

**SECTION 500
SANITARY SEWER**

PART 1 GENERAL

500 PVC GRAVITY SEWER INSTALLATION:

500.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, jointing, and testing the pipe and connecting the new line to the existing system, if the connection is into an existing manhole, as shown on the Plans or directed by the Public Infrastructure Representative.

500.02 MATERIALS:

- a. **Pipe Materials:** Section 650 Sanitary Sewer - PVC Pipe, Fittings, and Joints.
- b. **Bedding and Backfill Material Requirements for PCV Pipe:** See Standard Drawing SS01 and Section 602.

500.03 CONSTRUCTION METHODS:

- a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such Work, and to protect the public from the Work. At the close of each day's Work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences (This requirement does not apply if the sewer is a replacement that is being worked in a wet trench.). Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Public Infrastructure Representative. The pipeline must be delivered free from dirt or other foreign matter.
- b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. Each pipe shall be carefully laid to the line and grade given in the field with bells upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. At each bell, a hole shall be excavated of a size to give ample working room for proper make-up of the joint. Unless expressly ordered by the Public Infrastructure Representative, each pipe shall be brought to the required grade as established from grade lines. The Contractor shall, at their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Public Infrastructure Representative may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes.
- c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. The grade line shall be established in the trench by one of the following methods:
 1. Use of level and philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
 2. Use of level and philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert

elevation of shall be verified once between each manhole at approximately the center point and when the laser is moved.

- d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a watertight seal. Joints shall be assembled by bar and block, coupling pulleys or by backhoe. If the backhoe bucket is used to assemble the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe.
- e. **Service Lines:** House services and/or taps for house services, if required, shall be installed, in accordance with the appropriate sections of these Specifications before the pipeline is tested.
- f. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Where existing utility lines or other subsurface obstructions are shown on the Drawings, they have been located as accurately as practicable by the City. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets.
- g. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing SS01. Dig through locator tape as specified in Section 657 shall be buried 2 feet above the line.
- h. **Testing:** Testing shall be accomplished in accordance with Section 108. Testing shall be at the Contractor's expense, and if required by a testing laboratory approved by the City. Tests shall be as specified in Section 107 and as directed by the Public Infrastructure Representative.
- i. **Connection to the System:** When the line is tied into the existing sanitary sewer, the Contractor shall take special care in breaking into the existing manhole to ensure the minimum size hole necessary to accomplish the connection is cut. If the connection is into an existing manhole, the connection shall utilize the connection detail as shown in Standard Drawing SS06. If the connection is made using a new manhole the Contractor shall accomplish the connection in accordance with Section 512 Manholes. Special care shall be taken to cut the existing line and not break the line.
- j. **Aerial Crossings and Crossings with less than 4 feet of Cover:** See Standard Drawings STD SS14 for aerial crossing requirements unless otherwise directed by an authorized City representative.

500.04 SPECIAL REQUIREMENTS:

- a. **Inspection of Trench:** The Contractor shall notify the Public Infrastructure Representative prior to excavating any trench. The trench shall be approved by the Representative prior to installation of any pipe.
- b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.
- c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.

d. Location of Taps:

1. **New Installations:** The Contractor shall locate the top of taps in new locations by measuring from the center of the cap to the center of the nearest manhole. This measurement Will be verified by the Public Infrastructure Representative and entered, by the Contractor, on the as-built drawings in the following manner “Tap for Lot 1, Block 1, 99.9 feet from Manhole #8”.
2. **Replacement Sewer lines:** The Contractor shall locate the taps in replacement lines by measuring from the center of the tap to the center of the nearest manhole. This measurement Will be verified by the Public Infrastructure Representative and entered on the as-built drawings in the following manner “Tap for Lot 1, Block 1, 99.9 feet from Manhole #8”.

500.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all taps and fittings. This measurement will be made by the Public Infrastructure Representative and the Contractor down the centerline of the pipeline.

500.06 BASIS OF PAYMENT: PVC pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying and jointing the pipe, installing the protective materials, testing, flushing, and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. Taps are paid under Section 514 or Section 515. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA PVC PIPE INSTALLATION (SANITARY SEWER)	LINEAR FOOT
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500.07 STANDARD DRAWINGS: SS01, SS06.

501 PVC FORCE MAIN INSTALLATION:

501.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, jointing, and testing the pipe and connecting the new line to the existing system, if the connection is into an existing manhole, as shown on the Plans or directed by the Public Infrastructure Representative.

501.02 MATERIALS:

- a. **Pipe Materials:** Section 650 Sanitary Sewer - PVC Pipe, Fittings, and Joints.
- b. **Bedding and Backfill Material Requirements for PCV Pipe:** See Standard Drawing SS01 and Section 602.

501.03 CONSTRUCTION METHODS:

- a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such Work, and to protect the public from the Work. At the close of each day’s Work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences. Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Public Infrastructure Representative. The pipeline must be delivered free from dirt or other foreign matter.

- b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. Each pipe shall be carefully laid to the line and grade given in the field with bells upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. At each bell, a hole shall be excavated of a size to give ample working room for proper make-up of the joint. Unless expressly ordered by the Public Infrastructure Representative, each pipe shall be brought to the required grade as established from grade lines. The Contractor shall, at their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Public Infrastructure Representative may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes.
- c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. This section shall not apply when the Plans only require a minimum of 4 feet of cover and do not set an exact grade for the force main. The Contractor shall verify the requirement for exact grade with the Design Engineer prior to starting construction. The grade line shall be established in the trench by one of the following methods:
 - 1. Use of level and philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
 - 2. Use of level and philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert elevation of shall be verified once between each manhole at approximately the center point and when the laser is moved.
- d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a watertight seal. Joints shall be assembled by bar and block, coupling pulleys or by backhoe. If the backhoe bucket is used to assembly the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe.
- e. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Where existing utility lines or other subsurface obstructions are shown on the Drawings, they have been located as accurately as practicable by the City. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets.
- f. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing SS01. Dig through locator tape as specified in Section 657 shall be buried 2 feet above the line.
- g. **Testing:** Testing shall be accomplished in accordance with Section 108. Testing shall be at the Contractor's expense, and if required by a testing laboratory approved by the City. Tests shall be as specified in Section 107 and as directed by the Public Infrastructure Representative.
- h. **Connection to the System:** When the line is tied into the existing sanitary sewer, the Contractor shall take special care in breaking into the existing manhole to ensure the minimum size hole necessary to accomplish the connection is cut. If the connection is into an existing manhole, the connection shall utilize the connection detail as shown in Standard Drawing SS06. If the connection is made using a new manhole the Contractor shall

accomplish the connection in accordance with Section 512 Manholes. Special care shall be taken to cut the existing line and not break the line.

- i. **Aerial Crossings and Crossings with less than 4 feet of Cover:** See Standard Drawings STD SS14 for aerial crossing requirements unless otherwise directed by an authorized City representative.

501.04 SPECIAL REQUIREMENTS:

- a. **Inspection of Trench:** The Contractor shall notify the Public Infrastructure Representatives prior to excavating any trench. The trench shall be approved by the Representative prior to installation of any pipe.
- b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.
- c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.
- d. **Locator Wire:** All force main sanitary sewer lines constructed of polyvinyl chloride pipe shall have a #12 solid copper wire with blue insulation jacket 30 mil polyethylene buried on the top surface of the pipe. This wire shall be connected at the lift station end to the header pipe and at the manhole end to the manhole ring by Cadweld braising just above the ground or attachment to an above ground bolt. Wire connectors shall be suitable for direct bury low voltage wire and have a waterproof design. This shall be done for the purpose of allowing construction workers to locate the polyvinyl chloride pipe after it has been buried.
- e. **Testing:** Locator Wire shall be continuity tested by the Contractor in the presence of the Public Infrastructure Representative. Contractor shall replace the failed segment of wire should the wire not be continuous.

501.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all fittings. This measurement will be made by the Public Infrastructure Representative and the Contractor down the centerline of the pipeline.

501.06 BASIS OF PAYMENT: PVC pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying and jointing the pipe, installing the protective materials, testing, flushing, and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA PVC PIPE INSTALLATION (FORCE MAIN)

LINEAR FOOT

501.07 STANDARD DRAWINGS: SS01, SS06.

502 DUCTILE IRON SEWER PIPE INSTALLATION:

502.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, jointing, and testing the pipe and connecting the new line to the existing system, if the connection is into an existing

manhole, as shown on the Plans or directed by the Public Infrastructure Representative. Ductile iron pipe shall not be considered for new construction without approval from the Director of Engineering and Construction. This section is only to be referenced for modifications to existing ductile iron pipe systems.

502.02 MATERIALS:

- a. **Pipe Materials:** Section 651 Sanitary Sewer - Ductile Iron Pipe, Fittings, and Joints and Section 605 Polyethylene Wrap.
- b. **Bedding and Backfill Material Requirements for Ductile Iron Pipe:** See Standard Drawing SS01 and Section 602.

502.03 CONSTRUCTION METHODS:

- a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such work, and to protect the public from the Work. At the close of each day's work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences. Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Public Infrastructure Representative. The pipeline must be delivered free from dirt or other foreign matter.
- b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. Each pipe shall be carefully laid to the line and grade given in the field with bells upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. At each bell, a hole shall be excavated of a size to give ample working room for proper make-up of the joint. Unless expressly ordered by the Public Infrastructure Representative, each pipe shall be brought to the required grade as established from grade lines. The Contractor shall, at their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Public Infrastructure Representative may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes. **Ductile iron pipe that is buried shall be installed with polywrap.** The polywrap shall be installed in accordance with the manufacturer's recommendations, with particular attention to joint overlap (minimum of 1 foot), joint tape, and protection of polywrap to prevent tears or penetrations.
- c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. This section shall not apply to force mains when the Plans only require a minimum of 4 feet of cover and do not set an exact grade for the force main. The Contractor shall verify the requirement for exact grade with the Design Engineer prior to starting construction. The grade line shall be established in the trench by one of the following methods:
 1. Use of level and Philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
 2. Use of level and Philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert elevation of shall be verified once between each manhole at approximately the center point and when the laser is moved.

- d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a watertight seal. Joints shall be assembled by bar and block, coupling pulleys or by backhoe. If the backhoe bucket is used to assemble the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe.
- e. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Where existing utility lines or other subsurface obstructions are shown on the Drawings, they have been located as accurately as practicable by the City. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets.
- f. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing SS01. Dig through locator tape as specified in Section 657 shall be buried 2 feet above the line.
- g. **Testing:** Testing shall be accomplished in accordance with Section 108. Testing shall be at the Contractor's expense, and if required by a testing laboratory approved by the City. Tests shall be as specified in Section 107 and as directed by the Public Infrastructure Representative.
- h. **Connection to the System:** When the line is tied into the existing sanitary sewer, the Contractor shall take special care in breaking into the existing manhole to ensure the minimum size hole necessary to accomplish the connection is cut. If the connection is into an existing manhole, the connection shall utilize the connection detail as shown in Standard Drawing SS06. If the connection is made using a new manhole the Contractor shall accomplish the connection in accordance with Section 512 Manholes. Special care shall be taken to cut the existing line and not break the line.
- i. **Aerial Crossings and Crossings with less than 4 feet of Cover:** See Standard Drawings STD SS14 for aerial crossing requirements unless otherwise directed by an authorized City representative.

502.04 SPECIAL REQUIREMENTS:

- a. **Inspection of Trench:** The Contractor shall notify the Public Infrastructure Representative prior to excavating any trench. The trench shall be approved by the Representative prior to installation of any pipe.
- b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.
- c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.

502.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all fittings. This measurement will be made by the Utility Inspector and the Contractor down the centerline of the pipeline.

502.06 BASIS OF PAYMENT: Ductile Iron pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying and jointing the pipe, installing the protective materials, testing, flushing, and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA 503A DUCTILE IRON PIPE INSTALLATION (FORCE MAIN)	LINEAR FOOT
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BA 503B DUCTILE IRON PIPE INSTALLATION (SANITARY SEWER)	LINEAR FOOT
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502.07 STANDARD DRAWINGS: SS01, SS06.

503 CONCRETE SEWER PIPE INSTALLATION:

503.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, jointing, and testing the pipe and connecting the new line to the existing system, if the connection is into an existing manhole, as shown on the Plans or directed by the Public Infrastructure Representative. Concrete sewer pipe shall not be considered for new construction without approval from the Director of Engineering and Construction. This section is only to be referenced for modifications to existing concrete sewer pipe systems.

503.02 MATERIALS:

- a. **Pipe Materials:** Section 652 Sanitary Sewer - Reinforced Concrete Pipe, Fittings, and Joints.
- b. **Bedding and Backfill Material Requirements for Reinforced Concrete Pipe:** See Standard Drawing SS01 and Section 602.

503.03 CONSTRUCTION METHODS:

- a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such Work, and to protect the public from the Work. At the close of each day's work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences. Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Public Infrastructure Representative. The pipeline must be delivered free from dirt or other foreign matter.
- b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. Each pipe shall be carefully laid to the line and grade given in the field with bells upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. At each bell, a hole shall be excavated of a size to give ample working room for proper make-up of the joint. Unless expressly ordered by the Public Infrastructure Representative, each pipe shall be brought to the required grade as established from grade lines. The Contractor shall, at

their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Public Infrastructure Representative may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes.

- c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. This section shall not apply to force mains when the Plans only require a minimum of 4 feet of cover and do not set an exact grade for the force main. The Contractor shall verify the requirement for exact grade with the Design Engineer prior to starting construction. The grade line shall be established in the trench by one of the following methods:
 1. Use of level and Philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
 2. Use of level and Philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert elevation shall be verified once between each manhole at approximately the center point and when the laser is moved.
- d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a watertight seal. Joints shall be assembled by bar and block, coupling pulleys or by backhoe. If the backhoe bucket is used to assemble the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe.
- e. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Where existing utility lines or other subsurface obstructions are shown on the Drawings, they have been located as accurately as practicable by the City. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets.
- f. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing SS01. Dig through locator tape as specified in Section 657 shall be buried 2 feet above the line.
- g. **Testing:** Testing shall be accomplished in accordance with Section 108. Testing shall be at the Contractor's expense, and if required by a testing laboratory approved by the City. Tests shall be as specified in Section 107 and as directed by the Public Infrastructure Representative.
- h. **Connection to the System:** When the line is tied into the existing sanitary sewer, the Contractor shall take special care in breaking into the existing manhole to ensure the minimum size hole necessary to accomplish the connection is cut. If the connection is into an existing manhole, the connection shall utilize the connection detail as shown in Standard Drawing SS06. If the connection is made using a new manhole the Contractor shall accomplish the connection in accordance with Section 512 Manholes. Special care shall be taken to cut the existing line and not break the line.
- i. **Aerial Crossings and Crossings with less than 4 feet of Cover:** See Standard Drawings STD SS14 for aerial crossing requirements unless otherwise directed by an authorized City representative.

503.04 SPECIAL REQUIREMENTS:

- a. **Inspection of Trench:** The Contractor shall notify the Public Infrastructure Representative Department, prior to excavating any trench. The trench shall be approved by the Representative prior to installation of any pipe.
- b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.
- c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.

503.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all fittings. This measurement will be made by the Utility Inspector and the Contractor down the centerline of the pipeline.

503.06 BASIS OF PAYMENT: Reinforced Concrete pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying and jointing the pipe, installing the protective materials, testing, flushing, and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA 504A REINFORCED CONCRETE PIPE INSTALLATION (FORCE MAIN)	LINEAR FOOT
BA 504B REINFORCED CONCRETE PIPE INSTALLATION (SANITARY SEWER)	LINEAR FOOT

503.07 STANDARD DRAWINGS: SS01, SS06.

510 FITTINGS:

510.01 DESCRIPTION: The term fittings is understood to mean bends, tees, crosses, sleeves, plugs, restrained joints, and other specified fittings. This Work shall consist of furnishing, hauling, placing, and joining the fittings as shown on the Plans or directed by the Public Infrastructure Representative.

510.02 MATERIALS: Section 650 Sanitary Sewer - PVC Pipe, Fittings, and Joints; Section 651 Sanitary Sewer - Ductile Iron Pipe, Fittings, and Joints; Section 652 Sanitary Sewer - Reinforced Concrete Pipe, Fittings, and Joints; and Section 605 Polyethylene Wrap.

510.03 CONSTRUCTION METHODS: Fittings shall be installed in accordance with the manufacturer’s recommended procedures. Construction methods for fittings shall be the same as for the type of pipe corresponding to the fittings.

510.04 SPECIAL REQUIREMENTS:

- a. **Polywrapping of Fittings:** All cast or ductile iron fittings shall be polywrapped in accordance with Section 402.03b.
- b. **Thrust Blocks for Force Main Installation:** All bends, tees, crosses, and plugs shall be blocked with concrete under Section 544, except when the fittings have flanged, welded, or restrained joints, the Public Infrastructure Representative may, under certain conditions, delete the blocking. Blocking shall be placed so that joints are accessible for repair.

510.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each type of fitting.

510.06 BASIS OF PAYMENT: Fittings, measured as provided above, will be paid for by the individual fitting and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying, jointing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the fitting. When this item is included in a Contract it will be listed as follows:

<p>BA 510A1* BEND (ENTER BEND DEFLECTION, PIPE SIZE, AND TYPE MATERIAL) *(Each different bend deflection, size, and type will have a separate listing. Numbers run from BA 510A1 to BA 510A99)</p>	<p>EACH</p>
<p>BA 510B1* TEE (ENTER PIPE SIZES, AND TYPE MATERIAL) *(Each tee size and type will have a separate listing. Numbers run from BA 510B1 to BA 510B99)</p>	<p>EACH</p>
<p>BA 510C1* CROSS (ENTER PIPE SIZE, AND TYPE MATERIAL) *(Each cross size and type will have a separate listing. Numbers run from BA 510C1 to BA 510C99)</p>	<p>EACH</p>
<p>BA 510D1* SLEEVES (ENTER PIPE SIZE, AND TYPE MATERIAL) *(Each sleeve size, and type will have a separate listing. Numbers run from BA 510D1 to BA 510D99)</p>	<p>EACH</p>
<p>BA 510E1* PLUGS (ENTER PIPE SIZE, AND TYPE MATERIAL) *(Each plug size, and type will have a separate listing. Numbers run from BA 510E1 to BA 510E99)</p>	<p>EACH</p>
<p>BA 510F1* RESTRAINED JOINT (ENTER PIPE SIZE, AND TYPE MATERIAL) *(Each restrained joint size and type will have a separate listing. Numbers run from BA 510F1 to BA 510F99)</p>	<p>EACH</p>
<p>BA 510G1* SPECIAL FITTING (ENTER DESCRIPTION) *(Each special fitting will have a separate listing. Numbers run from BA 510G1 to BA 510G99)</p>	<p>EACH</p>

510.07 STANDARD DRAWINGS: SS01**511 MANHOLE:**

511.01 DESCRIPTION: The term manhole is understood to mean both standard and drop inlet manholes. This Work shall consist of furnishing, hauling, excavating, placing, constructing, finishing, joining the pipe to the manhole, and backfilling the manholes as shown on the Plans or directed by the Public Infrastructure Representative.

511.02 MATERIALS: Section 601 - Concrete; Section 602 - Pipe Bedding; Section 603 - Select Backfill; and Section 655 - Sanitary Sewer - Manholes.

511.03 CONSTRUCTION METHODS:

- a. **Excavation and Backfill:** Excavation for manholes shall be made with vertical sides and minimum dimensions permitting construction of the manhole in accordance with the Plans and Standard Drawings. Backfill of completed manholes shall be accomplished in accordance with Section 312 and Section 313.
- b. **Elevation of Manhole Lid:** The top of the manhole ring and lid shall be constructed at the finished elevation shown on the Plans. In the absence of a finished elevation the top of the lid shall be constructed no lower than the existing ground elevation. Adjustment of the manhole lid shall be accomplished by mortaring concentric rings into place. No more than 12 inches of concentric rings may be used. Each ring shall have a full mortar joint not exceeding 3/8-inch thickness. Inside joints shall be rubbed full and struck.
- c. **Construction over an Existing Line:** Manholes shall be constructed around existing lines without disturbing the line. Construction shall begin by placing a minimum of an 8-inches thick 3,000 psi concrete slab reinforced with #5 steel reinforcement bars 12 inches on-center each way under the existing line. This slab shall be placed on 12 inches of compacted Type "A" base rock. This slab shall extend a minimum of 8 inches outside the outside edge of the manhole. If there is a pipe joint within 2 feet of the edge of the base slab, the slab will be extended to cover the joint. Prior to placing the bottom section a rubber manhole pipe connector, as shown in the Standard Drawings, will be placed around the existing pipe. Following placement of the base, the bottom section of the manhole will be constructed. The invert of the manhole shall then be constructed and the existing pipe removed from the invert. The Contractor shall saw out the existing pipe taking care not to break the remaining pipe or drop pieces of pipe or mortar which could cause a blockage. The manhole shall then be completed and the ring and lid placed.
- d. **Pipe Connection:** Pipe connection to the manhole shall be made using a rubber manhole pipe connector, as shown in the Standard Drawings. This connector shall have a tight friction fit to the pipe and shall be anchored to the manhole by concrete.
- e. **Invert Construction:** Above the base, manhole inverts shall be carefully constructed of solid concrete to maintain proper velocities. Changes in pipe grade, alignment, or size shall be made by transition sections of the invert, determined by the lower half of the inlet and outlet pipes, but not greater than that of the outlet pipe. All inlets shall be plastered, troweled, and brushed to a smooth, clean surface. The bottom of the manhole shall be sloped to the pipe for drainage with a fall of not less than 1/2 inch per foot. Inlet and outlet pipes shall not project beyond the interior wall of the manhole and shall be free of sharp edges.
- f. **Manhole Steps:** During the construction of each manhole, steps as specified shall be set in place on the inside of the manhole, beginning 18 inches below the manhole top. If cast in place manholes are used, steps shall be securely fastened in place before the concrete is placed. For precast manholes the steps shall be securely fastened in place before the concrete

is placed at the fabrication site. The centerline, spacing, and configuration of the steps shall be as shown on the Plans and Standard Drawings.

- g. **Cast in Place Manholes:** Cast in place manholes shall rest on a pad of compacted Type "A" base rock 12 inches thick. Construction shall begin by placing a minimum of an 8-inch-thick 3,000 psi concrete slab reinforced with #5 steel reinforcement bars 12 inches on-center each way under the line. The manhole shall be constructed of 3,000 psi concrete 8 inches thick, meeting the requirements of Section 330. Concrete shall be fully placed and vibrated. Steps shall be held in place by formwork during the placement. After removal of forms, all blemishes shall be plastered with mortar to a smooth finish.
- h. **Precast Manholes:** Precast manholes with cast in place bases will be permitted for all standard and drop manhole installations. Precast manholes with precast bases will be permitted for standard and drop manhole installations with depths of 12 feet or less. Precast manholes with precast floors shall be set on a pad of compacted Type "A" base rock 12 inches thick. Precast manhole joints shall be sealed with omni-flex gaskets. After installation, all lifting eye holes and blemishes shall be plastered with mortar to a smooth finish.
- i. **Ring and Lid Installation:** Rings shall be set on a bed of mortar not more than 3/8-inch thick and shall be level. The inside joint shall be rubbed full and struck. The exterior shall be mortared to provide a watertight seal and shall be troweled and brushed to a smooth, clean surface.
- j. **Clean up:** The Contractor shall remove all construction debris from the manhole and shall take special care not to drop pieces of pipe, mortar, or other objects into the line which could cause a blockage.
- k. **Testing:** Testing shall be accomplished in accordance with Section 108. Testing shall be at the Contractor's expense, and if required by a testing laboratory approved by the City. Tests shall be as specified in Section 107 and as directed by the Public Infrastructure Representative.

511.04 SPECIAL REQUIREMENTS:

- a. **Brick Manholes:** Brick manholes may be used for very special situations and must be approved by the Director of Engineering and Construction prior to submittal. The Contractor shall provide Shop Drawings and Specifications for any brick manholes.
- b. **Construction Sequencing:** Manholes shall be constructed concurrent with the laying of the sewer pipe. The Contractor shall not have more than two manholes under construction at one time without the approval of the Public Infrastructure Representative.
- c. **Lid Type:** Manhole rings and lids for manholes in front yards and flood plains shall be of the bolt down sealing type. Standard ring and lid sets may be used in other areas.
- d. **Manhole Width:** Manholes 4 feet-6 inches or less in height shall have the full width, shown on the Plans, from top to bottom. Manholes over 4 feet 6 inches may taper to the ring size unless prohibited by the Plans.
- e. **Inspection of Work:** The Contractor shall notify the Public Infrastructure Representative prior to excavating. The excavation shall be approved by the Representative prior to installation of the manhole and the manhole installation shall be approved prior to backfilling.

511.05 BASIS OF PAYMENT: Manholes, measured as provided above, will be paid for by the individual manhole and foot of extra depth and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying, jointing, installing the protective materials, testing, flushing, and repairing of leaks. This item will be paid as a separate bid item and

payment will be made upon installation of the manhole. When this item is included in a Contract it will be listed as follows:

BA 511A 4 FOOT ID MANHOLE W/STANDARD LID	EACH
BA 511B 4 FOOT ID MANHOLE W/BOLT DOWN LID	EACH
BA 511C 4 FOOT ID MANHOLE EXTRA FOOT OF DEPTH	LINEAR FOOT
BA 511D 5 FOOT ID MANHOLE W/STANDARD LID	EACH
BA 511E 5 FOOT ID MANHOLE W/BOLT DOWN LID	EACH
BA 511F 5 FOOT ID MANHOLE EXTRA FOOT OF DEPTH	LINEAR FOOT
BA 511G * FOOT ID MANHOLE W/STANDARD LID	EACH
BA 511H * FOOT ID MANHOLE W/BOLT DOWN LID	EACH
BA 511I * FOOT ID MANHOLE EXTRA FOOT OF DEPTH	LINEAR FOOT

*Specify Diameter

511.06 STANDARD DRAWINGS: SS06, SS07, SS08, and SS11.

512 LAMPHOLE:

512.01 DESCRIPTION: This Work shall consist of furnishing, hauling, excavating, placing, constructing, finishing, joining the pipe to the lamphole, and backfilling the lampholes as shown on the Plans or directed by the Public Infrastructure Representative.

512.02 MATERIALS: Section 601 - Concrete; Section 602 - Pipe Bedding; Section 603 - Select Backfill; and Section 656 - Sanitary Sewer - Lampholes.

512.03 CONSTRUCTION METHODS:

- a. **Excavation and Backfill:** Excavation for lampholes shall be made with vertical sides and minimum dimensions permitting construction of the lamphole in accordance with the Plans and standard drawings. Backfill of completed lampholes shall be accomplished in accordance with Sections 312 and 313.
- b. **Elevation of Lamphole Lid:** The top of the lamphole ring and lid shall be constructed at the finished elevation shown on the Plans. In the absence of a finished elevation the top of the lid shall be constructed no lower than the existing ground elevation. Adjustment of the lamphole lid shall be accomplished by moving the ring up or down as required on the pipe and compacting the backfill around the ring.
- c. **Concrete Encasement:** Concrete encasement of the lamphole and pipe shall be accomplished using 3,000 psi plain concrete and shall be placed in accordance with Section 330 and the standard drawing.
- d. **Ring and Lid Installation:** Rings shall be set on compacted cohesive select fill and shall be level. The exterior shall be filled to ground level with cohesive select fill and compacted.
- e. **Clean up:** The Contractor shall remove all construction debris from the lamphole and shall take special care not to drop pieces of pipe, mortar, or other objects into the line which could cause a blockage.

- f. **Testing:** Testing shall be accomplished in accordance with Section 108. Testing shall be at the Contractor's expense, and if required by a testing laboratory approved by the City. Tests shall be as specified in Section 107 and as directed by the Public Infrastructure Representative.
- g. **Concrete Collar:** The Contractor shall place a 2-foot by 2-foot by 4-inch thick concrete collar around all lampholes not in the street surface. The Contractor shall place a 2 foot by 2-foot by 6-inch thick concrete collar around all lampholes in residential asphalt streets. In other asphalt streets the thickness of the collar shall be equivalent to the street thickness.

512.04 STANDARD DRAWINGS: SS10.

513 FORCE MAIN AIR RELIEF VALVE ASSEMBLIES:

513.01 DESCRIPTION: It is understood that an air relief valve assembly shall consist of the vault with lid, tap or outlet assembly, piping and bends, gate valve, air relief valve, and all associated items required to complete the installation. This Work shall consist of furnishing and installing air relief valve assemblies, as shown on Standard Drawing W02, and all other items necessary to complete the air relief valve assembly installation at the locations shown on the Plans or as directed by the Public Infrastructure Representative.

513.02 MATERIALS: Section 601 - Concrete; Section 602 - Pipe Bedding; Section 603 - Select Backfill; Section 605 Polyethylene Wrap; Section 650 Sanitary Sewer - PVC Pipe, Fittings, and Joints; Section 651 Sanitary Sewer - Ductile Iron Pipe, Fittings, and Joints; Section 652 Sanitary Sewer - Reinforced Concrete Pipe, Fittings, and Joints; Section 623 Water Line - Copper Service Line and Fittings; Section 624 Water Line - Taps; and Section 654 - Sanitary Sewer - Valves.

513.03 CONSTRUCTION METHODS:

- a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
- b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
- c. **Concrete Work:** Shall be accomplished in accordance with Section 330 Concrete Placement.
- d. **Tap or Outlet:** Taps shall be accomplished in accordance with Section 413 Service Line Taps for 8 inch and smaller lines. For lines larger than 8 inches outlets shall be accomplished in accordance with Section 421 Outlet Assemblies.
- e. **Assembly:** Shall be accomplished in accordance with the section that applies to the pipe being used and according to the manufacturer's recommendations.
- f. **Vault Construction:** Shall be accomplished in accordance with Section 433 Meter or Valve Vaults.

513.04 SPECIAL REQUIREMENTS:

- a. **Vertical Position:** The top of the vault shall be placed at ground level.
- b. **Testing:** All air relief valves shall be in place prior to testing. Valve operation shall be checked during filling and draining of the line.

513.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each air relief valve assembly, by type.

513.06 BASIS OF PAYMENT: Air relief valve assemblies, measured as provided above, will be paid for by the individual assembly and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, excavating, installing, installing the protective materials, backfilling, testing, flushing, sterilization and repairing of leaks. This item will be paid as a separate bid item and payment will be made upon installation of the air and/or vacuum valve assembly. When this item is included in a Contract it will be listed as follows:

BA 513A1* AIR RELIEF VALVE ASSEMBLY (ENTER DESCRIPTION)	EACH
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*(Each different air relief valve assembly will have a separate listing. Numbers run from BA 513A1 to BA 513A99)

513.07 STANDARD DRAWINGS: W02.

514 TAPS (NEW CONSTRUCTION):

514.01 DESCRIPTION: This Work shall consist of furnishing and installing sanitary sewer taps, as shown on Standard Drawings SS03 and SS03A, and all other items necessary to complete the tap installation at the locations shown on the Plans or as directed by the Public Infrastructure Representative.

514.02 MATERIALS: Section 602 - Pipe Bedding; Section 603 - Select Backfill; Section 620 Water Line - PVC Pipe, Fittings, and Joints; and Section 650 Sanitary Sewer - PVC Pipe, Fittings, and Joints.

514.03 CONSTRUCTION METHODS: Installation of the PVC tee, spacer, and schedule 40 PVC pipe shall be in accordance with Section 501. The follow items will receive special attention.

- a. **Jointing:** All joints will be properly glued to include the cap on the top of the schedule 40 pipe.
- b. **Backfill:** Special care will be taken to place sand around the tap where the schedule 40 pipe connects to the SDR 35 tee. The sand will be placed for a minimum of 6 inches on the top and sides of the connection and fully supporting the connection. This sand will be in place and compacted prior to backfilling the trench around the tap.
- c. **Marking:** The metal coupon will be placed on top of the glued schedule 40 cap and backfilled to ensure it remains in place. The mylar marking tape will be tied to the schedule 40 pipe and pulled vertical while the backfill material is placed.

514.04 SPECIAL REQUIREMENTS: The Contractor will measure the location of the tap from the nearest manhole and mark the distance on the as built drawings. The Public Infrastructure Representative will observe this process and the backfilling of the tap.

514.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each tap.

514.06 BASIS OF PAYMENT: Taps, measured as provided above, will be paid for by the individual tap and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, excavating, installing, installing the protective materials, backfilling, testing, flushing, and repairing of leaks. This item will be paid as a separate bid item

and payment will be made upon installation of the tap. When this item is included in a Contract it will be listed as follows:

BA 514 SANITARY SEWER TAP (NEW CONSTRUCTION) EACH

514.07 STANDARD DRAWINGS: SS03 and SS03A

515 TAPS (EXISTING LINES):

515.01 DESCRIPTION: This Work shall consist of furnishing and installing sanitary sewer taps, as shown on Standard Drawing SS02, and all other items necessary to complete the tap installation at the locations shown on the Plans or as directed by the Public Infrastructure Representative.

515.02 MATERIALS: Section 602 - Pipe Bedding; Section 603 - Select Backfill; Section 620 Water Line - PVC Pipe, Fittings, and Joints; and Section 650 Sanitary Sewer - PVC Pipe, Fittings, and Joints

515.03 CONSTRUCTION METHODS: Installation of the tapping saddle and schedule 40 PVC pipe shall be in accordance with Section 501. The follow items will receive special attention.

- a. **Jointing:** All joints will be properly glued or epoxied to ensure a watertight fit.
- b. **Cutting The Tap:** Each tap will be cut in with the proper cutting tools. The plumber making the tap must show the Building Inspector the coupon that was cut from the lateral line. Under no circumstances will a hammer, chisel, ax, or other inappropriate tool be used to cut a tap.
- c. **Backfill:** Special care will be taken to place concrete around the tap where the schedule 40 pipe connects to the saddle. The concrete will be placed for a minimum of 6 inches on the top and sides of the connection and fully supporting the connection. This concrete will be in place and set prior to backfilling the trench around the tap.

515.04 SPECIAL REQUIREMENTS: The Contractor must comply with the International Plumbing Code for installation of sanitary sewer service lines. Inspection of this type of tap will normally be by the City Building Inspectors.

515.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each tap.

515.06 BASIS OF PAYMENT: Taps, measured as provided above, will be paid for by the individual tap and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, excavating, installing, installing the protective materials, backfilling, testing, flushing, and repairing of leaks. This item will be paid as a separate bid item and payment will be made upon installation of the tap. When this item is included in a Contract it will be listed as follows:

BA 514 SANITARY SEWER TAP (EXISTING LINE) EACH

515.07 STANDARD DRAWINGS: SS02.

516 CONNECTIONS:

516.01 DESCRIPTION: This Work shall consist of all excavation, furnishing all materials required, construction, finishing, and backfilling of connections to manholes, as shown on the Plans or as directed by the Public Infrastructure Representative.

516.02 MATERIALS: Section 601 Concrete; Section 602 Pipe Bedding; Section 603 Select Backfill; Section 655 Sanitary Sewer - Manholes; Section 650 Sanitary Sewer - PVC pipe, fittings, and Joints; Section 651 Ductile Iron Pipe, Fittings, and Joints.

516.03 CONSTRUCTION METHODS:

- a. **Excavation and Backfill:** Excavation for connection shall be made with vertical sides and minimum dimensions permitting construction of the connection in accordance with the Plans and Standard Drawings. Backfill of completed connections shall be accomplished in accordance with Section 312 Common Backfill and Compaction and Section 313 Select Backfill and Compaction.
- b. **New Manhole Connection:** Pipe connection to the manhole shall be made using a rubber manhole pipe connector, as shown in the Standard Drawings SS06. The Contractor shall accomplish the connection in accordance with Section 511 Manholes. Special care shall be taken to cut the existing line without breaking the existing line.
- c. **Existing Manhole Connection:** The Contractor shall take special care in breaking into the existing manhole to ensure that the minimum size hole necessary to insert the pipe is cut, to accomplish the connection. Pipe Connections to the manhole shall be made at the specified grade, using a rubber manhole pipe connector, as shown in the Standard Drawings SS06. The connection shall have a tight friction fit and shall be anchored to the manhole by concrete.
- d. **New Manhole Invert Construction:** The invert construction shall be as shown in the Standard Drawings SS11. The Contractor shall accomplish the invert construction in accordance with Section 511 Manholes.
- e. **Existing Manhole Invert Construction:** The manhole base shall be cut and reconstructed in such a manner that a proper invert section is maintained, as shown in Standard Drawings SS06 and SS11. The Contractor shall accomplish the invert reconstruction in accordance with Section 511 Manholes, inlet and outlet pipes at the invert shall not project more than 2 inches beyond the interior walls of the manholes.
- f. **Step Relocation:** The Contractor shall remove and replace the existing manhole steps in the proper location. The location shall be as shown in the Standard Drawings SS11, if they are not properly located after the connection is made.
- g. **Wet Connection:** Any and all diversion or pumping of sewage in a wet connection shall be included in this item.
- h. **Cleanup:** The Contractor shall remove all construction debris from the manhole and shall take special care not to drop pieces of pipe, mortar, or other objects in the line which could cause blockage.

516.04 516.04 BASIS OF PAYMENT: Connections, measured as provided above, will be paid for by each type of connection constructed and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals to complete the Work as specified. The price bid shall include all cost and expense of furnishing, laying, jointing, installing the protective materials, testing flushing, and repairing of each. This item will be paid as a separate bid item and payment will be made upon installation of the connection. When this item is included in a Contract, it will be listed as follows:

516.05 Standard Drawings: SS06, SS08, and SS11.

540 CONCRETE ENCASEMENT:

540.01 DESCRIPTION: See Section 330.

540.02 MATERIALS: See Section 330.

540.03 CONSTRUCTION METHODS: See Section 330.

540.04 SPECIAL REQUIREMENTS: See Section 330.

BA 540 CONCRETE ENCASEMENT

CUBIC YARD

540.05 STANDARD DRAWINGS: W07.

541 CONCRETE SLAB PROTECTION FOR PIPELINES:

541.01 DESCRIPTION: See Section 330.

541.02 MATERIALS: See Section 330.

541.03 CONSTRUCTION METHODS: See Section 330.

541.04 SPECIAL REQUIREMENTS: See Section 330.

BA 541 CONCRETE SLAB PROTECTION FOR PIPELINES

CUBIC YARD

541.05 STANDARD DRAWINGS: N/A.

542 CONCRETE CRADLE:

542.01 DESCRIPTION: See Section 330.

542.02 MATERIALS: See Section 330.

542.03 CONSTRUCTION METHODS: See Section 330.

542.04 SPECIAL REQUIREMENTS: See Section 330.

BA 542 CONCRETE CRADLE

CUBIC YARD

542.05 STANDARD DRAWINGS: W07.

543 CONCRETE THRUST BLOCKS:

543.01 DESCRIPTION: See Section 330.

543.02 MATERIALS: See Section 330.

543.03 CONSTRUCTION METHODS: See Section 330.

543.04 SPECIAL REQUIREMENTS: See Section 330.

BA 543 CONCRETE THRUST BLOCKS

CUBIC YARD

543.05 STANDARD DRAWINGS: W06.

544 REINFORCED CONCRETE PIERS:

544.01 DESCRIPTION: See Section 330.

544.02 MATERIALS: See Section 330.

544.03 CONSTRUCTION METHODS: See Section 330.

544.04 SPECIAL REQUIREMENTS: See Section 330.

BA 544 REINFORCED CONCRETE PIERS

CUBIC YARD

544.05 STANDARD DRAWINGS: N/A.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION END