648.13 M  Rock Core Drilling AX  Meter
648.14 M  Rock Core Drilling BX  Meter
648.15 M  Rock Core Drilling NX  Meter
648.16 M  Rock Core Drilling HX  Meter
648.17 M  Furnishing Equipment for making Borings  Each 5
648.18 M  Furnishing Equipment for making Borings on water  Each
648.19 M  Furn. Equip. for making Borings on water using stationary platform  Each
648.20 M  Open Well Piezometer  Meter
648.21 M  Grouting 65 mm Bore Hole  Meter
648.22 M  Grouting 100mm Bore Hole  Meter

SECTION 649 (VACANT)

SECTION 650 - JACKING REINFORCED CONCRETE PIPE

650-1 DESCRIPTION.  Under this work the Contractor shall install by jacking, an extra strength, reinforced concrete, tongue and groove, culvert pipe of the size and at the location shown on the plans or as specified by the Engineer.

650-2 MATERIALS.  Pipe shall meet all the requirements of §706-02, Reinforced Concrete Pipe for Class V, except that the exterior barrel shall be smooth.

650-3 CONSTRUCTION DETAILS

650-3.01 Approval

A. General.  Construction drawings, showing the proposed method and procedure of jacking the pipe and construction of jacking and receiving pits shall be submitted to the Engineer for approval before work on the jacking operation is started.  Approval of construction drawings shall not relieve the Contractor of his responsibility to perform the work without damage to existing construction.  Field conditions may require changes in the approved drawings and such changes shall be subject to the approval of the Engineer.

B. Jacking Under Railroad.  Construction drawings, methods, work and necessary precautions related to jacking pipe under a railroad shall be submitted to, meet the requirements of, and have the approval of the Chief Engineer of the railroad company.  No work shall be commenced until such approval has been received from the railroad company.

650-3.02 Jacking Procedures

A. General.  The pipe shall be jacked with jacks of sufficient capacity to shove the pipe through the embankment into position true to required line and grade and with tongue downstream.  When jacking the pipe, a minimum 13 mm thick steel cutting shield at least 600 mm long with an arc length equal to 1/3 of the pipe circumference shall be required to abut the upper 1/3 circumference and extend beyond the forward end of the pipe being jacked.  The outside radius of this shield shall not exceed the outside radius of the pipe.  Excavation ahead of the pipe shall not be permitted to progress beyond the end of the shield being used.

B. Jacking Under Railroad.  Rail hangers shall be installed by railroad company forces prior to the jacking operations, unless the Engineer is advised otherwise by the railroad company.  The rail hangers will not be removed by railroad forces until all voids in the embankment as a result of the jacking operation, have been filled by the Contractor to the satisfaction of the railroad company.

650-3.03 Contractor Responsibility.  The Contractor shall be held responsible for surface subsidence and damage or disturbance to adjacent property and facilities that may result from his construction methods.  In case loose material is encountered and cave-ins occur or are anticipated, all jacking will be discontinued, approved shoring shall be provided and all voids filled either by pressure

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grouting or other approved methods before jacking is continued.

Field conditions may require that the actual jacking operations be continued without interruption in order to prevent undermining the roadway or the railroad roadbed and tracks. Should the Engineer permit interruption of jacking operations, the Contractor shall provide bulkheads and dewatering measures as approved by the Engineer.

650-3.04 Railroad Responsibility. Any settlement or upheaval of the railroad tracks resulting from the pipe installation and occurring within one year from the date the work is completed, will be corrected by the railroad company.

650-4 METHOD OF MEASUREMENT. The quantity to be paid for under this work will be the number of linear meters of extra strength reinforced concrete culvert pipe jacked into place and measured in its final position.

650-5 BASIS OF PAYMENT

650-5.01 General. The unit price bid per linear meter shall include the cost of jacking the pipe; sheeting, bracing and flooring the jacking and receiving pits; excavation and backfill; pressure grouting; construction drawings; and all labor, materials and equipment (including dewatering if required) necessary to complete the work in accordance with the plans and specifications or directions of the Engineer; except the pipe which will be paid for separately under the contract item for Reinforced Concrete Pipe Class V. Rail hangers (if required) shall be installed and removed by railroad company forces at no cost to the Contractor.

No extra payment of any sort will be made for premium time which may be required under this work, but the cost thereof shall be included in the unit price bid.

No partial or final payment for jacking pipe under a railroad will be made until the work has been approved by the respective railroad company.

Costs incurred by the railroad company to correct settlement or upheaval of the railroad tracks resulting from the pipe installation and occurring within one year from the date of work is completed, will be reimbursed to the railroad company directly by the State at no cost to the Contractor.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>650.01nn M</td>
<td>Jacking Reinforced Concrete Pipe Under Railroad</td>
<td>Meter</td>
</tr>
<tr>
<td>650.02nn M</td>
<td>Jacking Reinforced Concrete Pipe Under Highway</td>
<td>Meter 30</td>
</tr>
</tbody>
</table>

Refer to the Contract Proposal for full item number and full description.

SECTION 651 - COMMUNICATION FACILITIES

651-1 DESCRIPTION. The work in this section shall include special construction of communication facilities which are required for outside agencies such as police and fire departments.

The construction details for this work will be covered by special provisions in the contract documents.

SECTION 652 - FURNISHING AND APPLYING SALTS

652-1 DESCRIPTION. Under this work the Contractor shall furnish and apply salt for soil stabilization, as a cast palliative or for other purposes as specified.

652-2 MATERIALS. Materials for this work shall conform to the requirements of the following subsections of Section 700 - Materials:

Calcium Chloride 712-02
Sodium Chloride 712-03
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652-3 CONSTRUCTION DETAILS

652-3.01 Stabilized Gravel Surface Course. The Contractor shall apply salt for stabilization in accordance with the construction details specified in §411-3.

652-3.02 Dust Control. The Contractor shall apply salt on the highway to control dust at the locations and during periods as the Engineer may direct. The salt shall be applied on the dampened road surface by means of approved line spreader or equal equipment. An approved sprinkler or other approved method may be used to dampen the road surface. The recommended application rates for calcium chloride are as follows:

- 0.8 kg/m² per application
- 2.2 kg/m² per year

652-4 METHOD OF MEASUREMENT. Salt shall be measured by the number of the metric tons furnished and applied.

652-5 BASIS OF PAYMENT. The unit price bid per metric ton shall include all labor, material and equipment necessary to complete the work including necessary water to dampen the road surface.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>652.01 M</td>
<td>Furnishing and Applying Calcium Chloride</td>
<td>Metric Ton</td>
</tr>
<tr>
<td>652.02 M</td>
<td>Furnishing and Applying Sodium Chloride</td>
<td>Metric Ton</td>
</tr>
</tbody>
</table>

SECTION 653 (VACANT)

SECTION 654 IMPACT ATTENUATORS

654-1 DESCRIPTION. The Contractor shall furnish and install, remove and dispose, remove and store, relocate, or refurbish impact attenuators of the indicated types and sizes at or from the locations indicated in the Contract Documents or those directed in accordance with these specifications, the Contract Documents, materials details, manufacturer’s directions and drawings, and the directions of the Engineer.

654-2 MATERIALS. Materials shall conform to the following subsections of these specifications:

- Class A Concrete
- White Pavement Marking Paints
- Concrete Grouting Material
- Anchoring Material- Chemically Curing
- Epoxy Coated Bar Reinforcement, Grade 420
- Sodium Chloride
- Inertial Barrier Modules
- Impact Attenuator, Reusable, HDPE Cylinders and Cables
- Impact Attenuator, Quad Beam Type with Expendable Modules
- Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips
- Galvanized Coating and Repair Methods
- Aluminum Sign Panels
- Reflective Sheeting

654-3 CONSTRUCTION DETAILS.

654-3.01 General. The following shall apply to all impact attenuators to be installed under this section.

A Drawings. Prior to installing any materials required under this section, the Contractor shall submit three (3) copies of the manufacturer’s drawings, modified as necessary to reflect site conditions, to the Engineer. The submission shall include certification that modifications made to
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reflect site conditions will not impair the satisfactory performance of the impact attenuator. Manufacturer’s drawings, modified as necessary to reflect site conditions, will be referred to in this section as “working drawings.” Working drawings will take precedence over manufacturer’s drawings.

Working drawings shall show supports, transition pieces, connections, miscellaneous parts, concrete or steel back-up structure, and anchorages not detailed in the plans, but which are necessary to develop the full performance of the impact attenuator. The Contractor shall not commence installation of the impact attenuator earlier than five (5) days following submission of the above mentioned working or manufacturer’s drawings unless authorized by the Engineer to do so.

B Manuals. In addition to the drawings mentioned above, the Contractor shall deliver to the Engineer three (3) copies of design manuals, installation manuals, parts lists, and maintenance manuals prepared for each type impact attenuator being installed. The Contractor shall not commence installation of the impact attenuator earlier than five (5) days following submission of the above mentioned manuals, unless authorized by the Engineer to do so.

C Coordination with Other Work. The work under this section shall be coordinated with the removal or installation of shielded objects, guide rail and median barriers, impact attenuators or end terminals so as to minimize the time that motorists are exposed to unnecessary hazard. Also, the Contractor shall minimize exposure of vehicular traffic to the possibility of impact on the back-up structure. Unless modified in the contract documents, minimize shall mean seven (7) or fewer calender days.

D Traffic Protection. Traffic control devices, such as cones, drums, lights, signs, barricades, or other articles directed by the Engineer shall be provided and maintained under their respective pay items. These devices shall not be removed until the impact attenuator, including required transition pieces, is fully operational. If the impact attenuator is to be installed in lighted areas, or in areas to be lighted, the mentioned traffic control devices shall not be removed unless the lighting system is operational.

654-3.02 Impact Attenuators Requiring Foundations. If the work of furnishing and installing impact attenuators requires the provision of a foundation slab, the following shall apply:

A Excavation. Necessary excavation shall be performed in accordance with Section 203 of the Standard Specifications. If the foundation slab is to be installed in a pavement that is to remain in place in the completed project, the limits of excavation in such pavement shall be saw cut full depth prior to removal of the pavement and performance of the excavation work. Unless indicated otherwise, the limits of pavement excavation shall be 600 mm outside the perimeter of the foundation slab.

B Foundation Slab. The Contractor shall construct the foundation slab and back-up structure at the locations shown, or where directed by the Engineer, to the dimensions indicated in the working or manufacturer’s drawings. The foundation slab shall be reinforced Class A concrete not less than the thickness indicated on the working drawings or manufacturer’s drawings, batched, formed, placed, finished, and cured in accordance with §501-3 Portland Cement Concrete, Construction Details. The size, length, and bending details of reinforcement shall be as shown in the foundation slab details in the manufacturer’s drawings or in the working drawings, or as directed. If accelerators are needed, the Contractor shall submit the concrete mix design to the Materials Bureau for prior approval.

C Pavement Restoration. The excavated section of pavement between the new foundation slab and the limits of excavation shall be restored to the full height of the surrounding sound pavement in accordance with §402-3.05 Conditioning of Existing Surface, or in the manner directed by the Engineer.
654-3.03 Anchorage. The impact attenuator shall be anchored to the new foundation slab or existing concrete foundation as shown on the manufacturer’s drawings or the working drawings. Anchor bolts and studs not cast integrally into the new foundation slab shall be anchored with approved concrete expansion anchors, concrete grouting material conforming to §701-05, or approved chemically curing anchoring material conforming to §701-07. Such anchor bolts or studs shall be set into holes drilled with rotary impact drills of the size recommended by the manufacturer of the anchor. Core drills will not be acceptable. Care shall be taken that anchor studs projecting from the surface and exposed to foot or wheeled traffic be well marked by barricades, plastic drums, or protected by other means as approved by the Engineer.

654-3.04 Inertial Barrier Modules. The Contractor shall furnish and install Inertial Barrier Modules of the size and number required at the locations and to the configurations indicated on the contract plans, or at the locations and to the configurations directed by the Engineer. In addition to the requirements indicated in §654-3.01 General, the Contractor shall also paint and label the layout pattern and weights on paved surfaces using traffic or other durable paint. Glass beads will not be required. Either the metric weight or the U.S. customary weight, as directed by the Engineer, shall be marked.

The 90 kg units shall be restrained from movement by mechanical means, or by other means as approved by the Engineer.

654-3.05 Impact Attenuator, Quad Beam Type with Expendable Modules. In addition to the requirements indicated in §654-3.01 General, §654-3.02 Impact Attenuators Requiring Foundation (if applicable,) and §654-3.03 Anchorage, the Contractor shall furnish and install Impact Attenuators, Quad Beam Type with Expendable Modules on existing or new foundations, as indicated, of the indicated width and length and at the locations indicated on the contract plans, in accordance with these specifications, the manufacturer's directions and drawings, the working drawings, and the directions of the Engineer.

Steel Tension Strut Backup Assemblies shall be used, except when protecting concrete piers, concrete parapets, concrete walls, or other rigid objects, in which case either the Steel Tension Strut Backup Assembly or the Concrete Backup Assembly shall be used, at the option of the Contractor. The appropriate standard transition or special transition piece, if none of the standard transition pieces is appropriate, shall be furnished and installed.

654-3.06 Impact Attenuator, Reusable, HDPE Cylinders and Cable Type. In addition to the requirements indicated in §654-3.01 General, §654-3.02 Impact Attenuators Requiring Foundation and §654-3.03 Anchorage, the Contractor shall furnish and install Impact Attenuator, Reusable, HDPE Cylinders and Cable Type on existing or new foundations, as indicated, of the indicated number of cylinders of the required thicknesses in accordance with these specifications, the manufacturer’s directions, the working drawings, and the directions of the Engineer.

In addition to the above, the base of concrete barriers and other similar solid objects shall be cut back at a 45° angle, and transition pieces shall be provided on both sides between the backup structure and the concrete barrier or other similar object.

654-3.07 Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips. The Contractor shall furnish and install Impact Attenuators, Corrugated Beam Type with Metal Tearing Strips on new or existing foundations, as indicated, of the indicated number of bays at the locations indicated in the contract documents in accordance with these specifications, the manufacturer’s instructions and drawings, the working drawings, and the directions of the Engineer.

654-3.08 Impact Attenuators, All Types, Remove and Dispose. The Contractor shall remove impact attenuators of the indicated type and associated foundation slabs, if required, from their existing locations. Upon removal, the impact attenuators and foundation slabs shall become the property of the Contractor, and the Contractor shall dispose of them in a manner and at a location approved by the Engineer.

Holes in and other damage to the surfaces underlying the impact attenuator shall be repaired to the
§654-3

satisfaction of the engineer. Anchor bolts or studs that are no longer required or usable shall be removed or cut off flush with the surface. Voids resulting from the removal of foundation slabs shall be filled with compacted suitable material or compacted granular material, or other designated material as directed.

654-3.09 Impact Attenuators, All Types, Remove and Store. The Contractor shall remove impact attenuators of the indicated type from their existing locations with reasonable skill and care in a manner that preserves their condition. The impact attenuators shall remain the property of the State, and the Contractor shall store and protect them in a manner and at locations satisfactory to the Engineer. Damaged parts shall be replaced with like parts in satisfactory condition or repaired in a manner approved by the Engineer.

If required, pavement slabs shall be removed and disposed in a manner and at locations satisfactory to the Engineer. Voids resulting from the removal of foundation slabs shall be filled with compacted suitable material or compacted granular material, or other designated material as directed.

Holes and other damage to the surfaces underlying the impact attenuator shall be repaired to the satisfaction of the engineer. Anchor bolts or studs that are no longer required or usable shall be removed, or cut off flush with the surface.

654-3.10 Impact Attenuators, All Types, Relocate. The Contractor shall remove impact attenuators of the indicated type from their existing locations with reasonable skill and care in a manner that preserves the condition, and reinstall them at the same location or install them at another designated location. If required, the Contractor shall construct a new foundation slab. The impact attenuators shall remain the property of the State during the course of the work. If intermediate storage is required during the relocation, the Contractor shall store and protect impact attenuators in a manner and at locations approved by the Engineer. Damaged parts shall be replaced with like parts in satisfactory condition or be repaired in a manner approved by the Engineer.

If required, pavement slabs shall be removed and disposed of in a manner and at locations satisfactory to the Engineer. Voids resulting from the removal of foundation slabs shall be filled with compacted suitable material, compacted granular material, or other designated material, as directed.

Holes and other damage to the surfaces underlying the impact attenuator shall be repaired to the satisfaction of the Engineer. Anchor bolts or studs that are no longer required or usable shall be removed or cut off flush with the surface.

§654-3.01C Coordination with Other Work, §654-3.01D Traffic Protection, and §654-3.09 Impact Attenuators, All Types, Remove and Store shall apply. If required, a new foundation slab shall be constructed in accordance with the requirements of §654-3.02, Impact Attenuators Requiring Foundations.

654-3.11 Impact Attenuators, All Types, Refurbish. The contractor shall refurbish bays of designated impact attenuators of the indicated type in accordance with these specifications, the directions of the manufacturer, and as approved by the Engineer. Damaged parts shall be replaced with like parts in satisfactory condition or repaired to the satisfaction of the Engineer. §654-3.01C Coordination with Other Work, and §654-3.01D Traffic Protection shall apply. In addition, the Contractor shall repair the anchorages in accordance with §654-3.03 Anchorages, if they are damaged.

654-4 METHOD OF MEASUREMENT.

654-4.01 General. Measurement will be taken as the number of impact attenuators of the indicated type and size satisfactorily furnished and installed on existing foundations; as the number of impact attenuators of the indicated type and size satisfactorily furnished and installed on new foundation slabs; as the number of impact attenuators of the indicated type satisfactorily removed and disposed; as the number of impact attenuators of the indicated type satisfactorily removed and stored; as the number of impact attenuators of the indicated type and size satisfactorily relocated to existing foundation; as the number of impact attenuators of the indicated type and size satisfactorily relocated to a new foundation slab, including construction of the new foundation slab; or as the number of individual bays of impact
§654-5

attenuators of the indicated type satisfactorily refurbished, all in accordance with these specifications, the directions of the Engineer, and the manufacturer’s or working drawings and manufacture’s directions.

654-4.02 Number of Bays. Under the contract items for furnishing and installing Impact Attenuators, Quad Beam Type with Expendable Modules and the contract items for furnishing and installing Impact Attenuators, Corrugated Beam Type with Metal Tearing Strip, the nose will not be counted as a bay. Under the contract items for refurbishing Impact Attenuators, Quad Beam Type with Expendable Modules the nose will be counted as a bay.

654-5 BASIS OF PAYMENT.

654-5.01 General. Except as modified below, the following shall apply to contract items under this section. The unit prices bid for furnishing and installing, removing and disposing, removing and storing, relocating, or refurbishing Inertial Barrier Modules and Impact Attenuators of the various types shall include the cost of all labor, materials, and equipment necessary to satisfactorily perform the work.

A. Site preparation. Site preparation, if any, shall be paid for separately under appropriate contract items.

B. Pavement sawing. Pavement sawing in pavement to remain as finished surface, or that directed by the Engineer shall be separately paid. That conducted for the convenience of the contractor shall be at no additional expense to the State.

C. Excavation, and removal of existing foundation slabs. Excavation for new foundation slabs and for the removal of existing foundation slabs will be separately paid for under the contract item for unclassified excavation and disposal.

D. Pavement restoration. Pavement restoration shall be separately paid under the contract items for Truing and Leveling. If there are no contract pay items for Truing and Leveling, then pavement restoration shall be paid under the contract item for the top course of hot mix asphalt. If no contract items exist in the contract for paving items, then no separate payment for pavement restoration will be made.

E. Parts. The cost of replacing or repairing parts damaged during the course of the work shall be at no additional expense to the State. The cost of replacing or repairing parts having pre-existing damage shall be separately paid for under the provisions of Extra Work.

F. Maintenance and protection of Traffic. Maintenance and protection of traffic will be measured and paid for under appropriate items.

654-5.02 Progress Payments. The contract items under this section are eligible for progress payments as indicated below. The balance of payment will be made upon satisfactory completion of the work.

A. Working Drawings. Contract items requiring working drawings will be eligible for progress payment of ten (10) percent upon submission of the working drawings and certification that the modifications thereon will not impair the satisfactory performance of the impact attenuator. Submission of manufacturer’s drawings that are not working drawings, as determined by the Engineer, will not entitle the Contractor to a progress payment.

B. Impact Attenuators with New Foundation Slabs. Contract items requiring the construction of new foundation slabs will be eligible for progress payments of ten (10) percent upon satisfactory finishing and initiation of curing of the foundation slab.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>654.01xx M</td>
<td>Inertial Barrier Module, ___ Kilograms</td>
<td>Each</td>
</tr>
<tr>
<td>654.02xx M</td>
<td>Inertial Barrier Module, ___ Kilograms, Remove and Dispose</td>
<td>Each</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Quantity</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>654.03xx</td>
<td>Inertial Barrier Module, **** Kilograms, Remove and Store</td>
<td>Each</td>
</tr>
<tr>
<td>654.04xx</td>
<td>Inertial Barrier Module, **** Kilograms, Relocate</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td>** = 01 for 90 kg units; 02 for 180 kg units; 03 for 320 kg units; 04 for 640 kg units; 05 for 960 kg units.</td>
<td></td>
</tr>
<tr>
<td>654.10xx</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Including new Foundation Slab, <strong>xx</strong> Width Class, <strong>yy</strong> Bays</td>
<td></td>
</tr>
<tr>
<td>654.11xx</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td>Existing Foundation, <strong>xx</strong> Width Class, <strong>yy</strong> Bays</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td><strong>xx</strong> = width class; 24, 30, 36, 69, 90 (inches)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>yy</strong> = number of bays; 03, 04, 05, 06, 07, 08, 09</td>
<td>10</td>
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<tr>
<td>654.12</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules, Remove and Dispose</td>
<td>Each</td>
</tr>
<tr>
<td>654.13</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules, Remove and Store</td>
<td>Each</td>
</tr>
<tr>
<td>654.14</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules, Refurbish Bay</td>
<td>Each</td>
</tr>
<tr>
<td>654.15xx</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td>Relocate to and Construct New Foundation Slab, <strong>xx</strong> Width Class, <strong>yy</strong> Bays</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td><strong>xx</strong> = width class; 24, 30, 36, 69, 90 (inches)</td>
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<td></td>
<td><strong>yy</strong> = number of bays; 03, 04, 05, 06, 07, 08, 09</td>
<td>20</td>
</tr>
<tr>
<td>654.16</td>
<td>Impact Attenuator, Quad Beam Type with Expendable Modules, Relocate to Existing Foundation</td>
<td>Each</td>
</tr>
<tr>
<td>654.20xx</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, Including New Foundation Slab, <strong>xx</strong> Cylinders</td>
<td>Each</td>
</tr>
<tr>
<td>654.21xx</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, On Existing Foundation, <strong>xx</strong> Cylinders</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td><strong>xx</strong> = number of cylinders; 04, 06, 09</td>
<td>25</td>
</tr>
<tr>
<td>654.22</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, Remove and Dispose</td>
<td>Each</td>
</tr>
<tr>
<td>654.23</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, Remove and Store</td>
<td>Each</td>
</tr>
<tr>
<td>654.24xx</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, Relocate to and Construct New Foundation Slab, <strong>xx</strong> Cylinders</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td><strong>xx</strong> = number of cylinders; 04, 06, 09</td>
<td></td>
</tr>
<tr>
<td>654.25</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, Relocate to Existing Foundation</td>
<td>Each</td>
</tr>
<tr>
<td>654.26</td>
<td>Impact Attenuator, Reusable, HDPE Cylinders and Cable Type, Refurbish Cylinder</td>
<td>Each</td>
</tr>
<tr>
<td>654.30xx</td>
<td>Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips and New Foundation, <strong>xx</strong> Bays</td>
<td>Each</td>
</tr>
<tr>
<td>654.31xx</td>
<td>Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips on Existing Foundation, <strong>xx</strong> Bays</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td><strong>xx</strong> = number of bays; 06, 09</td>
<td></td>
</tr>
<tr>
<td>654.32</td>
<td>Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips, Remove and Dispose</td>
<td>Each</td>
</tr>
<tr>
<td>654.33</td>
<td>Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips, Remove and Store</td>
<td>Each</td>
</tr>
<tr>
<td>654.34xx</td>
<td>Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips, Relocate to and Construct New Foundation Slab, <strong>xx</strong> Bay Unit</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td><strong>xx</strong> = number of bays; 06, 09</td>
<td>50</td>
</tr>
<tr>
<td>654.35</td>
<td>Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips, Relocate to Existing Foundation</td>
<td>Each</td>
</tr>
</tbody>
</table>
654.36xx M  Impact Attenuator, Corrugated Beam Type with Metal Tearing Strips, Refurbish xx Bay Unit  

Each  

xx = number of bays; 06, 09

SECTION 655 - FRAMES, GRATES AND COVERS

655-1 DESCRIPTION. This work shall consist of furnishing and placing frames, grates, covers and curb boxes for drainage structures as shown on the plans or as directed by the Engineer.

655-2 MATERIALS

655-2.01 Castings. All cast gratings, covers, frames and curb boxes manufactured in conformance to the Standard Sheets “Cast Manhole Frames, Grates and Covers”, or “Cast Frames and Curb Boxes and Welded Frames”, or “Telescoping Manhole Casting & Ring” shall meet the requirements of §715-05 Iron Castings, Class No. 30B or Class No. 35B. All other gratings, covers, frames and curb boxes shall meet the requirements of §715-02, Steel Castings, Grade N-1; or §715-07, Proof Loaded Iron Castings, Class No. 30B or Class No. 35B; or §715-09, Malleable Iron Castings, Grade 22010, at the Contractor's option. No substitutions will be allowed.

655-2.02 Fabricated Articles. All frames, grates and appurtenant parts shall be fabricated from steel conforming to ASTM A36M, AISI Grade 1020 Steel, AISI Grade 1025 Steel, or ASTM A529M Gr. 345, except that the longitudinal bars for grates G1, G2, G3, 10 PCB, 11 PCB and 12 PCB shall meet the requirements of ASTM A529M, Gr. 345. The Contractor shall submit mill certifications, to the Engineer, for ASTM A529M, Gr.345. Welding or splicing by welding of any member of the frame or grate, other than the welds shown on the standard sheets, plans, approved shop drawings, approved Materials Details, or in the proposal will not be permitted. Galvanizing shall be in accordance with §719-01 Type I, unless indicated otherwise.

Welding shall comply with the requirements specified in the New York State Steel Construction Manual, except that radiographic inspection will not be required.

655-3 CONSTRUCTION DETAILS

655-3.01 Frames and Grates. Frames, covers and grates shall be placed true to line and grade. Covers, grates and frames shall make firm, full and even bearing on their respective underlying surfaces and shall be non-rocking under the influence of traffic or other loads. On all frames, the Contractor shall have the option of drilling and tapping holes or drilling holes in and welding nuts to the bottom of the frame to facilitate the stud bolts used to hold down the grate.

Unless otherwise specified, the hole shall be drilled and tapped or the nut welded to the frame before galvanizing. The threads shall be tapped sufficiently oversize to conform to ANSI B1.13M Class 6h after galvanizing.

655-3.02 Field Repairs for Improperly Fitting Systems. The Contractor may propose to the Engineer reasonable field repair procedures for improperly fitting castings. No field repairs of improperly fitting fabricated frames and grates shall be allowed. Field repairs may include grinding and/or proper welding techniques for the materials involved. Repairs that involve welding shall be allowed only on steel castings, and not on iron, and only with prior approval of the DCES. Implemented repairs must result in systems whose constituent parts have full, uniform and even bearing contact on their respective underlying surfaces and that do not rock or move under the influence of traffic and other loads. All such repairs must be completely satisfactory to the Engineer or the work shall be rejected and replaced with satisfactory systems. All repairs shall be done at no cost to the State.

655-4 METHOD OF MEASUREMENT

655-4.01 Frames and Grates. The quantity to be measured under this work will be the number of square meters measured inside the frame containing the grate and computed to the nearest 1/100 square meter. The payment areas shown on the standard sheets need not be computed.
§655-5

655-5 BASIS OF PAYMENT

655-5.01 Frames and Grates. The unit price bid per square meter for cast or prefabricated frames and grates shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including the cost of any field repair work for improperly fitting castings or to render the frame and grate non-rocking.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>655.0101 M</td>
<td>Frames and Grates (Castings)</td>
<td>Square Meter</td>
</tr>
<tr>
<td>655.0201 M</td>
<td>Frames and Grates (Fabricated)</td>
<td>Square Meter</td>
</tr>
<tr>
<td>655.0301 M</td>
<td>Frames and Grates (Parallel Bar Type)</td>
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<td>655.0401 M</td>
<td>Frames and Grates (Parallel Bar Type with Cast Frames)</td>
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</tr>
<tr>
<td>655.0501 M</td>
<td>Steel Fabricated Grates In Cast Iron Fabricated Frames</td>
<td>Square Meter</td>
</tr>
</tbody>
</table>

SECTION 656 - MISCELLANEOUS METALS

656-1 DESCRIPTION. This work shall consist of furnishing and placing all metal component parts in accordance with the specifications which are not included in other items of work and which are specifically identified on the plans to be reimbursed at the unit bid price for Miscellaneous Metals.

656-2 MATERIALS. Metals required for this work shall meet the requirements of the following Subsections of Section 700 — Materials:

- Castings, Forgings, and Metals (As Specified) 715
- Miscellaneous Metals and Plastics (As Specified) 725

656-3 CONSTRUCTION DETAILS

656-3.01 Drawings. Shop drawings shall be prepared, approved and distributed in accordance with the provisions of the SCM. When applicable, the manufacturer's specification data sheet (catalog clip) may be furnished in lieu of shop drawings. The Engineer may waive the shop drawing requirement for any non-welded component part that can be fabricated directly from the details shown on the plans.

656-3.02 Welding. Welding shall comply with the requirements specified in the New York State Steel Construction Manual.

656-3.03 Galvanizing. When materials for this work are to be galvanized, the process and spelter coating shall conform to the requirements of §719-01, Galvanized Coatings and Repair Methods.

656-3.04 Painting. All unembedded metal except castings and galvanized material shall be painted as specified in §740-01, Painting Procedures. Three coats of paint will be required and included in this item.

656-4 METHOD OF MEASUREMENT. Payment for this work shall be measured by the number of kilograms of metal furnished and placed in accordance with the plans and specifications.

656-5 BASIS OF PAYMENT. The unit price bid per kilogram shall include all labor, materials and equipment necessary to 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>656.01 M</td>
<td>Miscellaneous Metals</td>
<td>Kilogram</td>
</tr>
</tbody>
</table>
SECTIONS 657 AND 658 (VACANT)

SECTION 659 - TELECOMMUNICATION UTILITIES

659-1 DESCRIPTION. The work in this section shall include special construction required for telecommunications service utilities, including telephone, cellular telephone and cable television that are publicly, privately or cooperatively owned. The extent of work and construction specifications will be covered by special provisions in the contract documents.

659-2 MATERIALS. Materials shall meet the requirements specified by the respective utility company.

659-3 CONSTRUCTION DETAILS

659-3.01 General. The installation and testing procedures shall conform to the requirements specified by the utility company.

659-3.02 Schedule of Work. Work shall be scheduled for minimum interruption of service and must meet the approval of the utility company and the Engineer. A specified advance notice period must be given to the utility company and Engineer prior to interruption of services for construction.

659-3.03 Excavation. The requirements specified in Section 206, Trench, Culvert and Structure Excavation, shall apply.

659-3.04 Backfill. The requirements specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes and Conduits and Direct Burial Cables, shall apply.

659-4 METHOD OF MEASUREMENT. As specified in the special specifications.

659-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 660 - UTILITIES

660-1 DESCRIPTION. The work in this section shall include special construction required for service utilities that are publicly, privately or cooperatively owned. The extent of work, and construction specifications will be covered by special provisions in the contract documents.

660-2 MATERIALS. Materials shall meet the requirements specified by the respective utility company.

660-3 CONSTRUCTION DETAILS

660-3.01 General. The installation and testing procedures shall conform to the requirements specified by the utility company.

660-3.02 Schedule of Work. Work shall be scheduled for minimum interruption of service and must meet the approval of the utility company and the Engineer. A specified, advance notice, period must be given to the utility company and Engineer prior to interruption of services for construction.

660-3.03 Excavation. The requirements specified in Section 206, Trench, Culvert and Structure Excavation, shall apply.

660-3.04 Backfilling. The requirements specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes and Conduits and Direct Burial Cables, shall apply.

660-4 METHOD OF MEASUREMENT. As specified in the special specifications.

660-5 BASIS OF PAYMENT. As specified in the special specifications.
§661-1

SECTION 661 - ELECTRIC UTILITIES

661-1 DESCRIPTION. The work in this section shall include special construction required for electric service utilities that are publicly, privately or cooperatively owned. The extent of work and construction specifications will be covered by special provisions in the contract documents.

661-2 MATERIALS. Materials shall meet the requirements specified by the respective electric utility company.

661-3 CONSTRUCTION DETAILS

661-3.01 General. The installation and testing procedures shall conform to the requirements specified by the electric utility company.

661-3.02 Schedule of Work. Work shall be scheduled for minimum interruption of service and must meet the approval of the utility company and the Engineer. A specified advance notice period must be given to the utility company and Engineer prior to interruption of services for construction.

661-3.03 Excavation. The requirements specified in Section 206, Trench, Culvert and Structure Excavation, shall apply.

661-3.04 Backfill. The requirements specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes and Conduits and Direct Burial Cables, shall apply.

661-4 METHOD OF MEASUREMENT. As specified in the special specifications.

661-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 662 - GAS, OIL & STEAM UTILITIES

662-1 DESCRIPTION. The work in this section shall include special construction required for gas, oil and steam service utilities that are publicly, privately or cooperatively owned. The extent of work and construction specifications will be covered by special provisions in the contract documents.

662-2 MATERIALS. Materials shall meet the requirements specified by the respective utility company.

662-3 CONSTRUCTION DETAILS

662-3.01 General. The installation and testing procedures shall conform to the requirements specified by the utility company.

662-3.02 Schedule of Work. Work shall be scheduled for minimum interruption of service and must meet the approval of the utility company and the Engineer. A specified, advance notice period must be given to the utility company and Engineer prior to interruption of services for construction.

662-3.03 Excavation. The requirements specified in Section 206, Trench, Culvert and Structure Excavation, shall apply.

662-3.04 Backfill. The requirements specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes and Conduits and Direct Burial Cables, shall apply.

662-4 METHOD OF MEASUREMENT. As specified in the special specifications.

662-5 BASIS OF PAYMENT. As specified in the special specifications.