-4 METHOD OF MEASUREMENT

605-4.01 Underdrain Pipe. Underdrain pipe will be measured in feet, measured to the nearest whole foot, installed in accordance with the contract documents.

605-4.02 Underdrain Filter. Underdrain filter material will be measured in cubic yards, measured to the nearest whole cubic yard, installed between the payment lines shown in the contract documents. A deduction to the cross sectional area of the underdrain trench will be made for the pipes (based on nominal diameters) when the combined cross-sectional area exceeds 1.0 sq. ft. No deduction will be made for the cross-sectional area of an existing facility.

A. Underdrain Filter at Structures. Underdrain filter, Type I material at structures will be measured in cubic yards, measured to the nearest whole cubic yard, installed between the payment lines shown in the contract documents. No deduction will be made for the volume occupied by the underdrain pipe.

605-5 BASIS OF PAYMENT

605-5.01 Underdrain Pipe. The unit price bid per foot shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work. The unit price bid per foot for perforated corrugated polyethylene underdrain tubing and perforated PVC underdrain pipe installations that are daylighted through the side slope shall include the shield pipe.

Excavation, granular fill and backfill will be paid for separately.

605-5.02 Underdrain Filter. The unit price bid per cubic yard shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work.

Excavation, granular fill and backfill will be paid for separately.

Payment will be made under:

Item No.	Item	Pay Unit
605.04xx	Porous Concrete Pipe Underdrain	Foot
605.05xx	Extra Strength Porous Concrete Pipe Underdrain	Foot
605.07xx	Corrugated Steel Pipe - Type III	Foot
605.08xx	Corrugated Aluminum Pipe - Type III	Foot
605.0901	Underdrain Filter, Type I	Cubic Yard
605.1001	Underdrain Filter, Type II	Cubic Yard
605.1101	Underdrain Filter, Type III	Cubic Yard
605.15xx	Perforated Corrugated Polyethylene Underdrain Tubing	Foot
605.16xx	Perforated Polyvinyl Chloride Underdrain Pipe	Foot
605.17xx	Optional Underdrain Pipe	Foot

Refer to the Standard Contract Pay Item Catalog for full Item Number and full Description.

Section 606 – Type 0 Guide Rail End Terminal

Make the following changes to the Standard Specifications of May 1, 2008 (U.S. Customary Units):

Page 503, in §606-2, *Delete* the line “Guide Rail and Median Barrier Systems (Rustic) 710-25”

Page 504, in §606-2.01, *Delete* the last sentence “Similar hardware associated with Rustic barrier systems shall meet the requirements of §710-25.”

Page 504, *Replace* §606-2.03 through §606-2.05 with the following:

“**606-2.03 Fasteners.** Bolts, nuts and washers shall conform to the following, unless specified otherwise on the plans, standard sheets, manufacturer’s drawings’, or in the contract documents.

Bolts	ASTM A307 Grade A
Nuts	ASTM A563 Grade A or Better
Washers	ASTM F436

Bolts, nuts and washers shall be galvanized in accordance with the provisions of §719-01 Galvanized Coatings and Repair Methods, Type II.

606-2.04 I-Beam Posts for Existing Highway Barrier. I-beam posts for existing highway barrier shall conform to the requirements of §710-14 Galvanized Steel Barrier Posts. Posts shall conform to the details shown on the plans or the latest edition of the standard sheet for the guide railing or median barrier affected. Hardware (nuts, bolts, “J” bolts, offset beams or block-outs, back up plates, washers, and shelf angles) necessary shall conform to the requirements of the current specifications and standard sheets for the highway barrier affected.

606-2.05 Extra Long Guide Rail Posts. Extra long Guide Rail Posts shall conform to the requirements of §710-14 Galvanized Steel Barrier. The posts shall conform to the details for extra long posts shown on the standard sheets or plans.”

Page 505, *Replace* §606-2.10 and §606-2.11 with the following:

“**606-2.10 Corrugated Beam Guide Rail Transition To Bridge Rail, Concrete Barrier and Concrete Parapets.** Corrugated beam rail sections shall conform to the requirements of §710-20. All remaining material shall conform to the requirements of §710-23 except that:

- A. Block-outs and stiffening channels shall conform to ASTM A36.
- B. All components shall be galvanized in accordance with §719-01 *Galvanized Coating and Repair Methods*, Type I or Type II. If required by the plans, the components shall be painted to match the existing railing. Painting shall be done in accordance with Section 657 except that:
 1. Painting with rollers will not be permitted.
 2. Spray painting will be allowed only if the components are painted at a location, away from the work site, acceptable to the Engineer.
- C. Shop drawings will not be required. Approval of the system will be made by the Engineer.

606-2.11 Vacant.”

Page 514 and 515, *Delete* §606-3.17 in its entirety *Replace* with the following: “**606-3.17 Vacant.”**

Page 517, in §606-5.01, *Delete* the third paragraph “Payment for box beam guide rail terminating and buried in a backslope with the posts embedded in rock shall have a payment factor of 2 for the last 20 feet.”

Page 863, in §710-24, **A. GENERAL**, *Delete* the second paragraph “Rustic versions of box beam bursting style Type III End Assembling shall comply with the above requirements except the metal parts exposed to view shall be painted in accordance with '740-03 Painting Galvanized Surfaces”

Section 606 – Type 0 Guide Rail End Terminal

Page 864 through 867, *Delete* **710-25 GUIDE RAIL AND MEDIAN BARRIER STSTEMS (RUSTIC)** in its entirety and *Replace* with the following: “**710-25 Vacant.**”

SECTION 606 – Box Beam Guide Railing End Assembly, Type IIA

Make the following changes to the Standard Specifications of May 1, 2008:

Page 515, in §606-5, **delete** the pay items “606.1201 Box Beam Guide Railing End Assembly Type I” and “606.1202 Box Beam Guide Railing End Assembly Type II “ and **add** the following:

“606.120101 Box Beam End Piece
606.120102 Box Beam Guide Railing End Assembly Type I
606.120103 Box Beam Guide Railing End Assembly Type I with 18 ft Extension
606.120201 Box Beam Guide Railing End Assembly Type IIA”

Page 858, in **710-20 CORRUGATED BEAM GUIDE RAILING AND MEDIAN BARRIER**, under MATERIAL AND FABRICATION REQUIREMENTS **add** the following paragraph:

General: For new installations all components shall be new."

Page 859, in **710-21 BOX BEAM GUIDE RAILING AND MEDIAN BARRIER**, under MATERIAL REQUIREMENTS **add** the following paragraph:

General: For new installations all components shall be new."

Page 860, in **710-22 CABLE GUIDE RAILING**, under MATERIAL REQUIREMENTS **add** the following paragraph:

General: For new installations all components shall be new."

**SECTION 606 – GUIDE RAILING
SHOP BENT AND SHOP MITERED BOX BEAM GUIDE RAIL AND MEDIAN BARRIER**

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 507, **Delete** the last two sentences and Table 606-1 under **§606-3.01D. Erection**, and **Replace** them with the following:

“ Box beam to be installed on a curved alignment shall be shop bent or shop curved in accordance with Table 606-1.

TABLE 606-1 SHOP BENDING AND SHOP MITERING OF BOX BEAM GUIDE RAILING AND MEDIAN BARRIER		
Barrier Type	Shop Bending Required	Shop Mitering Required
Box Beam Guide Railing	Radius over 20 ft and less than 720 ft	Radius of 20 ft or less
Box Beam Median Barrier	Radius over 30 ft and less than 1525 ft	Radius of 30 ft or less

When shop bending or shop mitering of box beam guide railing or box beam median barrier is required, the rail element shall be shop-worked to the radius that the barrier will be installed on.

Corrugated beam guide railing and median barrier shall require shop curving if the radius is equal to or less than 150 feet. When shop curving of corrugated beam is required, the rail element shall be shop-worked to the radius that the barrier will be installed on.”

Page 515, **Delete** §606-4.01 and **Replace** it with the following:

“606-4.01 Cable, Corrugated Beam or Box Beam Guide Railing and Median Barrier. The quantity to be measured for payment will be in feet to the nearest foot of guide railing or median barrier installed, measured along the axis of the railing and between its pay limits as shown on the plans and/or standard sheets. The quantity to be measured for payment will be in feet to the nearest foot of shop bent or shop mitered guide railing or median barrier installed.

If the guide railing does not terminate at an anchorage unit, end assembly, or transition to another type of barrier, but is anchored to a structure, the railing will be measured up to the structure.”

Page 517, **Delete** the second paragraph of §606-5.01 and **Replace** it with the following:

“ Payment for corrugated guide rail and median barrier, or bent box beam guide rail, will be determined using the payment factors for the various typical post spacings listed in Table 606-2. Payment will be the sum of the products obtained by multiplying the unit price bid for a rail or median barrier by the payment factors listed in Table 606-2 for the relevant post spacings and multiplying each of those products by the length of rail having that given post spacing.

Payment for mitered box beam and median barrier with 6 foot post spacings will be made at the unit prices bid. If a reduced post spacing of 3 feet is used for mitered box beam guide rail, the payment will be determined by multiplying the unit price bid by a payment factor of 1.1 for the length installed.”

Page 519, **Remove** the following items from the list of pay items

606.100001 Box Beam Guide Railing (Shop Curved)
606.100101 Box Beam Guide Railing With Extra Long Posts (Shop Curved)
606.110001 Box Beam Median Barrier (Shop Curved)

SECTION 606 – GUIDE RAILING
SHOP BENT AND SHOP MITERED BOX BEAM GUIDE RAIL AND MEDIAN BARRIER

Page 519, **Add** the following pay items:

606.100002	Box Beam Guide Railing (Shop Bent or Shop Mitered)	Foot
606.100003	Box Beam Guide Railing (Shop Mitered)	Foot
606.100102	Box Beam Guide Railing with Extra Long Posts (Shop Bent or Shop Mitered)	Foot
606.100103	Box Beam Guide Railing with Extra Long Posts (Shop Mitered)	Foot
606.110002	Box Beam Median Barrier (Shop Bent or Shop Mitered)	Foot
606.110003	Box Beam Median Barrier (Shop Mitered)	Foot

Page 860, **§710-21 BOX BEAM GUIDE RAILING AND MEDIAN BARRIER, Insert** the following section immediately prior to **BASIS OF ACCEPTANCE**:

“FABRICATION. Curved box beam guide rail or median barrier shall be shop bent or shop mitered in accordance with the following. At the fabricator’s option, the shop mitering process may be used instead of a shop bending process. However, shop bending may not be used in place of shop mitering.

1. Shop Bent Box Beam Guide Railing. Box beam guide rail installed on a curved alignment with a radius above 20 and up to 720 feet shall be shop bent prior to galvanizing. In order to achieve a smooth arc, the bend points shall be placed no farther apart than two feet when the radius is from 20 to 50 feet, no farther apart than three feet when the radius is between 50 and 150 feet, and no farther apart than four feet when the radius is 150 feet or greater.

2. Shop Mitered Box Beam Guide Railing. Box beam guide railing installed on a curved alignment with a radius of 20 feet or less shall be miter cut and welded in the shop prior to galvanizing. For radii less than 12 feet, the average spacing of the cuts shall be approximately 18 inches. For radii from 12 feet to 20 feet, the average spacing of the cuts shall not exceed 24 inches. Cut locations shall be adjusted as needed to avoid bolt holes and post brackets. After the miter cuts are completed, backer bars shall be tack welded to one side of the cut and the miter shall be closed to within a quarter of an inch (+ 0”, -1/8”) and butt welding performed in accordance with AWS D1.1. Section 3.

3. Shop Bent Median Box Beam Barrier. Box beam median barrier installed on a curved alignment with a radius above 30 and up to 1525 feet shall be shop bent prior to galvanizing. For radii between 30 and 60 feet, the bending shall be performed prior to cutting the slots for the post support paddles. In order to achieve a smooth arc, the bend points shall be placed no farther apart than 18 inches.

4. Shop Mitered Box Beam Median Barrier. Box beam median barrier installed on a curved alignment with a radius of 30 feet or less shall be miter cut and welded in the shop prior to galvanizing. For radii less than 12 feet, the average spacing of the cuts shall be approximately 18 inches. For radii of 12 feet or greater, the average spacing of the cuts shall not exceed 24 inches. Cut locations shall be adjusted as needed to avoid post support slots. After the miter cuts are completed, backer bars shall be tack welded to one side of the cut and the miter shall be closed to within a quarter of an inch (+ 0”, -1/8”) and butt welding performed in accordance with AWS D1.1. Section 3.”

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Make the following changes to the Standard Specifications dated May 1, 2008.
Pages 541 to 556, **Delete** Sections 610 – 615 in their entirety and, **Replace** them with the following:

SECTION 610 – GROUND VEGETATION – PREPARATION, ESTABLISHMENT AND MANAGEMENT

610-1 DESCRIPTION.

610-1.01 Topsoil. This work shall consist of furnishing, screening, storing, stockpiling and placing topsoil in accordance with the contract documents and as directed by the Engineer.

610-1.02 Preparation of Subsoil for Turf Establishment. This work shall consist of ground preparation when topsoil is not included in the work prior to establishment of turf in accordance with the contract documents and as directed by the Engineer.

610-1.03 Turf Establishment. The work shall consist of ground preparation and establishing turf in accordance with the contract documents and as directed by the Engineer.

610-1.04 Wildflower Seeding. The work shall consist of ground preparation, furnishing and placing wildflower seeding materials and caring for wildflower areas in accordance with the contract documents and as directed by the Engineer.

610-1.05 Sod. The work shall consist of ground preparation, furnishing, installing and caring for sod in accordance with the contract documents and as directed by the Engineer.

610-1.06 Soil Amendments. The work consists of furnishing and placing soil amendments in accordance with the contract documents and as directed by the Engineer.

610-1.07 Compost. The work consists of furnishing, placing and incorporating compost in accordance with the contract documents and as directed by the Engineer.

610-1.08 Mulch for Planting. The work consists of furnishing and placing mulch, in accordance with the contract documents and as directed by the Engineer.

610-1.09 Permeable Weed Control Landscape Fabric. The work consists of furnishing and placing permeable landscape fabric for weed control, in accordance with the contract documents and as directed by the Engineer.

610-1.10 Watering Vegetation. This work shall include watering turf, sod, wildflower seeding, trees, shrubs, ground covers, vines, other plants, and filling portable drip irrigation systems in accordance with the contract documents and as directed by the Engineer.

610-1.11 Weed Removal. This work shall consist of removal and disposal of all native and non-native weeds including roots from newly established turf and sod areas, wildflower seeded areas, tree and shrub pits and plant beds in accordance with the contract documents and as directed by the Engineer.

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610-1.12 Mowing. This work shall consist of mowing newly established seeded or sodded areas including the removal and disposal of any debris and litter which has accumulated prior to or between mowings, in accordance with the contract documents and as directed by the Engineer.

610-1.13 Mowing Limits Markers. This work consists of furnishing and installing mowing limit markers in accordance with the contract documents and as directed by the Engineer.

610-2 MATERIALS

610-2.01 Topsoil. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*. Excavated material from earthwork operations defined in Section 203 *Excavation and Embankment* that is unsuitable for embankments but conforms to §713-01 *Topsoil* is acceptable.

Topsoil	713-01
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610-2.02 Preparation of Subsoil for Turf Establishment. None specified.

610-2.03 Turf Establishment. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
Seeds	713-04
Mulch For Turf Establishment and Erosion Control	713-11
Mulch anchorage	713-12
Straw	713-19

610-2.04 Wildflower Seeding. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
Seeds	713-04
Mulch For Turf Establishment and Erosion Control	713-11
Mulch anchorage	713-12
Straw	713-19

610-2.05 Sod. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
Topsoil	713-01
Sod	713-14

610-2.06 Soil Amendment. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
Limestone	713-02
Fertilizer	713-03
Mycorrhizal Fungi	713-09
Moisture Retention Additive	713-10
Sulfur	713-17

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610-2.07 Compost. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Compost	713-15
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610-2.08 Mulch for Planting. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Mulch for Planting	713-05
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610-2.09 Permeable Weed Control Landscape Fabric. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Weed Control Barriers	713-18
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610-2.10 Watering Vegetation. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
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610-2.11 Weed Removal. None specified.

610-2.12 Mowing. None specified.

610-2.13 Mowing Limits Markers. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Materials for the Protection of Plants	713-08
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610-3 CONSTRUCTION DETAILS

610-3.01 Topsoil.

A. General. The subsoil within the areas to be covered by topsoil shall be graded so that the completed work after the topsoil is placed shall conform to the specified lines and grades. The Contractor shall scarify or till the surface of the subsoil to a depth of 6 inches before the topsoil is placed to permit bonding the topsoil with the subsoil. Tillage by disking, harrowing, raking or other approved methods shall be accomplished in such a manner that depressions and ridges formed by tillage shall be parallel to the contours.

Topsoil in an unworkable condition due to excessive moisture, frost, or other conditions shall not be placed until its consistency is workable for spreading. Topsoil shall be placed on the designated area and spread to the depth specified in the contract documents or a minimum of 4 inches for turf areas and 3 inches for sod areas.

The finished surface shall be maintained for subsequent contract work such as seeding, sodding, mulching or planting.

The sites of all stockpiles shall be graded and maintained for subsequent contract work. Surplus topsoil will become the property of the Contractor.

Roots and top growth of non-native weeds or invasive species that emerge from topsoil stockpiles or after placement of the topsoil shall be eradicated and disposed of in accordance with §610-3.11 *Weed Removal* immediately upon emergence. Weed removal, treatment and disposal of invasive species will be paid for separately.

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B. Topsoil – Reuse On-Site Materials. Topsoil stripping shall be completed prior to starting the general excavation in an area. The Contractor shall take reasonable care that the topsoil is not contaminated during the stripping and other handling operations.

Topsoil identified for reuse that has a known, established population of invasive species shall be treated to eliminate the presence of invasive species per §610-3.11 *Weed Removal*. The invasive species material shall be disposed appropriately and then the resulting topsoil may be used within the limits. Treatment and disposal of invasive species will be paid for separately.

C. Topsoil – Roadside, Lawn, Special Planting Mix and Acidic. The Contractor shall place topsoil only from approved stockpiles.

D. Topsoil – On-Site Wetland and Wetland Off-Site or Manufactured. The Contractor shall not use topsoil wetlands materials which exhibit the presence of invasive species. Care shall be taken not to impact wetland areas remaining.

On-site wetland topsoil stripping shall be completed prior to starting the general excavation in an area. After stripping, on-site wetland topsoil shall be placed within 24 hours or stored within the contract limits at a location approved by the Engineer.

610-3.02 Preparation of Subsoil for Turf Establishment. Prior to establishment of turf in areas that are not to receive topsoil or other permanent erosion control measures, the Contractor shall remove all loose stones and other objects over 2 inches in size to a 4 inch depth. The Contractor shall mix compost with subsoil in accordance with §610-3.07 B. *Turf Establishment With No Topsoil/ On Subsoil* within the areas to be seeded and grade the surface so that the completed work shall conform to the specified finished lines and grades. Compost will be paid for separately.

610-3.03 Turf Establishment. The Contractor shall coordinate establishment of turf with other site and construction activities.

The Contractor shall clean all equipment involved in turf establishment to remove plants, seeds and propagules prior to commencement of work. Any work to clean equipment shall be at no additional cost to the State.

The Contractor shall apply the seed mix at one and one half to two times the manufacturer's recommended rate. Any method of sowing that does not injure the seeds and achieves even coverage in the process of spreading will be acceptable.

The Contractor shall perform the initial watering and shall spread straw uniformly in a continuous blanket to hide the soil from view or mulch Types I – V as specified in the contract documents. Rolled Erosion Control products shall be installed according to manufacturer's recommendations and paid for separately. Mulch anchorage shall be applied.

The Contractor shall water, mow, and weed the turf establishment areas for the duration of the contract or until turf areas are accepted. Watering, mowing, and weeding to care for the turf will be paid for separately. Any work required to correct initial seeding (installation) shall be done at no additional cost to the State.

A. Turf Establishment – Roadside. Areas will be accepted when:

- free from thin or bare ground greater than one foot in diameter;
- at least 80 percent of the ground surface is covered with established specified permanent turf grass species;

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- they have had one mowing cycle in accordance with §610-3.12 unless conditions prevent mowing, in which case turf grass shall be an average minimum height of 5 inches; and
- they exhibit healthy green color.

B. Turf Establishment- Lawns. Areas will be accepted when:

- free from thin or bare spots greater than six inches in diameter;
- at least 90 percent of the ground surface is covered with established specified permanent turf grass species;
- they have had one mowing cycle in accordance with §610-3.12 unless conditions prevent mowing, in which case turf grass shall be an average minimum height of 3 inches; and
- they exhibit healthy green color.

610-3.04 Wildflower Seeding. The Contractor shall clean all equipment involved in wildflower seeding to remove plants, seeds and propagules prior to commencement of work at no additional cost to the State.

The Contractor shall install wildflower seeding materials in accordance with the contract documents. Any method of sowing that does not injure the seeds and provides soil contact in the process of spreading will be acceptable. The Contractor shall apply the seed mix at twice the seed supplier's recommended rate.

The Contractor shall perform the initial watering and spread straw or mulch Types I – V as specified in the contract documents, uniformly at a rate consistent with seed supplier recommendations. Mulch anchorage is required unless otherwise specified in the contract documents. Wildflower seeding areas will be accepted after the seeding operation is complete. Any work required to correct initial seeding (installation) shall be done at no additional cost to the State.

The Contractor shall water the wildflower seeding areas for the duration of the contract. Watering to care for the wildflower seeding areas will be paid for separately.

610-3.05 Sod. The Contractor shall generally place sod during the seasons identified in Table 610-1 *Sodding Seasons*. The Contractor may request extension of seasons, provided the other conditions are met.

TABLE 610-1 SODDING SEASONS		
Geographic locations	Spring	Fall
R1-Essex, Warren (north of towns of Bolton & Warrensburg), R2-Hamilton, Herkimer (towns of Ohio and Webb) R7-Lewis, St. Lawrence, Franklin, Clinton, Jefferson (east of Rte 81)	4/15-6/30	8/15-10/15
R1- Greene, Rensselaer, Schenectady, Saratoga, Washington, Albany, Warren (towns of Bolton & Warrensburg & south) R2- Montgomery, Fulton, Oneida, Madison, Herkimer (south of town of Ohio) R3,6,9 – All counties R7- Jefferson (west of Route 81)	4/1-6/15	8/15-10/31
R4, 5 & 8- All counties	4/1 – 5/31	8/15 – 10/31
R10, 11- All counties	3/1-4/30	8/21-11/15

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The subgrade of areas to be sodded shall be excavated and firmed to a sufficient depth below the finished grade of the sod to accommodate the tamped or rolled thickness of topsoil and sod. No frozen sod shall be placed nor shall sod be placed on frozen ground surface.

The Contractor shall exercise care to retain the soil existing on the roots of the sod during transporting, handling and transplanting operations.

Sod shall be placed on a minimum of 3 inches of moist topsoil. The topsoil will be paid for separately.

The finished sod soil surface shall be flush with surface of the adjacent soil and adjacent structures. It shall meet the finished grades as shown in the contract documents.

Sod will be accepted when:

- It has been in place a minimum of 60 days after installation,
- It is 95 percent covered with permanent grass species,
- It has had one mowing cycle in accordance with §610-3.12 *Mowing*,
- It exhibits healthy green color,
- It is free from thin, bare or brown spots greater than 6 inches in diameter, and
- It is firmly rooted in the soil.

Sod not meeting the standards for acceptance, shall be re-sodded until a satisfactory turf has been established, at no additional expense to the State.

The Contractor shall water, mow and weed the sodded areas as necessary until contract final acceptance. These items will be paid for separately.

610-3.06 Soil Amendments. The Contractor shall place, apply or incorporate fertilizer, limestone, mycorrhizal fungi, sulfur and/or moisture retention additive where shown in the contract documents.

When mycorrhizal fungi are specified, application rates for turf shall ensure an even distribution of 100,000 propagules minimum per acre for drill seeding and 1,000,000 propagules minimum per acre for hydroseeding. Application rates for planting and Tree Root Zone Treatment, as well as any other aspects of distributing and/or incorporating mycorrhizal fungi, shall be in accordance with the manufacturer's recommendations.

All other amendments shall be mixed with topsoil prior to placing, spread evenly over the surface of turf, wildflower or sod areas, applied within shrub saucers or applied over the plant beds as appropriate, at the rates recommended by the manufacturer or as specified in the contract documents. The method of application shall ensure an even distribution. When hydraulic application is used, the minimum rate of water application shall be in accordance with manufacturer's recommendation.

Trees shall be fertilized using Method No. 1, No. 2 or No. 3 in accordance with the contract documents.

A. Method No. 1. Holes shall be made in the earth about 18 inches deep and 18 inches apart, and located in the outer two-thirds (as measured on the radius) of the circular area lying under the limits of the tree branches. The holes shall be made with a crowbar, soil auger, pneumatic equipment or other approved tools and care shall be taken to avoid injury to the roots. Fertilizer shall be applied at the rate specified; placing equal amounts of fertilizer in the lower 12 inches of each hole.

B. Method No. 2. Fertilizer shall be applied to soil's surface hydraulically at the rate specified with sufficient water to saturate the soil for the area and depth of the tree roots without creating air pockets.

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C. Method No. 3. Fertilizer rate and method of application shall be as specified in the contract documents.

610-3.07 Compost.

A. Existing Soil: The Contractor shall spread 2 inches of Compost Type A or E within the limits shown in the contract documents and tilled into existing soil to a total depth of six inches.

B. Turf Establishment With No Topsoil/ On Subsoil. The Contractor shall spread 2 inches of Compost Type A, D or E within the limits shown in the contract documents and tilled into subsoil to a minimum depth of four inches.

C. Turf Establishment With Topsoil. The Contractor shall mix Compost Type A, D or E with topsoil as specified in the contract documents.

D. Plant Pits or Beds: Compost Type A, D or E shall be applied at a ratio of 1 part compost to 5 parts existing soil.

610-3.08 Mulch for Planting. The Contractor shall apply mulch consisting of wood chips, pine nuggets or shredded bark to the surface of the beds and tree pit areas in accordance with the contract documents. The Contractor shall apply mulch to a uniform depth of 3 inches over the shrub bed and tree pit areas and 2 inches over groundcover beds. The mulch shall be distributed so as to create a smooth, level cover over the exposed soil. Mulch shall not cover plants or be in contact with tree root flare, tree trunks, and plant stems.

610-3.09 Permeable Weed Control Landscape Fabric. Areas where landscape fabric is to be installed shall be smooth, firm, stable and free of rocks, clods, foliage, roots, trash, debris or other material that will prevent the matting from lying in direct contact with the soil surface.

The landscape fabric shall be placed where shown in the contract documents and as required by the manufacturer.

610-3.10 Watering Vegetation. The Contractor shall provide water without damage to plants, mulch, stakes, plant saucers, sod or other areas to be watered. Damage resulting from watering operations shall be repaired at no additional cost to the State.

Watering shall be applied in accordance with §610-3.03 *Turf Establishment*, §610-3.04 *Wildflower Seeding*, §610-3.05 *Sod* or §611-3.01 *General*. Watering for existing vegetation shall be as specified in the contract documents.

Watering shall be applied at the following rates:

A. Turf, Wildflowers, Sod, Planting Beds. In the absence of 1 inch of rainfall within 5 consecutive calendar days the Contractor shall water all turf, wildflowers, sod and planting beds once a week to a depth of 1 inch.

B. Trees and Planting Pits. Between April 1st and November 15th, in the absence of 1 inch of rainfall within 5 consecutive calendar days, the Contractor shall apply water to trees and planting pits

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once per week, except during July and August, when water shall be applied twice per week, with a minimum of 2 days between applications. Soil saucers or portable drip irrigation systems shall be filled once per watering.

610-3.11 Weed Removal. The Contractor shall perform weed removal in accordance with the contract documents. The Contractor shall remove and dispose of weeds including roots prior to flowering and seed formation by manual, chemical or mechanical means. Any method of weed removal that leaves live roots in the soil will not be permitted. An appropriately licensed applicator is required for chemical weed control methods. The Contractor shall ensure the preservation of desirable vegetation. Treatment and removal of invasive species will be paid for separately.

610-3.12 Mowing. The schedule may be modified to accommodate prevailing or forecast weather conditions. The Contractor shall be responsible, prior to each mowing, for the removal and disposal of any debris and litter which has accumulated since the last mowing. Care shall be taken to avoid damage to existing plant materials.

A. Roadside. The Contractor shall mow all turf establishment areas to a height of 5 inches whenever growth reaches 8 inches for the duration of the contract. Clippings shall be left in place.

B. Lawns. The Contractor shall mow all turf establishment areas to a height of 3 inches after initial growth reaches 5 inches, and then mowed to a height of 3 inches whenever a 5 inch height is reached thereafter for the duration of the contract. Clippings shall be mulched in place.

C. Sod. The Contractor shall mow all sodded areas to a height of 3 inches after initial growth reaches 5 inches, and then mowed to a height of 3 inches whenever a 5 inch height is reached thereafter for the duration of the contract. Clippings shall be mulched in place.

610-3.13 Mowing Limits Markers. The Contractor shall install mowing limit markers plumb to a depth in accordance with the manufacturer's instruction.

610-4 METHOD OF MEASUREMENT

610-4.01 Topsoil. The quantity to be measured for payment will be in cubic yards of each type of topsoil measured to the nearest whole cubic yard of topsoil placed, from payment lines shown in the contract documents.

Cross sectioning, for the purpose of determining quantities for payment, will be employed only where payment lines are not shown on the Plans and cannot be reasonably established by the Engineer.

610-4.02 Preparation of Subsoil for Turf Establishment. The quantity to be measured for payment will be in square yards on slope to the nearest whole square yard of subsoil area prepared for turf establishment.

610-4.03 Turf Establishment. The quantity to be measured for payment will be in square yards on slope to the nearest whole square yard of turf established.

610-4.04 Wildflower Seeding. The quantity to be measured for payment will be in square yards on slope to the nearest whole square yard of wildflower seeding.

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610-4.05 Sod. The quantity to be measured for payment will be in square yards on slope to the nearest whole square yard of sod placed.

610-4.06 Soil Amendments. The quantity to be measured for payment will be in pounds to the nearest whole pound or in gallons to the nearest whole gallon of soil amendments (fertilizer, limestone, mycorrhizal fungi, sulfur and/or moisture retention additive) applied.

610-4.07 Compost. The quantity to be measured for payment will be in cubic yards to the nearest whole cubic yard of compost placed or incorporated.

610-4.08 Mulch for Planting. The quantity to be measured for payment will be in cubic yards to the nearest whole cubic yard of mulch placed.

610-4.09 Permeable Weed Control Landscape Fabric. The quantity to be measured for payment will be in square yards on slope to the nearest whole square yard.

610-4.10 Watering Vegetation. The quantity to be measured for payment will be in 1000 gallons (MGal) to the nearest MGal of water applied, determined from approved measuring devices, or by measurement in tanks or containers of known capacity.

610-4.11 Weed Removal. The quantity to be measured for payment will be in square yards on slope weeded per occurrence to the nearest whole square yard.

610-4.12 Mowing. The quantity to be measured for payment will be the number of square yards on slope mowed per occurrence to the nearest whole square yard.

610-4.13 Mowing Limits Markers. The quantity to be measured for payment will be by the number of complete markers satisfactorily installed.

610-5 BASIS OF PAYMENT

610-5.01 Topsoil. The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work, including the handling, storing, stockpiling, and placement.

610-5.02 Preparation of Subsoil for Turf Establishment. The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work

610-5.03 Turf Establishment. The unit price bid shall include the cost of all labor, materials and equipment including initial water, mulch and mulch anchorage as necessary to satisfactorily complete the work.

610-5.04 Wildflower Seeding. The unit price bid shall include the cost of all labor, materials and equipment including initial water, mulch and mulch anchorage necessary to satisfactorily complete the work.

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610-5.05 Sod. The unit price bid shall include the cost of all labor, materials and equipment including initial water, necessary to complete the work. Topsoil bed placed under the sod shall be paid for separately.

610-5.06 Soil Amendments. The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work, including water for hydraulic application.

610-5.07 Compost. The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work

610-5.08 Mulch for Planting. The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work.

610-5.09 Permeable Weed Control Landscape Fabric. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

610-5.10 Watering Vegetation. The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work.

610-5.11 Weed Removal. The unit price bid shall include the cost of labor, materials, and equipment necessary to satisfactorily complete the work.

610-5.12 Mowing. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

610-5.13 Mowing Limits Markers. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

Payment will be made under:

Item No.	Item	Pay Unit
610.0501	Fertilizer	Pound
610.0502	Fertilizer	Gallon
610.06	Limestone	Pound
610.0701	Mycorrhizal Fungi	Pound
610.0702	Mycorrhizal Fungi	Gallon
610.08	Moisture Retention Additive	Pound
610.0901	Sulfur	Pound
610.0902	Sulfur	Gallon
610.10	Compost	Cubic Yard
610.1101	Mulch for Planting Type A, B & D – Wood Chips and Shredded Bark	Cubic Yard
610.1102	Mulch for Planting Type C – USDA-APHIS Protocol Wood Chips	Cubic Yard
610.1103	Mulch for Planting Type E – Pine Nugget	Cubic Yard
610.1201	Permeable Weed Control Landscape Fabric	Square Yard
610.1202	Permeable Weed Control Landscape Fabric with Herbicide	Square Yard
610.13	Weed Removal	Square Yard
610.1401	Topsoil – Reuse On-Site Materials	Cubic Yard
610.1402	Topsoil - Roadside	Cubic Yard

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610.1403	Topsoil - Lawns	Cubic Yard
610.1404	Topsoil - Special Planting Mix	Cubic Yard
610.1405	Topsoil – Acidic	Cubic Yard
610.1406	Topsoil – On-Site Wetland Materials	Cubic Yard
610.1407	Topsoil – Wetland Materials	Cubic Yard
610.15	Preparation of Subsoil for Turf Establishment	Square Yard
610.1601	Turf Establishment - Roadside	Square Yard
610.1602	Turf Establishment -Lawns	Square Yard
610.17	Wildflower Seeding	Square Yard
610.18	Sodding	Square Yard
610.19	Watering Vegetation	1,000 Gallons
610.21	Mowing	Square Yard
610.22	Mowing Limits Markers	Each

SECTION 611 – PLANTING, TRANSPLANTING AND POST PLANTING CARE

611-1 DESCRIPTION.

611-1.01 General. Vacant

611-1.02 Planting. This work consists of furnishing, and planting trees, shrubs, vines, groundcovers and other plants in accordance with the contract documents and as directed by the Engineer.

611-1.03 Transplanting. This work consists of transplanting existing plants from existing locations to new locations in accordance with the contract documents and as directed by the Engineer.

610-1.04 Portable Drip Irrigation System. This work shall consist of furnishing, delivering, placing and removing Portable Drip Irrigation System (PDIS) for watering around newly planted trees and other vegetation in accordance with the contract documents and as directed by the Engineer.

611-1.05 Post-Planting Care. This work consists of the care of newly planted and transplanted trees, shrubs, vines, groundcovers and other plants in accordance with the contract documents and as directed by the Engineer.

611-1.06 Rodent Guards. This work shall consist of furnishing, delivering and placing rodent guards around newly planted trees and other vegetation in accordance with the contract documents and as directed by the Engineer.

611-2 MATERIALS

611-2.01 General. Materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
Topsoil	713-01
Mulch for Landscape Bedding	713-05
Materials for the Protection of Plants	713-08

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Compost 713-15

611-2.02 Planting. Trees, shrubs, vines, groundcovers and other plants shall be as specified under ' 713-06 and as further specified in the contract documents.

611-2.03 Transplanting. Plants shall be existing plants in accordance with ' 713-06.

611-2.04 Portable Drip Irrigation System. The materials shall meet the requirements of the following subsections of *Section 700 Materials and Manufacturing*. Materials may be new or previously used that meet the following material requirements.

Materials for the Protection of Plants 713-08

611-2.05 Post Planting Care. Materials shall meet the requirements of the following subsections of *Section 700 Materials and Manufacturing*.

Pesticides 713-13

611-2.06 Rodent Guards. Materials shall meet the requirements of the following subsections of *Section 700 Materials and Manufacturing*.

Materials for the Protection of Plants 713-08

611-3 CONSTRUCTION

611-3.01 General. Locations for plants shall be as specified in the contract documents. All plants for planting and transplanting shall be protected from damage and drying out, including during transportation, handling or while in temporary storage. No planting or transplanting shall be done when the soil is frozen, saturated (except in wetland conditions) or otherwise in an unsatisfactory condition for working. Planting seasons represent average times of suitable conditions between weather extremes. In general, planting or transplanting shall occur during these seasons. The Contractor may request an extension of the planting seasons.

TABLE 611-1 PLANTING SEASONS					
Planting Seasons	Spring		Fall		
	Deciduous & Evergreen B&B	Deciduous & Evergreen Container Grown	Evergreen B&B	Deciduous B&B	Deciduous & Evergreen Container Grown
(USDA 3b-4a) R1- Essex, Warren (north of towns of Warrensburg & Bolton) R2-Hamilton, Herkimer (towns of Ohio & Webb) R7-Lewis, St. Lawrence, Franklin, Clinton, Jefferson (east of Route 81)	4/15-5/31	4/15-5/31	8/15-9/30	9/15-10/31	8/15 - 10/31
(USDA 4a-5a) R1-Greene, Rensselaer,	4/1-5/15	4/1 - 5/31	8/15-9/30	9/15-11/15	8/15-11/15

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Schenectady, Saratoga, Washington, Albany, Warren (towns of Bolton & Warrensburg & south) R2- Montgomery, Fulton, Oneida, Madison, Herkimer (south of town of Ohio) R3,6,9 – All counties R7- Jefferson (west of Route 81)					
(USDA 5a-6a) R4, 5 & 8- All counties	3/15-5/15	3/15 – 5/31	8/15-10/15	9/15-11/30	8/15-11/30
(USDA 6b-7a) R10, 11- All counties	3/1-5/15	3/1 – 5/31	8/15-10/31	10/1-12/15	8/15-12/15
All Locations	Bare Root stock shall be planted while dormant				

Locations for plants and outlines of areas to be planted shall be staked or marked out on the ground by the Contractor and approved by the Engineer before any plant pits or plant beds are dug. Where non-movable underground obstructions are encountered, the plant pits shall be relocated as approved by the Engineer.

Existing vegetation shall be removed from all new planting beds.

Where an impervious layer of soil (hardpan, fragipan and soils with greater than 20% clay content) is encountered during the excavation of plant pits or beds, all such soil shall be removed up to a depth of one foot beyond required plant pit depth in order to provide adequate drainage for the plant. The pits or beds shall be backfilled with topsoil. Any additional excavation required to properly plant or transplant in impervious soils will be considered extra work.

Planting soil shall be unamended existing soil excavated from the plant pit unless otherwise specified. Watering shall accompany backfilling of plant. The Contractor shall perform the initial watering for backfilling plant so that no voids occur in the plant pit.

No tree shall be staked, guyed or anchored unless otherwise specified in the contract documents.

Mulch shall Type A or B unless otherwise specified in the contract documents and shall be placed at the time of planting or transplanting.

The Contractor shall water, weed and maintain mulch at no cost to the state until the newly planted or transplanted material is accepted.

Plants will be accepted when all specified plants meet the following conditions:

- Species has been verified and plant is in its designated location
- Planted or transplanted in accordance with ANSI A 300, Part 1, 2, 3 and 6 *Standard Practices*
- Planted or transplanted in accordance with 611 Standard sheets
- living, healthy, unimpaired and in an undamaged condition

Watering, if specified, shall begin upon acceptance of the planting or transplanting and unless otherwise specified continue for one year or the duration of the contract, whichever is later. Watering after acceptance shall be performed as required in Section 610-3.09 *Watering Vegetation* and paid for separately. Installation of rodent guards if specified are paid for separately.

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Plants that die after acceptance at any time during the contract duration shall be removed and unless otherwise specified, the surface area shall be restored to the condition of the adjacent surface at no additional cost to the state.

611-3.02 Planting. The Contractor shall notify the Engineer at least four calendar days before intended delivery of plants or planting materials to the site. The Contractor shall furnish the Engineer legible copies of the certificates of inspection of plant materials and documentation for each shipment showing point of origin, sizes, scientific names, quantities, and kinds of materials supplied.

Planting shall be in accordance with ANSI A300 Part 1, 2 and 3 *Standard Practices*.

Pruning at the time of planting shall be limited to the removal of dead, conflicting and broken branches; and to other pruning consistent with good horticultural practice in accordance with ANSI A300 Part 1 *Standard Practices*.

611-3.03 Transplanting. Transplanting shall be in accordance with ANSI A300 Part 1, 2, 3 and 6 *Standard Practices* and accomplished by a digging method intended to preserve the root system intact to the extent practicable. Planting soil shall be unamended existing soil excavated from the plant pit unless otherwise specified. Transplanted stock shall be pruned prior to transplanting in accordance with ANSI A300 Part 1 *Standard Practices*.

The Contractor shall take appropriate measures to avoid damage to plant during the transplanting operation including:

1. Provide trunk and branch Protection.
2. Treat plant with an anti-desiccant prior to being dug up
3. Protect all roots from drying out.
4. Prune damaged plant roots greater than 1 inch in diameter

Plants shall be set in a vertical position.

Where the contract duration allows plants greater than 6 inch DBH shall be root pruned up to one year prior to transplanting.

611-3.04 Portable Drip Irrigation System (PDIS). After the requirements for planting under Section 611 *Planting, Transplanting and Post Planting Care* are completed; the Contractor shall supply and install the required number and size of PDIS as recommended by the manufacturer for the trees planted. Watering shall be performed as required in Section 610-3.09 *Watering Vegetation* and paid for separately. All PDIS that are damaged and or missing shall be replaced at no added cost to the State.

The Contractor shall remove PDIS in the fall prior to the first frost. The PDIS shall remain the property of the Contractor.

611-3.05 Post-Planting Care. If specified, the Contractor shall care for planting as needed for one year following the satisfactory completion of all of the planting and/or transplanting or for the duration of the contract, which ever is later. The contractor shall prepare and submit a post-planting care work schedule for approval.

Post-planting care shall consist of:

1. Mulching – with materials to match those used in initial planting, twice to maintain a depth of 3 inches.
2. Weeding - twice
3. Integrated vegetation and pest management- in the event of threat of serious damage from insects or diseases the plants shall be treated by preventative or remedial measures.
4. Pruning (ANSI A300 Part 1) - once to prune dead or damaged branches.

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5. Maintenance/Replacement/of tree support system if present – once every six months
6. Removal of tree support system if present at the end of the post-planting care period.
7. Removal of rodent guards if present at the end of the post-planting care period

611-3.06 Rodent Guards. Vacant

611-4 METHOD OF MEASUREMENT.

611-4.01 Planting. The quantity to be measured for payment will be the number of plants placed.

611-4.02 Transplanting. The quantity to be measured for payment will be the number of plants placed.

611-4.03 Portable Drip Irrigation System (PDIS). The quantity of PDIS to be measured for payment will be the number of PDIS placed.

The quantity of Removal of Portable Drip Irrigation System to be measured for payment will be the number of PDIS removed.

611-4.04 Post-Planting Care. The quantity to be measured for payment will be the number of plants cared for or nearest whole square yard on slope of plants cared for.

611-4.05 Rodent Guards. The quantity to be measured for payment will be the number of rodent guards placed.

611-5 BASIS OF PAYMENT.

611-5.01 Planting. The unit price bid for each plant shall include the cost of all labor, materials, and equipment, including initial watering and mulch, compost, plants and plant protection materials and topsoil necessary to satisfactorily complete the work.

611-5.02 Transplanting. The unit price bid for each plant shall include the cost of all labor, materials, and equipment, including initial watering, mulch, compost, plant and plant protection materials and topsoil necessary to satisfactorily complete the work.

611-5.03 Portable Drip Irrigation System. The unit price bid shall include the cost of all labor, materials, and equipment, necessary to satisfactorily complete the work.

611-5.04 Post-Planting Care. The unit price bid for each plant shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work. Progress payments for work satisfactorily performed may be paid at the mid point of the post-planting care in amounts not to exceed forty percent (40%) of the unit price bid for the respective work.

611-5.05 Rodent Guards. The unit price bid shall include the cost of all labor, materials, and equipment, necessary to satisfactorily complete the work.

Payment will be made under:

Item No.	Item	Pay Unit
611.011x	Planting - Major Deciduous Trees – size as specified	Each

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611.012x	Planting - Major Deciduous Trees – 1 ¼ inch Caliper	Each
611.013x	Planting - Major Deciduous Trees – 1 ½ inch Caliper	Each
611.014x	Planting - Major Deciduous Trees – 1 ¾ inch Caliper	Each
611.015x	Planting - Major Deciduous Trees – 2 inch Caliper	Each
611.016x	Planting - Major Deciduous Trees – 2 ½ inch Caliper	Each
611.017x	Planting - Major Deciduous Trees – 3 inch Caliper	Each
611.018x	Planting - Major Deciduous Trees – 3 ½ inch Caliper	Each
611.019x	Planting - Major Deciduous Trees – 4 inch Caliper	Each
611.021x	Planting - Minor Deciduous Trees – size as specified	Each
611.022x	Planting - Minor Deciduous Trees – 3 foot height	Each
611.023x	Planting - Minor Deciduous Trees – 4 foot height	Each
611.024x	Planting - Minor Deciduous Trees – 5 foot height	Each
611.025x	Planting - Minor Deciduous Trees – ¾ inch Caliper	Each
611.026x	Planting - Minor Deciduous Trees – 1 inch Caliper	Each
611.027x	Planting - Minor Deciduous Trees – 1 ¼ inch Caliper	Each
611.028x	Planting - Minor Deciduous Trees – 1 ½ inch Caliper	Each
611.029x	Planting - Minor Deciduous Trees – 1 ¾ inch Caliper	Each
611.020x	Planting - Minor Deciduous Trees – 2 inch Caliper	Each
611.031x	Planting - Coniferous Trees – size as specified	Each
611.032x	Planting - Coniferous Trees – 2 ½ foot height	Each
611.033x	Planting - Coniferous Trees – 3 foot height	Each
611.034x	Planting - Coniferous Trees – 4 foot height	Each
611.035x	Planting - Coniferous Trees – 5 foot height	Each
611.036x	Planting - Coniferous Trees – 6 foot height	Each
611.037x	Planting - Coniferous Trees – 7 foot height	Each
611.038x	Planting - Coniferous Trees – 8 foot height	Each
611.039x	Planting - Coniferous Trees – 9 foot height	Each
611.041x	Planting - Deciduous Shrubs – As Specified	Each
611.042x	Planting - Deciduous Shrubs – 15 inch Height/Spread	Each
611.043x	Planting - Deciduous Shrubs – 18 inch Height/Spread	Each
611.044x	Planting - Deciduous Shrubs – 2 foot Height/Spread	Each
611.045x	Planting - Deciduous Shrubs – 3 foot Height/Spread	Each
611.046x	Planting - Deciduous Shrubs – 4 foot Height/Spread	Each
611.047x	Planting - Deciduous Shrubs – 5 foot Height/Spread	Each
611.048x	Planting - Deciduous Shrubs – 6foot Height/Spread	Each
611.051x	Planting - Evergreen Shrubs – As Specified	Each
611.052x	Planting - Evergreen Shrubs – 15 inch Height/Spread	Each
611.053x	Planting - Evergreen Shrubs – 18 inch Height/Spread	Each
611.054x	Planting - Evergreen Shrubs – 2 foot Height/Spread	Each
611.055x	Planting - Evergreen Shrubs – 2 ½ foot Height/Spread	Each
611.056x	Planting - Evergreen Shrubs – 3 foot Height/Spread	Each
611.057x	Planting - Evergreen Shrubs – 3 ½ foot Height/Spread	Each
611.058x	Planting - Evergreen Shrubs – 4 foot Height/Spread	Each
611.059x	Planting - Evergreen Shrubs – 5 foot Height/Spread	Each

x= Root Specification

1= Ball & Burlap, Field Potted or Field Boxed,

2 = Container or Box Grown,

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3 = Bare Root,

4 = In Ground Fabric Bag Grown

611.061y	Planting – Vines, Groundcovers – As Specified	Each
611.062y	Planting – Vines, Groundcovers – Number SP3 Container	Each
611.063y	Planting – Vines, Groundcovers – Number SP4 Container	Each
611.064y	Planting – Vines, Groundcovers – Number SP5 Container	Each
611.065y	Planting – Vines, Groundcovers – Number 1 Container	Each
611.066y	Planting – Vines, Groundcovers – Number 2 Container	Each
611.071y	Planting - Herbaceous Plants – As Specified	Each
611.072y	Planting - Herbaceous Plants – Number SP4 Container	Each
611.073y	Planting - Herbaceous Plants – Number SP5 Container	Each
611.074y	Planting - Herbaceous Plants – Number 1 Container	Each
611.075y	Planting - Herbaceous Plants – Number 2 Container	Each

y = Type Specification

1 = Container Grown, 2 = Bare Root

3 = Field Potted,

611.10	Transplanting 0 to 48 inch in height	Each
611.11	Transplanting over 48 inch to 72 inches in height	Each
611.12	Transplanting, over ¾ inch to 3 inches Diameter at Breast Height	Each
611.13	Transplanting, over 3 inches to 6 inches Diameter at Breast Height	Each
611.14	Transplanting over 6 inches to 12 inches Diameter at Breast Height	Each
611.15	Transplanting Vines, Groundcovers,	Each
611.16	Transplanting Herbaceous Plants	Each
611.17	Portable Drip Irrigation System	Each
611.18	Removal of Portable Drip Irrigation System	Each
611.19	Post-Planting Care	Each
611.20	Post-Planting Care	Square yard
611.21	Rodent Guard	Each

Refer to the Contract Proposal for full item number and full description

SECTION 612 - (VACANT)

SECTION 613 - (VACANT)

SECTION 614 - PRUNING, IMPROVING AND REMOVING EXISTING VEGETATION

614-1 DESCRIPTION.

614-1.01 Pruning Existing Trees. This work shall consist of pruning existing trees as shown in the contract documents and as directed by the Engineer.

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614-1.02 Improvement of Vegetated Areas. This work shall consist of cutting, disposing of all wood and debris, stump removal, or mechanical or chemical treatment of specified trees and woody vegetation within the area shown in the contract documents and as directed by the Engineer.

614-1.03 Tree Removal. The work shall consist of felling trees over 4 inch in diameter at breast height, disposing of all wood and debris, and may require topping, stump removal and other work as shown in the contract documents and as directed by the Engineer.

614-1.04 Existing Stump Removal. The work shall consist of removing existing stumps, disposing of all wood and debris, as shown in the contract documents and as directed by the Engineer.

614-1.05 Tree Root Zone Treatment (Vertical Mulching/Aeration). This work shall consist of treating the root zone of trees through aeration and/or mulching of the roots as shown in the contract documents and as directed by the Engineer.

614-1.06 Tree Root Pruning. This work shall consist of cleanly pruning, existing tree roots severed during construction operations, typically related to linear excavation, as shown in the contract documents and as directed by the Engineer.

614-2 MATERIALS

614-2.01 Pruning Existing Trees. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
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614-2.02 Improvement of Vegetated Areas. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Topsoil	713-01
Pesticides	713-13

614-2.03 Tree Removal. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Topsoil	713-01
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614-2.04 Existing Stump Removal. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Topsoil	713-01
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614-2.05 Tree Root Zone Treatment (Vertical Mulching/Aeration). The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Mortar Sand	703-03
Mycorrhizal Fungi	713-09
Compost	713-15

614-2.06 Tree Root Pruning. The materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
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614-3 CONSTRUCTION DETAILS

614-3.01 Pruning Existing Trees

A. Equipment. Workers shall employ accepted tree climbing methods, and shall not climb trees with climbing spurs. All tools used and methods employed in accordance ANSI A300 Part 1 *Standard Practices*, except that no anvil type pruners will be permitted. The cutting surfaces of all tools, ladders, ropes, soles of workers shoes and other objects coming into contact with the tree shall be disinfected with a 2% bleach solution and dried completely prior to the start of any work on a tree to prevent the spread of plant diseases.

B. Pruning. Pruning shall be in accordance ANSI A300 Part 1 *Standard Practices*. When specified the quantity of trees as shown in the contract documents shall be pruned so the resulting crown retains the growth habit of the tree species. Any and all branches interfering with or hindering the healthy growth of the tree shall be removed. All diseased branches and all dead branches 1 inch or more in diameter shall be removed. Any branch which may be partly dead, yet has a healthy lateral branch at least one-third the diameter of the parent branch shall be removed beyond the healthy branch. All stubs or improper cuts resulting from former pruning shall be removed. All cuts shall be cleanly made with sharp tools as close to the parent trunk or limb as possible without disturbing the branch bark ridge or callus collar. All existing nails, spikes, wire, plastic or other materials found driven into or fastened to the trunk or branches shall be removed or if approved they shall be cut flush in a manner to permit complete healing over.

614-3.02 Improvement of Vegetated Areas. All trees and shrubs specified for removal will be designated by the Engineer either by separate marking, marking in sample areas, or otherwise. Unless otherwise specified, all stumps shall be cut to a height of about 6 inches above the ground. Unless otherwise specified, an approved herbicide shall be applied to all live stumps in accordance with the manufacturer's recommendations. An approved dye shall be added to the herbicide mixture to identify treated stumps and stubble. Where stump removal is specified, all stump holes shall be backfilled with topsoil, unless otherwise specified in the contract documents, and backfill shall be compacted. Unless otherwise specified in the contract documents, grass shall be established on stump holes and will be paid for separately.

Care shall be taken in the felling of trees and the operation of equipment to prevent injury to trees and shrubs which are to be preserved. All injuries to the limbs, bark and roots of such plants shall be repaired in accordance with ANSI A300 Part 1 *Standard Practices Pruning* and ANSI Z133.1 *Arboricultural Operations Safety*.

Improvement of vegetated areas shall be completed in any area before any planting, seeding or other landscape work is begun in that area unless otherwise approved.

All wood, stumps, brush and other debris resulting from the work shall be disposed of as specified in Section 201 *Clearing and Grubbing*.

614-3.03 Tree Removal. No tree shown in the contract documents or listed for removal shall be cut until it is approved by the Engineer. The contractor shall be responsible to coordinate all work involving utilities with the respective utility company. All trees shall be topped and limbed before felling unless otherwise approved. All injuries to the limbs, bark and roots of plants to remain shall be repaired in

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accordance with ANSI A300 *Standard Practices Pruning* and ANSI Z133.1 *Arboricultural Operations Safety*.

The Contractor shall field measure all trees at 4 ½ feet above the ground, commonly referred to as Diameter Breast Height (DBH) before they are cut.

Stumps of trees removed under this item for removal shall be grubbed, cut, ground to the depth of six inches below grade or as specified in the contract documents. All stump holes shall be backfilled with topsoil, unless otherwise specified in the contract documents and backfill shall be compacted. Unless otherwise specified in the contract documents, grass shall be established on stump holes and will be paid for separately.

614-3.04 Existing Stump Removal. Existing stumps listed for removal in the contract documents shall be ground to the depth of 6 inches below grade unless otherwise specified in the contract documents. Stumps shall include all visible wood and roots. Backfill to finished grade with topsoil, unless otherwise specified in the contract documents. The backfill shall be compacted. Unless otherwise specified in the contract documents, grass shall be established on stump holes and will be paid for separately.

614-3.05 Tree Root Zone Treatment (Vertical Mulching/Aeration). Locations of work shall include areas within the dripline or wider root zone of existing trees to be preserved as shown on the contract documents.

Appropriate drilling tools shall be used for drilling of holes for root zone restoration. Drilling equipment shall be hand held or light weight devices (no heavy machinery) so as to avoid further impact to tree roots through compaction.

Holes shall be drilled and existing soil removed within a zone beginning 3 feet from the trunk of the specified tree and extending to its dripline on an approximately 2 foot x 2 foot grid. Dimensions of holes or drill size shall be approximately 2 inches in diameter and a minimum of 12 inches deep. Efforts should be made to minimize drilling through large tree roots (especially near the trunk). When woody roots are encountered, the drill hole shall be moved to avoid root damage.

The hole shall be completely filled to original grade as follows:

Method 1: with mortar sand

Method 2: with mortar sand amended with Mycorrhizal Fungi.

Method 3: with compost.

Method 4: with compost amended with Mycorrhizal Fungi.

When mycorrhizal fungi are specified, they shall be a dry granular powder specifically designed for vertical mulching applications. Apply in accordance with the manufacturer's recommendations at a rate of 3 ounces per hole or when pre-mixed in bulk 5 pounds per cubic yard of sand or compost.

614-3.06 Tree Root Pruning. Existing tree roots greater than 1 inch in diameter, measured at the edge of excavation, shall be pruned within 24 hours of the time they have been damaged by construction activity. The severed root shall be pruned at the edge of excavation, or 1 inch beyond the entire damaged portion of the tree root if damaged root extends beyond the edge of excavation into undisturbed soil. Pruning shall be in accordance with ANSI A300 Part 1 *Standard Practices Pruning* and ANSI Z133.1 *Arboricultural Operations Safety*. All cuts shall be cleanly made with sharp tools. The cutting surfaces of all tools, ladders, ropes, soles of workers shoes and other objects coming into contact with the tree roots shall be washed with a disinfectant at the start of any work on a tree to prevent the spread of plant diseases.

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The excavated area around the existing tree roots shall be backfilled as soon as construction activities permit with the specified or approved materials. If the excavated area around the existing tree roots is not backfilled within 24 hours, all roots shall be kept moist, to prevent dessication.

614-4 METHOD OF MEASUREMENT

614-4.01 Pruning Existing Trees. The quantity to be measured for payment will be the number of trees pruned.

614-4.02 Improvement of Vegetated Areas. The quantity to be measured for payment will be in square yards measured to the nearest whole square yard of area improved.

614-4.03 Tree Removal. The quantity to be measured for payment will be the number of trees, including their stumps if specified.

614-4.04 Pre-Existing Stump Removal. The quantity to be measured for payment will be the number of pre-existing stumps removed.

614-4.05 Tree Root Zone Treatment (Vertical Mulching/Aeration). The quantity to be measured for payment will be in square yards treated within the zone, measured to the nearest square yard.

614-4.06 Tree Root Pruning. The quantity to be measured for payment will be in feet to the nearest whole foot, along excavation line.

614-5 BASIS OF PAYMENT

614-5.01 Pruning Existing Trees. The unit price bid shall include the cost of labor, materials, and equipment necessary to satisfactorily complete the work.

614-5.02 Improvement of Vegetated Areas. The unit price bid shall include the cost of labor, materials, and equipment necessary to satisfactorily complete the work.

614-5.03 Tree Removal. The unit price bid shall include the cost of labor, materials, and equipment necessary to satisfactorily complete the work.

When trees are specified in the contract documents for removal, payment for each tree removal will include removal of the stump.

614-5.04 Existing Stump Removal. The unit price bid shall include the cost of labor, materials, and equipment necessary to satisfactorily complete the work.

614-5.05 Tree Root Zone Treatment. The unit price bid shall include the cost of labor, materials, equipment and incidentals necessary to complete the work. Mycorrhizal Fungi and mulch will be paid for separately.

614-5.06 Tree Root Pruning. The unit price bid shall include the cost of labor, materials, equipment and incidentals necessary to complete the work.

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Payment will be made under:

Item No.	Item	Pay Unit
614.0411	Care of Trees up to 12" Diam. at Breast Height – Pruning	Each
614.0421	Care of Trees Over 12" to 24" Diam. at Breast Height - Pruning	Each
614.0431	Care of Trees Over 24" to 36" Diam. at Breast Height - Pruning	Each
614.0441	Care of Trees Over 36" to 48" Diam. at Breast Height – Pruning	Each
614.0451	Care of Trees Over 48" to 60" Diam. at Breast Height – Pruning	Each
614.0461	Care of Trees Over 60" Diam. at Breast Height – Pruning	Each
614.05	Improvement of Vegetated Areas	Square Yard
614.0601nn	Tree Removal Over 4" to 6" Diam. Breast Height	Each
614.0602nn	Tree Removal Over 6" to 12" at Breast Height	Each
614.0603nn	Tree Removal Over 12" to 18" at Breast Height	Each
614.0604nn	Tree Removal Over 18" to 24" at Breast Height	Each
614.0605nn	Tree Removal Over 24" to 36" at Breast Height	Each
614.0606nn	Tree Removal Over 36" to 48" at Breast Height	Each
614.0607nn	Tree Removal Over 48" to 60" at Breast Height	Each
614.0608nn	Tree Removal Over 60" to 72" at Breast Height	Each

nn = *Stump Treatment*

01 = *Stumps Cut to Above Grade*, 02 = *Stumps Cut Flush*,

03 = *Stumps Cut to Below Grade*, 04 = *Stumps Grubbed*

614.0701	Pre-Existing Stump Removal up to 24" diameter at 6 inches above grade	Each
614.0702	Pre-Existing Stump Removal over 24" to 48" diameter at 6 inches above grade	Each
614.0703	Pre-Existing Stump Removal over 48" diameter at 6 inches above grade	Each
614.08	Tree Root Zone Treatment (Vertical Mulching/Aeration)	Square Yard
614.09	Tree Root Pruning	Feet

SECTION 615 LANDSCAPE APPURTENANCES

615-1 DESCRIPTION. The work in this section shall include all work required for furnishing, placing, and/or special construction of landscape appurtenances.

615-2 MATERIALS. As specified in the special specifications.

615-3 CONSTRUCTION DETAILS. As specified in the special specifications.

615-4 METHOD OF MEASUREMENT. As specified in the special specifications.

615-5 BASIS OF PAYMENT. As specified in the special specifications.

Make the following changes to the Standard Specifications dated May 1, 2008.
Pages 893 to 906, **Delete** Section 713 in its entirety and **Replace** it with the following:

SECTION 713 - LANDSCAPE DEVELOPMENT MATERIALS

02528=2008:**610-615,713**
L09/06/12

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713-01 TOPSOIL

SCOPE. This specification covers the material requirements for topsoil for use in turf establishment, wildflower seeding, sodding, and planting.

MATERIAL REQUIREMENTS. Topsoil may be naturally occurring or may be manufactured. If naturally occurring topsoil exists on the site it shall be the surface layer of soil at a depth specified in the contract documents or approved by the engineer.

Manufactured topsoil is a mixture of materials comprised of a mineral(soil) component that by itself does not exhibit the properties and characteristics of topsoil, an organic material component consisting of compost(s) meeting the requirements of §713-15 *Compost*, and amendment(s), such as limestone meeting the requirements of §713-02 *Limestone* that, when combined together, meet the requirements for topsoil. For manufactured topsoil the contractor shall thoroughly mix the organic portion with the granular portion under dry conditions.

Topsoil shall be free from refuse, material toxic or otherwise deleterious to plant growth, subsoil, sod clumps, seeds or other viable propagules of invasive plants, woody vegetation and stumps, roots, brush, refuse, stones, clay lumps, or similar objects. Construction and demolition debris as classified under 6 NYCRR Part 360, other than uncontaminated land clearing debris, shall not be used to manufacture or amend topsoil. Sod and herbaceous growth such as grass and non-invasive weeds need not be removed but shall be thoroughly broken up and mixed with the soil during handling or manufacturing operations.

A. Topsoil-Reuse of On-Site Materials. Existing topsoil stripped and reclaimed in accordance with Section 203 *Excavation and Embankment* taken from sites within the contract limits. The general limits and depth of the material to be utilized for topsoil will be indicated in the Contract documents. Where no depth is indicated it shall be 6 inches. Topsoil shall be stored on site. Based on visual inspection by the Engineer, topsoil may require screening to meet this requirement.

Gradation:	
Sieve Size	Percent Passing by Weight
2 inch	100
1 inch	85 to 100

B. Manufactured or Offsite Materials.

1. Topsoil -Roadside

- The pH of the material shall be between 5.5 and 7.6.
- The organic content shall be not less than 3% or more than 8%

Gradation:	
Sieve Size	Percent Passing by Weight
2 inch	100
1 inch	85 to 100
1/4 inch	65 to 100
No. 200	20 to 65
2 Micron	0 to 20

2. Topsoil -Lawn

- The pH of the material shall be between 5.5 and 7.6.

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-The organic content shall be not less than 6% or more than 12%

Gradation:	
Sieve Size	Percent Passing by Weight
1 inch	100
No. 10	90 to 100
No. 40	45 to 80
No. 200	25 to 70
2 Micron	5 to 35

3. Topsoil -Special Planting Mix

-The pH of the material shall be between 5.5 and 7.0.

-The organic content shall be not less than 10% or more than 15%,

Gradation:	
Sieve Size	Percent Passing by Weight
2 inch	100
1 inch	85 to 100
1/4 inch	65 to 100
No. 200	20 to 40
2 Micron	5 to 35

4. Topsoil - Acidic

-The pH of the material shall be between 4.8 and 6.0.

-The organic content shall be not less than 6% or more than 15%.

Gradation:	
Sieve Size	Percent Passing by Weight
1 inch	100
No. 10	90 to 100
No. 40	25 to 70
No. 200	5 to 10
2 Micron	5 to 35

C. Topsoil- Wetland

1. Topsoil - On-Site Wetland Materials. Existing wetland soil stripped and reclaimed from existing impacted delineated wetlands sites in accordance Section 203 *Excavation and Embankment* taken from within the contract limits and to the depth specified in the contract documents. This wetland soil shall be exempt from the Sampling & Testing requirements.

2. Topsoil - Offsite or Manufactured Wetland Materials. These materials shall meet the following requirements:

The pH of the material shall be between 5.0 and 7.0.

The organic content shall be not less than 15% or more than 20% dry weight basis and be comprised of leaf or well rotted manure compost meeting the requirements of §713-15 *Compost*.

Granular material shall be naturally occurring mineral soil

Gradation:	
Sieve Size	Percent Passing by Weight

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No. 16	100
No. 40	85 to 100
No. 60	40 to 100
No. 200	5 to 10

The Contractor may amend impacted upland area and manufactured wetland topsoil with approved materials and by approved methods to meet the material requirements.

STOCKPILING, SAMPLING & TESTING.

Topsoil-Reuse of On-Site Materials and Topsoil- On-Site Wetland Materials: Topsoil acquired from sites that are designated in the contract documents are not subject to requirements for stockpiling, sampling, and testing.

Topsoil Types Roadside, Lawns & Special Planting Mix, Acidic, and Topsoil - Manufactured or Offsite Wetland Materials are subject to the requirements for stockpiling, sampling and testing.

Stockpiling. The details for stockpiling methods and requirements may be obtained from the Landscape Architecture Bureau.

Sampling. The details for sampling methods and requirements may be obtained from the Landscape Architecture Bureau.

Samples taken for topsoil amended or manufactured with approved composted biosolids shall be identified as such.

Contractors who believe that an error was made in sampling the topsoil shall, within one work day, indicate the alleged error in writing to the Engineer. The Engineer will respond within 7 calendar days.

TESTING.

Composted Biosolids. Composted biosolids used to amend or manufacture topsoil shall conform to the applicable requirements of §713-15 *Compost*. Composted biosolids shall require a certificate, from a laboratory approved by the NYS Department of Health, verifying compliance with all applicable laws, rules, and regulations. The certification shall be provided to the Engineer by the Contractor prior to the delivery of any composted biosolids, topsoil containing composted biosolids, or other such regulated material to the contract site. The material shall be approved before it is used.

The Contractor shall have topsoil that has been amended with approved composted biosolids or other such regulated material tested to ensure compliance with the pH organic content, and gradation requirements certified by a nationally recognized entity which provides soils laboratory services and provide the laboratory results to the Engineer.

Topsoil Testing. All other material tests required by this section, will be performed by the Department or its designated representative, in conformance with the procedures contained in the appropriate Department publications or test methods. The details for testing methods and requirements may be obtained from the Materials Bureau.

Stockpiles meeting all requirements for pH, organic and gradation may be accepted and used.

Stockpiles that when tested fail to meet requirements for pH or organic may be amended in place. A stockpile that fails to meet gradation requirements may not be accepted. The Contractor shall provide a plan for amending pH and/or organic to the Engineer certified by a nationally recognized entity which provides soils laboratory services. Once the Department accepts the plan and certification the Contractor may amend the stockpile. Re-testing of the stockpile is not required prior to placing the topsoil materials.

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BASIS OF ACCEPTANCE. Topsoil-Reuse of On-Site Materials and Topsoil- On-Site Wetland Materials will be accepted on the basis of a visual inspection.

Topsoil - Roadside, Topsoil – Lawns, Topsoil - Special Planting Mix, Topsoil - Acidic, and Topsoil - Manufactured or Offsite Wetland Materials will be accepted on the basis of the stockpile meeting all the requirements or the stockpile material meeting all gradation requirements and a plan and certification approved by Engineer for amending pH and organic requirements.

713-02 LIMESTONE

SCOPE. This specification covers the material requirements for limestone.

MATERIAL REQUIREMENTS. Limestone shall be ground limestone having a minimum total neutralizing value of 88% calcium carbonate equivalence. A minimum of 90% shall pass the No. 20 sieve and a minimum of 60% shall pass the No. 100 sieve.

PACKAGING. Packaged agricultural limestone packed in the manufacturer's standard containers shall weigh not over 100 lbs each, with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container.

BULK DELIVERY. Bulk delivery of limestone shall be accompanied by a certificate providing the names, weight and analysis as specified herein for packaged material.

BASIS OF ACCEPTANCE. Limestone will be accepted on the basis of the manufacturer's label or certificate and visual inspection for compliance with the material requirements.

713-03 FERTILIZER

SCOPE. This specification covers the material requirements for fertilizers.

MATERIAL REQUIREMENTS. Fertilizers may be either fluid or dry formulations of commercial carriers of available plant nutrients. Fertilizers may also be provided in standardized packets designed to control the release of their contents over a specified period of time.

The following mixed commercial fertilizers shall contain total nitrogen, phosphoric acid and soluble potash in the ratios stated:

Type A. 2-1-1 or 3-1-1 (approximate analysis). Minimum of 50% water insoluble nitrogen and with a salt index of less than 50.

Type B. 1-2-1 (approximate analysis) 50 % Organic/IBDU (Isobutydine diurea)/ or coated for slow release with a water in-soluble nitrogen (WIN).

Type C. Nitrate of soda containing a minimum of 16% nitrogen or Ammonium sulfate containing a minimum of 20.5% nitrogen as appropriate to soil conditions.

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Type D. Bonemeal shall be commercial steamed bonemeal, finely ground with a minimum of 1.0% nitrogen and a minimum of 20% phosphoric acid.

Type E. 13-0-0 (approximate analysis) shall be a commercial slow release organic nitrogen fertilizer such as blood meal

PACKAGING. Packaged fertilizers shall be in the manufacturer's standard containers or packets. Containers shall weigh not more than 100 lbs and shall include a label stating the name of the material, the net weight of the contents, the manufacturer's name, and the guaranteed analysis of the fertilizer. Labels on containers of fluid fertilizers shall state the net volume of the container. Packets shall include a label stating the name of the material, the net weight of the contents, the manufacturer's name, and the guaranteed analysis of the fertilizer.

BULK DELIVERY. Bulk delivery of fertilizer shall be accompanied by the manufacturer's certificate stating the name of the manufacturer, the guaranteed analysis and the weight of the shipment. Certificates accompanying bulk deliveries of fluid fertilizers shall also state the net volume of the shipment.

BASIS OF ACCEPTANCE. Fertilizer will be accepted on the basis of the manufacturer's label or certificate indicating conformance with this specification and visual inspection. Material that has become caked or otherwise damaged will be rejected.

713-04 SEEDS

SCOPE. This specification covers the material requirements for seeds for grasses, legumes, wildflowers and cereals.

MATERIAL REQUIREMENTS. All species and their cultivars or varieties must be disease and insect resistant, not considered noxious or invasive, guaranteed hardy and adapted for the locality, and among the top 25% of commercially-available seed types as rated by NTEP (National Turfgrass Evaluation Program). Cultivars infected with non-pathogenic (non-disease causing) fungal endophytes are preferred, if available. Experimental varieties should be excluded.

Material other than pure live seed shall comprise only nonviable seed, chaff, hulls, live seed of crop plants other than those specified, harmless inert matter and non-noxious, non-invasive weed species seeds. Non-noxious, non-invasive species weed seeds will be permitted up to 1% of the gross weight of each seed mixture.

Seeding mixtures shall be composed of perennial (except for annual rye) grasses suited to the site conditions, use, soils, moisture and local climate. All seeds of leguminous plants requiring inoculation shall be inoculated prior to mixing or sowing unless otherwise specified or approved or unless accompanied by a certificate of preinoculation. The Contractor may propose a dormant seed additive for cold weather seeding at no additional cost to the state. The Contractor may propose an alternate range for a component of a given mix based on regional and commercial availability.

A. General Roadside Seed Mix

Common Name	Scientific Name	Variety	Percent by weight
Fine Fescue (2 varieties min. must include creeping red)	Festuca rubra var.	Commercial	50-70
Perennial Ryegrass (2 var. min.)	Lolium perenne	Commercial "turf" type	15-40

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Annual Ryegrass	<i>Lolium multiflorum</i>	Commercial	5-15
Clover (White preferred)	<i>Trifolium repens</i>	Commercial	5-10

B. Restoration/High-Traffic Seed Mix

Common Name	Scientific Name	Variety	Percent by weight
Kentucky Bluegrass (2 var. min.)	<i>Poa pratensis</i>	Commercial	5-20
Fine Fescue (2 var. min.; must include creeping red)	<i>Festuca rubra</i> var.	Commercial	15-40
Tall Fescue (2 var. min.)	<i>Festuca arundinacea</i>	Commercial "turf" type	25-50
Perennial Ryegrass (2 var. min.)	<i>Lolium perenne</i>	Commercial "turf" type	10--30
Annual Ryegrass	<i>Lolium multiflorum</i>	Commercial	5-15
Ticklegrass (or, if unavailable, Redtop)	<i>Agrostis scabra</i> (or <i>Agrostis alba</i>)	Commercial	0-15
Clover (White preferred)	<i>Trifolium repens</i>	Commercial	0-5

C. Lawn Seed Mix

Common Name	Scientific Name	Variety	Percent by weight
Kentucky Bluegrass (3 var. min.)	<i>Poa pratensis</i>	Commercial	15-40
Fine Fescue (2 var. min. must include creeping red)	<i>Festuca rubra</i> var.	Commercial	30-50
Perennial Ryegrass (2 var. min.)	<i>Lolium perenne</i>	Commercial "turf" type	15-40
Annual Ryegrass	<i>Lolium multiflorum</i>	Commercial	5-15

D. Salt-Tolerant Seed Mix

Common Name	Scientific Name	Variety	Percent by weight
Fine Fescue (must include creeping red and hard fescue)	<i>Festuca rubra</i> var. & <i>Festuca longifolia</i> *	Commercial	10-25
Perennial Ryegrass (2 var. min.)	<i>Lolium perenne</i>	Commercial "turf" type	10-40
Tall Fescue (2 var. min., selected for maximum salt tolerance)	<i>Festuca arundinacea</i>	Commercial "turf" type	25-45
Ticklegrass (or, if unavailable, Redtop)	<i>Agrostis scabra</i> (or <i>Agrostis alba</i>)	Commercial	5-10
Alkaligrass (weeping preferred)	<i>Puccinellia distans</i>	Commercial	15-40

*aka. *F. trachyphylla* Krajina; *F. brevipila* Tracey

Wildflower Seed Mix. Wildflower seed mix shall be as specified in contract documents

Nomenclature. The common and scientific names of grasses, legumes, wildflowers and cereals specified in the contract documents shall conform to one or more of the authorities on botanical nomenclature recognized by the American Association of Nurserymen.

Stratification. Seeds in Wildflower Seed Mixes that require cold and/or warm stratification in order to germinate shall be prepared prior to sowing or used only in fall planting mixes.

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Legume Inoculants. Legume seeds requiring inoculation shall be accompanied by adequate amounts of their proper inoculants unless accompanied by certification of preinoculation. Inoculants for treating legume seeds shall be a standard culture of nitrogen fixing bacteria that is not more than one year old. Each inoculant shall be the specific culture required for each legume. Inoculants shall be supplied only from suppliers licensed by the Department of Agriculture and Markets to sell legume inoculants in New York State.

PACKAGING. Seeds shall be furnished and delivered in labeled containers or bags that are acceptably sealed or sewn tight. All seed and seed labels shall be in accordance with Agriculture and Markets Law. Container or bag labels shall not be removed prior to the time of sowing nor shall container labels be altered, obliterated or otherwise illegible.

When seeds are to be accepted by certification, they may be mixed prior to delivery. The certification shall consist of the label that shall be attached to each container of seed in accordance with the provisions of the Agriculture and Markets Law. Seeds will not be accepted by certification unless the test dates shown on the seed container labels are within the twelve months prior to the date that the seeds are sown.

Seeds shall be furnished damage free, with no mold, rot or deterioration, as a result of handling, transit or storage. After delivery to the Contractor, seed shall be stored so that it is protected from damage or deterioration from any source.

BASIS OF ACCEPTANCE. Seeds will be accepted on the basis of the manufacturer's label or certificate indicating conformance with this specification and Agriculture and Markets Law.

713-05 MULCH FOR PLANTING

SCOPE. This specification covers the material requirements for wood and bark chips used as mulch, landscape bedding or erosion control.

MATERIAL REQUIREMENT. Wood and bark chips used for mulch, landscape bedding or erosion control may be the following.

TYPE A Seasoned Wood Chips. This shall be derived from 100 % first generation hardwood or softwood. The chips shall be seasoned (aged a minimum of 1 year), free from leaves, young growth, unchipped branches, twigs 1 inch or greater in diameter, wood shavings, sawdust or foreign materials such as stones, nails, plastic, etc. Wood chips shall not exceed 3 inches in the greatest dimension.

TYPE B Recycled or Green Wood Chips. Shall be wood chips derived from unadulterated construction and/or demolition waste wood. Wood chips derived from construction and/or demolition waste wood shall not be contaminated with paint, chemicals, asphalt shingles, glass, nails, etc. Wood chips shall not exceed 3 inches in the greatest dimension.

TYPE C USDA-APHIS Protocol Wood Chips. USDA-APHIS (United States Department of Agriculture- Animal and Plant Health Inspection Service) Protocol wood chips shall be wood chips from current construction activities derived from trees removed and chipped according to USDA-APHIS protocol. Wood is chipped or mulched to less than 1 inch in at least two dimensions or apply an APHIS approved method.

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Type D Shredded Bark Mulch. Shredded bark mulch shall be commercially available double or triple-processed aged bark mulch made from a mixture of hardwood and/or softwood. It shall be created by regrinding the mulch in a tub grinder and be finely screened to a uniform particle size. It shall be composed of bark and have a low wood content with no hidden woods from construction and demolition debris or pressure treated lumber.

Type E Pine Bark Chunks or Nuggets. Pine Bark chunks or nuggets shall be commercially available, manufactured from 100% pine bark and shall not exceed 3 inches.

BASIS OF ACCEPTANCE. Wood and bark chips will be accepted on the basis of visual inspection, upon delivery, for compliance with the materials requirements and applicable certification of compliance with 6 NYCRR Part 360.

Shredded bark mulch will be accepted on the basis of a visual inspection for compliance with the material requirements.

713-06 TREES, SHRUBS AND VINES

SCOPE. This specification covers the material requirements for trees, shrubs, vines, and other plants

MATERIAL REQUIREMENT.

Nomenclature. The common and scientific nomenclature for plants shall be in conformity with the American Nursery and Landscape Association's American Standard for Nursery Stock (ANSI Z60.1).

Quality and Size. Plants, including root spread and ball size, shall be in accordance with the American Standard for Nursery Stock (ANSI Z60.1). All plants shall have a normal habit of growth and be typically characteristic of their respective kinds. The specified plant sizes shall be the minimum size allowed and shall include plants from that size up to but not including the next larger size. Plants shall not be pruned at the time of digging or before delivery and no plants shall be cut back from larger sizes to meet the sizes specified. Plants shall be free from injury, insect damage, infestation and disease. Plants except those for transplanting shall be nursery and/or field grown and shall bear evidence of proper nursery care, including adequate transplanting and root pruning. Containers shall be sufficiently rigid to hold the ball shapes and protect the root balls during handling and shipping. Plants shall have been grown in the container long enough for new fibrous roots to have developed so that the root ball is firm and will retain its shape and hold together when removed from the container. The plants shall be in a healthy growing condition with tops which are of good quality, and shall have been adequately hardened off before shipment. The plants shall have been grown in similar climatic conditions to the planting location.

Digging Plants. Digging shall avoid all possible injury to, or loss of roots, but when required, roots cut shall be cleanly cut. No cold storage plants will be accepted unless approved in writing prior to delivery. Plants stored temporarily shall be properly heeled in or otherwise protected from injury.

Root Protection. After plants are dug, their roots shall be protected from injury such as caused by heat, sun, wind and freezing temperatures.

Trees. Pruning cuts on nursery and/or field grown trees shall be healed over. There shall be no cut back crowns or leaders and no abrasions of the bark. Any stem to rootstock grafts shall be healed. Trees must

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have good fibrous root systems characteristic of the kind. Deciduous trees shall have normal spread of crowns unless otherwise specified. Bare root trees shall not require earth adhering to the roots except as required under Root Protection above.

Balled and burlapped trees shall be properly dug and protected to preserve the natural earth in contact with the roots. No processed balls will be accepted. The balls shall be of the required size, firmly wrapped and tied with approved materials. No balled plants will be acceptable if the ball is cracked or broken.

The tops of trees shall be well formed structurally, but they are not required to have more than reasonably straight trunks, nor better than average well balanced crowns, nor be of specimen or street tree quality consistent with ANSI Z60.1 unless those requirements are specified on the plans

Shrubs. Shrubs shall have good fibrous root systems. The quality of balled and burlapped shrubs and container grown shrubs shall be as specified in ANSI Z60.1.

Vines. Vines shall be as specified in ANSI Z60.1. Vines shall be field grown unless otherwise specified. Pot grown plants shall be vigorous, well-developed plants, well established in pots with sufficient roots to hold the earth intact after removal from containers but they shall not be rootbound.

Plants for Transplanting. Plants, including root spread and ball size, shall be in accordance with ANSI Z60.1 for Collected Plant.

LABELING. Labeling shall be in accordance with currently accepted nursery labeling practice except that the Contractor shall upon request supply positive identification by genus and species of any plant.

TRANSPORTATION. Tarpaulins or other covers shall be placed over plants transported by open vehicles. Closed vehicles shall be ventilated to avoid overheating and the doors shall be kept closed during shipment to prevent plants from drying. The heads of trees shall be tied-in carefully to prevent fracturing or breaking the branches. Trunks and branches shall be adequately supported and padded to avoid scraping or bruising.

INSPECTION. The Contractor shall be responsible to supply current, valid certificates of inspection of plant materials which may be required by federal, state, provincial or other authority to accompany shipments of plants.

The Department will identify by suitable non-injurious means such as painting, marking by various methods, etc. all plant material rejected upon delivery to the contract site.

BASIS OF ACCEPTANCE: Acceptance will be based on visual inspection, upon delivery to site, by the Engineer for compliance with the materials requirements.

713-07 ROLLED EROSION CONTROL PRODUCTS AND SOIL STABILIZERS

SCOPE. This specification covers the material requirements for Rolled Erosion Control Products and Soil Stabilizers.

MATERIAL REQUIREMENTS

Class I (Short-Term) Light-duty, organic, or synthetic erosion control products.

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Type A. No minimum shear stress is required. The product shall be capable of withstanding moderate foot traffic without tearing or puncturing.

Type B. No minimum shear stress is required.

Type C. Products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 1.5 psf (pounds force per square foot) at ½ inch soil loss.

Class II (Intermediate-Term) Erosion control products.

Type A. Jute Mesh. Jute mesh shall be of a uniform, open, plain weave of undyed and unbleached, single-jute yarn. Jute mesh shall be woven as follows:
Approximately 55 warp ends per yard width.
Approximately 37 weft ends per linear yard.
Mass of jute mesh shall average 1.0 (± 5%) pound per square yard.

Type B. Products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 1 psf at ½ inch soil loss.

Type C. Products made entirely of organic materials. Only 100% organic materials are allowed. Products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 1 psf at ½ inch soil loss.

Type D. Organic or nonorganic products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 2 psf at ½ inch soil loss.

Class III (Permanent) Nondegradable synthetic [fibers, filaments, or nettings] which may be supplemented with degradable natural fiber components).

Type A. TRM (Turf Reinforcement Mat) mat products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 2 psf at ½ inch soil loss.

Type B. TRM mat products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 3 psf at ½ inch soil loss.

Type C. TRM mat (which includes a composite) products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 2.25 psf at ½ inch soil loss.

Type D. TRM mat (which includes a composite) products shall have the ability to protect soil from hydraulically induced shear stresses under bench scale conditions for at least 3 psf at ½ inch soil loss.

Class IV Soil Stabilizers. Soil stabilizers are short-term duration, erosion control products. When used alone, they shall be used on slopes 1:2 or flatter. They shall not be used in channels or in areas of concentrated flow. Type A, B, and C soil stabilizers may be used alone or in combination with Class

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III, Types A and B Turf Reinforcement Materials where those products are used on slope applications.

Type A. Type A Soil Stabilizer shall be a soil binding system consisting of one of the following:

A Cementitious soil binder which is added to wood cellulose fiber mulch, a Bonded Fiber Matrix (BFM), intended to form a thick, heavy-bodied crust or mat-like barrier that controls storm water and wind induced erosion. BFMs last up to six months and require a cure time up to 48 hours, without rain, to develop intimate soil contact.

A Soil stabilizing polymer which is added to wood cellulose fiber mulch, a Polymer Stabilized Fiber Matrix (PSFM), intended to form a matrix that is designed to work directly with soil to maintain its stability by preserving existing soil structure, flocculating fine sediment being dislodged by storm water or wind, and to prevent splash erosion. PSFMs last up to six months and require a cure time up to 24 hours.

Type B. An anionic polyacrylamide (PAM) and calcium solution intended to reduce the erodibility of bare soils during construction activities or to enhance the performance of mulching on permanent slopes. Soil stabilizers, Type B, shall bond soil particles and shall effectively increase the soil particle size to 3/64 inch or larger. Soil stabilizers, Type B, shall reduce the movement of soil due to chemical bonding, thereby increasing the particle size rendering silt fence/sediment trapping devices more effective, and increase the water absorption of the soil.

Type C. A soil binder which may be made up of wood fibers, straw fibers, cotton fibers, interlocking fibers, polymers and hydro-colloid tackifiers, a Flexible Growth Medium (FGM) or Cotton Fiber Reinforcement Matrix (C-FRM). Intended to form a thick, heavy-bodied crust or mat-like barrier that controls storm water and wind induced erosion. FGMs/C-FRMs last up to a year and require no cure time to develop intimate soil contact.

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer. Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Materials will be accepted on the basis of the manufacturer's name and location appearing on the Approved List and a material certification that specifies the product conforms to this specification.

713-08 MATERIALS FOR PROTECTION OF PLANTS

SCOPE. This specification covers the material requirements for materials used in planting and protection of plant operations.

MATERIAL REQUIREMENTS

Rodent Guards. Shall be a commercially available horticultural product created for this activity.

Stakes for Supporting Trees

A. Above Ground Support. Shall be wooden stakes, commercially available product or system developed for supporting trees. Wooden stakes shall be 8 to 10 feet long with a minimum diameter of

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2 to 2 1/2 inches or stakes 12 feet long which shall have a minimum diameter of 3 inches. The maximum diameter of stakes shall not exceed 4 inches. Stakes shall be pointed at one end. All wooden stakes shall be sound and free from insects and fungi.

B. Underground Support. Shall be a commercially available product or system developed for supporting trees.

Wire. Wire for guying plants shall be annealed steel wire (either galvanized or ungalvanized).

Hose. Hose for protecting the bark from guy wires shall be braided rubber, plastic, or reinforced materials. Hose shall be at least 3/4 inch outside diameter.

Straps for Protecting Tree Bark. Straps for protecting tree bark from guy wires shall be stretch resistant nylon or polypropylene fabric. Straps shall be 1 inch wide, shall have soft woven edges to assure abrasion resistance and shall have metal grommets at each end for the purpose of attaching guy wires. Straps shall be of sufficient length to assure guy wires will not be in contact with the tree. Straps for guying trees up to and including 2 inch in diameter shall have a minimum breaking strength of 1,000 lbs. Straps for guying trees up to and including 6 inches in diameter shall have a minimum breaking strength of 4,000 lbs.

Anti-Desiccants. Anti-desiccants shall be emulsions or other materials which will provide a protective film over plant surfaces, permeable enough to permit transpiration.

Portable Drip Irrigation System (PDIS). PDIS shall allow slow even watering. PDIS shall be a slow release watering system with accommodation for even watering. The fill opening shall accommodate a standard hose diameter. PDIS watering systems shall be constructed so that they can be attached to the trees, provide water from two drip points (minimum) and have a zipper or similar method to attach securely to the tree. PDIS watering system or bags shall be UV treated reinforced Polyethylene material. Each shall be sized according to manufacture's recommendation for plant size and type.

Mowing Markers.

A. Type A. Mowing limit markers shall be any commercially available semi-rigid composite fiber reinforced plastic posts or flexible co-extruded polyethylene posts with U.V. inhibitors. Posts shall not crack at -20 °F. Posts shall have adhesive decals meeting the following requirements and conforming to the attached details:

Posts or post assemblies shall be such that they can withstand wind and shall be approved by the Engineer.

Approximate Width: 2.5 to 3.inches

Length: 4 feet above ground

Color: Medium to dark brown or black.

Anchor Device: Manufacturer's standard anchor system

Decals shall be brown or black and shall match the color of the posts. Decals shall be cast vinyl sheeting, adhesive on one side, with inks suitable for outdoor use and shall be covered with a laminate protective layer that provides resistance to weather, graffiti, vandalism and discoloration. Letters shall be white and of a size and weight to fully utilize the full dimension of the decal and shall be legible.

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B. Type B. Mowing limit markers shall be any commercially available glass fiber reinforced polyester stakes, manufactured with UV inhibitors and shall not crack at -22° F. Tubular stakes shall be 3/16 inch (ID), with a 1/16 inch wall thickness, approximately 6 feet in length, and sealed on top with a cap or similar method.

Color shall be olive drab green.

Note: Solid glass fiber stakes which have the same length and color may be substituted with the approval of the Engineer.

Reflective Tapes. Material shall be reflective safety tape rated for 5 to 7 years of outdoor life meeting ASTM specifications D4596. Tape shall be 2 inch wide, reflective tape, in red or yellow.

BASIS OF ACCEPTANCE. Material for the protection of plants will be accepted on the basis of a visual inspection.

713-09 MYCORRHIZAL FUNGI

SCOPE. This specification covers the materials requirements for mycorrhizal fungi.

MATERIAL REQUIREMENTS. Mycorrhizal fungi shall be commercially available products suited to and labeled for the intended purpose.

Products for turf establishment shall be granular (when mixed directly with soil), or soluble powder or liquid (when mixed with seeds for drill seeding or hydroseeding) and shall typically include:

- Endomycorrhizal fungi. Live propagules (spores, colonized roots, hyphae) of vesicular arbuscular (VA) fungi including *Glomus intraradices* and at least two other *Glomus* species shown to be biologically adapted to grass.

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Products for planting pits, beds and Tree Root Zone Treatment (Vertical Mulching/Aeration) shall typically be granular and shall typically include:

- Endomycorrhizal fungi. Live propagules (spores, colonized roots, hyphae) of vesicular arbuscular (VA) fungi including *Glomus intraradices* and at least two other *Glomus* species.
- Ectomycorrhizal fungi. Live spores of *Pisolithus tinctorius* and at least four *Rhizopogon* species.

Products may also include any or all of:

- Biostimulants such as Dry soluble yucca extract (*yucca schidigera*), soluble sea kelp extract (*ascophylum*, *nodosum*) and humic acid (*leonardite humates*)
- Amino acids, vitamins, enzymes, beneficial bacteria, microbial metabolites, *trichoderma* fungi.
- Water management gels/polymers (for planting pits, beds and Tree Root Zone Treatment – typically not for turf applications).

PACKAGING. Mycorrhizal fungi shall be delivered in the manufacturer's standard containers. Containers shall include a label stating the name of the material, species, propagule counts, application rates, expiration date, the net weight of the contents, and the manufacturer's name.

BASIS OF ACCEPTANCE. Mycorrhizal fungi will be accepted on the basis of the manufacturer's label or material certification indicating compliance with these specifications. The Department reserves

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the right to reject any material that has become caked or otherwise damaged. Material that has expired will be rejected.

713-10 MOISTURE RETENTION ADDITIVE

SCOPE. This specification covers the material requirements for moisture retention additive.

MATERIAL REQUIREMENTS. Moisture retention additives shall be commercially available Polyacrylamide or Co-polymer of Acrylamide Hydro gel polymer products.

PACKAGING. Moisture retention additives shall be delivered in the manufacturer's standard containers. Containers shall include a label stating the name of the material, application rates, expiration date, the net weight of the contents, and the manufacturer's name.

BASIS OF ACCEPTANCE. Moisture retention additives will be accepted on the basis of the manufacturer's label or material certification indicating compliance with these specifications.

713-11 MULCH FOR TURF ESTABLISHMENT AND EROSION CONTROL

SCOPE. This specification covers the material requirements for organic mulch materials used in conjunction with turf establishment or erosion control.

MATERIAL REQUIREMENTS.

General

Mulch shall be manufactured so that the materials will remain uniformly suspended in water under agitation and will blend with seeds, fertilizer and other additives to form homogeneous slurry. It shall have the characteristics which, upon hydraulic application, shall form a blotter-like ground coating with moisture absorption and percolation properties and the ability to cover and hold seeds in contact with the soil. Mulch shall contain no growth or germination inhibiting factors.

Type I. Wood Fiber Mulch. Wood fiber shall be a first generation product manufactured directly from 100 percent wood which has been recovered or diverted from solid waste.

Wood fiber shall be manufactured from unadulterated wood that is not contaminated with paint, chemicals, non-wood shingles, plastic or other foreign materials. Wood fiber mulch shall not be manufactured exclusively from paper.

Type II Cellulose Mulch. Cellulose or Paper mulch shall be composed of 100% clean recycled cellulose fiber and free of plastic netting.

Water Holding Capacity >1000%

Moisture Content 12% +/- 3

Organic Matter >93%

Ash Content <7%

pH Range 6.5 +/- 2

Non toxic dye

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Type III Cellulose and Wood Fiber Blend Mulch. Cellulose and Wood fiber blend shall be composed of biodegradable recycled 100 % wood fibers and recycled paper, phyto-sanitized and free from plastic netting.

Wood fiber 70% Minimum

Paper fiber 30% Maximum

Water Holding Capacity >1000%

Moisture Content 12% +/- 3

Organic Matter >93%

Ash Content <7%

pH Range 5.5 +/- 2

Type IV Cotton Hydro Mulch. Cotton hydro mulch shall be a blend of processed straw and reclaimed cotton plant materials.

Straw 80% Maximum

Reclaimed Cotton Plant Material 17% Minimum

Additives, Activators and Tackifiers Range 3 to 10%

Moisture Content 12% +/- 3

Organic Matter \geq 90%

Type V Pelletized Hydro Mulch. Cellulose and Wood fiber blend shall be composed of clean cellulose fiber and raw lumber chips manufactured from unadulterated wood that is not contaminated with paint, chemicals, non-wood shingles, plastic or other foreign materials.

Wood fiber 20% Minimum

Paper fiber 80% Maximum

Water Holding Capacity >850%

Moisture Content Range 12 to 15% +/- 3

Organic Matter >93%

Ash Content <7%

pH Range 7.0 +/- 2

PACKAGING AND LABELING. Mulch shall be supplied in the manufacturer's standard containers, with the name of the material, net weight of contents, the manufacturer's name and the air dry weight of fiber (equivalent to 10% moisture) appearing on each container.

STORAGE AND HANDLING. Store and handle in compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations.

BASIS OF ACCEPTANCE. Mulch will be accepted on the basis of the manufacturer's product label, including methods and rates of applications, and material certification indicating compliance with these specifications and any applicable regulatory requirements pertaining to solid waste management.

713-12 MULCH ANCHORAGE

SCOPE. This specification covers the material requirements for mulch anchorage.

MATERIAL REQUIREMENTS. Mulch anchorage shall be 713-07 Class IV Soil Stabilizers or any non-asphaltic, non-toxic commercially available products formulated for the purpose of anchoring or

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tacking straw mulch. The paper content of paper-based hydraulic mulch anchorage shall be 100 percent post consumer recovered from solid waste.

PACKAGING. Mulch Anchorage shall be furnished in the manufacturer's standard containers with the name of the material, net weight of contents, the manufacturer's name and the dry weight of fiber (equivalent to 10% moisture) appearing on each container. The instructions for mixing and application shall also appear on each container.

BASIS OF ACCEPTANCE. Mulch Anchorage will be accepted on the basis of the manufacturer's product label or product literature that indicates compliance with this specification. Materials that have become wet, caked, frozen, separated or otherwise unfit for use will be rejected.

713-13 PESTICIDES

SCOPE. This specification covers the material requirements for pesticides used to manage vegetation, insects, rodents and/or other target pests.

MATERIAL REQUIREMENTS. Pesticides shall be approved commercially available products that are currently registered by the US Environmental Protection Agency and the NYS Department of Environmental Conservation. Pesticides shall also have all required labels indicating that they are approved for the intended use.

Pesticides shall be mixed and used in strict conformance with the instructions on the label or supplemental labels.

PACKAGING. Pesticides shall be delivered and securely stored until used in the manufacturer's standard containers that have legible labels affixed. Pesticides that do not meet these packaging requirements will be rejected.

Pesticide containers shall be sealed. Containers with breaks, damage; or altered, obliterated, illegible, or missing labels will not be accepted.

BASIS OF ACCEPTANCE. Pesticides will be accepted on the basis of the original, sealed, and properly labeled pesticide containers; and two copies of sample labels and supplemental labels that include instructions for the intended use of the pesticide. Pesticides that have become wet, caked or otherwise unfit for use will be rejected.

713-14 SOD

SCOPE. This specification covers the material requirements for sod.

MATERIAL REQUIREMENTS. Sod shall be commercially grown sod and shall be accompanied by a certificate indicating compliance with the regulations of the NYS Department of Agriculture and Markets.

Sources of sod shall be made known to the Engineer at least five calendar days before cutting. Sod shall be cut into squares or rectangular portions which shall be a minimum of 12 inches wide, or as approved, and may vary in length, but shall be of a size which will permit them to be lifted without breaking. Height of the grass shall not exceed 3 inches. The sod shall be cut to a minimum thickness of 3/4 inch. The sod shall be reasonably free from weeds in conformance with accepted commercial practice.

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The sod shall consist of a mixture of at least three permanent grasses such as bluegrass and fine leaved fescues, unless otherwise specified. Sod that is heat damaged or fermenting will be rejected.

DELIVERY AND HANDLING. Sod shall be delivered to the job within 24 hours after being cut and installed within 48 hours after being cut. The sod, when delivered to the contract site and during the time it is held on site, shall be sufficiently moist so the soil will adhere firmly to the roots when it is handled.

BASIS OF ACCEPTANCE. Sod will be accepted based on inspection for compliance with the material requirements.

713-15 COMPOST

SCOPE. This specification covers the material requirements for organic material used in conjunction with amending or manufacturing topsoil and for erosion control products.

MATERIAL REQUIREMENTS. Compost shall be the material resulting from the biological and biochemical decomposition of biosolids, source-separated organic waste, yard waste, leaves or agricultural waste. These composts shall have been commercially or municipally produced. Compost and composting facilities shall be in compliance with all federal laws (40 CFR Part 503 and others), Article 10 of the Agriculture and Markets Law and 6 NYCRR Part 360.

Biosolids, including mixed solid waste, septage and other sludges, are the solid or semi-solid organic material generated by a wastewater treatment plant. Source-separated organic waste (SSOW) is readily decomposable material that is separated at the point of waste generation, and may include, but not be limited to, food scraps, food processing residues, soiled and/or unrecyclable paper, and other compostable materials. Yard waste includes grass clippings, leaves and other similar readily-compostable organic material.

Compost shall be reasonably free of sticks, stones, refuse, materials deleterious to soil structure, or any material toxic or detrimental to plant germination and growth. Compost containing foreign material may be rejected on the basis of a visual examination.

Composted biosolids shall have a certificate from a laboratory approved by the NYSDOH verifying compliance with all applicable laws, rules, and regulations. Only facilities permitted to compost biosolids under 6 NYCRR Part 360 will be allowed to furnish biosolid compost. The certification shall be supplied by the Contractor prior to the delivery of any composted biosolids, topsoil containing composted biosolids, or other such regulated material to the contract site.

Type A. Compost for Turf Establishment, Sodding, and Planting. Compost for Turf Establishment, Sodding, and Planting shall have a minimum organic-matter content of 30% (dry-weight basis) as determined by loss on ignition.

Product shall be loose and friable, not dusty, and have a moisture content of 35% - 60%, (wet weight basis).

Particle size shall be < 1/2 inch, (100% passing).

Soluble salts concentration shall be < 4.0 mmhos/cm (ds/m), maximum.

Compost shall be stable to very stable.

pH shall be between 6.0-8.5.

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Type B. Compost for Erosion/Sediment Control Filter Berms. Compost for Erosion/Sediment Control Filter Berms shall meet the requirements of AASHTO Designation MP 9-03 and as follows:

Minimum organic matter content 25% - 65% (dry-weight basis) surfaces to be vegetated; 25% - 100% (dry weight basis) surfaces to be left unvegetated.

Gradation:	
Sieve Size	Percent Passing by Weight
3 inch	100
1 inch	90 to 100
3/4 inch	70 to 100
1/4 inch	30 to 75
Maximum particle length; 6 inch	

Soluble salt concentration shall be 5 mmhos/cm; (ds/m) maximum.
 Compost shall be stable to very stable
 pH shall be between 5.0 - 8.5.

Type C. Compost for Erosion/Sediment Control Compost Blankets (Mulch for Seeded Areas). Compost for Erosion/Sediment Control Compost Blankets, (mulch for seeded areas), shall meet the requirements of AASHTO Designation MP 10-03 and as follows:

For surfaces to be vegetated, minimum organic matter content 25% - 65% (dry weight basis); for surfaces to be left unvegetated 25% - 100% (dry-weight basis).

Gradation:	
Sieve Size	Percent Passing by Weight
3 inch	100
1 inch	90 to 100
3/4 inch	65 to 100
1/4 inch	0 to 75
Maximum particle length; 6 inch	

Soluble salt concentration shall be 5 mmhos/cm; (ds/m) maximum.
 Compost shall be stable to very stable.
 pH shall be between 5.0 - 8.5.

Type D. Leaf Compost. The material shall consist exclusively of deciduous leaf material. Compost material that contains food waste, sewage waste, or other waste material is unacceptable. The leaf compost shall be mature (actively composted for 6 months minimum, and temperature slightly above air temperature) and humic (organic material is no longer rapidly degrading). Mature compost material shall be a dark, friable, partially decomposed substance that has an earthy odor. Visible fibers should be short and dark with no discernable particles of leaf material. Because not all items decompose at the same rate screening may be necessary to remove larger partially decomposed material and/or undecomposed material.

- Organic Content – 25% to 100% by dry weight
- Natural Inert Material - <5% by dry weight of woody or green yard debris material.
- Man Made Inert Material - <1% by dry weight of man made material such as glass or plastic.
- Bulk Density – 636 to 812 kg/m³
- Moisture Content – 30% to 60% by total weight

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Gradation:	
Sieve Size	Percent Passing by Weight
1/2 inch	100
No 16	0
Maximum particle length; 6 inch	

Type E. Well Rotted Manure. The material shall consist of animal excreta with litter material. The well rotted manure shall be mature (aged a minimum of one year), dark brown or black in color, crumbly in texture, and shall not have an objectionable odor. The material's moisture content shall be such that no visible free water or dust is produced when handling it. It shall contain no visible admixture of refuse or other physical contaminants or any material toxic to plant growth.

BASIS OF ACCEPTANCE. Compost will be accepted on the basis of a Producer's label or a certificate of analysis by a laboratory certified by a nationally recognized entity indicating compliance with the material requirements and visual inspection.

Composted biosolids will be accepted on the basis of a material certification by a NYSDOH approved laboratory that the product conforms to this specification and all applicable regulations.

Compost supplied or manufactured by participants in the US Composting Council's Seal of Testing Approval Program will be accepted on the basis of the Program's Compost Technical Data Sheets. The data shall represent a minimum of one year of testing results and the most recent test shall have been conducted with ninety days of material acceptance.

Compost supplied or manufactured by suppliers that do not participate in the US Composting Council Seal of Testing Approval Program will be accepted on the basis of a material certification, by a laboratory certified by a nationally recognized entity, that the product conforms to this specification.

The Department reserves the right to sample and test the materials subsequent to delivery.

713-16 (VACANT)

713-17 SULFUR

SCOPE. This specification covers the material requirements for elemental sulfur (flowers of sulfur).

MATERIAL REQUIREMENTS.

PACKAGING. Agricultural sulfur packed in the manufacturer's standard containers shall weigh not over 100 lbs each, with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container. Sulfur shall be commercially available products.

DELIVERY. Bulk delivery of sulfur shall be accompanied by a certificate providing the names, weight and analysis as specified herein for packaged material.

BASIS OF ACCEPTANCE. Sulfur will be accepted on the basis of the manufacturer's label or certificate and visual inspection for compliance with the material requirements.

713-18 WEED CONTROL BARRIERS

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SCOPE. This specification covers the material requirements for landscape fabrics, mats and Geotextiles specifically manufactured to control weed growth.

MATERIAL REQUIREMENTS. Weed control barriers shall be commercially available products.

Type A. Permeable Landscape Fabric. Permeable Landscape Fabric shall be a permeable weed blocking geotextile resistant to rot, mold, chemicals and micro-organisms which allows the free flow of water, air, fertilizers and nutrients.

Type B. Permeable Landscape Fabric with Herbicide. Permeable Landscape Fabric with Herbicide shall be durable, nonwoven, polypropylene geotextile fabric with permanently attached nodules containing a slow release herbicide with a maximum EPA toxicity rating of class IV.

Type C. Permeable Weed Barrier Mat. Permeable Weed Barrier Mat shall be a commercial weed control product. The mat shall prevent sunlight, water, or vegetation nutrients from reaching the soil underneath. The mat shall contain no herbicides and shall resist ultraviolet light, mildew, and algae. The mat shall be self-extinguishing when removed from flame.

The mat shall be a polyester matting system a minimum of 0.2 inches thick, with a minimum weight of 1.8 pounds per square yard, able to support pedestrian traffic and commercial tractor mowing equipment's wheels and skid plates without displacement.

BASIS OF ACCEPTANCE. Weed control mats or fabric will be accepted on the basis of the manufacturer's label or certificate and visual inspection for compliance with the material requirements.

713-19 STRAW

SCOPE. This specification covers the materials requirements for straw.

MATERIAL REQUIREMENTS. Straw for mulching shall be stalks of oats, wheat, rye or other similar crops which are free from noxious and invasive species. Straw shall show no signs of excessive moisture and be visually free of mold or mildew

BASIS OF ACCEPTANCE. Straw will be accepted on the basis of a visual inspection for compliance with the material requirements.

Make the following changes to the Standard Specifications of May 1, 2008:
Page 558 **Delete** Section 619 *Work Zone Traffic Control* and **Replace** it with the following:

SECTION 619 - WORK ZONE TRAFFIC CONTROL

619-1 DESCRIPTION

619-1.01 General. Work zone traffic control shall consist of all work necessary to provide for the safe and efficient movement of traffic through or around work zones, and to protect workers and the public from damage to person and property which may result, directly or indirectly, from any construction operations. Work zone traffic control shall be completed under the direction of a trained, competent person, as shown in the contract documents, the MUTCD and as directed by the Engineer. The duration of this work shall be from the date any work is started on the contract site, including mobilization of equipment, signs, offices, and shops until the date of contract final acceptance. Temporary materials and components that are furnished by the Contractor shall remain the property of the Contractor.

See Figure 619-1 *Component Parts of a Typical Highway Work Zone* for definitions of terms.

619-1.02 Basic Work Zone Traffic Control. Work shall consist of controlling traffic over a reasonably smooth traveled way which shall be marked by signs, delineators, channelizing devices, pavement markings, and other devices as shown in the contract documents or as directed by the Engineer. Work after sunset and before sunrise shall include additional requirements for nighttime operations including, but not limited to, a written plan for nighttime operations, additional worker and equipment protection, additional channelizing devices and contract site patrol.

The Contractor shall conduct its operations to ensure the safety and convenience of travelers and abutting property owners as well as the safety of all workers on the contract. Travelers include, but may not be limited to motorists, motorcyclists, bicyclists and pedestrians.

Work shall be scheduled to keep the time and distance that existing pavement is removed or substantially disturbed to a minimum and consistent with the physical requirements of the contract. Unless otherwise indicated in the contract documents, the distance over which traffic is maintained on an unpaved surface shall not exceed 1/2 mile at any one time. During seasonal shutdown periods, no part of the highway shall be closed to traffic unless provided for in the contract documents, or the Contractor has submitted and the Engineer has approved a detailed schedule of operations reflecting a proposal to close the highway to traffic.

Basic work zone traffic control shall include the following:

A. Surface Condition, Debris, Drainage and Dust Control. Work shall consist of maintaining the surface condition of the traveled way, including detours, consistent with the preconstruction posted speed limit; including maintaining positive drainage, dust control and keeping the roadway free from debris and materials spilled from or tracked by vehicles or equipment. Debris and dust shall be controlled on all operations.

B. Seasonal Operations and Snow and Ice Control. Work shall consist of maintaining the traveled way to facilitate safe, efficient travel and permit snow and ice control by others during winter months and during any period that work is suspended.

C. Maintain Public Access. Work shall consist of maintaining public access to intersecting roads, residences, business establishments, adjacent property, bus stops and transportation facilities for vehicles, pedestrians, and bicyclists.

D. Maintain Existing Roadside Signs, Delineators and Markers. Work shall consist of maintaining, in their existing condition, existing highway signs, delineators, and markers within the contract limits.

E. Maintain Existing Guide Rail, Median Barrier and Bridge Rail. Work shall consist of maintaining existing traffic barriers and other safety devices, in their existing condition, within the contract limits.

F. Construction Vehicles and Equipment. Work shall consist of equipping construction vehicles and equipment with warning lights and reflective markings; and maintenance of vehicles and equipment in safe operating condition.

G. Barrier/Shadow Vehicles.

1. Barrier Vehicles. Work shall consist of furnishing barrier vehicles to guide traffic and protect workers in stationary lane and shoulder closures and other stationary temporary traffic control zones, as shown in the contract documents or as directed by the Engineer.

2. Shadow Vehicles. Work shall consist of furnishing shadow vehicles to guide traffic and to protect workers in mobile or short duration work zones not protected by stationary lane or shoulder closures, as shown in the contract documents or as directed by the Engineer.

H. Construction Signs. Work shall consist of furnishing, installing, moving, maintaining, deactivating, and removing construction signs, including warning lights, as shown in the contract documents or as directed by the Engineer.

I. Arrow Panels. Work shall consist of furnishing, installing, maintaining, and removing arrow panels as shown in the contract documents or as directed by the Engineer. Arrow panels are used to warn and guide traffic when travel lanes are temporarily closed by construction activities.

J. Channelizing Devices. Work shall consist of furnishing, placing, maintaining and removing channelizing devices, with warning lights where required, including drums, vertical panels, construction barricades, cones, and temporary tubular markers. Type III construction barricades and interim tubular markers may be specified under separate pay items.

K. Pavement Edge Drop-Off Protection. Work shall consist of furnishing and maintaining protection for edge drop-offs adjacent to the pavement or shoulder.

L. Flagging and Traffic Control. Work shall consist of furnishing the necessary traffic control equipment and flaggers for adequate traffic control. Portable traffic signal systems authorized by the Engineer may be utilized only on a highway designated as a Restricted Highway.

M. Maintain Existing Mailboxes. Work shall consist of maintaining postal route mailboxes serviced from vehicles, in a useable condition and location consistent with U.S. Postal Service requirements.

N. Contract Site Patrol. Work shall consist of furnishing personnel to patrol the contract area as necessary to ensure conditions on the site are adequate for public safety and convenience at all times.

619-1.03 Basic Work Zone Traffic Control (Daily Operations). Work shall consist of controlling and protecting traffic during a single work shift as shown in the contract documents, or as directed by the Engineer. The Contractor will not be required to repair or maintain the surface of the traveled way and other roadway features not part of the work, except to repair damage resulting from the Contractor-s operations.

619-1.04 Temporary Business Signs. Work shall consist of furnishing, installing, moving, covering, maintaining, and removing temporary business signs as shown in the contract documents or as directed by the Engineer.

619-1.05 Covering or Removal of Pavement Markings. Work shall consist of removing or covering existing permanent pavement markings or, if shown in the contract documents, interim pavement markings, including, but not limited to: edge lines, lane lines, center lines, crosswalks, stop bars, arrows, symbols, and diagonal markings in gores and medians as shown in the contract documents or as directed by the Engineer.

619-1.06 Temporary Pavement Markings. Work shall consist of furnishing, applying and removing temporary pavement markings as shown in the contract documents or as directed by the Engineer. Temporary pavement markings are intended for use on any new pavement or milled surface until the subsequent course is placed or interim pavement markings or final pavement markings are installed.

619-1.07 Interim Pavement Markings. Work shall consist of furnishing, applying, maintaining, and removing interim pavement markings as shown in the contract documents or as directed by the Engineer. Interim pavement markings are intended for use in diversions, temporary pavement realignments and crossovers, lane shifts and closures, and other traffic patterns associated with construction activities. Interim pavement markings are intended for use for a given phase or season, for a maximum of 1 year.

619-1.08 Temporary Rumble Strips. Work shall consist of installing, maintaining, and removing temporary rumble strips at the locations shown in the contract documents or as directed by the Engineer.

619-1.09 Interim Tubular Markers. Work shall consist of furnishing, installing, moving, and maintaining interim tubular markers attached to the pavement as shown in the contract documents or as directed by the Engineer. Interim tubular markers are typically used for 2-way, 2-lane freeway work zones and long-term closures where available width is limited.

619-1.10 Portable Variable Message Signs (PVMS). Work shall consist of furnishing, installing, operating, maintaining, relocating, and removing PVMSs as shown in the contract documents or as directed by the Engineer.

PVMS with a pay unit of each shall be provided for the duration of the contract at the general locations specified in the contract documents.

PVMS with a pay unit of weeks shall be provided at general locations and durations in accordance with the Special Note *Requirements for Portable Variable Message Signs (PVMS)* and the contract documents.

PVMSs are intended to supplement other traffic control devices by displaying symbolic or word messages, but are not to be used alone to replace conventional traffic control devices.

619-1.11 Type III Construction Barricades. Work shall consist of furnishing, installing, moving, maintaining, and removing Type III construction barricades, with warning lights where specified, as shown in the contract documents or as directed by the Engineer.

619-1.12 Temporary Concrete Barrier. Work shall consist of furnishing, installing, moving, maintaining, and removing temporary concrete barrier, including barrier warning lights where specified, as shown in the contract documents or as directed by the Engineer.

619-1.13 Temporary Glare Screen. Work shall consist of furnishing, installing, moving, maintaining, and removing glare screen mounted on a concrete barrier as shown in the contract documents or as directed by the Engineer.

619-1.14 Temporary Impact Attenuator. Work shall consist of furnishing, installing, maintaining, repairing, moving and removing temporary impact attenuators as shown in the contract documents or as directed by the Engineer.

619-1.15 Temporary Sand Barrel Arrays. Work shall consist of furnishing, installing, maintaining, relocating and removing temporary sand barrel arrays as shown in the contract documents or as directed by the Engineer.

619-1.16 Vehicle Arresting Barrier. Work shall consist of providing vehicle arresting barriers (net-type) and their anchorages as shown on the Standard Sheets to prevent errant vehicles from entering a closed work area as shown in the contract documents or as directed by the Engineer.

619-1.17 Maintain or Modify Traffic Signal Equipment. Work shall consist of modifying or maintaining in proper operation, existing, relocated, modified, or newly installed traffic signals as shown in the contract documents or as directed by the Engineer.

619-1.18 Temporary Traffic Signals. Work shall consist of furnishing, installing, moving, maintaining, and removing temporary traffic signals and necessary components as shown in the contract documents or as directed by the Engineer. Temporary signals shall be installed only on a highway designated as a Restricted Highway.

619-1.19 Nighttime Operations. Work shall consist of developing a Nighttime Operations and Lighting Plan, and furnishing, installing, operating, maintaining, moving and removing lighting equipment for nighttime construction operations as shown in the contract documents or as directed by the Engineer.

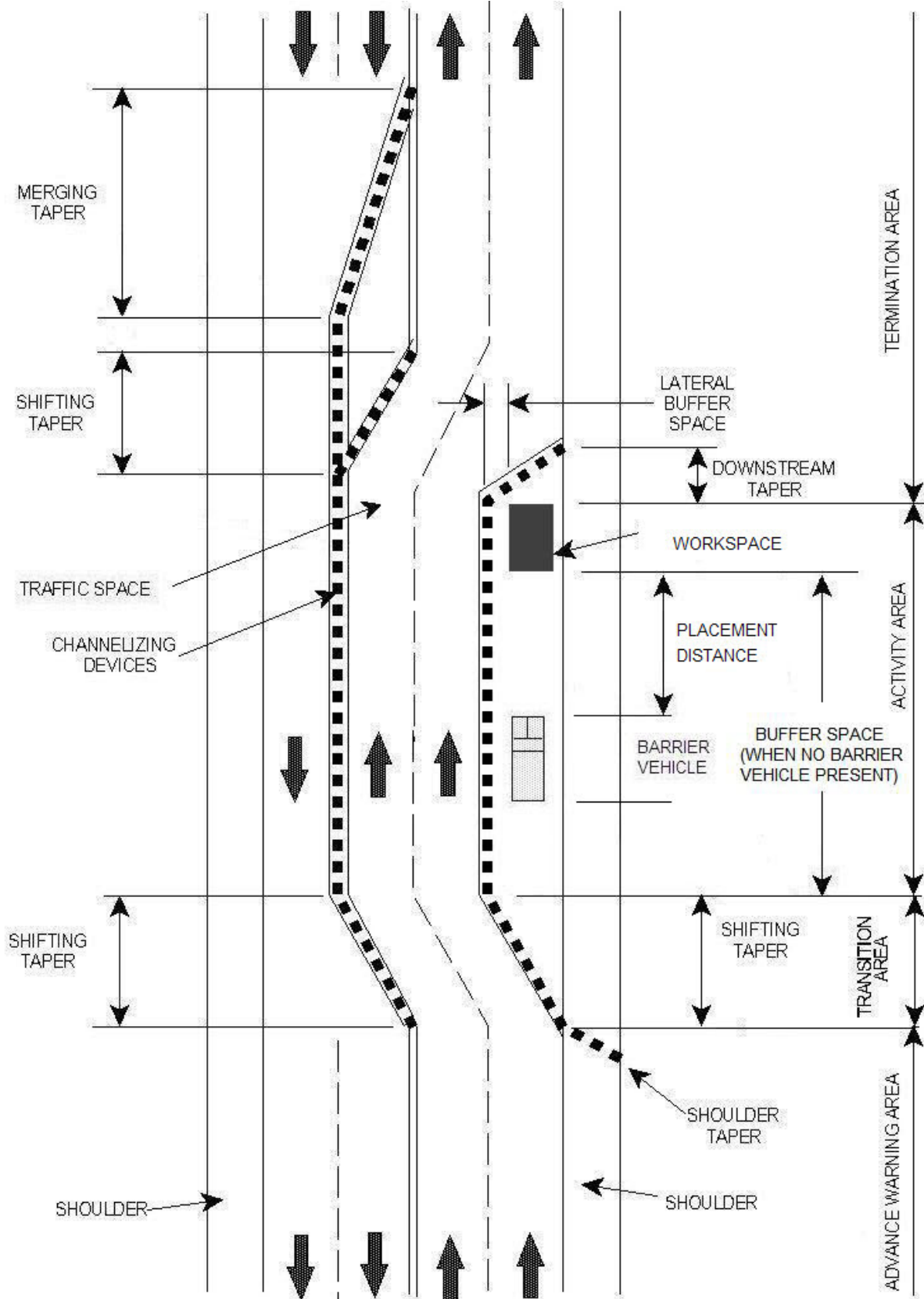
619-1.20 Traffic Control Supervisor. Work shall consist of providing a full-time traffic control supervisor having adequate training, experience, and authority to implement and maintain all traffic control operations, as shown in the contract documents or as directed by the Engineer.

619-1.21 Temporary Structures and Approaches. Work shall consist of designing, constructing, moving, maintaining, and removing temporary structures, and necessary appurtenances, as shown in the contract documents or as directed by the Engineer. Temporary structures may also include temporary structural elements added to an existing structure to allow temporary use, or staged removal, of the structure.

619-1.22 Pavement Patching. Work shall consist of providing and installing pavement patching materials to maintain pavements open to traffic in acceptable condition as shown in the contract documents or as directed by the Engineer.

619-1.23 Mailboxes. Work shall consist of relocating or replacing postal route mailboxes and/or mailbox supports consistent with U.S. Postal Service requirements, as shown in the contract documents or as directed by the Engineer.

FIGURE 619-1 COMPONENT PARTS OF A TYPICAL HIGHWAY WORK ZONE



619-2 MATERIALS.

619-2.01 General. All materials used shall comply with the requirements of the following subsections of Section 700 *Materials and Manufacturing*, or as established by this section, the applicable Standard Sheets, and the contract documents.

Concrete Grouting Material	701-05
Precast Concrete Barrier	704-05
Epoxy Polysulfide Grout	721-03
Traffic Signal Heads	724-04
Removable Raised Pavement Markers	727-02
Epoxy Paint	727-03
Permanent Tape	727-04
Glass Beads for Pavement Markings	727-05
Removable Pavement Tape	727-06
Removable Wet-Night Reflective Tape	727-07
Permanent Wet-Night Reflective Tape	727-08
Traffic Paint	727-09
Drums	729-01
Cones	729-02
Temporary Tubular Markers	729-03
Vertical Panels	729-04
Stop/Slow Paddles	729-05
Type II Construction Barricades	729-07
Type III Construction Barricades	729-08
Temporary Sign Supports	729-09
Temporary Impact Attenuators - Redirective	729-10
Temporary Impact Attenuators - Gating	729-11
Truck-Mounted Impact Attenuators	729-12
Temporary Sand Barrels	729-13
Vehicle Arresting Systems	729-14
Arrow Panels	729-15
Portable Variable-Message Signs	729-16
Temporary Glare Screens	729-17
Warning Lights	729-18
Aluminum Sign Panels	730-01
Temporary Plywood Sign Panels	730-02
Temporary Rigid Lightweight Sign Panels	730-03
Reflective Sheeting	730-05
Reflectorized Sheeting Sign Characters (Type IV)	730-12
Reflectorized Sheeting Sign Characters (Type V)	730-13
Temporary Wooden Sign Posts	730-19
Stiffeners, Overhead Brackets and Miscellaneous Hardware	730-22
Fiberglass Reinforced Plastic Sign Panels	730-23
Type A Sign Supports	730-24
Type B Sign Supports	730-25

619-2.02 Basic Work Zone Traffic Control.

A. Surface Condition, Debris, Drainage and Dust Control. Materials used to repair pavement surfaces shall be compatible with the pavement. In general, plant-mixed hot mix asphalt is suitable for all pavement surfaces to be repaired. Material other than plant-mixed hot mix asphalt may be used if approved by the Engineer.

Environmentally compatible, approved dust palliatives may be used in conformance with any conditions placed on their use.

B. Seasonal Operations and Snow and Ice Control. (None Specified)

C. Maintain Public Access. (None Specified)

D. Maintain Existing Roadside Signs, Delineators and Markers. All materials used to maintain existing roadside appurtenances shall be consistent with the features to be maintained.

E. Maintain Existing Guide Rail, Median Barrier and Bridge Rail. All materials used to maintain existing roadside appurtenances shall be consistent with the features to be maintained.

F. Construction Vehicles and Equipment. All vehicles with a GVWR greater than 10,000 lbs and with restricted visibility to the rear shall be equipped with an operational audible backup alarm. Any vehicle with a non-operational backup alarm shall be taken out of service until the alarm is repaired.

All vehicles and equipment within the contract limits and on the roadway shall be equipped with a rotating amber or flashing Light Emitting Diode (LED) beacon visible from all directions for a minimum of 1,000 feet during daylight. Flashing LED beacons shall meet the requirements of SAE J845 Class 2. Strobe lights shall not be used.

All trucks with a GVWR greater than 10,000 lbs shall display a minimum 2 inch wide band of reflective sheeting on the front, rear and each side. The sheeting need not be continuous, but the sum of the length of the segments shall be at least one-half the length of the body or trailer. The centerline of the sheeting shall be between 15 inches and 60 inches above the ground. All other construction equipment shall display a minimum 2 inch wide band of reflective sheeting on the front and rear (100 square inches per end minimum) as practicable. Reflective markings on construction vehicles and equipment shall conform to §730-05 *Reflective Sheeting* ASTM Type III, Type VII or Type IX.

G. Barrier/Shadow Vehicles. Barrier/Shadow vehicles shall weigh a minimum of 18,000 lb and shall be equipped with a Type B or Type C Arrow Panel. Ballast may be used to bring a lighter vehicle up to the indicated weight provided the ballast is securely contained within an enclosed body or otherwise securely fastened to the vehicle such that the ballast will not separate from the vehicle upon impact. Where the preconstruction posted speed limit is 55 mph or less, barrier/shadow vehicles shall be equipped with a Test Level-2 truck mounted or trailer mounted impact attenuator. Where the preconstruction posted speed limit is more than 55 mph, barrier/shadow vehicles shall be equipped with a Test Level-3 truck mounted or trailer mounted impact attenuator. Impact attenuators meeting the requirements of NCHRP 350 Test Level 3 are also acceptable as Test Level 2 devices.

Where a barrier vehicle remains stationary for extended periods of time, the Contractor may utilize a barrier trailer in lieu of a barrier vehicle. A barrier trailer is a trailer that may be detached from the tow vehicle and that meets barrier vehicle weight, arrow board, attenuator and placement distance requirements.

H. Construction Signs. Fabrication of all components shall produce a finished sign panel. Holes may be punched or drilled. Edges shall be smooth and true and free from burrs or ragged breaks. Sign panels, including face shape, color, dimensions, and characters shall be fabricated using colors, character series, character sizes, symbols, route shields and borders as shown in the MUTCD or in the contract documents.

1. Sign Panels. Modification of sign legends by overlaying an existing legend with a revised legend, changing a single word or distance, such as changing LEFT to RIGHT or 1000 to 1500 will be permitted if the overlay is a match to the rest of the sign in terms of legend size and type, sheeting color and reflectivity. The overlay shall be firmly adhered to the underlying panel. Any such overlays shall provide a visual match to the rest of the sign when viewed from a distance of 100 feet or greater during all periods in which the sign will be used.

a. Rigid Sign Panels. Rigid sign panels shall be aluminum, fiberglass, plywood, or lightweight plastic. Orange signs on rigid panels shall conform to §730-05 *Reflective Sheeting* fluorescent-orange ASTM Type IX (Class E) sheeting. All other colors of construction sign faces on rigid panels shall conform to §730-05 *Reflective Sheeting* ASTM Type III (Class B) sheeting. White characters and borders shall conform to §730-12 *Reflectorized Sheeting Sign Characters (Type IV)* or §730-13 *Reflectorized Sheeting Sign Characters (Type V)*. Shields shall be either demountable or directly applied panels and

shall conform to §730-13 *Reflectorized Sheeting Sign Characters (Type V)*. Black sign characters and background shall be non-reflective and shall conform to §730-13 *Reflectorized Sheeting Sign Characters (Type V)*.

b. Flexible Sign Panels. Flexible sign panels shall be a solid, fluorescent-orange, durable elastomeric material. Flexible panels fabricated from mesh will not be allowed. Flexible sign panels shall be mounted on supports with adequate bracing, so as to minimize flutter and to support the intended shape of the sign.

2. Mounting Temporary Signs. Temporary sign supports, except those located beyond the deflection distances of guide rail or temporary barrier as given in Table 619-6 *Guide Rail & Concrete Barrier Standard Deflection Distances* or otherwise protected against impact by errant vehicles, shall meet the following requirements for portable or fixed supports. If rigid diagonal bracing is used, the high end of the bracing shall face away from approaching traffic. All wood supports shall be painted white.

a. Portable Temporary Sign Supports. Ballast used to stabilize supports shall be bagged sand or other suitable material, and shall be located at ground level. Portable supports shall be a configuration which is NCHRP 350 approved, or be constructed in accordance with a Standard Sheet(s).

b. Fixed Temporary Sign Supports. The Contractor shall provide NCHRP 350 approved Type A, Type B or wooden sign posts in accordance with §730-19 *Temporary Wooden Sign Posts*, §730-24 *Type A Sign Supports*, or §730-25 *Type B Sign Supports* as appropriate.

3. Sign Covers. Covers used to inactivate unneeded construction signs shall be a single dark color, opaque material containing no wording or images. Rigid covers shall match the size and shape of the sign panel(s). Fabric sign covers may require more than one layer of fabric to prevent legibility of the sign being covered. Rigid Lightweight panels used as covers shall meet the requirements §730-03 *Temporary Rigid Lightweight Sign*. Signs hinged on the back side of the sign face to fold at the center and completely cover the sign face may be used.

I. Arrow Panels. Arrow panels shall be in accordance with §729-15 *Arrow Panels*.

J. Channelizing Devices. Drums shall be in accordance with §729-01 *Drums*. Standard cones, tall cones and extra tall cones shall be in accordance with §729-02 *Cones*. Temporary tubular markers shall be in accordance with §729-03 *Temporary Tubular Markers*. Standard and oversized vertical panels shall be in accordance with §729-04 *Vertical Panels*. Type II construction barricades shall be in accordance with §729-07 *Type II Construction Barricades*.

K. Pavement Edge Drop-off Protection. (None Specified)

L. Flagging and Traffic Control. Hand signaling devices used to control traffic shall meet the requirements of the MUTCD. The standard signaling device shall be STOP/SLOW signal paddles in accordance with §729-05 *Stop/Slow Paddles*. Red signal flags shall be a minimum of 24 inches x 24 inches. Automated Flagging Assistance Devices shall be in accordance with §729-19 *Automated Flagging Assistance Devices*. Portable traffic signals shall be in accordance with §729-20 *Portable Traffic Signals*.

M. Maintain Existing Mailboxes. (None Specified)

N. Contract Site Patrol. (None Specified)

619-2.03 Basic Work Zone Traffic Control (Daily Operations). (None Specified)

619-2.04 Temporary Business Signs. Temporary business signs shall conform to the MUTCD. Sign panels shall be in accordance with ' 619-2.02H.1. *Sign Panels*, except that the panels shall be white on a blue background.

Supplemental arrows, as required, shall be white on a blue background (M5-1 to M6-2). Temporary business signs shall be mounted on temporary sign supports.

619-2.05 Covering or Removal of Pavement Markings. Tape used to cover existing pavement markings shall be non-reflective, pavement marking masking tape, substantially similar in color to the pavement surface, in accordance with §727-06 *Removable Pavement Tape*.

619-2.06 Temporary Pavement Markings. Temporary pavement markings shall consist of removable raised pavement markers in accordance with §727-02 *Removable Raised Pavement Markers*, or removable pavement tape in accordance with §727-06 *Removable Pavement Tape*, or removable wet-night reflective tape in accordance with §727-07 *Removable Wet-Night Reflective Tape*, or traffic paint in accordance with §727-09 *Traffic Paint* and §727-05 *Glass Beads for Pavement Markings*, or temporary overlay markers in accordance with §729-21 *Temporary Overlay Markers*.

619-2.07 Interim Pavement Markings. Interim pavement markings shall consist of traffic paint in accordance with §727-09 *Traffic Paint* and §727-05 *Glass Beads for Pavement Markings*, epoxy paint in accordance with §727-03 *Epoxy Paint* and §727-05 *Glass Beads for Pavement Markings*, removable pavement tape in accordance with §727-06 *Removable Pavement Tape*, removable wet-night reflective tape in accordance with §727-07 *Removable Wet-Night Reflective Tape*. Interim pavement markings shall be supplemented, where specified, with removable raised pavement markers in accordance with §727-02 *Removable Raised Pavement Markers*.

619-2.08 Temporary Rumble Strips.

A. Raised Asphalt Rumble Strips. Raised asphalt rumble strips shall be formed from 6.3 or 9.5 hot mix asphalt. Asphalt Emulsion Tack Coat shall be used to adhere the rumble strip to the existing pavement.

B. Raised, Removable-Tape Rumble Strips. Removable-tape rumble strips shall be formed from black, non-reflectorized, removable pavement-marking tape. Raised, removable-tape rumble strips shall have a minimum width of 6 inches, measured in the direction of traffic, with sufficient layers of tape such that each finished rumble strip has a thickness of 3/8 inches ± 1/8 inch.

C. Raised, Preformed Rumble Strips. Raised, preformed rumble strips shall be manufactured specifically as temporary rumble strips. Raised, preformed rumble strips shall have a minimum width of 4 inches, measured in the direction of traffic, with a thickness of between ¼ inch and ½ inch.

D. Saw-Cut Rumble Strips. Saw-cut rumble strips shall have a width of 4 inches ± ½ inch measured in the direction of traffic. The depressions shall have a rectangular cross section with a depth of 3/8 inches ± 1/8 inch.

E. Milled-in Rumble Strips. Milled-in rumble strips shall have a nominal width of 6 inches measured in the direction of traffic. The depressions shall have a semicircular, concave cross section with a depth of 3/8 inches ± 1/8 inch.

F. Removing Temporary Rumble Strips. Rumble strip depressions shall be filled in with a 6.3 or a 9.5 hot mix asphalt meeting the requirements of Section 402, Hot Mix Asphalt (HMA) Pavements.

619-2.09 Interim Tubular Markers. Interim tubular markers shall be in accordance with §729-03 *Temporary Tubular Markers*.

619-2.10 Portable Variable-Message Signs (PVMS). Portable Variable-Message Signs shall be in accordance with §729-16 *Portable Variable-Message Signs (PVMS)*.

619-2.11 Type III Construction Barricades. Type III construction barricades shall be fabricated in accordance with §729-08 *Type III Construction Barricades*. All barricades used at night shall be equipped with warning lights in accordance with §729-18 *Warning Lights*.

619-2.12 Temporary Concrete Barrier. Temporary concrete barrier segments shall be precast concrete units in accordance with the Standard Sheets or approved Materials Details. All temporary concrete barrier supplied after January 1, 2015 shall be produced in accordance with the requirements of §704-05 *Precast Concrete Barrier*, and shall have a legible permanent marking. Temporary concrete barrier supplied prior to January 1, 2015 which was not produced in accordance with the requirements of §704-05 *Precast Concrete Barrier*, shall be material certified in accordance with specific Standard Sheets or Materials Details used for fabrication.

Warning lights for temporary concrete barrier with warning lights shall be in accordance with §729-18 *Warning Lights*. Where warning lights are not required, temporary concrete barrier segments shall be delineated using reflective panels covered with ASTM Type IX sheeting, approximately 3 x 6 inch, having a minimum area of 18 square inches. Where warning lights are required, barrier need not be delineated with panels. Reflective pavement marking material applied to the face of the barrier shall not, by itself, be considered acceptable delineation.

619-2.13 Temporary Glare Screen. Temporary glare screen shall be in accordance with §729-17 *Temporary Glare Screens*.

619-2.14 Temporary Impact Attenuator. Temporary impact attenuators shall be in accordance with §729-10 *Temporary Impact Attenuators - Redirective* or §729-11 *Temporary Impact Attenuators - Gating*.

619-2.15 Temporary Sand Barrel Arrays. Temporary sand barrels shall meet the requirements of §729-13 *Temporary Sand Barrels*. Sand fill shall meet the material requirements of §703-06 *Cushion Sand* or §203-2.02I *Sand Backfill*. Deicing material shall meet the requirements of §712-03 *Sodium Chloride*.

619-2.16 Vehicle Arresting Barrier (VAB). Vehicle arresting barriers shall meet the requirements of §729-14 *Vehicle Arresting Systems*. Portland Cement Concrete used for bases shall be Class A or C, except that requirements for automated batching shall not apply.

619-2.17 Maintain or Modify Traffic Signal Equipment. All traffic signal hardware, including but not limited to wire, cable, conduit, pull boxes, switch packs, modules and relays, detectors, signal heads, poles, and pedestrian push buttons used to maintain proper operation, shall meet the applicable requirements of Section 680 *Traffic Signals*. Materials which will be permanently incorporated into the work shall be in accordance with Section 680 *Traffic Signals*.

619-2.18 Temporary Traffic Signals. Equipment for temporary traffic signals shall meet the requirements of Section 680 *Traffic Signals*, except that used equipment in good operating condition may be furnished, and for which material certifications are not required. All span wire, inductance-loop wire, shielded lead-in cable, traffic signal cable, and other wire used for temporary traffic signals shall be new material. Portable traffic signals shall be in accordance with §729-20 *Portable Traffic Signals*.

All other equipment for temporary traffic signals shall meet the requirements of Section 680 *Traffic Signals* except for the following modifications:

A. Temporary Poles. Temporary timber poles shall be ANSI O5.1, Class 2, treated with an appropriate waterborne wood preservative. Preservative retention shall be appropriate for the species when used in ground-contact application.

B. Signal Controller. The signal controller may be either solid-state or electro-mechanical.

C. Traffic Signal Heads. The materials and painting requirements of ' 724-04 *Traffic Signal Heads* shall not apply except that the signal head housing shall be dark green.

D. Conflict Monitor. Means shall be provided to prevent the signal from displaying indications which will result in two or more conflicting traffic movements being permitted simultaneously.

619-2.19 Nighttime Operations. (None Specified)

619-2.20 Traffic Control Supervisor. (None Specified)

619-2.21 Temporary Structures and Approaches. When specific details and materials are shown in the contract documents for temporary structures, substitutions or alterations may be permitted if approved by Deputy Chief Engineer (Structures) (DCES).

When specific details are not shown in the contract documents, the Contractor shall assume all liability and responsibility for determining that all materials required conform to the AASHTO Standard Specifications for Highway Bridges or AASHTO LRFD Bridge Design Specifications, unless otherwise approved by the DCES. Used material shall not be furnished for fracture-critical members. Mill certifications shall be provided for all fracture critical material. Excluded from this provision are pedestrian and pre-engineered (fabricated) proprietary structures.

619-2.22 Pavement Patching. In general, hot mix asphalt (HMA) is suitable for all pavement surfaces. During winter months when HMA is not available, a bituminous cold-patch material shall be used.

619-2.23 Mailboxes. Materials used shall meet the requirements of the U.S. Postal Service.

619-3 CONSTRUCTION DETAILS

619-3.01 General. The Contractor shall designate a work zone traffic control competent person who has the primary responsibility and sufficient authority for implementing the work zone traffic control plan and other safety and mobility aspects as necessary. The Contractor's work zone traffic control competent person shall be appropriately experienced and adequately trained in traffic control operations by recognized training programs, including the American Traffic Safety Services Association (ATSSA) ATraffic Control Supervisor®, the National Safety Council, unions, or construction industry associations, or by an individual instructor from such a program in accordance with the level of decisions that the individual will be required to make, reflecting current industry practices and Department requirements.

The Contractor shall generally maintain a traveled way suitable for moving traffic, in accordance with the contract documents and ensure construction equipment, vehicles, and materials are safely stored beyond the clear zone or behind protective barrier during non-working hours so as not to constitute a hazard to vehicles, bicycles and pedestrians. Construction operations shall be conducted to ensure a minimum of delay to traffic. Stopping traffic for more than 5 minutes shall not be permitted unless specifically authorized in the contract documents or in writing by the Engineer. All operations shall be carried out in a manner that provides workers with safe access to the worksite and protects workers from moving traffic. The work zone traffic control competent person shall routinely inspect all work zone traffic control equipment and devices to make sure they are in a safe operating condition in accordance with §619-3.02N *Contract Site Patrol*. Unless otherwise noted, temporary items supplied in accordance with this section shall remain the property of the Contractor.

Where pedestrians are not prohibited from the street or highway, pedestrian traffic shall be maintained to allow their safe passage as shown in the contract documents. Where sidewalks, walkways, or shoulders must be temporarily closed to facilitate construction operations, safe pedestrian passage shall be maintained on at least one side of the roadway at all times, unless other temporary pedestrian accommodations are provided in the contract documents or are approved by the Engineer. Where pedestrian access is prohibited, workers shall not cross or enter travel lanes open to traffic.

The requirements in this section refer to posted speed limits. If prevailing or operating speeds for a highway exceed the preconstruction posted limits, the contract documents may direct the Contractor to assume that the preconstruction posted speed limits are different than posted.

619-3.02 Basic Work Zone Traffic Control. The Contractor shall control traffic so that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience ride, drive, or walk, day or night, over all or any portion of the highway and/or structure under construction where traffic is to be maintained.

The Contractor shall cease operations and restore the traveled way to safe operating condition during any specific periods listed in the contract documents, at such times as traffic renders conditions unsafe to continue work, and during periods of darkness (before sunrise or after sunset), fog, snow or rain, high winds, or other inclement weather that renders conditions unsafe to continue work, for either the traveling public or the workers. The Engineer will determine when traffic or weather conditions render work operations unsafe.

A. Surface Condition, Debris, Drainage and Dust Control. The traveled way, sidewalks and pedestrian walkways shall be kept reasonably smooth and hard at all times, and shall be well drained and free of potholes, bumps, irregularities, and depressions that hold water. Except when construction operations necessitate disturbance of the normal surface, the Contractor shall maintain the pavement surface in such a condition as to permit the safe, comfortable passage of vehicles at the posted speed limit. A satisfactory riding surface shall be maintained both when work is underway, and when work is inactive. Special attention shall be given to maintenance of the traveled surface during hours of inactivity, including nights, weekends, holidays, and the winter season.

Milling operations shall be conducted to prevent pavement runoff from collecting along milled joints. Bumps and transverse irregularities shall be eliminated to the extent practical. Pavement joints and milling rebates resulting in longitudinal or transverse vertical faces exceeding 1 inch in height that would be exposed to traffic during non-work hours shall be sloped or tapered with temporary patches or shims providing a taper rate in accordance with Table 619-1 *Required Treatment for Transverse Bumps*.

Where longitudinal tapered wedge paving joints are used, temporary pavement markings shall be provided prior to reopening lanes to traffic. The joints may be left open to traffic provided traffic is not expected to frequently change lanes, and UNEVEN LANES (W8-11) signs are posted in advance of the condition, posted at each ramp and roadway intersection and repeated every ½ mile, supplemented with NEXT [X] MILES (W7-3aP) auxiliary signs.

Transverse bumps or vertical faces, unpaved surfaces, milled or grooved pavement, rough pavement, and other surface irregularities 1 inch or more in height shall be adequately sloped or tapered, or BUMP (W8-1) or other appropriate warning signs shall be posted in advance of the condition. A Type 1 Object Marker (OM1-3) or a drum with a flashing warning light shall be installed on the right side of the roadway at the bump or other condition. On expressways and freeways, an object marker or a drum with a flashing warning light shall be installed on both sides of the roadway.

Where traffic will be riding on milled pavement, the Contractor shall install GROOVED PAVEMENT (W8-15) signs on the approaches. On multilane highways where only one lane in a direction is milled and multiple lanes are open to traffic, the Contractor shall supplement the GROOVED PAVEMENT sign with a black on orange LEFT LANE (M5-4), CENTER LANE (M5-5) or RIGHT LANE (M5-6) panel below the warning sign. Where only an entrance or exit ramp is milled, the Contractor shall sign the mainline with a GROOVED PAVEMENT sign and a supplemental ON RAMP (W13-4) panel.

Where both BUMP and GROOVED PAVEMENT signs are warranted, the GROOVED PAVEMENT sign shall be installed 500 feet upstream of the BUMP sign in non-urban areas, and 300 feet upstream in urban areas. Where the posted speed limit is 45 mph or higher, the Contractor shall place a portable variable message sign (PVMS) in advance of pavement that has been milled or grooved and is open to traffic, warning motorcycle riders to use caution. The PVMS will be paid for separately.

For expressways where the posted speed limit is 45 mph or higher, the Contractor shall not leave milled or grooved pavement for more than 7 calendar days before placement of the next pavement course.

The Contractor shall keep the traveled way, sidewalks, and walkways free of construction materials and foreign objects that fall from vehicles or equipment. Materials spilled by, dropped from, or tracked by traffic or by any vehicle used in the Contractor's operations along or across any public traveled way shall be removed immediately.

The Contractor shall keep all surface drainage facilities operative at all times. Positive drainage shall be provided at all times, even during grading operations and periods of accumulated plowed snow, to adequately drain the traveled way and the remainder of the right-of-way areas. Maintaining positive drainage shall include cleaning of drainage grates on roadway pavements. Cleaning of drainage structures and drainage pipes of material not deposited due to the Contractor's operations will be paid for separately. Repair of drainage structures will be paid for separately.

Dust control measures shall be applied to control dust resulting from traffic on unpaved surfaces and from Contractor operations on or adjacent to the roadway. Dust control shall be adequate to prevent dust which hinders driver visibility or which creates a nuisance condition for property owners and residents adjacent to the contract. Dusty conditions resulting from the Contractor's operations may be corrected by the use of calcium chloride and/or water. If used, water shall be distributed uniformly using a suitable spray head or spray bar.

Height of Bump (in)	Anticipated Exposure Time (Calendar Days)	Posted Speed ≤ 45 mph	Posted Speed > 45 mph
1 to 6	≤ 7	6:1	10:1
	> 7	15:1	30:1

B. Seasonal Operations and Snow and Ice Control. The Contractor shall maintain the traveled way in such a condition and conduct operations in such a manner that snow and ice may readily be controlled by others as and when necessary, and in such a manner that proper drainage is provided for the melting of snow banks resulting from normal plowing. The Contractor will not be responsible for snow and ice control on the pavement, shoulder, or sidewalks which are not restricted by construction operations and open to the public.

During periods of seasonal shutdown, the traveled way shall be maintained in an acceptable manner for travel, and all traffic control devices and safety features maintained in a safe, operable condition. All construction signs and temporary traffic control devices that are not needed during shutdown periods shall be covered or removed.

C. Maintain Public Access. The Contractor shall provide and maintain at all times safe and adequate ingress and egress for intersecting roads, residences, business establishments, adjacent properties, bus stops and other transportation facilities for vehicles, pedestrians and bicycles; at existing or at new access points, consistent with the work, unless otherwise authorized by the Engineer. Whenever construction operations disrupt or interfere with normal traffic patterns, intersections, business establishment access points, and driveways shall be clearly marked using channelizing devices.

A ROAD CLOSED (R11-2) sign on a temporary sign support and Type III construction barricades with warning lights shall be used whenever an entire roadway or ramp is closed to traffic.

Where pedestrian facilities exist, or where pedestrian traffic is reasonably anticipated, the Contractor shall maintain pedestrian access on at least one side of the highway or street at all times, in accordance with the contract documents and the MUTCD. Where an existing pedestrian facility is disrupted, closed or relocated, the temporary facility shall include accessibility features consistent with the features in the existing pedestrian facility. Pedestrian access may be provided using existing pedestrian facilities, temporary sidewalks or walkways, or alternate paths. Where a sidewalk is closed, it shall be marked with a Type II or Type III construction barricade and a SIDEWALK CLOSED (R9-9) sign. Advance warning signs and directional guidance shall be provided to direct pedestrians to alternate paths and crosswalks and to alert motorists. Where bus service is maintained, the Contractor shall provide suitable areas or locations for the loading and unloading of passengers.

Potentially hazardous areas adjacent to sidewalks, walkways, or other areas used by pedestrians shall be protected to prevent pedestrian intrusion in accordance with ' 107-05F. *Restricted Areas*.

Open sidewalks and walkways shall be maintained and kept smooth and free from holes, obstructions, and tripping hazards. Surfaces shall consist of pavement, firmly compacted granular material, or other surfaces noted in the contract documents or approved by the Engineer. The width of the temporary facility shall match that of the existing facility where practicable. When it is not possible to meet the minimum width of 5 ft. for the entire length of the facility, a 5 ft. by 5 ft. passing space should be provided every 200 ft. Construction materials, vehicles, equipment, debris, temporary sign supports or other materials shall not be placed or stored on open sidewalks or walkways unless expressly shown in the contract documents or approved by the Engineer.

Where bicycles are not prohibited from the highway, adequate accommodations for bicyclists shall be maintained in the travel lanes, on the shoulder, or on alternate paths or facilities.

D. Maintain Existing Roadside Signs, Delineators and Markers. Existing Department authorized signs, delineators, markers and their supports within the contract limits shall remain under the control and jurisdiction of the Engineer. Signs not authorized by the Department shall be removed from the right of way, as directed by the Engineer, in accordance with Section 647 *Removing, Storing and Relocating Signs*.

1. Maintenance. Existing signs, delineators, markers and their supports shall be maintained by the Contractor. Adequate visibility of route markers and directional signing shall be provided for drivers at all times. If relocation of route markers and directional signing is necessary to accommodate construction

operations, the temporary or new locations shall be subject to approval by the Engineer. Existing roadside delineators shall be removed or relocated only to the minimum extent necessary to accommodate the work under the contract. Where contract operations require the temporary removal of existing delineators to facilitate work operations, temporary roadside delineation consisting of the existing delineators, temporary delineators, or channelizing devices shall be in place each night and at any time work operations at that location are suspended. Temporary devices shall be placed at the outer edge of the shoulder at a spacing similar to the existing delineator spacing.

2. Storage. Existing signs, delineators, markers, and their supports which directly interfere with the construction operations shall be removed, stored, protected, cleaned and replaced in accordance with the contract documents and the provisions of Section 647 *Removing, Storing and Relocating Signs* and will be paid for separately. Existing signs, delineators and markers removed for the Contractor's convenience shall be stored, cleaned and replaced at no additional cost to the State. Existing signs, delineators and markers lost or damaged due to negligence of the Contractor shall be replaced at no additional cost to the State.

E. Maintain Existing Guide Rail, Median Barrier, and Bridge Rail. When construction operations require the temporary removal of existing bridge rail, guide rail or median barrier; or when existing rail will be removed and replaced with new rail, the Contractor shall schedule operations to minimize the time period that rail is not installed. Unless otherwise specified in the contract documents, guide rail or median barrier shall be replaced or the location otherwise protected within 14 calendar days.

Bridge rail systems shall be maintained in service at all times on any structure on which vehicle or pedestrian traffic is maintained, unless a temporary barrier is installed, or other means are used to ensure that vehicles, bicyclists and pedestrians are not exposed to the unprotected edge of a bridge.

During non-work hours when traffic is being maintained on the facility, all temporary ends (free ends) of guide rail, median barrier and bridge rail shall be temporarily terminated and marked with a channelizing drum or object marker equipped with a Type A flashing warning light. Corrugated beam guide rail and median barrier, and heavy-post, blocked-out, corrugated beam guide rail and median barrier shall be temporarily terminated by having the exposed ends (free ends) dropped to the ground and pinned. The approach ends of box beam guide rail, median barrier and bridge rail shall be temporarily terminated with box beam guide rail end assemblies utilizing two splice plates and the proper number of bolts per connection. No posts for anchorages will be required. Special temporary splice plates are required to adapt box beam guide rail end assemblies to box beam median barriers.

During any overnight period when existing guide rail or median barrier is temporarily removed, the Contractor shall install channelizing devices in the location where the guide rail or median barrier was removed in accordance with §619-3.02J.6. *Removed Existing Guide Rail or Median Barrier*.

F. Construction Vehicles and Equipment. All construction vehicles and equipment operating within the contract limits, whether in the work space, in the traffic space, in spoil areas, in storage areas, or any other areas under the contract, shall be operated at all times with due consideration for the safety of the public and workers.

All vehicles and equipment within the contract limits and on the roadway shall operate a rotating or flashing amber beacon. If visibility of the beacon is blocked by a portion of the vehicle or equipment, additional beacons shall be provided. Beacons shall be mounted in a manner which does not cause glare for the driver or operator. Short-term delivery vehicles not equipped with rotating or flashing amber beacon shall display four-way emergency flashers when in the temporary traffic control zone.

Other than vehicles registered and meeting all applicable requirements of the NYS Vehicle and Traffic Law, no construction vehicle or equipment used in the performance of the work shall be permitted to operate in travel lanes or shoulders open to traffic unless proper traffic control devices and other safety measures are in place to warn drivers of the presence of the equipment.

On any highway where the posted speed limit is 45 mph or higher, no construction vehicle or equipment shall operate in a travel lane or shoulder open to and unimpeded by traffic at a speed less than 15 mph slower than the posted speed limit unless followed by a vehicle equipped with flashing warning lights and *SLOW MOVING VEHICLE* (W21-4) sign on the rear.

The Contractor shall ensure that all construction vehicles and equipment are safely stored beyond the clear zone during non-working hours so as not to constitute a hazard to vehicles and pedestrians, unless protected by traffic barrier.

G. Barrier Vehicles/Barrier Trailers/Shadow Vehicles.

1. Barrier Vehicles. The Contractor shall provide barrier vehicles to guide traffic and protect workers at the beginning of stationary shoulder closures, lane closures and other stationary work zones in accordance with the contract documents.

When located in the taper of a lane closure and another arrow panel is not present, arrow panels on barrier vehicles shall be operated in the appropriate flashing arrow mode. For all other applications, arrow panels shall either display the four-corner flashing caution mode, or shall be turned off. Barrier vehicles should normally be unoccupied, with transmission in gear, parking brakes set and wheels straight, except when being moved. Barrier trailers should have parking brakes set and arrow panels shall be operated in the appropriate flashing arrow mode.

Barrier vehicles and barrier trailers shall be moved if necessary as the work progresses. The placement distance (distance a barrier vehicle or barrier trailer is located in advance of the first workers or hazard) shall be based on Table 619-2 *Placement Distance for Barrier/Shadow Vehicles*.

Table 619-2 PLACEMENT DISTANCE FOR BARRIER/SHADOW VEHICLES				
Posted Speed Limit (mph)	Placement Distance (ft)			
	Barrier Vehicles			
	18,000 lb		24,000 lb	
	Minimum	Maximum	Minimum	Maximum
> 55	100	200	100	200
45- 55	100	200	80	160
<45	80	160	50	100
	Shadow Vehicles			
> 55	230	325	180	280
50 - 55	180	280	150	250
≤ 45	100	200	100	200

2. Shadow Vehicles. For posted speed limits of 30 mph or higher, the Contractor shall provide shadow vehicles to guide traffic and protect workers conducting mobile or short duration work operations except where the travel lane is closed to traffic by traffic barriers or by channelizing devices., including, but not limited to, pavement marking application, pavement marking removal and sweeping

When located in an open travel lane of a multilane roadway, the shadow vehicle shall display the flashing arrow panel in the appropriate mode. When located in a travel lane closed by barrier or channelizing devices, on a shoulder, otherwise not in an open travel lane, or on a two-lane, two-way roadway, the arrow panel shall either display the four-corner flashing caution mode or be turned off.

The shadow vehicle shall be moved as necessary to keep pace with the work operations. The placement distance (distance the shadow vehicle is in advance of the first workers or hazard) shall be as shown in Table 619-2 *Placement Distance for Barrier/Shadow Vehicles*.

When mobile or short duration work operations occupy a long distance of a travel lane not closed to traffic by barrier or channelizing devices, such that traffic may reenter the lane between work operations, the Contractor shall provide additional shadow vehicles for any gaps in the operation of 500 ft or more.

H. Construction Signs. The Contractor shall install and maintain construction signs in good condition to adequately and safely inform and direct motorists, bicyclists and pedestrians. Existing and construction signs shall indicate actual roadway conditions, and shall be covered, uncovered, changed, relocated, or removed immediately to reflect current conditions. Construction signs shall be covered or removed when they no longer indicate actual conditions.

The Contractor shall provide measures to protect workers during placement and removal of construction signs adequate for the prevailing speed, volume of traffic and roadway geometry where the work is to occur. Such protection may include, but is not limited to, the use of flaggers, spotters, and shadow vehicles equipped with truck-mounted or trailer mounted attenuators. Where pedestrian access is prohibited, workers shall not cross or enter travel lanes open to traffic.

All signs shall be kept clean, mounted at the required height on acceptable supports, and installed in the proper position, alignment and orientation so as to give maximum visibility. Construction signs will be evaluated for acceptability in accordance with the American Traffic Safety Services Association (ATSSA) *Quality Guidelines for Work Zone Traffic Control Devices*. When auxiliary panels are mounted above or below a warning or regulatory sign, they shall not cover any part of the warning or regulatory sign. Signs shall be placed so that each sign is visible at night, at the desired distance, without being obscured by another sign, existing features on the highway, or foliage. The faces of stored signs shall not be visible to traffic in any direction, regardless of the orientation of the sign.

1. Sign Panels. Panels shall be flat and shall not be bowed or warped. Panel shapes shall not be altered, such as trimming corners of diamond shaped panels. If insufficient clearance exists, rectangular and/or smaller signs shall be used to obtain proper clearance. Panels with any wrinkling, delamination, or lack of adhesion of the reflective sheeting or legend will be evaluated for acceptability in accordance with the American Traffic Safety Services Association (ATSSA) *Quality Guidelines for Work Zone Traffic Control Devices*. Signs shall not bear any advertising message or any other message. A nonretroreflective logo or identifying information of the owner may be located on the back of the sign. The logo shall not exceed 1 square foot. The owner information shall not exceed 2 inches in height.

Flexible, or roll-up, sign panels shall only be used for short-term, daytime use. All flexible sign panels shall be mounted on supports with adequate bracing, so as to minimize flutter and to support the intended shape of the sign. Fluorescent-orange colored flexible sign panels shall be approved by the Engineer prior to and for the duration of their use.

2. Mounting Temporary Signs. Unless otherwise noted in the contract documents or in the MUTCD, construction signs shall be mounted on a separate support. In cases where construction signs on an existing support will replace or supplement existing sign(s), they shall be mounted in accordance with the Standard Sheet(s). The type of temporary sign supports used shall be selected by the Contractor. Signs that are erected and removed or relocated on a daily basis, or that must be frequently relocated to adjust to the location of construction operations, may be mounted on portable temporary sign supports. If rigid diagonal bracing is used, the high end of the bracing shall face away from approaching traffic. Signs that are to remain at one location may be supported on fixed temporary sign supports.

Supports for construction signs shielded by barrier or guide rail, and located beyond the deflection distance described in Table 619-6 *Guide Rail and Temporary Concrete Barrier Standard Deflection Distances* are not required to be NCHRP 350 approved.

When not in service, temporary signs mounted on portable temporary sign supports shall be stored in such a manner and location that they do not interfere with or present a hazard to vehicular, bicycle or pedestrian traffic. No signs or supports shall be stored on the traveled way, shoulders or sidewalks during non-working hours. Portable temporary sign supports stored within the clear zone shall be laid flat such that no part of the support is more than 4 inches above the ground. No portable temporary sign supports shall be leaned against or overhang the traffic side of traffic barrier.

All mounting heights are measured from the bottom of the lower sign panel to the nearest edge of pavement or to the ground directly below the sign, whichever results in a higher mounting. Rigid sign panels shall have a minimum mounting height of 5 feet, or a minimum mounting height of 7 feet, where pedestrians or parked vehicles are present. For signs incorporating an auxiliary panel below the primary panel, the minimum mounting heights shall be 4 feet and 6 feet, respectively. For pedestrian regulatory and guide signs the minimum mounting height shall be 4 feet.

Flexible panel and lightweight rigid panel signs shall be mounted at the same height as rigid panel signs, except they may be mounted, when approved by the Engineer, as low as 1 foot when all the following conditions are met:

- a. 1. On two-lane, two-way roadways, or;
2. When signs are placed on the left and right sides of expressways and freeways.
- b. Where there will be no parked vehicles to obstruct the view.
- c. Where the first warning sign(s) of a work zone warning sign sequence is mounted at a height of 5 feet or higher, and is located in advance of any flexible signs to alert motorists that they are entering a temporary traffic control zone.
- d. When the lower mounting height does not adversely affect visibility of the sign by motorists.

3. Sign Covers. Covers for unneeded construction and/or permanent signs shall be attached in such a manner to cover the entire sign face including auxiliary panels above or below the main sign panel. The cover shall be firmly attached to the sign in a secure manner using straps, small hand clamps, small brackets or other means to prevent dislodging. Sign covers shall be maintained in good condition to present a neat appearance and minimize distraction to motorists. Damaged covers which are no longer effective shall be promptly replaced.

Sign covers for permanent signs that are in conflict with long term work zone traffic control patterns shall be covered in accordance with §645-3.09 *Covering Signs* and paid for separately.

4. State Law Signs. Signs advising motorists of increased fines or license suspension for speeding within the work zone shall be installed in accordance with the contract documents. The LICENSE SUSPENDED AFTER TWO WORK ZONE SPEEDING TICKETS (NYR9-11) or the FINES DOUBLED FOR SPEEDING IN WORK ZONES (NYR9-12) sign shall be posted in advance of work zones not having a reduced regulatory speed limit. The FINES DOUBLED FOR SPEEDING IN WORK ZONES (NYR9-12) sign shall be posted in advance of work zones having a reduced regulatory speed limit. The state law sign shall be installed approximately 1,000 feet upstream of the first construction warning sign on highways with preconstruction posted speed limits equal to or greater than 45 mph and 300-500 feet upstream of the first construction warning sign on highways with preconstruction posted speed limits of less than 45 mph. For contracts with multiple work zones, the state law sign shall be installed at the aforementioned distances upstream of the ROAD WORK NEXT XX MILES (G20-1) sign or at the contract limits and need not be installed prior to each activity area. If any of the individual activity areas have a reduced regulatory speed limit, the FINES DOUBLED FOR SPEEDING IN WORK ZONES shall be used.

5. Special Use Work Zone Signs. Special use work zone signs shall be installed in accordance with the contract documents.

Reduced regulatory speed limits in work zones shall be posted in accordance with contract documents with SPEED LIMIT signs (R2-1) supplemented with WORK ZONE plaques (G20-5aP) of the same width mounted above the speed limit signs. The work zone plaques shall be placed on the same post and as the speed limit signs. REDUCED SPEED LIMIT AHEAD sign(s) (W3-5) shall be posted in advance of the first speed limit sign reducing the speed limit in a work zone.

All reduced regulatory speed limit signs shall be installed on both sides of expressways and freeways. When traffic is reduced to a single lane, reduced regulatory speed limit signs should be installed only on the right side of the highway. Reduced regulatory speed limit signs shall be placed within the work zone activity area at a maximum spacing of ½ mile. Reduced regulatory speed limit signs shall be completely covered or removed, and preconstruction posted speed limit signs shall be uncovered or replaced, after a work zone activity area is restored. A work zone plaque shall not be mounted above preconstruction posted speed limit signs within a work zone.

The END WORK ZONE SPEED LIMIT signs (R2-12) or the preconstruction posted speed limit sign (R2-1) shall be posted 100 ft beyond the end of a work zone activity area having a reduced regulatory speed limit. An END HIGHER FINES sign (R2-11) shall be placed 200 feet beyond the END WORK ZONE SPEED LIMIT sign.

Where shown in the contract documents, the Contractor shall install BE PREPARED TO STOP (W3-4) signs to inform oncoming traffic of potential stopped, queued or very slow conditions upstream of advanced warning signs. Multiple signs may be installed and covered for later use. A PVMS may be used for the sign or as a supplement.

Each BE PREPARED TO STOP sign shall be mounted on a temporary sign support, and shall be equipped with a pair of orange warning flags. For approaches on expressways and freeways with three lanes or more, both sides of the approach shall be signed unless the median is too narrow to fit the sign and the support.

The BE PREPARED TO STOP signs shall be posted approximately ½ mile in advance of the anticipated end of the queue. If the end of the queue is beyond the sign, the sign location shall be adjusted for the subsequent work day until the desired advance warning reflects typical conditions for that location. If the resulting adjustment places the sign in advance of the first warning sign, the Contractor shall also

furnish and place a ROAD WORK (W20-1) sign approximately 1,000 feet in advance of the BE PREPARED TO STOP signs.

I. Arrow Panels. The Contractor shall provide, operate and maintain arrow panels, also known as arrow boards, on highways having two or more travel lanes in the same direction, where the posted speed limit is 40 mph or higher, whenever a lane or lanes are closed to traffic and vehicles are required to merge with traffic in adjacent lanes. One arrow panel shall be provided for each lane closed to traffic regardless of the duration. Arrow panels shall be mounted so that the base of the panel is at least 7 feet above the pavement surface. Arrow panels shall be legible continuously from any point within the roadway (inclusive of shoulders) from 1,500 feet in advance of the lane closure taper to the beginning of the lane closure taper. Any arrow panel which cannot provide a sufficiently bright and clearly legible arrow display at any point within the roadway within the above distance shall be immediately repaired or replaced.

Arrow panels shall not be used where they would interfere with the operation of a traffic signal or flasher or where there is an operation controlled by a signal or flagger(s). Arrow panels will not be permitted for alignment changes or lane diversions where the number of through traffic lanes is not reduced, or for any application on two-lane, two-way roadways except in the caution mode.

J. Channelizing Devices. Where construction operations obliterate pavement markings, or otherwise change or disrupt the normal traffic pattern, the Contractor shall use channelizing devices to physically separate traffic from portions of the roadway not available for travel; to separate traffic from hazards adjacent to the roadway; to separate opposing or adjacent travel lanes; to mark the location of hazards within or adjacent to the roadway; and to clearly define the intended travel path for vehicles, bicycles, and pedestrians. Spacing of devices shall be sufficiently close at all times to provide clear and adequate guidance to ensure that vehicles, bicycles, and pedestrians follow the intended travel path. Channelizing device spacing requirements are stated in center-to-center distances.

Channelizing devices shall be maintained upright, at proper spacing, in proper alignment and orientation, and kept clean. Channelizing devices used at night shall be retroreflective. Channelizing devices shall not bear any advertising or other message. A non-retroreflective logo or identifying information of the owner may be located on the back, base or top of channelizing devices where it does not obstruct the face, color, or reflectivity. The logo shall not exceed 1 square foot. The owner information shall not exceed 2 inches in height. The Contractor shall make frequent checks commensurate with traffic conditions to identify and reset channelizing devices dislodged by traffic. Deformed or damaged devices and devices that do not maintain appearance, color, and reflectivity will be evaluated for acceptability in accordance with the American Traffic Safety Services Association (ATSSA) *Quality Guidelines for Work Zone Traffic Control Devices*. Ballast and/or mailboxes shall not be placed on top of a device or at any point above ground level. Ballast rings may be added to traffic cones, or traffic cones may be doubled, with one cone on top of the other, to serve as ballast.

One Type A flashing warning light shall be installed on the first channelizing device in each series of a nightwork shoulder or travel lane closure. One Type A flashing warning light shall be installed on channelizing devices used to mark the location of hazards in or adjacent to the travel lane, including, but not limited to, pavement discontinuities, drainage structures, excavations, fixed objects, and other obstructions and potential hazards remaining at the end of the work shift. Where the placement of numerous Type A flashing warning lights may present a distraction to motorists, flashing warning lights may be eliminated at intermediate locations such as driveway entrances or intersections.

Cones may be used in work zones where workers are not exposed to traffic, where the cones are placed to protect the work, and the placement does not create a hazard for traffic. In this application, cones are not considered channelizing devices.

Channelizing device application is summarized in Table 619-3A *Channelizing Device Application for Short-Term Stationary Work Zones* and Table 619-3B *Channelizing Device Application for Intermediate-Term and Long-Term Stationary Work Zones*. Where permitted, the Contractor may opt to substitute interim tubular markers or Type III construction barricades for other channelizing devices at no additional cost to the State.

1. Tapers. Tapers are defined as a transition area where motorists are redirected out of their normal path to a new path, including the tapered portion of lane closures, lane shifts, transitions, crossovers, ramps, intersections, or interchanges. The Contractor shall use drums, oversized vertical panels, or Type II construction barricades to delineate tapers. The Contractor may also use standard cones, tall cones, extra

tall cones, and vertical panels for short term work zones during daylight hours only. At stationary work zones where workers are exposed to traffic and the posted speed limit is 40 mph or more, the spacing between channelizing devices shall not exceed 40 feet. Where the posted speed limit is less than 40 mph, the spacing between channelizing devices shall not exceed 20 feet.

2. Traveled Way (Including Lane and Shoulder Closures). The Contractor shall use drums, tall cones, extra tall cones, vertical panels, oversized vertical panels, or Type II construction barricades to delineate the traveled way. The Contractor may also use standard cones and vertical panels for short term work zones during daylight hours only. At stationary work zones, where no workers are exposed to traffic or no workers are present, the spacing between channelizing devices shall not exceed 80 feet. At stationary work zones, where workers are exposed to traffic, the spacing between channelizing devices shall not exceed 40 feet. Where necessary to permit ingress or egress by construction vehicles, wider gaps may be provided between channelizing devices, not to exceed the deletion of every fifth device.

At expressway gores, the Contractor shall use drums, tall cones, extra tall cones, oversized vertical panels, or Type II construction barricades. The Contractor may also use standard cones and vertical panels for short term work zones (during daylight hours) only. The Contractor may opt to substitute Type III construction barricades except in locations where they restrict driver vision. The spacing between channelizing devices shall not exceed 20 feet.

At transverse bumps and other hazards on roadways where the posted speed limit is 40 mph or less, the Contractor shall use drums, extra tall cones or oversized vertical panels.

Along lane or shoulder closures, where traffic will be traveling adjacent to the closures, two channelizing devices consisting of tall cones, extra tall cones, drums, vertical panels, oversized vertical panels or Type II construction barricades shall be placed transversely across each closed lane and shoulder at maximum 800 feet intervals except in locations where it would interfere with milling, paving or other ongoing work, to discourage traffic from driving through the closed lane. The Contractor may also use standard cones for short term work zones (during daytime hours) only. The Contractor may opt to substitute one Type III construction barricade for two transverse devices. These transverse devices may be relocated or adjusted as necessary to permit passage of construction vehicles.

3. Roadway or Pavement Edge. The Contractor shall use drums, tall cones, extra tall cones, vertical panels, oversized vertical panels, or Type II construction barricades where the work introduces or exposes hazards within the roadway or at the outside edge of the roadway, and pavement edge markings or permanent delineators are not installed. The Contractor may opt to substitute Type III construction barricades. The spacing between channelizing devices shall not exceed 200 feet. If barrier is within 4 feet of the nearest travel lane, barrier delineation at a spacing not exceed 20 feet may be provided in place of channelizing devices.

4. Roadway Intersections and Commercial Driveway Radii. The Contractor shall use drums, or extra tall cones to delineate roadway intersections and commercial driveways. The Contractor may also use standard cones, tall cones, and temporary tubular markers for short term work zones during daylight hours only. The spacing between channelizing devices shall not exceed 6 feet. Reduced spacing near roadway intersections and commercial driveways may be necessary to provide clear guidance. Vertical panels, oversized vertical panels, Type II barricades and Type III barricades shall not be used.

A non-signalized intersecting roadway shall be delineated by a new series of channelizing devices, and the series will start with one drum equipped with a Type A flashing warning light, placed along the primary roadway after the intersection.

5. Residential Driveway Radii. The Contractor shall use drums, or extra tall cones to delineate residential driveways. The Contractor may also use standard cones, tall cones, and temporary tubular markers for short term work zones during daylight hours only. The spacing between channelizing devices shall not exceed 6 feet. Reduced spacing near residential driveways may be necessary to provide clear guidance. Vertical panels, oversized vertical panels, Type II barricades and Type III barricades shall not be used.

6. Removed Existing Guide Rail or Median Barrier. The Contractor shall use drums, tall cones, extra tall cones, temporary tubular markers, vertical panels, oversized vertical panels, Type II construction barricades, Type III construction barricades to delineate the edge of the shoulder or median in locations where guide rail or median barrier was removed. The spacing between channelizing devices shall not exceed 80 feet where the shoulder width is 4 feet or greater, and shall not exceed 40 feet where the shoulder width is less than 4 feet. A minimum of three devices shall be provided for each individual run of guide rail or median barrier that has been removed.

7. Placing, Maintaining and Removing Channelizing Devices. The Contractor shall take all necessary precautions to protect the public and workers during the placement, maintenance, and removal of channelizing devices. Warning signs shall be in place in advance of and prior to the start of channelizing device placement, and shall remain in place until after the channelizing devices have been removed.

Channelizing devices shall be set up and removed by properly trained worker(s). The Contractor shall protect workers during placement and removal of channelizing devices, using measures adequate for the prevailing speed, volume of traffic and roadway geometry where the work is to occur. Protection shall include the use of automatic devices or from protected areas of a vehicle where practicable. Such protection may include, but is not limited to, the use of cone-setting equipment, cone baskets mounted on work vehicles, flaggers, spotters, and shadow vehicles equipped with impact attenuators. Workers placing or removing traffic control channelizing devices onto/from the roadway from the back or side of a moving vehicle shall be protected by a fall restraint system consisting of side racks, harness and lanyard and/or cone basket so that a worker cannot fall off the vehicle and strike the pavement. Workers shall be seated in seats having seatbelts on moving work vehicles when not in the process of placing or removing channelizing devices.

A shadow vehicle shall protect the channelizing device placement or removal operation on multi-lane highways, or a vehicle with a side or front cone basket shall meet the requirements of a shadow vehicle. Vehicles with front mounted cone baskets shall be used only on expressways and freeways traveling in the same direction as traffic.

TABLE 619-3A CHANNELIZING DEVICE APPLICATION FOR SHORT-TERM STATIONARY WORK ZONES												
Work Zone Provisions		Maximum Device Spacing (center to center)	Channelizing Device									
			Drums	Standard Cones	Tall Cones	Extra Tall Cones	Temporary Tubular	Interim Tubular Markers	Vertical Panels	Oversized Vertical	Type II Barricades	Type III Barricades
Shoulder/Merging/Shifting Tapers	< 40 mph	20 ft.	X	X	X	X			X	X	X	
	≥ 40 mph	40 ft.	X	X	X	X			X	X	X	
One-Lane Taper for Alternating Two-Way Traffic		20 ft.	X	X	X	X			X	X	X	
Longitudinal Lane or Shoulder Closure w/Workers		40 ft.	X	X	X	X			X	X	X	
Longitudinal Lane or Shoulder Closure w/No Workers		80 ft.	X	X	X	X			X	X	X	
Freeway / Expressway Gores		20 ft.	X	X	X	X			X	X	X	O
Marking for Transverse Bumps ¹		N/A	X ²			X ²				X ²		
Transverse Device within Closed Traffic Lane and/or		800 ft	X	X	X	X			X	X	X	O
Roadway edge exposed with no Edgeline or Permanent Delineators		200 ft.	X		X	X			X	X	X	O
Roadway Intersection or Commercial Driveway Radii		6 ft.	X	X	X	X	X					
Residential Driveway Radii		6 ft	X	X	X	X	X					
Removal of existing guide rail	Shoulder width ≥ 4 ft.	80 ft.	X		X	X	X		X	X	X	O
	Shoulder width < 4 ft.	40 ft.										
Pavement Drop offs > 2 in. and < 24 in.		See Table 619-4										
Drop off ≥ 24 in. within 10 ft. of active travel way; Posted speed ≤ 45 mph; Drop off Length ≤ 100 ft.; Not to last longer than 1 work shift		20 ft.	X			X				X		
Closed Roads		N/A										X
Closed Sidewalks		N/A									X	X

NOTES: X = Allowed Blank = Not Allowed O = Optional at Contractor's expense

1 - A Type 1 Object Marker may be used in lieu of channelizing device

2 - Channelizing devices shall be equipped with a flashing warning light

TABLE 619-3B CHANNELIZING DEVICE APPLICATION FOR INTERMEDIATE-TERM AND LONG-TERM STATIONARY WORK ZONES

Work Zone Provisions	Maximum Device Spacing (center to center)	Channelizing Device									
		Drums	Standard Cones	Tall Cones	Extra Tall Cones	Temporary Tubular	Interim Tubular Markers	Vertical Panels	Oversized Vertical	Type II Barricades	Type III Barricades
Shoulder/Merging/Shifting Tapers	<40 mph	20 ft.	X						X	X	
	≥ 40 mph	40 ft.	X						X	X	
One-Lane Taper for Alternating Two-Way Traffic	20 ft.	X							X	X	
Longitudinal Lane or Shoulder Closure w/Workers	40 ft.	X		X	X				X	X	
Longitudinal Lane or Shoulder Closure w/No Workers	80 ft.	X		X	X				X	X	
Freeway / Expressway Gores	20 ft.	X		X	X				X	X	O
Marking for Transverse Bumps ¹	N/A	X ²			X ²				X ²		
Transverse Device within Closed Traffic Lane and/or	800	X		X	X			X	X	X	O
Roadway edge exposed with no Edgeline or Permanent Delineators	200 ft.	X		X	X			X	X	X	O
Roadway Intersection or Commercial Driveway Radii	6 ft.	X			X						
Residential Driveway Radii	6 ft.	X			X						
Removal of existing guide rail	shoulder width ≥ 4	80 ft.	X		X	X		X	X	X	O
	shoulder width < 4	40 ft.	X		X	X		X	X	X	O
Pavement Drop offs > 2 in. and < 24 in.	See Table 619-4										
Drop off ≥ 24 in. within 10 ft. of active travel way; Posted speed ≤45 mph; Drop off Length ≤ 100 ft.; Not to last longer than 1 work shift	20 ft.	X			X				X		
Two-Lane Two-Way Operations on expressways and freeways at	along curves	20 ft.	X						X	X	O
	along tangents	40 ft.	X						X	X	O
Two-Lane Two-Way Operations on expressways and freeways between Crossovers	40 ft.	X		X	X		X	X	X		
Closed Roads	N/A										X
Closed Sidewalks	N/A									X	X

NOTES: X = Allowed Blank = Not Allowed O = Optional at Contractor's expense

1 - A Type 1 Object Marker may be used in lieu of channelizing device.

2 - Channelizing devices shall be equipped with a flashing warning light.

K. Pavement Edge Drop-Off Protection. A drop-off is an abrupt difference in surface elevation of more than 2 inches at approximately 1V:3H or steeper. In the absence of adequate Traffic Control Plans in the contract documents, the Contractor shall submit alternate Traffic Control Plans to the Engineer for approval at least 30 calendar days prior to proposed work which will create a drop-off of over 24 inches within 10 feet from the edge of the traveled way for durations longer than one shift.

The Contractor shall provide pavement edge drop-off protection in accordance with Table 619-4 *Pavement Edge Drop-Off Protection*. Channelizing devices used to mark drop-offs shall be placed, as practicable, to not reduce the available travel lane width, at the elevation of the open travel lane in order to provide maximum target value and visibility for motorists.

A drop-off of greater than 24 inches within 10 feet from the edge of the traveled way to remain at the end of the work shift shall be separated from traffic with temporary or permanent barrier. For posted speed limit of 45 mph and less, a drop-off of greater than 24 inches within 10 feet from the edge of the traveled way that is 100 feet or less in length will be allowed with channelizing devices consisting of drums, extra tall cones or oversized vertical panels only at a maximum spacing of 20 feet for short durations not to exceed one work shift.

Unless otherwise noted in the contract documents, the Contractor shall begin work to eliminate unprotected drop-offs created by contract work within 7 calendar days of the completion of the work creating the drop-off. Work shall continue in a timely manner until such time as the unprotected drop-off condition is eliminated.

Where pavement edge lines are not provided, channelizing devices shall be preceded by a NO SHOULDER (W8-23) sign, repeated at all ramps and roadway intersections. Signs shall be repeated every ½ mile and supplemented with a NEXT [X] MILES (W7-3aP) plaque where applicable.

Where pavement edge lines are provided, channelizing devices shall be preceded by SHOULDER DROP-OFF (W8-17) signs, repeated at all ramps and roadway intersections. Signing shall be repeated every ½ mile and supplemented with NEXT [X] MILES (W7-3aP) plaque where applicable.

TABLE 619-4 PAVEMENT EDGE DROP-OFF PROTECTION						
Drop-Off Height	Edge Line Pavement Markings	Drum Spacing (feet)	Vertical Panel Spacing (feet)	Tubular Marker Spacing (feet)	Tall Cone Spacing (feet)	Signs
DROP-OFF AT OR WITHIN SHOULDER AREA						
Within 4 ft. from Travel Lane						
2 – 6 in.	Yes	100	100	N/A	N/A	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder
6 - 24 in.	Yes	40	40	N/A	N/A	Shoulder Drop-off
	No	20	20	N/A	N/A	No Shoulder
More than 4 ft. from Travel Lane						
2 – 6 in.	Yes	200	200	100	100	Shoulder Drop-off
	No	100	100	40	40	No Shoulder
6 - 24 in.	Yes	40	40	N/A	N/A	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder
DROP-OFF OUTSIDE OF SHOULDER EDGE						
Shoulder width ≤ 4 ft.						
2 – 6 in.	Yes	100	100	N/A	N/A	Shoulder Drop-off
	No	100	100	N/A	N/A	No Shoulder
6 - 24 in.	Yes	40	40	N/A	N/A	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder
Shoulder width > 4 ft.						
2 – 6 in.	Yes	200	200	100	100	Shoulder Drop-off
	No	100	100	40	40	No Shoulder
6 - 24 in.	Yes	100	100	40	40	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder

L. Flagging and Traffic Control. The Contractor shall provide an adequate number of competent flaggers to control traffic when it is necessary to maintain alternating one-way traffic in one lane of a two-lane, two-way roadway, and at all other locations where construction operations, construction vehicles and equipment, and

temporary traffic patterns related to the construction operations require positive temporary traffic control for safe, efficient traffic operations. These locations include, but are not limited to, locations where construction traffic enters, exits, or crosses open traffic lanes, locations of temporary stoppage of traffic for work operations, rail crossings, locations requiring slowing of traffic adjacent to work operations, on-ramps with restricted site distance, pedestrian crossings, intersections, and other locations where traffic needs to be alerted to unexpected conditions ahead.

Multiple lane approaches shall be reduced to a single lane prior to a flagger station. Automated flagger assistance devices (AFAD), portable traffic signals, and temporary traffic signals used to control traffic at the Contractor's option in lieu of flaggers shall be at no additional expense to the State.

1. Flagger Training. All flaggers shall be adequately trained in flagging operations by recognized training programs, including the American Traffic Safety Services Association, the National Safety Council, unions, or construction industry associations, or by an individual who holds a current certification as a flagger training instructor from such a program. Prior to the start of flagging operations, the Contractor shall provide to the Engineer a list of certified flaggers to be used in the operation, identifying the source of flagger training for each individual. When requested by the Engineer, flaggers shall demonstrate their competency in flagging procedures. Flaggers not competent in flagging procedures shall be retrained or replaced at once.

2. Flagger Equipment. Flaggers shall wear orange protective helmets and traffic control apparel in accordance with ' 107-05A. *High Visibility Apparel*. Flaggers shall be appropriately dressed, including apparel that covers the legs, torso and arms with sleeves a minimum of 4 inches long and appropriate footwear. Immodest or sloppy dress will not be permitted. Flaggers shall be equipped with an emergency air horn to alert workers of errant vehicles or other dangerous situations. Where flaggers are not within sight of each other, each flagger shall be equipped with a communication device, such as portable phone or two-way radio. The communication device shall only be used to communicate with other flaggers, other workers, or supervisor(s) regarding the flagging operations. Where the distance between flaggers is more than ½ mile or where shown in the contract documents, the Contractor shall use pilot cars to lead lines of vehicles through the work zone.

The standard signaling device for flagging operations, where one or more flaggers are controlling a single stream of traffic or two alternating streams of traffic in opposite directions, shall be STOP/SLOW signal paddles. Red signal flags may be used where display of the STOP and SLOW faces in opposite directions may be inappropriate or misleading.

3. Operational Control. Flaggers shall be located in a position clearly visible to, but not in the path of, approaching traffic, with an available escape path to avoid an oncoming errant vehicle. The number of flaggers to be furnished for each operation shall be sufficient to provide safe, efficient flow of vehicle and pedestrian traffic. A spotter is not a flagger, and shall only direct construction vehicles or equipment, and shall not direct traffic in any manner.

Work zones utilizing flaggers shall comply with the Standard Sheet for flagger operation and a Flagger symbol (W20-7) sign shall be provided in advance of each flagger.

For control of alternating one-way traffic, one flagger shall be provided at each end of the one-way section, with additional flaggers provided to control traffic entering the one-way section from intermediate intersections and major commercial driveways. Where the length of the one-way section is less than 150 feet, the posted speed limit is less than 40 mph, traffic volumes are such that queues do not develop, and sight distances are adequate, the Contractor may request approval from the Engineer to use a single flagger.

For intersection control, at least one flagger shall be provided for each intersection approach. Where traffic speeds and/or volumes are unusually low, and adequate sight distance is available, such that safe operations can be ensured with fewer flaggers, the Contractor may request approval from the Engineer to use fewer flaggers. When flagging at an intersection with a traffic signal, the signal shall be turned off unless directed otherwise by the Engineer.

The Contractor shall provide enhanced flagger stations consisting of a Flag Tree (6F.57) and additional cones at all approaches to flaggers, in accordance with the Standard Sheet, in order to provide effective advanced warning to motorists. Flag Trees shall display a minimum of 3 orange warning flags, with the flags mounted such that the lowest corners of the flags are at a minimum height of 8 feet. On roadways

with posted speed limits less than 40 mph, in locations having obstructed traffic flow, such as those having controlled intersections along the approach or approaches, where conditions do not permit placing the devices in a manner that will provide effective advanced warning to motorists, enhanced flagger stations need not be provided.

Flaggers shall be alert at all times, and shall not stand with their backs to approaching traffic. Flaggers shall only direct traffic to stop, to slow or to proceed, using hand signals to supplement the signaling device in accordance with the flagging procedures shown in the MUTCD. Flaggers shall be provided periodic breaks (minimum 15 minutes every 4 hours) throughout the work day, with competent substitutes provided during breaks to maintain continuous coverage of the flagging operation.

A spotter shall be provided at all locations where construction vehicles or equipment must back across or into open travel lanes, sidewalks, or pedestrian walkways. A spotter shall only direct construction vehicles or equipment, and shall not direct traffic in any manner.

For ongoing flagging operations at a specific location, the Contractor may request approval from the Engineer to substitute portable traffic signals in lieu of flaggers.

4. Automated Flagging Assistance Devices (AFAD). AFADs are devices to control traffic through work zones remotely by a single flagger at a central location or at one end of the work zone.

A minimum of 7 calendar days prior to initial deployment of the AFAD system, the Contractor shall submit a traffic control plan to the Engineer, for review and approval, detailing AFAD operation including a list of competent flaggers trained to operate the AFAD. AFADs shall be used only on two-lane two-way or single lane one-way roadways. AFADs shall not be used where there are intersections and/or commercial driveways or where construction operations within the controlled highway segment frequently disrupt traffic flow. Appropriate flagger apparel and equipment shall be maintained near each AFAD to facilitate flagging in the event of a malfunction or operational need due to frequent disruptions of traffic flow. The Contractor shall immediately provide traffic control with flaggers if a AFAD malfunctions; fails to properly or adequately control traffic; creates congestion, queues or gridlock which cannot be remedied by timely on-site adjustments to the signal operation; or is otherwise inadequate.

A competent flagger, who has been trained on the operation of the AFAD, shall operate and not leave the AFAD(s) unattended at any time. The flagger shall have an unobstructed view of the AFAD(s) and approaching traffic in both directions at all times. The distance between AFADs shall not exceed ½ mile. Work zones utilizing AFADs shall comply with the Standard Sheet for flagger operation on a 2-lane 2-way roadway, where the AFAD is used in lieu of a flagger and a BE PREPARED TO STOP sign (W3-4) is to be used in lieu of the Flagger symbol sign. Red/Yellow lens AFAD shall have a STOP HERE ON RED (R10-6) sign installed on the right-hand shoulder at least 8 ft in advance of the AFAD where vehicles are expected to stop.

A portable traffic signal may be used, at the Contractor's option, as an AFAD. A Signal Ahead symbol (W3-3) sign shall replace the Flagger symbol sign. An 18 inch wide removable stop line with a STOP HERE ON RED (R10-6) sign shall be installed at intended stopping point. The Engineer may waive the requirement for a stop line if the roadway is unpaved or it is otherwise impractical to install a stop line and the STOP HERE ON RED sign is in place.

When the work no longer necessitates use of the AFAD or portable traffic signal, the units shall be removed or turned off and moved out of view from the traveled way.

M. Maintain Existing Mailboxes. The Contractor shall not move any mailbox which contains mail. The Contractor will advise the owner to remove mail before the box is moved. Mailboxes shall be mounted, either permanently or temporarily, on a post. Before acceptance of the work, any mailbox which has been disturbed or moved shall be restored by the Contractor at a location consistent with the requirements of the U.S. Postal Service and the contract documents.

N. Contract Site Patrol. The Contractor shall provide adequate personnel and supervision to conduct operations and patrol the contract site to ensure that conditions are adequate for public safety and convenience at all times. The Contractor shall patrol the site as often as necessary during working and non-working hours to adjust and maintain signs, channelizing devices, and other traffic control devices and safety features.

619-3.03 Basic Work Zone Traffic Control (Daily Operations). The Contractor shall control traffic in accordance with §619-3.02 *Basic Work Zone Traffic Control* paragraphs A. *Surface Condition*; C. *Maintain Public Access*; D. *Maintain Existing Roadside Signs*; F. *Construction Vehicles*; G. *Barrier/Shadow Vehicles*; H. *Construction Signs*; I. *Arrow Panels*; J. *Channelizing Devices*; L. *Flagging*; M. *Maintaining Existing Mailboxes*; and O. *Portable Traffic Signals* so that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience drive, ride, or walk, during the day or at night, over all or any portion of the highway and/or structure under construction where traffic is to be maintained. The Contractor will not be required to repair or maintain the roadway except to repair any damages resulting from its operations.

The Contractor shall cease operations and clear the traveled way, shoulders, and clear zones of all obstructions including traffic control devices, construction equipment, and materials at the end of each work shift.

619-3.04 Temporary Business Signs. The Contractor shall provide temporary business signs (NY18-4) mounted on temporary sign supports to identify business entrances in accordance with the contract documents. Entrances shall be identified by only a single sign. Temporary business signs shall be mounted at a minimum height of 7 feet, and at a location that will guide traffic seeking access to the business, but where they will not interfere with traffic flow or other traffic control devices.

619-3.05 Covering or Removal of Pavement Markings. The Contractor shall remove or cover existing permanent pavement markings and interim pavement markings, when indicated in the contract documents or directed by the Engineer, to accommodate traffic pattern changes by covering the markings with preformed removable pavement marking masking tape, or by removing the markings. Masking tape shall be placed in blocks to prevent the underlying shape of pavement marking symbols or letters from being confused with existing markings.

A. Removal of Pavement Markings. The removal method will be at the Contractor's option, subject to its ability to achieve satisfactory results. Removal shall be completed prior to the installation of temporary pavement markings or interim pavement markings. Grinding to remove pavement markings will typically remove 1/8 to 1/4 inch of pavement surface. Prior to installation, the existing marking and adjacent pavement shall be cleaned of debris by compressed air or sweeping.

B. Masking Pavement Markings. Removable pavement marking masking tape shall be installed in accordance with the manufacturer's written instructions. Prior to installation, the existing pavement marking and adjacent pavement shall be cleaned by compressed air, sweeping, or other means adequate to remove debris, but that does not result in damage to the existing pavement marking. The width of the removable pavement marking masking tape shall be sufficient to completely cover the existing pavement marking.

The masking tape shall firmly adhere to the entire length and width of the existing pavement marking to be covered. The Contractor shall maintain the tape for the duration of its use. Any tape that is loosened, removed, or that fails to retain its original matte finish, or that for any other reason fails to obliterate the existing pavement marking shall be replaced immediately, at no additional expense to the State.

When the covered pavement markings are to be restored to service, masking tape shall be removed. Temporary adhesive residues will be allowed to remain, providing that the existing pavement marking visibility is not impaired.

Any damage to the existing pavement markings or to the pavement surface that results from the removal of the masking tape shall be repaired at no additional cost to the State. If the existing marking cannot be repaired satisfactorily, the Contractor shall remove damaged pavement markings completely and/or replace the pavement section at no additional cost to the State.

619-3.06 Temporary Pavement Markings. The Contractor shall install and maintain temporary pavement markings in accordance with the contract documents, using patterns and colors shown in the MUTCD to establish temporary traffic pattern(s) during construction on any pavement, including milled or grooved surface, resurfaced, new pavement, or other paved surface without pavement markings, for a maximum of 14 calendar days. Within 14 calendar days after placement, the Contractor shall either (1) install the succeeding pavement course or (2) install the remaining pavement markings including edge lines, stop bars, and simple crosswalks, with no hatching. Pavements which will be open to traffic shall be properly marked before being opened, before nightfall, or before the end of the work day, whichever is soonest, except areas that are open during the work shift and delineated with

channelizing devices or flaggers. Traffic paint need not be removed before placing a subsequent course. Removable pavement tape, removable wet-night reflective tape, temporary overlay markers and removable raised pavement markers shall be removed before placing a subsequent course. No additional payment will be made for removal of temporary pavement markings.

Temporary pavement marking stripes shall be 4 inches in width. Temporary pavement markings shall be applied to a clean, dry pavement in accordance with the manufacturer's recommendations. Temporary pavement markings on roadways open to traffic shall be applied in the direction of traffic. Hatch lines and symbols will not be required as temporary pavement markings unless required by the contract documents.

Traffic paint pavement markings shall be applied at a minimum wet film thickness of 20 mil, immediately followed by an application of glass beads, at a rate of 6 lb/gal of paint.

Where specified, removable raised pavement markers shall be used to supplement line pavement markings. The raised markers shall not be a substitute for line pavement markings, letters or symbols. Removable raised pavement markers spaced every 5 feet may be used to supplement line pavement markings. Two removable raised pavement markers spaced at each end of the 2 foot marking may be used to supplement a 2 foot broken line pavement marking.

If unanticipated weather or other conditions prevent the application of temporary pavement markings, the Contractor shall apply 2 foot removable pavement tape markings or temporary overlay markers at 40 foot spaces at no additional cost to the State, for a maximum of 3 days until such time as temporary pavement markings may be applied, or the next pavement course is installed.

A. Divided Highways. On freeways, expressways and parkways, the Contractor shall install broken lines a minimum of 2 feet long at 40 foot spacing to separate traffic lanes in the same direction. The Contractor shall install solid edge lines for a minimum of 100 feet on either side of the apex of a gore.

B. Undivided Multilane Highways. On three or more lane highways, and two or more lane highways with center two way left turn lanes, the Contractor shall install white broken lines a minimum of 2 feet long at 40 foot spacing to separate traffic flows in the same direction, and partial barrier or full barrier centerline to separate traffic flows in opposite directions.

C. Two-Lane, Two-Way Highways. For two-lane, two-way highways, the Contractor shall install a temporary pavement markings consisting of full barrier centerline markings in no passing zones and 2 foot broken line markings at 40 foot spacing in passing zones.

Two-lane, two-way highways may for a maximum of 3 days have the centerline marked with yellow 2 foot by 4 inch removable pavement tape or yellow temporary overlay markers at 40 foot spaces with NO CENTER STRIPE (W8-12) signs and DO NOT PASS (R4-1) signs at no additional cost to the State. A NO CENTER STRIPE sign shall be installed in advance of the area marked with yellow 2 foot removable pavement tape markings or temporary overlay markers, as well as after major intersections and after major traffic generators within the area marked with the removable pavement tape markings or temporary overlay markings. A DO NOT PASS sign shall be installed within 100 feet of the beginning of the area with the removable pavement tape markings or temporary overlay markers, and a second DO NOT PASS sign shall be installed within 1,100 feet of the first DO NOT PASS sign and subsequent DO NOT PASS sign(s) shall not exceed 3,000 feet spacing. On an approach without centerline pavement markings where passing will not be permitted, a black on orange NO PASSING ZONE (W14-3) pennant shaped sign shall be installed on that approach. Full barrier, partial barrier or broken line temporary centerline pavement markings shall be placed within three calendar days.

619-3.07 Interim Pavement Markings. The Contractor shall install and maintain interim pavement markings in accordance with the contract documents, to establish a construction traffic pattern or diversion during a construction phase or season, for a maximum of one year. After a winter season, interim pavement markings which are illegible shall be reapplied, if necessary, and for which additional payment will be made. Interim pavement marking stripes shall be 4 inches or 6 inches in width, to match preconstruction conditions. Epoxy pavement markings should not be applied to existing pavement that will not be replaced or overlaid, in order to prevent conflicting and/or confusing guidance to motorists. Any marking material that fails to provide both satisfactory daytime and nighttime visibility upon installation shall be replaced by the Contractor at no additional cost to the State.

A. Installation. Interim pavement markings shall be applied to a clean, dry pavement in accordance with the manufacturer's recommendations. Interim pavement markings on roadways open to traffic shall be applied in the direction of traffic. Traffic paint and epoxy paint pavement markings shall be applied at a minimum wet film thickness of 20 mils, immediately followed by an application of glass beads at a rate of 6 lb/gal of paint.

Painted markings may be supplemented with removable raised pavement markers. Removable raised pavement markers shall be spaced at 5 feet to supplement a solid line, and 4 markers spaced shall be used to supplement a 10 foot segment of broken line. When used to supplement a solid or broken line, markers shall be spaced a maximum of 80 feet on tangents and a maximum of 40 feet for curves with a radius less than 2,800 feet. Removable raised pavement markers shall not be used alone to simulate interim pavement markings.

B. Maintenance/Replacement. Traffic paint or removable tape shall be replaced upon (1) abrasion of the line such that more than 10 percent of the underlying pavement is visible within any 300 feet segment of line or (2) loss of more than 2 consecutive skip lines or (3) loss of more than 50 feet of continuous line or (4) failure of any line to be clearly visible at night under low-beam headlamp illumination when viewed from a distance of 200 feet.

Missing removable raised pavement markers shall be replaced upon (1) loss of more than 10 percent of the markers within a 300 feet long segment of line or (2) loss of more than 3 consecutive markers or (3) failure of any line to be clearly visible at night under low-beam headlamp illumination when viewed from a distance of 200 feet.

The Contractor will not be responsible for damage or loss caused by snowplowing. In the event that such pavement markings are damaged or lost, the Engineer will determine whether to replace the lost pavement markings in kind or with other marking materials. Separate payment will be made for pavement markings replaced, or installed due to damage or loss caused by snowplowing.

619-3.08 Temporary Rumble Strips. The Contractor shall install temporary rumble strips in three sets of 6-strip patterns with 10 foot between individual strips. The type of strip installed will be at the Contractor's option, except that sawcut or milled-in strips shall not be installed on new top course surfaces or existing surfaces that will not be paved over. Where there is no usable shoulder, or the shoulder is less than 3 feet wide, the rumble strips should be ended 3 feet short of the edge of usable pavement. On curbed roadways, rumble strips should end a minimum of 3 feet from the curb in order not to interfere with drainage. Rumble strips shall typically be placed in advance of each of the last three long-term advance warning signs such that drivers are alerted in time to see and read the signs. Rumble strips will typically be installed for a minimum of one week.

A. Raised Asphalt Rumble Strips. The roadway surface on which the rumble strips are to be attached shall be dry, free of surface contaminants such as dust or oil, and thoroughly swept with a stiff broom. The surface temperature of the pavement shall be 45°F or greater unless otherwise authorized by the Engineer. The pavement surface shall be cleaned with compressed air just prior to tack coating and subsequent installation of the rumble strips. The strips shall be formed using a rumble strip paver (drag box) pulled transversely across the pavement, or by hand placement between forms fixed to the pavement. If forms are used, they shall be removed prior to compaction of the asphalt mixture. Compaction shall be accomplished using a plate tamper or a static roller. Raised asphalt rumble strips shall have a width of 6 to 9 inches, measured in the direction of traffic, and have a final compacted thickness of 3/8 inch ± 1/8 inch.

B. Raised Removable Tape Rumble Strips. Raised removable tape rumble strips shall be formed by applying one or more layers of removable preformed pavement marking masking tape. The tape shall be applied to a clean, dry pavement surface in accordance with the manufacturer's recommendations. The pavement surface shall be swept or cleaned with compressed air just prior to application of the tape.

C. Raised, Preformed Rumble Strips. Raised preformed rumble strips shall be applied to a clean, dry pavement surface in accordance with the manufacturer's recommendations. The pavement surface shall be swept or cleaned with compressed air just prior to application of the strip.

D. Saw-cut Rumble Strips. Saw-cut rumble strips shall be saw cut into existing pavement using wet cutting methods. The blade or blades shall be of such configuration that the desired dimensions of the saw cut can be made with one pass. No spacers between blades will be allowed.

Before a travel lane with saw-cut rumble strips is reopened to traffic, the pavement shall be cleaned by sweeping, flushing, or with a stream of compressed air. Sawing slurry from the wet-sawing process shall be flushed from the pavement surface immediately.

E. Milled-in Rumble Strips. Milled-in rumble strips shall be milled into existing pavement using a rotary-type cutting head with a maximum nominal outside diameter of 24 inches. The cutting head shall be on its own suspension system, independent from that of the power unit, to allow the head to align itself with the slope of the pavement and/or any irregularities in the pavement surface. The pattern of cutting tips on the head shall be arranged to produce a relatively smooth cut with no more than 3/32 inches between peaks and valleys. Prior to beginning work, the Contractor shall demonstrate to the Engineer the ability to achieve the desired surface without tearing or snagging the pavement.

Before a travel lane with milled-in rumble strips is reopened to traffic, the pavement shall be cleaned by sweeping, flushing, or with a stream of compressed air.

F. Removing Temporary Rumble Strips. The Contractor shall either completely remove raised rumble strips from the pavement or fill in the depressions from saw-cut or milled-in rumble strips prior to the start of the winter plowing season, prior to the placement of successive pavement courses, or as directed by the Engineer. Any damage to the pavement surface resulting from the removal of raised rumble strips shall be repaired at no additional cost to the State.

Rumble strip depressions shall be filled in with hot mix asphalt. Before they are filled, the depressions shall be cleaned by sweeping, flushing, or with a stream of compressed air, and coated with Asphalt Emulsion Tack Coat. The rumble strips shall be overfilled slightly and compacted using a plate tamper or static roller so that the final compacted surface is flush with the existing pavement.

619-3.09 Interim Tubular Markers. The Contractor shall install interim tubular markers in accordance with the contract documents. The Contractor shall attach interim tubular markers to the pavement in a manner that prevents them from being moved or dislodged by traffic. Interim tubular markers shall be installed on pavement that has been cleaned to remove pavement markings, oil, dirt, or other debris or substances that may interfere with a proper bond. Attachment to the pavement shall be by mechanical fastener or by adhesive, in accordance with the manufacturer's recommendations. Bonding agents shall be of sufficient amount or size to ensure proper bonding of the base to the pavement.

Interim tubular markers removed or damaged by the Contractor's operations or by traffic shall be replaced immediately, so that positive separation is maintained between opposing lanes of traffic at all times. Damaged reflective sheeting on interim tubular markers shall be replaced before nightfall as necessary to maintain adequate visibility of the markers. In cases where only isolated individual markers are lost or damaged, and adequate visibility is maintained by the remaining markers, replacement will not be required until more than 3 consecutive markers, or 25 percent of all markers within ½ mile have been damaged or lost. The replacement of markers damaged or lost by traffic, where the Contractor has demonstrated reasonable effort to collect the costs from the person(s) responsible for damage will be considered extra work.

619-3.10 Portable Variable-Message Signs (PVMS). The Contractor shall provide, operate and maintain PVMSs for the duration of the contract until the progress of work no longer requires their use. The contractor shall relocate or reorient PVMSs with a pay unit of each, if necessary, up to four (4) times per year as conditions dictate, at no additional cost to the State. The message to be displayed shall be as required by the contract documents and may change on a daily basis or more frequently as conditions dictate. PVMS with a pay unit of each shall be made available to the Regional Transportation Management Center for emergency incident management within the contract limits.

The Contractor shall provide, operate, and maintain PVMSs with pay units of weeks at the general location and duration stated in the contract documents. The message to be displayed shall be as required by the contract documents or as directed by the Engineer.

When in use, PVMS shall be placed so that the base of the message panel is at least 7 feet above the adjacent pavement surface and aligned to provide optimum viewing by approaching motorists.

The Contractor shall supply the Engineer with an accurate log of the text of all messages and times messages were displayed monthly, not later than the 15th of the following month. The log of messages may be either a listing

in a manual register or printouts from the control software. The Contractor shall inform the Engineer of PVMS locations and update as they are relocated and removed.

PVMS with Cellular Communications Option shall have cellular telephone service provided by the Contractor. The Contractor shall supply the Engineer with a copy of control software a minimum of 14 calendar days prior to installation of the first unit.

619-3.11 Type III Construction Barricades. Type III construction barricades shall be installed at all locations where a highway, bridge, ramp, or other segment of the roadway is closed to traffic. Type III construction barricades shall be maintained upright, in proper alignment and orientation. If ballast is used to maintain alignment and position of the barricade, it shall consist of dry sand contained in a closed waterproof bag, and shall be placed at ground level.

Barricade rails shall be oriented such that the stripes slope downward toward the side on which traffic is to pass. If traffic may pass to either side, adjacent barricades shall be arranged such that the stripes slope downward toward each side starting at the center. Where no passage is intended or permitted, the stripes shall slope downward toward the center of the barricade or barricades.

At night, each Type III construction barricade used to close a roadway, a segment of a roadway or a sidewalk shall be equipped with one flashing warning light.

619-3.12 Temporary Concrete Barrier. The Engineer will inspect temporary concrete barrier segments upon delivery to the contract. Any barrier segment having damage and/or defects in the concrete and/or joint connections will be rejected if the performance of the barrier may be affected.

Temporary concrete barrier segments shall be fastened together with connection keys to form a continuous string. When joined together, the barrier segments shall form a smooth and continuous barrier. Any segments damaged or misaligned shall be corrected or replaced.

Tapered end sections shall not be used in traversable medians, gores, and other areas where impacts on a tapered end section could allow vehicles to penetrate into opposing or adjacent lanes of traffic. Where the posted speed limit is 45 mph or higher, a temporary impact attenuator or temporary sand barrel array shall be provided on approach ends of temporary concrete barrier when the offset from the edge of the traveled way to end of the barrier is less than 12 feet, and will be paid for separately.

Temporary delineation shall be provided with each segment of temporary concrete barrier in accordance with the Standard Sheet. When temporary glare screen is attached to the barrier, temporary delineation shall be mounted such that its visibility is not blocked by the glare screen.

Where space is available, approach ends of the barrier string shall be flared away from the traveled way at the taper rate shown in Table 619-5 *Flare Rates for Positive Barrier* and terminated in a tapered end section, embedded in a slope, or otherwise protected against impact by errant vehicles.

The Contractor shall install unpinned temporary concrete barrier where indicated in the contract documents, with one segment at either end of the string pinned using a minimum of four pins on the construction, or non-traffic side, and with the segment immediately adjacent to the pinned segment, towards the center of the string, pinned using two pins on the construction side. Where pins extend above the top surface of the barrier anchor recess, they shall be capped.

The Contractor shall install pinned temporary concrete barrier where indicated in the contract documents, with each segment pinned with a minimum of 4 pins on the construction, or non-traffic side, side in order to reduce movement of temporary concrete barrier on structures and in other locations where limited deflection is desired. Where an unpinned portion of a barrier string is connected to a pinned string in the direction of approaching traffic, the barrier segment immediately prior to the pinned segment shall be pinned using two pins on the construction side.

Table 619-5 FLARE RATES FOR POSITIVE BARRIER					
POSTED PRECONSTRUCTION SPEED LIMIT (mph)	30	40	50	55	65
TEMPORARY CONCRETE BARRIER	8:1	11:1	14:1	16:1	20:1
BOX BEAM OR HEAVY POST CORRUGATED BEAM	7:1	9:1	11:1	12:1	15:1

TABLE 619-6 GUIDE RAIL AND TEMPORARY CONCRETE BARRIER STANDARD* DEFLECTION DISTANCES		
BARRIER TYPE	POST SPACING (ft)	DEFLECTION DISTANCES (ft)
CABLE GUIDE RAIL	16	11.0
	12	9.5
	8	8.0
	4	7.0
CORRUGATED W-BEAM (WEAK POST) GUIDE RAIL	12.5	8.0
	6.25	6.0
	4.16	5.0
CORRUGATED W-BEAM (HEAVY POST BLOCKED OUT)	6.25	4.0
	3.12	2.0
BOX BEAM GUIDE RAIL	6.0	5.0
	3.0	4.0
CORRUGATED W-BEAM (WEAK POST) MEDIAN BARRIER	12.5	7.0
	6.25	5.0
CORRUGATED W-BEAM (HEAVY POST) MEDIAN BARRIER	6.25	2.0
	6.0	3.0
TEMPORARY CONCRETE BARRIER UNPINNED STIFFENED WITH BOX BEAM PINNED	Not Applicable	3.3**
		2.2**
		0.8**

* Note: Standard Deflection is caused by a 4400 lb test vehicle traveling 62mph impacting the barrier at a 25° angle.

** Note: MASH Standard Deflection caused by 5000 lb test vehicle traveling 62mph impacting the barrier at a 25° angle.

The Contractor shall install temporary concrete barrier stiffened with box beam where indicated in the contract documents, in accordance with the Standard Sheet, in order to reduce deflection of temporary concrete barrier on structures and in other locations where limited deflection is desired. Temporary concrete barrier stiffened with box beam shall be installed at least 50 feet prior to, be continuous through, and extend at least 50 feet beyond the area requiring limited deflection wherever practicable. Where space limits extending the string of barrier stiffened with box beam, one segment at either end of the string shall be pinned with 4 pins on the construction, or non-traffic, side and the segment immediately adjacent to the pinned segment, towards the center of the string, shall be pinned using a minimum of two pins on the construction side.

The Contractor shall install pinned temporary concrete barrier stiffened with box beam where indicated in the contract documents, with each segment pinned with a minimum of 4 pins, on the construction, or non-traffic side, side.

Pins shall have the following minimum pin embedment lengths:

- Bridge Decks and Cement Concrete Pavement 5 in.
- Flexible Pavement 18 in.
- Unpaved Areas 30 in.

After removal of the barrier, holes created in the surface to pin the barrier shall be filled, unless that area will be further disturbed. Holes in flexible pavement or unpaved areas shall be filled with material consistent with the

subbase, base and surface material. Holes in portland cement concrete pavement or structural decks shall be filled with material meeting the requirements of §701-05 *Concrete Grout Material* or §721-03 *Epoxy Polysulfide Grout*.

A. Barrier Without Warning Lights. Where warning lights for temporary concrete barrier are not required, the Contractor shall provide and maintain delineation on the temporary concrete barrier. The delineation shall be maintained visible and free of dirt and snow, including during shutdown periods. The maximum spacing of delineation shall be 20 feet.

B. Barrier With Warning Lights. Type C warning lights shall be provided on temporary concrete barrier with warning lights. The maximum spacing of warning lights shall be 40 feet in tangents and 20 feet in curves with radii less than 2,800 feet. Warning lights shall be attached to the barrier so that the lights remain securely in place and so that the attachment minimizes damage to the barrier.

All warning lights shall be kept clean, properly aligned and in operating condition. Batteries shall be replaced as necessary to maintain adequate visibility of the warning lights at night.

Where channelizing devices with Type A flashing warning lights are not provided immediately preceding a run of barrier to be marked with warning lights, the first warning light on that run of barrier shall be a Type A warning light.

619-3.13 Temporary Glare Screen. Temporary glare screen shall be installed in accordance with the manufacturer's instructions. All components of the glare screen shall be maintained in a safe and functional condition. Damaged components shall be repaired or replaced.

If blades are utilized, the blades shall be spaced and angled to provide approximately a 22° headlight cutoff angle. The screen shall not overhang the face of the barrier and shall not cover delineation or lights. The screen shall be kept plumb and properly positioned on the barrier, with reflectorization securely affixed to the screen. Cleaning of the reflectorization shall be by a method that does not damage the paddles, reflectorization or barrier, and is not hazardous to traffic.

The Contractor shall remove and dispose of the temporary glare screen upon completion of the contract or when it is no longer required. Upon removal of the temporary glare screen, there shall be no protrusions remaining on the top face of the barrier. Bolt holes or other damage to permanent barrier from glare screen installation shall be repaired by the Contractor at no additional cost to the State.

619-3.14 Temporary Impact Attenuator. The Contractor shall install temporary impact attenuators in accordance with the contract documents, the manufacturer's instructions and materials details. The Contractor shall provide the Engineer a copy of the manufacturer's materials details and installation instructions a minimum of 7 calendar days prior to use, to allow verification of the attenuator supplied and proper installation. The selection of the manufacturer and model of temporary impact attenuator shall be at the Contractor's option, provided the attenuator supplied is of the type indicated, gating or redirective; shields the hazard; and fits in the location without encroachment into travel lanes or required offsets.

The Contractor shall maintain temporary impact attenuators for continuous operation. If an attenuator is out of operation, the Contractor shall immediately mark the hazard with drums, vertical panels and or extra tall cones until repairs are made or a new attenuator is installed. The Contractor shall promptly begin repairs to damaged attenuators, and shall complete repairs to a damaged attenuator or mitigate the hazard within 1 work day. Attenuators damaged beyond repair shall be replaced within 3 work days.

When temporary impact attenuators are removed or moved to another location, the Contractor shall restore the location to match the surrounding area.

619-3.15 Temporary Sand Barrel Arrays. The Contractor shall install sand barrel arrays in accordance with the patterns shown on the Standard Sheet or a NCHRP 350 approved pattern and fill the barrels with sand to provide the desired module weight, plus or minus 5 percent. Units that will be in use between November 1 and March 31 shall have sodium chloride, as dry rock salt, equal to 3% - 5% by weight of the sand, thoroughly mixed into the sand to prevent freezing. The sand shall be placed in the modules loose, not in bags or sacks. If the contract documents indicate that the site necessitates securing of the modules, the work shall be performed as recommended by the manufacturer.

The Contractor shall maintain sand barrel arrays for continuous 24 hour operation. If an array is out of operation, the Contractor shall immediately mark the hazard with drums, vertical panels and or extra tall cones until

repairs are made or new module(s) are installed. The Contractor shall promptly begin repairs to damaged arrays, and shall complete repairs to a damaged array or mitigate the hazard within one work day.

619-3.16 Vehicle Arresting Barrier (VAB). Vehicle arresting barriers (VAB) shall be installed in accordance with the contract documents and the manufacturer's instructions and materials details. The Contractor shall provide the Engineer a copy of the manufacturer's materials details and installation instructions a minimum of 5 work days prior to use, to allow verification of the barrier supplied and proper installation. The deceleration area behind the VAB shall be kept clear of workers, vehicles or stored materials. The Contractor shall provide for periodic surveillance of each VAB by workers or by electronic device.

The Contractor shall maintain vehicle arresting barrier for continuous operation. If a barrier is out of operation, the entire barrier shall be restored within 4 hours after the incident, or prior to the next shift the barrier will be used. No work may be progressed in an unprotected area, and the hazard shall be eliminated or minimized, until restorations have been completed.

The VAB, except anchorages, shall be dismantled and removed prior to reopening the road to traffic. After the last day of use, if directed by the Engineer, temporary anchorages shall be removed and disturbed areas shall be restored to match the surrounding area.

619-3.17 Maintain or Modify Traffic Signal Equipment. Traffic signals shall be maintained in proper operation, including the maintenance of all features of the traffic signal operation in effect and operating at the time any work begins on the contract. Traffic-actuated phases shall remain actuated, and signals operating within signal systems shall remain coordinated with the remainder of the system unless otherwise approved by the Engineer. Except for emergencies, no changes in the signal operation or timing shall be made without prior approval by the Engineer. If emergency conditions dictate a change in the operation, the Engineer shall be notified by the start of the next work day. Unless otherwise approved by the Engineer, an altered signal operation must be returned to the original signal operation within 24 hours.

The Contractor shall maintain in operation all equipment including signal heads, supports, cable, wiring, span-wire-mounted signing, controllers, master controllers, detector systems, conflict and current monitors, relays, switch packs, and all other accessory and necessary equipment. Maintenance shall also include the repair and replacement of existing detector loops, paid for separately.

The Contractor shall have capable traffic signal repair personnel on call 24 hours a day, seven days a week, and shall provide to the Engineer a single telephone number for contacting them. If for any reason a signal is not functioning properly, the Contractor shall commence work on the signal within 2 hours of notification. If directed by the Engineer, the Contractor shall notify the appropriate police agency for traffic control operations. If the police agency cannot or will not provide traffic control, the Contractor shall provide flaggers at locations specified by the Engineer within the 2-hour time period. The Contractor shall continue the flagger services until the signal is in proper operation. A flagger warning (W20-7 or W20-7a) sign shall be used on all approaches to an intersection controlled by flaggers.

If the malfunction is in the equipment supplied by the State, due to an area wide power outage, or due to a localized power outage beyond the Contractor's control, the Contractor shall notify the Engineer and, if directed by the Engineer, provide flaggers until the malfunction is corrected or State personnel take over. Such flagging operations in excess of 4 hours for the first call and for any subsequent call will be considered extra work.

The Contractor shall provide the Engineer, on a monthly basis, with a record of all maintenance calls received and responded to, as well as a record of all corrective action taken by the Contractor.

A. Requirement A. The Contractor shall maintain in proper operation the indicated existing, relocated, modified, and newly installed signals in accordance with the contract documents. If such signals are to be removed, the Contractor shall be responsible for operation and maintenance until the signals are removed. The Contractor shall be responsible for their continuous operation except for reasonable shutdown periods authorized by the Engineer during relocation and transfer operations.

B. Requirement B. The State shall assume operation and maintenance responsibility for the signal from the Contractor following successful completion by the Contractor of the installation /modification testing as required by Section 680 *Traffic Signals*. The six month warranty/guarantee period shall be measured from the day the State assumes maintenance responsibility.

C. Requirement C. At relocated, modified or newly installed signals, the Department will assume responsibility for the following items after successful testing as required by Section 680 *Traffic Signals* has been completed. Assumption of the below listed responsibilities by the State will not relieve the Contractor of the responsibility for operation and maintenance of the signal. At existing microcomputer controlled traffic signals, the Department will be responsible for the following items:

1. Supply and maintenance of the microcomputer assembly and software.
2. Programming of the microcomputer furnished by the State.
3. Operation or timing changes directed by the Engineer.
4. Normal (no abuse or vandalism) equipment failures of existing, relocated, modified or new traffic signal equipment furnished by the State.

D. Modify Traffic Signal Equipment. Where the Contractor is required to temporarily modify or relocate existing traffic signals because of construction operations, all existing equipment, fittings, wire, cable, conduit, and related materials shall be reinstalled and extended where necessary. Temporary timber poles, guys, and related material shall be furnished and installed where necessary.

619-3.18 Temporary Traffic Signals. The Contractor shall install temporary traffic signals in accordance with the contract documents and the MUTCD. The Contractor shall maintain traffic signal systems, including traffic detectors, in proper operation until approved removal, and be responsible for its continuous 24-hour operation except for reasonable shutdown during relocation and transfer operations. Substitution of temporary traffic signals for flaggers shall be at no additional cost to the State.

If for any reason a signal does not function as required, the Contractor shall commence repair work on this signal within 2 hours after notification of a malfunction. In the event flashing operation occurs, all signal faces shall show flashing red indications. Flashing operation of a signal is considered a malfunction. The Contractor shall provide an adequate number of flaggers to control traffic at each malfunctioning traffic signal, in accordance with ' 619-3.02L. *Flagging and Traffic Control* until the signal is restored to proper operation.

If the malfunction is due to an area wide power outage or due to a localized power outage beyond the Contractor's control, the Contractor shall notify the Engineer and, if directed by the Engineer, provide flaggers until the malfunction is corrected or State personnel take over. Flagging operations in excess of 4 hours for the first maintenance call shall be paid for as extra work.

619-3.19 Nighttime Operations. Work occurring after sunset and before sunrise will be considered nighttime operations. All workers involved in nighttime operations shall wear protective helmets and nighttime apparel in accordance with §107-05A. *High Visibility Apparel* at all times.

Vehicles operating on the pavement of a closed roadway or travel lane shall display four-way flashers or rotating amber beacons at all times. Vehicles using headlights, except for rollers and vehicles retrieving channelizing devices, shall travel facing in the same direction as adjacent traffic in order to avoid glare and confusion to drivers.

The Contractor shall meet the following additional requirements for work zone traffic control during nighttime operations.

A. Nighttime Operations and Lighting Plan. Thirty days prior to the start of nighttime operations, the Contractor shall submit a written Nighttime Operations and Lighting Plan to the Engineer for approval. The plan shall detail all aspects of the traffic control setup, the functions, responsibilities and identities of the nighttime traffic control competent person and other details as necessary. It shall include a contingency plan identifying foreseeable problems and emergencies that may arise, and the approach that will be used to address them. This plan shall be revised and updated by the Contractor as necessary during the progress of the work to accommodate conditions on the contract.

The Contractor shall submit a Nighttime Operations and Lighting Plan to the Engineer, at a scale and printed size similar to the contract plans and appropriate to adequately describe the work, including the following:

- Layout showing location of light towers, including typical spacing, lateral placement and mounting height, and clearly show the location of all lights necessary for all work to be done at night.
- Description of light towers to be used and electrical power source.

- Specific technical details on all lighting equipment, including brand names, model numbers, power rating and photometric data.
- Details of any hoods, louvers, shields or other means to be used to control glare.
- Attachment and mounting details for lights to be attached to equipment.
- Lighting calculations confirming that the illumination requirements will be met by the layout.

The Contractor shall maintain a supply of emergency flares for use in the event of unanticipated situations such as traffic accidents, equipment breakdowns, failure of lighting equipment, etc.

B. Lighting for Nighttime Operations. Prior to the first night of nighttime operations, the Contractor shall set up and operate the lighting equipment at night as a trial run to demonstrate its ability to establish a safe, properly illuminated, nighttime operation. The Contractor shall furnish the Engineer with a photometer, capable of measuring the level of illumination, for use as necessary to check the adequacy of illumination throughout nighttime operations.

1. Equipment. The Contractor shall supply all lighting equipment required to provide a work zone safe for the workers and traffic. Material and/or equipment shall be in good operating condition and in compliance with applicable safety and design codes.

a. Light Towers. Light towers shall be provided as a primary means of illumination, and shall provide Level I illumination throughout the work space. They may be supplemented to the extent necessary by lighting fixtures mounted on construction equipment to provide Level II or Level III illumination where required for paving, milling and similar moving operations. Light towers shall be sturdy and free-standing without the aid of guy wires or bracing, and shall be capable of being moved as necessary to keep pace with construction operations. Light towers shall be positioned to minimize the risk of being impacted by traffic on the roadway or by construction traffic or equipment.

b. Light Towers on Paving, Milling, and Finishing Machines. If needed to supplement portable and/or trailer-mounted light towers, towers shall be affixed to paving, milling, and finishing machines to provide the required level of illumination for the specified distance in front of and behind the machine. Luminaires shall be aimed and adjusted to provide uniform illumination with a maximum uniformity ratio of 5:1. The hopper, auger, and screed areas of pavers and the operator-s controls on all machines shall be uniformly illuminated.

c. Construction Equipment Lights. All construction equipment, including rollers, backhoes, loaders, and other equipment operating in areas not illuminated to a minimum of Level I Illumination, shall be equipped with a minimum of two 500 watt flood lights facing in each direction to provide a minimum of 1 foot-candle of horizontal illumination measured 60 feet in front of and behind the equipment. In areas illuminated to a minimum of Level I, construction equipment may move unescorted. In non-illuminated areas, construction equipment shall be equipped with conventional vehicle headlights, shall be illuminated with flood lights on the vehicle, or shall be escorted to permit safe movement. Headlights shall not be permitted as the sole means of illumination while working.

d. Equipment Mounting. The Contractor shall provide suitable brackets and hardware to mount lighting fixtures and generators on machines and equipment. Mountings shall be designed so that light fixtures can be aimed and positioned as necessary to reduce glare and to provide the required illumination. Mounting brackets and fixtures shall not interfere with the equipment operator or any overhead structures, and shall provide for secure connection of the fixtures with minimum vibration.

e. Portable Generators. The Contractor shall provide portable generators to furnish adequate power to operate all required lighting equipment. Fuel tank capacity and availability of fuel on site shall be sufficient to permit uninterrupted operation throughout the planned shift. Adequate switches shall be provided to control the various lights. All wiring shall be weatherproof and installed in accordance with 29 CFR 1926 Subpart K. All power sources shall be equipped with a Ground-Fault Circuit Interrupter.

2. Illumination Requirements. Tower-mounted luminaires, whether fixed, portable, trailer-mounted, or equipment-mounted, shall be of sufficient wattage and/or quantity to provide the required level of illumination and uniformity over the area of operation while minimizing glare.

The uniformity of illumination, defined as the ratio of the average illumination to the minimum illumination over an area requiring an indicated illumination level, shall not exceed 5:1. Illumination levels on approach roadways should be increased sequentially to prevent motorists from becoming disoriented by rapid changes from full dark to very bright conditions.

Existing street and highway lighting shall not eliminate the need for the Contractor to provide lighting. Consideration will be given to the amount of illumination provided by existing lights in determining the wattage and/or quantity of lights to be provided. Such consideration shall be presented in the Contractor's lighting plan. In the event of any failure of the lighting system, nighttime operation(s) shall be discontinued until the required level of illumination is restored.

a. Level I (5 foot-candles). Level I illumination shall be provided for all areas of general construction operations to include all work operations by Contractor's personnel, including work zone traffic control set-up and operations, staging, excavation, cleaning and sweeping, pavement marking, spoil disposal, landscaping, planting and seeding, layout and measurements ahead of the actual work, borrow areas, spoil areas, and truck cleanout areas. Level I illumination shall be provided near the beginning of lane closure tapers and at road closures for nighttime work zones, including the setup and removal of the closure tapers. Level I illumination shall be provided a minimum of 400 feet ahead and 800 feet behind a paving or milling machine, or for the entire area of concrete placement or pavement work if less than this distance. This area shall be extended as necessary to incorporate all vehicle and equipment operations associated with the paving operation.

The only exception to the requirement for Level I illumination throughout the area of construction operations is that finish rollers can work beyond the area of Level I illumination using floodlights mounted on the roller.

b. Level II (10 foot-candles). Level II illumination shall be provided for flagging stations, asphalt paving, milling, and concrete placement and/or removal operations, including bridge decks, 50 feet ahead of and 100 feet behind a paving or milling machine.

c. Level III (20 foot-candles). Level III illumination shall be provided for pavement or structural crack filling, joint repair, pavement patching and repairs, installation of signal equipment or other electrical/mechanical equipment, and other tasks involving fine details or intricate parts and equipment.

3. Glare Control. All lighting shall be designed, installed, and operated to avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjoining the roadway. The Contractor shall locate and aim lighting fixtures to provide the required level of illumination and uniformity in the work zone without the creation of objectionable glare. The Engineer will determine when glare exceeds acceptable levels, either for traffic or for adjoining residences.

The Contractor shall provide shields, visors or louvers on luminaires as necessary to reduce objectionable levels of glare. As a minimum, the following requirements shall be met to avoid objectionable glare on roadways open to traffic in either direction:

- \$ Tower-mounted luminaires shall be aimed either generally parallel or perpendicular to the roadway.
- \$ Luminaires shall be aimed such that the angle between the center of the beam axis and the vertical mounting pole is no greater than 45°.
- \$ No luminaires shall be permitted that provide a luminous intensity greater than 20,000 candelas at an angle of 72° above the vertical.
- \$ Except where prevented by overhead utilities or structures, towers shall be extended to their full working height when in use to reduce glare and provide uniform illumination.

619-3.20 Traffic Control Supervisor. When indicated in the contract documents, the Contractor shall provide a dedicated traffic control supervisor having adequate training, experience, and authority to implement and

maintain all traffic control operations. The traffic control supervisor shall not be assigned other duties that interfere with performance as a traffic control supervisor.

The traffic control supervisor shall be adequately trained in traffic control operations by recognized training programs, including the American Traffic Safety Services Association (ATSSA) Traffic Control Supervisor®, the National Safety Council, unions, or construction industry associations, or by an individual instructor from such a program. Traffic control supervisors not competent to the satisfaction of the Engineer shall be replaced immediately.

During setup and removal of lane closures and other traffic control setups, the traffic control supervisor shall be assisted by additional workers as necessary. The traffic control supervisor shall patrol the contract area to ensure that conditions on the site are adequate for public safety and convenience at all times, to monitor worker safety from intrusions into the work area, and to ensure that the work adheres to the provisions for work zone traffic control. The traffic control supervisor shall ensure signs, channelizing devices, barricades, barrier, impact attenuators and other traffic control devices are adjusted and maintained as necessary. The Contractor shall provide workers to install, maintain, adjust, and remove traffic control devices as required by the work operations.

When the work does not require closure of an active lane, roadway, or ramp; when no construction operations occur within 30 feet of active traffic lanes; and when there is no delivery of materials or equipment; the Engineer may waive the requirements for a traffic control supervisor.

619-3.21 Temporary Structures and Approaches. The Contractor shall design, construct, maintain and remove temporary structures and their approaches, or move and remove existing structures to provide temporary structures along with their temporary approaches. The Contractor shall install temporary approaches, including necessary earth support structures, in such a manner and sequence that interference with and inconvenience to the traveling public and the abutting owners is kept to a minimum. The Contractor shall be responsible for the workmanship, upkeep, and safety of all temporary structures and approaches. All fabrication shall conform to the AASHTO Standard Specifications for Highway Bridges, Division II or AASHTO LRFD Bridge Construction Specifications, except as modified herein. Fabrication shall be performed by an AISC Category III-Certified Fabricator. Plans and design computations shall bear the stamp and signature of a Professional Engineer.

When specific details are not included in the contract documents, or when the Contractor receives approval to vary from the contract documents, the Contractor shall design all elements of the temporary structure and approaches including the railing system. Design shall be done in conformance with the NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications, except that the only design live load shall be HL-93. Alternatively, the design shall be in conformance with the NYSDOT Standard Specifications for Highway Bridges, except that the minimum design live load shall be HS 20. The bridge rail shall be designed for a minimum of TL-2.

Any structure that is expected to be in service for more than 5 years, shall be designed as a permanent structure according to the NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications, including the Permit Vehicle and seismic loading.

Load rating calculations for the temporary structure shall be submitted to the DCES. Load ratings shall be computed based on Load Factor Design (LFD) or Allowable Stress Design (ASD), and shall be based on an HS-20 loading. Additionally, if the structure is designed using the NYSDOT LRFD specifications, load ratings shall also be computed by the Load and Resistance Factor Rating (LRFR) method. LRFR ratings shall be shown at the Inventory and Operating levels as rating factors of the AASHTO HL-93 live load. All Load Ratings shall be calculated in accordance with the AASHTO Manual for Bridge Evaluation.

Prior to beginning construction of any temporary structure designed by the Contractor, the Contractor shall submit detailed plans and calculations to the DCES for review and approval in accordance with §585-3.02 *Working Drawings*. Such review, however, shall not relieve the Contractor of the responsibility for the adequacy and design of such temporary structures and approaches. If the Contractor proposes to construct with used materials, the Contractor's Professional Engineer shall submit with the plans the method for documenting that all primary member material meets the physical properties required by the design. In the absence of record plans or other valid documentation for the used materials, physical testing shall be performed. Excluded from this provision are proprietary structures. All welding required for the fabrication of temporary steel structures shall be performed in accordance with the provisions of the NYS Steel Construction Manual. Complete penetration groove welds in primary members shall be radiographed as described therein. The DCES reserves the right to perform in-process fabrication inspection. The Contractor shall notify the DCES of the fabrication schedule 7 calendar days prior to commencement of fabrication.

Prior to opening a temporary structure to traffic, the structure shall be inspected by a Professional Engineer who shall certify in writing to the Engineer that the structure was constructed in accordance with the design. The Contractor shall have the temporary structure inspected, under the direction of a Professional Engineer, by a person familiar with bridge construction at least once a month. On or before each anniversary of the opening of a temporary structure that has been open to traffic for one year or more, the structure shall be inspected by a Professional Engineer, who shall certify in writing that:

1. The plans of the structure, including its foundations, have been reviewed.
2. A hands-on inspection of the structure has been performed in accordance with the latest edition of the NYSDOT Bridge Inspection Manual by an inspection team whose leader is a Professional Engineer and who was present for the inspection.
3. A detailed inspection of those areas of the structure critical to its integrity has been performed.
4. The structure is currently adequate for its design loads.

A signed and stamped copy of the inspection results shall be provided to the Engineer within one week of the inspection.

619-3.22 Pavement Patching. The Contractor shall place paving materials suitable to provide temporary pavement patches on paved surfaces where vehicular, bicycle or pedestrian traffic is to be maintained, including the traveled way, shoulders, sidewalks, and other paved surfaces damaged by traffic or environmental factors and not by Contractor operations. During periods of active work on the contract, the Contractor shall complete needed patches on a daily basis. During periods of winter shutdown, the Contractor shall inspect the contract on a regular basis, and pavement patches shall be installed as needed.

The Contractor shall place pavement patches to provide a relatively smooth, uniform driving surface suitable for safe travel at the posted speed limit. Pavement patches shall be placed to repair surface irregularities including, but not limited to, holes, depressions, cracks and uneven joints. Areas to be patched shall be adequately cleaned and tack-coated if necessary, and patching material shall be thoroughly compacted by hand or by roller.

619-3.23 Mailboxes. In the event the original mounting post has been lost, damaged, is unusable, or is not consistent with U.S. Postal Service requirements, the Contractor shall furnish and install a new mounting post and/or mailbox with mounting post at the designated location and at the proper height in accordance with the requirements of the U.S. Postal Service.

619-4 METHOD OF MEASUREMENT

619-4.01 General. (None Specified.)

619-4.02 Basic Work Zone Traffic Control. The work under basic work zone traffic control will be measured for payment on a lump sum basis.

619-4.03 Basic Work Zone Traffic Control (Daily Operations). The work under basic work zone traffic control (daily operations) will be measured for payment on a lump sum basis.

619-4.04 Temporary Business Signs. The quantity to be measured for payment will be in square feet to the nearest 0.1 square feet of business signs installed.

619-4.05 Covering or Removal of Pavement Markings. The quantity to be measured for payment will be in feet to the nearest whole foot along the centerline of the pavement stripes covered or removed, and will be based on a 4 inch wide stripe. No measurement will be made for the gaps between broken and dotted line segments. If preformed tape is used to cover an existing line, payment will be based on the width of the line covered. Measurement for covering or removal of striping with a width greater than 4 inches will be made by the following method:

$$\frac{\text{Width of Striping (in)} \times \text{Number of Feet}}{4 \text{ (in)}}$$

Letters and symbols will be measured by each unit covered or removed. A unit will consist of one letter or one symbol except that a double-headed arrow will be measured as two units and triple headed arrow will be measured

as three units. Example: ASCHOOL@ would be measured as six units. Each R in a railroad crossing marking will be measured as a single unit, but the AX@ will be measured by the number of feet of 4 inch stripe.

619-4.06 Temporary Pavement Markings. The quantity to be measured for payment will be in feet to the nearest whole foot along the centerline of the pavement stripes installed, and will be based on a 4 inch wide stripe. No measurement will be made for the length of skips in the dashed line. Measurement for installation of striping with a width greater than 4 inches will be made by the following method:

$$\frac{\text{Width of Striping (in)} \times \text{Number of Feet}}{4 \text{ (in)}}$$

619-4.07 Interim Pavement Markings. The quantity to be measured for payment will be in feet to the nearest whole foot along the centerline of the pavement stripes installed, and will be based on a 4 inch wide stripe. No measurement will be made for the length of skips in the dashed line. Measurement for installation of striping with a width greater than 4 inches will be made by the following method:

$$\frac{\text{Width of Striping (in)} \times \text{Number of Feet}}{4 \text{ (in)}}$$

Letters and symbols will be measured by each unit installed. A unit will consist of one letter or one symbol except that a double-headed arrow will be measured as two units and triple headed arrow will be measured as three units. Example: ASCHOOL@ would be measured as six units. Each R in a railroad crossing marking will be measured as a single unit, but the AX@ will be measured by the number of feet of 4 inch stripe.

619-4.08 Temporary Rumble Strips. The quantity to be measured for payment will be in feet to the nearest whole foot of individual temporary rumble strip installed, measured transverse to the direction of traffic flow.

619-4.09 Interim Tubular Markers. The quantity to be measured for payment will be the number of interim tubular markers installed.

619-4.10 Portable Variable-Message Signs (PVMS). The quantity of PVMS with a pay unit of each to be measured for payment will be the number of signs provided. The quantity of PVMS with a pay unit of weeks to be measured for payment will be in weeks to the nearest whole week.

619-4.11 Type III Construction Barricades. The quantity to be measured for payment will be the number of barricade units installed.

619-4.12 Temporary Concrete Barrier. The quantity to be measured for payment of temporary concrete barrier will be in feet to the nearest foot along the centerline of temporary concrete barrier installed.

The quantity to be measured for payment of pinned temporary concrete barrier will be in feet to the nearest foot along the centerline of pinned temporary concrete barrier installed.

The quantity to be measured for payment of temporary concrete barrier stiffened with box beam will be in feet to the nearest foot along the centerline of temporary concrete barrier stiffened with box beam installed.

The quantity to be measured for payment of temporary concrete barrier with barrier warning lights installed will be in feet to the nearest foot along the centerline of temporary concrete barrier installed.

619-4.13 Temporary Glare Screen. The quantity to be measured for payment will be in feet to the nearest whole foot along the length of the temporary glare screen installed.

619-4.14 Temporary Impact Attenuator. The quantity to be measured for payment will be the number of temporary impact attenuators installed.

619-4.15 Temporary Sand Barrel Arrays. The quantity to be measured for payment will be the number of individual sand barrel modules installed.

619-4.16 Vehicle Arresting Barrier. The quantity to be measured for payment will be the number of barriers installed.

619-4.17 Maintain or Modify Traffic Signal Equipment. The quantity of signalized intersections maintained to be measured for payment will be in months to the nearest 1/4 month. The quantity of traffic signal equipment modified to be measured for payment will be on an each location basis.

619-4.18 Temporary Traffic Signals. The work under temporary traffic signals will be measured for payment on an each location basis.

619-4.19 Nighttime Operations. The work under nighttime operations will be measured for payment on a lump sum basis.

619-4.20 Traffic Control Supervisor. The work under traffic control supervisor will be measured for payment on a monthly basis to the nearest 1/4 month.

619-4.21 Temporary Structures and Approaches. The quantity to be measured for payment will be the number of temporary structures and approaches installed.

619-4.22 Pavement Patching. The quantity to be measured for payment will be in cubic yards to the nearest 0.1 cubic yard of pavement patching installed.

619-4.23 Mailboxes. The quantity to be measured for payment will be the number of mailboxes installed.

619-5 BASIS OF PAYMENT

619-5.01 General. The price bid shall include all labor, materials and equipment necessary to complete the work. No payment will be made for damage caused by vehicle accidents, vandalism, or any other similar causes.

A. Non-Payment. For each calendar day during which there are substantial deficiencies in compliance with the requirements of this section, no payment will be made under basic work zone traffic control. The amount of such calendar day nonpayment will be deducted from monies due the Contractor in accordance with Table 619-7 *Basic Work Zone Traffic Control Nonpayment*.

Table 619-7 BASIC WORK ZONE TRAFFIC CONTROL NON-PAYMENT		
Original Contract Amount		Nonpayment Amount
From More Than	To and Including	
\$ 0	\$ 500,000	\$ 200
\$ 500,000	\$ 2,000,000	\$ 400
\$ 2,000,000	\$ 5,000,000	\$ 500
\$ 5,000,000	\$ 10,000,000	\$ 750
\$ 10,000,000	\$ 20,000,000	\$ 1,000
\$ 20,000,000	-----	\$ 3,000

B. Liquidated Damages. If the Contractor fails to adequately correct substantial cited deficiencies within 24 hours of notification by the Engineer for any item under this section, or those deficiencies reoccur on a subsequent, but not necessarily concurrent calendar day, liquidated damages will be assessed for each calendar day or part thereof in addition to non-payment for deficiencies.

C. Major Non-Conformance. Where major non-conformance with the requirements of this specification is noted by the Engineer, and prompt Contractor compliance is deemed not to be obtainable, the Engineer may stop contract work.

Where major non-conformance with the requirements of this specification is noted by the Engineer, and the Contractor fails to correct deficiencies for a period of 24 hours, the Department may correct the adverse conditions by any means deemed appropriate, and will deduct the cost of the corrective work from any monies

due the Contractor. The cost of this corrective work will be in addition to the non-payment for basic work zone traffic control, non-payment of any other items of work under this section and liquidated damages assessed.

619-5.02 Basic Work Zone Traffic Control. The lump sum price bid for basic work zone traffic control shall include all labor, materials and equipment necessary to complete the work. Construction signs; arrow panels; warning lights on signs, barricades and channelizing devices; the cost of temporarily terminating guide rail, median barrier, or bridge rail during non-work hours; work required to maintain drainage facilities during construction operations; and dust control shall be included in the lump sum price bid for basic work zone traffic control. Removal of debris from drainage features that was present at the time of contract award shall be paid for separately.

Progress payments will be made at 20 percent of the lump sum price bid when 10 percent of the contract work, excluding basic work zone traffic control, contingency items and mobilization, has been completed. The remaining 80 percent will be paid in subsequent contract payments, in proportion to the amount of other contract work completed, less any non-payment for deficient work zone traffic control. If the contract completion date is extended, no additional payment will be made for basic work zone traffic control.

619-5.03 Basic Work Zone Traffic Control (Daily Operations). The lump sum price bid for basic work zone traffic control (daily operations) shall include all labor, materials and equipment necessary to complete the work. Construction signs; arrow panels; warning lights on signs, barricades and channelizing devices; and the cost of temporarily terminating guide rail, median barrier, or bridge rail during non-work hours; shall be included in the lump sum price bid for basic work zone traffic control (daily operations).

Progress payments will be made at 20 percent of the lump sum price bid when 10 percent of the contract work, excluding basic work zone traffic control, contingency items and mobilization, has been completed. The remaining 80 percent will be paid in subsequent contract payments, in proportion to the amount of other contract work completed, less any non-payment for deficient work zone traffic control. If the contract completion date is extended, no additional payment will be made for basic work zone traffic control.

619-5.04 Business Signs. The unit price bid for temporary business signs shall include the cost of labor, materials and equipment necessary to complete the work, including sign supports.

619-5.05 Covering or Removal of Pavement Markings. The unit price bid for the removal of pavement markings shall include the cost of all labor, materials and equipment necessary to complete the work, including the costs of any repairs or replacement of damaged pavement or existing pavement markings resulting from pavement marking removal or covering operations.

Payment for removal of temporary pavement markings and interim pavement markings is included in those items, and additional payment will not be included under covering or removal of pavement markings.

619-5.06 Temporary Pavement Markings. The unit price bid for temporary pavement markings shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. Payment shall be provided each time temporary pavement markings are first applied on a pavement course in accordance with the contract requirements.

No additional payment shall be provided for the installation of construction signs, temporary delineators, and channelizing devices necessitated by the Contractor's failure to place temporary pavement markings before the pavement is opened to traffic, or for temporary roadside pavement channelization, until edge lines are placed. No additional payment shall be provided for markings required because the Contractor failed to place the next pavement course or the final pavement markings within 14 calendar days.

619-5.07 Interim Pavement Markings. The unit price bid for interim pavement markings shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

619-5.08 Temporary Rumble Strips. The unit price bid for temporary rumble strips shall include the cost of all labor, materials and equipment necessary to complete the work. Payment will include the cost of pavement cleaning, asphalt concrete, and other materials used to form or fill in the rumble strips, and tack coat. On multiyear contracts where it is desired to have rumble strips in place for more than one construction season, the rumble strips will be paid for separately each year they are installed.

619-5.09 Interim Tubular Markers. The unit price bid for interim tubular markers shall include the cost of furnishing all labor, materials and equipment necessary to complete the work, including removal and the cost of replacing damaged markers. Interim tubular markers that are in satisfactory condition may be relocated. When interim tubular markers are relocated, payment will be made for another interim tubular marker.

619-5.10 Portable Variable-Message Signs (PVMS). The unit price bid for PVMS shall include the cost of all labor, materials and equipment necessary to complete the work, including cellular telephone service initial start-up and monthly charges for the cellular communications option.

Progress payments for PVMS with a pay unit of each will be made for 90 percent of the unit price bid when each unit has been satisfactorily installed and is operational at the first location. The remaining 10 percent will be paid upon removal.

619-5.11 Type III Construction Barricades. The unit price bid for Type III construction barricades shall include all labor, materials and equipment necessary to complete the work, including lighting when required. When barricades are relocated or the diagonal stripes are changed to allow traffic to pass on the other side of the barricade, additional payment will be made for another barricade. Movements of the barricade from one side of the roadway to the other side, movements within 100 feet of the initial location, or daily replacement to approximately the same location, not requiring any change in the diagonal stripes, will not be considered as relocation and will not be paid for as additional barricades.

No payment will be made for Type III construction barricades used at the option of the Contractor in lieu of channelizing devices.

619-5.12 Temporary Concrete Barrier. The unit price bid for temporary concrete barrier shall include all labor, materials and equipment necessary to satisfactorily complete the work, including any required connection devices, end treatments, end section pinning, temporary delineation and repair of pavement after removal of temporary concrete barrier. Temporary impact attenuators, if required, will be paid for separately. When temporary concrete barriers are relocated, except movements necessary to maintain, realign, or replace damaged units and daily relocation of segments to allow access to the work area which are restored at the end of the work shift, additional payment will be made for additional length of temporary concrete barrier.

The unit price bid for pinned temporary concrete barrier shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including pinning.

The unit price bid for temporary concrete barrier stiffened with box beam shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including the box beam.

The unit price bid for temporary concrete barrier with warning lights shall include the cost of furnishing all labor, materials, equipment, and electrical power necessary to complete the work. Should a barrier that is equipped with warning lights be moved to a new location where temporary concrete barrier with warning lights is required, payment will be made for additional length of temporary concrete barrier with warning lights.

Progress payments will be made at the unit price bid for 90 percent of the quantity, after placement and demonstration of satisfactory operation. The remaining 10 percent will be paid upon removal. No payment will be made for temporary concrete barrier installed at the Contractor's option, required solely due to a delay caused by the Contractor's operations, or installed to protect pavement edge drop-offs, unless required in the contract documents.

619-5.13 Temporary Glare Screen. The unit price bid for temporary glare screen shall include all labor, materials and equipment necessary to complete the work. When glare screens are relocated, except movements necessary to maintain, realign, or replace damaged units and daily relocation of temporary concrete barrier segments with glare screen attached to allow access to the work area which are restored at the end of the work shift, additional payment will be made for the length of glare screen relocated. No payment will be made for repair or replacement of damaged components.

619-5.14 Temporary Impact Attenuator. The unit price bid shall include the cost of all labor, materials, and equipment necessary to complete the work, including the connection to temporary or existing barrier, the back-up system, the pad, if indicated, and any excavation or backfill. When attenuators are relocated, payment will be made for a new temporary impact attenuator, except minor movements within a site, such as movements to maintain,

realign, or adjust an attenuator. No payment will be made to repair, restore or replace an attenuator damaged by public traffic or by the Contractor's operations.

619-5.15 Temporary Sand Barrel Arrays. The unit price bid for temporary sand barrel arrays shall include the cost of all labor, materials and equipment necessary to complete the work, including the cost of the sand fill and salt additive. Replacement of individual modules damaged by public traffic will be paid for at the unit price bid for each temporary sand barrel. Relocation of barrels to a new location will be paid for as a new installation.

619-5.16 Vehicle Arresting Barrier. The unit price bid for vehicle arresting barrier shall include the cost of all labor, materials and equipment necessary to complete the work. No payment will be made to repair, restore or replace an attenuator damaged by public traffic or by the Contractor's operations.

619-5.17 Maintain or Modify Traffic Signal Equipment. The unit price bid for maintaining traffic signal equipment shall include the cost of all labor, materials and equipment necessary to perform the work, with the exception of inductance loop replacement, if necessary, which will be paid for separately. The cost of the electric power shall be the responsibility of the original maintaining agency. No payment will be made during any period for which the Contractor has been granted an extension of time with engineering charges.

The unit price bid for modifying traffic signal equipment per location shall include the cost of all labor, materials and equipment necessary to perform the work.

619-5.18 Temporary Traffic Signals. The unit price bid for temporary traffic signals per location shall include the cost of all labor, materials and equipment necessary to complete the work, including the cost of electric power necessary to operate the signal until its removal is approved or directed by the Engineer. A location may be an intersection, a work zone with two or more signal faces interconnected and operating together, or other limits as defined in the contract documents. Portable or temporary traffic signals used at the Contractor's option in lieu of flaggers shall be included in the lump sum price bid for basic work zone traffic control.

Progress payments will be made at 50 percent of the unit price bid for each location after installation and demonstration of satisfactory operation. The remaining 50 percent will be paid in progress payments per week of temporary traffic signal provided. The amount of such weekly payment will be determined by dividing 50 percent of the unit price bid by the number of weeks the temporary traffic signal is to remain in operation, as shown on the approved progress schedule.

619-5.19 Nighttime Operations. The lump sum price bid for portable lighting shall include all labor, materials and equipment necessary to complete the work.

Progress payments will be made based on the lump sum price bid as follows: 20 percent when the Nighttime Operations and Lighting Plan has been accepted and satisfactory lighting of nighttime operations has begun; the remaining 80 percent will be paid in progress payments per week of nighttime operations completed. The amount of such weekly payment will be determined by dividing 80 percent of the lump sum amount bid by the number of weeks of nighttime operations in the approved Nighttime Operations and Lighting Plan.

619-5.20 Traffic Control Supervisor. The unit price bid for traffic control supervisor shall include the cost of furnishing all labor, materials, equipment, training and direct supervision necessary to provide and support the activities of a traffic control supervisor.

619-5.21 Temporary Structures and Approaches. The unit price bid for temporary structures and approaches shall include the cost of all labor, materials and equipment necessary to complete the work including design preparation. Two temporary structures separated by a portion of an existing structure greater than 3 feet in length will be paid for as two separate structures.

Progress payments will be made at the unit price bid for 90 percent of the quantity after the temporary structures and approaches are complete and operable. The remaining 10 percent will be paid upon removal.

619-5.22 Pavement Patching. The unit price bid for pavement patching shall include the cost of furnishing all labor, materials and equipment necessary to patch pavement during periods of winter shutdown when work on the contract is inactive, or when hot mix asphalt material is not available, including mobilization of work crews and work zone traffic control.

The cost of all work associated with providing and installing suitable pavement patching materials to maintain pavements open to traffic in acceptable condition when work on the contract is active, or when hot mix asphalt material is available, will be paid under a hot mix asphalt sidewalk item if that item is in the contract, or alternatively, under a top course paving item, regardless of the material actually used.

619-5.23 Mailboxes. The unit price bid for mailboxes shall include all labor, materials and equipment necessary to complete the work. Only one payment for each mailbox will be made regardless of the number of times it is moved or replaced and shall be made when the mailbox has been placed in its final location. Where multiple mailboxes are installed on a single post, payment will be based upon the number of individual mailboxes so installed.

Payment will be made under:

Item No.	Item	Pay Unit
619.01	Basic Work Zone Traffic Control	Lump Sum
619.0101	Basic Work Zone Traffic Control (Daily Operations)	Lump Sum
619.04	Type III Construction Barricades	Each
619.06nn	Temporary Structures and Approaches	Each
619.0701	Temporary Business Signs	Square Feet
619.0801	Remove Existing Pavement Marking Stripes	Feet
619.0802	Remove Existing Pavement Marking Letters or Symbols	Each
619.0803	Cover Existing Pavement Marking Stripes (Removable Tape)	Feet
619.0804	Cover Existing Pavement Marking Letters or Symbols (Removable Tape)	Each
619.09xx	Temporary Pavement Markings, Stripes xx = Material 01= Traffic Paint, 03= Removable Tape, 04= Removable Wet Reflective Tape,	Feet
619.1001xx	Interim Pavement Markings, Stripes	Feet
619.1002xx	Interim Pavement Markings, Symbols	Each
619.1003xx	Interim Pavement Markings, Letters xx = Material 01= Traffic Paint, 02= Epoxy Paint, 03= Removable Tape, 04= Removable Wet Reflective Tape, 05= Traffic Paint Supplemented with Raised Markers	Each
619.1101xx	Portable, Variable Message Sign (PVMS) (Hybrid Flip Disk)	Each
619.1102xx	Portable, Variable Message Sign (PVMS) (LED)	Each
619.1103xx	Portable, Variable Message Sign (PVMS) (Hybrid Flip Disk)	Week
619.1104xx	Portable, Variable Message Sign (PVMS) (LED) xx = Options 01= None, 02= Cellular Communications 03= Radar, 04= Cellular Communications and Radar	Week
619.12	Temporary Glare Screen	Feet
619.13nn	Temporary Traffic Signals	Each Location
619.1611	Maintain Traffic Signal Equipment (Requirement A)	Intersection Month
619.1612	Maintain Traffic Signal Equipment (Requirement B)	Intersection Month
619.1613	Maintain Traffic Signal Equipment (Requirement C)	Intersection Month
619.1614nn	Modify Existing Traffic Signal Equipment (Temporary)	Each Location
619.1701	Temporary Concrete Barrier (Unpinned)	Feet
619.1702	Temporary Concrete Barrier (Unpinned) with Warning Lights	Feet
619.1703	Temporary Concrete Barrier (Pinned)	Feet
619.1704	Temporary Concrete Barrier (Pinned) with Warning Lights	Feet
619.1705	Temporary Concrete Barrier (Stiffened with Box Beam)	Feet
619.1706	Temporary Concrete Barrier (Stiffened with Box Beam) with Warning Lights	Feet
619.1707	Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)	Feet
619.1708	Temporary Concrete Barrier (Stiffened with Box Beam and Pinned) with Warning Lights	Feet

619.1802	Temporary Impact Attenuator - Redirective (Test Level 2)	Each
619.1803	Temporary Impact Attenuator - Redirective (Test Level 3)	Each
619.1812	Temporary Impact Attenuator - Gating (Test Level 2)	Each
619.1813	Temporary Impact Attenuator - Gating (Test Level 3)	Each
619.20	Interim Tubular Markers	Each
619.21	Temporary Sand Barrel Module	Each
619.22	Temporary Rumble Strips	Feet
619.23	Vehicle Arresting Barrier	Each
619.24	Nighttime Operations	Lump Sum
619.25	Traffic Control Supervisor	Month
619.26	Pavement Patching, Winter	Cubic Yards
619.27	Mailboxes	Each

SECTION 620 – BANK AND CHANNEL PROTECTION

Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 601 through 606, **Delete** SECTION 620 and **Replace** it with the following:

SECTION 620 – BANK AND CHANNEL PROTECTION

620-1 DESCRIPTION. This work shall consist of furnishing all labor, equipment, and materials to place a protective covering of erosion-resistant material in the locations indicated in the contract documents or as directed by the Engineer. The work shall be done in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical sections shown in the contract documents or established by the Engineer.

620-1.01 Vacant.

620-1.02 Stone Filling. Stone filling shall consist of a layer of well graded stone.

620-1.03 Dry Rip-Rap. Dry rip-rap shall consist of a fitted layer of shaped and graded stone.

620-1.04 Grouted Rip-Rap. Grouted rip-rap shall consist of a layer of stone, similar to dry rip-rap, with the spaces between the stones filled with cement grout.

620-1.05 Bedding Material. Bedding material shall consist of a layer of granular material placed to prevent underlying finer material from passing into and through the stone filling or rip-rap.

620-1.06 Concrete Block Paving. Concrete block paving shall consist of concrete blocks placed on embankment slopes under structures as protection against erosion.

620-1.07 Gabions. Gabions shall consist of open wire mesh baskets, filled with stones.

620-2 MATERIALS

620-2.01 General. The requirements for bank and channel protection materials are described below. The procedure for acceptance or rejection of stone filling and rip-rap materials shall be in conformance with the procedures contained in the geotechnical control procedure "*Procedure for the Control of Stone Filling and Rip-Rap Items*".

620-2.02 Stone Filling. Provide material meeting the requirements of §733-21 *Stone Filling* for the type of stone filling specified in the contract documents.

620-2.03 Dry Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap*, except for §733-22D *Grout*.

620-2.04 Grouted Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap*.

620-2.05 Bedding Material. Provide material meeting the requirements of §733-23 *Bedding Material*.

620-2.06 Concrete Block Paving. Provide concrete blocks meeting the requirements of §704-04 *Concrete Block (Slope Paving)*. The blocks shall conform to the dimensions identified in Table 620-1 *Concrete Block Dimensions*:

SECTION 620 – BANK AND CHANNEL PROTECTION

TABLE 620-1 CONCRETE BLOCK DIMENSIONS		
	Nominal Dimension	Standard Dimension
Length	16 to 20 in.	15 ⁵ / ₈ to 19 ⁵ / ₈ in. (± ¹ / ₈ in.)
Thickness	6 in. (solid)	5 ⁵ / ₈ in. (± ¹ / ₈ in.)
Width	8 in.	7 ⁵ / ₈ in. (± ¹ / ₈ in.)

The size of block used shall be consistent throughout any continuously paved area, and only one nominal length shall be used in any contract. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the blocks or impair the strength, permanence and appearance of the construction.

Cushion sand for concrete block paving shall meet the requirements of §703-06 *Cushion Sand*. Grout, where used, shall conform to Table 620-2 *Concrete Block Grout Requirements*.

TABLE 620-2 CONCRETE BLOCK GROUT REQUIREMENTS		
Material	Subsection	Grout Mix
Portland Cement Type 2	§701-01	1 part
Mortar Sand	§703-03	2 parts

620-2.07 Gabions. Provide materials meeting the requirements of §712-15 *Gabions*.

620-3 CONSTRUCTION DETAILS

620-3.01 General. The ground surface on which bank or channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. All soft or spongy material shall be removed to the depth shown in the contract documents and replaced with approved material. Filled areas shall be compacted in accordance with applicable provisions of Section 203. Protection for structure foundations shall be provided as early as the foundation construction permits. The type of protection shall be placed in accordance with these specifications and the contract documents.

620-3.02 Stone Filling. Stone filling shall be placed in a manner that will produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids. The final section of stone filling shall be in conformance with the lines, grades, and thicknesses shown in the contract documents. Stone filling used for bank or channel protection shall be placed to its full course thickness in one operation, unless specified in the special provisions, and in such a manner that the underlying material will not be displaced or worked into the layer of stone filling. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placing; or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to secure the specified results. When stone filling is dumped under water, methods shall be used that will minimize segregation.

620-3.03 Dry Rip-Rap. The stones shall be placed so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface and that the weight of the stone is carried by the underlying material and not by the adjacent stones. On slopes, the largest stones shall be placed at the bottom of the slope. The dry rip-rap shall be properly aligned and placed so as to minimize void spaces between the adjacent stones. The spaces between the stones shall be filled with spalls of suitable size.

620-3.04 Grouted Rip-Rap. The procedure of placing the stones shall be the same as described in §620-3.03 *Dry Rip-Rap* except that the space between stones shall be filled with grout rather than spalls. Material upon which the grouted rip-rap is laid shall not be allowed to occupy the space between the stones.

SECTION 620 – BANK AND CHANNEL PROTECTION

When the stones are in place, the spaces between them shall be completely filled with grout and the surface of the stones cleaned to remove accumulation of grout. Rip-rap shall not be grouted in freezing weather. The grouted rip-rap shall be kept moist for seven days after grouting. A suitable curing compound may be employed, if approved by the Engineer.

The Engineer may direct that occasional spaces be left ungrouted for relief of hydrostatic pressure. The ungrouted spaces shall be chinked with spalls of suitable size.

620-3.05 Bedding Material. Where called for in the contract documents, stone filling and dry rip-rap shall be placed on bedding material. The bedding material shall be placed on the prepared area to the full specified thickness of each layer in one operation, using methods which will not cause segregation of particle sizes. Contamination of bedding material by natural soils or other materials shall be prevented. Bedding material that becomes contaminated shall be removed and replaced with uncontaminated bedding material at no additional cost to the State.

620-3.06 Concrete Block Paving. Blocks shall be laid on a 3 in. bed of cushion sand in running bond with the long dimension transverse to the slope and all joints tight. Blocks shall be set slightly higher than their final position and carefully hand tamped into their final position to provide a uniformly even surface and solid bedding under each block.

In the areas where grouting is called for, the block shall be laid in running bond with the length parallel to the slope and with ¼ in. joints. Following the laying of blocks, in the area to be grouted, sufficient mortar sand shall be spread over the surface and swept into the joints to fill the latter to 4 in. from the surface. The block shall be wetted before any grout is placed. The joints shall be filled with grout from the bottom flush with the top of the block.

After grouting has been completed and the grout has sufficiently hardened, the blocks shall be wetted, covered and cured with curing covers for the first seven days after grouting. Grout shall not be poured during freezing weather.

620-3.07 Gabions. Each gabion unit shall be assembled by binding together all vertical edges with wire ties on approximately 6 in. spacing or by a continuous piece of connecting wire stitched around the vertical edges with a coil about every 4 in. Empty gabion units shall be set to line and grade as shown in the contract documents. For structural integrity, wire ties or connecting wire shall be used to join the gabions together along the perimeter of all contact surfaces according to the manufacturer's instructions. Internal tie wires shall be uniformly spaced and securely fastened in each outside cell of the structure in accordance with the manufacturer's instructions or where ordered by the Engineer. When gabions are being placed as slope protection, the cross-connecting wire may be deleted if directed by the Engineer.

A fence stretcher, chain fall, or iron rod may be used to stretch the wire baskets and hold alignment.

The gabions shall be filled with stone, carefully placed by hand or machine, to ensure alignment and avoid bulges with a minimum of voids. After a gabion has been filled, the lid shall be bent over until it meets the side and edges. The lid shall then be secured to the sides, ends, and diaphragms with wire ties or connective wire in the same manner described above for assembly.

620-4 METHOD OF MEASUREMENT

620-4.01 General. Vacant.

620-4.02 Stone Filling. Stone filling will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.03 Dry Rip-Rap. Dry rip-rap will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.04 Grouted Rip-Rap. Grouted rip-rap will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

SECTION 620 – BANK AND CHANNEL PROTECTION

620-4.05 Bedding Material. Bedding material will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.06 Concrete Block Paving. Concrete block paving will be measured in square yards, measured to the nearest whole square yard, computed from the payment lines shown in the contract documents.

620-4.07 Gabions. Gabions will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-5 BASIS OF PAYMENT

620-5.01 General. Vacant.

620-5.02 Stone Filling. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.03 Dry Rip-Rap. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.04 Grouted Rip-Rap. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.05 Bedding Material. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.06 Concrete Block Paving. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.07 Gabions. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

Payment will be made under:

Item No.	Item	Pay Unit
620.02	Stone Filling (Fine)	Cubic Yard
620.03	Stone Filling (Light)	Cubic Yard
620.04	Stone Filling (Medium)	Cubic Yard
620.05	Stone Filling (Heavy)	Cubic Yard
620.06	Dry Rip-Rap	Cubic Yard
620.07	Grouted Rip-Rap	Cubic Yard
620.08	Bedding Material	Cubic Yard
620.09	Concrete Block Paving	Square Yard
620.10	Galvanized Gabions	Cubic Yard
620.11	P.V.C. Coated Galvanized Gabions	Cubic Yard

CLEANING CULVERTS AND DRAINAGE STRUCTURES

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 606, **Delete** SECTIONS 621 AND 622 (VACANT) and **Replace** it with the following:

SECTION 621 – CLEANING CULVERTS, DRAINAGE STRUCTURES AND EXISTING ROADSIDE SECTIONS

621-1 DESCRIPTION

621-1.01 General. This work shall consist of cleaning and keeping clean, existing culverts, closed drainage systems, drainage structures, and existing roadside sections as shown in the contract documents.

621-1.02 Definitions. The following general definitions shall be used in conjunction with this section:

1. **Culvert.** A culvert is defined as an enclosed channel open at both ends carrying water from a stream or water course through an artificial barrier such as a roadway embankment.
2. **Closed Drainage System.** A closed drainage system is a collection system for stormwater runoff that carries water to a discharge point. A closed drainage system consists of enclosed channel(s) closed at either one or both ends by a drainage structure, and may include intermediate drainage structures at junction points.
3. **Drainage Structure.** A drainage structure includes catch basins, manholes, drop inlets, leaching basins and similar structures that collect and/or redirect runoff water.
4. **Materials Removed.** Materials removed have been presumed not to include non-hazardous industrial waste or hazardous waste in accordance with §107-10 *Managing Surplus Material and Waste*.
5. **Clean and Keeping Clean.** Clean and keeping clean is the activity of removing accumulated sediment, debris, and vegetation which impedes the flow of water to maintain a proper drainage path and re-establish the design capacity.
6. **Graded Surfaces.** Grading surfaces entails forming and trimming surfaces to the lines and grades shown in the contract documents.

621-2 MATERIALS. None specified.

621-3 CONSTRUCTION DETAILS

621-3.01. General. Provide appropriate control and discharge practices for all water throughout the cleaning process. Include methods and schedules to be consistent with the soil erosion and sediment control plan in accordance with §209-3.01 *General* and perform all work in accordance with §107-12 *Water Quality Protection*.

621-3.02. Cleaning Culverts. Culvert locations identified in the contract documents shall be cleaned. Materials removed shall be disposed of in accordance with §203-3.02 B. *Disposal of Surplus Excavated Materials*. Removal of contaminated material shall be disposed of in accordance with Section 205 *Contaminated Soil*.

It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.

621-3.03 Cleaning Closed Drainage System. Closed drainage systems identified in the contract documents shall be cleaned. Materials removed shall be disposed of in accordance with §203-3.02 B. *Disposal of Surplus Excavated Materials*. Removal of contaminated material shall be disposed of in accordance with Section 205 *Contaminated Soil*.

It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.

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621-3.04 Cleaning Drainage Structures. Drainage structures identified in the contract documents shall be cleaned. Materials removed shall be disposed of in accordance with §203-3.02 B. *Disposal of Surplus Excavated Materials*. Removal of contaminated material shall be disposed of in accordance with Section 205 *Contaminated Soil*.

It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.

621-3.05 Cleaning, Grading and Shaping Existing Roadside Section. The Contractor shall remove earth, turf, brush and debris, or provide necessary fill material to restore adequate roadside drainage. Ditches shall be shaped as shown in the contract documents. Material removed shall be disposed of in conformance with the provisions of §203-3.02 B. *Disposal of Surplus Excavated Materials*. Removal of contaminated material shall be disposed of in accordance with Section 205 *Contaminated Soil*.

The Contractor shall protect all fences, markers, culverts, underground structures, utilities and other appurtenances adjacent to the work area. Any damaged facilities and/or disturbed areas shall be replaced in kind at no additional cost to the state.

621-4 METHOD OF MEASUREMENT

621-4.01. General. None specified.

621-4.02. Cleaning Culverts. Cleaning culverts will be measured in linear feet of culvert cleaned, measured along the invert, to the nearest foot. Multiple barrel culverts will be measured along each individual barrel.

621-4.03 Cleaning Closed Drainage System. Cleaning closed drainage systems will be measured in linear feet of pipe cleaned, measured along the invert of the pipe, from the inside wall surface of the drainage structure to the inside wall surface of the next drainage structure, measured to the nearest foot.

621-4.04 Cleaning Drainage Structures. Cleaning drainage structures will be measured as the number of drainage structures cleaned.

621-4.05 Cleaning, Grading and Shaping Existing Roadside Section. Cleaning, grading, and shaping existing roadside section will be measured as the number of linear feet along the edge of the adjacent roadway.

621-5 BASIS OF PAYMENT

621-5.01. General. None specified.

621-5.02. Cleaning Culverts. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work including the cost of managing and disposing the materials used to clean and the materials removed from the culverts. Payment for cleaning culverts will be made only for those facilities designated in the contract documents. Only one payment for each length of facility will be made regardless of the number of times it is cleaned.

621-5.03 Cleaning Closed Drainage System. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work including the cost of managing and disposing the materials used to clean and the materials removed from the closed drainage system. Payment for cleaning closed drainage systems will be made only for those facilities designated in the contract documents. Only one payment for each facility will be made regardless of the number of times it is cleaned. Cleaning intermediate drainage structures at junction points within a closed drainage system shall be paid for under its respective item.

621-5.04 Cleaning Drainage Structures. The unit price bid for each shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work including the cost of managing and

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disposing the materials used to clean and the materials removed from the drainage structures. Payment for cleaning drainage structures will be made only for those facilities designated in the contract documents. Only one payment for each facility will be made regardless of the number of times it is cleaned.

621-5.05 Cleaning, Grading and Shaping Existing Roadside Section. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work including the cost of disposing the materials removed from the roadside section and/or fill material to restore the shape.

Payment will be made under:

Item No.	Item	Pay Unit
621.01	Cleaning Culverts with Span of 50 in. or Less	Linear Foot
621.02	Cleaning Culverts with Span of More Than 50 in.	Linear Foot
621.03	Cleaning Closed Drainage Systems	Linear Foot
621.04	Cleaning Drainage Structures	Each
621.05	Clean, Grade and Shape Existing Roadside Section	Linear Foot
621.11	Cleaning Culverts (Contaminated Material) with Span of 50 in. or Less	Linear Foot
621.12	Cleaning Culverts (Contaminated Material) with Span of More Than 50 in.	Linear Foot
621.13	Cleaning Closed Drainage Systems (Contaminated Material)	Linear Foot
621.14	Cleaning Drainage Structures (Contaminated Material)	Each
621.15	Clean (Contaminated Material), Grade and Shape Existing Roadside Section	Linear Foot

SECTION 622 (VACANT)

SURVEY OPERATIONS

Make the following changes to the Standard Specifications dated May 1, 2008:
Page 609 - 614, **Delete** Section 625 in its entirety and **Replace** it with the following:

SECTION 625 - SURVEY OPERATIONS**625-1 DESCRIPTION****625-1.01 General.**

Some survey work is required be completed under the direction of a Land Surveyor or Professional Engineer in accordance with the professional license requirements contained in NYS Education Law.

625-1.02 Survey Operations.

This work shall consist of providing all necessary survey work to establish, spatially position, and verify the locations of existing and proposed terrain features and measure quantities of items in accordance with the contract documents or as directed by the Engineer. This work includes but is not limited to the establishment, reestablishment or localization of primary and secondary control, the stakeout or layout of proposed features, the initialization, calibration and navigation of automated equipment operations, the location or verification of existing terrain or of constructed features, the verification of geospatial data for proposed construction work and the coordination and sharing of engineering data with the Department or other contract stakeholders.

625-1.03 Right of Way Markers.

This work shall consist of furnishing, installing and certifying right of way markers at the positions described on the right of way appropriation maps, in accordance with the contract documents and the Standard Sheet.

625-1.04 Permanent Survey Markers.

This work shall consist of furnishing, installing, and certifying permanent survey markers in accordance with the details shown on the appropriate Standard Sheet.

625-1.05 Supplemental Site Survey.

This work shall consist of providing all necessary field survey and terrain mapping necessary to locate, spatially position, verify and digitally map the locations of existing above or below ground terrain features as described in the contract documents or as directed by the Engineer. The limits of this supplemental survey will be described in the contract documents.

625-1.06 GPS Inspection Units.

This work shall consist of furnishing, configuring, installing, maintaining and removing Global Positioning System (GPS) units as needed for use by the Engineer and their inspection staff, including the training of the Engineer and their representatives on the use of the GPS units provided.

625-2 MATERIALS

625-2.01 General. None specified.

625-2.02 Survey Operations. None specified.

625-2.03 Right of Way Markers.**A. Concrete Right of Way Markers.**

Concrete ROW Markers shall conform to the requirements of §712-05 *Precast Concrete Right-of-Way Markers*, and shall be in accordance with the details shown on the Standard Sheet.

B. Steel Pin and Cap Right of Way Markers.

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Reinforcing steel used for the shank shall conform to ASTM A615, Grade 300 or Grade 420. It shall be epoxy coated for its entire length in accordance with §705-14 *Longitudinal Joint Ties* or §709-04 *Epoxy Coated Bar Reinforcement*.

The cap shall be aluminum or a corrosion resistant aluminum alloy. The cap shall weigh a minimum of 50 grams and fasten to the shank by means of threading or force fitting.

A commercial grade silicone sealant shall be used between the cap and the shank. Steel Pin and Cap-Type Markers shall be anchored into rock using Concrete Grouting Material meeting the requirements of §701-05 *Concrete Grouting Material*.

625-2.04 Permanent Survey Markers.

The concrete shall meet the requirements of Class A Concrete in Section 501 *Portland Cement Concrete--General*, except that the requirements for inspection facilities, automated batching controls and recordation do not apply. The batching, mixing and curing methods and the inspection facilities shall meet the approval of the Department. The Contractor may submit for approval by Director, Materials Bureau, a mix at least equivalent to Class A Concrete.

625-2.05 Supplemental Site Survey. None specified.

625-2.06 GPS Inspection Units.

Each GPS Unit shall include all necessary components, communication devices, integrated antennae and receiver, controller and/or data collector, cables, software, operating manuals, attachments, and fastening hardware to meet the minimum requirements described below.

A. All GPS Inspection Units.

1. All GPS units provided for a single contract shall be of the same model and manufacturer; and shall include, and be licensed to operate, the same versions of GPS planning software, data collection software, navigation software, stakeout software and post processing software. All software provided (including firmware) shall be the most current available from the manufacturer at the time of delivery of the GPS units. GPS units should be of the same manufacturer as those used by the Contractor. GPS units shall not be more than 2 years old from the date of manufacturing to the time of delivery. To verify the age of the GPS units, the Contractor shall provide a dated copy of the manufacturer's receipt(s) for the purchase, lease or rental of the units.
2. GPS units shall include both standard USB cable and Bluetooth wireless technology for data transfer.
3. Data shall be capable of being copied onto or from a removable industry standard data storage card (eg: secure digital SD Card). Each GPS Unit shall include 2 data storage cards, each with a minimum capacity of 4 GB.
4. GPS units shall include the ability to import/export and display point and alignment data which is in XML format, and also import graphics files which are in DGN or DXF format.
5. GPS units shall have an internal, or modular, rechargeable battery system capable of operating a minimum of 8 hours (may include interchangeable batteries), including the battery charger.
6. GPS units shall include a hard or soft shell carry case, and all appropriate operation manuals.

B. Survey Grade GPS Inspection Units.

1. GPS units shall be equipped to receive Global Positioning System (GPS), GLONASS and GNSS position data.
2. GPS units shall be equipped to receive, and be capable of utilizing, Real Time Kinematics (RTK) correctional data (current version of RTCM format) through internet protocol as provided from the NYS Continuously Operating Reference System (NYS CORS) Network. This shall include all necessary communication devices, repeaters and systems, data service plans and communications to meet the minimum required accuracy and not exceed a 2 second latency at the rover. Whichever communication method is utilized by the Contractor to broadcast the NYS CORS RTK correctional data, the Contractor shall ensure that the RTK data shall be available at all locations across the entire contract site during all hours of construction and inspection operations.

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3. GPS units shall include the capability to “localize” both the horizontal and vertical control to local project monumentation (also known as calibrate), while utilizing RTK corrections from a reference network.
4. GPS units shall include either an integrated or modular communication device capable of receiving RTK correctional data to satisfy the requirement of using NYS CORS RTK corrections.
5. GPS units shall have the ability to display the number of satellites tracked at any one time, and indicate the accuracy quality of each measurement relative to the strength of signals, and the GDOP (Geometric Dilution of Precision).
6. GPS Unit shall include dual frequency receivers.
7. Minimum Required Kinematic Accuracy relative to primary project control (CORS): Horizontal: 0.033 ft + 1.0 ppm; Vertical: 0.065 ft + 1.0 ppm
8. All necessary hardware and software shall be included (including communication drivers) to connect the GPS unit to a Department provided Tablet PC and communicate/exchange positional data with Bentley™ OnSite software. Firmware used on the GPS unit shall be verified as interoperable with Bentley™ OnSite software. If the firmware cannot be verified as being interoperable with Bentley™ OnSite, the next older version may be used.
9. The data controller shall permit the user to program and store multiple configurations (also known as user preferences) prior to the actual field measurements. Configurations shall be capable of being stored and recalled in the field.
10. GPS units shall include one fixed height rover rod of 6.56 feet in length, one attachable bipod which is compatible with the rover rod, and one topo shoe.
11. A GPS unit set up to operate as a base station shall include all necessary additional cables, hardware, fasteners or accessories necessary to install it in a fixed semi-permanent location, . will not be considered as a rover unit, and therefore will not require a rover rod, a bi-pod, or a topo shoe.

C. Mapping Grade GPS Inspection Units.

1. Minimum Required Kinematic Accuracy: less than 3.0 feet in real time.
2. GPS units shall also provide standard support for the Wide Area Augmentation System (WAAS) position correction services.

625-3 CONSTRUCTION DETAILS

625-3.01 General.

A. Professional Responsibilities.

The following types of Survey Operations shall be completed by the Contractor under the direction of a Land Surveyor. This requirement is directly or indirectly associated with the professional license requirements contained in Article 145 of the NYS Education Law.

1. Establishment, reestablishment or localization of primary or secondary control which shall be used for:
 - a. Establishing boundaries of new right of way appropriated for this contract.
 - b. Location of property or highway boundary markers.
 - c. Tie measurements to, or resetting of control points.
2. Location or resetting of existing highway and property boundary markers by reference ties to or from contract control to protect their integrity.
3. Establishment or certification of location of right of way markers and permanent survey markers.

The following types of Survey Operations shall be completed by the Contractor under the direction of either a Land Surveyor or Professional Engineer.

1. Establishment, reestablishment or localization of primary or secondary control which shall be used for:
 - a. Establishing location for horizontal or vertical roadway alignment.
 - b. Establishing location for the horizontal or vertical alignment of a structure.
 - c. Establishing or localizing reference base station for Global Positioning System (GPS) control work.

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- 2 Establishing new horizontal or vertical roadway alignment in the field from contract control either by conventional stakeout methods or by use of automated equipment operations.

B. Survey/Engineering Geospatial Data.

All establishments or reestablishment of contract primary or secondary control, and the survey collection of terrain data shall be performed in accordance with the standards and procedures required in the Department's *Land Surveying Standards and Procedures Manual*. The Contractor shall incorporate the NYS CORS network into contract control to facilitate the use of GPS survey within the site and on the same datum by other project stakeholders, or to align with other adjacent projects.

When the Department provides electronic copies of engineering data to the Contractor, files should follow the standard file naming conventions listed in Appendix 14 of the Department's *Project Development Manual*.

1. Existing Terrain Data. When an existing digital terrain model was developed during design and provided for construction purposes, and possibly updated during construction by supplemental survey, the Department and Contractor shall use that information as a basis from which to develop contract pay item quantities. The Contractor shall consider all existing terrain data supplied by the Department as being within acceptable tolerances, except where changes or additions have been approved by the Engineer. If the Contractor questions the accuracy of the existing terrain data provided, the Contractor may verify any or all portion(s) of the existing terrain model, at no additional cost to the State, in accordance with §105-10 *Survey and Stakeout*. All exceptions or discrepancies found with the supplied existing terrain data shall be brought to the attention of the Engineer, in writing, and terrain data modifications shall be mutually agreed upon and shared with both parties prior to beginning construction operations within those areas being modified. Changes to existing terrain data will not be accepted by the Department where existing terrain is verified to be within Departmental accepted positional tolerances in accordance with the Department's *Land Surveying Standards and Procedures Manual*, or after the Contractor has disturbed the existing ground surface.

2. Proposed Data. When proposed digital terrain models (or surfaces), proposed alignments and proposed graphics were developed during design and provided for construction purposes, or revised during construction due to site changes or redesign, the Department and Contractor shall use that information from which to position and compute applicable contract pay item quantities and to field verify positional locations of constructed items. When the Contractor and Department agree to utilize the proposed digital terrain data (surface), alignments or graphics the Contractor shall first review its consistency with all other contract information, and review for any perceived physical conflicts or inconsistencies of information prior to using the data in the field for any construction purpose. All exceptions or discrepancies with the supplied data shall be brought to the attention of the Engineer, in writing, and terrain data, alignment or graphics modifications shall be approved by the Engineer prior to beginning construction operations within those areas being modified. All approved changes shall be shared electronically with both the Department and the Contractor, and both parties shall acknowledge acceptance of such changes before beginning the work.

When proposed digital terrain model (or surfaces), alignments or graphics are not provided by the Department, the Contractor may choose to develop their own terrain model surfaces from the contract plans to facilitate their use of Automated Machine Guidance, at no additional cost to the State. A request by the Contractor to use Automated Machine Guidance shall be made as part of the Contract Control Plan. The Contractor developed terrain model surfaces shall be shared with the Engineer in a Department accepted format prior to beginning construction operations. Generation of proposed terrain model surfaces or other electronic engineering data does not constitute a redesign of the project, and the Contractor retains all responsibility to complete the work in accordance with the engineering intent conveyed in the contract documents unless otherwise agreed to in writing by the Engineer.

625-3.02 Survey Operations.

All Survey Operations shall follow either Traditional *Survey Stakeout* or Automated Stakeout and *Automated Machine Guidance Operations*, or a combination of both, for the establishment, positioning, equipment guidance or

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verification of construction items. The proposed method shall be approved by the Engineer as part of the Contract Control Plan prior to beginning any field construction operations. Both methods include the same basic requirements that: (1) both parties (Contractor and Department) utilize the same contract control, the same existing terrain data, and the same proposed feature data; (2) both parties utilize the same accuracy and tolerance limits; and (3) both parties utilize equivalent survey verification techniques to ensure that field features are constructed as proposed.

The Contractor shall establish the center line of bearings for all bridge abutments and piers, by setting offset hubs or reference points, so located and protected to ensure they remain undisturbed until such time as they are no longer needed. The Contractor shall mark the location of anchor bolts to be installed, establish the elevation of bearing surfaces and check bearing plates to ensure installation at their proper elevation. Before the erection of structural steel or concrete beams the Contractor shall verify the locations, both vertically and horizontally, of all bearings and the distances between associated bearings. Control used to establish center line of bearings shall be included in the contract control plan.

On contracts which include proposed and existing roadway alignments and profiles, the Contractor shall verify the roadway tie-in locations of where existing and proposed alignments meet prior to beginning construction operations and report the results to the Engineer. This requirement is intended to verify that no changes have occurred to the existing roadway and that the proposed design is buildable as designed.

A. Contract Control Plan.

The Contractor shall develop and submit a Contract Control Plan for all contracts which include the contract pay item for Survey Operations. Contract control includes all statewide or local primary and secondary horizontal and vertical control which will be used for the geospatial positioning of work items. Upon the Contractor's completion of initial survey reconnaissance and control verification, but prior to beginning primary field operations, the Contractor shall submit a Contract Control Plan document which is to be signed and sealed by a Land Surveyor or Professional Engineer in accordance with §625-3.01.A *Professional Responsibilities*, for acceptance by the Engineer. The Contract Control Plan shall include the below listed required control information and follow the acceptance procedure.

All revisions or additions to contract control for the purpose of stakeout or layout of proposed work items shall be provided in writing to the Engineer prior to beginning that revised portion of stakeout or layout work.

1. Acceptance Procedure.

- a. The Contractor shall document required information and submit electronically to the Engineer at least 10 work days prior to beginning field operations.
- b. The Engineer will coordinate review with the Regional Land Surveyor and provide comments.
- c. Upon acceptance of the procedure by the Engineer, the Contractor shall submit 2 signed and sealed copies to the Engineer.

2. Control Information.

The Contractor shall list the following control information (tabular format is acceptable):

- a. All contract control shown in the contract documents or in the Survey Control Report. Note: The NYS CORS Network provides primary control for most Department contracts.
- b. The following elements shall be submitted for all contract control points or benchmarks:
 - (1) Recovered in the field and did it appear undisturbed?
 - (2) Contract indicated coordinate or elevation.
 - (3) Field determined coordinate or elevation.
 - (4) Contractor adjusted coordinate or elevation, if necessary.
 - (5) Point or benchmark intended to be used for construction purposes.
- c. Adjustment method is used to balance or adjust the control (ex: Compass Rule for Baseline or Calibration Report for GPS, etc). Attach a copy of the adjustment/calibration report.
- d. Control network diagram (drawn to a legible scale) with roadways indicated.
- e. New York State Plane Coordinate System (NYSPCS) Zone utilized.
- f. Horizontal Datum used.
- g. Vertical Datum used.

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- h. Combined Factor used to account for the ellipsoidal reduction factor and the grid scale factor.
- i. Additional (new) control is anticipated to be needed and where will they be set?
- j. When a GPS base station(s) is utilized on a project either for inspection or stakeout, provide the determined coordinate and elevation value of the station, and the datum differential from that localized value to a NYS CORS determined value.

3. Methods or Procedures.

The Contractor shall document and provide the following survey information on methods or procedures to be used:

- a. Survey method used to verify the control (ex: Total Station, GPS/RTK, Auto Level, etc).
- b. Survey method(s) used to stakeout which types of proposed features.
- c. Survey method(s) used to stakeout proposed ROW Markers.
- d. Survey method used for stakeout of proposed bridge structures (if applicable). How will control be set up and maintained around the bridge(s)?
- e. Proposed manufacturer, model and software version for GPS Inspection Units.
- f. Automated Machine Guidance (AMG) proposed for use on this contract.
- g. Type and frequency of quality control measures included to maintain the proper calibration and adjustment of the AMG systems.
- h. If GPS will be used for stakeout or for AMG, will the NYS CORS Network be used as its reference network or will base station(s) be used?
- i. If a base station is to be used, describe the mounting location, attachment technique, and instrumental protection included which ensures a sound and reliable reference station will be provided.

B. Traditional Survey Stakeout.

The Contractor shall field locate all features to be constructed from survey control points which are identified in the Contract Control Plan. Any error, apparent discrepancy or absence in the data shown or required to appropriately accomplish the stakeout survey shall be referred to the Engineer immediately for interpretation when such is observed or required.

The Contractor shall place two offset stakes or references points along the center line at maximum intervals of 50 feet and at such intermediate locations as required to determine location and direction. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the center line station number, offset and cut or fill from which the establishment of the centerline location and elevation can be determined. If markings become illegible for any reason the markings shall be restored by the Contractor. The Contractor shall locate and place all cut, fill, slope, fine grade, or other stakes and points for the proper progress of the work with a maximum station spacing of 50 feet. All control points shall be properly protected and flagged for easy identification.

The Contractor shall be responsible for the accuracy of the work and shall maintain all applicable reference points, stakes, etc. Damaged or destroyed reference points or bench marks made inaccessible by the progress of the construction shall be replaced or transferred by the Contractor. All control points shall be referenced by ties (4 minimum) to specific points on acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the Engineer. All stakeout survey work related to highway control shall be referenced to the control line (or survey baseline) shown in the contract documents. Computations and survey notes necessary to establish the position of the work from control points, shall be made and maintained in a neat, legible and acceptable format by the Contractor. Computations, survey notes and other survey information shall be made available to the Engineer within 3 work days from the request. The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.

C. Automated Stakeout and Automated Machine Guidance Operations.

Should the Contractor choose automated methods for the establishment, layout, measurement, equipment guidance or verification of work to be constructed, they shall submit their proposed automated methods including quality control measures as part of their contract control plan for acceptance by the Engineer. When

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utilizing these methods, all horizontal and vertical survey control, roadway alignment control, existing terrain data and proposed design engineering data shall be shared/exchanged electronically and kept current between the Contractor and the Engineer. All original version files of electronic contract data shall be maintained and stored by the Department. Prior to beginning field operations, the Contractor and Engineer shall mutually determine acceptable uses of and procedures for the technology being used, and how data can be exchanged for use in stakeout, automated machine operations, positional verification, quantity measurements and calculations. All record copies of engineering data shall be stored and shared in Department accepted standard formats, and shall be derived primarily from the original electronic data, when provided by the Department.

Automated survey operations have a high reliance on accurate control networks from which to make measurements, establish positions, and verify geospatial locations of features. Therefore, a strong contract control network in the field which is consistent with the project control used during the design of the contract is essential to the successful use of these technologies with the proposed digital terrain model and alignments. Consistent and well designed site calibration (localization) for all automated machine guidance, as described above under *Contract Control Plan*, is required to ensure the quality of the contract deliverables. The Contract Control Plan is intended to document which local horizontal and vertical control will be used for calibration during construction operations and how that calibration or adjustment will be maintained along the entire contract length. Continued incorporation of NYS CORS Network is essential to maintaining the integrity of positional locations and elevations of features.

The Engineer may perform quality assurance verifications of feature positions at any time during the contract. Dimensional tolerances shall hold a higher order of precedence than positional tolerances, but both may require verification. Quality assurance activities by the Engineer will not relieve the Contractor of any responsibilities for the quality control of the accuracy or completeness of the work.

The Department's verification of the positional locations of features, calculation and merging of supplemental terrain data surfaces, and the measurement and calculation for quantity payments will be performed using Department standard software. Both the Contractor and the Department shall utilize the following standards: (1) All terrain data collected for the purpose of being used for or merged with Department provided terrain data for the calculation of pay quantities shall be delivered in a format and correctly display in accordance with the current Departmental CADD Standards. (2) The Department will maintain record copies of electronic data files which will be available to the Contractor using the Department's designated file management system or other method. This will ensure that both parties utilize the same credible data from which to establish locations and measure quantities. The Department will provide all available CADD resource files for use by the Contractor.

The Contractor may choose to introduce an additional new automated survey method or technology which involves a new technique for positioning features, measuring quantities, or verifying constructed locations. The quality and accuracy of this data produced by this method shall be demonstrated to the Engineer, for acceptance, by a comparison of this method to previously accepted techniques over a mutually agreed upon portion of the work. The new technology shall meet or exceed the quality and accuracy results provided by previously accepted techniques, and the Engineer shall make the final determination as to the acceptability of its use based on the resulting performance, cost savings, safety and effectiveness of the operation. Previous uses of this same method on other contracts or by other contractors are not acceptable evidence of a technology's viability, due to inherent variations in operator's experience levels, data availability, changing field conditions and differing technologies.

625-3.03 Right of Way Markers.

The Contractor shall verify with the Engineer that it has the most current vested Right of Way Acquisition Maps to determine the geospatial positions of all proposed right of way markers. Right of way markers are indicated in the contract for approximate locations and quantities, and shall not be positioned according to the contract information, but rather by the positions shown for the equivalent points on the ROW Maps.

Right of way marker locations shall be determined under the direction of a Land Surveyor from a closed traverse or GPS network which is included in the contract control plan and in accordance with Federal Geographic Data Committee (FGCC) C2-II, Second-Order, Class II (1 part in 20,000) accuracy, ensuring a local accuracy of 0.065 ft as described in the Department's *Land Surveying Standards and Procedures Manual*.

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The Contractor shall install right of way markers at the station/offset positions specified on the vested Right of Way Acquisition Maps in accordance with the Standard Sheets to within an absolute positional tolerance of 0.065 ft relative to the primary project control network.

The Land Surveyor shall certify the as-built location of each installed right of way marker on certification forms provided by the Engineer, including contract information, and control line station and offset (proposed and as-built) to the marker. The record location of all right of way markers shall be recorded to the nearest 0.01 ft and reflect as-built coordinates from a closed traverse or GPS network which is included in the contract control plan and in accordance with FGCC C2-II, Second-Order, Class II (1 part in 20,000) accuracy.

Prior to placing the cap on a steel pin right of way marker, the cap shall be filled 2/3 full of silicone sealant and then fastened to the bar by threading or by force fit. During the driving operation for the steel pin right of way marker, the lettering on the cap shall be protected by the use of a metal sleeve or cushion block. The marker shall be driven so that the cap is flush with the ground surface.

625-3.04 Permanent Survey Markers.

The Contractor shall install permanent survey markers in accordance with the standard sheet at locations described in the contract documents and approved by the Engineer prior to installation. The Engineer will provide the Contractor with the sequential numbering required on the permanent survey marker caps in coordination with the Regional Land Surveyor.

The Contractor shall provide the as-built location of each installed permanent survey marker on certification forms provided by the Engineer, including contract information, as-built NYSPCS values, control line and centerline station and offset to the marker, distance and direction to adjacent markers, the elevation of the marker, and a sketch which shows the relative positions to the control line points, four physical ties to the markers, and a north arrow. The certification form shall be sealed and signed by a licensed Land Surveyor. The record location of all permanent survey markers shall be recorded to the nearest 0.01 ft and reflect as-built coordinates from a closed traverse or GPS network which is included in the contract control plan and in accordance with FGCC C2-II, Second-Order, Class II (1 part in 20,000) accuracy as described in the Department's "*Land Surveying Standards and Procedures Manual*."

625-3.05 Supplemental Site Survey.

The Contractor shall perform supplemental site survey work in accordance with §625-3.01 *General* and §625-3.02. *Survey Operations*. The limits of the survey and mapping and the need for property line or right of way determination shall be as described in the Special Note entitled *Supplemental Site Survey Requirements*. Changes to the contract established limits by the Engineer shall be considered changes to the scope of work. The work shall include:

1. The Engineer shall determine what level of detailed information may need to be added to the Contract Control Plan for a supplemental site survey. Significant additional requirements will be considered extra work.
2. For new locations, a minimum of 3 inter-visible horizontal control points and 2 benchmarks shall be set at each site.
3. All survey control and terrain data collection shall be performed in accordance with the standards and procedures required in the Department's *Land Surveying Standards and Procedures Manual*.
4. Survey shall include all readily identifiable surface and subsurface utilities, including, but not limited to drainage, sanitary, water supply, gas, electric and telephone. The Contractor shall contact the appropriate one call center to identify all underground utilities so they can be marked in the field at each site prior to survey.
5. If property or right of way markers are found inside of or within 30 ft of the survey limits, they shall be located and described as part of the survey.
6. For traffic signal intersection work, elevations of above-ground utilities at the poles and at sag points shall be provided for primary and secondary electric lines, telephone lines and cable television lines. Utility poles shall be identified, including pole numbers. The next pole by number, and next manhole or valve. Sign inventory shall include only a type designation (e.g. stop sign, no parking sign, etc.) without MUTCD code, or a brief description of a private sign.
7. For underground utility surveys, the horizontal positions and vertical elevations of all exposed public and private utilities within the described limits shall be located, mapped and appropriately identified by the

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Contractor according to the utility's identification. Horizontal positions and vertical elevations shall be determined from project control to within 2 inches of its absolute location. Linear utilities shall be located at all bend or angle points, junctions or termini, and at a spacing of no more than 50 feet.

8. Copies of original survey field data, tie diagrams, and control diagrams shall be provided in Department accepted formats.

9. All terrain mapping deliverables (DGN & DTM) shall conform to the requirements included in Chapter 20 and 22 of the Department's *Highway Design Manual*.

10. File naming convention shall conform to standards listed in Appendix 14 of the Department's *Project Development Manual*.

625-3.06 GPS Inspection Units.

The Contractor shall furnish, configure, install, maintain and remove the GPS units, and provide the Engineer and/or their representatives with training on the operation of the GPS units. The Contractor shall ensure all GPS units are fully operational and training has been provided before construction begins.

All projects shall utilize the NYS CORS as the spatial reference datum network from which RTK corrections are derived. The Contractor shall choose which communication technique and devices will be used which will insure the consistent and reliable delivery of RTK correctional data from the NYS CORS to the GPS units. When geographic location or lack of a reliable communications network prohibits the use of the NYS CORS, the Engineer may approve the use of a Survey Grade GPS Inspection unit as a base station in place of the NYS CORS, which will be paid for separately. The Contractor shall semi-permanently mount the base station in a stable and secure location where it shall not be disturbed by construction activities nor be easily damaged by vandalism and where it shall be capable of providing radio signal coverage over the entire contract area. If the base station cannot broadcast a signal that covers the entire site, the Contractor shall provide adequate repeater radios or other communications. A GPS unit installed as a base station for inspection operations shall only be moved with the approval of the Engineer.

The GPS units shall be maintained and remain in service until either: (a) a maximum of one week after the Engineer requests its removal in writing, or (b) the State relinquishes the Engineer's Field Office. The Contractor shall maintain all GPS units and software in good working condition and shall provide replacement due to breakdown, damage, or theft within 2 work days. The Contractor shall retain ownership of all supplied GPS units at the end of the contract.

A. GPS Training Provisions.

1. For all GPS units, the Engineer and/or their representatives shall be provided with a minimum of one 8 hour training session for GPS localization/calibration of the contract site.
2. For all Survey Grade GPS units, the Engineer and/or their representatives shall be provided with a minimum of two separate 8 hour minimum training sessions on the use and operation of the GPS units during the first year of the contract. One of these two sessions shall occur within one week of delivery of GPS units to the site. The second of the two classes shall occur upon the request of the Engineer. One additional 8 hour minimum training session shall be provided during each additional contract year that the GPS units are in service.
3. For all Mapping Grade GPS units, the Engineer and/or their representatives shall be provided with a minimum of one training session during the first year of the contract, being at least 8 hours in length, and to occur within one week of delivery of GPS units to the site. This training shall be separate from the Survey Grade GPS Unit training.
4. All training shall be performed by a manufacturer-verified trainer who is approved by the Engineer. The training shall occur at the Engineer's Field Office or at a location agreed to by the Engineer.

625-4 METHOD OF MEASUREMENT

625-4.01 General. (Vacant)

625-4.02 Survey Operations. This work will be measured on a lump sum basis.

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625-4.03 Right of Way Markers. The quantity to be measured for payment will be the number of right of way markers installed.

625-4.04 Permanent Survey Markers. The quantity to be measured for payment will be the number of permanent survey markers installed.

625-4.05 Supplemental Site Survey. This work will be measured on a lump sum basis for each site location.

625-4.06 GPS Inspection Units. The quantity to be measured for payment will be the number of GPS Inspection units provided.

625-5 BASIS OF PAYMENT

625-5.01 General. (Vacant)

625-5.02 Survey Operations. The price bid shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including preparation of the contract control plan. Progress payments will be made in proportion to the amount of work completed.

625-5.03 Right of Way Markers. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. Payment will be made after the complete and proper installation of the marker, receipt of the certification form by the Engineer, and after approval of the certification by the Regional Land Surveyor.

625-5.04 Permanent Survey Markers. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. Payment will be made after the complete and proper installation of the marker, receipt of the certification form by the Engineer, and after approval of the certification by the Regional Land Surveyor.

625-5.05 Supplemental Site Survey. The price bid shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work. Payment will be made upon the satisfactory submission of the completed and certified mapping deliverables. Substantive additions to the work limits described in the contract will be considered extra work.

625-5.06 GPS Inspection Units. The unit price bid shall include the cost of labor, materials and equipment necessary to satisfactorily complete the work, including the cost of the required training and necessary maintenance.

Payment will be made under:

Item No.	Item	Pay Unit
625.01	Survey Operations	Lump Sum
625.03	Concrete Right of Way Markers Type H (High)	Each
625.04	Concrete Right of Way Markers Type L (Low)	Each
625.05	Steel Pin and Cap Right of Way Markers	Each
625.06	Permanent Survey Markers	Each
625.07nnnn	Supplemental Site Survey	Lump Sum
625.11nnnn	Survey Grade GPS Inspection Unit	Each
625.12nnnn	Mapping Grade GPS Inspection Unit	Each

ENGINEER'S FIELD OFFICE, LABORATORY AND EQUIPMENT
Delete Digital Camera and CHAMP Management System

Make the following changes to Section 637 of the Standard Specifications of 2008:

Page 622 to Page 639, *Delete* §637-1.07, §637-2.07, §637-3.07, §637-4.07 and §637-5.07 and *Replace* them with the following:

637-1.07 (Vacant).

637-2.07 (Vacant).

637-3.07 (Vacant).

637-4.07 (Vacant).

637-5.07 (Vacant).

Page 622 to Page 639, *Delete* §637-1.13, §637-2.13, §637-3.13, §637-4.13 and §637-5.13 and *Replace* them with the following:

637-1.13 (Vacant).

637-2.13 (Vacant).

637-3.13 (Vacant).

637-4.13 (Vacant).

637-5.13 (Vacant).

Delete the following from the contract pay items list:

637.10	CHAMP® Management System	Dollars-Cents
637.24	Digital Camera	Dollars-Cents