SECTION 620 - BANK AND CHANNEL PROTECTION

620-1 DESCRIPTION. This work shall consist of furnishing all plant, labor, equipment, and materials to place a protective covering of erosion-resistant material on embankment slopes, streambanks, at culvert inlets or outlets on bottoms and side slopes of channels, at structure foundations, and at other locations shown on the plans or as directed by the Engineer. The work shall be done in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical sections shown on the plans or established by the Engineer.

620-1.01 Stone Filling. Stone filling shall consist of well graded stone placed as protective material on stream-banks, in channels and elsewhere, as required.

620-1.02 Dry Rip-Rap. Dry rip-rap shall consist of stone fitted and placed on streambanks or in channels in order to provide protection against erosion.

620-1.03 Grouted Rip-Rap. Grouted rip-rap shall consist of stone similar to dry rip-rap but with all spaces between the stones filled with cement grout.

620-1.04 Bedding Material. Bedding material shall consist of granular material placed in a layer, where required, on the ground surface prior to placing stone filling or rip-rap. The purpose of the bedding material is to prevent underlying finer materials from passing into and through the stone filling or rip-rap.

620-1.05 Concrete Block Paving. Concrete block paving shall consist of concrete blocks placed on embankment slopes under structures as protection against erosion.

620-1.06 Gabions. Gabions shall consist of open wire mesh baskets, filled with stones.

620-2 MATERIALS

620-2.01 Soundness Approval. The soundness of all material used for stone filling or rip-rap shall be approved on the basis of a geologic evaluation in accordance with the control procedure in effect on the date of advertisement for bids. Prior to the evaluation, the Contractor shall stockpile the material. Where the State elects to conduct tests, a material will be rejected if it fails to meet either of the following criteria:

A. Freeze-Thaw Test. A maximum 10 percent loss, by weight, after 25 cycles of freezing and thawing.

B. Magnesium Sulfate Soundness Test. A maximum 10 percent loss, by weight, after 10 cycles of the magnesium sulfate soundness test.

620-2.02 Stone Filling. The gradation of materials furnished for use as stone filling shall be as specified in Figure 620-1, and will be accepted or rejected based on a visual examination of the material by the Engineer.

Figure 620-2 is incorporated to assist the Engineer and the Contractor to evaluate the gradation of materials considered for use as Stone Filling and Rip-Rap.

620-2.03 Dry Rip-Rap. In addition to meeting the requirements set forth in §620-2.01, dry rip-rap shall consist of stones shaped as nearly as practicable in the form of right rectangular prisms. At least fifty percent, by weight, of the stones shall weigh in excess of 150 kg each, and the remainder of the stones shall weigh from 50 to 150 kg each. One dimension of each of the stones furnished shall be at least equal to the thickness of the rip-rap as shown on the plans.

The gradation of materials furnished for use as dry rip-rap will be accepted or rejected based on a visual examination of the material by the Engineer.
§620-2

620-2.04 Grouted Rip-Rap. The requirements for the stone used for grouted rip-rap shall be the same as stated in §620-2.03.

The grout shall consist of one part cement conforming to the requirements for Portland Cement Type 2, §701-01 and three parts fine aggregate, conforming to the requirements for Concrete Sand in §703-07.

620-2.05 Bedding Material. Bedding material shall be composed of crushed stone, crushed air-cooled blast furnace slag, or gravel, free of soft, nondurable particles, organic material, and thin or elongated particles. Bedding material shall be stockpiled.

Bedding material shall meet the following gradation requirements:

<table>
<thead>
<tr>
<th>Sieve Designation</th>
<th>Percent by Weight Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mm</td>
<td>100</td>
</tr>
<tr>
<td>25.0 mm</td>
<td>15 to 60</td>
</tr>
<tr>
<td>6.3 mm</td>
<td>0 to 25</td>
</tr>
<tr>
<td>425 µm</td>
<td>0 to 10</td>
</tr>
</tbody>
</table>

The procedure for acceptance or rejection of these materials shall be as described in the appropriate Soil Control Procedure (SCP) Manual.

FIGURE 620-1
STONE FILLING GRADATION REQUIREMENTS

<table>
<thead>
<tr>
<th>Stone Filling Item</th>
<th>See Notes</th>
<th>Stone Size¹</th>
<th>Percent of Total by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine</td>
<td>2, 3, 4</td>
<td>Smaller than 200 mm</td>
<td>90 - 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Larger than 75 mm</td>
<td>50 - 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than 2.0 mm</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Light</td>
<td>2, 3, 4</td>
<td>Lighter than 50 kg</td>
<td>90 - 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Larger than 150 mm</td>
<td>50 - 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than 12 mm</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Medium</td>
<td>2, 4</td>
<td>Heavier than 50 kg</td>
<td>50 - 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than 150 mm</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Heavy</td>
<td>2, 4, 5</td>
<td>Heavier than 300 kg</td>
<td>50 - 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller than 150 mm</td>
<td>0 - 10</td>
</tr>
</tbody>
</table>

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 percent 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 on the plans or in the proposal.
§620-2

<table>
<thead>
<tr>
<th>Specified Masses and Sizes</th>
<th>Approximate Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 kg</td>
<td>d = 475 mm</td>
</tr>
<tr>
<td>150 kg</td>
<td>d = 400 mm</td>
</tr>
<tr>
<td>75 kg</td>
<td>d = 300 mm</td>
</tr>
<tr>
<td>50 kg</td>
<td>d = 260 mm</td>
</tr>
<tr>
<td>200 mm</td>
<td>23 kg</td>
</tr>
<tr>
<td>150 mm</td>
<td>9 kg</td>
</tr>
</tbody>
</table>

620-2.06 Concrete Block Paving. The concrete block shall comply with the requirements for Concrete Block (Slope Paving), §704-04. The block shall have the following nominal dimensions:

- **Length:** 400 to 500 mm
- **Thickness:** 150 mm (solid)
- **Width:** 200 mm

The standard dimensions of the block shall be the specified nominal dimension minus 10 mm. The maximum permissible variation in dimensions of individual units from standard dimensions shall be not more than 3 mm. The size of block used shall be consistent throughout any continuously paved area, and only one nominal length shall be used in any contract. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the blocks or impair the strength, permanence and appearance of the construction.

Cushion sand for concrete block paving shall conform to the requirements for cushion sand set forth in §703-06. Grout, where used, shall consist of one part Portland Cement Type 2, conforming to the requirements of §701-01, and two parts Mortar Sand, conforming to the requirements of §703-03.

620-2.07 Gabions. The materials used in this work shall conform to the requirements of the following subsection of Section 700 - Materials.

- Gabions

620-3 CONSTRUCTION DETAILS

620-3.01 General. The ground surface on which bank or channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. All soft or spongy material shall be removed to the depth shown on the plans or as directed by the Engineer and replaced with approved material. Filled areas shall be compacted in accordance with applicable provisions of §203-3.12, Compaction. Protection for structure foundations shall be provided as early as the foundation construction permits. The type of protection shall be placed in accordance with these specifications and the contract documents.

620-3.02 Stone Filling. Stone filling shall be placed in a manner that will produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids. The final section of stone filling shall be in
conformance with the lines, grades, and thicknesses shown on the plans. Stone filling used for bank or channel protection shall be placed to its full course thickness in one operation, unless otherwise directed by the Engineer or specified in the special provisions, and in such a manner that the underlying material will not be displaced or worked into the layer of stone filling. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placing; or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to secure the specified results. When stone filling is dumped under water, methods shall be used that will minimize segregation.

620-3.03 Dry Rip-Rap. The stones shall be placed so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface and that the weight of the stone is carried by the underlying material and not by the adjacent stones. On slopes, the largest stones shall be placed at the bottom of the slope. The dry rip-rap shall be properly aligned and placed so as to minimize void spaces between the adjacent stones. The spaces between the stones shall be filled with spalls of suitable size.

620-3.04 Grouted Rip-Rap. The procedure of placing the stones shall be the same as described in §620-3.03, Dry Rip-Rap, except that the space between stones shall be filled with grout rather than spalls. Material upon which the grouted rip-rap is laid shall not be allowed to occupy the space between the stones.

When the stones are in place, the spaces between them shall be completely filled with grout and the surface of the stones cleaned to remove accumulation of grout. Rip-rap shall not be grouted in freezing weather. The grouted rip-rap shall be kept moist for seven days after grouting. A suitable curing compound may be employed, if approved by the Engineer.

The Engineer may direct that occasional spaces be left ungrouted for relief of hydrostatic pressure. The ungrouted spaces shall be chinked with spalls of suitable size.

620-3.05 Bedding Material. Where called for on the plans or directed by the Engineer, stone filling and dry rip-rap shall be placed on bedding material. The bedding material shall be placed on the prepared area to the full specified thickness of each layer in one operation, using methods which will not cause segregation of particle sizes. Contamination of bedding material by natural soils or other materials shall be prevented at all times. Bedding material that becomes contaminated shall be removed and replaced with uncontaminated bedding material at no expense to the State.

620-3.06 Concrete Block Paving. Blocks shall be laid on a 75 mm bed of cushion sand in running bond with the long dimension transverse to the slope and all joints tight. Blocks shall be thoroughly rammed in place to provide a uniformly even surface and solid bedding under each block.

In the areas where grouting is called for, the concrete block shall be laid in running bond with the length parallel to the slope and with 6 mm joints. Following the laying of blocks, in the area to be grouted, sufficient mortar sand shall be spread over the surface and swept into the joints to fill the latter to 100 mm from the surface. The block shall be wetted to the satisfaction of the Engineer before any grout is placed. The joints shall be filled with grout from the bottom flush with the top of the block.

After grouting has been completed and the grout has sufficiently hardened, the blocks shall be wetted, covered and cured with curing covers for the first seven days after grouting. Grout shall not be poured during freezing water.

620-3.07 Gabions. Each gabion unit shall be assembled by binding together all vertical edges with wire ties on approximately 150 mm spacing or by a continuous piece of connecting wire stitched around the vertical edges with a coil about every 100 mm. Empty gabion units shall be set to line and grade as shown on the plans. For structural integrity wire ties or connecting wire shall be used to join the gabions.
§620-3

together along the perimeter of all contact surfaces according to the manufacturer's instructions. Internal tie wires shall be uniformly spaced and securely fastened in each outside cell of the structure in accordance with the manufacturer's instructions or where ordered by the Engineer. When gabions are being placed as slope protection the cross-connecting wire may be deleted if ordered by the Engineer.

A standard fence stretcher, chain fall, or iron rod may be used to stretch the wire baskets and hold alignment.

The gabions shall be filled with stone carefully placed by hand or machine to assure alignment and avoid bulges with a minimum of voids. After a gabion has been filled, the lid shall be bent over until it meets the side and edges. The lid shall then be secured to the sides, ends, and diaphragms with the wire ties or connective wire in the same manner described above for assembling.

620-4 METHOD OF MEASUREMENT

620-4.01 Stone Filling, Dry Rip-Rap, Gabions, Grouted Rip-Rap and Bedding Material. The quantity to be paid for under each of these items shall be the number of cubic meters computed from the payment lines shown on the plans, or as directed by the Engineer.

620-4.02 Concrete Block Paving. The quantity to be paid for under this item shall be the number of square meters computed from the payment lines shown on the plans, or as directed by the Engineer.

620-5 BASIS OF PAYMENT

620-5.01 Stone Filling, Dry Rip-Rap, Gabions, Grouted Rip-Rap and Bedding Material. The unit price bid per cubic meter for each of these items shall include the costs of furnishing all materials, labor and equipment necessary to satisfactorily complete the work, except that any necessary excavation will be paid for under its appropriate pay item.

620-5.02 Concrete Block Paving. The unit price bid per square meter for this item shall include the costs of furnishing all materials, labor and equipment necessary to satisfactorily complete the work, except that any necessary excavation will be paid for under its appropriate pay item.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>620.02 M</td>
<td>Stone Filling (Fine)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.03 M</td>
<td>Stone Filling (Light)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.04 M</td>
<td>Stone Filling (Medium)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.05 M</td>
<td>Stone Filling (Heavy)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.06 M</td>
<td>Dry Rip-Rap</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.07 M</td>
<td>Grouted Rip-Rap</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.08 M</td>
<td>Bedding Material</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.09 M</td>
<td>Concrete Block Paving</td>
<td>Square Meter</td>
</tr>
<tr>
<td>620.10 M</td>
<td>Galvanized Gabions</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>620.11 M</td>
<td>P.V.C. Coated Galvanized Gabions</td>
<td>Cubic Meter</td>
</tr>
</tbody>
</table>

SECTIONS 621 AND 622 (VACANT)

SECTION 623 - SCREENED GRAVEL, CRUSHED GRAVEL, CRUSHED STONE, CRUSHED SLAG

623-1 DESCRIPTION. This work shall consist of furnishing and placing, as shown on the plans or directed by the Engineer, screened gravel, crushed gravel, crushed stone, or crushed slag.

623-2 MATERIALS. The materials shall meet the requirements of §703-02, Coarse Aggregates, unless
otherwise indicated, and shall be furnished in the sizes or combination of sizes indicated on the plans or ordered by the Engineer.

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

623-4 METHOD OF MEASUREMENT

623-4.01 Measurement by Weight. The quantity to be paid for shall be the number of metric tons, loose measure, incorporated into the work conforming to the requirements of these specifications and in accordance with the lines, grades, and cross-sections shown on the plans or as directed by the Engineer.

623-4.02 In-Place Measure. The quantity to be paid for shall be the number of cubic meters of material placed, measured in the completed work, within the payment lines, as shown on the plans or as ordered by the Engineer.

623-5 BASIS OF PAYMENT. The unit price bid shall include costs of all labor, material and equipment necessary to properly 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>623.01 M</td>
<td>Screened Gravel (By Weight)</td>
<td>Metric Ton</td>
</tr>
<tr>
<td>623.02 M</td>
<td>Crushed Gravel (By Weight)</td>
<td>Metric Ton</td>
</tr>
<tr>
<td>623.03 M</td>
<td>Crushed Stone (By Weight)</td>
<td>Metric Ton</td>
</tr>
<tr>
<td>623.04 M</td>
<td>Crushed Slag (By Weight)</td>
<td>Metric Ton</td>
</tr>
<tr>
<td>623.10 M</td>
<td>Screened Gravel (In-Place Measure)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>623.11 M</td>
<td>Crushed Gravel (In-Place Measure)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>623.12 M</td>
<td>Crushed Stone (In-Place Measure)</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>623.13 M</td>
<td>Crushed Slag (In-Place Measure)</td>
<td>Cubic Meter</td>
</tr>
</tbody>
</table>

SECTION 624 - PAVED GUTTERS

624-1 DESCRIPTION. This work shall consist of the construction of asphalt concrete, precast, conventionally formed or machine formed Portland Cement concrete, or cobblestone gutters in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established by the Engineer.

624-2 MATERIALS

624-2.01 Asphalt Concrete Gutters. The materials for hot mix asphalt gutters shall meet the requirements specified for a 9.5 mm mixture designed for <0.3 million ESALs using coarse aggregate Type F9.

624-2.02 Conventionally Formed Concrete Gutters. The materials and manufacture of concrete for this work shall meet the requirements for Class A concrete specified in Section 501 Portland Cement Concrete—General.

624-2.03 Precast Concrete Gutters. Precast concrete gutters shall comply with the requirements of §714-07, Precast Concrete Gutters.

624-2.04 Cobble Gutters. Cobble gutters shall be made of rounded “Hardheads,” 150 mm to 255 mm in diameter.

624-2.05 Machine Formed Concrete Gutter. The material requirements, mix preparation and manufacturing of concrete shall comply with the requirements for Class I concrete, as specified in Section 501 Portland Cement Concrete-General.
§624-3

624-3 CONSTRUCTION DETAILS

624-3.01 Asphalt Concrete Gutters. Except as provided below, the construction requirements shall meet those of §402-3, Construction Details for Hot Mix Asphalt (HMA) Pavements.

A. Preparation of Bed. The location of the gutter shall be properly excavated and graded to conform with the gutter cross-section and line and grade. The excavated area shall be firm and dry before laying the gutter.

B. Placing. The asphalt concrete may be placed by handwork or by a paving machine approved by the Engineer. The gutter shall be uniform in texture, shape and density. The asphalt may be placed in a single layer providing that the section, line and grade after compaction are determined satisfactory by the Engineer.

C. Sealing. After compaction, the finished surface of the gutter shall be sealed by an application of bituminous material, 702-3001, in the quantity and manner directed by the Engineer.

624-3.02 Conventionally Formed or Machine Formed Concrete Gutters. Concrete gutters shall be either conventionally formed or machine formed to the size and shape shown on the standard sheets.

A. Conventionally Formed Gutters.

1. General. Unless otherwise indicated, concrete gutters shall be constructed in 2.4 m sections of the shapes and types shown on the plans and/or standard sheet. A steel separation plate 3 mm thick and cut to fit the section shall be used in each joint and removed as the concrete hardens or the gutter may be constructed in alternate sections, 24 hours to elapse before the construction of the intermediate sections. Excess concrete shall be screeded off perpendicular to the line of the gutter.

   All construction joints shall be poured full with material meeting the requirements of 702-0700, Miscellaneous Asphalt Cement.

2. Curing. Curing of the gutters shall comply with the requirements of §502-3.11, Curing. Minimum curing periods for the various types of curing materials shall comply with the requirements of Table 502-3. A clear membrane curing compound may be used in lieu of a white-pigmented membrane.

B. Machine Formed Gutter. The machine forming requirements of concrete curb as specified under §609-3.03 shall apply except that contraction joints shall be formed or scored every 2440 mm to depths sufficient to produce weakened planes in the concrete.

624-3.03 Precast Concrete Gutters. The location of the gutter shall be excavated and graded to conform with the gutter cross-section and line and grade. Gutter sections shall be placed to line and grade on a firm and dry subgrade.

   All joints shall be poured full with material meeting the requirements of 702-0700, Asphalt Filler.

624-3.04 Cobble Gutters. The largest stones shall be selected and set along the inner edge and the center of the gutter. All stones shall be embedded in mortar composed of one part Type 1 or 2 cement, §701-01, and two parts of §703-07, Concrete Sand. All stone shall be laid to line and grade, with close joints, by skilled workmen using regular paving tools. The stones shall then be thoroughly rammed in place and brought to a uniform surface.

   The joints shall be made of the same mortar as described above. The mortar shall completely fill the joints after being tamped.

624-4 METHOD OF MEASUREMENT
§625-1

624-4.01 **Asphalt Concrete Gutters.** The quantity of asphalt gutters to be paid for will be measured by the number of metric tons of asphalt concrete furnished and placed in accordance with the plans, specifications and requirements of the Engineer. Quality payment adjustments will be measured as outlined in §402-4, Method of Measurement.

624-4.02 **Conventionally Formed or Machine Formed Concrete Gutters.** The quantity to be paid for under this work will be the number of square meters of exposed surface of concrete gutters placed in accordance with the plans and as specified by the Engineer. No reduction in the number of square meters will be made to account for drainage structure frames and grates, or any other obstruction placed within the gutter section.

624-4.03 **Precast Concrete Gutters.** The quantity to be paid for under this item will be the number of meters of gutter (laying length) placed in the work in accordance with the plans and specifications.

624-4.04 **Cobble Gutters.** The quantity of cobble gutters to be paid for under this work will be the number of square meters of exposed surface laid in accordance with the plans or as directed by the Engineer.

624-5 **BASIS OF PAYMENT**

624-5.01 **Asphalt Concrete Gutters.** The unit price bid per metric ton of asphalt concrete shall include the cost of furnishing all materials including the asphalt cement, the mixing, transporting, grading, placing, rolling and all equipment and labor necessary to complete the work including all necessary excavation below the finished surface, exclusive of any undercutting or excavation for special bedding materials. 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 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 amount shown, the altered figure will be disregarded and the original price will be used to determine the total amount bid for the Contract.

624-5.02 **Conventionally Formed or Machine Formed Concrete Gutters.** The unit price bid shall include the cost of furnishing all labor, materials and equipment necessary to complete the work including all necessary excavation below the finished surface exclusive of any undercutting or excavation for special bedding materials.

624-5.03 **Precast Concrete Gutters.** The provisions of §624-5.02 shall apply.

624-5.04 **Cobble Gutters.** The provisions of §624-5.02 shall apply.

**Payment will be made under:**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>624.01 M</td>
<td>Conventionally Formed or Machine Formed Concrete Gutters</td>
<td>Square Meter</td>
</tr>
<tr>
<td>624.020101 M</td>
<td>Asphalt Concrete Gutter</td>
<td>Metric Ton</td>
</tr>
<tr>
<td>624.020110 M</td>
<td>Plant Production Quality Adjustment to 624.020101 M</td>
<td>Quality Unit</td>
</tr>
<tr>
<td>624.03 M</td>
<td>Precast Concrete Gutters</td>
<td>Meter</td>
</tr>
<tr>
<td>624.0401 M</td>
<td>Cobble Gutters</td>
<td>Square Meter</td>
</tr>
</tbody>
</table>

Refer to the Standard Contract Pay Item Catalog for full Item Number and full Description.

**SECTION 625 - SURVEY OPERATIONS, ROW MARKERS, & PERMANENT SURVEY MARKERS**

625-1 **DESCRIPTION**
§625-1

625-1.01 Project Survey and Stakeout. Under this work the Contractor shall do all necessary surveying required to construct all elements of the project as shown on the plans and specified in the proposal and specifications, and to protect all boundary and survey markers which are either shown on the plans or discovered on the project site. This work shall include but not be limited to stakeout, layout, and elevations for the highway, structures, forms, pile layouts and appurtenances as shown and required, consistent with the current practices of the Department, and shall be performed by competently qualified personnel acceptable to the Engineer. This shall also include all work necessary to preserve the location of all existing boundary or right of way and survey markers which should not be in direct conflict with the work to be performed under the contract, as well as all private property monumentation which is in direct conflict with the work to be performed under the contract. Where railroad relocation or alteration is done by force account by the railroad or by the Contractor, all necessary surveying is to be done as part of this work as directed by the Engineer. All survey stake-out shall proceed immediately following the award of the contract and shall be expeditiously progressed to completion in a manner and at a rate satisfactory to the Engineer. The Contractor shall keep the Engineer fully informed as to the progress of the stakeout survey. All survey control work shall be done in accordance with the Department’s “Surveying Standards & Procedures Manual”.

625-1.02 Right of Way Markers. Under this work, the Contractor shall locate, furnish, place and certify right-of-way markers at the locations indicated on the plans or where shown on right-of-way maps or where directed by the Engineer, in accordance with the details shown on the appropriate Standard Sheet, these specifications, and the directions of the Engineer. The Contractor shall verify with the Engineer, their use of the most current Right of Way Acquisition Maps to determine the appropriate locations of the proposed markers.

625-1.03 Permanent Survey Markers. Under this work the Contractor shall furnish and place permanent survey markers at locations indicated on the plans or as directed by the Engineer, and in accordance with the details shown on the appropriate standard sheet.

625-2 MATERIALS

625-2.01 Project Survey and Stakeout. All stakes, reinforcing steel, and any other material necessary to perform the work satisfactorily, shall be provided by the Contractor.

All stakes used shall be of a type approved by the Engineer. All reinforcing steel shall be a minimum diameter 16 mm bar, 1 meter length, and Grade 300 or 420. It shall be the Contractor’s responsibility to maintain stakes in their proper position and location at all times.

625-2.02 Concrete Right of Way Markers. Concrete right-of-way markers shall conform to the requirements of §712-05, Precast Concrete Right-of-Way Markers.

625-2.03 Steel Pin and Cap Right-of-Way Markers. 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 the coating application requirements of §705-14 Longitudinal Joint Ties or §709-04 Epoxy Coated Bar Reinforcement, Grade 420.

The cap shall be aluminum or a corrosion resistant aluminum alloy. The cap shall weigh a minimum of fifty 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. Zinc Chromate Primer, §708-04 shall be applied to all aluminum or aluminum alloy surfaces to be in contact with cement concrete.

Concrete Grouting Material §701-05 shall be used to anchor the Steel Pin and Cap Type Markers into rock.

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 or its representative. The
Contractor may submit, for approval by Director, Materials Bureau, a mix at least equivalent to the specified Class A Concrete. The cap shall be provided by the Contractor as specified by the standard sheet.

**625-3 CONSTRUCTION DETAILS**

**625-3.01 Project Survey and Stakeout.** The Contractor shall trim trees, brush and other interfering objects, not inconsistent with the plans, from survey lines in advance of all survey work to permit accurate and unimpeded work by its own stake-out survey crews and the Department’s survey crews.

The location and length shown on the plans for pipe and structural plate culverts shall be considered to be approximate. The ordered length of culverts will be determined by the Engineer after the Contractor accurately stakes the proposed culvert in the planned location as approved by the Engineer and after appropriate and necessary engineering study.

The exact position of all work shall be established from survey control points which are shown on the plans and/or modified by the Engineer. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing the stake-out survey shall be referred to the Engineer for interpretation or furnishing when such is observed or required.

The Contractor shall place two offset stakes or references at each center line station and at such intermediate locations as the Engineer may direct. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the correct center line station number, offset and cut or fill so as to permit the establishment of the exact centerline location and elevation during construction. If markings become faded or blurred for any reason the markings shall be restored by the Contractor and at the request of the Engineer. The Contractor shall locate and place all cut, fill, slope, fine grade or other stakes and points, as the Engineer may direct for the proper progress of the work. All control points shall be properly guarded and flagged for easy identification.

Drainage structures shall be staked out by the Contractor at the locations and elevations shown on the plans or specified by the Engineer.

The Contractor shall also accurately establish the center line of bearings for bridge abutments and piers, by setting special hubs or reference points as directed by the Engineer, so located and protected to insure their remaining undisturbed until such time as they are no longer needed. The Contractor shall accurately mark the location of anchor bolts to be installed, establish the elevation of bearing surfaces and check bearing plates to insure installation at their exact elevation. Before the erection of structural steel is started the Contractor shall verify by accurate field measurements the locations, both vertically and horizontally, of all bearings and shall assume full responsibility for the fabricated structural steel fitting the substructure as constructed.

All required Rights-of-Way and easement limits shall be established, staked and referenced by the Contractor concurrent with the construction stake-out survey, and prior to any construction work beginning on the affected properties. Rights of way and easement limits shall only be set, and property lines reset, by or under the direction of a Licensed Land Surveyor or exempt Professional Engineer (as permitted under Section 7209(m) of the NYS Education Law), who is licensed and registered to practice in New York State. The Contractor shall supply proof to the Engineer that such work is being performed by or supervised by a Licensed Land Surveyor or exempt Professional Engineer and all control has been established in accordance with the Department’s “Surveying Standards & Procedures Manual”.

Reference points, base lines, stakes and bench marks for borrow pits shall be established by the Contractor.

As specified under §05-10 Survey and Stakeout, and §107-08 Preservation of Property, the Contractor shall ensure that prior to beginning work, all existing property line and survey monuments (including right of way markers) which are adjacent to work areas and may be disturbed during construction shall be properly tied into fixed reference points or located from prime project control, before beginning work in that area. Reference ties (3 or 4 minimum) or field location notes shall be neatly recorded and made available to the Engineer upon request. If any property line and/or survey monuments are disturbed by the Contractor, they shall be reset under this item prior to the conclusion.
of the contract by either reuse of the original marker or by use of reinforcing steel, as directed by the Engineer. All work connected with tying off monuments and/or resetting them shall be performed by or under the direction of a Professional Land Surveyor or exempt Professional Engineer, who is licensed and registered to practice in New York State.

Information on installed right-of-way markers and permanent survey markers shall be neatly recorded on certification forms provided by the Engineer. The permanent survey marker forms include project information, as-built State Plane Coordinate values, control line and centerline station and offset to 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, 3 or 4 physical ties to the markers, and a north arrow. The right of way marker forms include project information and control line (proposed and as-built) station and offset to the marker. The as-built location of all markers shall be recorded to the nearest millimeter and located from prime project control to a minimum accuracy of one part in twenty thousand. These locations shall be certified by a Professional Land Surveyor or exempt Professional Engineer who is licensed to practice in New York State. The certification forms shall be delivered to the Engineer within 30 calendar days of setting the markers, which then will be forwarded to the Regional Land Surveyor.

The Contractor shall be responsible for the accuracy of the work and shall maintain all reference points, stakes, etc. throughout the life of the contract. Damaged or destroyed points, bench marks or stakes, or any reference points made inaccessible by the progress of the construction shall be replaced or transferred by the Contractor. Any of the above points, which may be destroyed or damaged shall be transferred by the Contractor before they are damaged or destroyed. All control points shall be referenced by ties (3 or 4 minimum) to acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the Engineer immediately. All stake-out survey work related to highway control shall be referenced to the center line shown on the plans. All computations necessary to establish the exact position of the work from control points, shall be made and preserved by the Contractor. All computations, survey notes and other records necessary to accomplish the work shall be neatly made available to the Engineer upon request and shall become the property of the State and delivered to the Engineer not later than the date of acceptance of the contract.

The Engineer may check all or any portion of the stake-out survey work or notes made by the Contractor. Any necessary correction to the work shall be made immediately by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.

Prior to the final cross-section survey of the project by the Engineer, the Contractor shall reestablish center line or base line points and stationing as required by the Engineer.

Prior to the final cross-section survey of any borrow pits by the Engineer, the Contractor shall reestablish base line points and stationing, as well as any necessary bench marks as required by the Engineer.

The Contractor will not be required or permitted to take the preconstruction or final cross-sections that are used for payment purposes.

During the progress of the construction work the Contractor will be required to furnish all of the surveying and stake-out incidental to the proper location by line and grade for each phase of the work. For paving and any other operation requiring extreme accuracy, the Contractor will re-stake with pins or other acceptable hubs located directly adjacent to the work at a spacing directed by the Engineer.

Just prior to completion of the contract, the Contractor shall reestablish if necessary and retie all control points as permanently as possible and to the satisfaction of the Engineer.

625-3.02 Right of Way Markers. The Contractor shall set right-of-way markers at the time the Engineer directs them to be placed. Placement shall be made from a closed traverse within Second-Order, Class II (1 part in 20,000) accuracy, and in accordance with the Department’s “Surveying Standards & Procedures Manual”. The right-of-way markers shall be set at the locations specified by the Engineer and as shown on the appropriate Right of Way Acquisition Maps. This work shall be performed by, or under the direction of, a Professional Land Surveyor or an exempt Professional Engineer who is licensed and registered to practice in New York State. The Licensed Land Surveyor or exempt Professional
Engineer shall certify the as-built position of each marker on the appropriate form provided by the Engineer. The scheduling for installation of Right of Way Markers shall be approved by the Engineer prior to their installation.

Right-of-Way markers shall be installed in accordance with the Standard Sheets, these specifications, and in accordance with the directions of the Engineer. If the Steel Pin ROW Marker is used, prior to placing the cap on the bar, 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.

When located in rock, right-of-way markers shall be installed as shown on the Standard Sheet. For Steel Pin Right-of-Way Markers, the surface of the aluminum cap to be in contact with the concrete grout shall be thoroughly coated with §708-04 Zinc Chromate Primer or an alternate material approved by the Materials Bureau.

All right-of-way markers shall be properly guarded and flagged for easy identification during construction. The Contractor shall be responsible for maintaining and protecting right-of-way markers during construction. Any new or existing markers disturbed or damaged prior to contract acceptance shall be replaced by the Contractor at no expense to the State.

625-3.03 Permanent Survey Markers. The markers shall be constructed as shown on the applicable standard sheet and placed where directed by the Engineer. Upon completion of installation, the survey markers shall be located from a closed traverse within Second-Order Class II (1 part in 20,000) accuracy, which has been established in accordance with the NYS DOT “Surveying Standards & Procedures Manual”. This work shall be performed by, or under the direction of, a Professional Land Surveyor or an exempt Professional Engineer licensed and registered in New York State. The Contractor shall provide the Engineer with completed forms which are certified by a Licensed Land Surveyor or exempt Professional Engineer and which lists the precise as-built location of each survey marker. Certification forms are available from the Engineer. The scheduling for installation of Survey Markers shall be approved by the Engineer prior to their installation. The sequential numbering required on the permanent survey marker caps is to be coordinated with the Engineer and the Regional Land Surveyor.

625-4 METHOD OF MEASUREMENT

625-4.01 Project Survey and Stakeout. Payment will be made at the lump sum price bid for this work. Monthly payments will be made under this work in proportion to the amount of work done as determined by the Engineer.

625-4.02 Right of Way Markers. The number of right-of-way markers to be paid for under this work shall be the number placed and certified in accordance with the plans, right-of-way maps, or directions of the Engineer. Payment will be made upon proper installation of the marker, receipt of the certification form by the Engineer, and approval of the certification by the Regional Land Surveyor.

625-4.03 Permanent Survey Markers. The number of permanent survey markers to be paid for under this work shall be the number placed and certified, in accordance with the plans or as directed by the Engineer. Payment will be made upon proper installation of the marker, receipt of the certification form by the Engineer, and approval of the certification by the Regional Land Surveyor.

625-5 BASIS OF PAYMENT

625-5.01 Project Survey and Stakeout. The price bid shall include the cost of furnishing all labor, instruments, materials and equipment necessary to satisfactorily complete the work.

625-5.02 Right of Way Markers. The unit price bid per each shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, except that all survey control necessary for stakeout and certification shall be included under the contract item for Survey and Stakeout.
§625-5

625.03 Permanent Survey Markers. The unit price bid per each shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, except that all survey control necessary for stakeout and certification shall be included under the contract item for Survey and Stakeout.

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<td>625.04 M</td>
<td>Concrete Right-of-Way Markers Type L (Low)</td>
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<td>625.05 M</td>
<td>Steel Pin and Cap Right-of-Way Markers</td>
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<td>625.06 M</td>
<td>Permanent Survey Markers</td>
<td>Each</td>
</tr>
</tbody>
</table>

SECTIONS 626 THRU 629 (VACANT)

SECTION 630 - BARRICADES

630-1 DESCRIPTION. This work shall consist of furnishing and erecting in accordance with the appropriate standard sheet, permanent type barricades for highway or highway-railroad installations at the locations indicated on the plans or as directed by the Engineer.

630-2 MATERIALS. Materials shall meet the requirements of the following subsections of §700 - Materials.

Paint 708 Galvanized Steel Barrier Posts 710-14
Wood Posts 710-13 Corrugated Beam Guide Railing and Median Barrier 710-20

630-2.01 Barricades (All Permanent Types). Rails shall conform to §710-20 Corrugated Beam Guide Railing and Median Barrier, and to the details indicated on the appropriate standard sheet. Posts shall be steel W150 x 22 or wood 150 mm x 205 mm (nominal) as indicated in the proposal and in accordance with the details shown on the appropriate standard sheet for Highway Barrier and Highway Railroad Barricade. All metal posts shall conform to §710-14 Galvanized Steel Barrier Posts. Paint shall conform to the requirements specified in §708, Paints of the Standard Specifications.

630-3 CONSTRUCTION DETAILS

630-3.01 Barricades (All Permanent Types). Posts shall be set as shown on the plans, the applicable standard sheet, or as directed by the Engineer, and shall be set true to the line and grade and on a firmly tamped base.

Rails shall be erected in such a manner as to produce a smooth appearance, and approximately parallel with the grade of the ground surface. Bolts shall be drawn tight and shall extend 6 mm to 12 mm beyond the nuts unless otherwise permitted by the Engineer.

630-4 METHOD OF MEASUREMENT

630-4.01 Barricades (All Permanent Types). The quantity to be measured for payment under this work will be the number of meters of barricade outside to outside of end posts plus an allowance of 1.2 m for each complete terminal assembly including all rails as specified on the plans.

630-5 BASIS OF PAYMENT

630-5.01 Barricades (All Permanent Types). The unit price bid per meter shall include the cost of all labor, equipment and material necessary to complete the work including inspection and testing information required as well as painting, excavating and backfilling. Any required signs will be paid for separately under the appropriate payment item.
§632-3

Payment will be made under:

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<td>Barricade (Steel Posts)</td>
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SECTION 631 (VACANT)

SECTION 632 - CRIBBING

632-1 DESCRIPTION

632-1.01 General. This work shall consist of all the work required for furnishing and placing precast concrete cribbing or metal bin-type retaining walls including all excavation and filling in the manner specified by the contract documents or by the Engineer. Other types of cribbing not shown on the standard sheets may be furnished and placed, if approved by the D.C.E.S.

632-1.02 Definitions. The following general definitions shall be used in conjunction with this section:

A. Unit. Any single piece used to construct precast concrete cribbing or metal bin-type retaining walls. For precast concrete cribbing the work unit shall include but not be limited to, stretchers, headers (both closed and open face), coping, bearing blocks, full sections, half sections, end sections, and leveling footings. For metal bin-type retaining walls the work unit shall include, but not be limited to, stringers, spacers, columns, column caps, stringer stiffeners and base plates.

B. Bin. Any volumetric space which is designated to be filled with backfilling material, as defined in this section, and is enclosed on all four sides by precast concrete cribbing units, or metal bin-type retaining wall units.

C. Wall. A series of units to form bins connected in unbroken sequence so that, when filled with backfill material, they will act as a single entity (i.e., a retaining wall).

632-2 MATERIALS

632-2.01 Unit Materials. Materials shall meet the requirements specified in the following subsections of §700 - Materials:

- Precast Concrete Cribbing 704-06
- Premoulded Resilient Joint Filler 705-07
- Metal Bin-Type Retaining Wall 715-11

632-2.02 Backfill. Backfill Material shall conform to the material requirements for either Stone Filling (Fine), as specified in §620-2.01 and 620-2.02, or Select Granular Fill and Select Structure Fill as specified in §203-2.01 and 203-2.02C.

632-3 CONSTRUCTION DETAILS

632-3.01 Precast Concrete Cribbing.

A. Excavation. Excavation shall be conducted in accordance with the applicable requirements of Section 206, Trench, Culvert and Structure Excavation, and the details specified in the contract documents.

Prior to erection of the cribbing, the foundation shall be inspected and approved by the Engineer.

B. Erection. All units shall be assembled and handled in accordance with the manufacturer's instructions and the contract documents. In the event of a conflict between the contract documents and the manufacturer's instructions, the Engineer shall decide which course to follow. During erection, any units damaged beyond repair shall be removed and replaced, by the Contractor, with
approved units. The Contractor shall use precast leveling footings. Cast-in-place leveling footings will not be permitted.

C. Backfill. Immediately prior to backfilling, the Engineer shall inspect units for damage. Units, which are determined by the Engineer to be damaged beyond repair, shall be rejected. Rejected units shall be replaced by the Contractor.

Filling the interior of the bins and behind the walls shall progress simultaneously with the erection of the units and the material shall be placed as specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables.

D. Contractor Responsibility. Movement of construction equipment and all other vehicles and loads over and adjacent to walls shall be done at the Contractor's risk. Any damage to bins and units from any cause whatsoever shall be repaired or replaced by the Contractor in a manner satisfactory to the Engineer.

632-3.02 Metal Bin-Type Retaining Walls. The provisions specified in §632-3.01, Precast Concrete Cribbing, shall apply with the following additions and modifications:

The ends of all stringers and spacer units shall be bolted to corner columns by means of connecting channels.

In the construction of a wall on a curve, the proper curvature for the face shall be obtained by the use of shorter stringers in the front or rear units of walls as designed on the plans or by the Engineer.

The wall height and depth may be varied, but not to exceed the maximum dimension shown for the design selected. Two or more wall designs may be incorporated in the same wall by the use of standard split columns to make the connections on the step-back.

632-4 METHOD OF MEASUREMENT

632-4.01 Cribbing or Retaining Wall. Cribbing or retaining wall shall be measured by the number of square meters of the front wall face computed between the payment lines shown on the plans or between payment lines established, in writing, by the Engineer.

632-4.02 Excavation and Disposal of Excavated Material for the Installation of Cribbing or Retaining Wall. Excavation and disposal of excavated material shall be measured by the number of cubic meters of material measured in its original position between the payment lines shown on the plans or between payment lines established, in writing, by the Engineer.

632-4.03 Backfill for the Installation of Cribbing or Retaining Wall. Backfill shall be measured by the number of cubic meters of material, computed between the payment lines shown on the plans or between payment lines established in writing by the Engineer. Deductions for the volume of units of precast concrete cribbing will be made. No deduction will be made for the volume of a metal-bin unit.

632-5 BASIS OF PAYMENT

632-5.01 Cribbing or Retaining Wall. The unit price bid shall cover the cost of furnishing all materials, labor, and equipment necessary to complete the work including leveling footings required for precast concrete wall units, and the replacement or repair of any materials damaged by the Contractor's operations.

632-5.02 Excavation and Disposal of Excavated Material for the Installation of Cribbing or Retaining Wall. The unit price bid shall include the cost of all labor, material and equipment necessary to complete the work.

632-5.03 Backfill for the Installation of Cribbing or Retaining Wall. The unit price bid shall include the cost of all materials, labor, and equipment necessary to complete the work. No direct payment will be made for any loss of material which may result from compaction, foundation settlement, erosion, or any other cause; the cost of such losses shall be included in the price bid for this work. The cost of adding water for compaction of backfill shall be included in the price bid unless the item
“Applying Water” is included in the proposal.

Payment will be made under:

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SECTION 633 - CONDITIONING EXISTING PAVEMENT

633-1 DESCRIPTION. This work shall consist of cleaning, sealing and filling joints and cracks in the existing pavement and cleaning the existing pavement prior to the application of a new course. Shoulders are to be cleaned when they are to be overlaid.

633-2 MATERIALS. The materials shall conform to the requirements of the specifications listed below:

- Hot Mix Asphalt (HMA) Pavements: 402
- Bituminous Materials: 702
- Asphalt Filler: 702-0700
- Fine Aggregate: 703-01
- Coarse Aggregate: 703-02
- Mineral Filler: 703-08

633-3 CONSTRUCTION DETAILS

633-3.01 Cleaning Existing Pavement and/or Shoulders. Existing pavement and shoulder surfaces to be overlaid, including ruts and depressions, shall be cleaned by the use of mechanical sweepers, hand brooms, or other effective means until the surfaces are free of all material which might interfere with the bond between the overlay material and the existing surfaces. All cleaning equipment shall be approved by the Engineer prior to use. Cleaning shall continue until adequate cleaning results, as determined by the Engineer.

All debris shall be removed from the pavement and shoulders surfaces and disposed of in a manner directed by the Engineer. The pavement and shoulders shall be kept clean until the overlay operations are completed. Cleaning of shoulders is required only when the shoulder surface is constructed of Portland Cement, asphalt concrete or a surface treatment thereon.

633-3.02 Cleaning, Sealing and Filling Joints and Cracks. All unsealed and inadequately sealed joints and cracks, as determined by the Engineer, shall be subjected to a compressed air stream of at least 550 kPa measured at the source. Joints and cracks in the pavement as designated by the Engineer, shall be cleaned of all dirt and loose material holding the cleaning jet 25 mm above the pavement surface. Old joint and crack sealer remaining after such cleaning operation need not be removed. The cracks shall be kept clean until the sealing, filling and paving operations are completed.

Joints and cracks in the existing pavement from 6 mm to 25 mm wide shall be sealed with a bituminous material meeting the requirements of §702-0700, Asphalt Filler. To insure that space will be available for expansion of the asphalt when the hot bituminous mixture is paved over the joint or crack, the joint or crack shall not be filled completely to the surface. Blotting with fine aggregate may be required by the Engineer to prevent tracking the bituminous material over the pavement surface.

Joints and cracks greater than 25 mm wide shall be filled with asphalt concrete meeting the requirements of Section 402 or a Department approved cold plant mixed stockpile patching material.
Alternate materials may be used subject to the approval of the Engineer. Joints and cracks less than 6 mm will not be required to be cleaned or sealed.

Work on joints and cracks shall not begin until all stress relieving pavement repairs have been completed.

**633-4 METHOD OF MEASUREMENT**

**633-4.01 Cleaning Existing Pavement and/or Shoulders.** The quantity to be measured shall be the actual number of square meters of existing pavement and/or shoulder surfaces cleaned.

**633-4.02 Cleaning, Sealing and Filling Joints and Cracks.** The quantity measured will be on a lump sum basis for work satisfactorily completed in a manner approved by the Engineer.

**633-5 BASIS OF PAYMENT**

**633-5.01 Cleaning Existing Pavement and/or Shoulders.** The unit price bid per square meter for this work shall include the cost of all labor, materials and equipment necessary to complete the work.

**633-5.02 Cleaning, Sealing and Filling Joints and Cracks.** The lump sum price bid for this item shall include the cost of all labor, materials and equipment necessary to complete the work.

*Payment will be made under:*

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<td>633.05 M</td>
<td>Cleaning, Sealing and Filling Joints and Cracks</td>
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**SECTION 634 (VACANT)**

**SECTION 635 - CLEANING AND PREPARATION OF PAVEMENT SURFACES FOR PAVEMENT MARKINGS**

**635-1 DESCRIPTION.** This work shall consist of cleaning and preparing portland cement and bituminous pavement surfaces for the application of reflectorized pavement marking materials. Examples of pavement markings requiring this item include, but are not limited to, reflectorized thermoplastic, preformed, and epoxy type marking materials.

**635-2 MATERIALS.** Materials and equipment for cleaning and preparing pavement surfaces may be selected by the Contractor, except that they will be approved by the Engineer and shall conform to all applicable Local, State or Federal law, regulation or codes.

**635-3 CONSTRUCTION DETAILS**

**635-3.01 General.** The work required to clean and prepare pavement surfaces shall be performed in accordance with these specifications, the contract documents and to the satisfaction of the Engineer. Before any work is begun, a schedule of operations shall be submitted for the approval of the Engineer. When the work is conducted under traffic, the Contractor shall supply all necessary flags, markers, signs, and other devices to maintain and protect traffic.

Whenever grinding, waterblasting, dry sandblasting or other operations are performed, the work shall be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that will mislead or misdirect the motorist. When these operations are completed the pavement surface shall first be power broomed and then blown off with compressed air to remove residue and debris resulting from the cleaning work. All such debris that remains on the roadway, including broken parts from cleaning equipment, shall be removed and disposed of in a manner satisfactory to the Engineer.

The Contractor shall conduct removal and cleaning work in such a manner as to minimize airborne dust, and similar debris so as to prevent a hazard to motor vehicle operation or nuisance to property.
Care shall be taken on bituminous and portland cement concrete surfaces when performing removal and cleaning work to prevent damage to transverse and longitudinal joint sealers.

Unless otherwise specified in the contract documents the area(s) and quantity of cleaning work will be determined by the Engineer at the job site when the contract is in progress. In addition the Engineer will have the authority of increasing the work area as the project continues.

635-3.02 Limits of Work. Cleaning and surface preparation work shall be confined to the surface area specified for the application of pavement marking materials; or the surface area of existing pavement markings that are specified for removal on the plans, or as directed by the Engineer.

Surface preparation work includes cleaning for lines or cleaning for letters and symbols. Lines will be meant to include: broken line; dotted line; channelizing line; barrier lines; stop lines; crosswalk line and crossbars.

When lines are cleaned, the area of preparation will be the width of the new pavement marking, or existing line, plus twenty five (25) millimeter on each side. When letters and symbols are cleaned the area of preparation will be sufficiently large to accommodate the new marking, or to remove the existing marking.

635-3.03 Cleaning Concrete Curing Compounds. On new portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, pavement markings shall be applied no sooner than 24 hours after the blasting has been completed.

The extent of the blasting work shall be to clean and prepare the concrete surface such that:

A. There is no visible evidence of curing compound on the peaks of the textured concrete surface.

B. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.

C. All remaining curing compound is intact; all loose and flaking material is removed.

D. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.

635-3.04 Cleaning Existing Pavement Markings. Existing pavement markings shall be cleaned for the purpose of:

A. Preparing the pavement surface for the application of new pavement markings in the same location as the existing markings.

B. To remove existing markings that are in good condition which, if allowed to remain, will interfere with or otherwise conflict with newly applied marking patterns.

It shall be understood that in this context cleaning means the removal of an existing marking. It is not intended that all deteriorated existing pavement markings be removed. Example: If a new marking is applied to an unmarked "gap" in a broken line and the existing broken line pattern is worn or deteriorated, as determined by the Engineer, to the extent that it is not misleading or confusing to the motorist, the existing markings do not require removal.

Pavement markings shall be cleaned to the extent that 95% to 100% of the existing marking is removed. Removal operations shall be conducted in such a manner that no more than moderate color and/or surface texture change results on the surrounding pavement surface. When waterblasting is performed, pavement markings shall be applied no sooner than 24 hours after the blasting has been completed. Waterblasting shall not be allowed for cleaning markings requiring replacement within the same day as removal as specified under §635-3.05.

The determination of acceptable removal will be made by judgement of the Engineer and will be guided by the Department's pictorial standards of acceptable marking removal. Pictorial standards are available from the Materials Bureau.
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635-3.05 Replacement of Pavement Markings. The Contractor shall not remove existing pavement markings and leave the highway unmarked overnight.

If traffic is to be maintained overnight on highways where the existing markings have been removed either the permanent type marking(s) as called for in the contract documents, or short-term pavement markings, shall be applied before the end of the working day for the following conditions.

1. Yellow broken lines, partial barrier lines and full lines used to separate opposing traffic flows on two-way roadways.
2. White broken lane lines to separate traffic flows in the same direction on multi-lane highways.

In the event of sudden, unforeseen precipitation or other extraordinary situations, Do Not Pass signs shall be used on two or three lane, two-way roadways, in accordance with §619–3.06 Short-Term Pavement Markings.

All other pavement marking patterns on both two way and multi-lane highways shall be applied within 14 calendar days using the project's permanent markings.

The Contractor may apply the permanent white and yellow broken line in the gaps between the existing broken line, before the existing broken line is removed, when the Engineer determines that the existing broken line will not be misleading to traffic.

If short-term pavement markings are placed, they shall be applied and conform to the requirements of §619–3.06. Short-term Pavement Markings will be considered acceptable for periods not longer than fourteen (14) days.

If within 14 days after removal the Contractor fails to install the project's permanent pavement markings, temporary pavement markings shall be applied and maintained in accordance with §619–3.06 Short-Term Pavement Markings.

All short-term and temporary pavement markings shall be cleaned from the pavement in accordance with this specification, at the time that the project's permanent markings are installed, or as directed by the Engineer. Signs shall be removed as ordered by the Engineer.

The work of furnishing, applying, maintaining and cleaning short-term and temporary markings shall be performed by the Contractor at no additional expense to the State.

635-4 METHOD OF MEASUREMENT. Surface cleaning and preparation of pavement surfaces for lines will be measured in meters along the centerline of the prepared surface and will be based on a nominal 100 mm wide line. Measurement for cleaning surfaces for line widths greater than the nominal 100 mm will be made by the following method:

\[
\text{Nominal Existing Width of Line (millimeters) x Length (meters)}
\]
\[
100 \text{ (millimeters)}
\]

No payment will be made for the additional 25 mm of cleaning on each side of the line required by §635-3.02.

No payment will be made for cleaning the number of meters of unmarked gaps between broken or dotted line segments.

Cleaning and preparation of letters and symbols on pavement surfaces will be measured by each unit cleaned. A unit will consist of one letter or one symbol. Example: "STOP" would be measured as four units.

The Engineer will adjust the quantities of these items as required to meet field conditions. This may result in substantial increases or decreases of the proposal quantities.

635-5 BASIS OF PAYMENT. The accepted quantities of cleaned pavement surface will be paid for at the contract unit price, which shall include the cost of furnishing all labor, materials and equipment to satisfactorily complete the work. The cost of maintaining and protecting traffic during the cleaning work will be included in the price bid. No payment will be made under this item for the removal of pavement markings required under §635-3.05.
SECTION 637 - ENGINEER’S OFFICE AND LABORATORY BUILDING

637-1 DESCRIPTION. This work shall consist of providing, furnishing and maintaining an Engineer’s Office and a Field Laboratory Building for the exclusive use of and occupancy by the Department and Consultant field engineers. It shall be the responsibility of the Contractor to install and maintain the Engineer’s Office in compliance with all applicable building, safety, and health regulations and/or laws. The Contractor shall maintain all facilities and furnished equipment in good working condition. The office shall be cleaned weekly, or as required by the Engineer.

637-1.01 Engineer’s Office (Type A, B, C, D or E). The Contractor shall supply for the Engineer’s use a building or mobile trailer, (specified at Type A, B, C, D or E), which shall be erected at a location selected by the Engineer and shall be separate from any building used by the Contractor.

637-1.02 Laboratory Building. The Contractor shall supply mobile building(s) or trailer(s) for use as field laboratories for soils and materials testing. As work progresses on the contract, the laboratory shall be moved by the Contractor to follow the work, at such times and to the locations approved or designated by the Engineer.

637-1.03 Furnishing Existing Facilities and Buildings. The Contractor may furnish equivalent facilities in existing buildings provided such facilities and building(s) are located to provide convenient service and provided that the building location(s) and facilities are approved by the Regional Director in writing.

637-1.04 Concrete Cylinder Curing Box. This work shall consist of furnishing, prior to placement of any structural concrete, an approved concrete cylinder curing box.

637-2 MATERIALS

637-2.01 General Construction. Each Engineer’s Office or Field Laboratory shall be an approved and weatherproof building or mobile trailer of the type specified in the contract documents. The structure shall have a minimum ceiling height of 2.13 meters and shall be provided with weatherproof windows and weatherproof doors each equipped with adequate locking devices. Each window shall have a minimum area of 0.75 square meters, shall be screened and of a type that will open and close to provide adequate ventilation.

637-2.02 General Requirements for all Engineer’s Offices.

A. Lighting. Electric light, non-glare type luminaires to provide a minimum illumination level of 1000 lux at desk height level.

B. Heating and Cooling. Adequate equipment to maintain an ambient air temperature of 21°C ±3°C.

C. 35mm Camera. Autofocus operation with “red-eye reduction” and “easy film loading” features. A soft storage/carry case shall be provided. The camera functions shall include the following.

Automatic and motorized film advance and rewind