Proposition Description:

Bridge Rehabilitation at Various Locations Throughout the Greater Capital Region.

Letting of 4/26/2012 @ 10:30 A.M.

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

Book 2 of 4
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/contractors-repository/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-notices. 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 with the Company Name, Street Address, Federal Identification Number, Project Number and Project Description 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.
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

ACCELERATED BRIDGE PROGRAM
PHASE II, CONTRACT 2
LOCATIONS: VARIOUS
COUNTIES: ALBANY, GREENE & RENSSELAER
PIN: SABP02
D262026

PROJECT LOCATION
REFER TO PROJECT LOCATION MAPS FOR PROJECT LOCATIONS.

APPROVED BY
Mary A. Bridg 3/5/12
REGIONAL DESIGN ENGINEER DATE

RECOMMENDED BY
John E. Hacks 3/5/12
REGIONAL CONSTRUCTION ENGINEER DATE

REGIONAL DIRECTOR OF OPERATIONS
DATE

REGIONAL TRAFFIC ENGINEER
DATE

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

APPROVED BY
Mary A. Bridg 3/5/12
REGIONAL DIRECTOR DATE

THE LATEST REVISIONS OF THE STANDARD SHEETS MAINTAINED BY THE DEPARTMENT, WHICH ARE CURRENT ON THE DATE OF ADVERTISEMENT FOR BIDS, SHALL BE CONSIDERED TO BE IN EFFECT. ALL PAY ITEMS AND WORK CONTAINED IN THE CONTRACT AND ANY ADDITIONAL PAY ITEMS AND WORK ENCOUNTERED DURING THE COURSE OF THE CONTRACT SHALL BE SUBJECT TO THE APPLICABLE STANDARD SHEETS UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

ALL WORK CONTEMPLATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY WITH THE STANDARD SPECIFICATIONS (US CUSTOMARY) OF MAY 1, 2008, EXCEPT AS MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL.
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

ACCELERATED BRIDGE PROGRAM
PHASE 1A, CONTRACT 2
LOCATION: NYS RT. 162 OVER ABANDONED RAILROAD
COUNTIES: MONTGOMERY
PIN SABP.02
D262026

PROJECT LOCATION
REFER TO PROJECT LOCATION MAP FOR PROJECT LOCATION

RECOMMENDED BY:

REGIONAL DESIGN ENGINEER
DATE 3/5/12

REGIONAL CONSTRUCTION ENGINEER
DATE 3/5/12

REGIONAL TRANSPORTATION MAINTENANCE ENGINEER
DATE 3/5/12

REGIONAL TRAFFIC ENGINEER
DATE 3/5/12

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

APPROVED:
REGIONAL DIRECTOR
DATE 3/5/12

THE LATEST REVISIONS OF THE STANDARD SHEETS MAINTAINED BY THE DEPARTMENT, WHICH ARE CURRENT ON THE DATE OF ADVERTISEMENT FOR BIDS, SHALL BE CONSIDERED TO BE IN EFFECT. ALL PAY ITEMS AND WORK CONTAINED IN THE CONTRACT AND ANY ADDITIONAL PAY ITEMS AND WORK ENCOUNTERED DURING THE COURSE OF THE CONTRACT SHALL BE SUBJECT TO THE APPLICABLE STANDARD SHEETS UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

ALL WORK CONTemplATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY WITH THE STANDARD SPECIFICATIONS (METRIC UNITS) OF MAY 1, 2006, EXCEPT AS MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL.
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

ACCELERATED BRIDGE PROGRAM
PHASE IA, CONTRACT 2
LOCATIONS: VARIOUS
COUNTY: COLUMBIA
PIN: SABP.02
D262026

PROJECT LOCATION

REFER TO PROJECT LOCATION MAPS FOR PROJECT LOCATIONS.

THE LATEST REVISIONS OF THE STANDARD SHEETS MAINTAINED BY THE DEPARTMENT, WHICH ARE CURRENT ON THE DATE OF ADVERTISEMENT FOR BIDS, SHALL BE CONSIDERED TO BE IN EFFECT, ALL PAY ITEMS AND WORK CONTAINED IN THE CONTRACT AND ANY ADDITIONAL PAY ITEMS AND WORK ENCOUNTERED DURING THE COURSE OF THE CONTRACT SHALL BE SUBJECT TO THE APPLICABLE STANDARD SHEETS UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

ALL WORK CONTemplated UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY WITH THE STANDARD SPECIFICATIONS US CUSTOMARY OF MAY 1, 2008, EXCEPT AS MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL.

RECOMMENDED BY,

Michael Aldrich
REGIONAL DESIGN ENGINEER
3/5/12

Barbara Haffner
REGIONAL CONSTRUCTION ENGINEER
3/5/12

Michael Cotton
REGIONAL DIRECTOR OF OPERATIONS
3/5/12

REGIONAL TRAFFIC ENGINEER
3/5/12

APPROVED BY

Michael Aldrich
REGIONAL DIRECTOR
3/5/12
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

ACCELERATED BRIDGE PROGRAM
PHASE 1A, CONTRACT 2
LOCATION: ROUTE 20 OVER FLY CREEK
SH 8081, TOWN OF ESPERANCE
COUNTY: SCHHERARIE
PIN S88102
D262026

PROJECT LOCATION
REFER TO PROJECT LOCATION MAP FOR PROJECT LOCATION

THE LATEST REVISIONS OF THE STANDARD SHEETS MAINTAINED BY THE DEPARTMENT, WHICH
ARE CURRENT ON THE DATE OF ADVERTISEMENT FOR BIDS, SHALL BE CONSIDERED TO BE IN
EFFECT, ALL PAY ITEMS AND WORK CONTAINED IN THE CONTRACT AND ANY ADDITIONAL PAY
ITEMS AND WORK ENCOUNTERED DURING THE COURSE OF THE CONTRACT SHALL BE SUBJECT TO
THE APPLICABLE STANDARD SHEETS UNLESS OTHERWISE SPECIFIED IN THE CONTRACT
DOCUMENTS.

ALL WORK CONTEMPLATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY
WITH THE STANDARD SPECIFICATIONS US CUSTOMARY OF MAY 1, 2008, EXCEPT AS
MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL.

RECOMMENDED BY

DATE

REGIONAL DESIGN ENGINEER

DATE

REGIONAL CONSTRUCTION ENGINEER

DATE

REGIONAL DIRECTOR OF OPERATIONS

DATE

REGIONAL TRAFFIC ENGINEER

DATE

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

APPROVED BY

DATE

REGIONAL DIRECTOR
## REQUIRED CONTRACT PROVISIONS

<table>
<thead>
<tr>
<th>Provision</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARRA Reporting &amp; Record Keeping Requirements</td>
<td></td>
</tr>
<tr>
<td>D/M/WBE Utilization</td>
<td></td>
</tr>
<tr>
<td>EEO Goals</td>
<td></td>
</tr>
<tr>
<td>D/M/WBE Goals</td>
<td></td>
</tr>
<tr>
<td>Form CONR 9k</td>
<td></td>
</tr>
<tr>
<td>Electronic Bidding</td>
<td></td>
</tr>
<tr>
<td>Federal Aid Contract Provisions</td>
<td></td>
</tr>
<tr>
<td>Percentage Bid Items</td>
<td></td>
</tr>
<tr>
<td>List of Additional Insured</td>
<td></td>
</tr>
<tr>
<td>Railroad Insurance</td>
<td></td>
</tr>
<tr>
<td>New York State Uniform Contracting Questionnaire</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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

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 41 CFR 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 __10__% (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, 1st Floor South
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
www.empire.state.ny.us/Small_and_Growing_Businesses/mwbe.asp
The following information is available at the Office having jurisdiction for this project, as identified in the advertisement for bids, for inspection and review prior to the letting date. 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:

<table>
<thead>
<tr>
<th>INFORMATION</th>
<th>Hard Copy Only</th>
<th>CD/DVD</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asbestos Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Asbestos Blanket Variances</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>b. Asbestos Reports</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>2. CADD Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. MicroStation DGN</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>b. InRoads DTM and XML format</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>c. InRoads ALG and XML format</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>3. Cross Sections in ADOBE PDF format</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>4. Quantity Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Quantity Work-ups – All</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>b. Quantity Work-ups – Partial (specify)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>5. Record Plans</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>6. Rock Cores (available for inspection only)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>7. Sign Face Layouts in ADOBE PDF format</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>8. Stormwater Pollution Prevention Plan (SWPPP)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>9. Subsurface Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Subsurface Exploration Logs</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>b. Undisturbed Sample Logs</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>c. Laboratory Test Data from Soil Samples</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>d. Tabulated Results of Probing</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>e. Tabulated Depth to Bedrock</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>f. Rock Core Evaluation Logs</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>g. Compression Test Data from Rock Samples</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>h. Rock Outcrop Maps</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>i. Granular Materials Resource Survey Reports</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>j. Terrain Reconnaissance Reports</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>10. Subsurface Information - Other Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Subsurface information from outside sources</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>b. Source Information - Granular Material and aggregates</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>c. Special Subsurface Reports</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>11. Anticipated Construction Schedule</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>12. Special Reports or Other Information:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Design Approval Document</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>b. Wetland Compensation Report</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>c. Survey Control Report</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>13. NWP #3 and section 401 of the Clean Water Act</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
</tbody>
</table>
Section 1. Summary: The New York State Department of Transportation (NYSDOT) uses Trns•port Expedite and Bid Express for electronic bidding. To see if internet bidding through Bid Express is available for a specific project, check New York’s web pages at https://www.bidx.com/main/index.html

Expedite allows bidders to receive electronic proposal bid item information from the Department’s internet web site and to produce both an electronic and a paper-based bid. Bidders need to enter unit prices only, all other information is supplied by the software. 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, and has import/export capability for use with database and spreadsheet systems. Benefits may include:

A. Instant entry of item data. Bid data import in seconds and users of computer systems that collect item data need not spend hours constructing bid files from "item libraries."
B. Automated calculations and error-checking. 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. This greatly reduces errors in calculation and reasoning.
C. Electronic amendments. Amended item bid data is downloaded and applied to bids, with automatic recognition of changes.
D. Faster delivery of item bid data. Electronic files of item bid data will be posted to the NYSDOT website to coincide with advertising and contract proposal sale dates. Amended item bid data will be posted as soon as it is available.
E. Faster processing of contract documents and verification of bid results. The Department processes electronic bids much faster then handwritten bids.

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:

A. Real-time bid submittal from any location
B. No worries about driving bids to Albany or mail services arriving after the deadline. Contractors who use Bid Express do not have to submit hard copies of any documents in advance of the letting.
C. 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
D. As data accumulates, the ability to search & analyze bids on prior contracts for specific work items, by specific competitors, etc.
E. Ability to solicit and receive quotes from subcontractors

For additional information and downloads, please visit the NYSDOT and Bid Express websites: https://www.nysdot.gov/bids-and-lettings/construction-contractors/electronic-bid-system https://www.bidx.com/main/index.html

Section 2. Participation and Relationship to Paper 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. Contractors who use Bid Express should not
submit a hard copy paper bid. If NYSDOT receives both a Bid Express internet bid and a hard copy printed bid from the same contractor, the Bid Express internet bid will prevail.

Bidders who do not use Bid Express are still encouraged to submit an electronic bid file on diskette or CD attached to their hard copy paper bid. NYSDOT will not accept electronic bids on diskette or CD without a hard copy paper bid. Expedite writes a matching date-time group in both the computer file and on every printed bid page as per Department specifications. This date-time helps verify that the electronic and printed files are consistent. If there is any discrepancy between an electronic file submitted on diskette or CD and the hard copy paper bid, the paper bid will prevail.

Section 3. Third-party software. The Department endorses no particular product but expects all such vendors and individuals to voluntarily keep pace with changes in Department specifications.

Section 4. Proposal Notes and Changes By Amendment: Contractors are solely responsible for recognizing and properly responding to any and all special notes and circumstances printed in the contract proposal and any and all changes by amendment from the amendment documents and/or notices communicated to them by the Department’s Plan Sales Unit.

If an amendment involves changes to item bid data, an amended Expedite file will be posted to the Department’s website and to the Bid Express website, and this file must be applied to your electronic bid. If there is any discrepancy in the itemized proposals published in hard copy 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. Do not bid without carefully reviewing the printed proposal and any and all changes by amendment. Proposal notes and circumstances include, but are not limited to, printed information on alternate, fixed and/or limited cost items and/or special circumstances regarding item placement and use.

Section 5. Tips and Precautions: All electronic bidders should:

A. Allow at least five business days to obtain a digital ID and password for internet bidding through Bid Express
B. Follow the procedures in NYSDOT’s “Expedite BID Instructions”, which are posted on the NYSDOT website at http://www.dot.state.ny.us/cmb/contract/ebs/ebshome.html
   The Expedite downloads & demos and the software Help messages are also useful.
C. Enter the Agency as NYSDOT.
D. Use the appropriate Federal-ID and firm name. Federal-ID must be in the format 12-3456789. If possible, joint ventures should create and save a new Expedite export configuration with the Federal-ID and legal name assigned to the joint venture. Alternatively, use the Federal-ID and name of the joint venture partner with the largest financial commitment or managing role in cases of 50/50 financial commitments.
E. Enter days for the B portion(s) of A + B bids on the Proposal Sites folder (if applicable).
F. Enter the required info in the JURAT and Disclosure of Lobbying Activity folders if submitting bid through Bid Express.

G. Enter the required info in the Bid Bond folder if submitting bid through Bid Express and click Verify to verify the bid bond.

H. 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.

I. If you submit your electronic bid file on a CD or diskette attached to your paper bid, include only one file per bid. The diskette or CD must be labeled with the following information:
   1) Firm name
   2) Letting date
   3) D number
   4) A statement as to whether the paper bid does or does not include any handwritten changes from the electronic bid file.

Import, export and print files as per the instructions. Maintain consistent date-time groups. Never mix partial printouts with differing date-time groups or create electronic or print files in independent efforts that cause different date-time groups. Mismatched date-time groups indicate files of a different age and origin and invalidate the electronic portion of your bid.

Section 6. Additional Information and Assistance: For assistance with...

A. Bid Express – Contact the Bid Express Help Desk at (352) 381-4888

B. NYSDOT electronic bidding specifications, Expedite software, Department website problems and general concerns - Contact the NYSDOT Information Services Bureau Help Desk, at 888-664-9343 or 518-485-8111.

C. Third-party Software - Contact the author or vendor of your software. The Department is neither authorized nor able to assist you with the mechanics of a particular software package.

Last Update: February 19, 2009
REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. 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.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

   Section I, paragraph 2;
   Section IV, paragraphs 1, 2, 3, 4, and 7;
   Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 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 DOL, or the contractor's employees or their representatives.

6. Selection of Labor: During the performance of this contract, the contractor shall not:

   a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment , or

   b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

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 and 41 CFR 60) 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 this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American 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 State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

   b. The contractor will accept as his 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 SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO 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
required contract provisions federal-aid construction contracts

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 minority group employees.

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 minority groups 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 minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group 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, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such agreements have the effect of discriminating against minorities or women within the unions, and to effect referrals by such unions of minority and female employees. Actions to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth above.

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 minority group and women employees and applicants for employment.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. 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 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 his 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 his avenues of appeal.
unions and increasing the skills of minority group employees and
women so that they may qualify for higher paying employment.

b. The contractor will use best 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 SHA 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 minority and women 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 minority group persons and women. (The DOL
has held that it shall be no excuse that the union with which the
contractor has a collective bargaining agreement providing for
exclusive referral failed to refer minority employees.) 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 SHA.

8. 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.

a. The contractor shall notify all potential subcontractors and
suppliers of his/her EEO obligations under this contract.

b. Disadvantaged business enterprises (DBE), as defined in 49 CFR
23, shall have equal opportunity to compete for and perform
subcontracts which the contractor enters into pursuant to this
contract. The contractor will use his best efforts to solicit bids from
and to utilize DBE subcontractors or subcontractors with
meaningful minority group and female representation among their
employees. Contractors shall obtain lists of DBE construction firms
from SHA personnel.

c. The contractor will use his best efforts to ensure subcontractor
compliance with their EEO obligations.

9. 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
completion of the contract work and shall be available at reasonable
times and places for inspection by authorized representatives of the
SHA and the FHWA.

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

i. The number of minority and non-minority group members
and women employed in each work classification on the project;

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

iii. The progress and efforts being made in locating, hiring,
training, qualifying, and upgrading minority and female employees;
and

iv. The progress and efforts being made in securing the
services of DBE subcontractors or subcontractors with meaningful
minority and female representation among their employees.

b. The contractors will submit an annual report to the SHA 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. If on-the
job training is being required by special provision, the contractor
will be required to collect and report training data.

III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all
related subcontracts of $10,000 or more.)

a. By submission of this bid, the execution of this contract or
subcontract, or the consummation of this material supply agreement
or purchase order, as appropriate, the bidder, Federal-aid
construction contractor, subcontractor, material supplier, or vendor,
as appropriate, certifies that the firm does not maintain or provide
for its employees any segregated facilities at any of its
establishments, and that the firm does not permit its employees to
perform their services at any location, under its control, where
segregated facilities are maintained. The firm agrees that a breach
of this certification is a violation of the EEO provisions of this
contract. The firm further certifies that no employee will be denied
access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities"
means any waiting rooms, work areas, restrooms and washrooms,
restaurants and other eating areas, timeclocks, locker rooms, and
other storage or dressing areas, parking lots, drinking fountains,
recreation or entertainment areas, transportation, and housing
facilities provided for employees which are segregated by explicit
directive, or are, in fact, segregated on the basis of race, color,
religion, national origin, age or disability, because of habit, local
custom, or otherwise. The only exception will be for the disabled
when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical
certification from proposed subcontractors or material suppliers
prior to award of subcontracts or consummation of material supply
agreements of $10,000 or more and that it will retain such
certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding
$2,000 and to all related subcontracts, except for projects located on
roadways classified as local roads or rural minor collectors, which
are exempt.)
1. General:

a. All mechanics and laborers 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 (29 CFR 3) issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c)] the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) 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. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, 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 paragraphs 4 and 5 of this Section IV.

b. 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.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

Classification:

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

i. the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

ii. the additional classification is utilized in the area by the construction industry;

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

iv. with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification 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 DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour 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.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional 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. Said Administrator, or an authorized representative, will issue a determination 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.

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. Payment of Fringe Benefits:

a. 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 or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a 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.

4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:
a. Apprentices:

i. Apprentices will be permitted to work at less than the predetermined rate for the work performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/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 Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

ii. The allowable ratio of apprentices to journeyman-level employees 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 employee 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 listed in 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 or subcontractor 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-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

iii. 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 journeyman-level 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 for the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

iv. In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor 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. Helpers:

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under a approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. 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.

6. Withholding:

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor 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, as 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 SHA contracting officer 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.

7. Overtime Requirements:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. Violation:

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her 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, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of $10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. Withholding for Unpaid Wages and Liquidated Damages:

The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies 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 8 above.

V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. Compliance with Copeland Regulations (29 CFR 3):

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. Payrolls and Payroll Records:

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof 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. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found 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 and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/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 maintained under paragraph 2b of this Section V and that such information is correct and complete;

ii. that such laboror 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 the Regulations, 29 CFR 3;

iii. that each laboror or mechanic has been paid not less that the applicable wage rate and fringe benefits or cash equivalent for the classification of worked performed, as specified in the applicable wage determination incorporated into the contract.

e. 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 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, 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 SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions 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.

VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than $1,000,000 (23 CFR 635) the contractor shall:

   a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.

   b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.

   c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

   2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

VII. SUBLETTING OR ASSIGNING THE CONTRACT

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 State. 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).

   a. "Its own organization" shall be construed to include only workers employed and paid directly 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, assignee, or agent of the prime contractor.

   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 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 VII 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 SHA 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 SHA 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 SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

VIII. SAFETY: ACCIDENT PREVENTION

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 SHA 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

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

IX. FALSE STATEMENTS CONCERNING HIGHWAY
PROJECTS

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
violation of Federal law. To prevent any misunderstanding
regarding the seriousness of these and similar acts, the following
notice 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:

NOTICE TO ALL PERSONNEL ENGAGED ON FEDERAL-
AID HIGHWAY PROJECTS

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

"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
quality 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 not more that $10,000 or imprisoned not more than 5
years or both."

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

(Applicable to all Federal-aid construction contracts and to all
related subcontracts of $100,000 or more.)

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

1. That any facility that is or will be utilized in the performance of
this contract, unless such contract is exempt under the Clean Air
Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-
604), and under the Federal Water Pollution Control Act, as
amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500),
Executive Order 11738, and regulations in implementation thereof
(40 CFR 15) is not listed, on the date of contract award, on the U.S.
Environmental Protection Agency (EPA) List of Violating Facilities
pursuant to 40 CFR 15.20.

2. That the firm agrees to comply and remain in compliance with
all the requirements of Section 114 of the Clean Air Act and
Section 308 of the Federal Water Pollution Control Act and all
regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of any
communication from the Director, Office of Federal Activities,
EPA, indicating that a facility that is or will be utilized for the
contract is under consideration to be listed on the EPA List of Violating Facilities.

4. That the firm agrees to include or cause to be included the
requirements of paragraph 1 through 4 of this Section X in every
nonexempt subcontract, and further agrees to take such action as the
government may direct as a means of enforcing such requirements.

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

1. Instructions for Certification - Primary Covered Transactions:
(Applicable to all Federal-aid contracts - 49 CFR 29)

   a. By signing and submitting this proposal, the prospective primary
      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 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 primary 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 department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary 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," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary 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 primary 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 Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. 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.

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.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Primary Covered Transactions

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement 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;

c. 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 1b of this certification; and

d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2. Where the prospective primary 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 Covered Transactions:

(Applicable to all subcontracts, purchase orders and other lower tier transactions of $25,000 or more - 49 CFR 29)

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," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

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.

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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

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 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 Covered Transactions:

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 participation in this transaction 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.

** * * * *

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(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, 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, 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 his or her bid or proposal that he or she 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

The following is a list of additional insured parties for which the Contractor must provide coverage.

1. State of New York
2. New York State Department of Transportation
3. Counties of Albany, Columbia, Greene, Montgomery, Rensselaer & Schoharie
4. Cities of Rensselaer, Troy & Watervliet
5. Towns of Ashland, Claverack, Esperance, New Lebanon, Petersburgh, Root, Schodack & Stephentown
6. Public Utilities (e.g. National Grid, Time Warner Cable, Verizon, etc.) whose property is occupied or facilities are affected by the work.

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.
REVISIONS TO STANDARD SPECIFICATIONS
AND OTHER VARIANCES

Variances

Asphalt and Fuel Price Adjustment

NOTE: This form was developed for repetitive use throughout all contract proposals and may identify items not applicable to this specific project.
Make the following change to the Standard Specifications of May 1, 2008:
(Issued with Prop Makeup for 2008)

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, 15, 15, 15, 20, 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.”
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 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 form 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

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:

<table>
<thead>
<tr>
<th>Sampler Diameter (Inches)</th>
<th>Outside Diameter (Inches)</th>
<th>Cutting Shoe Opening (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1½</td>
</tr>
<tr>
<td>2½</td>
<td>2½</td>
<td>1⅜</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>2⅜</td>
</tr>
<tr>
<td>3½</td>
<td>3½</td>
<td>2⅘</td>
</tr>
</tbody>
</table>

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 ¼ inch) thickness or an approved equal material and conform to the overall box dimensions given below:

<table>
<thead>
<tr>
<th>Core Box Size</th>
<th>Length (Inches)</th>
<th>Width (Inches)</th>
<th>Height (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“AX”</td>
<td>61½</td>
<td>9⅝</td>
<td>2⅜</td>
</tr>
<tr>
<td>“BX”</td>
<td>61½</td>
<td>10⅛</td>
<td>3</td>
</tr>
<tr>
<td>“NX”</td>
<td>61½</td>
<td>10⅛</td>
<td>3⅜</td>
</tr>
<tr>
<td>“HX”</td>
<td>61½</td>
<td>11⅝</td>
<td>4⅛</td>
</tr>
</tbody>
</table>

Core rows shall be separated by wooden or tempered hardboard, ⅛ inch thick strips recessed to ⅝ 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.
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 645.8XYZZ 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 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 ±3%, Water ±1%”
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
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 Organization Chart below (e.g., Office of Engineering changed to Engineering Division, Design Division changed to Office of Design,...).
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.
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.
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 STANDARD CLAUSES FOR ALL NEW YORK STATE 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 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 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) Federal Employer Identification Number and/or Federal Social Security Number.
All invoices or New York State standard vouchers submitted for payment for the sale of goods or services or the lease of real or personal property to a New York State agency must include the payee's identification number, i.e., the seller's or lessor's identification number. The number is either the payee's Federal employer identification number or Federal social security number, or both such numbers when the payee has both such numbers. Failure to include this number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or New York State standard voucher, 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 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 New York State's Central Accounting System by the Director of Accounting Operations, 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, 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:

(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, 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 Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State; or (iii) banking services, insurance policies or the sale of securities. 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 NYS Empire State Development Corporation, Division of Minority- and Women-Owned 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 subsection, the terms of this subsection 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 Section 165 State Finance Law. Any such use must 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 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 are not applicable to Federal-Aid contracts.

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 (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.
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.
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: curbline, 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
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.
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.
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.
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.
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-
INSURANCE

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.
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
INSURANCE

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.
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.
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.
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.
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”.

01420=2008:203 L05/06/10
EXCAVATION AND EMBANKMENT

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.”
EXCAVATION AND EMBANKMENT

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 697, 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
EXCAVATION AND EMBANKMENT

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.
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.
EXCAVATION AND EMBANKMENT

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
EXCAVATION AND EMBANKMENT

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.
**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
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.

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.
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:

\[
SD = \frac{D}{\sqrt{E_{\text{max}}}}
\]

where:

- \( SD \) = Scaled Distance
- \( D \) = Distance from blasting area to nearest structure to be protected in feet

\[ E_{\text{max}} \] is the maximum particle velocity of 2 in./s.
or

\[
E_{\text{max}} = \frac{D^2}{(SD)^2}
\]

where: \(E_{\text{max}}\) = 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.
EXCAVATION AND EMBANKMENT

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.
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>
<thead>
<tr>
<th>TABLE 203-1 PNEUMATIC-TIRED COMPACTOR CLASSIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic</td>
</tr>
<tr>
<td>-----------</td>
</tr>
</tbody>
</table>

01420=2008:203  Page 13 of 24  EI 09-024  L05/06/10
**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.

---

**FIGURE 203-1 PNEUMATIC-TIRED COMPACTORS**

For letter class data, see Table 203-1
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:

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

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:

\[
\text{Speed } X = \frac{(\text{Specified Speed}) \times (\text{Min. Passes at Speed } X)}{(\text{Specified Min. Passes})}
\]

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.
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
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
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.

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.
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.
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.
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 pre-split 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.
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:

<table>
<thead>
<tr>
<th>Distributor Capacity</th>
<th>Pressure Distributor per Calendar Day Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000 gal. &lt; distributor capacity &lt; 5,000 gal.</td>
<td>p.d.d.’s will be multiplied by 1.5</td>
</tr>
<tr>
<td>5,000 gal. ≤ distributor capacity</td>
<td>p.d.d.’s will be multiplied by 2.0</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>203.02</td>
<td>Unclassified Excavation and Disposal</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.03</td>
<td>Embankment In Place</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Unit</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>203.05</td>
<td>Select Borrow</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.06</td>
<td>Select Fill</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.07</td>
<td>Select Granular Fill</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.0801</td>
<td>Select Granular Fill, Slope Protection - Type A</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.0802</td>
<td>Select Granular Fill, Slope Protection - Type B</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.10</td>
<td>Surface Settlement Gauges</td>
<td>Each</td>
</tr>
<tr>
<td>203.12</td>
<td>Settlement Rods</td>
<td>Each</td>
</tr>
<tr>
<td>203.13</td>
<td>Piezometers</td>
<td>Each</td>
</tr>
<tr>
<td>203.1601</td>
<td>Applying Water</td>
<td>P.D.D.</td>
</tr>
<tr>
<td>203.20</td>
<td>Select Granular Subgrade</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.21</td>
<td>Select Structural Fill</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>203.25</td>
<td>Sand Backfill</td>
<td>Cubic Yards</td>
</tr>
</tbody>
</table>
CONTROLLED LOW STRENGTH MATERIAL

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

Page 176-178, Delete SECTION 204 entirely and Replace it with the following:

SECTION 204 - CONTROLLED LOW STRENGTH MATERIAL (CLSM)

204-1 DESCRIPTION. The work shall consist of mixing and placing Controlled Low Strength Material (CLSM) or Controlled Low Strength Material (CLSM) (No Fly Ash) at the locations shown in the contract documents.

204-2 MATERIALS.

204-2.01 Controlled Low Strength Material Requirements. Provide backfill material meeting the requirements of §733-01 Controlled Low Strength Material (CLSM).

204-3 CONSTRUCTION DETAILS.

204-3.01 Submit certification of a mix design for CLSM meeting the unconfined compressive strength requirements to the Engineer.

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.

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 2½ 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.

Narrower trench widths can be employed when using CLSM due to the self-compacting properties of the material. Construction personnel and equipment are not required to be in the trench for compaction operations. For installations that require that construction personnel temporarily occupy the trench, follow OSHA safety requirements for worker safety.

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 Cold Weather Curing regulations.

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.

Include in the CLSM placement sequence, a procedure to account for subsidence during the settling and curing process.

204-3.02 Fill and Backfill 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.

Keep CLSM encapsulated with soil, as it is highly erodible and disintegrates when left exposed to the environment.

In situations where CLSM is used as backfill around lightweight pipe, take precautions to counteract the pipe’s buoyancy.

204-4 METHOD OF MEASUREMENT. CLSM will be measured for payment in cubic yards measured to the
CONTROLLED LOW STRENGTH MATERIAL

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.

204-5 BASIS OF PAYMENT.

204-5.01 General. The unit price bid shall include the costs of furnishing all labor, material, and equipment necessary to satisfactorily complete the work, including work needed to counteract buoyancy.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>204.01</td>
<td>Controlled Low Strength Material (CLSM)</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>204.02</td>
<td>Controlled Low Strength Material (CLSM) (No Fly Ash)</td>
<td>Cubic Yard</td>
</tr>
</tbody>
</table>
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

601-1 DESCRIPTION. The work in this section shall include work required for architectural pavements and treatments.

601-2 MATERIALS. Materials shall be as specified in the special specifications.

601-3 CONSTRUCTION DETAILS. The extent of work and construction requirements will be covered by special specifications in the contract documents.

601-4 METHOD OF MEASUREMENT. As specified in the special specifications.

601-5 BASIS OF PAYMENT. As specified in the special specifications.”
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.”
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)”**
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:


      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
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 ¾ 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. from each end along a line 3 in. from the edge opposite the angle. The anchor angle shall also have three 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 ¼ in. nominal diameter, 5 ft. long, rock bolt assembly conforming to the requirements of §731-03 Rock Bolt Assembly.

Provide galvanized and Epoxy-coated 3/8 in. x 2 ½ in. throat by 4 ½ in. depth “U” bolts as shown in Detail’s C1 & C2 of the Standard Sheet 212-4 Chain Link Rock Catchment Fence with 1/8 in. thread length to clamp ¾ in. guide rail cables to No. 11 rebar posts.

G. Miscellaneous Appurtenances.

1. Thimbles. Provide galvanized thimbles for ¾ 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 ¾ 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
ROCK SLOPE REINFORCEMENT AND CATCHMENT SYSTEMS

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.


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 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 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.


2. Steel Rings. Provide 1 in. x 4 in. steel rings conforming to the requirements of Federal Specification RR-C71D Type VI.


4. Thimbles. Provide 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 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 1/12 in. minimum diameter steel tie wire.

2. Hog Rings. Provide 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 1/4 in. nominal diameter, 6 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.
ROCK SLOPE REINFORCEMENT AND CATCHMENT SYSTEMS

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.


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.
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
case shall the bolt hole diameter exceed the resin cartridge diameter by more than 3/8 in. Install the anchor angle within 90°± 15° 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°± 2° 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°± 5°) 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°± 5° 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 ¾ 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 ¾ 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.
ROCK SLOPE REINFORCEMENT AND CATCHMENT SYSTEMS

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

<table>
<thead>
<tr>
<th>Load</th>
<th>Observation Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>Minimum of 1 minute&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.25 P</td>
<td>Minimum of 1 minute&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.50 P</td>
<td>Minimum of 1 minute&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.75 P</td>
<td>Minimum of 1 minute&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>1.00 P</td>
<td>Minimum of 1 minute&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>1.25 P</td>
<td>Minimum of 1 minute&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>1.50 P</td>
<td>10 minutes (or 60 minutes depending on total movement&lt;sup&gt;3&lt;/sup&gt;)</td>
</tr>
</tbody>
</table>

<sup>1</sup>P = Design Load

<sup>2</sup>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.

<sup>3</sup>Hold each load increment, except for the 1.5 P load, until the deflection stabilizes.

<sup>3</sup>The 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
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 ¾ in. diameter guide rail cable horizontally across the top of the rock slope, secured by 1 ¼ 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 ¼ 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.
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 ¾ 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 ¾ 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 ½ 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
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:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>212.0106</td>
<td>Wire Rope Rock Catchment Fence (Medium Impact – 6 ft.)</td>
<td>Feet</td>
</tr>
<tr>
<td>212.0108</td>
<td>Wire Rope Rock Catchment Fence (Medium Impact – 8 ft.)</td>
<td>Feet</td>
</tr>
<tr>
<td>212.0110</td>
<td>Wire Rope Rock Catchment Fence (Medium Impact – 10 ft.)</td>
<td>Feet</td>
</tr>
<tr>
<td>212.0112</td>
<td>Wire Rope Rock Catchment Fence (Medium Impact – 12 ft.)</td>
<td>Feet</td>
</tr>
<tr>
<td>212.0201</td>
<td>Chain Link Rock Catchment Fence</td>
<td>Feet</td>
</tr>
<tr>
<td>212.0202</td>
<td>Vinyl Coated Chain Link Rock Catchment Fence</td>
<td>Feet</td>
</tr>
<tr>
<td>212.03</td>
<td>Wire Mesh Slope Protection</td>
<td>Square Feet</td>
</tr>
<tr>
<td>212.04</td>
<td>Wire Mesh Drape</td>
<td>Square Feet</td>
</tr>
<tr>
<td>212.0501</td>
<td>Temporary Rock Catchment Barrier (10 ft.)</td>
<td>Feet</td>
</tr>
<tr>
<td>212.0502</td>
<td>Move Temporary Rock Catchment Barrier (10 ft.)</td>
<td>Feet</td>
</tr>
</tbody>
</table>
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 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 applying 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:
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>304.11</td>
<td>Subbase Course, Type 1</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>304.12</td>
<td>Subbase Course, Type 2</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>304.13</td>
<td>Subbase Course, Type 3</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>304.14</td>
<td>Subbase Course, Type 4</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>304.15</td>
<td>Subbase Course, Optional Type</td>
<td>Cubic Yards</td>
</tr>
</tbody>
</table>
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.
### TABLE 401-1 COMPOSITION OF HOT MIX ASPHALT MIXTURES

<table>
<thead>
<tr>
<th>Screen Sizes</th>
<th>Permeable Base Type 1</th>
<th>Permeable Base Type 2</th>
<th>Shim Type 1</th>
<th>Shim Type 2</th>
<th>Shim Type 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Limits % Passing¹</td>
<td>Job Mix Tolerance %</td>
<td>General Limits % Passing¹</td>
<td>Job Mix Tolerance %</td>
<td>General Limits % Passing¹</td>
</tr>
<tr>
<td>2 in</td>
<td>100</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 1/2 in</td>
<td>95-100</td>
<td>-</td>
<td>75-100 ±7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 in</td>
<td>80-95 ±6</td>
<td>55-80 ±8</td>
<td>75-100 ±7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1/2 in</td>
<td>30-60 ±6</td>
<td>23-42 ±7</td>
<td>75-100 ±7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1/4 in</td>
<td>10-25 ±6</td>
<td>5-20 ±6</td>
<td>75-100 ±7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1/8 in</td>
<td>3-15 ±6</td>
<td>2-15 ±4</td>
<td>75-100 ±6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. 20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>32-72 ±7</td>
</tr>
<tr>
<td>No. 40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>18-52 ±7</td>
</tr>
<tr>
<td>No. 80</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7-26 ±4</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-4 ±2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2-12 ±2</td>
</tr>
<tr>
<td>Asphalt Content, %²³</td>
<td>2-0.4</td>
<td>NA</td>
<td>2.5-4.5</td>
<td>NA</td>
<td>7.0-9.5</td>
</tr>
<tr>
<td>Mixing and Compaction Temperature Range °F⁴</td>
<td>225-300</td>
<td>225-300</td>
<td>250-325</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
1. All aggregate percentages are based on the total weight of the aggregate.
2. 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.
3. 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.
4. Or as recommended by the PG binder manufacturer.

**A. Coarse Aggregate Type F1 Conditions.** Use one of the following types of coarse aggregate.

1. Limestone, dolomite or a blend of the two having an acid-insoluble residue content of not less than 20.0%.
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 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.
   b. 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.

1. Limestone, dolomite, or a blend of the two having an acid-insoluble residue content of not less than 20.0%.
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
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.
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.
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.
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>
<thead>
<tr>
<th>Nominal Compacted Lift Thickness</th>
<th>Surface Temperature Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1 in</td>
<td>50°F</td>
</tr>
<tr>
<td>1 in &lt; Thickness ≤ 3 in</td>
<td>45°F</td>
</tr>
<tr>
<td>&gt; 3 in</td>
<td>40°F</td>
</tr>
</tbody>
</table>

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
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.
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:

<table>
<thead>
<tr>
<th>Maximum Wheel Load</th>
<th>5,600 lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire Compression on Pavement</td>
<td>80±5 psi</td>
</tr>
<tr>
<td>Maximum Axle Load</td>
<td>22,400 lbs</td>
</tr>
</tbody>
</table>

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.
TABLE 402-3 MIXTURE SELECTION FOR T&L COURSE

<table>
<thead>
<tr>
<th>Compacted Thickness Range (in)</th>
<th>Mixture Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 2</td>
<td>9.5 or 12.5 Top Course</td>
</tr>
<tr>
<td>2 &lt; Thickness ≤ 3</td>
<td>19.0 or 25.0 Binder Course</td>
</tr>
<tr>
<td>3 &lt; Thickness ≤ 5</td>
<td>25.0 Binder Course or 37.5 Base Course</td>
</tr>
</tbody>
</table>

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
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 (MMDT).

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
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>
<thead>
<tr>
<th>Compaction Methods</th>
<th>Item Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=50 series</td>
<td>402.XX5FQR</td>
</tr>
<tr>
<td>B=60 series</td>
<td>402.XX6FQR</td>
</tr>
<tr>
<td>C=70 series</td>
<td>402.XX7FQR</td>
</tr>
<tr>
<td>D=80 series &amp; other</td>
<td>402.XX8FQR</td>
</tr>
</tbody>
</table>

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.
• 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 sublot 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 sublot. 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
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.
• 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>
<thead>
<tr>
<th>HMA Placement Days</th>
<th>Set of Pavement Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or Less</td>
<td>None</td>
</tr>
<tr>
<td>3 – 5</td>
<td>One Set</td>
</tr>
<tr>
<td>More than 5</td>
<td>Two Sets</td>
</tr>
</tbody>
</table>
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
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>
<thead>
<tr>
<th>Pavement Courses</th>
<th>Option 1 Three Roller Train (Static)</th>
<th>Option 2 Vibratory Rollers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steel Wheel Rollers</td>
<td>Pneumatic Roller</td>
</tr>
<tr>
<td>37.5 Base (Each Lift)</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>25.0 Binder</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>19.0 Binder</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>12.5 Top</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>9.5 Top</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Permeable Base²</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
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
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 sublot 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.
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 sublot’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
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 travel 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.
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:

- 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.
• 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>
<thead>
<tr>
<th>Method Type</th>
<th>Pay Item Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=50 series</td>
<td>402.XX5FQR</td>
<td>QAF based on calculated PWL using four cores.</td>
</tr>
<tr>
<td>B=60 series</td>
<td>402.XX6FQR</td>
<td>QAF based on average of four core densities.</td>
</tr>
</tbody>
</table>

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.
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**

<table>
<thead>
<tr>
<th>Percent Within Limits (PWL)</th>
<th>Quality Adjustment Factor (QAF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWL(_{92.97} &gt; 93)</td>
<td>1.05</td>
</tr>
<tr>
<td>(\sum (PWL_{\text{Segment}} \times \text{Pay Factor}_{\text{Segment}})) (\leq 93)</td>
<td></td>
</tr>
</tbody>
</table>

1. \(PWL_{\text{Segment}}\) 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**

<table>
<thead>
<tr>
<th>Density Segment</th>
<th>Segment Pay Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>88 – 89</td>
<td>0.60</td>
</tr>
<tr>
<td>89 – 90</td>
<td>0.70</td>
</tr>
<tr>
<td>90 – 91</td>
<td>0.80</td>
</tr>
<tr>
<td>91 – 92</td>
<td>0.90</td>
</tr>
<tr>
<td>92 – 93</td>
<td>1.00</td>
</tr>
<tr>
<td>93 – 96</td>
<td>1.05</td>
</tr>
<tr>
<td>96 – 97</td>
<td>1.00</td>
</tr>
<tr>
<td>97 – 98</td>
<td>0.90</td>
</tr>
<tr>
<td>98 – 99</td>
<td>0.80</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Average Core Density</th>
<th>Quality Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq 92) Density (\leq 97)</td>
<td>1.00</td>
</tr>
<tr>
<td>91.0 (\leq) Density (&lt; 92.0) or 97.0 (&lt;) Density (\leq 98.0)</td>
<td>0.95</td>
</tr>
<tr>
<td>90.0 (\leq) Density (&lt; 91.0)</td>
<td>0.90</td>
</tr>
<tr>
<td>88.0 (\leq) Density (&lt; 90.0)</td>
<td>0.85</td>
</tr>
<tr>
<td>Density (&lt; 88.0) or Density (&gt; 98.0)</td>
<td>0.60</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>402.010902</td>
<td>Type 1 F9, Asphalt-Treated Permeable Base Course</td>
<td>Ton</td>
</tr>
<tr>
<td>402.010912</td>
<td>Plant Production Quality Adjustment to 402.010902</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.011902</td>
<td>Type 2 F9, Asphalt-Treated Permeable Base Course</td>
<td>Ton</td>
</tr>
<tr>
<td>402.011912</td>
<td>Plant Production Quality Adjustment to 402.011902</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.017902</td>
<td>True &amp; Leveling F9, Superpave HMA, 70 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.017912</td>
<td>Plant Production Quality Adjustment to 402.017902</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.018902</td>
<td>True &amp; Leveling F9, Superpave HMA, 80 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.018912</td>
<td>Plant Production Quality Adjustment to 402.018902</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.058902</td>
<td>Shim Course F9, Hot Mix Asphalt</td>
<td>Ton</td>
</tr>
<tr>
<td>402.058912</td>
<td>Plant Production Quality Adjustment to 402.058902</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.095102</td>
<td>9.5 F1 Top Course HMA, 50 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.095112</td>
<td>Plant Production Quality Adjustment to 402.095102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.095122</td>
<td>Pavement Density Quality Adjustment to 402.095102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.095152</td>
<td>Test Section Adjustment to 402.095102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.095202</td>
<td>9.5 F2 Top Course HMA, 50 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.095212</td>
<td>Plant Production Quality Adjustment to 402.095202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.095222</td>
<td>Pavement Density Quality Adjustment to 402.095202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.095252</td>
<td>Test Section Adjustment to 402.095202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096102</td>
<td>9.5 F1 Top Course HMA, 60 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.096112</td>
<td>Plant Production Quality Adjustment to 402.096102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096122</td>
<td>Pavement Density Quality Adjustment to 402.096102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096152</td>
<td>Test Section Adjustment to 402.096102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096202</td>
<td>9.5 F2 Top Course HMA, 60 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.096212</td>
<td>Plant Production Quality Adjustment to 402.096202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096222</td>
<td>Pavement Density Quality Adjustment to 402.096202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096252</td>
<td>Test Section Adjustment to 402.096202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096302</td>
<td>9.5 F3 Top Course HMA, 60 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.096312</td>
<td>Plant Production Quality Adjustment to 402.096302</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096322</td>
<td>Pavement Density Quality Adjustment to 402.096302</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.096352</td>
<td>Test Section Adjustment to 402.096302</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.097102</td>
<td>9.5 F1 Top Course HMA, 70 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.097112</td>
<td>Plant Production Quality Adjustment to 402.097102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.097202</td>
<td>9.5 F2 Top Course HMA, 70 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.097212</td>
<td>Plant Production Quality Adjustment to 402.097202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.097302</td>
<td>9.5 F3 Top Course HMA, 70 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.097312</td>
<td>Plant Production Quality Adjustment to 402.097302</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.098102</td>
<td>9.5 F1 Top Course HMA, 80 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.098112</td>
<td>Plant Production Quality Adjustment to 402.098102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.098202</td>
<td>9.5 F2 Top Course HMA, 80 Series Compaction</td>
<td>Ton</td>
</tr>
<tr>
<td>402.098212</td>
<td>Plant Production Quality Adjustment to 402.098202</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>402.098302</td>
<td>9.5 F3 Top Course HMA, 80 Series Compaction</td>
<td>Ton</td>
</tr>
</tbody>
</table>
SECTION 402 - HOT MIX ASPHALT (HMA) PAVEMENTS

0402.098312  Plant Production Quality Adjustment to 0402.098302  Quality Unit
0402.098902  9.5 F9 Top Course HMA, Shoulder Course, 80 Series Compaction  Ton
0402.098912  Plant Production Quality Adjustment to 0402.098902  Quality Unit
0402.125102  12.5 F1 Top Course HMA, 50 Series Compaction  Ton
0402.125112  Plant Production Quality Adjustment to 0402.125102  Quality Unit
0402.125122  Pavement Density Quality Adjustment to 0402.125102  Quality Unit
0402.125152  Test Section Adjustment to 0402.125102  Quality Unit
0402.125202  12.5 F2 Top Course HMA, 50 Series Compaction  Ton
0402.125212  Plant Production Quality Adjustment to 0402.125202  Quality Unit
0402.125222  Pavement Density Quality Adjustment to 0402.125202  Quality Unit
0402.125252  Test Section Adjustment to 0402.125202  Quality Unit
0402.125302  12.5 F3 Top Course HMA, 50 Series Compaction  Ton
0402.125312  Plant Production Quality Adjustment to 0402.125302  Quality Unit
0402.125322  Pavement Density Quality Adjustment to 0402.125302  Quality Unit
0402.125352  Test Section Adjustment to 0402.125302  Quality Unit
0402.126102  12.5 F1 Top Course HMA, 60 Series Compaction  Ton
0402.126112  Plant Production Quality Adjustment to 0402.126102  Quality Unit
0402.126122  Pavement Density Quality Adjustment to 0402.126102  Quality Unit
0402.126152  Test Section Adjustment to 0402.126102  Quality Unit
0402.126202  12.5 F2 Top Course HMA, 60 Series Compaction  Ton
0402.126212  Plant Production Quality Adjustment to 0402.126202  Quality Unit
0402.126222  Pavement Density Quality Adjustment to 0402.126202  Quality Unit
0402.126252  Test Section Adjustment to 0402.126202  Quality Unit
0402.126302  12.5 F3 Top Course HMA, 60 Series Compaction  Ton
0402.126312  Plant Production Quality Adjustment to 0402.126302  Quality Unit
0402.126322  Pavement Density Quality Adjustment to 0402.126302  Quality Unit
0402.126352  Test Section Adjustment to 0402.126302  Quality Unit
0402.127102  12.5 F1 Top Course HMA, 70 Series Compaction  Ton
0402.127112  Plant Production Quality Adjustment to 0402.127102  Quality Unit
0402.127202  12.5 F2 Top Course HMA, 70 Series Compaction  Ton
0402.127212  Plant Production Quality Adjustment to 0402.127202  Quality Unit
0402.127302  12.5 F3 Top Course HMA, 70 Series Compaction  Ton
0402.127312  Plant Production Quality Adjustment to 0402.127302  Quality Unit
0402.128102  12.5 F1 Top Course HMA, 80 Series Compaction  Ton
0402.128112  Plant Production Quality Adjustment to 0402.128102  Quality Unit
0402.128122  Pavement Density Quality Adjustment to 0402.128102  Quality Unit
0402.128202  12.5 F2 Top Course HMA, 80 Series Compaction  Ton
0402.128212  Plant Production Quality Adjustment to 0402.128202  Quality Unit
0402.128302  12.5 F3 Top Course HMA, 80 Series Compaction  Ton
0402.128312  Plant Production Quality Adjustment to 0402.128302  Quality Unit
0402.128902  12.5 F9 Top Course HMA, Shoulder Course, 80 Series Compaction  Ton
0402.128912  Plant Production Quality Adjustment to 0402.128902  Quality Unit
0402.195902  19 F9 Binder Course HMA, 50 Series Compaction  Ton
0402.195912  Plant Production Quality Adjustment to 0402.195902  Quality Unit
0402.195922  Pavement Density Quality Adjustment to 0402.195902  Quality Unit
0402.195952  Test Section Adjustment to 0402.195902  Quality Unit
0402.196902  19 F9 Binder Course HMA, 60 Series Compaction  Ton
0402.196912  Plant Production Quality Adjustment to 0402.196902  Quality Unit
0402.196922  Pavement Density Quality Adjustment to 0402.196902  Quality Unit
0402.196952  Test Section Adjustment to 0402.196902  Quality Unit
0402.197902  19 F9 Binder Course HMA, 70 Series Compaction  Ton
0402.197912  Plant Production Quality Adjustment to 0402.197902  Quality Unit
0402.198902  19 F9 Binder Course HMA, 80 Series Compaction  Ton
0402.198912  Plant Production Quality Adjustment to 0402.198902  Quality Unit
0402.255902  25 F9 Binder Course HMA, 50 Series Compaction  Ton
0402.255912  Plant Production Quality Adjustment to 0402.255902  Quality Unit
0402.255922  Pavement Density Quality Adjustment to 0402.255902  Quality Unit
### Mix Type – XX

<table>
<thead>
<tr>
<th>Mix Type – XX</th>
<th>Compaction Series - Y</th>
<th>Friction - Z</th>
<th>Quality Adjustment - Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5 Top - 09</td>
<td>50 series - 5</td>
<td>F1 - 1</td>
<td>HMA Item - 0</td>
</tr>
<tr>
<td>12.5 Top - 12</td>
<td>60 Series - 6</td>
<td>F2 - 2</td>
<td>Plant – 1</td>
</tr>
<tr>
<td>19.0 Binder - 19</td>
<td>70 Series - 7</td>
<td>F3 - 3</td>
<td>Density – 2</td>
</tr>
<tr>
<td>25.0 Binder - 25</td>
<td>80 Series - 8</td>
<td>F9 - 9</td>
<td>Test Section – 5</td>
</tr>
<tr>
<td>37.5 Base - 37</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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](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:

<table>
<thead>
<tr>
<th>AV 86</th>
<th>AV 106</th>
<th>AV 120</th>
<th>BV 3R1</th>
<th>BV 6R1</th>
<th>BV 9</th>
<th>BV 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV 87</td>
<td>AV 108</td>
<td>BV 1</td>
<td>BV 4</td>
<td>BV 7</td>
<td>BV 10</td>
<td></td>
</tr>
<tr>
<td>AV 89</td>
<td>AV 119</td>
<td>BV 2</td>
<td>BV 5</td>
<td>BV 8</td>
<td>BV 11</td>
<td></td>
</tr>
</tbody>
</table>

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.
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 Dimethylthiocarbamate) 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:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch</td>
<td>100</td>
</tr>
<tr>
<td>1/4 inch</td>
<td>90 - 100</td>
</tr>
<tr>
<td>No. 30</td>
<td>0 - 20</td>
</tr>
</tbody>
</table>

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.
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, 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 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 controlled low strength material meeting the requirements of Section 204 *Controlled Low Strength Material (CLSM)* or cement, concrete sand and water conforming to Table 552-1 *Grout Backfill Requirements*.

<table>
<thead>
<tr>
<th>TABLE 552-1 GROUT BACKFILL REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Portland Cement Type 2</td>
</tr>
<tr>
<td>Concrete Sand</td>
</tr>
<tr>
<td>Water</td>
</tr>
</tbody>
</table>

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 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>
<thead>
<tr>
<th>TABLE 552-2 SOLDIER PILE AND LAGGING WALL PILE TOLERANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Location</td>
</tr>
<tr>
<td>Plan</td>
</tr>
<tr>
<td>Vertical</td>
</tr>
</tbody>
</table>

**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 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.

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, 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.

**Payment will be made under:**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>552.10</td>
<td>Permanent Timber Sheeting</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.11</td>
<td>Permanent Steel Sheeting</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.12</td>
<td>Temporary Timber Sheeting</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.13</td>
<td>Temporary Steel Sheeting</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.14</td>
<td>Interim Timber Sheeting</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.15</td>
<td>Interim Steel Sheeting</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.16</td>
<td>Excavation Protection System</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.20nn</td>
<td>Holes in Earth for Soldier Pile and Lagging Wall</td>
<td>Foot</td>
</tr>
<tr>
<td>552.21nn</td>
<td>Rock Sockets for Soldier Pile and Lagging Wall</td>
<td>Foot</td>
</tr>
<tr>
<td>552.22nn</td>
<td>Soldier Piles for Soldier Pile and Lagging Wall</td>
<td>Foot</td>
</tr>
<tr>
<td>552.2301nn</td>
<td>Treated Wood Lagging for Soldier Pile and Lagging Wall</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.2302nn</td>
<td>Untreated Wood Lagging for Soldier Pile and Lagging Wall</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.2303nn</td>
<td>Precast Concrete Panel Lagging for Soldier Pile and Lagging Wall</td>
<td>Square Foot</td>
</tr>
<tr>
<td>552.2304nn</td>
<td>Steel Sheeting Lagging for Soldier Pile and Lagging Wall</td>
<td>Square Foot</td>
</tr>
</tbody>
</table>

Note: nn denotes serialized pay item. Each wall and its associated components will be serialized.
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>
<thead>
<tr>
<th>Ambient Temperature (AT) at time of concrete placement and as anticipated during curing duration</th>
<th>Curing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT &lt; 32°F</td>
<td>Heated enclosure required</td>
</tr>
<tr>
<td>32°F &lt; AT &lt; 45°F for less than 24 consecutive hours</td>
<td>Contractor proposed/Engineer approved method for maintaining temperatures used</td>
</tr>
<tr>
<td>32°F &lt; AT &lt; 45°F for more than 24 consecutive hours</td>
<td>Heated enclosure required</td>
</tr>
</tbody>
</table>

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...
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

<table>
<thead>
<tr>
<th>Wall Thickness (Inches)</th>
<th>Minimum ambient air temperatures (°F) allowable for concrete placed at 50°F (Thermal Resistance Values (R): hr·ft²·F/Btu)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R = 2</td>
</tr>
<tr>
<td>Portland Cement Content: 400 lb/cy</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>47</td>
</tr>
<tr>
<td>12</td>
<td>43</td>
</tr>
<tr>
<td>18</td>
<td>39</td>
</tr>
<tr>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>48</td>
<td>18</td>
</tr>
<tr>
<td>60</td>
<td>18</td>
</tr>
</tbody>
</table>

| 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   | -60   | *     |

| 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 |

01714b=2008.502-2,555-2,-3.08C,711-07 Page 2 of 5 EI 11-006
L01/12/12
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.
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.

---

TABLE 555-4 MINIMUM TIME FOR FORM REMOVAL/FORMING/LOADING LIMITATIONS –SUBSTRUCTURES (1)

<table>
<thead>
<tr>
<th>SUBSTRUCTURE ELEMENT</th>
<th>STRIPPING (2)</th>
<th>FORMING NEXT PLACEMENT</th>
<th>LOADING</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Footings</td>
<td>2 days</td>
<td>2 days</td>
<td>4 days before next placement</td>
</tr>
<tr>
<td>Abutment stems, backwalls</td>
<td>2 days if less than 10 feet (avg.). Add 1 day for each additional 5 feet to 5 days, maximum.</td>
<td>2 days</td>
<td>5 days before placing backwall on stem. 7 days before backfilling, 14 days before placing superstructure loads. (3)</td>
</tr>
<tr>
<td>Pier Columns, Pier Plinths</td>
<td>2 days if less than 10 feet high (avg.). Add 1 day for each additional 5 feet.</td>
<td>4 days – columns 2 days if forming pedestal</td>
<td>Columns – 7 days before placing cap beam. Plinth- 2 days before pedestal placement. 21 days before placing superstructure loads. (3)</td>
</tr>
<tr>
<td>Pier cap beams</td>
<td>8 days (bottom) 3 days (sides)</td>
<td>2 days</td>
<td>5 days before pedestal placement. 21 days before placing superstructure loads. (3)</td>
</tr>
<tr>
<td>All pedestals</td>
<td>2 days</td>
<td>__</td>
<td>7 days (class A) 3 days (class F) (4)</td>
</tr>
<tr>
<td>Wingwalls or Retaining walls</td>
<td>Same as abutment stems.</td>
<td>__</td>
<td>14 days before backfilling (3)</td>
</tr>
<tr>
<td>Arch centers</td>
<td>8 days</td>
<td>__</td>
<td>14 day (3)</td>
</tr>
</tbody>
</table>

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.
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.”
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 1½ 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”.

Page 364

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

**Page 402**, Section 568-1 Description, *delete* the second and third paragraphs, and *replace* with the following:

“As soon as the Contract is awarded, the Contractor shall notify the DCES of the name and address of the Fabricator of all bridge railing in accordance with §106-01 Sources of Supply. This notification shall list the specific shop or shops in which the railing will be fabricated.”


**Page 405**, Section 568-5.01 Material Requirements, *replace* the list of items with the following:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>568.50</td>
<td>Steel Bridge Railing (Two-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.51</td>
<td>Steel Bridge Railing (Four-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.52</td>
<td>Steel Bridge Railing (Five-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.53</td>
<td>Steel Bridge Railing (Two-Rail) with Handrail</td>
<td>Foot</td>
</tr>
<tr>
<td>568.54</td>
<td>Steel Bridge Railing (Three-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.60</td>
<td>Steel Bridge Railing - Brown (Two-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.61</td>
<td>Steel Bridge Railing - Brown (Four-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.62</td>
<td>Steel Bridge Railing - Brown (Five-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.63</td>
<td>Steel Bridge Railing - Brown (Two-Rail) with Handrail</td>
<td>Foot</td>
</tr>
<tr>
<td>568.64</td>
<td>Steel Bridge Railing - Brown (Three-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.70</td>
<td>Transition Bridge Railing</td>
<td>Foot</td>
</tr>
<tr>
<td>568.71</td>
<td>Transition Bridge Railing – Brown</td>
<td>Foot</td>
</tr>
<tr>
<td>568.80</td>
<td>Pedestrian and Bicycle Railing (One-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.81</td>
<td>Pedestrian and Bicycle Railing (Two-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.82</td>
<td>Pedestrian and Bicycle Railing (Three-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.83</td>
<td>Pedestrian and Bicycle Railing (Four-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.84</td>
<td>Pedestrian and Bicycle Railing (Five-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.85</td>
<td>Pedestrian and Bicycle Railing - Brown (One-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.86</td>
<td>Pedestrian and Bicycle Railing - Brown (Two-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>538.87</td>
<td>Pedestrian and Bicycle Railing - Brown (Three-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.88</td>
<td>Pedestrian and Bicycle Railing - Brown (Four-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.89</td>
<td>Pedestrian and Bicycle Railing - Brown (Five-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.90</td>
<td>Bicycle Railing (Two-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.91</td>
<td>Bicycle Railing - Brown (Two-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.92</td>
<td>Bicycle Railing (Four-Rail)</td>
<td>Foot</td>
</tr>
<tr>
<td>568.93</td>
<td>Bicycle Railing - Brown (Four-Rail)</td>
<td>Foot</td>
</tr>
</tbody>
</table>

**Pages 861**, §710-23 Material Requirements, *replace* the list of materials with the following:

Rail Tubes A500 Grade B
Rail End Caps A36 (A709 Grade 36)
Base Plates¹ A572 Grade 50 (A709 grade 50)
Anchor Studs A325 or A449 Grade 1
Splice Bolts A325 or A449 Grade 1
Round Head Bolts A325 or A449 Grade 1
Nuts² A563
Washers\(^2\)  F436
Lock Washers  High Carbon Heat Treated Spring Steel: ASME B18.2
Anchor Plates  A36 (A709 Grade 36)
Plate Shims  A36 (A709 Grade 36)
Tube Rail Splices  A500 Grade B
Solid Rail Splices  A572 Grade 50 (A709 grade 50)
Angle\(^1\)  A572 Grade 50 (A709 grade 50)
Splice Plates  A572 Grade 50 (A709 grade 50)
Railing Post\(^1\)  A572 Grade 50 (A709 grade 50)
Tubular Posts  A500 Grade B

1 All post material, including base plates, shall be furnished to minimum Charpy V-notch toughness requirements as required by §715-01, under Charpy V-Notch Impact test.
2 Use the following nut and washers for the given bolt class:

<table>
<thead>
<tr>
<th>Bolt or Stud Class</th>
<th>NUT A563 (class &amp; Dimension style of nut)</th>
<th>Washer A563 Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6</td>
<td>5 H1</td>
<td>1 or 3</td>
</tr>
<tr>
<td>8.8</td>
<td>10S HH</td>
<td>1 or 3</td>
</tr>
</tbody>
</table>

Page 821, §710-23 E. Galvanizing, fourth paragraph, replace “When paint is used to obtain a rustic appearance”, with the following:

“F. Brown Rail. When brown rail is specified”
TYPICAL LEAD-BASED PAINT WASTE INFORMATION

A. 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 Special Note provides supplemental information about the waste 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, the following waste material information has been developed for typical lead-based paint waste.

B. 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.

C. 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:

<table>
<thead>
<tr>
<th>Removal Method</th>
<th>Abbrasive</th>
<th>Paint Chips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler Slag (an amorphous mixture of Fe, Al, and Ca silicates)</td>
<td>90-95%</td>
<td>5 – 10%</td>
</tr>
<tr>
<td>Steel grit (% varies by degree of grit recycling)</td>
<td>40-90%</td>
<td>10 – 60%</td>
</tr>
<tr>
<td>No abrasive (manual, shrouded mechanical or water methods)</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Paint Chips: Paint chips contain basic lead silico chromate, titanium dioxide, chromium 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), animal waste (for example, feces, guano, nesting materials) and dirt/miscellaneous debris potentially present.

RCRA Metals: The waste is presumed to contain lead at levels exceeding 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.
D. 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:
Approx 2.7 (boiler slag)
Approx. 7.5 (steel grit)

Bulk Density:
Approx. 1.2 kg/l (75 lb/cu. ft) (boiler slag)
Approx. 3.6 kg/l (225 lb/cu. ft.) (steel grit)

Free Liquids:
None (moisture may be present from water added during removal)

E. 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 (1001 lbs) or bulk - Class 9

- Hazardous Waste due to the Characteristic Lead Toxicity, Waste Code D008

- Constituents of Concern: Lead and Chromium

- Treatability Group: Nonwastewater

- Treatment Standard: 0.75 mg/L Lead and 0.60 mg/L Chromium by TCLP test

- Reportable Quantity: 4.54 kg (10 lbs) 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 US Environmental Protection Agency.
  Generator’s Name: NYSDOT Region
  EPA ID # (   )
  Manifest Document Number (   )
  Accumulation Start Date (   )

- USDOT Emergency Response Guidebook Guide: 171, Substances (Low to Moderate Hazard)
TYPICAL HAZARDOUS PAINT WASTE INFORMATION

A. Lead-Based Paint Containing Asbestos Waste Profile: Lead-based paint containing asbestos waste generated by the removal of paint consists of a mixture of abrasive blast media such as boiler slag and paint chips. This Special Note provides supplemental information about the waste 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, the following waste material information has been developed for typical lead-based paint containing asbestos waste.

B. Process Generating Waste: The waste results from removal of lead-based coatings containing asbestos from painted structures, typically steel bridges, by wet 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.

C. Composition: To the Department’s knowledge, the waste does not contain PCBs, pesticides, cyanides, organic TCLP constituents, dioxins, 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:

<table>
<thead>
<tr>
<th>Removal Method</th>
<th>Abrasive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetted Boiler Slag (an amorphous mixture of Fe, Al, and Ca silicates)</td>
<td>90-95%</td>
</tr>
<tr>
<td>No abrasive (manual, shrouded mechanical or water methods)</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paint Chips Containing Asbestos</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint chips contain basic lead silico chromate, titanium dioxide, chromium dioxide, magnesium silicate, linseed oil, alkyd resin, fillers, driers, and other miscellaneous materials. Paint chips include asbestos fibers at approximately 1-20% of paint mixture.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Components</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water added during removal/packaging to ensure wetting of asbestos. Iron oxide (rust, mill scale), animal waste (for example; feces, guano, nesting materials) and dirt/miscellaneous debris potentially present.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RCRA Metals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The waste is presumed to contain lead at levels exceeding 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.</td>
<td></td>
</tr>
</tbody>
</table>

D. Typical Physical Characteristics:
Physical State: Solid
Color: Black for boiler slag component. Color varies for paint chips.
Odor: None
pH: Not applicable
Liquid Flash Point: Not applicable
Friability: Non-friable
Specific Gravity:
  Approx 2.7 (boiler slag)
Bulk Density:
  Approx. 1.2 kg/l (75 lb/cu. ft) (boiler slag)
Free Liquids:
  None (moisture may be present from water added during removal)

E. Consolidated Hazardous Waste Information: The following consolidated information for hazardous lead-based paint containing asbestos 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, asbestos); 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 (1001 lbs) or bulk - Class 9
  • Documents: Hazardous Waste Manifest AND Asbestos Waste Shipping Record
  • Hazardous Waste due to the Characteristic Lead Toxicity, Waste Code D008
  • Constituents of Concern: Lead and Chromium (also contains non-friable asbestos)
  • Treatability Group: Nonwastewater
  • Treatment Standard: 0.75 mg/L Lead and 0.60 mg/L Chromium by TCLP test
  • Reportable Quantity: 4.54 kg (10 lbs) 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 US Environmental Protection Agency.
    Generator’s Name: NYSDOT Region
    EPA ID # (    )
    Manifest Document Number (    )
    Accumulation Start Date (    )
    ASBESTOS WASTE - Containers shall be labeled in accordance with 40 CFR Part 61.
  • USDOT Emergency Response Guidebook Guide: 171, Substances (Low to Moderate Hazard)
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.
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.
Make the following changes to the Standard Specifications of May 1, 2008:

Page 469 to 472

*delete* Section 586 in its entirety and *replace* it with the following:

**SECTION 586 - MISCELLANEOUS STRUCTURAL RECONSTRUCTION**

586-1 DESCRIPTION. The work of this section shall consist of the following:

- Drilling and Grouting Bolts, or Reinforcing Bars.
- Removal of Rivets - Replacement with High Strength Bolts.
- Field Drill Holes in Existing Structural Steel.

586-1.01 Drilling and Grouting Bolts, or Reinforcing Bars. For the purposes of this section the terms bolts and reinforcing bars are identical.

586-1.02 Field Drill Holes in Existing Structural Steel. Existing structural steel is that structural steel in service prior to the beginning of construction.

586-2 MATERIALS

586-2.01 Drilling and Grouting Bolts. Grout material used in overhead applications, or where a sustained tensile load will exist, shall conform to §701-05 Concrete Grouting Material. Grout used in other applications shall conform to §701-07 Anchoring Materials - Chemically Curing.

586-2.02 Removal of Rivets - Replacement with High Strength Bolts. High strength bolts, nuts and washers shall meet the requirements of §715-14 High Strength Bolts, Nuts and Washers. If paint color is not specified, the color selected shall match the existing paint. Paint shall be selected from the Department’s Approved List for Structural Steel Paint - Class 2.

586-3 CONSTRUCTION DETAILS

586-3.01 Drilling and Grouting Bolts

**A.** All holes shall be drilled by means of a rotary impact drill. If reinforcing steel is encountered, the reinforcing steel shall be cut and removed by means of a core drill. The remainder of the drilling shall be done with the rotary impact drill.

**B.** Drilling with a lubricant will not be permitted. Water is not considered a lubricant. Drilling methods shall not cause spalling, or other damage to concrete. Concrete spalled, or otherwise damaged by the Contractor's operations shall be repaired at no additional cost to the State.

**C.** Holes shall be surface dry and shall have had all foreign and loose material removed immediately prior to grout placement.

**D.** Grout shall be stored, mixed, and placed in strict accordance with the manufacturer's instructions, unless modified here, or elsewhere, in the contract documents. No grout shall be placed at a temperature below that recommended by the grout manufacturer.

**E.** Prior to bolt placement in the grouted hole, all material which might interfere with bond between the bolt and the grout shall have been removed. This includes, but is not limited to: moisture, grease,
dirt, mill scale and rust. Rust which cannot be removed even by vigorous scrubbing with a wire brush is considered firmly bonded and may remain. The hole diameter shall be in accordance with the grout manufacturer's recommendation. The length of any plastic sleeve used as an aid to grout placement shall not be included in the length of the bolt hole. The bolts shall be inserted full depth into the hole and shall be manipulated and rotated to ensure complete coverage by the grout. After insertion of the bolt, all excess grout shall be struck off flush with the concrete face. Care shall be taken to prevent grout from running out of the drilled hole. Should the grout fail to fill the hole after bolt insertion, additional grout shall be added to the hole to allow a flush strike-off.

**F.** If the bolt is inserted in a hole with an axis that is predominantly horizontal, care shall be taken to prevent grout from running down the face of the concrete.

**G.** If approved by the Engineer, hole locations may be moved to avoid encountering reinforcing steel.

**H.** The Contractor may increase the embedment length beyond that required by the contract documents if approved by the Engineer, at no additional cost to the State. The bottom of the hole shall be at least 1 5/8 inches from the nearest free surface of a structural element, unless otherwise shown in the contract documents.

**586-3.02 Pull-Out Testing**

**A. Testing.** Table 1 gives the number of anchors (N1) to be tested for any lot size. The Engineer will randomly choose the anchors to be tested. Testing of anchors in a lot shall not begin until all the anchors in the lot are installed. If any (N1) anchors fail, N2 indicates the number of additional anchors that must be tested. If only one anchor fails, the lot will be accepted. If a second anchor fails, all remaining anchors must be tested.

A lot size is determined by the Contractor, but must meet the following criteria:

1. A lot size shall not exceed 600 anchors.
2. All anchors in a lot must be installed within a two-month period.
3. Any anchors installed beyond the two-month period set forth in 2 above shall be part of another lot.
4. A lot shall only include anchors grouted with a single product
5. A lot shall only include anchors of the same type, diameter and embedment depth.

<table>
<thead>
<tr>
<th>LOT SIZE</th>
<th>N1</th>
<th>N2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-30</td>
<td>All the anchors in the lot</td>
<td>-</td>
</tr>
<tr>
<td>31-50</td>
<td>30</td>
<td>All remaining anchors</td>
</tr>
<tr>
<td>51-75</td>
<td>38</td>
<td>All remaining anchors</td>
</tr>
<tr>
<td>76-100</td>
<td>44</td>
<td>21</td>
</tr>
<tr>
<td>101-200</td>
<td>49</td>
<td>26</td>
</tr>
<tr>
<td>201-300</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>301-600</td>
<td>55</td>
<td>30</td>
</tr>
</tbody>
</table>

**B. Equipment.** The equipment shall consist of a load cell, jacking system, a frame to distribute the jack load, couplers to connect the jack to the anchors, and appropriate safety devices. A calibrated pressure gauge with hydraulic ram is equivalent to a load cell. Prior to starting the testing,
Contractor shall supply the Engineer with a certificate of calibration for the load cell performed within the previous six months by an independent testing agency. Supports for the frame used to distribute the jack load shall be located outside a circle centered at the anchor. The circle shall have a diameter equal to 2 inches plus twice the anchor embedment length, but need not exceed 24 inches. The frame and jack shall be positioned so that the load is applied along the axis of the anchor. Chains or cables shall be used to connect the various pieces of the tensioning system so that free flying projectiles will not be created by the failure of an anchor coupling or other portion of the testing system.

**C. Test Load.** The test load for anchor bolts shall be 90% of the ASTM proof load, unless otherwise specified in the contract documents. When no proof load is given in the ASTM specifications for anchor bolt steel, use the yield strength. The test load for reinforcement shall be 90% of the yield strength unless otherwise specified in the contract documents. Listed below are the test loads for the most commonly used anchor bolts and rebar steels, and anchor types.

<table>
<thead>
<tr>
<th>Table 586-2 TEST LOADS</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Diameter (inches)</th>
<th>ASTM A325 or ASTM A449 Anchor Bolts (Coarse-Threaded Full Length)</th>
<th>ASTM A615 GR 60 Reinforcement Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test Load (kips)</td>
<td>Size</td>
</tr>
<tr>
<td>1/2</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>5/8</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>3/4</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>7/8</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>46</td>
<td>8</td>
</tr>
<tr>
<td>1 1/8</td>
<td>51</td>
<td>9</td>
</tr>
<tr>
<td>1 1/4</td>
<td>65</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

Anchors shall be deemed to pass if the specified test load is attained without permanently displacing the anchors. Concrete spalled or otherwise damaged by the load testing shall be repaired. Such repair shall be done at no additional cost to the State. All anchors which fail a load test, or are otherwise damaged, shall be replaced at no additional cost to the State. All such replaced anchors shall be load tested.

**NOTE:** THIS LOAD TESTING IS DESIGNED TO BE NON-DESTRUCTIVE. LOADING SHALL BE STOPPED AS SOON AS THE TEST LOAD IS REACHED.

**586-3.03 Removal of Rivets-Replacement with High Strength Bolts**

**A. Paint Removal.** If the steel is painted, then prior to the beginning of any other work operations, the paint shall be removed for a minimum distance of 4 inches on each side of the centerline of work location. The paint removal work shall be done in accordance with the requirements of Section 574, *Structural Steel Painting: Localized.*

**B.** Unless otherwise noted in the contract documents, all bolts shall be the same diameter as the rivets they replace.

**C.** Rivets shall be removed by one of the following methods:
I. Shear rivet head using a pneumatic rivet breaker (helldog), and drive out rivet shank with a pneumatic punch.

2. Flame cut rivet head 0.079 inches above the base metal using a rivet scarfing tip, and drive out shank using a pneumatic punch. If punching will damage the base metal, the shank shall be removed by drilling.

D. High strength bolts shall be installed after the nicks, burrs and foreign substances that might interfere with seating of the bolt head and nut washers are removed. Light grinding may be required.

E. Installation and inspection of high strength bolts shall be done in accordance with the New York State Steel Construction Manual requirements.

F. If it becomes necessary to disconnect, or adjust, steel remaining as part of the structure to complete the work the Contractor shall obtain the Engineer's approval prior to performing disconnections or adjustments.

G. If the bolt will not fit the rivet hole, the hole may be reamed sufficiently to accommodate the bolt.

H. If the contract does not include an item(s) for cleaning, priming and painting of structural steel, cleaning and painting of the bolt and immediate surrounding area shall be done as part of this work. Cleaning and painting shall be done in accordance with the requirements of Section 574, *Structural Steel Painting: Localized*. All steel exposed by the cleaning operations shall be painted. However, at least 2 inches in every direction, measured from the washer's edge, shall be painted.

586-3.04 Field Drill Holes in Existing Structural Steel

A. The requirements of §586-3.03A *Paint Removal* shall apply.

B. The required hole diameter will be indicated on the contract documents.

C. No flame cutting, or flame drilling will be permitted.

D. All damage to existing steel shall be repaired by the Contractor, at no additional cost to the State.

586-4 METHOD OF MEASUREMENT

586-4.01 Drilling and Grouting Bolts. The quantity to be measured for payment will be the number of holes into which grout and bolts have been inserted.

586-4.02 Removal of Rivets - Replacement with High Strength Bolts. The quantity to be measured for payment will be the number of high strength bolts installed.

586-4.03 Field Drill Holes in Existing Structural Steel. The quantity to be measured for payment will be each hole drilled.

586-5 BASIS OF PAYMENT

586-5.01 Drilling and Grouting Bolts

A. The unit price bid per hole shall include the cost of all labor, materials, and equipment necessary
to complete the work.

B. Payment will not be made for holes which do not contain both grout and bolts.

C. The cost of the bolts will be paid for under a separate, appropriate item.

586-5.02 Removal of Rivets - Replacement with High Strength Bolts

A. The unit price bid for each installed bolt shall include the cost of all labor, material and equipment necessary to complete the work including paint removal and when appropriate painting.

B. Payment will be made for each installed bolt regardless of whether or not a rivet had been removed from the location in question.

586-5.03 Field Drill Holes in Existing Steel

A. The unit price bid for each hole drilled shall include the cost of all labor, equipment and materials necessary to complete the work, including paint removal when required.

B. No extra compensation will be paid for holes drilled through different thicknesses, or through different numbers of plates.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>586.02</td>
<td>Drilling and Grouting Bolts or Reinforcing Bars</td>
<td>Each</td>
</tr>
<tr>
<td>586.03</td>
<td>Drilling and Grouting Bolts or Reinforcing Bars with Pullout Test</td>
<td>Each</td>
</tr>
<tr>
<td>586.04</td>
<td>Drilling and Grouting Bolts, Overhead or Sustained Tension, with Pullout Test</td>
<td>Each</td>
</tr>
<tr>
<td>586.05</td>
<td>Removal of Rivets-Replacement with High Strength Bolts</td>
<td>Each</td>
</tr>
<tr>
<td>586.10</td>
<td>Field Drill Holes in Existing Structural Steel</td>
<td>Each</td>
</tr>
</tbody>
</table>
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’
Page 864 through 867, **Delete 710-25 GUIDE RAIL AND MEDIAN BARRIER SYSTEMS (RUSTIC)** in its entirety and **Replace** with the following: “**710-25 Vacant.**”
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."
Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 527 through 535, **Delete** Section 608 – *Sidewalks, Driveways and Bicycle Paths* entirely and **replace** it with the following:

**SECTION 608 - SIDEWALKS, DRIVEWAYS, BICYCLE PATHS, AND VEGETATION CONTROL STRIPS**

608-1 DESCRIPTION. This work shall consist of the construction of Portland cement concrete sidewalks and driveways; hot mix asphalt (HMA) sidewalks, driveways, bicycle paths, and vegetation control strips; or furnishing and placing precast concrete paving, brick paving or grouted stone block paving. Furnish and install detectable warnings on sidewalk curb ramps and other locations as detailed in the contract documents or as directed by the Engineer. All work shall be in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established by the Engineer.

608-2 MATERIALS. Materials shall meet the requirements specified in the following subsections of Section 700 – *Materials and Manufacturing*:

- Portland Cement 701-01
- Bituminous Materials 702-00
- Fine Aggregates 703-01
- Coarse Aggregates 703-02
- Mortar Sand 703-03
- Cushion Sand 703-06
- Concrete Sand 703-07
- Mineral Filler 703-08
- Brick Pavers 704-08
- Stone Blocks 704-09
- Precast Concrete Driveway and Sidewalk Pavers 704-13
- Premoulded Resilient Joint Filler 705-07
- Masonry Mortar 705-21
- Wire Fabric for Concrete Reinforcement 709-02
- Fibers for Concrete Reinforcement 711-01
- Membrane Curing Compound 711-05
- Form Insulating Materials for Winter Concrete (Blankets) 711-07
- Water 712-01
- Surface-applied Detectable Warning Units 726-01
- Embedded Detectable Warning Units 726-02

608-2.01 Portland Cement Concrete Sidewalks and Driveways.

**A. Reinforcement.** Welded wire fabric reinforcement shall be made of W2.9 or W3 wire at 6 inch centers transversely and longitudinally.

**B. Conventionally Formed Concrete.** Conventionally formed concrete shall meet the requirements for Class D in accordance with Section 501 *Portland Cement Concrete - General*. All concrete shall contain a water-reducing admixture meeting the requirements of §711-08 *Admixtures* in such a quantity as to provide a minimum 10% reduction of the design water content by using a normal range water-reducer.

**C. Machine-Formed Concrete Sidewalks.** Machine-formed concrete shall meet the requirements for Class J in accordance with Section 501 *Portland Cement Concrete - General* with the exception that fibers shall be incorporated in the mix.
SIDEWALKS, DRIVEWAYS, BICYCLE PATHS, AND VEGETATION CONTROL STRIPS

D. Accelerated-Cure Sidewalks and Driveways. When specified in the plans that an accelerated cure sidewalk and/or driveway is required at a commercial driveway, a mix design must be submitted to the Materials Bureau by the Contractor for approval a minimum of 14 days prior to anticipated sidewalk or driveway construction. Supply data indicating that the mix achieves a compressive strength of 2,000 psi in less than 24 hours. Also supply data indicating that the mix will have a scaling rating of one or less when tested in accordance with ASTM C672.

608-2.02 Hot Mix Asphalt (HMA) Sidewalks, Driveways, Bicycle Paths, and Vegetation Control Strips. The requirements for these items shall either be 9.5 mixture for surface course or 19.0 mixture for any course below the surface. These mixtures shall be designed for <0.3 million ESALs and produced in accordance with Section 401 using coarse aggregate Type F9. The number of courses and course thicknesses shall be as given in Table 608-1 Hot Mix Asphalt Composition except for vegetation control strips which have a minimum thickness requirement of 3 inches of a 9.5 mix that may be placed in one course. The PG binder grades specified will be PG 64-22. Alternate PG binder grades may be allowed by the RME in lieu of PG 64-22. Upstate use of polyphosphoric acid (PPA) to modify the PG binder properties is prohibited. This prohibition also applies to the use of PPA as a cross-linking agent for polymer modification. Upstate is defined as all other counties not designated as downstate. Downstate is defined as Orange, Putnam, Rockland, Westchester, Nassau, Suffolk Counties and the City of New York. Downstate use of polyphosphoric acid (PPA) to modify the PG binder properties is prohibited for mixtures containing limestone, limestone as an aggregate blend component, limestone as a constituent in crushed gravel aggregate, or recycled asphalt pavement (RAP) that includes any limestone. This prohibition also applies to the use of PPA as a cross-linking agent for polymer modification.

<table>
<thead>
<tr>
<th>Total Paved Thickness</th>
<th>9.5 Mix</th>
<th>19.0 Mix</th>
<th>Number of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2 inch</td>
<td>1 1/2 inch</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2 inch</td>
<td>2 inch</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>≥3 inch</td>
<td>≥1 1/2 inch</td>
<td>≥1 1/2 inch</td>
<td>≥2</td>
</tr>
</tbody>
</table>

NOTES:
1. For the 19.0 mixture, the maximum thickness that can be placed in one pass is 3 inches.
2. A course shall consist of one or more separate lifts of hot mix asphalt, as directed by the Engineer, to attain the indicated thickness.

608-2.03 Brick-Paved Sidewalks and Driveways. Brick pavers shall meet the requirements of §704-08 Brick Sidewalk and Driveway Pavers and shall be the size(s), shape(s) and color(s) as specified in the contract documents.

A. Neoprene-Modified Asphalt Adhesive. Neoprene-modified asphalt adhesive shall consist of 2% neoprene, grade WM1, oxidized asphalt with an R & B softening point of 155°F minimum and a penetration of 80, and 10% asbestos-free fibers.

B. Mortar for Brick Paving. Mortar for brick paving shall meet the requirements outlined in §705-21 Masonry Mortar.

C. Sand-Cement Setting Bed. Sand-Cement Setting Bed shall consist of 1 part Portland Cement Type 2, §701-01 and 6 parts of Fine Aggregate, §703-01 by volume.

608-2.04 Grouted Stone Block Paved Sidewalks and Driveways. Stone Blocks shall meet the requirements of §704-09 and shall be the size(s), shape(s) and color(s) as specified in the contract documents.

A. Sand-Cement Setting Bed. Sand-cement setting bed shall consist of 1 part Portland Cement Type 2, §701-01 and 6 parts of Fine Aggregate, §703-01 by volume.
B. Mortar for Stone Block Paving. Mortar for stone block paving shall meet the requirements outlined in §705-21 Masonry Mortar.

608-2.05 Precast Concrete Block Paved Sidewalks and Driveways. Precast Concrete Driveway and Sidewalk Pavers shall meet the requirements of §704-13 and shall be the size(s), shape(s) and color(s) as specified in the contract documents. Unless otherwise specified in the contract documents the setting bed material shall consist of hard, durable, uncoated particles of soil or rock, free from lumps of clay and all deleterious substances.

Setting Bed Material shall meet the following gradation requirements:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 inch</td>
<td>100</td>
</tr>
<tr>
<td># 10</td>
<td>50-85</td>
</tr>
<tr>
<td># 40</td>
<td>20-45</td>
</tr>
<tr>
<td># 200</td>
<td>3-10</td>
</tr>
</tbody>
</table>

608-2.06 Surface-Applied Detectable Warning Units. Surface-Applied Detectable Warning Units shall meet the requirements of §726-01 and shall be the color as specified in the contract documents to provide the required contrast, light-on-dark or dark-on-light, with the adjacent surface. If no color is specified, the color shall be dark gray Federal Standard 595B #36081 or darker. Setting bed material and/or surface preparation materials for installation of detectable warning units shall be in accordance with the manufacturer’s recommendations.

608-2.07 Embedded Detectable Warning Units. Embedded Detectable Warning Units shall meet the requirements of §726-02 and shall be the color as specified in the contract documents to provide the required contrast, light-on-dark or dark-on-light, with the adjacent surface. If no color is specified, the color shall be dark gray Federal Standard 595B #36081, or darker. Setting bed material and/or surface preparation materials for installation of detectable warning units shall be in accordance with the manufacturer’s recommendations.

608-2.08 Stamped Concrete Detectable Warnings. Imprinted or stamped concrete detectable warning units shall comply with the specifications for Class D concrete as outlined in Section 501 Portland Cement Concrete - General. The color of the constructed detectable warning shall be uniform over the entire surface. The color shall be an approximate visual match to the color specified in the contract documents. If no color is specified, the color shall be dark gray Federal Standard 595B #36081 or darker. The color shall be incorporated into the concrete surface immediately prior to stamping the detectable warnings, or integrally incorporated throughout the mix. Color admixtures for integrally colored concrete shall meet the requirements of ASTM C979.

Imprinting tools shall be capable of imprinting the surface of the concrete with a uniform and aligned pattern meeting the required dimensions.

608-3 CONSTRUCTION DETAILS

608-3.01 Portland Cement Concrete Sidewalks and Driveways. When the contract includes 65 cubic yards or more of sidewalk and driveway concrete, provide an American Concrete Institute (ACI) certified concrete flatwork finisher to supervise all finishing. Provide proof of ACI flatwork certification to the Engineer prior to concrete placement. The general construction details for manufacturing and transporting concrete shall meet the requirements of Section 501 Portland Cement Concrete - General. Concrete placement operations may be started when the ambient air temperature is 40º F or higher when measured in the shade within an accuracy of ± 2º F. Discontinue placement when the air temperature falls below 40º F. The temperature of the base material must be 40º F or higher. The base material shall not have any snow, ice, frost, or standing water on its surface. The use of insulating materials and heating equipment may be required before concreting begins. Do not place concrete in the rain.

Install a Premoulded Resilient Joint Filler, §705-07, at all joints between sidewalk and curb, pavement, building, etc. and at all transverse construction joints.
Sidewalks and driveways may be conventionally formed or machine formed. Concrete reinforcement shall be welded wire fabric or fiber reinforcement except, at all commercial driveways both the sidewalk and the driveway must be reinforced with welded wire fabric. They may be additionally reinforced with fiber reinforcement.

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. Fibers shall be added to the concrete during batching under supervision of the Regional Materials Engineer, or using a method approved by the Director, Materials Bureau. Batch an appropriate volume of concrete such that whole standard size bags or packages of fibers are used. It is the responsibility of the producer to indicate on each delivery ticket the amount of fibers added to the concrete.

A. Conventionally Formed Sidewalks and Driveways. Forms shall be free from warp, extend to the full depth of the sidewalk or driveway, and be secured so no displacement will occur during the placement of concrete. Reinforcement may be either fiber or wire fabric. When using wire fabric for concrete reinforcement, embed it at mid-depth in the slab.

Place the concrete in one course to the full depth shown in the contract documents. Immediately after placement of the concrete thoroughly compact the concrete with internal mechanical vibrating equipment. Internal mechanical vibrators shall be adequately powered, capable of transmitting vibration to the concrete in frequencies of not less than 5,000 vibrations per minute while inserted in concrete and shall produce a vibration of sufficient intensity to consolidate the concrete into place without separation of the ingredients. The vibrating element shall be vertically inserted in the concrete mass at a depth sufficient to vibrate the entire depth. It shall be withdrawn completely from the concrete before being advanced to the next point of application. Vibrate at evenly spaced intervals not farther apart than the radius over which the vibration is visibly effective and at a distance close enough to the forms to effectively vibrate the surface concrete. The time of vibration shall be of sufficient duration to accomplish thorough consolidation, produce dense, smooth surfaces free from aggregate pockets, honeycombing, and air bubbles; and to work the concrete into all angles and corners of the forms. However, over-vibration shall be avoided. Vibration shall be continued in one place until the concrete has become uniformly plastic, but not to the extent that pools of grout are formed. Vibration shall be supplemented by working or spading by hand in the corners and angles of forms and along form surfaces while the concrete is plastic. Vibrators shall not be used to push or distribute the concrete laterally.

The use of mechanical screeding or finishing equipment (such as a jitterbug) shall not be allowed. Only hand screeding and finishing shall be allowed.

B. Machine-Formed Sidewalk. Machine-formed paving consists of a single paver capable of placing, spreading, consolidating, screeding, and finishing the concrete such that hand finishing is kept to a minimum. Use equipment guided by a reference system that ensures the pavement is placed to the specified line, grade, and cross section. Use a self-propelled paver equipped with rigid side forms that laterally support the concrete and minimize edge slumping, a full-width finishing pan, and attached internal vibrators capable of consolidating the entire concrete placement. The equipment proposed for use by the Contractor shall demonstrate the capability of placing the concrete in accordance with these specifications.

Apply the provisions of §569-3.05 E. Central and Transit Mixed Concrete to maintain desired slump during the concrete placement. The reinforcement shall be fibers. Water additions at the point of deposition may be made according to §569-3.05 E.

C. Finishing. Only magnesium floats and trowels are allowed. The use of aluminum or steel finishing trowels and tools is prohibited. The concrete shall be finished to produce a smooth surface and then lightly broomed to a uniform texture. The edges and scored joints of all sidewalk slabs shall be tooled with an edging tool having a ¼ inch radius.

Unless otherwise specified in the contract documents, the concrete surface shall be scored and tooled at intervals of 5 feet. Score the concrete a minimum ⅛ inch to a maximum ¼ inch in width and to a minimum depth of one-third the total thickness.

D. Curing. Immediately after finishing, and not more than 30 minutes after concrete placement, apply a clear
with fugitive dye *Membrane Curing Compound* meeting §711-05 at a rate of 1 gallon per 150 square feet. Do not apply curing compound in the rain. If rain damages the curing compound before it sets, reapply curing compound immediately after the concrete surface dries. Alternative curing methods shall be approved by the Director, Materials Bureau.

Concrete must be cured for a minimum of six days in colder weather. Colder weather and the methods of curing during colder weather are described as follows: If the ambient air temperature falls, or is expected to fall below 40º F anytime during the curing period of the concrete placement, a supply of blankets meeting §711-07 *Form Insulating Materials for Winter Concreting* must be provided at the work site that is sufficient to cover all concrete placed. Use material capable of maintaining a surface temperature of 55º F. Apply the insulating material to prevent the newly placed concrete from being exposed to ambient air temperatures at the surface below 36º F during the curing period. Secure and overlap the insulation tight to the concrete surface to prevent air intrusion beneath the insulation. Extend these materials a minimum of 12 inches beyond the edge of the concrete. Place recording surface thermometers provided by the Contractor between the concrete surface and the insulating material and 12 inches from the outside edge of concrete wherever insulation is used. Use four equally spaced thermometers for each day’s placement. When insulation is needed it must remain in place for the curing period. Do not subject the concrete to a temperature drop in excess of 50º F during the first 24 hours after removing the insulation. If the concrete temperature falls below 32º F or the concrete is cold-weather damaged as determined by the Engineer, it shall be removed and replaced at the Contractor’s expense.

Cure all driveways and sidewalks at driveways for a minimum of three days prior to opening to vehicle traffic. In colder weather, as defined above, extend the curing period to six days unless other provisions to determine strength are provided and approved by the Director, Materials Bureau.

If saw cutting is necessary, use diamond blade saws capable of making straight cuts to the dimensions required. Saws must be equipped with cutting guides, blade guards, water cooling systems, dust controls, and cut depth control.

### E. Accelerated-Cure Sidewalks and Driveways.

When specified in the plans that an accelerated-cure sidewalk and/or driveway is required at a commercial driveway all the provisions for constructing sidewalks and driveways outlined above shall apply with the following exceptions: Only conventional forming with wire fabric reinforcing is allowed. Apply curing compound as outlined in “D” above. To reduce the time needed to reach the required opening compressive strength the concrete must be covered with blankets meeting §711-07 *Form Insulating Materials for Winter Concreting* such that the concrete curing temperature reaches a minimum 25º F above ambient air temperature. Secure the insulation tight to the concrete surface to prevent air intrusion beneath the insulation. Extend these materials a minimum of 12 inches beyond the edge of the concrete. Place recording surface thermometers between the concrete surface and the insulating material and 12 inches from the edge of concrete wherever insulation is used. Use four thermometers for each day’s placement. These thermometers may be equally spaced at one location or placed at separate locations depending on the nature of the placements. Also, use one recording thermometer for ambient air temperature. At the request of the Contractor, external heat meeting the requirements of §555-3.08 C, 2. * Provision of External Heat* may be applied to the concrete.

Compressive strength cylinders for determining strength gain must be cast at the time of placement. These cylinders must be kept insulated with the placement. Cylinders shall be broken at times requested by the Contractor until the minimum compressive strength of 2,000 psi is reached. Alternate means to determine concrete maturity may be considered with approval of the Director, Materials Bureau by coordinating cylinder compressive strengths to concrete curing temperature.

### 608-3.02 Hot Mix Asphalt (HMA) Sidewalks, Driveways, Bicycle Paths, and Vegetation Control Strips.

The provisions under §402-3 *Construction Details for Hot Mix Asphalt (HMA) Pavements*, shall apply. For compaction requirements, the provisions under §402-3.07 *Compaction D. 80 Series Compaction Method* shall apply.

The sidewalks, driveways, bicycle paths, and vegetation control strips shall be constructed as indicated in the contract documents (including the Standard Sheets).
608-3.03 **Brick-Paved Sidewalks and Driveways.** All brick pavers shall be laid in the pattern shown in the contract documents or as directed by the Engineer to provide a uniformly even surface. Joints shall be hand tight unless otherwise specified. No brick pavers shall be laid or grouted in freezing weather.

A dry mixture of mortar for brick paving shall be swept over the brick pavers until the joints are completely filled. The joints shall be lightly wetted with water. Brick pavers shall be cleaned of excess mortar, and joints shall be finished prior to the mortar setting up. All brick paving shall be kept moist for 4 days after filling the joints with mortar. After the 4 day curing period, removal of remaining mortar film may be accomplished by the use of a light acid wash (10% solution of hydrochloric or muriatic acid) followed by flushing clean with water or as approved by the Engineer. Care shall be taken to avoid the use of acid in areas where runoff could damage trees or other vegetation.

All brick pavers used over tree pits shall be laid in a 3 inch bed of **Cushion Sand**, §703-06 with sand filled joints.

A. **Brick-Paved Sidewalks and Driveways (Sand Setting Bed).** Brick pavers shall be laid in a properly compacted 2 inch bed of cushion sand over the specified subbase or subgrade.

B. **Brick-Paved Sidewalks and Driveways (Mortar Setting Bed).** Brick pavers shall be laid in a bed of mortar with a minimum thickness of 1 inch over the specified concrete or bituminous subbase.

C. **Brick-Paved Sidewalks and Driveways (Bituminous Setting Bed).** Brick pavers shall be laid in a ¾ inch thick bituminous setting bed over the specified concrete or bituminous subbase. The setting bed shall consist of PG binder 64-22 mixed with fine aggregate meeting the requirements of §703-01. Alternate PG binder grades may be allowed by the RME in lieu of PG 64-22. The PG binder will meet the requirements outlined in Section 702 **Bituminous Materials**, Table 702-1 **Performance-Graded Binders for Paving**. The PG binder shall be 7.0% of the total batch weight. The mix shall be heated to approximately 325º F. A coating of neoprene-modified asphalt adhesive shall be applied by mopping, squeegeeing or troweling over the top surface of the setting bed to provide bond under the bricks.

D. **Brick-Paved Sidewalks and Driveways (Sand-Cement Setting Bed).** Brick pavers shall be laid on a 2 inch setting bed of sand-cement over the specified subbase. The sand-cement setting bed shall not be placed more than 4 hours prior to installing the brick paving.

E. **Brick-Paved Sidewalks and Driveways (Optional Concrete Setting Bed).** The Contractor shall have the option of installing Brick Paved Sidewalks and Driveways by one of the following methods:

1. Bricks shall be laid on a bed of cement concrete as specified in the contract documents. The bricks shall be laid in the cement concrete while it is still fresh as approved by the Engineer and they shall be firmly positioned to provide a uniformly even surface, and solid bedding under each brick.
2. Bricks shall be laid as provided for under “**Brick-Paved Sidewalks and Driveways (Mortar Setting Bed)**” provided the finished surface shall conform to the lines and grades shown in the contract documents.

608-3.04 **Grouted Stone Block Paved Sidewalks and Driveways.** All grouted stone block pavers shall be laid in the pattern shown in the contract documents or as directed by the Engineer to provide a uniformly even surface. Joints between blocks shall be a maximum of 1¼ inch or as specified. No blocks shall be laid or grouted in freezing weather.

Unless otherwise approved by the Engineer, a dry mixture of mortar as specified for Brick-Paved Sidewalks and Driveways, §608-2.03, shall be swept over the stone blocks until the joints are completely filled and the joints lightly wetted with water prior to the mortar setting up. All grouted stone block paving shall be kept moist for four days after filling the joints with mortar. After the four day curing period, removal of remaining mortar film may be accomplished by the use of a light acid wash (10% ± solution of hydrochloric acid) followed by flushing clean with water, or as approved by the Engineer. Care shall be taken to avoid the use of acid in areas where runoff could damage trees or other vegetation.
All blocks used over tree pits shall be laid in a 1 inch bed of cushion sand with sand filled joints.

**A. Grouted Stone Block Paved Sidewalks and Driveways (Sand Setting Bed).** Blocks shall be laid in a 3 inch bed of cushion sand over the specified subbase or subgrade.

**B. Grouted Stone Block Paved Sidewalks and Driveways (Mortar Setting Bed).** Blocks shall be laid in a bed of mortar with a minimum thickness of 1 inch over the specified concrete or bituminous subbase.

**C. Grouted Stone Block Paved Sidewalks and Driveways (Sand-Cement Setting Bed).** Blocks shall be laid on a 2 inch setting bed of sand-cement over the specified subbase. The sand-cement setting bed shall not be placed more than 4 hours prior to installing the block paving.

**D. Grouted Stone Block Paved Sidewalks and Driveways (Optional Concrete Setting Bed).** The Contractor shall have the option of installing Grouted Stone Block Paved Sidewalks and Driveways by one of the following methods:

1. Blocks shall be laid on a bed of cement concrete as specified in the contract documents. The blocks shall be laid in the cement concrete while it is still fresh as approved by the Engineer and they shall be firmly positioned to provide a uniformly even surface, and solid bedding under each stone block.
2. Blocks shall be laid as provided for under “Grouted Stone Block Paved Sidewalks and Driveways (Mortar Setting Bed)” provided the finished surface shall conform to the lines and grades shown in the contract documents.

**608-3.05 Precast Concrete Block Paved Sidewalks and Driveways.** Precast Concrete Driveway and Sidewalk Pavers shall be laid in the pattern shown in the contract documents or as directed by the Engineer to provide a uniformly even surface. Joints shall be hand tight unless otherwise specified. No pavers shall be laid in freezing weather.

   After the pavers are in place, an approved sand joint filler shall be swept over the pavers until the joints are completely filled.

   Unless otherwise specified in the contract documents, or directed by the Engineer, the Contractor shall install the pavers in accordance with the manufacturer's recommended procedures.

   Precast Concrete Block Paved Sidewalks and Driveways (Granular Material Setting Bed). Unless otherwise specified in the contract documents, Precast Concrete Driveway and Sidewalk Pavers shall be laid on a setting bed not to exceed 2 inches of uniformly compacted material placed over the specified subbase.

**608-3.06 Surface-Applied Detectable Warning Units.** Surface-applied detectable warning units may be applied to existing curb ramps, formed and bonded to existing curb ramps, or as otherwise directed by the manufacturer or specified in the Contract Documents.

   Follow all applicable manufacturer’s requirements for environmental conditions, surface preparation, installation procedures, curing procedures, and materials compatibility.

**608-3.07 Embedded Detectable Warning Units.** Embedded detectable warning units may be installed in plastic concrete, installed directly on existing subbase prior to placing concrete, inlaid on prepared concrete surfaces or as otherwise directed by the manufacturer or specified in the Contract Documents.

   Follow all applicable manufacturers’ requirements for environmental conditions, surface preparation, installation procedures, curing procedures, and materials compatibility.

**608-3.08 Stamped Concrete Detectable Warnings.** Apply §608-3.01 with the following modifications:

   Prior to the start of work, the Contractor shall provide a contract-site sample that meets the dimensional requirements of the current Standard Sheet for Detectable Warnings and meets the approval of the Engineer. The sample may be constructed as part of the contract.

   Color hardening powder, if used to color the surface of the concrete, shall be applied to the finished
concrete in accordance with the manufacturer’s recommendations.

If required, construct as many test panels as are necessary to achieve a sample panel that is satisfactory to the Engineer. All completed surfaces shall conform to the appearance of the approved sample.

608-4 METHOD OF MEASUREMENT

608-4.01 Portland Cement Concrete Sidewalks and Driveways. Portland Cement concrete sidewalks and driveways will be measured by the number of cubic yards of cement concrete installed, measured to the nearest 0.1 cubic yard.

608-4.02 Hot Mix Asphalt (HMA) Sidewalks, Driveways, Bicycle Paths, and Vegetation Control Strips. Hot mix asphalt sidewalks, driveways, bicycle paths, and vegetation control strips will be measured by the number of tons of hot mix asphalt furnished and incorporated in the work. A QAF of 1.00 will be assigned to material meeting the specification requirements as certified by the QCT. A QAF of 0.85 will be assigned to material that fails to meet the specification as tested by the QAT. Quality Units will be determined when there is a disincentive and will be calculated as per §402-4, Method of Measurement.

608-4.03 Brick-Paved Sidewalks and Driveways. Brick paving shall be measured as the number of square yards installed, measured to the nearest 0.1 square yard.

608-4.04 Grouted Stone Block Paved Sidewalks and Driveways. Grouted stone block paving shall be measured as the number of square yards installed, measured to the nearest 0.1 square yard.

608-4.05 Precast Concrete Block Paved Sidewalks and Driveways. Precast concrete paving will be measured by the number of square yards installed, measured in the field to the nearest 0.1 square yard.

608-4.06 Surface-Applied Detectable Warning Units. Surface-applied detectable warning units will be measured as the number of square yards installed, measured in the field to the nearest 0.1 square yard.

608-4.07 Embedded Detectable Warning Units. Embedded Detectable Warning Units will be measured as the number of square yards installed, measured in the field to the nearest 0.1 square yard.

608-4.08 Stamped Concrete Detectable Warnings. Stamped concrete detectable warnings will be measured as the number of square yards installed, measured in the field to the nearest 0.1 square yard.

608-5 BASIS OF PAYMENT

608-5.01 Portland Cement Concrete Sidewalks and Driveways. The unit price bid per cubic yard shall include the cost of labor, materials, and equipment necessary to satisfactorily complete the work, including preparing the subgrade, saw cutting and wire fabric reinforcement, except that any necessary excavation and subbase course will be paid for under their appropriate items.

Payment at the unit bid price will be made after the concrete sidewalk or driveway, and curing application have been properly placed.

608-5.02 Hot Mix Asphalt (HMA) Sidewalks, Driveways, Bicycle Paths, and Vegetation Control Strips. The unit price bid per ton shall include the cost of preparing the subgrade and all materials, equipment and labor (including milling, cleaning surfaces, tack coat, saw cut, truing and leveling courses, etc.) necessary to complete the work as specified except that any necessary excavation and subbase course will be paid for under their appropriate items. When there is a disincentive, the payment adjustment 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 shall be considered the price bid. The unit (index) price is NOT to be altered in any manner by the bidder. Should the bidder alter the price shown, the altered figure will be disregarded and the original price will be used to determine
the total amount bid for the contract.

608-5.03 Brick-Paved Sidewalks and Driveways. The price bid per square yard shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including setting bed material, except that any necessary excavation and subbase course will be paid for under their appropriate items.

608-5.04 Grouted Stone Block Paved Sidewalks and Driveways. The unit bid per square yard shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including setting bed material, except that any necessary excavation and subbase course will be paid for under their appropriate items.

608-5.05 Precast Concrete Block Paved Sidewalks and Driveways. The unit price bid per square yard shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work, including setting bed material, except that any necessary excavation and subbase course will be paid for under their appropriate items.

608-5.06 Surface-Applied Detectable Warning Units. The unit bid price per square yard shall include all labor, material, and equipment necessary to satisfactorily complete the work, including surface preparation.

608-5.07 Embedded Detectable Warning Units. The unit bid price per square yard shall include all labor, material, and equipment necessary to satisfactorily complete the work, including bedding material. No adjustment shall be made for concrete removed to accommodate embedded units.

608-5.08 Stamped Concrete Detectable Warnings. The unit bid price per square yard shall include all labor, material, and equipment necessary to satisfactorily complete the work, including construction of contract site sample(s).

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>608.0101</td>
<td>Concrete Sidewalks and Driveways</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>608.0102</td>
<td>Accelerated-Cure Sidewalks and Driveways</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>608.020102</td>
<td>Hot Mix Asphalt (HMA) Sidewalks, Driveways, Bicycle Paths, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation Control Strips</td>
<td></td>
</tr>
<tr>
<td>608.020112</td>
<td>Plant Production Quality Adjustment to 608.020102</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>608.03</td>
<td>Brick-Paved Sidewalks and Driveways (Sand Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.04</td>
<td>Brick-Paved Sidewalks and Driveways (Mortar Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.05</td>
<td>Brick-Paved Sidewalks and Driveways (Bituminous Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.06</td>
<td>Brick-Paved Sidewalks and Driveways (Sand-Cement Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.07</td>
<td>Brick-Paved Sidewalks and Driveways (Optional Concrete Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.08</td>
<td>Grouted Stone Block Paved Sidewalks and Driveways (Sand Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.09</td>
<td>Grouted Stone Block Paved Sidewalks and Driveways (Mortar Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.10</td>
<td>Grouted Stone Block Paved Sidewalks and Driveways (Sand-Cement Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.11</td>
<td>Grouted Stone Block Paved Sidewalks and Driveways (Optional Concrete Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.12</td>
<td>Precast Concrete Block Paved Sidewalks and Driveways (Granular Material Setting Bed)</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.20</td>
<td>Surface-Applied Detectable Warning Units</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.21</td>
<td>Embedded Detectable Warning Units</td>
<td>Square Yard</td>
</tr>
<tr>
<td>608.22</td>
<td>Stamped Concrete Detectable Warning Units</td>
<td>Square Yard</td>
</tr>
</tbody>
</table>
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.


619-2.11 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.


619-2.15 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) Traffic 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 I 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.
### 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>
<thead>
<tr>
<th>Posted Speed Limit (mph)</th>
<th>Placement Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Barrier Vehicles</td>
</tr>
<tr>
<td></td>
<td>18,000 lb</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>100</td>
</tr>
<tr>
<td>45-55</td>
<td>100</td>
</tr>
<tr>
<td>≤45</td>
<td>80</td>
</tr>
<tr>
<td>Shadow Vehicles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 55</td>
</tr>
<tr>
<td></td>
<td>50-55</td>
</tr>
<tr>
<td></td>
<td>≤45</td>
</tr>
</tbody>
</table>

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.

Cone 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**

Short-Term Stationary Work Zones involve daytime work that occupies a location for more than one hour and up to a single daylight period.

| Channelizing Device | Maximum Device Spacing (center to center) | Shoulder/Merging/Shifting | One-Lane Taper for Alternating Two-Way Traffic | Longitudinal Lane or Shoulder Closure w/Workers | Longitudinal Lane or Shoulder Closure w/No Workers | Freeway / Expressway Gores | Marking for Transverse Bumps | Transverse Device within Closed Traffic Lane and/or | Roadway edge exposed with no Edgeline or Permanent Delineators | Roadway Intersection or Commercial Driveway Radii | Residential Driveway Radii | Removal of existing guide rail | Pavement Drop offs > 2 in. and < 24 in. |
|---------------------|------------------------------------------|---------------------------|------------------------------------------------|-----------------------------------------------|------------------------------------------------|---------------------------|-----------------------------|------------------------------------------------|------------------------------------------------|-----------------------------------------------|---------------------------------------------|---------------------------------|----------------------------------------|-----------------------------|
|                     | Drums | Standard Cones | Extra Tall Cones | Temporary Tubular Markers | Interim Tubular Markers | Vertical Panels | Oversized Vertical Barricades | Type II Barricades | Type III Barricades |
| Shoulder width ≥ 4 ft. | 80 ft. | X | X | X | X | X | X | O |
| Shoulder width < 4 ft. | 40 ft. | X | X | X | X | X | X | O |
| 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 | X |
| Removal of existing guide rail | Shoulder width ≥ 4 ft. | 80 ft. | X | X | X | X | X | O |
| Removal of existing guide rail | Shoulder width < 4 ft. | 40 ft. | X | X | X | X | X | O |
| Pavement Drop offs > 2 in. and < 24 in. | See Table 619-4 |

**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 619-3A CHANNELIZING DEVICE APPLICATION FOR SHORT-TERM STATIONARY WORK ZONES**

<table>
<thead>
<tr>
<th>Work Zone Provisions</th>
<th>Maximum Device Spacing (center to center)</th>
<th>Channelizing Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder/Merging/Shifting</td>
<td>&lt; 40 mph</td>
<td>20 ft. X X X X</td>
</tr>
<tr>
<td>Tapers</td>
<td>≥ 40 mph</td>
<td>40 ft. X X X X</td>
</tr>
<tr>
<td>One-Lane Taper for Alternating Two-Way Traffic</td>
<td>20 ft.</td>
<td>X X X X X X</td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/Workers</td>
<td>40 ft.</td>
<td>X X X X X X</td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/No Workers</td>
<td>80 ft.</td>
<td>X X X X X X</td>
</tr>
<tr>
<td>Freeway / Expressway Gores</td>
<td>20 ft.</td>
<td>X X X X X</td>
</tr>
<tr>
<td>Marking for Transverse Bumps</td>
<td>N/A</td>
<td>X X</td>
</tr>
<tr>
<td>Transverse Device within Closed Traffic Lane and/or</td>
<td>800 ft.</td>
<td>X X X X</td>
</tr>
<tr>
<td>Roadway edge exposed with no Edgeline or Permanent Delineators</td>
<td>200 ft.</td>
<td>X X X</td>
</tr>
<tr>
<td>Roadway Intersection or Commercial Driveway Radii</td>
<td>6 ft.</td>
<td>X X X X</td>
</tr>
<tr>
<td>Residential Driveway Radii</td>
<td>6 ft.</td>
<td>X X X X</td>
</tr>
<tr>
<td>Removal of existing guide rail</td>
<td>Shoulder width ≥ 4 ft.</td>
<td>80 ft.</td>
</tr>
<tr>
<td>Removal of existing guide rail</td>
<td>Shoulder width &lt; 4 ft.</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Pavement Drop offs &gt; 2 in. and &lt; 24 in.</td>
<td>See Table 619-4</td>
<td></td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Work Zone Provisions</th>
<th>Channelizing Device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum Device Spacing (center to center)</td>
</tr>
<tr>
<td>Intermediate-term and Long-Term Stationary Work Zones involve work that occupies a location for more than 1 daylight period or nighttime work that occupies a location for more than 1 hour</td>
<td>Drums</td>
</tr>
<tr>
<td>Shoulder/Merging/Shifting Tapers &lt;40 mph</td>
<td>20 ft.</td>
</tr>
<tr>
<td>Shoulder/Merging/Shifting Tapers ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>One-Lane Taper for Alternating Two-Way Traffic &lt;40 mph</td>
<td>20 ft.</td>
</tr>
<tr>
<td>One-Lane Taper for Alternating Two-Way Traffic ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/Workers &lt;40 mph</td>
<td>20 ft.</td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/Workers ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Freeway / Expressway Gores &lt;40 mph</td>
<td>20 ft.</td>
</tr>
<tr>
<td>Freeway / Expressway Gores ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Freeway / Expressway Gores w/Workers &lt;40 mph</td>
<td>20 ft.</td>
</tr>
<tr>
<td>Freeway / Expressway Gores w/Workers ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Marking for Transverse Bumps 1</td>
<td>N/A</td>
</tr>
<tr>
<td>Transverse Device within Closed Traffic Lane and/or Roadway Intersection or Commercial Driveway Radii &lt;40 mph</td>
<td>800 ft.</td>
</tr>
<tr>
<td>Transverse Device within Closed Traffic Lane and/or Roadway Intersection or Commercial Driveway Radii ≥ 40 mph</td>
<td>400 ft.</td>
</tr>
<tr>
<td>Roadway edge exposed with no Edgeline or Permanent Delineatators &lt;40 mph</td>
<td>200 ft.</td>
</tr>
<tr>
<td>Roadway edge exposed with no Edgeline or Permanent Delineatators ≥ 40 mph</td>
<td>400 ft.</td>
</tr>
<tr>
<td>Roadway Intersection or Commercial Driveway Radii &lt;40 mph</td>
<td>6 ft.</td>
</tr>
<tr>
<td>Roadway Intersection or Commercial Driveway Radii ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Residential Driveway Radii &lt;40 mph</td>
<td>6 ft.</td>
</tr>
<tr>
<td>Residential Driveway Radii ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Removal of existing guide rail &lt;40 mph</td>
<td>80 ft.</td>
</tr>
<tr>
<td>Removal of existing guide rail ≥ 40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Pavement Drop offs &gt; 2 in. and &lt; 24 in.</td>
<td>See Table 619-4</td>
</tr>
<tr>
<td>Drop off ≥ 24 in. with in 10 ft. of active travel way;</td>
<td>20 ft.</td>
</tr>
<tr>
<td>Posted speed ≤45 mph; Drop off Length ≤ 100 ft.; Not to last longer than 1 work shift</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Two-Lane Two-Way Operations on expressways and freeways at along curves &lt;40 mph</td>
<td>20 ft.</td>
</tr>
<tr>
<td>Two-Lane Two-Way Operations on expressways and freeways at along tangents &lt;40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Two-Lane Two-Way Operations on expressways and freeways between Crossovers &lt;40 mph</td>
<td>40 ft.</td>
</tr>
<tr>
<td>Two-Lane Two-Way Operations on expressways and freeways between Crossovers ≥ 40 mph</td>
<td>80 ft.</td>
</tr>
<tr>
<td>Closed Roads &lt;40 mph</td>
<td>N/A</td>
</tr>
<tr>
<td>Closed Sidewalks &lt;40 mph</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Drop-Off Height</th>
<th>Edge Line Pavement Markings</th>
<th>Drum Spacing (feet)</th>
<th>Vertical Panel Spacing (feet)</th>
<th>Tubular Marker Spacing (feet)</th>
<th>Tall Cone Spacing (feet)</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DROP-OFF AT OR WITHIN SHOULDER AREA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within 4 ft. from Travel Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
<td></td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>20</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
<td></td>
</tr>
<tr>
<td>More than 4 ft. from Travel Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>200</td>
<td>200</td>
<td>100</td>
<td>100</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>No Shoulder</td>
<td></td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
<td></td>
</tr>
</tbody>
</table>

**DROP-OFF OUTSIDE OF SHOULDER EDGE**

<table>
<thead>
<tr>
<th>Shoulder width ≤ 4 ft.</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
<td></td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shoulder width &gt; 4 ft.</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>200</td>
<td>200</td>
<td>100</td>
<td>100</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>No Shoulder</td>
<td></td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
<td></td>
</tr>
</tbody>
</table>

**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 (NYI8-4) 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 ¼ 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**

<table>
<thead>
<tr>
<th>BARRIER TYPE</th>
<th>POST SPACING (ft)</th>
<th>DEFLECTION DISTANCES (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABLE GUIDE RAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>7.0</td>
</tr>
<tr>
<td>CORRUGATED W-BEAM (WEAK POST)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GUIDE RAIL</td>
<td>12.5</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>6.25</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>4.16</td>
<td>5.0</td>
</tr>
<tr>
<td>CORRUGATED W-BEAM (HEAVY POST BLOCKED OUT)</td>
<td>6.25</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>3.12</td>
<td>2.0</td>
</tr>
<tr>
<td>BOX BEAM GUIDE RAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>CORRUGATED W-BEAM (WEAK POST)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIAN BARRIER</td>
<td>12.5</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>6.25</td>
<td>5.0</td>
</tr>
<tr>
<td>CORRUGATED W-BEAM (HEAVY POST)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIAN BARRIER</td>
<td>6.25</td>
<td>2.0</td>
</tr>
<tr>
<td>BOX BEAM MEDIAN BARRIER</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>3.0</td>
</tr>
<tr>
<td>TEMPORARY CONCRETE BARRIER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNPINNED STIFFENED WITH BOX BEAM</td>
<td>Not Applicable</td>
<td>3.3**</td>
</tr>
<tr>
<td>PINNED</td>
<td></td>
<td>2.2**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.8**</td>
</tr>
</tbody>
</table>

* 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 Contractors' 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 or 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:

\[
\text{Width of Striping (in) x Number of Feet} \div 4 \text{ (in)}
\]

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: SCHOOL would be measured as six units. Each R in a railroad crossing marking will be measured as a single unit, but the Ā 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:

\[
\text{Width of Striping (in)} \times \text{Number of Feet} \div 4 \text{ (in)}
\]

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:

\[
\text{Width of Striping (in)} \times \text{Number of Feet} \div 4 \text{ (in)}
\]

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: SCHOOL would be measured as six units. Each R in a railroad crossing marking will be measured as a single unit, but the Ā 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>
<thead>
<tr>
<th>Original Contract Amount</th>
<th>To and Including</th>
<th>Nonpayment Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 0</td>
<td>$ 500,000</td>
<td>$ 200</td>
</tr>
<tr>
<td>$ 500,000</td>
<td>$ 2,000,000</td>
<td>$ 400</td>
</tr>
<tr>
<td>$ 2,000,000</td>
<td>$ 5,000,000</td>
<td>$ 500</td>
</tr>
<tr>
<td>$ 5,000,000</td>
<td>$ 10,000,000</td>
<td>$ 750</td>
</tr>
<tr>
<td>$ 10,000,000</td>
<td>$ 20,000,000</td>
<td>$ 1,000</td>
</tr>
<tr>
<td>$ 20,000,000</td>
<td>-----</td>
<td>$ 3,000</td>
</tr>
</tbody>
</table>

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 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:**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>619.01</td>
<td>Basic Work Zone Traffic Control</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>619.0101</td>
<td>Basic Work Zone Traffic Control (Daily Operations)</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>619.04</td>
<td>Type III Construction Barricades</td>
<td>Each</td>
</tr>
<tr>
<td>619.06mn</td>
<td>Temporary Structures and Approachess</td>
<td>Each</td>
</tr>
<tr>
<td>619.0701</td>
<td>Temporary Business Signs</td>
<td>Square Feet</td>
</tr>
<tr>
<td>619.0801</td>
<td>Remove Existing Pavement Marking Stripes</td>
<td>Feet</td>
</tr>
<tr>
<td>619.0802</td>
<td>Remove Existing Pavement Marking Letters or Symbols</td>
<td>Each</td>
</tr>
<tr>
<td>619.0803</td>
<td>Cover Existing Pavement Marking Stripes (Removable Tape)</td>
<td>Feet</td>
</tr>
<tr>
<td>619.0804</td>
<td>Cover Existing Pavement Marking Letters or Symbols (Removable Tape)</td>
<td>Each</td>
</tr>
<tr>
<td>619.09xx</td>
<td>Temporary Pavement Markings, Stripes</td>
<td>Feet</td>
</tr>
<tr>
<td></td>
<td>xx = Material</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01 = Traffic Paint, 03 = Removable Tape,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>04 = Removable Wet Reflective Tape,</td>
<td></td>
</tr>
<tr>
<td>619.1001xx</td>
<td>Interim Pavement Markings, Stripes</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1002xx</td>
<td>Interim Pavement Markings, Symbols</td>
<td>Each</td>
</tr>
<tr>
<td>619.1003xx</td>
<td>Interim Pavement Markings, Letters</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td>xx = Material</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01 = Traffic Paint, 02 = Epoxy Paint, 03 = Removable Tape,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>04 = Removable Wet Reflective Tape,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>05 = Traffic Paint Supplemented with Raised Markers</td>
<td></td>
</tr>
<tr>
<td>619.1101xx</td>
<td>Portable, Variable Message Sign (PVMS) (Hybrid Flip Disk)</td>
<td>Each</td>
</tr>
<tr>
<td>619.1102xx</td>
<td>Portable, Variable Message Sign (PVMS) (LED)</td>
<td>Each</td>
</tr>
<tr>
<td>619.1103xx</td>
<td>Portable, Variable Message Sign (PVMS) (Hybrid Flip Disk)</td>
<td>Week</td>
</tr>
<tr>
<td>619.1104xx</td>
<td>Portable, Variable Message Sign (PVMS) (LED)</td>
<td>Week</td>
</tr>
<tr>
<td></td>
<td>xx = Options</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01 = None, 02 = Cellular Communications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>03 = Radar, 04 = Cellular Communications and Radar</td>
<td></td>
</tr>
<tr>
<td>619.12</td>
<td>Temporary Glare Screen</td>
<td>Feet</td>
</tr>
<tr>
<td>619.13nn</td>
<td>Temporary Traffic Signals</td>
<td>Each Location</td>
</tr>
<tr>
<td>619.1611</td>
<td>Maintain Traffic Signal Equipment (Requirement A)</td>
<td>Intersection Month</td>
</tr>
<tr>
<td>619.1612</td>
<td>Maintain Traffic Signal Equipment (Requirement B)</td>
<td>Intersection Month</td>
</tr>
<tr>
<td>619.1613</td>
<td>Maintain Traffic Signal Equipment (Requirement C)</td>
<td>Intersection Month</td>
</tr>
<tr>
<td>619.1614nn</td>
<td>Modify Existing Traffic Signal Equipment (Temporary)</td>
<td>Each Location</td>
</tr>
<tr>
<td>619.1701</td>
<td>Temporary Concrete Barrier (Unpinned)</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1702</td>
<td>Temporary Concrete Barrier (Unpinned) with Warning Lights</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1703</td>
<td>Temporary Concrete Barrier (Pinned)</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1704</td>
<td>Temporary Concrete Barrier (Pinned) with Warning Lights</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1705</td>
<td>Temporary Concrete Barrier (Stiffened with Box Beam)</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1706</td>
<td>Temporary Concrete Barrier (Stiffened with Box Beam) with Warning Lights</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1707</td>
<td>Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)</td>
<td>Feet</td>
</tr>
<tr>
<td>619.1708</td>
<td>Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)</td>
<td>Feet</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Unit</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>619.1802</td>
<td>Temporary Impact Attenuator - Redirective (Test Level 2)</td>
<td>Each</td>
</tr>
<tr>
<td>619.1803</td>
<td>Temporary Impact Attenuator - Redirective (Test Level 3)</td>
<td>Each</td>
</tr>
<tr>
<td>619.1812</td>
<td>Temporary Impact Attenuator - Gating (Test Level 2)</td>
<td>Each</td>
</tr>
<tr>
<td>619.1813</td>
<td>Temporary Impact Attenuator - Gating (Test Level 3)</td>
<td>Each</td>
</tr>
<tr>
<td>619.20</td>
<td>Interim Tubular Markers</td>
<td>Each</td>
</tr>
<tr>
<td>619.21</td>
<td>Temporary Sand Barrel Module</td>
<td>Each</td>
</tr>
<tr>
<td>619.22</td>
<td>Temporary Rumble Strips</td>
<td>Feet</td>
</tr>
<tr>
<td>619.23</td>
<td>Vehicle Arresting Barrier</td>
<td>Each</td>
</tr>
<tr>
<td>619.24</td>
<td>Nighttime Operations</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>619.25</td>
<td>Traffic Control Supervisor</td>
<td>Month</td>
</tr>
<tr>
<td>619.26</td>
<td>Pavement Patching, Winter</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>619.27</td>
<td>Mailboxes</td>
<td>Each</td>
</tr>
</tbody>
</table>
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.
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
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:**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>621.01</td>
<td>Cleaning Culverts with Span of 50 in. or Less</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.02</td>
<td>Cleaning Culverts with Span of More Than 50 in.</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.03</td>
<td>Cleaning Closed Drainage Systems</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.04</td>
<td>Cleaning Drainage Structures</td>
<td>Each</td>
</tr>
<tr>
<td>621.05</td>
<td>Clean, Grade and Shape Existing Roadside Section</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.11</td>
<td>Cleaning Culverts (Contaminated Material) with Span of 50 in. or Less</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.12</td>
<td>Cleaning Culverts (Contaminated Material) with Span of More Than 50 in.</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.13</td>
<td>Cleaning Closed Drainage Systems (Contaminated Material)</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.14</td>
<td>Cleaning Drainage Structures (Contaminated Material)</td>
<td>Each</td>
</tr>
<tr>
<td>621.15</td>
<td>Clean (Contaminated Material), Grade and Shape Existing Roadside Section</td>
<td>Linear Foot</td>
</tr>
</tbody>
</table>

**SECTION 622 (VACANT)**
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.**
SURVEY OPERATIONS

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 manufacture to the date 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 (e.g., 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.
SURVEY OPERATIONS

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.

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.
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
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.
SURVEY OPERATIONS

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 reference 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.

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
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 (FGDC) 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.
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
SURVEY OPERATIONS

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.
SURVEY OPERATIONS

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:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>625.01</td>
<td>Survey Operations</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>625.03</td>
<td>Concrete Right of Way Markers Type H (High)</td>
<td>Each</td>
</tr>
<tr>
<td>625.04</td>
<td>Concrete Right of Way Markers Type L (Low)</td>
<td>Each</td>
</tr>
<tr>
<td>625.05</td>
<td>Steel Pin and Cap Right of Way Markers</td>
<td>Each</td>
</tr>
<tr>
<td>625.06</td>
<td>Permanent Survey Markers</td>
<td>Each</td>
</tr>
<tr>
<td>625.07</td>
<td>Supplemental Site Survey</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>625.11</td>
<td>Survey Grade GPS Inspection Unit</td>
<td>Each</td>
</tr>
<tr>
<td>625.12</td>
<td>Mapping Grade GPS Inspection Unit</td>
<td>Each</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>637.10</td>
<td>CHAMP® Management System</td>
<td>Dollars-Cents</td>
</tr>
<tr>
<td>637.24</td>
<td>Digital Camera</td>
<td>Dollars-Cents</td>
</tr>
</tbody>
</table>
Make the following changes to the Standard Specifications of May 1, 2008

Delete §637-1.13 (Vacant) and replace with “637-1.13 Construction Testing Supplies - Consumables. This work shall consist of providing consumable testing supplies to be used by inspection staff.”

Delete §637-2.13 (Vacant) and replace with “637-2.13 Construction Testing Supplies – Consumables. Consumable testing materials as specified by the Engineer.”

Delete §637-3.13 (Vacant) and replace with “637-3.13 Construction Testing Supplies - Consumables. The Contractor shall provide consumable testing materials for the exclusive use of Department personnel and their authorized representatives. The supplies shall be provided within five (5) working days of the Engineer’s request, unless the Engineer agrees to a longer delivery time. The Department shall retain ownership of the consumable testing materials, both materials used and those materials unused for which the Contractor has been paid, at the completion of the contract.”

Delete §637-4.13 (Vacant) and replace with “637-4.13 Construction Testing Supplies – Consumables. Construction testing supplies will be measured for payment on a fixed price Dollars-Cents pay unit basis.”

Delete §637-5.13 (Vacant) and replace with “637-5.13 Construction Testing Supplies – Consumables. Construction testing supplies is a “draw-down” item. As the materials are supplied, the receipts shall be submitted to the Engineer. The Contractor will be reimbursed for receipted costs of materials plus 5% for profit and overhead (“materials” includes all labor, materials and equipment, including delivery charges from vendor sources).”

Add the following to the contract pay items list:

“637.36 Construction Testing supplies – Consumables Dollars-Cents”
POLE MOUNTED SIGN SUPPORT SYSTEM

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

*delete 645-3.07 Pole-Mounted Sign Support Systems in its entirety and replace with the following:*

“645-3.07 Pole-Mounted Sign Support System. Pole-Mounted Sign Support System, as defined in 645-2.07, shall be firmly attached to the pole in accordance with the standard sheets and/or manufacturer's instructions.

   **A. Panels without Z-bar stiffeners:**
   Sign panels less than or equal to 18 inches wide, shall be attached to the pole with at least two bands. Sign panels less than or equal to 18 inches wide and longer than 30 inches, shall be attached to the pole with at least three bands.

   **B. Panels and assemblies with Z-bar stiffeners:**
   Sign panels greater than 18 inches wide and sign panel assemblies shall be banded to the pole at each horizontal Z-bar stiffener, as shown on the standard sheets.

Sign Panels mounted with this type of sign support shall not be greater than 48 inches wide, and shall not be greater than 60 inches in height. Sign panel assemblies mounted with this type of sign support shall not be greater than 48 inches wide.”
Make the following changes to the Standard Specifications of May 1, 2008 US Customary Units:

**Page 661 thru 663 Delete** Section 646 - DELINEATORS, REFERENCE MARKERS AND SNOWPLOWING MARKERS in its entirety, and **Replace** it with the following:

**“SECTION 646 - DELINEATORS, REFERENCE MARKERS AND SNOWPLOWING MARKERS**

**646-1 DESCRIPTION.** Furnish and install delineators, reference markers and snowplowing markers in accordance with the MUTCD, contract documents and as directed by the Engineer.

**646-1.01 Delineators.** Delineators are retroreflective sheeting applied to panels mounted on posts or applied to flexible units, which are installed along the highway to serve as driving aids.

**646-1.02 Reference Markers.** Reference markers are panels with a legend, placed at approximately 528 ft (1/10 mile) intervals along the highway, to provide a numerical location reference.

**646-1.03 Snowplowing Markers and Supplementary Snowplowing Markers.** Snowplowing markers and supplementary snowplowing markers are reflective units installed along the highway to identify guiderail sections for snowplow operators.

**646-2 MATERIALS.**

<table>
<thead>
<tr>
<th>Galvanized Coating and Repair Methods</th>
<th>719-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Sign Panels</td>
<td>730-01</td>
</tr>
<tr>
<td>Reflective Sheeting</td>
<td>730-05</td>
</tr>
<tr>
<td>Delineator, Reference Marker and Snowplowing Marker Posts</td>
<td>730-20</td>
</tr>
<tr>
<td>Flexible Delineator Posts</td>
<td>730-21</td>
</tr>
<tr>
<td>Stiffeners, Overhead Brackets and Miscellaneous Hardware</td>
<td>730-22</td>
</tr>
</tbody>
</table>

**646-2.01 Posts.** Galvanized steel posts as shown on the standard sheets and used for mounting panels.

**646-2.02 Panels.** Panels for backing of retro-reflective sheeting and installed on a post or other structure. Holes may be punched or drilled. Edges shall be smooth and true and free from burrs or ragged breaks. Panels shall be fabricated as shown on the standard sheets.

**646-2.03 Flexible Delineator Posts.** Plastic or other polymer units with retroreflective sheeting applied directly to the surface of the flexible delineator and installed directly along a highway.

**646-2.04 Retro-Reflective Material.**

<table>
<thead>
<tr>
<th>Delineators</th>
<th>730-05.05 ASTM Type IX (Class E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowplowing Markers, Supplementary Snowplowing Markers, and Reference Markers</td>
<td>730-05.02 ASTM Type III (Class B), 730-05.03 ASTM Type V (Class C) or 730-05.05 ASTM Type IX (Class E)</td>
</tr>
</tbody>
</table>

On any one contract all of the delineators must be fabricated from the same material, all of the snowplowing markers and supplementary snowplowing markers must be fabricated from the same material and all of the reference markers must be fabricated from the same material but the material may differ between the delineators, the snowplowing markers, the supplementary snowplowing markers and the reference markers.
646-2.05 Fasteners. Stainless steel, galvanized steel or aluminum as shown on the standard sheets.

646-2.06 Brackets. Aluminum alloy, galvanized steel or polycarbonate as shown on the standard sheets.

646-2.07 Corrosion Protection.

Provide and use either an approved mastic or 1/8 inch thick plastic pad placed between aluminum and steel to prevent dissimilar metals from coming in direct contact with each other.

646-3 CONSTRUCTION DETAILS

646-3.01 Fabrication. Delineators, reference markers, snowplowing markers, and supplementary snowplowing markers fabricated as shown on the standard sheets. Fabricate reference markers with legend content as shown on the contract documents.

646-3.02 Installation. Install at the locations and spacing as shown on the contract documents or as ordered by the Engineer. Directional orientation, arrangement, number and color of reflector units, at any given location shall be as shown on the contract documents.

Install reference markers at approximately 528 ft (1/10 mile) intervals along the highway on new construction, at existing locations for replacement units, or as ordered by the Engineer. The Contractor will be given the location of each marker.

Install flexible delineator posts as per the manufacturer’s recommendations and as directed by the Engineer.

Erect delineator, reference marker and snowplowing/supplemental snowplowing marker panels on posts, brackets, existing posts and structures in the manner shown on the standard sheets.

After the installation, an inspection by the Engineer will be made in the day time for proper location, line and grade, vertical post alignment and visibility. A night inspection will also be performed to evaluate orientation, retroreflectivity and defects more conspicuous at night. Correct all apparent defects disclosed after the day and night inspections at no additional cost to the State.

When panels are installed on walls, bridges, existing posts, poles or structures, do not damage the appearance or structural features of the existing facilities. Repair or replace all damaged features to the satisfaction of the Engineer and at no additional cost to the State.

646-3.03 Panel Relocation. Carefully remove panels to be relocated and stockpile them in a safe above ground location as shown in the Contract documents or at a location satisfactory to the Engineer. Protect the panels, including the retroreflective sheeting, from damage. Replace all damaged panels at no cost to the State.

Remove and dispose of all existing posts and/or hardware used only for the support of the existing panels. Removed posts shall become the property of the Contractor and shall be removed from the work site in a neat and skillful manner.

Re-erect relocated panels on new posts, brackets, or bands at the locations specified in the contract documents or as directed by the Engineer.

646-4 METHOD OF MEASUREMENT. Delineators, reference markers, snowplowing markers, supplementary snowplowing markers, flexible delineator posts, posts and brackets will be measured as the number of complete panels, brackets and posts installed. In the event a section of highway is under
construction by others and reference markers cannot be installed, they will be measured as the number of marker panels and posts furnished only. Relocated panels will be measured as the number of panels relocated.

646-5 BASIS OF PAYMENT. The unit price bid shall include the cost of all materials, equipment and labor necessary to satisfactorily complete the work. Cost of mounting hardware will be included with the cost of the panels.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>646.21</td>
<td>Reference Marker Panel</td>
<td>Each</td>
</tr>
<tr>
<td>646.22</td>
<td>Delineator, Snowplowing Marker, Supplementary Snowplowing Marker Panels</td>
<td>Each</td>
</tr>
<tr>
<td>646.23</td>
<td>Large Delineator, Large Snowplowing Marker, Large Supplementary Snowplowing Marker Panel</td>
<td>Each</td>
</tr>
<tr>
<td>646.24</td>
<td>Reference Marker, Delineator, Snowplowing Marker, Supplementary Snowplowing Marker Panels Relocation</td>
<td>Each</td>
</tr>
<tr>
<td>646.31</td>
<td>Steel Post, 1.1 lb/ft</td>
<td>Each</td>
</tr>
<tr>
<td>646.32</td>
<td>Steel Post, 2.0 lb/ft</td>
<td>Each</td>
</tr>
<tr>
<td>646.40</td>
<td>Flexible Delineator, Single Unit, One Way</td>
<td>Each</td>
</tr>
<tr>
<td>646.41</td>
<td>Flexible Delineator, Single Unit, Back to Back</td>
<td>Each</td>
</tr>
<tr>
<td>646.42</td>
<td>Flexible Delineator, Double Unit</td>
<td>Each</td>
</tr>
<tr>
<td>646.50</td>
<td>Brackets for Barrier and Multidirectional Mounting</td>
<td>Each</td>
</tr>
</tbody>
</table>
Make the following changes to the Standard Specifications of May 1, 2008:

Delete Section 649 (VACANT) and replace with the following:

SECTION 649 – AUDIBLE ROADWAY DELINEATORS

649-1 DESCRIPTION. Audible delineators are depressions placed on the road surface to serve as driving aids. This work shall consist of installing audible roadway delineators where indicated on the contract documents.

649-2 MATERIALS. None specified.

649-3 CONSTRUCTION DETAILS

Milled-In Audible Roadway Delineators (MIARDs).

A. Equipment. The construction equipment shall include a rotary type cutting head capable of cutting the MIARD depressions to the dimensions and at the spacing indicated on the Standard Sheets. The pattern of cutting tips on the head shall be arranged to produce a relatively smooth cut with approximately 1/16 inch between peaks and valleys. Prior to beginning full production work on asphalt shoulders, the Contractor shall demonstrate to the Engineer the ability to achieve the desired surface without tearing or snagging the asphalt to be milled.

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 shoulder and/or any irregularities in the shoulder surface. The cutting tool shall be equipped with guides or a guidance system, clearly visible to the operator, to provide for consistent alignment of each MIARD at the offsets from traveled way indicated on the project plans. Where directed by the Plans or EIC to mill in MIARDs in areas marked with crosshatching, the spacing of the MIARDs shall be adjusted to minimize damage to the markings. No milling shall be done within 4 inches of transverse joints.

B. Installation and Dimensions. The finished MIARDs shall conform to the dimensions and spacing shown on the Standard Sheets. The milling machine shall be capable of grinding to within 3 feet of an obstruction. The offset from traveled way may be changed at the EIC's discretion.

At the end of each working day, the Contractor shall remove all equipment to a location where it does not present a hazard to traffic. The pavement shall be cleaned by sweeping and the work area shall be reopened to traffic. The milled material shall be thoroughly removed from the shoulders. In uncurbed areas, the millings may be swept off the shoulder to serve as shoulder back-up material. In curbed areas, millings shall be removed from the project and disposed of in an acceptable manner.

Centerline Audible Roadway Delineators (CARDs).

A. Scheduling and Coordination. Because of the need to promptly replace pavement markings and reopen the highway to traffic, milling of CARDs shall not be conducted when conditions would not allow pavement markings to be placed soon after. To facilitate prompt placement of pavement markings by either the Department’s pavement marking crews or the Contractor as indicated in the contract documents, all work shall be done between April 1 and November 30 Downstate (in the counties of Dutchess, Orange, Rockland, Putman, Westchester, Nassau, Suffolk, and the City of New York) and between May 1 and October 31 Upstate (all other counties). If the contract documents indicate that pavement markings will be installed by the Department, the Contractor shall inform the Engineer of the planned work schedule and the Engineer will coordinate with the Department’s pavement marking crew chief. If the contract documents indicate that pavement markings will be installed by the Contractor, pavement markings shall be installed...
within three calendar days, measuring from the date on which the markings at that point were first
removed.

Gaps: Prior to milling, the Contractor shall obtain EIC approval on where CARDs are to be installed and
where gaps are to be included.

B. Timing of CARD Placements. New asphalt pavement should be allowed to harden for at least 24 hours
before CARDs are milled in, so that the milling machine does not tear the asphalt and so that asphalt does
not build up on the cutters. Temporary Pavement Markings, in conformance with Section 619-3.06, shall
be installed during this hardening period. If tape is used, it shall be removed before milling commences.
After the CARDs have been milled and the millings have been removed, the permanent pavement markings
can be installed.

C. Equipment. The construction equipment shall include a rotary type cutting head capable of cutting the
CARD depressions to the dimensions and at the spacing indicated on the Standard Sheets. The pattern of
cutting tips on the head shall be arranged to produce a relatively smooth cut with approximately 1/16 inch
between peaks and valleys. Prior to beginning full production work, the contractor shall demonstrate to the
Engineer the ability to achieve the desired surface without tearing or snagging the asphalt.

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 surface. The cutting
tool shall be equipped with guides or a guidance system, clearly visible to the operator, to provide for
consistent alignment of each CARD relative to the centerline markings.

D. Installation and Dimensions. The Contractor shall provide Maintenance and Protection of Traffic as
indicated in the contract documents.

CARDs shall be installed within the limits indicated in the contract documents. Unless indicated otherwise
in the contract documents, CARDs shall be centered on the middle of the centerline marking pattern. No
milling shall be done within 4 inches of sawn and sealed transverse joints. CARDs shall not be carried
through any intersection where the CARD’s direction of travel is controlled by a yield sign, stop sign, or
traffic light, or would encounter crosswalks. In those instances, the CARD shall stop before any stop line
or crosswalk. CARDs shall not be carried through any crosswalks or across any concrete bridge deck or
concrete culvert surface. Treatment for left turn lanes shall be as shown on the Standard Sheets.

At the end of each working day, the Contractor shall remove all equipment to a location where it does not
present a hazard to traffic. The pavement shall be cleaned by sweeping and the work area shall be reopened
to traffic. Millings shall be thoroughly removed from the work area and disposed of in an acceptable
manner.

649-4 METHOD OF MEASUREMENT. Audible Roadway Delineators will be measured as the sum of the
lengths in linear feet of the individual segments where audible roadway delineators have been satisfactorily
installed. Individual gaps and exclusions under 100 feet in length will be included in segments identified for
payment. Individual gaps and exclusions 100 feet or more in length will be excluded from segments identified for
payment.

For milled-in audible roadway delineators, lengths will be measured along the inside edge of the shoulder from the
center of the first milled-in audible roadway delineator in a segment to the center of the last milled-in audible
roadway delineator in that segment. Where milled-in audible roadway delineators are provided on more than one
shoulder, lengths will be measured separately for each segment and added to the sum.

For centerline audible roadway delineators, lengths will be measured along the centerline of the CARDs from the
center of the first centerline audible roadway delineator in a segment to the center of the last centerline audible roadway delineator in that segment.

649-5 BASIS OF PAYMENT. The unit price bid shall include the cost of all materials, equipment and labor necessary to satisfactorily complete the work.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>649.01</td>
<td>Milled-In Audible Road Delineators (MIARDs)</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>649.11</td>
<td>Centerline Audible Road Delineators (CARDs)</td>
<td>Linear Foot</td>
</tr>
</tbody>
</table>
BARRIER COATING FOR SLIP JOINTS OF WEATHERING STEEL POLES

The work shall consist of applying a barrier coating to all metal to metal contact surfaces of slip joints of weathering steel poles. This coating shall be either a two coat, structural steel paint system or a metallized zinc coating system. The cost of this work shall be included in the price bid for the weathering steel pole.

The Contractor shall have the option of applying either a two coat paint system or a metallized zinc coating system. The Contractor is advised that some systems may not conform to existing regulations for the emission of Volatile Organic Compounds (VOC's). The Contractor is responsible for selecting a system that meets all applicable requirements for the emission of VOC's at the point of application. Two coat paint systems or metallized zinc coating systems shall meet the following requirements:

1. **Paint Coatings.** Abrasive material for use in blast cleaning work shall be selected by the Contractor. The material shall be such that the nominal blast profile of the cleaned steel surface shall be within the range of 1.6 to 2.4 mils.

   The two coat paint system shall consist of an inorganic zinc rich primer meeting the requirements of SSPC-Paint 20, Type 1-C and a coal tar epoxy top coat meeting the requirements of SSPC-Paint 16. A list of acceptable paint types is shown below.

   Abrasive material shall be accepted by the Engineer. Paints shall be accepted based on the list below. Only paints from a single manufacturer, of the types appearing on the list, shall be used for the work.

2. **Metallized Zinc Coatings.** Abrasive material for blast cleaning, wire used in spraying, and Aluminum Vinyl sealer shall meet the requirements of 5719-01, Type V, Flame Sprayed Coating System.

   Abrasive material, wire, and sealer shall be accepted by the Engineer.

   The entire metal to metal contact area shall be coated, plus three inches above on the inner surface of the outer tube.

   1. **Paint Coatings.** All structural steel surfaces to be painted shall be cleaned to bare steel in accordance with SSPC-SP10, Near White Blast Cleaning. After blast cleaning is completed, cleaned surfaces shall be defined by SSPC-Visl, Pictorial Standards ASa2-1/2, BSa2-1/2 and CSa2-1/2, as applicable.

   Paint shall be applied in accordance with §740-01, Painting Metal Structures. Individual coatings shall be applied in sufficient quantity so that the following dry film thicknesses (DFT) result:

<table>
<thead>
<tr>
<th>Primer</th>
<th>Top Coat</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4 mils (min)</td>
<td>6 mils (min)</td>
</tr>
</tbody>
</table>

2. **Metallized Zinc Coatings.** All structural steel surfaces to be metallized shall be cleaned and coated in accordance with §719-O1 Type V, Flame Sprayed Coating System, except that a minimum of 5 mils of zinc shall be applied.

   A finish coating consisting of two coats of Aluminum Vinyl sealer shall be applied in accordance with
**BARRIER COATING FOR SLIP JOINTS OF WEATHERING STEEL POLES**

§719-01, Type V.

**ACCEPTABLE MANUFACTURERS AND PRODUCTS**

**TWO COAT PAINT SYSTEM-ZINC RICH PRIMER & COAL TAR EPOXY TOPCOAT**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Inorganic Zinc-Rich Primer</th>
<th>Coat Tar Epoxy Top Coat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameron-Corrosion Control Division</td>
<td>Dimetcote No. 9</td>
<td>C-200</td>
</tr>
<tr>
<td>Koppers Co.</td>
<td>No. 701</td>
<td>Bitumastic 300-M</td>
</tr>
<tr>
<td>Valspar Corp.</td>
<td>No. 13F12</td>
<td>578-J-I</td>
</tr>
<tr>
<td>Porters Coatings Co.</td>
<td>Zinc Lock 351</td>
<td>Tarset C-200a Prod. No. 7023</td>
</tr>
<tr>
<td>Tnemec Co.</td>
<td>9093 Tnemec</td>
<td>46-413 Tneme-Tar</td>
</tr>
<tr>
<td>Carboline Co.</td>
<td>Carbo Zinc D11 HS</td>
<td>Carbohmastic 14</td>
</tr>
</tbody>
</table>
Make the following changes to the Standard Specification of May 4, 2006 / May 1, 2008:

Delete Sections 689 thru 696 and Replace them with the following:

SECTIONS 689 THRU 695 (VACANT)

SECTION 696 CONTRACTOR CHARGES

696-1 DESCRIPTION. This section will provide for the accounting of charges assessed against the Contractor in accordance with the contract documents.

696-2 MATERIALS. None specified.

696-3 CONSTRUCTION DETAILS. The Department may assess the Contractor charges for Engineering Charges and/or Liquidated Damages against monies due the Contractor in accordance with §108-03 Failure to Complete Work On Time, or may make other charges in accordance with the contract. These charges will be assessed using the contract pay items in this section.

696-4 METHOD OF MEASUREMENT. These contract pay items will not be shown in the itemized proposal. Contractor charges will be measured on a Dollars-Cents basis.

696-5 BASIS OF PAYMENT. Should the Contractor be assessed charges, the amounts will be accounted for using the contract pay items in this section. Assessed charges will be deducted from a contract payment processed after the determination that charges will be made, or, if the Contractor is not due monies sufficient to recover the assessed charges, the State may utilize other methods of recovery.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>696.01</td>
<td>Engineering Charges</td>
<td>Dollars Cents</td>
</tr>
<tr>
<td>696.02</td>
<td>Liquidated Damages</td>
<td>Dollars Cents</td>
</tr>
<tr>
<td>696.03</td>
<td>Contractor Charges – Other</td>
<td>Dollars Cents</td>
</tr>
</tbody>
</table>
Make the following changes to the Standard Specifications of May 1, 2008:

Page 781, remove 704-02 in its entirety and replace it with the following:

“704-02 CONCRETE BRICK

SCOPE. This specification covers the material and quality requirements for concrete brick produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”. Item 704-02 can be used in brick masonry construction, altering drainage structures, leaching-basins and manholes (section 604).

MATERIAL REQUIREMENTS. Concrete brick shall conform to the requirements of ASTM C936, except as noted herein. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of concrete brick shall meet the requirements of the following subsections:

<table>
<thead>
<tr>
<th>Material</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>701-01</td>
</tr>
<tr>
<td>Coarse Aggregate</td>
<td>703-02</td>
</tr>
<tr>
<td>Mortar Sand</td>
<td>703-03</td>
</tr>
<tr>
<td>Grout Sand</td>
<td>703-04</td>
</tr>
<tr>
<td>Concrete Sand</td>
<td>703-07</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>711-10</td>
</tr>
<tr>
<td>Ground, Granulated Blast-Furnace Slag</td>
<td>711-12</td>
</tr>
<tr>
<td>Water</td>
<td>712-01</td>
</tr>
</tbody>
</table>

Fly ash or ground, granulated blast-furnace slag may be substituted up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau. The nominal dimensions of the brick shall be 8 inches long, 4 inches wide, and 2⅔ inches in height.

Physical Properties. Concrete brick shall meet the compressive strength and absorption requirements in ASTM C936. In addition, the maximum acceptable average freeze/thaw loss of five paver samples, subjected to 25 freeze/thaw cycles in a 10% NaCl solution, is 1.0%, with no individual sample exceeding 1.5%.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A total of 15 concrete bricks of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140. Five samples will be tested for freeze/thaw durability in accordance with NYSDOT test methods.

BASIS OF ACCEPTANCE. Concrete brick will be accepted on the job site based on the following:
- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
Page 788, remove 704-04 in its entirety and replace with the following:

"704-04 CONCRETE BLOCK (SLOPE PAVING)

SCOPE. This specification covers the material details and quality requirements for concrete block for use in concrete block slope paving and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of concrete block shall meet the requirements of the following subsections:

- Portland Cement 701-01
- Coarse Aggregate 703-02
- Mortar Sand 703-03
- Grout Sand 703-04
- Concrete Sand 703-07
- Fly Ash 711-10
- Ground, Granulated Blast-Furnace Slag 711-12
- Water 712-01

Fly ash or ground granulated blast furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. The minimum acceptable average compressive strength of five-block samples is 6000 psi, with no individual block less than 5500 psi. The maximum acceptable average freeze/thaw loss of five-block samples, subjected to 42 freeze/thaw cycles in a 3% NaCl solution, shall not exceed 1.0%, with no individual sample exceeding 1.5%.

Block dimensions shall be as required in the contract documents. Dimensions shall not vary by more than ¼ inch from those specified. Blocks shall be sound and free from cracks or other defects that would interfere with their proper placement or performance.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of five samples, prepared by the manufacturer in accordance with ASTM C1262, will be required for freeze/thaw testing.

Samples will be tested for compressive strength in accordance with ASTM C140. Samples will be tested for freeze/thaw durability in accordance with ASTM C1262.

BASIS OF ACCEPTANCE. Concrete block will be accepted on the job site based on the following:

- The manufacturer’s name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
Page 790, remove 704-07 in its entirety and replace with the following:

“704-07 SEGMENTAL RETAINING WALL BLOCKS

SCOPE. This specification covers the material details and quality requirements for segmental retaining wall blocks produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Provide segmental retaining wall block meeting the style and color requirements in the contract documents. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland cement. Use materials, meeting the following requirements, in the manufacture of segmental retaining wall blocks:

Portland Cement 701-01
Coarse Aggregate 703-02
Mortar Sand 703-03
Grout Sand 703-04
Concrete Sand 703-07
Fly Ash 711-10
Ground, Granulated Blast-Furnace Slag 711-12
Water 712-01

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Use integral coloring pigments, when required, meeting the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. The minimum acceptable average compressive strength of five-block samples is 6000 psi, with no individual block sample less than 5500 psi. The maximum acceptable average freeze/thaw loss of five-block samples, subjected to 42 freeze/thaw cycles in a 3% NaCl solution, is 1.0%, with no individual sample exceeding 1.5%.

The formed dimensions of concrete retaining wall block units will not differ more than ¼ inch from the nominal dimensions shown on the approved Materials Detail Drawing. Provide sound blocks, free from cracks or other defects that would interfere with the proper placing, performance, or appearance of the blocks.

Materials Details. At the time of application to the Approved List, submit Materials Details Drawings to the Director, Materials Bureau for approval. Prepare and submit drawings in accordance with Departmental procedural directives. Submit a unique drawing(s) for each block style under consideration.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of 5 samples, prepared by the manufacturer in accordance with ASTM C140, will be required for compression testing. A minimum of five samples, prepared by the manufacturer in accordance with ASTM C1262, will be required for freeze/thaw testing.

Samples will be tested for compressive strength in accordance with ASTM C140. Samples will be tested for freeze/thaw durability in accordance with ASTM C1262.

BASIS OF ACCEPTANCE. Segmental retaining wall blocks will be accepted on the job site based on...
the following:

- The manufacturer's name and block style must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- Conformance to the approved material detail drawing(s).
- An acceptable product evaluation made by the Engineer.”

Page 792, remove 704-10 in its entirety and replace with the following:

“704-10 SPLIT-FACED CONCRETE BRICK

SCOPE. This specification covers the material details and quality requirements for split faced concrete brick for use in facing structural walls and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Split-faced concrete brick shall conform to the requirements of ASTM C90, except as noted herein. The shape, size, and color of split-faced concrete brick shall be as shown in the contract documents. The splitting operation shall leave relatively sharp, straight and parallel edges. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of split-faced concrete brick shall meet the requirements of the following subsections:

- Portland Cement 701-01
- Coarse Aggregate 703-02
- Mortar Sand 703-03
- Grout Sand 703-04
- Concrete Sand 703-07
- Fly Ash 711-10
- Ground, Granulated Blast-Furnace Slag 711-12
- Water 712-01

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of 10 full-size, split-faced bricks of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140.

The manufacturer shall be responsible for having brick tested for linear drying shrinkage in accordance with ASTM C90. A copy of the test report shall be included with the samples submitted to the Department for compression and absorption testing.

BASIS OF ACCEPTANCE. Split-faced concrete brick will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being
supplied.

- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”

Page 793, remove 704-12 in its entirety and replace with the following:

“704-12 CONCRETE BLOCK

SCOPE. This specification covers the material and quality requirements for concrete block for use in structural walls and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Concrete block shall conform to the requirements of ASTM C90 except as noted herein. The shape, size, and color of concrete block shall be as shown in the contract documents. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of concrete block shall meet the requirements of the following subsections:

Portland Cement 701-01
Coarse Aggregate 703-02
Mortar Sand 703-03
Grout Sand 703-04
Concrete Sand 703-07
Fly Ash 711-10
Ground, Granulated Blast-Furnace Slag 711-12
Water 712-01

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of 10 full-size concrete blocks of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140.

The manufacturer shall be responsible for having block tested for linear drying shrinkage in accordance with ASTM C90. A copy of the test report shall be included with the samples submitted to the Department for compression and absorption testing.

BASIS OF ACCEPTANCE. Concrete block will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”

Page 794, remove 704-13 in its entirety and replace with the following:
"704-13 PRECAST CONCRETE DRIVEWAY AND SIDEWALK PAVERS

SCOPE. This specification covers the material details and quality requirements for precast concrete pavers used for driveway and sidewalk paving and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Precast concrete pavers shall meet the requirements of ASTM C936 except as noted herein. The shape, size, and color of precast concrete pavers shall be as shown in the Contract documents. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of precast concrete pavers shall meet the requirements of the following subsections:

<table>
<thead>
<tr>
<th>Material</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>701-01</td>
</tr>
<tr>
<td>Coarse Aggregate</td>
<td>703-02</td>
</tr>
<tr>
<td>Mortar Sand</td>
<td>703-03</td>
</tr>
<tr>
<td>Grout Sand</td>
<td>703-04</td>
</tr>
<tr>
<td>Concrete Sand</td>
<td>703-07</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>711-10</td>
</tr>
<tr>
<td>Ground, Granulated Blast-Furnace Slag</td>
<td>711-12</td>
</tr>
<tr>
<td>Water</td>
<td>712-01</td>
</tr>
</tbody>
</table>

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. Precast concrete pavers shall meet the compressive strength and absorption requirements of ASTM C936. In addition, the maximum acceptable average freeze/thaw loss of five paver samples, subjected to 25 freeze/thaw cycles in a 10% NaCl solution, is 1.0%, with no individual sample exceeding 1.5%.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A total of 15 precast concrete pavers of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140. Five samples will be tested for freeze/thaw durability in accordance with NYSDOT test methods.

BASIS OF ACCEPTANCE. Precast concrete driveway and sidewalk pavers will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
“704-23 PRECAST CONCRETE STREET PAVERS

SCOPE. This specification covers the material and quality requirements for precast concrete pavers used for street paving and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Precast concrete pavers shall meet the requirements of ASTM C936 except as noted herein. The shape, size, and color of precast concrete pavers shall be as shown in the contract documents. Minimum thickness for precast concrete street pavers shall be 3 1/8 inches. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland cement. Materials used in the manufacturing of precast concrete pavers shall meet the requirements of the following subsections:

Portland Cement 701-01
Coarse Aggregate* 703-02
Mortar Sand* 703-03
Grout Sand* 703-04
Concrete Sand* 703-07
Fly Ash 711-10
Ground, Granulated Blast-Furnace Slag 711-12
Water 712-01

* Aggregates. For precast concrete pavers or equivalent products placed in concrete highway wearing surfaces, use aggregate from a source or sources on the “Approved List of Sources of Fine and Coarse Aggregate.” All aggregate must be approved for use in concrete. Fine aggregate, natural or manufactured sand, must meet the requirements of §703-01, Fine Aggregate. Crushed stone, crushed gravel, or crushed slag from a coarse aggregate source must meet the requirements of §703-02, Coarse Aggregate.

Aggregate friction requirements: Sample and test aggregate for friction characteristics according to the procedures of Materials Method 28 “Friction Aggregate Control and Test Procedures”, PCC Sand. The Engineer will identify pavement areas, if any, represented by failing samples according to the procedures of Materials Method 28 “Friction Aggregate Control and Test Procedures.”

Aggregate must contain at least 25.0% acid-insoluble residue in the plus No. 30 size fraction and in the minus No. 30, plus No. 200 size fraction. If more than one source of aggregate is used, aggregate from each source must meet the acid-insoluble residue requirements.

Fly ash or ground, granulated blast-furnace slag may be substituted up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. Precast concrete pavers shall meet the compressive strength and absorption requirements of ASTM C936. In addition, the maximum acceptable average freeze/thaw loss of five paver samples, subjected to 25 freeze/thaw cycles in a 10% NaCl solution, is 1.0%, with no individual
sample exceeding 1.5%.

**SAMPLING AND TESTING.** When samples are requested by the Department, they will be randomly selected from production-run material. A total of 15 precast concrete pavers of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140. Five samples will be tested for freeze/thaw durability in accordance with NYSDOT test methods.

**BASIS OF ACCEPTANCE.** Precast Concrete Street pavers will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
Make the following changes to the Standard Specifications dated May 1, 2008:

Page 799 Add the following:

704-24 - PRECAST CONCRETE PANELS

SCOPE. This specification covers the material and fabrication requirements for precast concrete panels.

MATERIAL REQUIREMENTS. The Material Requirements contained in §704-03 shall apply.

DRAWINGS. The Drawing requirements contained in §704-03 shall apply.

FABRICATION. The Fabrication requirements contained in §704-03 shall apply.

SAMPLING AND TESTING. The Sampling And Testing requirements contained in §704-03 shall apply.

MARKING. The Marking requirements contained in §704-03 shall apply.

FINAL PRODUCTION INSPECTION. The Final Production Inspection requirements contained in §704-03 shall apply.

SHIPPING. The Shipping requirements contained in §704-03 shall apply.

BASIS OF ACCEPTANCE. The Basis Of Acceptance requirements contained in §704-03 shall apply.
709-15 GROUTED REINFORCING BAR SPLICE SLEEVES

Make the following changes to Standard Specifications Construction and Materials of May 1, 2008.

Page 352, §556-2 MATERIALS: add the following to the list of materials:
Grouted Reinforcing Bar Splice Sleeves 709-15

Page 379, §563-2 MATERIALS: add the following before §563-3 CONSTRUCTION DETAILS:
563-2.07 Grouted Reinforcing Bar Splice Sleeves shall meet the requirements of §709-15 Grouted Reinforcing Bar Splice Sleeves.

Page 852, before SECTION 710- FENCE AND GUIDE RAIL, add the following:

709-15 GROUTED REINFORCING BAR SPLICE SLEEVES

SCOPE. This specification covers the material requirements for Grouted Splice Sleeves. The splice sleeve and the grout constitute a system, and both parts of the system will appear together on the Approved List.

MATERIAL REQUIREMENTS
Grouted splice sleeves may be made of plain steel, stainless steel, or steel with epoxy coating. Grouted splice sleeves made of plain steel shall not be used with epoxy coated reinforcement. Grouted splice sleeves will be tested for the following parameters using California Test 670. The total slip shall be a maximum of:

- #3 to #6 0.010 in.
- #7 to #9 0.015 in.
- #10 to #11 0.020 in.
- #14 0.025 in.
- #18 0.030 in.

The tensile strength of the splice shall be at least 125% of the yield strength of the reinforcing bar as tested according to ASTM A370.

In addition, the manufacturer shall submit test data as set forth in AASHTO LRFD 5.5.3.4 for grout-filled sleeves. The results shall show that the fatigue resistance of the splice meets the set criteria. The sample preparation, testing methodology, and data analysis shall all be conducted by a certified and independent laboratory using the same methodology as that used in NCHRP 10-35.

The grout shall be as supplied by the manufacturer of the splice sleeve, and shall be the same grout that appears on the Approved List.

BASIS OF ACCEPTANCE. Grouted Reinforcing Bar Splice Sleeve systems 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.
§711-08 – ADMIXTURES- NON-CHLORIDE ACCELERATORS

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

**Page 872** under 711-08 ADMIXTURES, *delete* the paragraph SCOPE, and *replace* with the following:

“SCOPE. These specifications cover the material requirements for air-entraining, water-reducing and retarding, water-reducing (normal range and high range), and non-chloride accelerating admixtures used in the manufacture of Portland Cement concrete.”

**Page 874,** *after* paragraph E. Length Change, *add* the following:

“Non-Chloride Accelerating Admixtures. Non-chloride accelerating admixtures shall conform to the requirements outlined in ASTM C494 for Type C or Type E admixtures.”

**Page 874,** *delete* the paragraph SAMPLING AND TESTING, and *replace* with the following:

“SAMPLING AND TESTING. A one quart sample of admixture shall be submitted to the Materials Bureau by the manufacturer applying for approval, except that for Water-reducing (High Range) admixtures, two quarts will be required. The manufacturer shall submit information on the formulation of the product including the raw materials from which it is compounded, data from tests performed in accordance with these specifications and a description of the manufacturing process. Data from tests performed in accordance with ASTM C260 for air-entraining agents and ASTM C494 for water-reducing and retarding, water-reducing (normal range and high range), and non-chloride accelerating admixtures may be substituted.

The Department will test the submitted admixture sample according to written Department instructions. The test procedures are available from the Materials Bureau upon request.

The Department reserves the right to monitor the performance of any previously approved admixture. Samples of admixture may be taken from actual concrete operations and retested by the Materials Bureau.”

**Page 875,** *delete* the paragraph BASIS OF ACCEPTANCE, and *replace* with the following:

“BASIS OF APPROVAL. The approval of the admixture shall be based upon the submitted information and tests performed by the Materials Bureau. Upon approval by the Materials Bureau, the name of the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Admixtures will be accepted on the basis of the brand name appearing on the Approved List and the product containers plainly labeled with the brand name.

Any admixtures sampled from actual concrete operations and retested in the Materials Bureau shall give substantially the same results, at the same dosage rate, as the original tests. Any significant change will be cause for rejection of that material and may require a resubmission of the admixture by the manufacturer for a complete retest to determine specification compliance. The admixture may be withdrawn from the Approved List during the retest period.”
PAVEMENT MARKING MATERIALS

Make the following changes to the Standard Specifications of May 1, 2008. Page 1006, Delete Section 727 Pavement Marking Materials and Replace it with the following:

SECTION 727 - PAVEMENT MARKING MATERIALS

727-01 EXTRUDED THERMOPLASTIC

SCOPE. This specification covers the material requirements for thermoplastic that is extruded, in a molten state, onto a pavement surface. Following a surface application of reflective beads the resultant marking is a reflectorized stripe.

MATERIAL REQUIREMENTS. Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73°F ± 3°F.

General.
• Formulated for application at temperatures greater than 400°F.
• Show no significant breakdown or deterioration at 475°F.
• Pigment, beads and filler uniformly dispersed in the binder resin.
• Be free from all skins, dirt and foreign objects.
• Comply with the following requirements:

<table>
<thead>
<tr>
<th>TABLE 727-01-1 THERMOPLASTIC PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Binder</td>
</tr>
<tr>
<td>Titanium Dioxide</td>
</tr>
<tr>
<td>Reflective Beads</td>
</tr>
<tr>
<td>Calcium Carbonate &amp; Inert Fillers</td>
</tr>
<tr>
<td>Yellow Pigments</td>
</tr>
</tbody>
</table>

* Amount and type of yellow pigment, calcium carbonate and inert fillers at the option of the manufacturer, providing the other composition requirements are met and the yellow pigment is lead chromate free.

Physical Properties.

A. Color. (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0.
Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14.

B. Yellowness Index. (ASTM D1925 at 2°Observer angle and C Illuminate)
White thermoplastic: 0.12 maximum

PAVEMENT MARKING MATERIALS

D. Specific Gravity. Between 1.8 and 2.2 as determined by a water displacement method at 77°F.

E. Field Drying Time. At 70°F, and thickness between 1/8 inch and 3/16 inch: Completely solid and showing no damaging effect from traffic after 10 minutes.

Thermoplastic Primer.

- Specifically designed to enhance the bond of thermoplastic pavement markings to HMA and/or PCC pavements.
- Be either a one-component or two-component, cold- or hot-applied material of the type recommended by the manufacturer.
- Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA, and the NYSDEC.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers, clearly marked with the following and including:

- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Expiration Date
- Quantity
- Two-component primer containers clearly identified as "Part A" and "Part B"
- Primers accompanied with written instructions for use

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product and applicable glass beads in accordance with §727-05 Glass Beads For Pavement Markings, independent lab test results in accordance to this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and a certification that the product conforms to this specification.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Extruded Thermoplastic will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-02 REMOVABLE RAISED PAVEMENT MARKERS

SCOPE. This specification covers the material requirements for removable raised pavement markers for use as interim and temporary pavement markings.

MATERIAL REQUIREMENTS

General. Removable raised pavement markers shall be:

Designed as single units consisting of an acrylic plastic or another type of durable casing, containing one or two reflective faces.
Approximately square in shape.
Capable of providing daytime delineation.
Adhere to HMA or PCC surfaces using adhesives and/or methods recommended by the manufacturer.
Removable from HMA and PCC pavements, intact or in substantially large pieces, without the use of heat, solvents, grinding or blasting.
Free from dirt or any other contaminants.

Physical Properties.

**A. Color.** (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0
Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14

**B. Size.**
2. Reflective Lens. Minimum area of the reflective lens: 0.38 square inches.

**C. Reflectance.** Initial average reflectance values, when measured with incident light parallel to the base of the marker, at an observation angle of 0.2°.

| TABLE 727-02-1 REFLECTIVE MARKER LENSES REFLECTANCE |
|---------------------------------------------|--------|--------|
| Color | White | Yellow |
| Entrance Angle | 0° | 20° | 0° | 20° |
| Specific Intensity (cd/fc) | 1.0 | 0.4 | 0.6 | 0.24 |

NOTES:
1. Observation Angle: The angle at the reflector between the observer's line of sight and the direction of light incident on the reflector.
2. Entrance Angle: The angle in the horizontal plane between the direction of incident light and the normal to the leading edge of reflective marker.
3. Specific Intensity: The luminous intensity (candelas) of returned light at the chosen observation and entrance angles for each footcandle of illumination at the reflector on a plane perpendicular to the incident light.
4. Photometric Test Procedure: The reflective marker to be tested shall be located with the center of the reflective lens at a distance of 5 feet from a uniformly bright light source, having an effective diameter of 0.2 in. The return of light shall be measured using an annular ring photocell (3/8 inch I.D. x 1/2 inch O.D.). The photocell shall be shielded to eliminate stray light. The distance from the light source center to the photocell center shall be 0.21 inches. If a test distance of other than 5 feet is used, the source and receiver shall be modified in the same proportion as the test distance.

**Basis of Approval.** Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional field tests will be carried out in accordance with Materials Bureau Directives.
PAVEMENT MARKING MATERIALS

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Removable Raised Pavement Markers for Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Removable Raised Pavement Markers used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-03 EPOXY PAINT

SCOPE. This specification covers the material requirements for epoxy pavement marking paint that is applied onto pavement, followed by a surface application of retroreflective beads for use as interim and permanent pavement markings.

MATERIAL REQUIREMENTS

General. Epoxy paint shall be:
Formulated for use as a pavement marking material and for hot-spray application at elevated temperatures.
Two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g., two volumes of Part A to one volume of Part B).
VOC compliant and lead chromate free.
Use organic yellow pigments, Color Index Pigment Yellow 65 (C.I. 11740) and/or 74 (C.I. 11741).
Have a consistent target value of epoxy in Part A, based on ASTM D1652. Tested on a pigment free basis and calculated as the weight per epoxy equivalent (WPE).
Have a consistent total amine value of Part B based on ASTM D2074, or an alternate test method for determining the amine value specified by the manufacturer subject to the approval of the Director, Materials Bureau.
Display no bleeding on the surface upon which the paint is applied.
Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

Physical Properties.

A. % Pigment – Part A. (ASTM D2371) Yellow: 23% minimum
White: 18% minimum
% TiO2 (100% Purity) (NYS Test Method 727-20C) White: 16.5% minimum

B. % Resin – Part A. (ASTM D2371) Yellow: 70% - 77%
White: 75% - 82%

C. Color. (ASTM D1535) When viewed under North Standard Daylight, at a 15 ± 1 mil wet film thickness with no glass beads applied:
White: Approximate visual color match to Munsell Book Notation N 9.5/0
PAVEMENT MARKING MATERIALS

Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14 and within the following chromaticity coordinate limits when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>Coordinate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.485</td>
<td>0.526</td>
<td>0.504</td>
<td>0.468</td>
</tr>
<tr>
<td>y</td>
<td>0.426</td>
<td>0.472</td>
<td>0.481</td>
<td>0.450</td>
</tr>
</tbody>
</table>

D. Directional Reflectance. (ASTM E1347) White: 84% minimum
Yellow: 54% minimum

E. Yellowness Index. (ASTM D1925 at 2° Observer angle and C Illuminate) White Epoxy Paint: 0.12 maximum

F. Drying Time – Laboratory. (ASTM D711) Dry to no-pick-up time in 3 minutes maximum at an application rate of 15 ± 1 mils wet-film thickness and glass-sphere application rate of 20 lb/gal.

G. Hardness. (ASTM D2240) Samples cured for 72 to 96 hours prior to testing. Shore D Hardness: 75 - 100.

H. Infrared Spectrophotometer Analysis. (ASTM D2621) The spectrum of each component will be analyzed and maintained as a base record. Any subsequent samples taken from a Department contract must be a reasonable match to the original formulation spectrum accepted by the Materials Bureau for the Approved List.

Placement Properties. The material shall be capable of being placed using standard epoxy pavement marking equipment and have a maximum field no track time of 30 minutes when installed at 77°F.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers, clearly marked with the following information:
- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Date of Manufacture
- Expiration Date
- The Statement (as appropriate):
  “Part A Contains Pigment and Epoxy Resin,” or “Part B Contains Catalyst”
- Quantity

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by two 1/2 pint samples of each color (white and yellow) of Part A and one 1/2 pint of Part B for each color, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that
the product conforms to this specification. Additional field tests will be carried out in accordance with Materials Bureau Directives. Upon approval by the Materials Bureau, the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Epoxy Paint for Permanent and/or Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification. Epoxy Paint used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

**727-04 PERMANENT PAVEMENT TAPE**

**SCOPE.** This specification covers the material requirements for preformed pavement marking tape that is applied to the pavement for use as permanent pavement markings.

**GENERAL.** Permanent pavement tape shall be: Designed to provide immediate and continuous retroreflection. Meet all the requirements of ASTM D4505. Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material. Have a layer of reflective beads bonded to, or embedded in the top surface. Pre-coated, on its bottom side, with a pressure-sensitive adhesive for adherence to HMA or PCC surfaces. Of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects. Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage. Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces. Show no significant tearing, rollback, lifting or other signs of poor adhesion. Free from dirt and any other contaminants.

**MATERIAL REQUIREMENTS.** Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73° ± 3°F.

**A. Color.** (ASTM D1535) When viewed under North Standard Daylight:
White:  Approximate visual color match to Munsell Book Notation N 9.5/0
Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14

**B. Thickness.** Preformed pavement marking tape shall be: Uniform Cross Section: 60 mils minimum thickness. Patterned (Variable Cross Section): 20 mils minimum thickness at the thinnest portions and 60 mils minimum thickness at the thickest portions. The patterned top surface shall have approximately 50% of the surface area raised, and its design shall provide immediate and continuing retroreflection.

**C. Tensile Strength.** (ASTM D638) 40 psi minimum
Test specimens shall be Type II prepared by die cutting with Die C as specified in ASTM D412 Test.
PAVEMENT MARKING MATERIALS

Method A. The testing machine shall operate at a speed of 0.2 inches per minute. For calculating the tensile strength of patterned type material, the thickness measurements shall be taken in the thinnest portions of the cross sectional area.

D. Elongation. (ASTM D638) When tested in accordance with the conditions as specified for Tensile Strength: 15% minimum elongation

Primer. Primer shall be recommended by the manufacturer of the permanent tape and be compatible with the marking and surface the marking is being applied to.

Specifically designed to enhance the bond of the permanent tape to HMA and/or PCC pavements. Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers, clearly marked with the following and including:

- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Quantity
- Primers accompanied with written instructions for use
- Expiration Date

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Permanent Pavement Tape and primer will be accepted on the basis of the products appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Permanent Pavement Tape and primer used for Temporary Pavement Markings will be accepted on the basis of the products appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-05 GLASS BEADS FOR PAVEMENT MARKINGS

SCOPE. This specification covers the material requirements for retroreflective beads applied on top of thermoplastic, epoxy or traffic paint for use as pavement markings.
MATERIAL REQUIREMENTS. Glass beads for pavement markings shall meet the requirements of AASHTO M247 and shall be:
Composed of glass that is highly resistant to traffic wear and to the effects of weathering.
Colorless, clean, transparent, free from milkiness or excessive air bubbles, and essentially free from surface scarring or scratching.
Silica content (ASTM C169): 60% minimum.
Refractive index: 1.50 when tested by the liquid immersion method at 77°F.
Show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps.
Flow freely from the dispensing equipment at any time when surface and atmospheric conditions are satisfactory for painting.

A. Sphericity. (ASTM D1155 Procedure A) Spherical in shape - 70% minimum, true spheres.
Wet/Night Visibility Beads will be tested for roundness according to the procedural directives of the Materials Bureau.

B. Gradation. (ASTM D1214).

**TABLE 727-05-1**
GLASS SPHERE GRADATION (Standard Bead)

<table>
<thead>
<tr>
<th>Marking Type</th>
<th>Sieve Size</th>
<th>#20</th>
<th>#30</th>
<th>#50</th>
<th>#80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy</td>
<td>100</td>
<td>80-95</td>
<td>9-42</td>
<td>0-10</td>
<td></td>
</tr>
<tr>
<td>Traffic Paint</td>
<td>100</td>
<td>80-95</td>
<td>9-42</td>
<td>0-10</td>
<td></td>
</tr>
<tr>
<td>Thermoplastic</td>
<td>100</td>
<td>79-95</td>
<td>15-60</td>
<td>0-15</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 727-05-2**
GLASS SPHERE GRADATION (Wet/Night Visibility Bead)

<table>
<thead>
<tr>
<th>Marking Type</th>
<th>Sieve Size</th>
<th>#10</th>
<th>#12</th>
<th>#14</th>
<th>#16</th>
<th>#18</th>
<th>#20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy Wet/Night Reflective</td>
<td>100</td>
<td>95-100</td>
<td>75-95</td>
<td>10-47</td>
<td>0-7</td>
<td>0-2</td>
<td></td>
</tr>
</tbody>
</table>

C. Coating.

**TABLE 727-05-3**
GLASS SPHERE COATINGS

<table>
<thead>
<tr>
<th>Marking Type</th>
<th>Coating Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy Wet/Night Reflective</td>
<td>Silane Type adherence coating designed to interact with and adhere to epoxy pavement markings.</td>
</tr>
<tr>
<td>Epoxy (Standard Bead)</td>
<td>Moisture-resistant coating or a dual purpose type coating (moisture-resistant and adherence).</td>
</tr>
<tr>
<td>Traffic Paint</td>
<td></td>
</tr>
<tr>
<td>Thermoplastic (Drop on)</td>
<td></td>
</tr>
</tbody>
</table>
PAVEMENT MARKING MATERIALS

D. Moisture Resistance. AASHTO M 247 Section 5.3.2

PACKAGING AND SHIPPING. Shipped to the job site in waterproof plastic lined burlap or plastic lined paper bags with the following information clearly marked on the packages:

- Manufacturer's Name
- Name of Product
- Size/Type/Coating
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Quantity/Weight of Material

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by one 50 lb bag sample of the product, independent lab test results in accordance with this specification and certification that the product conforms to this specification.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Glass Beads for Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Glass Beads for Pavement Markings used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-06 REMOVABLE PAVEMENT TAPE

SCOPE. This specification covers the material requirements for removable pavement marking tape and masking tape for use as interim and temporary pavement markings.

MATERIAL REQUIREMENTS.

General. Removable pavement tape shall be:

- Composed of a mixture of plastics or polymeric materials, resins, pigments.
- Have on its bottom side, a pre-applied, pressure-sensitive adhesive for adherence to HMA or PCC surfaces.
- Of the specified dimension and shape with clean-cut, well defined-edges, of good appearance, and free of cracks or other defects.
- Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage.
- Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces.
- Show no significant tearing, rollback, lifting or other signs of poor adhesion.
- Removable from HMA and PCC pavements, intact or in substantially large pieces, without the use of heat, solvents, grinding or blasting, and leaving minimal permanent marks, scars or damage to the pavement surface after removal.
- Be free from dirt and any other contaminants.
PAVEMENT MARKING MATERIALS

Retroreflective Tape.
Designed to provide immediate and continuous retroreflection.
Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
Have a layer of reflective beads bonded to, or embedded in the top surface.

Meet the following requirements:

A. Color: (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0
Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and be within the following chromaticity coordinate limits when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>TABLE 727-06-1 CHROMATICITY COORDINATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
</tr>
<tr>
<td>x</td>
</tr>
<tr>
<td>y</td>
</tr>
</tbody>
</table>

B. Reflectance:

<table>
<thead>
<tr>
<th>TABLE 727-06-2 PREFORMED TAPE REFLECTANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
</tr>
<tr>
<td>Observation Angle</td>
</tr>
<tr>
<td>Specific Luminance (mcd/ft²/ft)</td>
</tr>
</tbody>
</table>

Masking Tape. Masking tape shall be:
Specifically designed for use to temporarily cover existing pavement markings.
Consist of durable, nonreflective, pliant polymer tape on a reinforced, conformable backing, pre-coated with a pressure-sensitive adhesive
Capable of adhering to existing pavement markings, asphalt pavement and Portland cement concrete pavement without the use of heat, solvents, additional adhesives or other means.
Be substantially similar in color to the pavement surface with a flat matte finish and textured, skid resistant surface.

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white, yellow, black/grey) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Removable Pavement Tape used for Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.
PAVEMENT MARKING MATERIALS

Removable Pavement Tape used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing material on the Approved List and that it conforms to this specification.

727-07 REMOVABLE WET-NIGHT REFLECTIVE TAPE

SCOPE. This specification covers the material requirements for removable wet-night reflective tape for use as interim and temporary pavement markings.

MATERIAL REQUIREMENTS.

General. Removable Wet-Night reflective tape shall be:
Designed to provide immediate and continuous retroreflection in day and night as well as dry and wet conditions.
Composed of a mixture of durable plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
Pre-coated, on its bottom side, with a pressure-sensitive adhesive.
Capable of adhering to existing pavement markings, asphalt pavement and Portland cement concrete pavement without the use of heat, solvents, additional adhesives or other means.
Of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects.
Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage.
Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces.
Show no significant tearing, rollback, lifting or other signs of poor adhesion.
Removable from HMA and PCC pavements, intact or in substantially large pieces, without the use of heat, solvents, grinding or blasting, and leaving minimal permanent marks, scars or damage to the pavement surface after removal.
Have a layer of reflective beads bonded to, or embedded in the top surface.
Free from dirt and any other contaminants.

Meet the following requirements:

Physical Properties.

A. Color: (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>TABLE 727-07-1 WHITE CHROMATICITY COORDINATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
</tr>
<tr>
<td>x</td>
</tr>
<tr>
<td>y</td>
</tr>
</tbody>
</table>

Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.
TABLE 727-07-2 YELLOW CHROMATICITY COORDINATES

<table>
<thead>
<tr>
<th>Coordinate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.560</td>
<td>0.460</td>
<td>0.420</td>
<td>0.490</td>
</tr>
<tr>
<td>y</td>
<td>0.440</td>
<td>0.400</td>
<td>0.440</td>
<td>0.510</td>
</tr>
</tbody>
</table>

B. Retroreflectivity.

Wet: ASTM E2176 and ASTM E2177
Dry: ASTM E1710

TABLE 727-07-3 MINIMUM INITIAL RETROREFLECTIVITY

<table>
<thead>
<tr>
<th>Entrance Angle: 88.76° Observation Angle: 1.05°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
</tr>
<tr>
<td>Condition</td>
</tr>
<tr>
<td>Retroreflectivity [mcd/ft²/fc]</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Removable Wet-Night Reflective Tape used for Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Removable Wet-Night Reflective Tape used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-08 PERMANENT WET-NIGHT REFLECTIVE TAPE

SCOPE. This specification covers the material requirements for permanent wet-night pavement marking tape for use as permanent pavement markings.

MATERIAL REQUIREMENTS. Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73° ± 3°F.

General. Permanent wet-night reflective tape shall be:
Designed to provide immediate and continuous retroreflection in day and night as well as dry and wet conditions.
Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
PAVEMENT MARKING MATERIALS

Have a layer of reflective beads bonded to, or embedded in the top surface. Pre-coated, on its bottom side, with a pressure-sensitive adhesive for adherence to HMA or PCC surfaces. Of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects. Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage. Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces. Show no significant tearing, rollback, lifting or other signs of poor adhesion. Free from dirt and any other contaminants.

Physical Properties.

A. Color:  (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>TABLE 727-08-1 WHITE CHROMATICITY COORDINATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
</tr>
<tr>
<td>x</td>
</tr>
<tr>
<td>y</td>
</tr>
</tbody>
</table>

Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>TABLE 727-08-2 YELLOW CHROMATICITY COORDINATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
</tr>
<tr>
<td>x</td>
</tr>
<tr>
<td>y</td>
</tr>
</tbody>
</table>

B. Retroreflectivity.  Wet: ASTM E2176 and ASTM E2177
Dry: ASTM E1710

<table>
<thead>
<tr>
<th>TABLE 727-08-3 MINIMUM INITIAL RETROREFLECTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrance Angle: 88.76° Observation Angle: 1.05°</td>
</tr>
<tr>
<td>Color</td>
</tr>
<tr>
<td>Retroreflectivity (mcd/ft²/cd)</td>
</tr>
</tbody>
</table>

C. Thickness.
Uniform Cross Section: 60 mils minimum thickness
Patterned (Variable Cross Section): 20 mils minimum thickness at the thinnest portions and 60 mils minimum thickness at the thickest portions.
The patterned top surface shall have approximately 50% of the surface area raised, and its design shall provide immediate and continuing retroreflection.

D. Friction Resistance.  (ASTM E303) Friction resistance: 45 BPN minimum.
PAVEMENT MARKING MATERIALS

E. Tensile Strength. (ASTM D638) Tensile strength: 40 psi minimum
Test specimens shall be Type MII prepared by die cutting with Die C as specified in ASTM D412,
Test Method A. The testing machine shall operate at a speed of 0.2 inches per minute. For calculating
the tensile strength of patterned type material, the thickness measurements shall be taken in the
thinnest portions of the cross sectional area.

F. Elongation. (ASTM D638) 15% minimum elongation when tested in accordance with the
conditions as specified for Tensile Strength.

Primer. Primer shall be:
Be recommended by the manufacturer of the preformed pavement marking and be compatible with the
marking and surface the marking is being applied to.
Specifically designed to enhance the bond of the preformed pavement markings to HMA and/or PCC
pavements.
Conform to current Federal, State and Local air pollution regulations, including those for the control
(emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers, clearly marked
with the following and including:
• Manufacturer's Name
• Name of Product
• Material Specification Number
• Lot/Batch Number
• Manufacture Date
• Quantity
• Primers accompanied with written instructions for use
• Expiration Date

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the
manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab
test results in accordance with this specification or in conjunction with the National Transportation
Product Evaluation Program (NTPEP), and certification that the product conforms to this specification.
Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau
Directives.
Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Permanent Wet Night Reflective Tape and primer will be accepted on the
basis of the product appearing on the Approved List and a material certification that the product is the
same as the one appearing on the Approved List and that it conforms to this specification.
Permanent Wet-Night Reflective Tape and primer used for Temporary Pavement Markings will be
accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall
provide a material certification that the product is the same as the one appearing on the Approved List and
that it conforms to this specification.

727-09 TRAFFIC PAINT
PAVEMENT MARKING MATERIALS

SCOPE. This specification covers the material requirements for waterborne and solventborne paints that are applied onto pavement, followed by a surface application of retroreflective beads for use as temporary, interim and permanent pavement markings.

MATERIAL REQUIREMENTS.

General. Traffic paint shall be:
Formulated for use as a pavement marking material.
Be VOC compliant and lead chromate free.
Yellow paints must use organic yellow pigments Color Index Pigment Yellow 65 (C.I. 11740) and/or 74 (C.I. 11741).
Display no bleeding on the surface upon which the paint is applied.
Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA, and the NYSDEC.

Physical Properties.
Traffic paint for permanent and Interim Pavement Markings shall conform to the requirements of paragraphs A through L below. Traffic paint for Temporary Pavement Markings shall conform to the following paragraphs: B. Color; C. Directional Reflectance; D. Yellowness Index; E. Drying Time; F. Viscosity; and G. Dry Opacity.

A. Composition.
% Pigment. (ASTM D3723) 58.0% – 62.0%
% Total Solids. (ASTM D3723) 76.0% minimum
% Vehicle Non-Volatile. (ASTM D3723) 43.0% minimum

The manufacturers certified organic yellow pigment content shall be used to determine the final laboratory test results for: total pigment (%), and for nonvolatile vehicle (%). The Department reserves the right to validate the manufacturers "certified" organic yellow pigment content through outside, independent laboratory testing.

B. Color. (ASTM D1535) When viewed under North Standard Daylight at a 15 ± 1 mils wet film thickness with no glass beads applied:
White: Approximate visual color match to Munsell Book Notation N 9.5/0.
Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and within the following chromaticity coordinate limits when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>TABLE 727-09-1 CHROMATICITY COORDINATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>x</td>
</tr>
<tr>
<td>y</td>
</tr>
</tbody>
</table>

C. Directional Reflectance (ASTM E1347) White: 84% minimum
Yellow: 54% minimum

D. Yellowness Index. (ASTM D1925 at 2°Observer angle and C Illuminate)
PAVEMENT MARKING MATERIALS

White Traffic Paint: 0.12 maximum.

E. Viscosity. (ASTM D562 Procedures B) 75 – 95 Kreb Units at 77°F

F. Dry Opacity. (ASTM D2805) 0.95 minimum contrast ratio
Application at 3 1/2 inches wide, wet-film thickness of 5 mils to white and black contrast panels matching Lenta Form 5C or equivalent. Dry time of 1 hour minimum.

G. Abrasion Resistance. (ASTM D4060) Four plate samples for each lot will be prepared for testing on the Taber Abaser. The paint will be sprayed on steel plates, or applied by other suitable means so as to ensure a nominal 15 mil wet film thickness on each plate. Plates will be cured at standard laboratory temperature and humidity for 2 to 24 hours. The paint abrasion plates will be cleaned, dressed, and baked at 221°F for 18 hours. After baking, the plates will be allowed to cool in a desiccator for one hour and then weighed. The plates will be abraded for 1000 cycles on the Taber Abraser. The Taber Abraser will be operated with 1.10 lb weights and CS 10 wheels on the machine.

After abrading, the samples will be cleaned with a soft brush, placed in a desiccator for one hour and weighed again. The average weight loss for the four plates shall not exceed 0.00176 oz.

H. Flexibility. (Federal Specification TT-P-1952B Section 4.5.4) No cracking or flaking visible. Determine flexibility in accordance with Method B of ASTM D522.

I. Freeze-Thaw Stability. (Federal Specification TT-P-1952b, Section 4.5.7) No coagulation or change in consistency (ASTM D562) greater than 15 Kreb Units.

J. Heat Stability. (Federal Specification TT-P-1952b, Section 4.5.8) Waterborne only. No coagulation, discoloration or change in consistency (ASTM D562) greater than 15 Kreb Units when tested in an oven at 120°F ± 2°F.

K. Infrared Spectrophotometer Analysis.
Waterborne: (ASTM D3168) Solventborne: (ASTM D2621)
The spectrum of the paint will be analyzed and maintained as a base record. Any subsequent samples taken from a Department contract must be a reasonable match to the original formulation spectrum accepted by the Materials Bureau for the Approved List.

Placement Properties.
The material shall be placed using standard traffic paint application equipment and have a maximum field no track time of 3 minutes when installed at 77°F.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers. Individual containers plainly marked with the following information:

- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Test Number
- Manufacture Date
PAVEMENT MARKING MATERIALS

- Expiration Date
- Quantity

**BASIS OF APPROVAL.** Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by eight 1 pint samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Addition field tests will be carried out in accordance with Materials Bureau Directives. Upon approval by the Materials Bureau, the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Traffic Paint for permanent and Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification. Traffic Paint used for Temporary Pavement Markings need not appear on the Approved List. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.
Make the following changes to the Standard Specifications dated May 1, 2008:

Page 1021 **Delete** §728-06 Sheet Gasket (Treated Both Sides) in its entirety and **Replace** it with the following:

**728-06 SHEET GASKET (TREATED BOTH SIDES)**

**SCOPE.** This specification covers the material requirements for sheet gasket, treated both sides with a parting agent to prevent adhesion to working surfaces. This material is used as a bond breaker and sliding surface in bridge construction.

**MATERIAL REQUIREMENTS.** The sheet gasket shall have a nominal 1/16 inch thickness and shall be treated on both sides with a parting agent. The material shall meet the following requirements:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water absorption, %</td>
<td>Prepare 3 samples (2x2 inches, 1/16±1/32 inch thick). Record initial weight of the specimen. Immerse the samples in a distilled water tank for 24 hrs at room temperature. Take out the samples and dry it with a dry cloth, then record final weight. Use the difference in weight to calculate the water absorption %.</td>
<td>25.0 Maximum</td>
</tr>
<tr>
<td>Coefficient of static friction</td>
<td>ASTM D1894</td>
<td>0.36 Maximum</td>
</tr>
<tr>
<td>Coefficient of kinetic friction</td>
<td>ASTM D1894</td>
<td>0.24 Maximum</td>
</tr>
<tr>
<td>Tensile strength, psi in the weakest direction</td>
<td>ASTM F152, Type 2</td>
<td>1200 Minimum</td>
</tr>
</tbody>
</table>

**BASIS OF ACCEPTANCE.** Sheet Gaskets will be accepted on the basis of the product appearing on the Department's Approved List.
Make the following changes to the Standard Specifications of May 1, 2008:
Page 1021, **Delete** Section 729 Temporary Traffic Control Devices and **Replace** it with the following:

**SECTION 729 – TEMPORARY TRAFFIC CONTROL DEVICES**

**729-01 DRUMS**

**SCOPE.** This specification covers the material, fabrication, and performance requirements for traffic drums. Drums are defined by FHWA as a Category I device.

**MATERIAL REQUIREMENTS.** Drums shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be orange plastic, one-piece or two-piece construction, with a closed top. Drums shall be a minimum of 18 inches in diameter (visible from all directions), a minimum of 36 inches in height. Drums shall have a maximum weight of 75 lbs., including ballast. Two-piece drums shall consist of a base no more than 4 inches in height and an upper section. The base and upper section of two-piece drums shall be designed as a unit. One-piece drums shall include a base ring or elongation designed to hold ballast. The base and/or any nonflexible portion of the drum shall not extend more than 2 inches above the pavement surface.

Drums shall have 4 horizontal circumferential stripes of reflective sheeting a minimum of 4 inches wide, of alternating orange and white, starting with orange on the top. The top edge of the upper band shall be a maximum of 2 inches from the top edge of the drum. The space between stripes shall not exceed 2 inches.

Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B), or higher. Reflective sheeting shall be firmly bonded to the drum with an adhesive; mechanical fasteners to bond reflective sheeting to the drum will not be allowed.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

**729-02 CONES**

**SCOPE.** This specification covers the material, fabrication, and performance requirements for traffic cones. Cones are defined by FHWA as a Category I device.

**MATERIAL REQUIREMENTS.** Cones shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be orange rubber or plastic. Cones shall have a maximum weight of 20 lbs, including ballast.

Standard cones shall be approximately 28 inches in height with a minimum conical bottom width of 10 inches. Standard cones shall have two horizontal circumferential stripes of white reflective sheeting, the upper a minimum of 6 inches wide, with the upper edge 3 to 4 inches from the top of the cone, and the lower a minimum of 4 inches wide with the upper edge approximately 2 inches below the upper stripe.

Tall cones shall be approximately 36 inches in height with a minimum conical bottom width of 10 inches. Tall cones shall have two horizontal circumferential stripes of white reflective sheeting, the upper a minimum of 6 inches wide, with the upper edge 3 to 4 inches from the top of the cone, and the lower a minimum of 4 inches wide with the upper edge approximately 2 inches below the upper stripe.

Extra tall cones shall be a minimum of 42 inches in height with a minimum conical bottom width of 7 inches. Extra tall cones shall have a minimum of four horizontal circumferential stripes of reflective sheeting from 4 to 6 inches wide, of alternating orange and white starting with orange on the top. The upper edge of the sheeting shall be 4 inches from the top of the cone. Nonreflective spaces between the stripes shall not exceed 3 inches wide.

Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher. Reflective sheeting shall be firmly bonded to the cone with adhesive.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.
729-03 TEMPORARY TUBULAR MARKERS

**SCOPE.** This specification covers the material, fabrication, and performance requirements for tubular markers. Tubular markers are defined by FHWA as a Category I device.

**MATERIAL REQUIREMENTS.** Tubular markers shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be orange, with a minimum height of 36 inches and a minimum outside diameter of 2 inches. Tubular markers shall be circular or elliptical in cross section. Tubular markers shall have a maximum weight of 12 lbs, not including a mounting base.

The markers shall have two horizontal circumferential stripes of white reflective sheeting a minimum of 3 inches wide. The top edge of the upper band shall be a maximum of 2 inches from the top of the marker. The space between shall not exceed 6 inches.

Reflective sheeting shall conform to ‘730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher. The sheeting shall be bonded to the post with a precoated, pressure-sensitive adhesive or a tack-free, heat-activated adhesive. Mechanical fasteners to bond reflective sheeting to the post will not be allowed.

For free-standing tubular markers, the base and/or any nonflexible portion of the marker shall not be more than 2 inches in height.

For tubular markers fastened to pavement, the bonding system used to shall be a fast-setting chemical compound, mastic-type material, or mechanical fastener capable of fixing the tubular marker to either concrete or asphalt pavement. The bonding system shall not present a hazard to traffic if the tubular marker or base unit becomes unfixed from the pavement.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-04 VERTICAL PANELS

**SCOPE.** This specification covers the material, fabrication, and performance requirements for vertical panels. Vertical panels are defined by FHWA as a Category II device.

**MATERIAL REQUIREMENTS.** Vertical panels shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be constructed of plastic, aluminum, or other lightweight materials. Vertical panels shall be supported by a base capable of maintaining the panel in an upright position and in the proper position and orientation.

Vertical panels shall have 4 to 6 inch wide diagonal stripes of alternating orange and white reflective sheeting, sloping downward at an angle of 45° toward the side on which traffic is to pass. Vertical panels which are 36 inches and larger shall have 6 inch wide diagonal stripes.

Standard vertical panels shall be a minimum of 24 inches in height and a minimum of 8 inches in width. The top of the panel shall be mounted a maximum of 36 inches high. Support posts for standard vertical panels shall not be located on the traffic face of the panel.

Oversized vertical panels shall be a minimum of 36 inches in height and have a minimum reflective area of 2.0 square feet.

Reflective sheeting shall conform to ‘730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-05 STOP/SLOW PADDLES

**SCOPE.** This specification covers the material requirements for stop/slow paddles.
MATERIAL REQUIREMENTS. Stop/slow paddles shall conform to the requirements of the MUTCD and shall be constructed of plastic, aluminum, or other lightweight materials. Stop/slow paddles shall be a minimum of 24 inches wide and shall be mounted on a support staff with a minimum height of 6 feet to the bottom of the panel. Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type IX (Class E).

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-06 TYPE I CONSTRUCTION BARRICADES

SCOPE. This specification covers the material, fabrication, and performance requirements for Type I construction barricades. Type I construction barricades are defined by FHWA as a Category II device.

MATERIAL REQUIREMENTS. Type I construction barricades shall conform to the requirements of the MUTCD and shall be NCHRP 350 or MASH approved. Type I construction barricades shall be constructed of an A-frame with a single rail panel 8 to 12 inches wide and a minimum of 24 inches long. Rails on barricades used on expressways and other high-speed roadways shall have an area of at least 2.0 square feet. The top of the upper panel shall be mounted at a minimum height of 36 inches. Barricade frames shall be designed to maintain the proper orientation and location of the device during windy conditions. Non-rigid ballast may be placed on the frame, close to the ground, to hold the barricade in position, and shall not obscure the view of the rail panels to approaching traffic.

Barricade rail panels shall have 4 inch wide reflective, alternating orange and white diagonal stripes sloping at an angle of 45°. Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B), or higher.

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-07 TYPE II CONSTRUCTION BARRICADES

SCOPE. This specification covers the material, fabrication, and performance requirements for Type II construction barricades. Type II construction barricades are defined by FHWA as a Category II device.

MATERIAL REQUIREMENTS. Type II construction barricades shall conform to the requirements of the MUTCD and shall be NCHRP 350 or MASH approved. Type II construction barricades shall be constructed of a frame with two rail panels 8 to 12 inches wide and a minimum of 24 inches long. Rails on barricades used on expressways and other high-speed roadways shall have an area of at least 2.0 square feet. The top of the upper panel shall be mounted at a minimum height of 36 inches. Barricade frames shall be designed to maintain the proper orientation and location of the device during windy conditions. Non-rigid ballast may be placed on the frame, close to the ground, to hold the barricade in position, and shall not obscure the view of the rail panels to approaching traffic.

Barricade rail panels shall have 4 to 6 inch wide reflective, alternating orange and white diagonal stripes sloping at an angle of 45°. Barricade rail panels 36 inches and longer shall have 6 inch wide stripes. Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B), or higher.

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-08 TYPE III CONSTRUCTION BARRICADES

SCOPE. This specification covers the material, fabrication, and performance requirements for Type III construction barricades. Type III construction barricades are defined by FHWA as a Category II device.

MATERIAL REQUIREMENTS. Type III construction barricades shall conform to the requirements of the MUTCD and shall be NCHRP 350 or MASH approved. Type III construction barricades shall be constructed of a frame with
three rail panels 8 to 12 inches wide and a minimum of 48 inches long. The top of the upper panel shall be mounted at a minimum height of 60 inches. Barricade frames shall be designed to maintain the proper orientation and location of the device during windy conditions. Nonrigid ballast may be placed on the frame, close to the ground, to hold the barricade in position, and shall not obscure the view of the rail panels to approaching traffic.

Barricade rail panels shall have 6 inch wide reflective alternating orange and white diagonal stripes sloping at an angle of 45°. Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher.

Warning lights, when used, shall be securely mounted directly to the barricade frame, above the top rail, using a bolt, nut, and washer of sufficient strength to ensure that the light does not detach if impacted by a vehicle, and no part of the light or wiring shall cover the face of the rail. Batteries shall be placed at ground level, except that integral batteries weighing a maximum of 7 lbs may be mounted on the barricade frame. Warning lights shall not be attached to the barricade rail.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

### 729-09 TEMPORARY SIGN SUPPORTS

**SCOPE.** This specification covers the material, fabrication, and performance requirements for temporary sign supports. Temporary sign supports are defined by FHWA as a Category II device.

**MATERIAL REQUIREMENTS.** Temporary sign supports shall conform to the requirements of the MUTCD and shall be constructed in accordance with the Standard Sheets or shall be commercially manufactured, temporary sign supports that are NCHRP 350 or MASH approved.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

### 729-10 TEMPORARY IMPACT ATTENUATORS - REDIRECTIVE

**SCOPE.** This specification covers the material and performance requirements for temporary impact attenuators. Temporary impact attenuators are defined by FHWA as a Category III device.

**MATERIALS REQUIREMENTS.** Temporary impact attenuators shall be NCHRP 350 or MASH approved as a redirective, non-gating device. Temporary impact attenuators that use liquid or other materials as a filler or to provide ballast will be evaluated for potential environmental impacts and/or seasonal limitations. Temporary impact attenuators meeting the requirements of NCHRP 350 or MASH Test Level 2 are acceptable only as Test Level 2 devices. A Temporary impact attenuator accepted as a Test Level 3 device is also acceptable as Test Level 2 device. Temporary impact attenuators will be approved for use in shielding an object of a maximum width as specified in the Approved List, and specific configurations may be approved for maximum speeds. Approach ends of Temporary impact attenuators shall have impact attenuator markings in accordance with the MUTCD.

Concrete Grouting Material 701-05
Anchoring Materials - Chemically Curing 701-07

If a temporary foundation slab is required, concrete shall be Class A concrete conforming to Section 501 Portland Cement Concrete - General; reinforcing steel shall conform to §709-01 Bar Reinforcement, Grade 420.

**BASIS OF APPROVAL.** Manufacturers or material suppliers desiring to have Test Level 2 or Test Level 3 temporary impact attenuators approved shall prepare and submit copies of drawings, specifications, test reports, and Federal acceptance letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.
BASIS OF ACCEPTANCE. Test Level 2 or Test Level 3 temporary impact attenuators will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-11 TEMPORARY IMPACT ATTENUATORS - GATING

SCOPE. This specification covers the material and performance requirements for temporary impact attenuators. Temporary impact attenuators are defined by FHWA as a Category III device.

MATERIALS REQUIREMENTS. Temporary impact attenuators shall be NCHRP 350 or MASH approved as a gating device. Temporary impact attenuators that use liquid or other materials as a filler or to provide ballast will be evaluated for potential environmental impacts and/or seasonal limitations. Temporary impact attenuators meeting the requirements of NCHRP 350 or MASH Test Level 2 are acceptable only as Test Level 2 devices. A Temporary impact attenuator accepted as a Test Level 3 device is also acceptable as Test Level 2 device. Temporary impact attenuators will be approved for use in shielding an object of a maximum width as specified in the Approved List, and specific configurations may be approved for maximum speeds. Approach ends of Temporary impact attenuators shall have impact attenuator markings in accordance with the MUTCD.

Concrete Grouting Material 701-05
Anchoring Materials - Chemically Curing 701-07

If a temporary foundation slab is required, concrete shall be Class A concrete conforming to Section 501 Portland Cement Concrete - General; reinforcing steel shall conform to §709-01 Bar Reinforcement, Grade 420.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have Test Level 2 or Test Level 3 temporary impact attenuators approved shall prepare and submit copies of drawings, specifications, test reports, and Federal acceptance letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Test Level 2 or Test Level 3 temporary impact attenuators will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-12 TRUCK-MOUNTED AND TRAILER MOUNTED IMPACT ATTENUATORS

SCOPE. This specification covers the material and performance requirements for truck mounted impact attenuators or trailer mounted impact attenuators (TMIAs) mounted on the rear of work vehicles and barrier trailers. Impact attenuators are defined by FHWA as a Category III device.

MATERIALS REQUIREMENTS. TMIAs shall be NCHRP 350 or MASH approved. TMIAs meeting the requirements of NCHRP 350 or MASH Test Level 3 are also acceptable as a Test Level 2 device. TMIAs meeting the requirements of NCHRP 350 or MASH Test Level 2 are acceptable only as Test Level 2 devices. Approach ends of TMIAs shall have impact attenuator markings in accordance with the MUTCD.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Test Level 2 or Test Level 3 TMIAs will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.
729-13 TEMPORARY SAND BARRELS

**SCOPE.** This specification covers the material and performance requirements for sand barrels. Sand barrels are defined by FHWA as a Category III device.

**MATERIAL REQUIREMENTS.** Sand barrels of each size module shall be NCHRP 350 or MASH approved. Sand barrels shall be yellow, durable, waterproof, ultraviolet-stable plastic. The first barrel in the array shall have impact attenuator markings in accordance with the MUTCD.

Sand barrels shall resist deformation from dynamic loadings due to vibration in the placement area and long-term stresses induced by thermal expansion/contraction and fill settlement. Sand barrels shall be free draining with respect to residual moisture in the fill sand. Lids shall divert precipitation and prevent moisture from entering the module. Lids shall be fastened or otherwise secured to provide a closed, reasonably vandal-resistant barrel.

The fill sand shall conform to the requirements of either '703-06 Cushion Sand' or '703-07 Concrete Sand.' Sodium chloride, as dry rock salt, equal to 3-5% by weight of the sand, shall be thoroughly mixed into the sand. Sodium chloride shall meet the requirements of '712-03 Sodium Chloride.'

**BASIS OF APPROVAL.** Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Sand barrels will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-14 VEHICLE-ARRESTING SYSTEMS

**SCOPE.** This specification covers the material and performance requirements for vehicle-arresting systems. Vehicle-arresting systems are defined by FHWA as a Category III device.

**MATERIAL REQUIREMENTS.** Vehicle-arresting systems shall be NCHRP 350 or MASH approved.

**BASIS OF APPROVAL.** Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days.

**BASIS OF ACCEPTANCE.** Vehicle-arresting systems will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-15 ARROW PANELS

**SCOPE.** This specification covers the material and performance requirements for arrow panels. Arrow panels are defined by FHWA as a Category IV device.

**MATERIAL REQUIREMENTS.** Arrow panels shall be signs with a matrix of illuminated elements capable of either flashing or sequential arrow displays that meets the requirements of the MUTCD. Arrow panels shall be equipped with a sign control console, mounted in a lockable, weather-resistant compartment.

Arrow panels shall not bear any advertising message or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier may be located on the back of the arrow panel or on the arrow panel trailer. The logo shall not exceed 0.1 m². The name and telephone number shall not exceed inches in height. The rear face of the arrow panel shall contain one or more clear lamp(s) to indicate that the arrow board is operating properly.
Truck-Mounted Series B. Arrow panels consist of a 60 x 30 inch rectangular panel mounted at a minimum of 5 feet above the roadway. The arrow display shall be legible at a minimum distance of 3/4 mile on a bright, sunny day or a clear night when the sight line is unobstructed.

Trailer-Mounted or Truck-Mounted Series C. Arrow panels consist of a 96 x 48 inch rectangular panel mounted at a minimum of 7 feet above the roadway for trailer mounted arrow panels and 5 feet above the roadway for truck mounted arrow panels. Arrow panels shall be powered by self-contained engine-driven generator systems, capable of energizing the arrow displays for 72 hours unattended and shall be capable of being powered by 110V AC supply; solar-powered, capable of energizing the arrow displays continuously for 21 days unattended; or powered by a truck. Arrow panel operation controls shall be mounted in a lockable enclosure. The arrow display shall be legible at a minimum distance of 1 mile on a bright, sunny day or a clear night when the sight line is unobstructed.

TESTING. Manufacturers or material suppliers desiring to have Truck-Mounted Series B arrow panels considered for inclusion on the Approved List shall submit a material certification that the arrow panel conforms to this specification and the requirements of the MUTCD, and provide an arrow panel to the Director, Materials Bureau in Albany for initial field testing. Field testing will include evaluation of arrow panel operation during various light conditions for brightness, legibility, and angularity. The review process requires a minimum of 30 calendar days.

Manufacturers or material suppliers desiring to have Trailer-Mounted or Truck-Mounted Series C arrow panels considered for inclusion on the Approved List shall submit test results from the AASHTO National Transportation Product Evaluation Program (NTPEP), a material certification that the arrow panel conforms to this specification and the requirements of the MUTCD, and provide an arrow panel to the Director of the Materials Bureau in Albany for initial field testing. Field testing will include evaluation of arrow panel operation during various light conditions for brightness, legibility, and angularity. The review process requires a minimum of 30 calendar days.

BASIS OF APPROVAL. Truck-Mounted Series B arrow panels meeting the requirements of this specification and having satisfactory initial field test results will be placed on the Approved List.

Trailer-Mounted or Truck-Mounted Series C arrow panels meeting the requirements of this specification and satisfactory initial field test results, as well as satisfactory NTPEP test results will be placed on the Approved List. Trailer-Mounted or Truck-Mounted Series C arrow panels for which NTPEP test results have not been submitted may be provisionally placed on the Approved List for a maximum of one year. After one year of provisional approval, the manufacturer may request an extension for one additional year based on a pending application filed with NTPEP for testing. No extensions of provisional approvals past two years will be granted. If satisfactory test results are not provided by the expiration date of the provisional approval, all units provided or in use shall be removed and replaced by the Contractor with approved units at no additional cost to the State. Arrow panels on the Approved List that have repeated poor evaluations will be removed from the Approved List.

BASIS OF ACCEPTANCE. Arrow panels will be accepted on the basis of the product appearing on the Approved List and a material certification that the product meets this specification and is the same as the one appearing on the Approved List.

729-16 PORTABLE VARIABLE-MESSAGE SIGNS (PVMS)

SCOPE. This specification covers the material and performance requirements for variable-message signs. Variable-message signs are defined by FHWA as a Category IV device.

MATERIAL REQUIREMENTS. Portable variable-message signs (PVMS) shall be tested by the National Transportation Product Evaluation Program (NTPEP) of the American Association of State and Highway Transportation Officials (AASHTO) demonstrating the arrow panel meets the requirements of this specification and the MUTCD. PVMS shall be trailer mounted and equipped for use on public highways in accordance with NYS Vehicle and Traffic Law. The unit shall operate primarily from a solar-powered electrical system and shall be capable of energizing the message display for a minimum of 21 days without auxiliary charge. The electrical system shall...
consist of batteries and a solar array panel and on-board auxiliary charging system to enable the batteries to be recharged via a 110V AC connection.

PVMS shall have a 3 line display with a minimum of 8 characters per line, and shall be capable of displaying 3 separate messages in a cyclical sequence. Characters shall be a minimum of 18 inches high.

PVMS shall be visible at a minimum distance of 1/2 mile during the day and at night. For highways with a posted pre-construction speed limit of 55 mph or greater, PVMS messages shall be legible from a minimum distance of 800 feet during the day, and 600 feet at night. For highways with a posted pre-construction speed limit of 50 mph or less, PVMS messages shall be legible from a minimum distance of 650 feet during the day. PVMS shall not bear any advertising message or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier may be located on the back of the PVMS or on the PVMS trailer. The logo shall not exceed 1 square foot. The name and telephone number shall not exceed 2 inches in height.

PVMS shall be equipped with a sign control console, mounted in a lockable, weather-resistant compartment. The sign controller shall have programmable memory capable of storing messages pertinent to planned construction activities, including emergency messages. The controller shall be equipped with 14 day calendar programming capability, providing the ability to start and stop the display of a minimum of three (3) different messages on a repeating schedule without an operator present. The controller shall be capable of producing an accurate log of all messages and the times they were displayed. The controller shall have programmable messages, display rate, and display interval settings. The controller shall blank the sign if the output voltage drops below the manufacturer’s recommended output level.

PVMS shall be equipped with control software using a Microsoft Windows operating system. The Contractor shall supply the Engineer with two copies of operating instructions for the PVMS and the control software. Electronic copies of software instructions are acceptable.

A. **Light-Emitting Diode (LED) Type.** LED type PVMS shall have light-emitting diodes arranged in arrays and the arrays shall be arranged in a matrix for each character to be 7 pixels high by 5 pixels wide. The LED display shall have the ability to display characters at a minimum height of 18 inches. The controller shall provide a means of dimming the pixels.

B. **Hybrid Flip-Disk Type.** Hybrid, flip-disk type PVMS shall have pixels consisting of individual electromagnetic disks with at least two (2) high-output amber LEDs. The disk face shall be covered with yellow prismatic retroreflective sheeting or an approved equal. The PVMS shall operate using both flip-disk and light-emitting diode (LED) during nighttime and low-light periods. The hybrid flip disk type shall be arranged in a matrix of 7 disks high by 5 disks wide for each character.

C. **Cellular Communications Option.** PVMS with cellular communications shall be equipped with a cellular telephone with cellular service and a modem capable of remotely operating the control software. The phone numbers for PVMS on a contract shall be sequential whenever possible to facilitate remote control of multiple devices. The unit shall accept a land line telephone connection mode without rewiring or modification.

D. **Radar Option.** The PVMS with radar shall be equipped with a radar speed detection option, providing the system with the ability to determine the speed of an approaching vehicle and interrupt the programmed sequence with a special default message displaying the vehicle speed. The unit shall collect and store vehicle speed data for retrieval.

E. **NTCIP Communication Protocol Option.** PVMS units that will be operated by the Department, typically from a Transportation Management Center (TMC), shall be equipped with communications and control systems that are National Transportation Communications for ITS Protocol (NTCIP) compliant.

**TESTING.** Manufacturers or material suppliers desiring to have PVMS considered for inclusion on the Approved List shall submit test results from the AASHTO National Transportation Product Evaluation Program (NTPEP), a material certification that the PVMS conforms to this specification and the requirements of the MUTCD, and provide a PVMS to the Director, Materials Bureau in Albany for initial field testing. Field testing will include evaluation of PVMS...
operation during various light conditions for brightness, legibility, and angularity. The initial testing process requires a minimum of 30 calendar days.

**Basis of Approval.** PVMS meeting the specification, having satisfactory NTPEP test results, and having satisfactory initial field test results will be placed on the Approved List.

PVMS meeting the specification, and having satisfactory initial field test results, that do not have NTPEP test results may be provisionally placed on the Approved List for a maximum of one year. After one year of provisional approval, the manufacturer may request an extension for one additional year based on a pending application filed with NTPEP for testing. No extensions of provisional approvals past two years will be granted. No extensions of provisional approvals will be granted. If satisfactory test results are not provided by the expiration date of the provisional approval, all units provided or in use shall be removed and replaced by the Contractor with approved units at no additional cost to the State. PVMS on the Approved List that have repeated poor evaluations will be removed from the Approved List.

**Basis of Acceptance.** PVMS will be accepted on the basis of the product appearing on the Approved List and a material certification that the product meets this specification and is the same as the one appearing on the Approved List.

### 729-17 Temporary Glare Screens

**Scope.** This specification covers the material and performance requirements for temporary glare screens. Glare screens are not defined separately by FHWA, but rather are considered a system component.

**Material Requirements.** Temporary glare screens shall consist of a opaque screen on a horizontal base which is, in turn, mounted on a concrete barrier. The system shall be modular to allow flexible use and ease of maintenance.

The screen shall be constructed of durable, lightweight, flexible, weather-resistant and impact-resistant materials of a single, uniform dark color. The minimum height of the screen shall be approximately 24 inches. The screen shall be reflectorized at a uniform maximum spacing of 40 feet. If barrier delineation is blocked, the screen shall be reflectorized on both sides with a 3 inch wide by 6 inch high (minimum) piece of reflective sheeting, ASTM Type I (Class A), ASTM Type III (Class B), or higher. Yellow reflective sheeting shall be used facing traffic which is to pass to the right of the glare screen. White reflective sheeting shall be used facing traffic which is to pass to the left of the glare screen.

Individual temporary glare screen modules shall not span a joint between concrete barrier sections, and bases shall not overhang the face of the barrier. Temporary glare screens shall not have any horizontal rigid members that could potentially spear an impacting vehicle, or shall be NCHRP 350 or MASH approved if the system has horizontal rigid members.

The base shall have sufficient rigidity to facilitate ease of handling and proper screen support and position. The connection of the base to the vertical components shall prevent unintentional screen rotation or dislocation. The base shall be properly secured to prevent it from being dislodged upon impact.

**Basis of Acceptance.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

### 729-18 Warning Lights

**Scope.** This specification covers the material and performance requirements for warning lights. Warning lights are not defined separately by FHWA, but rather are considered a system component.

**Material Requirements.** Warning lights shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not be likely to penetrate the windshield. Warning lights shall be Type A (low-intensity flashing), Type B (high-intensity flashing), or Type C (steady-burning). Warning lights shall meet the requirements of the MUTCD Section 6F.83 and the ITE *Purchase Specification for Flashing and Steady Burn Warning Lights*. Warning lights shall have a minimum nominal diameter of 7 inches and shall emit yellow light.
Flashing warning lights shall flash between 55 and 75 times per minute. Flashing warning lights required to operate 24 hours per day shall be Type B. Steady-burning warning lights shall operate from one-half hour after sunset to one-half hour before sunrise. Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens. Warning lights shall be powered by batteries, line power, or solar cells adequate to maintain the required luminance during all periods of required operation.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

### 729-19 AUTOMATED FLAGGER ASSISTANCE DEVICES

**SCOPE.** This specification covers the material and performance requirements for automated flagger assistance devices (AFAD) designed to control road users through work zones to be remotely operated by a flagger. AFADs are defined by FHWA as a Category IV device.

**MATERIAL REQUIREMENTS.** AFADs shall meet the requirements of the MUTCD. Each AFAD shall consist of a remotely controlled self-contained trailer or movable cart consisting of STOP/SLOW signs or RED/YELLOW lenses.

Stop/Slow Sign AFAD shall consist of:
- A STOP/SLOW sign (R1-1/W20-8) having an octagonal shape of at least 36 x 36 inch with letters at least 12 inches high.
  - One red stop beacon, 12 inch diameter red Light Emitting Diode (LED), mounted above the STOP sign.
  - At least one amber beacon, 12 inch diameter amber Light Emitting Diode (LED) or Type B high-intensity flashing warning light mounted above, below or to the side(s) of the SLOW sign.
- A gate arm capable of extending up to 8.5 feet.
- WAIT ON STOP (R1-7) and GO ON SLOW (R1-8) signs mounted under the STOP/SLOW sign.
  - WAIT ON STOP sign shall be a 24 x 30 inches with black legend and black border on a white background with letters at least 2 inches high.
  - GO ON SLOW sign shall be a 24 x 30 inches with black legend and black border on a white background with letters at least 2 inches high.
- All sign sheeting shall conform to §730-05 Reflective Sheeting ASTM Type IX (Class E).

RED/Yellow Lens AFAD shall consist of:
- Circular red and circular yellow 12 inch diameter Light Emitting Diode (LED) displays.
- A gate arm capable to extend up to 8.5 feet.
- STOP HERE ON RED sign (R10-6) 24 x 30 inches.
- All sign sheeting shall conform to §730-05 Reflective Sheeting ASTM Type IX (Class E).

The AFADs shall be controlled by a single flagger with a remote control, which shall allow safe operation of two AFADs remotely, employ bi-directional communications to verify each command sent from the handheld was successfully received, be equipped with conflict monitoring to prevent displaying a SLOW message simultaneously in both directions, permit an override feature to allow a simultaneous slow display, and show the current status of each AFAD. The control console and power supply shall be housed in a locked compartment. Each trailer/cart shall be equipped with a remote control warning horn alerting workers of intruding vehicles.

Trailers/carts shall display a minimum of 2 inch wide band of reflective sheeting on all four sides of the trailer. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type VII (Class C) or ASTM Type IX (Class E). 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 trailer. AFADs shall not bear an advertising message(s) or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier not to exceed 1.0 square feet may be located on the trailer or cart. The name and telephone number shall not exceed 2 inches in height.
BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have AFADs be considered for inclusion on the Approved List shall submit a material certification that the AFADs meet this specification and the requirements of the MUTCD, as well as provide one AFAD for initial field testing to the Director of the Materials Bureau in Albany for review. Initial field testing will include evaluating the AFADs for operation, sign visibility/legibility, retractable arm functionality/visibility and beacon/warning light brightness and angularity. The review process requires a minimum of 30 calendar days. AFADs having acceptable certifications and satisfactory initial field test results will be placed on the Approved List. AFADs that consistently have repeated poor evaluations will be removed from the approved list.

BASIS OF ACCEPTANCE. AFADs will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-20 PORTABLE TRAFFIC SIGNALS

SCOPE. This specification covers the material and performance requirements for portable traffic signals. Portable traffic signals are defined by FHWA as a Category IV device.

MATERIAL REQUIREMENTS. Portable traffic signals shall meet the requirements of the MUTCD. Portable traffic signals shall consist of two self-contained, trailer-mounted traffic signals, each with a vertical signal mast, horizontal mast arm and two - 3 section traffic signal heads. Each traffic signal head shall have 12 inch diameter circular red, yellow and green Light Emitting Diode (LED) modules.

The portable traffic signal system shall be able to function continuously and independent of utility power sources. The signal control console and power supply shall be housed in a locked compartment. The traffic signal controller shall be password protected, capable of providing traffic-actuated control with microwave detector sensors, have a built-in conflict monitor to prevent the display of conflicting indications, shall be hard-wired or radio-controlled to keep the signal indications synchronized, and have adequate phasing to serve expected traffic movements.

Trailers shall display a minimum of 2 inch wide band of reflectivesheeting on all four sides of the trailer. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type VII (Class D) or ASTM Type IX (Class E). 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 trailer. Portable traffic signals shall not bear an advertising message(s) or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier may be located on the portable traffic signal trailer. The logo shall not exceed 1.0 square feet. The name and telephone number shall not exceed 2 inches in height.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have Portable Traffic Signals considered for inclusion on the Approved List shall submit a material certification that the Portable Traffic Signal meets this specification and the requirements of the MUTCD, as well as one portable traffic signal for initial field testing to the Director of the Materials Bureau in Albany for review. Initial field testing will include evaluating the traffic signal system for phasing, clearances, detector operation and layout of the signal faces for brightness and angularity. The review process requires a minimum of 30 calendar days. Portable traffic signals having acceptable certifications and satisfactory initial field test results will be placed on the Approved List. Portable traffic signals on the Approved List that consistently have poor evaluations will be removed from the Approved List.

BASIS OF ACCEPTANCE. Portable traffic signals will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-21 TEMPORARY OVERLAY MARKERS

SCOPE. This specification covers the material and performance requirements for temporary overlay markers.
MATERIAL REQUIREMENTS. Temporary overlay markers are flexible polymer “L” shaped road reflectors with an adhesive on its base to adhere to the pavement surface. Temporary overlay markers are approximately 4 inches wide by 2 inches high with at least a 1 inch base. Yellow temporary overlay markers have a yellow reflective sheeting strip a minimum of 1/4 inch in height at the top of the vertical section on both sides. White temporary overlay markers have a white reflective strip a minimum of 1/4 inch in height at the top of the vertical section on one side only. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type VII (Class D) or ASTM Type IX (Class E).

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.
REFLECTORIZED SHEETING SIGN CHARACTERS

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

Page 1036:
*Delete* entirely Standard Spec 730-12 and *replace* with:

“**730-12 REFLECTORIZED SHEETING SIGN CHARACTERS (TYPE IV)**

**SCOPE.** These specifications cover the material requirements for Type IV reflectorized sheeting sign characters.

**MATERIAL REQUIREMENTS.** Type IV characters shall consist of cutout reflective sheeting material meeting the requirements of §730-05 Reflective Sheeting, Materials Designation 730-05.02 (Class B).

Characters or borders shall be applied directly to clean, dust-free reflective sheeting background panels. Characters or borders shall be applied mechanically with equipment and in a manner specified by the sheeting manufacturer. Borders shall be cut neatly and butt-joined at corners and panel joints.

**TESTING.** The Department reserves the right to conduct tests on samples taken by a representative of the Department as follows: 2% or a minimum of five (5) characters (whichever is the greater) for each size character used; and 2% or a minimum of 2 ft of border (whichever is greater) for each width of border used.

When performed, tests will be conducted in accordance with §730-05 Reflective Sheeting.

**BASIS OF ACCEPTANCE.** Type IV characters will be accepted on the basis of a material certification that the product conforms to this specification.”

Page 1036:
*Delete* entirely Standard Spec 730-13 and *replace* with:

“**730-13 REFLECTORIZED SHEETING SIGN CHARACTERS (TYPE V)**

**SCOPE.** These specifications cover the material requirements for Type V reflectorized sheeting sign characters.

**MATERIAL REQUIREMENTS.** Type V characters shall consist of a painted, screened, or reverse-screened application of paint, paste, or transparent color of a type and in a manner recommended by the manufacturer of the reflective material.

Reflective material used for reverse-screened signs shall meet the requirements of §730-05 Reflective Sheeting, Materials Designation 730-05.02 (Class B).

**TESTING.** The Department reserves the right to conduct tests on samples taken by a representative of the Department as follows: 2% or a minimum of five (5) characters (whichever is the greater) for each size character used; and 2% or a minimum of 2 ft of border (whichever is greater) for each width of border used.

When performed, tests will be conducted in accordance with §730-05 Reflective Sheeting.

**BASIS OF ACCEPTANCE.** Type V characters will be accepted on the basis of a material certification that the product conforms to this specification.”
Make the following changes to the Standard Specifications dated May 1, 2008:

Page 1049, Delete SECTION 733 AND 734 (VACANT) and Replace it with the following:

SECTION 733 – EARTHWORK MATERIALS

733-01 B CONTROLLED LOW STRENGTH MATERIAL (CLSM)

SCOPE. This specification covers the material requirements and methods of testing CLSM generally used as a replacement for compacted soil backfill in sites where performing compaction is difficult and labor intensive.

GENERAL. Provide CLSM with a mix design based on the unconfined compressive strength requirements of the specification. Design the CLSM mix so that it sets within the time stated in the contract documents. If no set time is required, design the set time to meet Contractor’s operational requirements.

MATERIAL REQUIREMENTS.

A. MATERIAL. Provide CLSM containing cement and water. At the Contractor’s option, it may also contain fly ash (unless the No Fly Ash item is specified), aggregate, or chemical admixtures in any proportions such that the final product meets the strength and flow consistency requirements included in this specification.

Provide materials meeting the requirements of Table 733-01A CLSM Material Requirements:

<table>
<thead>
<tr>
<th>Material Subsection</th>
<th>$701-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement, Type 1 or Type 2</td>
<td>§701-01</td>
</tr>
<tr>
<td>Water</td>
<td>§712-01</td>
</tr>
</tbody>
</table>

If used, provide materials meeting Table 733-01B Requirements for Optional CLSM Material:

<table>
<thead>
<tr>
<th>Material Subsection</th>
<th>$703-07 Concrete Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Gradation</td>
<td>§703-07 Concrete Sand</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>§711-10 Fly Ash</td>
</tr>
<tr>
<td>Chemical Admixtures</td>
<td>§711-08 Admixtures</td>
</tr>
</tbody>
</table>

Provide admixtures that comply with §711-08 Admixtures. The mix may include high air generators manufactured for CLSM.

B. UNCONFINED COMPRESSIVE STRENGTH. Provide CLSM with a mix design generating an unconfined compressive strength in Table 733-01C CLSM Unconfined Compressive Strength:

<table>
<thead>
<tr>
<th>Test Age</th>
<th>Unconfined Compressive Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 days</td>
<td>$40\ psi \leq q_u \leq 150\ psi$</td>
</tr>
</tbody>
</table>

SAMPLING AND TESTING.

A. SPREAD DIAMETER. Provide CLSM that has, at the time of placement, a minimum diameter spread of 8 in. as determined by a Department Representative in accordance with ASTM D6103 Standard Test Method for Flow Consistency of Controlled Low Strength Material (CLSM).

B. CYLINDER CAST. A Department Representative will cast three (3) specimens (cylinders) for each batch of CLSM for QA testing.
BASIS OF APPROVAL. Mix designs will be approved based on certification of the unconfined compressive strength meeting the requirements of the specification.

BASIS OF ACCEPTANCE. CLSM material will be accepted on the jobsite upon submission of an approved mix design to the Engineer.

CLSM material will be accepted as part of the contract quantities upon successful completion of the field tests and Quality Assurance (QA) program indicating the material conforms to the specification. In addition to the requirements of Section 106 Control of Material, the Department will sample and test CLSM to assure quality. Three (3) specimens (cylinders) will be cast for each batch in accordance with this specification and tested for unconfined compressive strength. A batch is defined as the amount of material that can be mixed at one time.

733-02 B MECHANICALLY STABILIZED EARTH SYSTEM BACKFILL MATERIAL

SCOPE. This specification covers the material requirements and methods of testing backfill material generally used for the construction of a MSES.

SAMPLING. Perform material tests and assurance methods pertaining to the backfill requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

GENERAL. Provide backfill material for any MSES from a single source unless prior approval for use of designated multiple sources is obtained from the Director, GEB.

MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile the backfill material in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide backfill material of one of the following types:
1. **Type A.** Material consisting of any mineral (inorganic) soil, blasted or broken rock, or similar materials of natural origin, including mixtures thereof, and having a gradation in accordance with TABLE 733-02A Backfill Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in.</td>
<td>100</td>
</tr>
<tr>
<td>¼ in.</td>
<td>30-100</td>
</tr>
<tr>
<td>No. 40</td>
<td>0-60</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-15</td>
</tr>
</tbody>
</table>

2. **Type B.** Material consisting of crushed stone conforming to §703-02 Coarse Aggregate, Size Designation 2.

3. **Type C.** Material consisting of recycled Portland Cement Concrete Aggregate (RCA). Type C backfill consists of at least 95%, by weight, of RCA and is free from organic and other deleterious material. Material may contain up to 5% by weight asphalt and/or brick. Gradation for Type C backfill conforms to Table 733-02A Backfill Gradation.

4. **Type D.** Material consisting of recycled Portland Cement Concrete Aggregate (RCA). Type D backfill consists of at least 95%, by weight, of RCA and is free from organic and other deleterious material. Material may contain up to 5% by weight asphalt and/or brick. Gradation for Type D backfill conforms to §703-02 Coarse Aggregate, Size Designation 2.
C. PLASTICITY INDEX. Provide material having a Plasticity Index not exceeding 5.

D. DURABILITY. Provide material having a Magnesium Sulfate Soundness loss less than 30 percent.

E. CORROSION POTENTIAL (METAL REINFORCING AND/OR CONNECTORS ONLY). The Department will test for the corrosion potential of any system with exposed metal in the backfill. Stockpiled materials will be tested for resistivity and pH, and may be tested for sulfides at the Department's discretion. Material failing to meet the following requirements of Table 733-02B Resistivity, Soluble Salts and pH Requirements, will be rejected except as specified below:

Material failing to meet the resistivity criterion may be tested for sulfate and chlorides. Material meeting the criteria for both sulfates and chlorides and having a resistivity greater than 10 ohm-m will be acceptable. Chemical testing (i.e. resistivity, sulfate ion content, sulfide ion content, and chloride ion content) is not required for Type B backfill or for Type D backfill.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Acceptance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistivity</td>
<td>AASHTO T288</td>
<td>$\rho \geq 30$ ohm-m</td>
</tr>
<tr>
<td>Chlorides</td>
<td>AASHTO T291 Method A</td>
<td>$Cl^- \leq 100$ mg/kg</td>
</tr>
<tr>
<td>Sulfates</td>
<td>AASHTO T290 Method A, gravimetric</td>
<td>$SO_4^{2-} \leq 200$ mg/kg</td>
</tr>
<tr>
<td>Sulfides</td>
<td>NYS DOT Test Method 711-12C</td>
<td>$S^{2-} \leq 300$ mg/kg</td>
</tr>
<tr>
<td>pH</td>
<td>Type A or C NYSDOT GTM-24</td>
<td>$5 \leq pH \leq 10$</td>
</tr>
<tr>
<td></td>
<td>Type B or D NYSDOT GTM-24</td>
<td>$5 \leq pH \leq 12.5$</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Stockpiles of MSES backfill material will be approved by the GEB in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials” and the procedural directives of the GEB.

BASIS OF ACCEPTANCE. Backfill material from approved stockpiles will be accepted on the contract site by delivery ticket. Each delivery ticket shall identify the Suppliers name, Suppliers granular source number (GSN), date, NYSDOT contract number, stockpile number, item number and quantity.

Backfill material from approved stockpiles will be accepted as part of the MSES upon confirmation that the material gradation type provided by the Contractor, outlined in §733-02B Gradation, conforms to the MSES submittal provided by the wall system designer-supplier and upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. In addition to the requirements of Section 106 Control of Material, the Department will sample and test backfill taken from behind the newly-constructed wall to assure quality. The number of samples and their locations (plan and elevation) will be determined based on the quantity of material to be used in each MSES structure in accordance with the geotechnical control procedure “Procedure for Taking Random Samples of Backfill Material for Mechanically Stabilized Earth Systems”. Results from chemical testing (i.e. resistivity, sulfate ion content, sulfide ion content, and chloride ion content) can take several weeks to obtain.

733-03 B GEOSYNTHETIC REINFORCED EARTH 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 Geosynthetic Reinforced Earth System (GRES).
SECTION 733 – EARTHWORK MATERIALS

SAMPLING. Obtain a representative sample of the source for the performance of a gradation analysis in accordance with the procedures contained in the geotechnical test method “Test Method for the Grain-Size Analysis of Granular Soil Materials”.

MATERIAL REQUIREMENTS. Any mineral (inorganic) soil, blasted or broken rock, or similar materials of natural origin, including mixtures thereof, may be suitable materials subject to the following:

A. GRADATION. Provide backfill material conforming to the following:

1. Gradation Spread. Provide backfill material having a gradation in accordance with TABLE 733-03A Backfill Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 in.</td>
<td>100</td>
</tr>
<tr>
<td>No. 40</td>
<td>0-60</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-40</td>
</tr>
</tbody>
</table>

2. Gradation Ratio. Provide backfill material having a gradation ratio in accordance with the following formula:

$$\frac{\text{Percent Pass. No.200 sieve}}{\text{Percent Pass. No.40 sieve}} \times 100 \leq 70$$

The gradation is evaluated at the contract level.

BASIS OF APPROVAL. Sources will be approved upon successful completion of the gradation tests indicating that the material conforms to the specification.

BASIS OF ACCEPTANCE. Backfill material will be accepted based upon successful completion of the gradation tests indicating that the material conforms to the specification.

733-04 B SUBBASE COURSE

SCOPE. This specification covers the material requirements and methods of testing subbase material generally used in the construction of a pavement structure. The following subbase types are evaluated in this specification:

- 733.0401 – Subbase Course, Type 1
- 733.0402 – Subbase Course, Type 2
- 733.0403 – Subbase Course, Type 3
- 733.0404 – Subbase Course, Type 4

Subbase course types are based on the gradation of the material as outlined in Table 733-04A Subbase Gradation.

SAMPLING. Perform material tests and assurance methods pertaining to subbase requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

GENERAL. Provide suitable material conforming to the requirements of Section 203 Excavation and Embankment and to the requirements contained herein.

MATERIAL REQUIREMENTS. For Types 1, 3 and 4 furnish materials consisting of approved Blast Furnace Slag, Stone, Sand, and Gravel, or blends of these materials.

For Type 2, furnish materials consisting of approved Blast Furnace Slag or of Stone which is the product of crushing or blasting ledge rock, or a blend of Blast Furnace Slag and of Stone.

A. STOCKPILE. Stockpile subbase material in accordance with the geotechnical control procedure
SECTION 733 – EARTHWORK MATERIALS

“Procedure for the Control and Quality Assurance of Granular Materials” except as noted herein.

1. **Type 3.** Material furnished under Type 3 will not be required to be stockpiled unless it contains RCA, glass, or Corian®.

2. **Recycled Materials, Alternate C.** Stockpiling of the Reclaimed Asphalt Pavement (RAP) for Alternate C is not required.

B. **GRADATION.** Provide subbase material having a gradation in accordance with TABLE 733-04A Subbase Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type 1</td>
</tr>
<tr>
<td>4 in.</td>
<td>-</td>
</tr>
<tr>
<td>3 in.</td>
<td>100</td>
</tr>
<tr>
<td>2 in.</td>
<td>90-100</td>
</tr>
<tr>
<td>½ in.</td>
<td>30-65</td>
</tr>
<tr>
<td>No. 40</td>
<td>5-40</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-10</td>
</tr>
</tbody>
</table>

C. **PLASTICITY INDEX.** Provide material having a Plasticity Index based on the material passing the No. 40 mesh sieve equal to or less than 5.0.

D. **DURABILITY.**

1. **Types 1, 2 and 4.** Provide material for Types 1, 2 and 4 having a Magnesium Sulfate Soundness loss less than 20% after four (4) cycles, unless material meeting the requirements of Alternate C (F. Recycled Materials) is used.

2. **Type 3.** Provide material for Type 3 having a Magnesium Sulfate Soundness loss less than 30% after four (4) cycles.

E. **ELONGATED PARTICLES.** A flat or elongated particle is defined herein as one which has its greatest dimension more than three (3) times its least dimension. Provide material consisting of particles where not more than 30%, by weight, of the particles retained on a ½ in. sieve is flat or elongated. When the State elects to test for this requirement, material with a percentage greater than 30 will be rejected. Acceptance for this requirement will normally be based on a visual inspection by the Regional Geotechnical Engineer.

F. **RECYCLED MATERIALS.** The following materials are an acceptable replacement for Types 1, 3 and 4. Only one alternate shall be selected for use per stockpile.

- **Alternate A.** Recycled Portland Cement Concrete Aggregate (RCA) meeting the requirements of §733-07 Recycled Portland Cement Concrete Aggregate, Alternate A.
- **Alternate B.** Recycled Portland Cement Concrete Aggregate (RCA) meeting the requirements of §733-07 Recycled Portland Cement Concrete Aggregate, Alternate B.
- **Alternate C.** Reclaimed Asphalt Pavement (RAP) meeting the requirements of §733-06 Reclaimed Asphalt Pavement for Earthwork and Subbase.
- **Alternate D.** Blends of Blast Furnace Slag, Stone, Sand, and Gravel, with not more than 30% by weight of glass. Glass shall meet the requirements of §733-05 Glass Backfill.
- **Alternate E.** Blend of Alternate A with not more than 5% by weight of Corian®. Corian® shall meet the requirements of §733-19 Corian® Backfill.
- **Alternate F.** Blend of Alternate B with not more than 5% by weight of Corian®. Corian® shall meet the requirements of §733-19 Corian® Backfill.

G. **MATERIAL FOR TEMPORARY WORK.** Material used as a subbase for the construction of temporary
work may be approved by a Departmental Geotechnical Engineer by visual inspection in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”. Do not permanently incorporate material so approved into the work without following the appropriate acceptance procedure.

BASIS OF APPROVAL. Stockpiles of subbase material will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

BASIS OF ACCEPTANCE. Subbase material from approved stockpiles will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, subbase material will be accepted upon the basis of the stockpile approval.

733-05 B GLASS BACKFILL

SCOPE. This specification covers the material requirements and methods of assessing glass backfill material generally used as fill material.

SAMPLING. Perform material tests and assurance methods pertaining to the glass backfill requirements in conformance with the procedures for stockpiled granular materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile glass backfill material in accordance with the procedures for stockpiled granular materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide glass crushed to a maximum particle size of 3/8 in. The material shall be subject to visual inspection by the Regional Geotechnical Engineer.

C. CHARACTERISTICS. Glass may contain up to a maximum of 5% by volume of china, ceramics, plate glass products, paper, plastics or other deleterious materials.

BASIS OF APPROVAL. Glass backfill will be approved in accordance with the procedures for stockpiled granular materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

The material shall be subject to visual inspection by the Regional Geotechnical Engineer.

BASIS OF ACCEPTANCE. Approved glass backfill material will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, glass backfill material will be accepted upon the basis of the stockpile approval.

733-06 B RECLAIMED ASPHALT PAVEMENT FOR EARTHWORK AND SUBBASE

SCOPE. This specification covers the material requirements and methods of assessing Reclaimed Asphalt Pavement (RAP) generally used as fill material.

SAMPLING. Perform material tests and assurance methods pertaining to the RAP requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.
SECTION 733 – EARTHWORK MATERIALS

A. SOURCE. Provide written documentation that the reclaimed bituminous material originated on a Department project. Include an identifier, such as State Highway number, construction contract number or Department Project Identification Number (PIN).

B. GRADATION.

1. Gradation Spread. Provide RAP having a maximum top size of 2 in. at the time of placement.

2. Elongated Particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than three (3) times its least dimension. Provide material consisting of particles where not more than 30%, by weight, of the particles retained on a ½ in. sieve are flat or elongated. When the State elects to test for this requirement, material with a percentage greater than 30 will be rejected. Acceptance for this requirement will normally be based on a visual inspection by the Regional Geotechnical Engineer.

C. CHARACTERISTICS. Bituminous material that is well-graded from coarse to fine and free from organic or other deleterious material, including tar. This material is at least 95%, by weight, reclaimed bituminous material. No soundness or Plasticity Index testing will be required.

BASIS OF APPROVAL. RAP will be approved based upon a visual inspection by the Regional Geotechnical Engineer.

BASIS OF ACCEPTANCE. If this material becomes unstable during construction, it may be necessary to add a mixture of natural suitable material to the RAP. Acceptance of the final product will be based on an evaluation by the Engineer.

Approved RAP will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, RAP will be accepted upon the basis of the visual inspection by the Regional Geotechnical Engineer.

733-07 B  RECYCLED PORTLAND CEMENT CONCRETE AGGREGATE

SCOPE. This specification covers the material requirements and methods of testing Recycled Portland Cement Concrete Aggregate (RCA) generally used as fill material. The following RCA types are evaluated in this specification:

733.0701 – Recycled Portland Cement Concrete Aggregate
733.0702 – Recycled Portland Cement Concrete Aggregate Mixture

SAMPLING. Perform material tests and assurance methods pertaining to the RCA requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile RCA in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

If RCA comes from other than a Department project, provide documentation showing that the material obtained is from a NYSDEC registered or permitted construction and demolition (C&D) debris processing facility as specified in Section 360-16.1 of 6NYCRR Part 360, “Solid Waste Management Facilities”.

B. GRADATION.

1. Gradation Spread. Provide RCA meeting the gradation requirements for the appropriate item of use.
2. Elongated Particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than three (3) times its least dimension. Provide material consisting of particles where not more than 30%, by weight, of the particles retained on a ½ in. sieve are flat or elongated. When the State elects to test for this requirement, material with a percentage greater than 30 will be rejected. Acceptance for this requirement will normally be based on a visual inspection by the Regional Geotechnical Engineer.

C. CHARACTERISTICS.

1. Alternate A. At least 95%, by weight, of Recycled Portland Cement Concrete Aggregate (RCA), and free from organic and other deleterious material. This material may contain up to 5% by weight asphalt and/or brick.

2. Alternate B. A mixture of Recycled Portland Cement Concrete Aggregate (RCA) conforming to Alternate A above mixed with stone, sand, gravel or blast furnace slag. This material may contain up to 5% by weight asphalt and/or brick.

BASIS OF APPROVAL. Stockpiles of RCA will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

BASIS OF ACCEPTANCE. RCA from approved stockpiles will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, RCA will be accepted upon the basis of the stockpile approval.

733-08 B EMBANKMENT IN PLACE

SCOPE. This specification covers the material requirements and methods of assessing material generally used for embankment construction.

MATERIAL REQUIREMENTS. 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.

A. GRADATION. Provide suitable backfill material having no particles with a dimension in excess of two-thirds of the loose lift thickness controlled by the compaction equipment supplied by the Contractor.

Glass incorporated into embankments shall be thoroughly mixed with other suitable material so that Glass constitutes no more than 30% by weight anywhere in the embankment.

The material shall be subject to visual inspection by the Engineer.

BASIS OF ACCEPTANCE. Embankment material will be accepted upon visual inspection by the Engineer.

733-09 B SELECT BORROW

SCOPE. This specification covers the material requirements and methods of testing select borrow material generally used for backfilling in areas beneath the watertable.

SAMPLING. Perform material tests and quality assurance methods pertaining to the backfill requirements in conformance with the procedures for non-stockpiled materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.
SECTION 733 – EARTHWORK MATERIALS

A. SOURCE. Provide backfill material from a source approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide material consisting of rock, stone, slag, cobbles, or gravel, substantially free of shale or other soft, poor durability particles having no particles greater than 3 ft. in maximum dimension. Of the portion passing the 4 in. square sieve, the material shall have a gradation in accordance with TABLE 733-09A Select Borrow Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 40</td>
<td>0-70</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-15</td>
</tr>
</tbody>
</table>

The gradation is evaluated at the project level.

C. DURABILITY. Provide material having a Magnesium Sulfate Soundness loss less than 35%.

D. COMPOSITION. RAP shall not be used.

BASIS OF APPROVAL. Sources will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

A preceding source evaluation will be valid for the time identified in the manual. For sources without a current evaluation, samples shall be obtained under the direction of the Departmental Geotechnical Engineer and will be tested and evaluated by the Geotechnical Engineering Bureau.

BASIS OF ACCEPTANCE. Approved select borrow backfill material from approved sources will be accepted upon successful completion of the gradation tests and Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, approved select borrow material will be accepted upon successful completion of the gradation tests.

733-10 B SELECT FILL

SCOPE. This specification covers the material requirements and methods of testing select fill material generally used for backfilling in areas beneath the watertable.

SAMPLING. The sampling procedure contained in §733-09 Select Borrow shall apply.

MATERIAL REQUIREMENTS. The material requirements contained in §733-09 Select Borrow shall apply.

BASIS OF APPROVAL. The basis of approval contained in §733-09 Select Borrow shall apply.

BASIS OF ACCEPTANCE. The basis of acceptance contained in §733-09 Select Borrow shall apply.

733-11 B SELECT GRANULAR FILL

SCOPE. This specification covers the material requirements and methods of testing select granular fill material generally used for backfilling around pipes. The following materials are evaluated in this specification:

733.1101 – Select Granular Fill (Typical)
733.1102 – Select Granular Fill for Corrugated Aluminum Pipe

SAMPLING. Perform material tests and quality assurance methods pertaining to the backfill requirements in conformance with the procedures for non-stockpiled materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

03396=2008:733-01 thru -23 Page 9 of 21 EI 09-027, EI 11-001 L01/12/12 EI 11-011
MATERIAL REQUIREMENTS.

A. SOURCE. Provide backfill material from an approved source in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide material consisting of rock, stone, slag, cobbles, or gravel, substantially free of shale or other soft, poor durability particles and conforming to the following requirements:

1. Typical. Except when used as backfill material for aluminum pipe with Type IR corrugations (Spiral Rib Pipe), the material shall have a gradation in accordance with TABLE 733-11A Select Granular Fill Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in.</td>
<td>100</td>
</tr>
<tr>
<td>No. 40</td>
<td>0-70</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-15</td>
</tr>
</tbody>
</table>

2. Exception. When used as backfill for Corrugated Aluminum Pipe, Type 1R (Spiral Rib Pipe) 100% of the material shall also pass the 2 in. sieve.

The gradation is evaluated at the project level.

C. DURABILITY. Provide materials substantially free of shale and soft, poor durability particles. Provide material having a Magnesium Sulfate Soundness loss less than 30%.

D. COMPOSITION. RAP shall not be used.

When used as backfill for aluminum pipe, the material shall be free of Portland cement or Portland cement concrete.

E. pH. Where the State elects to test for this requirement, the material shall have a pH in accordance with TABLE 733-11B Select Granular Fill pH Requirement.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Acceptance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>NYSDOT GTM-24</td>
<td>$5 \leq pH \leq 10$</td>
</tr>
</tbody>
</table>

When RCA is used as backfill in a non-aluminum pipe application, the pH requirements are waived.

BASIS OF APPROVAL. Sources will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

A preceding source evaluation will be valid for the time identified in the manual. For sources without a current evaluation, samples shall be obtained under the direction of the Departmental Geotechnical Engineer and will be tested and evaluated by the Geotechnical Engineering Bureau.

BASIS OF ACCEPTANCE. Approved select granular fill backfill material from approved sources will be accepted upon successful completion of the gradation tests and Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, approved select granular fill backfill material will be accepted upon successful completion of the gradation tests.

733-12 B SELECT GRANULAR FILL SLOPE PROTECTION

SCOPE. This specification covers the material requirements and methods of testing select granular fill slope
SECTION 733 – EARTHWORK MATERIALS

protection material generally used for stabilizing sloughing slopes. The following materials are evaluated in this specification:

733.1201 – Select Granular Fill Slope Protection (Blasted Rock)
733.1202 – Select Granular Fill Slope Protection (Typical)

SAMPLING. Perform material tests and quality assurance methods pertaining to the backfill requirements in conformance with the procedures for non-stockpiled materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. SOURCE. Provide backfill material from an approved source in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide material consisting of rock, stone, slag, cobbles, or gravel, substantially free of shale or other soft, poor durability particles.

1. Broken or blasted unweathered rock used for this item shall be well graded, having no particles greater than 24 in. in maximum dimension, and be substantially free from particles greater than 12 in. in maximum dimension, containing little or no material passing the No. 10 mesh sieve.

2. All materials, other than broken or blasted unweathered rock, shall have a gradation in accordance with TABLE 733-12A Select Granular Fill Slope Protection Gradation.

| TABLE 733-12A SELECT GRANULAR FILL SLOPE PROTECTION GRADATION |
|-------------------|-----------------|
| Sieve Size Designation | Percentage Passing by Weight |
| 24 in. maximum dimension | 100 |
| 6 in. maximum dimension | 90-100 |
| 2 in. square sieve | 0-30 |
| ¼ in. sieve | 0-10 |

The gradation is evaluated at the project level.

C. DURABILITY. Provide material having a Magnesium Sulfate Soundness loss less than 35%.

BASIS OF APPROVAL. Sources will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

A preceding source evaluation will be valid for the time identified in the manual. For sources without a current evaluation, samples shall be obtained under the direction of the Departmental Geotechnical Engineer and will be tested and evaluated by the Geotechnical Engineering Bureau.

BASIS OF ACCEPTANCE. Approved select granular fill slope protection backfill material from approved sources will be accepted upon successful completion of the gradation tests and Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, approved select granular fill slope protection backfill material will be accepted upon successful completion of the gradation tests.

733-13 B SELECT GRANULAR SUBGRADE

SCOPE. This specification covers the material requirements and methods of testing select granular subgrade material generally used for backfilling undercuts. The following materials are evaluated in this specification:

733.1301 – Select Granular Subgrade (Blasted Rock)
733.1302 – Select Granular Subgrade (Typical)
733.1303 – Select Granular Subgrade (RCA)
733.1304 – Select Granular Subgrade (RCA Mixture)
733.1305 – Select Granular Subgrade (RAP)

**SAMPLING.** Perform material tests and quality assurance methods pertaining to the backfill requirements in conformance with the procedures for non-stockpiled materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

**MATERIAL REQUIREMENTS.**

A. **SOURCE.** Provide backfill material from an approved source in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. **GRADATION.** Provide material consisting of rock, stone, slag, cobbles, or gravel, substantially free of shale or other soft, poor durability particles.

1. Well graded rock may be used for this item. Particles shall not exceed 12 in. in greatest dimension nor \( \frac{2}{3} \) of the loose lift thickness, whichever is less.

2. All materials, other than well graded rock, furnished under this item shall have no particles greater than 6 in. in maximum dimension. Of the portion passing the 4 in. square sieve, the material shall have a gradation in accordance with TABLE 733-13A Select Granular Subgrade Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼ in.</td>
<td>30-100</td>
</tr>
<tr>
<td>No. 40</td>
<td>0-50</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-10</td>
</tr>
</tbody>
</table>

The gradation is evaluated at the project level.

C. **DURABILITY.** Provide material having a Magnesium Sulfate Soundness loss less than 35%.

D **RECYCLED MATERIALS.** The following materials are an acceptable replacement for natural material:

- **Alternate A.** Recycled Portland Cement Concrete Aggregate (RCA) meeting the requirements of §733-07 Recycled Portland Cement Concrete Aggregate, Alternate A.

- **Alternate B.** Recycled Portland Cement Concrete Aggregate (RCA) meeting the requirements of §733-07 Recycled Portland Cement Concrete Aggregate, Alternate B.

- **Alternate C.** Reclaimed Asphalt Pavement (RAP) meeting the requirements of §733-06 Reclaimed Asphalt Pavement for Earthwork and Subbase.

**BASIS OF APPROVAL.** Sources will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

A preceding source evaluation will be valid for the time identified in the manual. For sources without a current evaluation, samples shall be obtained under the direction of the Departmental Geotechnical Engineer and will be tested and evaluated by the Geotechnical Engineering Bureau.

**BASIS OF ACCEPTANCE.** Approved select granular subgrade backfill material from approved sources will be accepted upon successful completion of the gradation tests and Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, approved select granular subgrade backfill material will be accepted upon successful completion of the gradation tests.

733-14 B SELECT STRUCTURAL FILL
SECTION 733 – EARTHWORK MATERIALS

SCOPE. This specification covers the material requirements and methods of testing select granular fill material generally used for backfilling behind structures.

SAMPLING. The sampling procedure contained in §733-11 Select Granular Fill shall apply.

MATERIAL REQUIREMENTS. The material requirements contained in §733-11 Select Granular Fill shall apply.

BASIS OF APPROVAL. The basis of approval contained in §733-11 Select Granular Fill shall apply.

BASIS OF ACCEPTANCE. The basis of acceptance contained in §733-11 Select Granular Fill shall apply.

733-15 B SAND BACKFILL

SCOPE. This specification covers the material requirements and methods of testing sand backfill generally used for backfilling around utilities.

SAMPLING. Perform material tests and quality assurance methods pertaining to the backfill requirements in conformance with the procedures for non-stockpiled materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. SOURCE. Provide backfill material from an approved source in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide material have a gradation in accordance with TABLE 733-15A Sand Backfill Gradation.

<table>
<thead>
<tr>
<th>TABLE 733-15A SAND BACKFILL GRADATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size Designation</td>
</tr>
<tr>
<td>½ in.</td>
</tr>
<tr>
<td>¼ in.</td>
</tr>
<tr>
<td>No. 200</td>
</tr>
</tbody>
</table>

The gradation is evaluated at the project level.

C. DURABILITY. Provide materials substantially free of shale and soft, poor durability particles.

D. pH. Where the State elects to test for this requirement, the material shall have a pH in accordance with TABLE 733-15B Sand Backfill pH Requirement.

<table>
<thead>
<tr>
<th>TABLE 733-15B SAND BACKFILL pH REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property</td>
</tr>
<tr>
<td>pH</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Sources will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

A preceding source evaluation will be valid for the time identified in the manual. For sources without a current evaluation, samples shall be obtained under the direction of the Departmental Geotechnical Engineer and will be tested and evaluated by the Geotechnical Engineering Bureau.

BASIS OF ACCEPTANCE. Approved sand backfill material from approved sources will be accepted upon
SECTION 733 – EARTHWORK MATERIALS

successful completion of the gradation tests and Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, approved sand backfill material will be accepted upon successful completion of the gradation tests.

733-16 B WINTER EARTHWORK

SCOPE. This specification addresses the material requirements and methods of assessing earthwork materials placed during construction operations between November 1st and April 1st. The following materials are evaluated in this specification:

- Winter Earthwork Material for Embankment In Place
- Winter Earthwork Material for Select Borrow
- Winter Earthwork Material for Select Fill
- Winter Earthwork Material for Select Granular Fill (Typical)
- Winter Earthwork Material for Select Granular Fill for Corrugated Aluminum Pipe
- Winter Earthwork Material for Select Granular Subgrade (Blasted Rock)
- Winter Earthwork Material for Select Granular Subgrade (Typical)
- Winter Earthwork Material for Select Granular Subgrade (RCA)
- Winter Earthwork Material for Select Granular Subgrade (RCA Mixture)
- Winter Earthwork Material for Select Structural Fill
- Winter Earthwork Material for GRES Slope Backfill

SAMPLING. Perform material tests and quality assurance methods pertaining to the backfill requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. SOURCE. Provide unfrozen backfill material from an approved source in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION.

1. Winter Earthwork Material for Embankment In Place. Provide material consisting of rock, stone, slag, cobbles, or gravel, substantially free of shale or other soft, poor durability particles. The material shall have no particles greater than 12 in. in maximum dimension. The material shall have a gradation in accordance with TABLE 733-16A Gradation of Winter Earthwork Material.

| TABLE 733-16A GRADATION OF WINTER EARTHWORK MATERIAL |
|----------------------------------|------------------|
| Sieve Size Designation          | Percentage Passing by Weight |
| Maximum Dimension               | 100               |
| 0.5(Maximum Dimension)          | 0-50              |
| ¼ in.                           | 0-10              |
| No. 200                         | 0-4               |

The gradation is evaluated at the project level.

2. Winter Earthwork Material for Select Borrow. Provide material meeting the requirements of §733-09 Select Borrow with the following gradation adjustment:

The material shall have no particles greater than 3 ft. in maximum dimension. The material shall have a gradation in accordance with TABLE 733-16A Gradation of Winter Earthwork Material. The gradation is evaluated at the project level.

3. Winter Earthwork Material for Select Fill. The material requirements contained in §733-16 B.2.
Winter Earthwork Material for Select Borrow shall apply.

4. **Winter Earthwork Material for Select Granular Fill.** Provide material meeting the requirements of §733-11 Select Granular Fill with the following gradation adjustment:
   The material shall have no particles greater than 4 in. in maximum dimension. The material shall have a gradation in accordance with TABLE 733-16A Gradation of Winter Earthwork Material. The gradation is evaluated at the project level.

5. **Winter Earthwork Material for Select Granular Subgrade.** Provide material meeting the requirements of §733-13 Select Granular Subgrade with the following material and gradation adjustment:
   The material shall have no particles greater than 6 in. in maximum dimension. The material shall have a gradation in accordance with TABLE 733-16A Gradation of Winter Earthwork Material. RAP shall not be used. The gradation is evaluated at the project level.


7. **Winter Earthwork Material for GRES Slope Backfill.** The material requirements contained in §733-16 B.5. Winter Earthwork Material for Select Granular Subgrade shall apply.

C. **CHARACTERISTICS.**
   1. No frozen material is to be incorporated into or be allowed to remain in any of the work.
   2. Material of silt, clay, or high moisture content will not be permitted under any circumstances.

**BASIS OF APPROVAL.** Sources will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.
   A preceding source evaluation will be valid for the time identified in the manual. For sources without a current evaluation, samples shall be obtained under the direction of the Departmental Geotechnical Engineer and will be tested and evaluated by the Geotechnical Engineering Bureau.

**BASIS OF ACCEPTANCE.** Approved winter earthwork material from approved sources for the substitution of embankment in place, select borrow, select fill, select granular fill, select granular subgrade, select structural fill, or GRES slope backfill will be accepted upon successful completion of the gradation tests and Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, approved winter earthwork material will be accepted upon successful completion of the gradation tests.

### 733-17 B SURFACE SETTLEMENT GAUGE

**SCOPE.** This specification covers the material requirements and methods of installation of the embankment construction control device surface settlement gauge generally used for monitoring embankment construction. The following materials are evaluated in this specification:

- 733.1701 – Surface Settlement Gauge (Pipe Gauge)
- 733.1702 – Surface Settlement Gauge (Manometer Gauge)

**MATERIAL REQUIREMENTS.** Provide material in conformance with the geotechnical control procedure “ Settlement Gauges and Settlement Rods” including:

**A. PIPE GAUGE.**

1. **Pipe.** Provide a minimum 2 ½ in. diameter metal pipe with steel flange meeting the requirements of §732-02 Drive Pipe. Provide a sufficient amount of pipe extensions to meet the rise requirements identified in the geotechnical control procedure “Settlement Gauges and Settlement Rods”.

2. **Base.** Provide either of the following:
SECTION 733 – EARTHWORK MATERIALS

a. **Steel.** Provide a minimum ¼ in. thick steel plate meeting the requirements of §715-01 Structural Steel.

b. **Wood.** Provide wood to the sizes shown in the geotechnical control procedure “Settlement Gauges and Settlement Rods” conforming to the requirements of §712-14 Stress Graded Timber and Lumber. Treat wood in accordance with §708-31 Wood Preservative - Waterborne and applied in conformance with American Wood Preservers Association (AWPA) Use Category Designation UC4B.

B. MANOMETER GAUGE. Provide materials specified for A. Pipe Gauge with the exception of the pipe extensions. To obtain readings from the buried device, provide the following connection:

1. **Interconnection.**
   a. **Tubing.** Provide ½ in. O.D. polyethylene tubing indicated in the geotechnical control procedure “Settlement Gauges and Settlement Rods”.
   
   b. **Sand.** Provide sand conforming to the requirement of §703-07 Concrete Sand.
   
   c. **Fluid.** Provide a 50-50 mixture of ethylene glycol and water.

2. **Readout Box.** Provide wood to the sizes shown in the geotechnical control procedure “Settlement Gauges and Settlement Rods” conforming to the requirements of §712-14 Stress Graded Timber and Lumber. Treat wood in accordance with §708-31 Wood Preservative - Waterborne and applied in conformance with American Wood Preservers Association (AWPA) Use Category Designation UC4B.

3. **Base.** Provide wood to the sizes shown in the geotechnical control procedure “Settlement Gauges and Settlement Rods” conforming to the requirements of §712-14 Stress Graded Timber and Lumber. Treat wood in accordance with §708-31 Wood Preservative - Waterborne and applied in conformance with American Wood Preservers Association (AWPA) Use Category Designation UC4B.

**BASIS OF APPROVAL.** The material shall be approved on the basis of manufacturer’s certification that the material conforms to the specification.

**BASIS OF ACCEPTANCE.** Approved material will be accepted upon successful assemblage and installation in accordance with the geotechnical control procedure “Settlement Gauges and Settlement Rods”.

733-18 B SETTLEMENT ROD

**SCOPE.** This specification covers the material requirements and methods of installation of the embankment construction control device settlement rod generally used for monitoring embankment construction.

**MATERIAL REQUIREMENTS.** Provide material in conformance with the geotechnical control procedure “Settlement Gauges and Settlement Rods” including:

A. **ROD.** Provide a minimum ½ in. diameter steel rod meeting the requirements of §709-01 Bar Reinforcement, Grade 60.

B. **PIPE.** Provide a minimum 3 in. diameter metal pipe and cap meeting the requirements of §732-02 Drive Pipe.

**BASIS OF APPROVAL.** The material shall be approved on the basis of manufacturer’s certification that the material conforms to the specification.
BASIS OF ACCEPTANCE. Approved material will be accepted upon successful assemblage and installation in accordance with the geotechnical control procedure “Settlement Gauges and Settlement Rods”.

733-19 B CORIAN® BACKFILL

SCOPE. This specification covers the material requirements and methods of assessing Corian® backfill material generally used as fill material.

SAMPLING. Perform material tests and assurance methods pertaining to the Corian® backfill requirements in conformance with the procedures for stockpiled granular materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile Corian® backfill material in accordance with the procedures for stockpiled granular materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

B. GRADATION. Provide Corian® crushed to a maximum particle size of 2 in. The material shall be subject to visual inspection by the Regional Geotechnical Engineer.

BASIS OF APPROVAL. Corian® backfill will be approved in accordance with the procedures for stockpiled granular materials contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

The material shall be subject to visual inspection by the Regional Geotechnical Engineer.

BASIS OF ACCEPTANCE. Approved Corian® backfill material will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, Corian® backfill material will be accepted upon the basis of the stockpile approval.

733-20 UNDERDRAIN FILTER MATERIAL

SCOPE. This specification covers the material requirements and methods of testing underdrain filter material generally used in drainage systems. The following underdrain filter types are evaluated in this specification:

733.2001 – Underdrain Filter, Type 1
733.2002 – Underdrain Filter, Type 2

Underdrain filter types are based on the gradation of the material as outlined in Table 733-20A Underdrain Filter Material Gradation or alternate recycled material as outlined in Table 733-20B Underdrain Filter Material, Glass Substitution Gradation.

SAMPLING. Perform material tests and assurance methods pertaining to underdrain filter material requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile underdrain filter material in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials” except as noted herein.

B. GRADATION. Provide material consisting of crushed stone, sand, gravel, or screened gravel having a gradation in accordance with TABLE 733-20A Underdrain Filter Material Gradation.
SECTION 733 – EARTHWORK MATERIALS

TABLE 733-20A UNDERDRAIN FILTER MATERIAL GRADATION

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type 1</td>
</tr>
<tr>
<td>1 in.</td>
<td>100</td>
</tr>
<tr>
<td>% in.</td>
<td>30-100</td>
</tr>
<tr>
<td>% in.</td>
<td>0-30</td>
</tr>
<tr>
<td>No. 10</td>
<td>0-10</td>
</tr>
<tr>
<td>No. 20</td>
<td>0-5</td>
</tr>
</tbody>
</table>

C. DURABILITY. Provide material meeting the soundness requirements of §703-02 Coarse Aggregates or §703-10 Lightweight Aggregates. When electing to use material from sources not approved under §703-02 or §703-10, provide material having a Magnesium Sulfate Soundness loss less than 20% in conformance with the procedures contained in the geotechnical test method “Test Method for Magnesium Sulfate Soundness of Granular Materials”.

D. RECYCLED MATERIALS. The following material is an acceptable replacement for Types 1 or 2.

- **Alternate A**. Crushed glass backfill. Glass shall meet the requirements of §733-05 Glass Backfill and have a gradation in accordance with TABLE 733-20B Underdrain Filter Material, Glass Substitution Gradation.

TABLE 733-20B UNDERDRAIN FILTER MATERIAL, GLASS SUBSTITUTION GRADATION

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>% in.</td>
<td>100</td>
</tr>
<tr>
<td>% in.</td>
<td>90 – 100</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-5</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Stockpiles of underdrain filter material will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

BASIS OF ACCEPTANCE. Underdrain filter material from approved stockpiles will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, underdrain filter material will be accepted upon the basis of the stockpile approval.

733-21 B STONE FILLING

SCOPE. This specification covers the material requirements and methods of testing stone filling generally used in stream bank channel protection. The following stone filling types are evaluated in this specification:

- 733.2101 – Stone Filling, Fine
- 733.2102 – Stone Filling, Light
- 733.2103 – Stone Filling, Medium
- 733.2104 – Stone Filling, Heavy

Stone filling types are based on the gradation of the material as outlined in Table 733-21A Stone Filling Gradation and Table 733-21B Stone Filling Approximate Shape.

SAMPLING. Perform material tests and assurance methods pertaining to stone filling requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items”.

03396=2008:733-01 thru -23
Page 18 of 21
MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile stone filling in accordance with the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items” except as noted herein.

B. GRADATION. Provide material having a gradation in accordance with TABLE 733-21A Stone Filling Gradation and Table 733-21B Stone Filling Approximate Shape.

<table>
<thead>
<tr>
<th>Stone Filling Item</th>
<th>See Notes</th>
<th>Stone Size</th>
<th>Percent of Total by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine</td>
<td>2, 3, 4</td>
<td>Smaller than 8 in.</td>
<td>90-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Larger than 3 in.</td>
<td>50-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than No. 10 sieve</td>
<td>0-10</td>
</tr>
<tr>
<td>Light</td>
<td>2, 3, 4</td>
<td>Lighter than 100 lbs.</td>
<td>90-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Larger than 6 in.</td>
<td>50-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than ½ in.</td>
<td>0-10</td>
</tr>
<tr>
<td>Medium</td>
<td>2, 4</td>
<td>Heavier than 100 lbs.</td>
<td>50-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than 4 in.</td>
<td>0-10</td>
</tr>
<tr>
<td>Heavy</td>
<td>2, 4, 5</td>
<td>Heavier than 600 lbs.</td>
<td>50-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than 6 in.</td>
<td>0-10</td>
</tr>
</tbody>
</table>

C. DURABILITY. The soundness of all material used for stone filling shall be approved on the basis of a geologic evaluation in accordance with the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items”.

Notes:
1. Stone sizes, other than weights, refer to the average of the maximum and minimum dimensions of a stone particle as estimated by the Engineer.
2. Materials shall contain less than 20% of stones with a ratio of maximum to minimum dimension greater than three.
3. Air-cooled blast furnace slag, cobbles or gravel having at least one fractured face per particle are acceptable substitutes for stone under these items, provided that the soundness and gradation requirements are met.
4. Materials shall contain a sufficient amount of stones smaller than the average stone size to fill in the spaces between the larger stones.
5. Heavier gradings of this item may be required on some projects, in which case the requirements will be stated in the contract documents.
Where the State elects to conduct soundness tests, stone filling shall have a Magnesium Sulfate Soundness loss less than 10%, by weight, after 10 cycles.

**BASIS OF APPROVAL.** Stockpiles of stone filling will be approved in accordance with the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items”.

**BASIS OF ACCEPTANCE.** Stone filling from approved stockpiles will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, stone filling will be accepted upon the basis of the stockpile approval.

### 733-22 B RIP-RAP

**SCOPE.** This specification covers the material requirements and methods of testing rip-rap generally used in stream bank channel protection. The following rip-rap types are evaluated in this specification:
- 733.2201 – Dry Rip-Rap
- 733.2202 – Grouted Rip-Rap

**SAMPLING.** Perform material tests and assurance methods pertaining to rip-rap requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items”.

**MATERIAL REQUIREMENTS.**

**A. STOCKPILE.** Stockpile rip-rap in accordance with the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items” except as noted herein.

**B. GRADATION.** Provide material consisting of stones shaped as nearly as practicable in the form of right rectangular prisms having a gradation in accordance with TABLE 733-22A Rip-Rap Gradation. One dimension of each of the stones furnished shall be at least equal to the thickness of the rip-rap shown in the contract documents.

<table>
<thead>
<tr>
<th>Stone Weight</th>
<th>Gradation Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavier than 300 lbs.</td>
<td>50-100 percent of total by weight</td>
</tr>
<tr>
<td>100 lbs. ≤ γ ≤ 300 lbs.</td>
<td>Remainder of stones</td>
</tr>
</tbody>
</table>

**C. DURABILITY.** The soundness of all material used for rip-rap shall be approved on the basis of a geologic evaluation in accordance with the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items”.

Where the State elects to conduct soundness tests, rip-rap shall have a Magnesium Sulfate Soundness loss less than 10%, by weight, after 10 cycles.

**D. GROUT.** Provide grout manufacture materials conforming to Table 733-22B Grouted Rip-Rap Grout Requirements:

<table>
<thead>
<tr>
<th>Material</th>
<th>Subsection</th>
<th>Grout Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement Type 2</td>
<td>§701-01</td>
<td>1 part</td>
</tr>
<tr>
<td>Concrete Sand</td>
<td>§703-07</td>
<td>3 parts</td>
</tr>
</tbody>
</table>
SECTION 733 – EARTHWORK MATERIALS

BASIS OF APPROVAL. Stockpiles of rip-rap will be approved in accordance with the geotechnical control procedure “Procedure for the Control of Stone Filling and Rip-Rap Items”.

The material shall be subject to visual inspection by the Regional Geotechnical Engineer.

BASIS OF ACCEPTANCE. Rip-rap from approved stockpiles will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, rip-rap will be accepted upon the basis of the stockpile approval.

733-23 B BEDDING MATERIAL

SCOPE. This specification covers the material requirements and methods of testing bedding material generally used as a foundation material prior to placing stone filling or rip-rap.

SAMPLING. Perform material tests and assurance methods pertaining to bedding material requirements in conformance with the procedures contained in the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

MATERIAL REQUIREMENTS.

A. STOCKPILE. Stockpile bedding material in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials” except as noted herein.

B. GRADATION. Provide material consisting of crushed stone, crushed air-cooled blast furnace slag, or gravel, free of soft, non-durable particles, organic material, and thin or elongated particles having a gradation in accordance with TABLE 733-23A Bedding Material Gradation.

<table>
<thead>
<tr>
<th>Sieve Size Designation</th>
<th>Percentage Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in.</td>
<td>100</td>
</tr>
<tr>
<td>1 in.</td>
<td>15-60</td>
</tr>
<tr>
<td>¼ in.</td>
<td>0-25</td>
</tr>
<tr>
<td>No. 40</td>
<td>0-10</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Stockpiles of bedding material will be approved in accordance with the geotechnical control procedure “Procedure for the Control and Quality Assurance of Granular Materials”.

BASIS OF ACCEPTANCE. Bedding material from approved stockpiles will be accepted upon successful completion of the Quality Assurance (QA) program indicating that the material conforms to the specification. If the QA program is not introduced, bedding material will be accepted upon the basis of the stockpile approval.

SECTION 734 (VACANT)