SECTION 663 - WATER SUPPLY UTILITIES

663-1 DESCRIPTION. This work shall consist of the construction or reconstruction of water supply utilities in accordance with these specifications, the contract documents and the standard sheets.

663-2 MATERIALS

663-2.01 General. Materials requirements are specified in the following subsections:

- Portland Cement Concrete 501
- Reinforced Concrete Pipe Classes II, III, IV, V 706-02
- Prefabricated Adjustment Rings, Frames and Utility Valve Risers for Drainage Units, Manholes and Utilities 715-13
- High Strength Bolts, Nuts and Washers 715-14
- Pins and Rollers 715-15
- Stainless Steel Connecting Products 715-16
- Ductile Iron Water Pipe, Fittings and Encasement 722-01
- Steel Water Pipe and Fittings 722-02
- Concrete Water Pipe 722-03
- Water Valves and Hydrants 722-04
- Plastic Water Pipe and Fittings 722-05
- Water Service Pipe, Service Valves and Fittings 722-06
- Wedge Type Mechanical Restraint Glands 722-07
- Insulation for Water Mains 722-08
- Steel Pipe ASTM A53

Materials for water systems shall meet the appropriate American Water Works Association (AWWA) standards and American National Standards Institute (ANSI) specifications, except as modified by these specifications. Asbestos cement pipe or lead tipped gaskets shall not be used. The materials provided shall meet the requirements specified in the “Owner Requirements for Water Mains and Appurtenances”.

663-2.02 Concrete. All concrete for thrust blocks and cradles for water mains 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 will not apply. Class A concrete for thrust blocks and cradles, or other concrete that comes into contact with ductile iron or cast iron materials for water mains, including pipe, fittings, hydrants, valves and valve boxes shall not contain fly ash. 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.

663-3 CONSTRUCTION DETAILS

663-3.01 General. All work shall be done in accordance with applicable AWWA standards, the plans and specifications, and shall be completed to the satisfaction of the Engineer. Owner requirements will be specified in the contract documents under the special notes “Owner Requirements for Water Mains and Appurtenances”. The Contractor shall make all necessary arrangements, obtain all local permits, and pay all charges as required to satisfy the requirements and regulations of the system Owner. Any required health agency permits will be obtained by the system Owner. The local fire department shall be notified by the Contractor a minimum of forty-eight (48) hours prior to interruption of service to any existing hydrant and within twenty-four (24) hours after a hydrant is placed into service. The Contractor shall notify the Owner, in writing, of any hydrant installed with the drain hole plugged.

The locations of the existing mains as shown on the contract plans are often approximate, as indicated by the underground utility quality level designation. Where new water main connections, not including service connections of 2 NPS and smaller, to existing facilities are proposed, existing utility
type, size and/or condition shall be determined by excavating test pits prior to the start of installation. The Contractor shall submit details for connecting existing pipe(s) to the proposed main(s) and drawings or catalog cuts of water pipes and appurtenances comprising the work to the Engineer, with sufficient time to allow for local approval, prior to ordering materials. The Contractor shall prepare and submit schedules of the proposed sequence of work for approval by the Engineer in accordance with §108-01. At any time pipe laying is not in progress, the open ends of the working pipe shall be kept plugged and watertight with plugs, stoppers or other means acceptable to the Engineer.

The Engineer shall be notified immediately of the discovery of any suspected asbestos-containing water supply utilities not identified in the contract documents. Any asbestos-containing water supply utility not identified in the contract documents and encountered during the work shall not be disturbed. No cutting, grinding or any disturbance of asbestos-containing utility shall be performed under the items in this section.

663-3.02 Removals. Removal of existing water main shall include the removal of all appurtenances and fittings within the trench excavation width for that size pipe as shown on the standard sheets, except that an existing concrete thrust block need not be removed unless its presence will interfere with proposed work. Existing items requiring removal and disposal shall become the property of the Contractor and shall be removed from the work site to the satisfaction of the Engineer. Existing items requiring removal and storage shall be removed and stored by the Contractor for pick up by the Owner. The Contractor shall exercise care in removing items to be stored to prevent damage. Unusable or unwanted material shall be disposed of by the Contractor. Removal of an existing water service connection shall include the removal of the service pipe from the main to the highway boundary or other location(s) shown in the contract documents and the removal of the curb stop and curb box. Unless otherwise noted in the Owner requirements, corporation stops shall be removed and the hole plugged with a solid brass or iron plug.

Disturbance of asbestos-containing water supply utility requires use of a New York State Department of Labor (NYSDOH) licensed contractor using NYSDOH certified asbestos handlers. Removal of asbestos-containing water supply utility encountered during excavation or exploration shall not be performed under the removal items contained in this section.

663-3.03 Shutdowns. A shutdown of any portion of a water system to make connections to existing mains shall be made with the consent of the system Owner. Approvals for shutting off a water service shall be obtained from the Engineer. The Contractor shall give a minimum of forty-eight (48) hours notice to each customer prior to interruption of service, unless the system Owner requires a longer notification period. Such notice may be provided by posting a written notice at the entrance to the building from the street. When a residential service is to be interrupted for more than eight (8) hours, the Contractor shall, when directed by the Engineer, provide a temporary water service. When a commercial service is to be interrupted for more than 60 minutes during the establishment’s normal business hours, the Contractor shall, when directed by the Engineer, provide a temporary water service. A temporary water service shall be required only when specified in the plans, or when directed by the Engineer, and will then be paid for under the Temporary Water Service item.

663-3.04 Excavation and Backfill. The Contractor shall meet the requirements specified in Section 206, Trench, Culvert and Structure Excavation, except as modified by the contract documents. The payment width of trench excavation shall be as shown on the standard sheet for this section. Bell holes shall be excavated no larger than required to allow joint assembly and to allow the pipe to lay flat in the trench. Trenches for pipe sizes from 3 NPS to 24 NPS shall provide a minimum of 150mm clearance to rocks or boulders and trenches for pipe sizes from 30 NPS to 64 NPS shall provide a minimum of 225mm clearance to rocks or boulders. Longitudinal excavation and backfill limits shall be 1.0 m beyond the connection or termination point with an existing main, and 0.6 m beyond the barrel of a hydrant.

The Contractor shall meet the requirements of §203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits, and Direct Burial Cables. Materials containing fly ash or slag, including Controlled
Low Strength Material that contains flyash, shall not be used as backfill or allowed to come into contact with ductile iron or cast iron materials for water mains, including pipe, fittings, hydrants, valves and valve boxes. Bedding and embedment material used for backfill around plastic pipe shall have a maximum particle size of 19mm.

663-3.05 Thrust Restraint. Thrust forces produced in water mains at changes in direction or size shall be restrained in order to keep the main intact. Thrust restraint may be provided by restrained joints, retainer glands, thrust blocks or tie rods, as required by the Owner. The minimum required thrust block areas and volumes shown on the standard sheet are for a standard water system test pressure, soil bearing capacity and soil unit weight. These values shall be adjusted for higher water system test pressure requirements or different soil conditions in the field. The Contractor shall be responsible for providing the proper size and type of thrust restraint, based on the standard sheets, the Owner requirements and the contract plans. Thrust restraint for sizes larger than 24 NPS will be designed on a case by case basis, and will be shown in the contract documents.

663-3.06 Pipe.

A. General. Pipe shall be laid in close conformity to line and grade having a full, firm and even bearing at each joint and along the entire length of pipe. Pressurized pipe need not be laid with the bells upstream. Only gaskets certified by the Manufacturer for use with the type of pipe or fitting installed shall be used. Existing gray iron pipe shall be cut with an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw, milling wheel saw or a hydraulic squeeze cutter. The Contractor shall repair, realign or replace pipe that is damaged or disturbed through any cause occurring prior to acceptance of the contract. Pipe which is defective from any cause, including damage caused by handling and determined by the Engineer to not be repairable, will be unacceptable for installation and shall be replaced as directed by the Engineer at no cost to the State.

B. Ductile Iron Cement Lined Water Pipe. Ductile iron water mains shall be installed in accordance with AWWA Standard C600. Unless otherwise noted in the Owners requirements, ductile iron pipe up to 12 NPS shall be pressure class 350 or thicker, and the cement lining shall be 1.6 mm thick. Unless otherwise noted in the Owners requirements, ductile iron pipe from 14 NPS to 24 NPS shall be pressure class 250 or thicker, and the cement lining shall be 2.4 mm thick. Unless otherwise noted in the Owners requirements, ductile iron pipe from 30 NPS to 64 NPS shall be pressure class 250 or thicker and the cement lining shall be 3.2 mm thick. Ductile iron pipe joints shall be installed with deflections not exceeding that listed in the table on the standard sheet. Ductile iron pipe selected for cutting shall be field gauged in order to ensure that after smoothing and beveling (if required), the cut end will provide a sound joint. Ductile iron pipe shall be cut with an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw or milling wheel saw. Ductile iron pipe shall be cut with an oxyacetylene torch only when recommended by the Manufacturer and approved by the Engineer. Cut ends and rough edges shall be ground smooth. Cut ends shall be bevel if using push-on joints. The Contractor shall ensure that the cement mortar lining of ductile iron pipe is not damaged during cutting operations.

C. Steel Water Pipe. Steel water pipe shall be installed in accordance with the contract documents and the Owner requirements. Steel pipe may be cut with an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw or milling wheel saw. Steel pipe shall be welded in accordance with AWWA Standards and with the provisions of the “NYS Steel Construction Manual”. Fittings for steel pipe shall be shop fabricated in accordance with AWWA Standard C208. Linings and coatings shall be installed in accordance with the appropriate AWWA Standard for the specified material.

D. Concrete Water Pipe. Concrete water pipe shall be installed in accordance with the contract documents and the Owner requirements.

E. Plastic Water Pipe. Plastic water mains shall be installed in accordance with AWWA Standard C605. Unless otherwise noted in the Owners requirements, plastic water pipe shall be
§663-3

pressure class 150. Plastic water pipe may be cut with a hand saw, circular saw or similar equipment. After cutting plastic water pipe, ends shall be smoothed or beveled similar to factory ends to provide sound joint connections. Plastic water pipe shall be re-marked with an insertion line to allow proper joint make-up. Unless otherwise noted in the Owners requirements, plastic water pipe shall be installed with a coated tracing wire above the pipe to facilitate location. A portion of the wire shall be stripped and firmly connected to valves, hydrants, corporation stop and curb stops to provide electrical connectivity.

F. Bridge Mounted Water Pipe. Water pipe shall be installed on a bridge in accordance with the contract plans. This shall include, but is not limited to, expansion devices, rollers, chairs, connectors, insulation, insulation covering and sleeves.

G. Handling and Assembly of Pipe. Pipe and fittings shall be inspected prior to placement. The inside of pipe, fittings and existing water mains shall be kept free of dirt and foreign material. If dirt or potentially contaminated water has entered the inside of a water main, the main shall be cleaned and disinfected prior to placement to facilitate the disinfection process on the completed installation. Pipe and fittings shall be lowered into place, and shall not be rolled, dropped or allowed to fall into a trench or pit.

663-3.07 Polyethylene Encasement and Insulation.

A. Polyethylene Encasement. When called for in the contract documents, ductile-iron pipe shall be polyethylene encased in accordance with the methods outlined in AWWA Standard C105.

B. Insulation for Buried Water Pipe. When called for in the contract documents, insulation shall be installed in accordance with the contract plans and the Manufacturer’s recommendations. Insulation for underground installation shall use appropriate material or be covered with an appropriate waterproof jacket or insulator, as specified in the Owner requirements.

663-3.08 Valves & Valve Boxes.

A. General. Valves shall have an asphaltic or epoxy coating as required under AWWA Standard C509 or C515. Valves shall open in the direction specified in the Owner requirements. Valves shall be lowered into place, and shall not be rolled, dropped or allowed to fall into a trench or pit. Valves shall not be lifted or moved by the valve stem.

B. Valve Installation. Valves shall be installed where shown on the contract plan during the progress of the pipe laying. Valves shall be laid with full, firm and even bearing. Bearing shall be provided by concrete blocks, or a minimum of 150mm of well-compacted granular fill or crushed stone, as required in the Owner requirements or as shown on the plans.

C. Handling of Removed or Relocated Valves. All valves shown on the plans to be removed or relocated shall be carefully detached, cleaned and stored in locations acceptable to the Engineer within the job site. The Contractor shall take special precautions to prevent damage to the valve during disconnection, movement and reinstallation.

D. Valve Relocation. Valves shall be removed from the existing location, checked, all foreign material removed from the interior and placed in operating condition before reinstallation. Exterior rust and corrosion shall be removed and the valve exterior recoated with an asphaltic coating prior to installation.

E. Valve Boxes. Unless otherwise noted in the Owner requirements, valve boxes shall be slide type adjustable, set plumb over the center of the valve and to the proper grade. Any valve box which has moved sufficiently from the original position so as to prevent the application of the valve key shall be reset by the Contractor at no additional cost to the State. New valve box covers shall be cast with the word “WATER” on the top as a means of identification.
663-3.09 Hydrants.

A. General. Each hydrant shall include bonnet, upper barrel, lower barrel and shoe with all internal operating parts. Hydrants shall be dry-barrel, traffic type, incorporating a frangible connection on the hydrant barrel or at the groundline joint and on the operating rod. The outside of the hydrant upper barrel shall be painted with a minimum of one coat of primer and one finish coat of industrial enamel in the color noted in the Owner requirements or to match existing hydrants if not noted. Unless otherwise noted in the Owner requirements, all hydrants shall have a 5 NPS main valve and be equipped with a 4½ NST steamer nozzle and two 2½ NST hose nozzles. Non-operational hydrants shall be bagged or covered, in a manner acceptable to the Engineer, until they are tested and placed in service.

B. Hydrant Installation. Hydrants shall be installed during the laying of pipe. Hydrants shall be restrained, typically from the main to the hydrant shoe, using one of the methods outlined under §663-3.05 “Thrust Restraint”. Hydrants shall be set plumb at the proposed locations. The groundline marked on the hydrant, or identified by the manufacturer using an offset from a point on the hydrant, shall be within 25 mm above or below finished grade. The hydrant shall be installed so that no portion of the lower barrel, (that portion remaining if the hydrant top is broken off) extends more than 100 mm above grade. The measurement will be taken over a 1.5 m horizontal span when a change in grade occurs within 1.5 m of the hydrant. Hydrant drainage material meeting the specifications of §703-02, Table 703-4, Size Designation 1 or 2, shall be placed around the hydrant at the drip location (0.2 m3 minimum) to drain the barrel, except as noted on the standard sheets or the contract plans. Hydrant barrels shall be rotated so that the steamer nozzle is facing the roadway, unless otherwise noted in the contract documents.

C. Handling of Removed or Relocated Hydrants. All hydrants shown on the plans to be removed or relocated shall be carefully detached, cleaned and stored in locations designated by the Engineer within the job site. The Contractor shall take special precautions to prevent damage to the hydrant assembly during disconnection, movement and reinstallation.

D. Hydrant Relocation. Hydrants shall be removed from the existing location, checked, all foreign material removed from the interior of the barrel and placed in operating condition before reinstallation. Exterior rust and corrosion shall be removed and the hydrant repainted the color specified by the Owner prior to reinstallation. When the hydrant is ready for service, the hydrant shall be opened and closed to verify that all parts are in working condition. The barrel interior shall be inspected for proper drainage after reinstallation is completed.

663-3.10 Hydrant Fenders. Fenders shall be installed where shown on the contract plans, in accordance with the standard sheets.

663-3.11 Dry Hydrants. Dry hydrants shall be furnished and installed in accordance with the contract documents.

663-3.12 Tapping Sleeve, Valve & Valve Boxes and Line Stop & Tapping Fittings. Fittings shall be installed in accordance with the Manufacturers recommendations. All valves shall be installed in accordance with the requirements of §663-3.08.

663-3.13 Bolted, Sleeve Type Couplings. All couplings shall meet the requirements of AWWA Standard C219.

663-3.14 Iron Water Main Fittings. All fittings shall be compact ductile iron (AWWA C153) unless specifically required otherwise in the Owner requirements. When approved by the Owner, the Contractor may provide a comparable full body fitting (AWWA C110) when not specifically required.

663-3.15 Wedge Type Mechanical Restraint Glands. Glands shall be installed in accordance with the Manufacturer’s recommendations, using break away wedge bolts. If a gland needs to be moved or adjusted, the Contractor shall reinstall the wedges using a torque indicating wrench to within the
torque range recommended by the Manufacturer.

663-3.16 High Deflection Restrained Joint Fittings. All fittings shall be compact ductile iron (AWWA C153) unless specifically required otherwise in the Owner requirements.

663-3.17 Water Service Connections. A water service connection shall include the installation of everything, except water service pipe, required to provide a connection from a main to a customer at the highway boundary, including corporation stop, curb stop, curb box, tapping sleeve or saddle, if required, and all necessary fittings. Taps should be a minimum of 600mm from a pipe end. Multiple taps should be a minimum of 450mm apart, measured along the axis of the main. If taps are made at the 2 or 10 o’clock positions, the Contractor shall ensure that the high point in the water service pipe meets the minimum cover requirement. Taps greater than 2 NPS shall be made using a tapping sleeve and valve. For ductile iron pipe, unless otherwise noted in the Owner requirements, maximum allowable direct tap sizes shall be as shown in Table 663-1. For plastic pipe, unless otherwise noted in the Owner requirements, taps up to NPS 1 may be direct tapped into a main, and taps from 1-1/4 NPS to 2 NPS shall be tapped using a tapping saddle.

<table>
<thead>
<tr>
<th>Pipe Size (NPS)</th>
<th>Pressure Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>250</td>
</tr>
<tr>
<td>4</td>
<td>--</td>
</tr>
<tr>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>8</td>
<td>--</td>
</tr>
<tr>
<td>10</td>
<td>--</td>
</tr>
<tr>
<td>12</td>
<td>--</td>
</tr>
<tr>
<td>14</td>
<td>1-1/4</td>
</tr>
<tr>
<td>16</td>
<td>1-1/2</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: All thickness class sizes of ductile iron pipe may be direct tapped.

Unless otherwise noted in the Owner requirements, water service pipe shall be Type K copper. Unless otherwise noted in the Owner requirements, polyethylene water service pipe shall be installed with a coated tracing wire to facilitate location. A portion of the wire shall be stripped and firmly connected to the corporation stop and the curb stop to provide electrical connectivity.

The Contractor will have the option to install water service pipe using boring, drilling or other trenchless method. Trenchless installation shall be performed in a manner acceptable to the Engineer. Water service pipe installed using a trenchless method shall be installed in a single length free of couplings or other fittings over that length.

663-3.18 Water Meter Pits, Type A. All pits shall be furnished in accordance with details in the contract documents and the Owner requirements. Type A pits are concrete or masonry structures capable of holding water meters and valves, and allow personnel entry for service and repair. Unless otherwise noted in the Owner requirements, meters to be installed in water meter pits will be supplied by the Owner at no cost to the Contractor or to the State.
§663-4

663-3.19 Water Meter Pits, Type B. All pits shall be furnished and installed in accordance with the standard sheets and the Owner requirements. Unless otherwise noted in the Owner requirements, meters to be installed in water meter pits will be supplied by the Owner at no cost to the Contractor or to the State.

663-3.20 Temporary Water Service for Water Main Installation. The Contractor shall, when called for in the contract documents or directed by the Engineer, provide temporary water service to customers during interruptions caused by water main work. The service may be provided by temporary piping or other method approved by the Engineer.

663-3.21 Adjust Valve Box Elevation. Prior to the placement of the top course and after the placement of the binder course, when required, the Contractor shall install adjustment rings or frames for valve boxes. The Contractor shall be responsible for ensuring that the adjustment rings or frames are compatible with the existing valve boxes. The adjustment ring or frame shall be placed so the valve box cover will not protrude above the finished surface of the pavement, and is no more than 5 mm below finished grade. The Contractor shall have the option of resetting the existing valve box to the required grade.

To ensure a firm and secure fit with the adjustment ring or frame, the seat of the existing valve box shall be free of all foreign material at the time of installation. The entire assembly shall be set on the seat of the existing valve box and secured. The valve box cover shall then be set upon the seat of the adjustment ring or frame. All rings or frames shall be protected from displacement caused by traffic maintained on the roadway or equipment used in the paving operation.

663-3.22 Disconnect and Cap Existing Water Main. Existing water main shall be disconnected and capped in accordance with the contract documents.

663-3.23 Hydrostatic Testing. Hydrostatic pressure and leakage tests shall be performed in accordance with AWWA C600. Prior to formal testing, the mains shall be thoroughly flushed. Hydrostatic pressure and leakage tests shall be made on installations (water mains, valves, fittings, etc.) having diameters larger than 2 NPS. The testing shall include any filling points, sampling points or other appurtenances required to conduct the tests. The total leakage per day shall not exceed the amounts allowable under AWWA C600. Unless otherwise noted in the Owner requirements, the system shall be subjected to the pressure/leakage test with water under a hydrostatic pressure of 1035 kPa for two (2) hours.

663-3.24 Disinfection. Upon completion of all water supply related construction, all mains, valves, hydrants and other appurtenances built under this contract shall be flushed, disinfected and tested for bacteriological quality in accordance with AWWA C651. Tablets shall not be used for chlorination of solvent welded plastic or screwed-joint steel pipe due to danger of fire or explosion from the reaction of joint compounds with calcium hypochlorite.

663-4 METHOD OF MEASUREMENT

663-4.01 Water Pipe. The quantity to be measured for payment will be in meters to the nearest 0.1 m as defined under Laying Length of Pipe in §101-02 Definition of Terms. The measurement for pipe will not include the length of fittings installed.

663-4.02 Water Service Pipe. The quantity to be measured for payment will be in meters to the nearest whole meter as defined under Laying Length of Pipe in §101-02 Definition of Terms. The measurement for pipe will not include the length of fittings installed.

663-4.03 Steel Pipe Bends and Fittings. Steel pipe bends and fittings will be measured in meters of equivalent lengths of steel pipe, to the nearest 0.1 m. The length of bends will be the length of the circular arc using the angle of the bend and the radius of bend used to make the desired connection. The length of special fittings for steel pipe will be the length along the centerline from an intersecting centerline, as in a tee or wye. The lengths may be measured for different diameters on a tee or wye.
§663-4

having legs of unequal diameter. Refer to AWWA Standard C208, Figure 1 and Table 1 for lengths.

663-4.04 Bridge Mounted Water Pipe. The quantity to be measured for payment will be in meters to the nearest 0.1 m from a point 1.5 m behind the back surface of each structure abutment or backwall, or to points indicated in the contract documents for installations that do not pass through an abutment or backwall.

663-4.05 Valve & Valve Boxes. The quantity to be measured for payment will be the number of units of each size furnished and incorporated into the work in accordance with the contract documents.

663-4.06 Hydrants. The quantity to be measured for payment will be the number of units furnished and incorporated into the work in accordance with the contract documents.

663-4.07 Hydrant Fenders. The quantity to be measured for payment will be the number of fenders furnished and incorporated into the work in accordance with the contract documents.

663-4.08 Dry Hydrants. The quantity to be measured for payment will be the number of dry hydrants, including all necessary pipe and fittings furnished and incorporated into the work in accordance with the contract documents.

663-4.09 Tapping Sleeve, Valve & Valve Boxes; Line Stop and Tapping Fittings; and Bolted, Sleeve Type Couplings. The quantity to be measured for payment will be the number of units of each size furnished and incorporated into the work in accordance with the contract documents.

663-4.10 Iron Water Main Fittings. The quantity to be measured for payment will be the bare weight of fittings installed, as listed in AWWA Standard C110 or C153, as applicable. Total contract quantity will be measured to the nearest whole kilogram. No measurement will be made for the weight of gaskets, other appurtenant hardware, retainer glands provided solely for thrust restraint or thrust restraints rods. The quantity measured for payment for fittings not listed in the AWWA Standards will be based upon Manufacturer certifications.

663-4.11 Wedge Type Mechanical Restraint Glands and High Deflection Restrained Joint Fittings. The quantity to be measured for payment will be the number of units furnished and incorporated into the work in accordance with the contract documents.

663-4.12 Polyethylene Encasement for Water Mains and Insulation for Water Mains. The quantity to be measured for payment will be the number of meters along the pipe axis measured to the nearest whole meter furnished and incorporated into the work in accordance with the contract documents.

663-4.13 Water Service Connections and Curb Stop & Curb Box. The quantity to be measured for payment will be the number of complete units furnished and incorporated into the work in accordance with the contract documents.

663-4.14 Water Meter Pits, Type A and Water Meter Pits, Type B. The quantity to be measured for payment will be the number of complete units furnished and incorporated into the work in accordance with the contract documents.

663-4.15 Temporary Water Service for Water Main Installation. Payment for Temporary Water Service for Water Main Installation will be made on a lump sum basis.

663-4.16 Relocate Existing Water Valve & Valve Box, Relocate Existing Hydrant Assembly and Relocate Existing Curb Stop & Curb Box. The quantity to be measured for payment will be the number of units of each relocated in accordance with the contract documents.

663-4.17 Adjust Existing Valve Box Elevation, Adjust Existing Hydrant Elevation and Adjust Existing Curb Box Elevation. The quantity to be measured for payment will be the number of units of each adjusted in accordance with the contract documents.
§663-5

663-4.18 Disconnect and Cap Existing Water Main. The quantity to be measured for payment will be the number of mains disconnected and capped in accordance with the contract documents.

663-4.19 Remove and Dispose of Existing Water Main. The quantity to be measured for payment will be in meters along the pipe axis measured to the nearest whole meter in accordance with the contract documents.

663-4.20 Remove and Dispose of Existing Water Valve & Valve Box and Remove and Dispose of Existing Hydrant. The quantity to be measured for payment will be the number of units removed and disposed of in accordance with the contract documents.

663-4.21 Remove and Dispose of Existing Water Service Connection. The quantity to be measured for payment will be the number of units removed and disposed of in accordance with the contract documents.

663-4.22 Remove and Store Existing Water Valve & Valve Box and Remove and Store Existing Hydrant. The quantity to be measured for payment will be the number of units removed and stored in accordance with the contract documents.

663-5 BASIS OF PAYMENT

663-5.01 General. The unit price bid shall include the cost of all materials, labor and equipment necessary to complete the work, except that test pits, excavation and backfill will be paid for separately. Unless otherwise noted in the contract documents, payment for thrust restraint shall be included in the price bid for pipe and appurtenances. No additional payment will be made for permits, cutting existing mains, thrust restraint, disinfection or testing. Progress payments for installed or relocated items will be made at the unit bid price for 80 percent of the quantity installed, when the installation is completed and backfilled to a minimum of 600mm over the top of the pipe plus additional cover required to protect the installation from vehicular and construction traffic. The remaining 20 percent will be paid for when required testing and disinfection of the system has been satisfactorily completed.

663-5.02 Steel Pipe Bends and Fittings. The payment for steel pipe bends and fittings will be made under the steel water pipe item for equivalent lengths of steel pipe. The payment item for a reducer will be based on the larger diameter.

663-5.03 Bridge Mounted Water Pipe. The unit price bid shall include the cost of all labor, materials and equipment necessary to complete the work, including but not limited to, expansion devices, rollers, chairs, connectors, insulation, insulation covering and sleeves, except that structural utility support members will be paid for under a structural steel item.

663-5.04 Water Service Pipe. The unit price bid for plastic pipe and polyethylene water service pipe will include the installation of tracing wire, if required. If the Contractor opts to install water service pipe using a trenchless method, excavation and backfill will be paid for as if the standard installation method had been used. No additional payment will be made for surface restoration not required due to use of trenchless installation.

663-5.05 Hydrants. The unit price bid for each hydrant shall include a length or lengths of anchor pipe, installed at any point between the main and the hydrant up to 2.0 m long at no additional cost to the State. Hydrant drainage material will be included in the payment for each hydrant at no additional cost to the State.

663-5.06 Hydrant Fenders. The unit price bid shall include the cost of all labor, materials and equipment necessary to complete the work. The work shall include excavation for the fenders, installation and backfill. The excavation for the concrete collars and slabs and the concrete required will be paid for separately.
§663-5

663-5.07 Bolted, Sleeve Type Couplings. If a bolted coupling is used to join two different diameters of pipe, the payment item will be based on the larger size.

663-5.08 Iron Water Main Fittings. Payment for a full body (AWWA C110) fitting provided but not required will be the weight of a similar compact (AWWA C153) fitting. The payment item for a fitting with different size connections will be based on the largest NPS size on that fitting (i.e. a 12 NPS x 4 NPS Tee will be in the 10 NPS - 16 NPS range).

663-5.09 Water Service Connections. Payment for a water service connection will include the cost of all labor, materials and equipment necessary to complete the installation of everything required to provide a connection from a main to a customer at the highway boundary, including corporation stop, curb stop, curb box, tapping sleeve or saddle, if required, and all necessary fittings, except the service pipe, which will be paid for separately.

663-5.10 Water Meter Pits. The unit price bid shall include the cost of all labor, materials, including meter pit lids, covers and steps, and equipment necessary to complete the work.

663-5.11 Relocate Existing Hydrant. The unit price bid for each hydrant relocation shall include a length of lateral pipe up to 2.0 m long, installed at any point between the main and the hydrant and hydrant drainage material at no additional cost to the State.

663-5.12 Adjust Existing Valve Box Elevation and Adjust Existing Curb Box Elevation. If the Contractor elects to reset the existing valve box, the costs of the work involved in the removal and replacement of existing disturbed pavement shall be included in the bid price for adjustment of the valve box.

663-5.13 Adjust Existing Hydrant Elevation. The unit price bid for each hydrant elevation adjustment shall include the cost of any barrel extensions required to complete the work at no additional cost to the State.

663-5.14 Disconnect and Cap Existing Water Main. Any fittings required to complete the work will be paid for separately.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>663.01xx M</td>
<td>Ductile Iron Cement Lined Water Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.02xx M</td>
<td>Steel Water Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.03xx M</td>
<td>Concrete Water Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.04xx M</td>
<td>Plastic Water Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.05xx M</td>
<td>Bridge Mounted Water Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.06zz M</td>
<td>Copper Water Service Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.07zz M</td>
<td>Polyethylene Water Service Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.08zz M</td>
<td>Steel Water Service Pipe</td>
<td>Meter</td>
</tr>
<tr>
<td>663.10xx M</td>
<td>Resilient Wedge Valve &amp; Valve Box</td>
<td>Each</td>
</tr>
<tr>
<td>663.11xx M</td>
<td>Butterfly Valve &amp; Valve Box</td>
<td>Each</td>
</tr>
<tr>
<td>663.12xx M</td>
<td>Double Disk Gate Valve &amp; Valve Box</td>
<td>Each</td>
</tr>
<tr>
<td>663.13mn M</td>
<td>Hydrant</td>
<td>Each</td>
</tr>
<tr>
<td>663.14 M</td>
<td>Hydrant Fender</td>
<td>Each</td>
</tr>
<tr>
<td>663.15mn M</td>
<td>Dry Hydrant</td>
<td>Each</td>
</tr>
<tr>
<td>663.16xxxy M</td>
<td>Tapping Sleeve, Valve &amp; Valve Box Assembly</td>
<td>Each</td>
</tr>
<tr>
<td>663.17xx M</td>
<td>Line Stop Fitting</td>
<td>Each</td>
</tr>
<tr>
<td>663.18xx M</td>
<td>Bolted, Sleeve Type Coupling</td>
<td>Each</td>
</tr>
<tr>
<td>663.2001 M</td>
<td>Iron Water Main Fittings (3 NPS - 8 NPS)</td>
<td>Kilogram</td>
</tr>
<tr>
<td>663.2002 M</td>
<td>Iron Water Main Fittings (10 NPS - 16 NPS)</td>
<td>Kilogram</td>
</tr>
<tr>
<td>663.2003 M</td>
<td>Iron Water Main Fittings (18 NPS and larger)</td>
<td>Kilogram</td>
</tr>
</tbody>
</table>
664-3 CONSTRUCTION DETAILS

664-3.01 General. The installation and testing procedures shall conform to the requirements specified by the utility company.

664-3.02 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.

664-3.03 Excavation. The requirements specified in Section 206, Trench, Culvert and Structure Excavation, shall apply.

664-3.04 Backfill. The requirements specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes and Conduits and Direct Burial Cables, shall apply.
§664-4

664-4 METHOD OF MEASUREMENT. As specified in the special specifications.

664-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 665 - WATERWAYS

665-1 DESCRIPTION. The work in this section shall include special construction required for the New York State Canal Corporation.

The extent of work, material required, construction details, method of measurement and basis of payment will be covered by special provisions in the contract documents.

SECTION 666 (VACANT)

SECTION 667 - LOCAL ROAD GRAVEL SURFACE, BASE,
AND SUBBASE COURSES

667-1 DESCRIPTION.

667-1.01 General. The work consists of furnishing, placing and compacting gravel surface, base and subbase courses in conformity with the lines, grades, thicknesses and typical sections shown on the plans, or as determined by field conditions and ordered in writing by the municipality.

667-1.02 Material Types. Provide materials as specified by the following options.

- Type A. Surface quality material with a maximum particle size of 25 mm.
- Type B. Base quality material with a maximum particle size of 50 mm.
- Type C. Subbase quality material with a maximum particle size of 75 mm.

667-2 MATERIALS.

667-2.01 Test and Control Methods. All tests shall be performed by laboratories accredited under the AASHTO accreditation program. Materials tests and quality control methods pertaining to the work of this section will be performed in conformance with the procedures contained in the appropriate New York State Department of Transportation (NYSDOT) and/or American Association of State Highway and Transportation Officials (AASHTO) publications which are current on the date of advertisement of bids.

667-2.02 Materials Requirements. Provide materials for road gravel surface, base, and subbase courses that consist of Sand and Gravel, approved Blast Furnace Slag or Stone that meet the requirements contained herein. Provide materials well graded from coarse to fine, and free from organic or other deleterious materials. Any gravel material will be rejected if it is determined to contain any unsound or deleterious materials.

- A. Gradation. Perform sieve analysis in accordance with the AASHTO procedures T 27, T 88 or T 311. Report the following sieves for all tests: 75µm, 425µm, 6.3 mm, 12.5 mm, 19 mm, 25 mm, 37.5 mm, 50 mm, 75 mm.
  Provide material meeting the gradation limits from Table 667-1.
- B. Soundness. Material for local road gravel surface, base, and subbase courses will be accepted on the basis of Magnesium sulfate Soundness Loss after four (4) cycles performed according to NYSDOT procedures and Table 667-2.
- C. Plasticity. Determine plasticity using either of the following methods:
  1. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall meet the values in Table 667-2. Determine plasticity using AASHTO tests T 89 and T 90.
  2. Sand Equivalent. The sand equivalence of the granular material shall meet the values in

6-190

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

STANDARD SPECIFICATIONS of January 2, 2002
Table 667-2. Determine sand equivalence using AASHTO test T 176.

### Table 667-1: Percent Passing by Weight of Gravel Materials

<table>
<thead>
<tr>
<th>Sieve (U.S. sieve)</th>
<th>Option Type</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>75 mm (3&quot;)</td>
<td>A (Surface)</td>
<td>B (Base)</td>
<td>C (Subbase)</td>
</tr>
<tr>
<td>50 mm (2&quot;)</td>
<td></td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>37.5 mm (1.5&quot;)</td>
<td></td>
<td>85-100</td>
<td>70-100</td>
</tr>
<tr>
<td>25 mm (1&quot;)</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>19 mm (3/4&quot;)</td>
<td>85-100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6.3 mm (1/4&quot;)</td>
<td>50-75</td>
<td>30-50</td>
<td>30-55</td>
</tr>
<tr>
<td>425 μm (#40)</td>
<td>15-35</td>
<td>5-20</td>
<td>5-25</td>
</tr>
<tr>
<td>75 μm (#200)</td>
<td>8-15</td>
<td>0-5</td>
<td>0-8</td>
</tr>
</tbody>
</table>

### Table 667-2: Test and Control Limits of Gravel Materials

<table>
<thead>
<tr>
<th>Material Properties</th>
<th>Material Type</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (Surface)</td>
<td>B (Base)</td>
<td>C (Subbase)</td>
</tr>
<tr>
<td>Maximum Soundness loss (%)</td>
<td>20</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Plasticity Index</td>
<td>2-9</td>
<td>0-5</td>
<td>0-8</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>&gt;25</td>
<td>&gt;40</td>
<td>&gt;35</td>
</tr>
</tbody>
</table>

**D. Elongated Particles.** Not more than 30 percent, by weight, of the particles retained on a 12.5 mm sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will normally be based on a visual inspection. When the municipality elects to test for this requirement, material with a percentage greater than 30 will be rejected.

**E. Fractured Faces.** When the municipality elects to test for this requirement, Type A material shall have at least two fractured faces on 50 percent of the stone particles larger than 12.5 mm or at least one fractured face on 75 percent of the particles larger than 12.5 mm. Type B material shall have at least one fractured face on 50 percent of the stone particles larger than 12.5 mm.

**667-2.03 Stockpiling.** Stockpile all material, except that material furnished under Type C will not be required to be stockpiled if the total project quantity is more than 500 tons, unless otherwise stated in the contract documents. Follow stockpile construction requirements, sampling, testing and acceptance/rejection procedures as stipulated by applicable NYSDOT procedures.

**667-3 CONSTRUCTION DETAILS.**
§667-3

667-3.01 General. Use uniform gravel types and materials between the roadbed limits.

667-3.02 Placement.

A. Place the upper course material on the grade in a manner to minimize segregation, using equipment and procedures approved by the Municipality. Do not perform uncontrolled spreading from piles dumped on the grade.

B. The maximum compacted layer thickness is 380 mm, or as shown on the plans. In confined areas as defined by the Municipality the maximum compacted layer thickness is 150 mm. The minimum loose lift thickness is 1.5 times the maximum particle size.

667-3.03 Compaction. When the moisture content is within the limits for proper compaction, compact the material in accordance with the requirements of §203-3.12, Compaction. Density tests are not required for the acceptance of these courses. If a subbase course has been disturbed by frost action prior to paving, recompact the layer.

667-3.04 Traffic and Contamination. The movement of highway traffic over the final surface of the base or subbase may be permitted at locations designated by, and under such restrictions as directed by the Municipality, provided such movements take place prior to the final finishing of this course to the specified tolerance. The movement of construction equipment on this course may be permitted at locations designated by and under such restrictions as directed by the Municipality.

No payment will be made for furnishing, placing, maintaining, removing and disposing any protective layer. Include the cost thereof in the price bid.

If a layer is damaged or mixed with the subgrade or any other material due to the Contractor’s operation, remove such material and replace it with the appropriate material at no additional cost to the Municipality.

667-3.05 Tolerance.

A. Surface and Base Course. Place material so that after compaction the top surface of the course does not extend more than six (6) mm above nor more than six (6) mm below true grade for the course at any location.

B. Subbase Course. Place material so that after compaction the top surface of the course does not extend more than twelve (12) mm above nor more than twelve (12) mm below true grade for the course at any location.

667-4 METHOD OF MEASUREMENT. The quantity is the number of cubic meters of material, computed from payment lines shown on the plans or, where changes has been ordered, from payment lines established by the Municipality.

667-5 BASIS OF PAYMENT. The unit price bid for this work includes the cost of furnishing all labor, material and equipment necessary to complete the work. Include the cost of adding water in the price bid unless the items for furnishing and applying water are included in the contract. No direct payment will be made for losses of material resulting from compaction, foundation settlement, erosion, or any other cause. Include the cost of such losses in the price bid for this item. No deductions will be made for the volumes occupied by manholes, catch basins and other such objects.

Progress payments will be made after each Type course has been properly placed and compacted. Payment will be made at the unit price bid for seventy-five (75) percent of the quantity. The balance of the quantity will be paid for after the final finishing to the required tolerance and just prior to the placing of the next course or Type.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS of January 2, 2002

6-192
667.01 M  Local Road Gravel Surface Course, Type A  Cubic Meter
667.02 M  Local Road Gravel Base Course, Type B  Cubic Meter
667.03 M  Local Road Gravel Subbase Course, Type C  Cubic Meter

SECTION 668 AND 669 (VACANT)

SECTION 670 - HIGHWAY LIGHTING SYSTEM

670-1 DESCRIPTION. This work shall consist of furnishing and installing an operating highway lighting system in accordance with the plans, standard sheets, and specifications or as directed by the Engineer.

Where not specifically covered on the plans, specifications, or special provisions, all equipment shall be installed according to the manufacturer’s published recommendations.

Included in this work is the furnishing and installing of metal light standards, breakaway transformer bases, arms, luminaires, lamps, electrical conductors, fittings, minor miscellaneous components (pole line hardware, insulators, etc.), concrete foundations, pull boxes and all other materials necessary for operating and controlling the highway lighting system. Also included is the removal, relocation, storage, and/or disposal of the above materials.

670-2 MATERIALS. All electrical equipment shall conform to the EEI, NEMA, ANSI and ASTM Standards. All material shall conform to the latest requirements of the “National Electrical Code”, herein referred to as the “Code”; the rules of the New York State Public Service Commission; local power company requirements and any local ordinances which may apply. Differences in standards or code requirements shall be resolved as determined by the Engineer.

The materials used in the construction of lighting systems shall meet the requirements of the following subsections of Section 700-Materials:

- Aluminum Light Standards and Arms 723-01
- High Mast Pole, Head Frame Assembly with Luminaire Ring and Lowering Device 723-02
- Portable Power Drive for High Mast Luminaire Lowering System 723-03
- Anchor Base (Aluminum) 723-10
- Breakaway Transformer Base (Aluminum) 723-15
- Rigid Plastic Conduit 723-19
- Metal Steel Conduit, Zinc Coated 723-20
- P.V.C. Coated Galvanized Steel Conduit 723-23
- Flexible Liquid-Tight Steel Conduit 723-24
- High Pressure Sodium Vapor Luminaires (Standard Mount) 723-27
- Low Pressure Sodium Vapor Luminaires (Underbridge Mount) 723-28
- High Pressure Sodium Vapor Luminaires (Underbridge Mount) 723-29
- Mercury Vapor Luminaires (Standard Mount) 723-30
- Mercury Vapor Luminaires (Underbridge Mount) 723-31
- Cast Iron Junction Box 723-40
- Precast Reinforced Concrete Foundations and Pullboxes 723-45
- Photoelectric Control 723-50
- Anchor Bolts 723-60
- Single Conductor Cable 723-70
- Single Conductor Direct Burial Cable 723-71
- Ground Wire 723-75