

The location of pipe and valves shall be marked with fiberglass markers. The markers shall be inscribed "SEWER VALVE" or "SEWER LINE CROSSING" as appropriate. Markers shall be Carsonite, H & W Industries, or other approved equal. Markers shall be installed for all type valves including isolation valves, air release valves, electric control valves, etc. Markers shall also be set at all locations where pipeline crosses streets and highways or other utilities.

## 2.23 SEWER SERVICE CLEAN-OUTS, WYES, BOXES, AND COVERS

Typical sewer service clean-outs (6-inch or 4-inch) shall be included in the construction plan. The clean out shall consist of a clean out wye (no tees) along with a 45° bend. The 6-inch or 4-inch plug or cap shall be contained in a cast iron valve box.

## 2.24 DESIGN CRITERIA FOR SERVICE LATERALS

Sewers shall be designed to serve every lot or parcel adjacent to the sewer. Service laterals shall not cross property lines between adjacent properties.

Service laterals shall be installed for each lot or property to 1' behind the utility and drainage easement. The service laterals shall be installed 6' from the side lot line. Standard details for service laterals are included in the standard details. Service laterals shall not be installed beneath driveways or transformers. At the time of final inspection, any laterals found beneath driveways or transformers shall be relocated by the developer.

A permanent marker shall be installed on the curb face at a point which intersects with the service lateral. The curb markers shall be of the manufacturer and make pre-approved by Integra Water. Curb markers shall be of the high-impact PVC (laminated) plastic, reflective, U.V. resistant coating and of color coding that conforms to Integra Water Standards.

### Gravity Service Laterals

Ductile iron, mechanical joint wyes shall be used at the service lateral connection to the main as indicated in the Standard Details. The connection between the service lateral and sewer main shall be watertight. The service lateral shall not protrude into the sewer main.

Service laterals shall tie into manholes where practical. The invert of the service lateral shall be placed above the crown of the mainline pipe inside the manhole. All service laterals shall have warning tape installed one foot below ground surface along length of service lateral pipe.

Service laterals shall not be allowed to tie directly into main interceptors.

Residential service laterals shall not be less than 4 inch in diameter.

Ductile iron pipe service laterals shall be minimum Pressure Class 350. Polyvinyl Chloride service laterals shall be minimum schedule 40.

A manhole shall be installed at the edge of easement or property line in lieu of a cleanout on all commercial service lines greater than or equal to 6 inches in diameter.

### Low Pressure Service Laterals

Epoxy coated service saddles with double stainless steel straps shall be used at the service lateral connection to the main as indicated in the Standard Details. Electrofusion saddles are an acceptable. The connection between the service lateral and sewer main shall be watertight. The service lateral shall not protrude into the sewer main.

All service laterals shall have warning tape installed one foot below ground surface and tracer wire along the length of the service lateral pipe. Service laterals shall be 1-1/4" unless otherwise noted by the pump manufacturer. Service laterals shall be HDPE DR 11 with a green stripe. Long side service laterals

beneath roadways shall be encased from right of way to right of way with a 2" PVC pipe (green or green stripe)

### 3.28 LEAKAGE AND INFILTRATION

The Contractor will test the sewer as directed by Integra Water's Representative, in accordance with Specifications applying to infiltration and exfiltration. Integra Water reserves the right to participate in all such tests as prescribed herein. Integra Water's Engineer shall be the judge of the final acceptance of the work.

All pipe joints shall be as near watertight as it is practicable to construct them with the material and methods specified herein.

### 3.29 GRAVITY SERVICE CONNECTIONS

Ductile Iron, mechanical joint wyes shall be installed in sanitary sewer lines at all points shown on the Plans and in accordance with the Standard Details. If such wyes are not to be used immediately, they shall be closed with approved stoppers and shall be physically restrained.

If the work consists of the construction of a sewer that is to replace an existing sewer, all existing service lines shall be connected to the new sewer, and the location of the connection recorded by station for record drawing purposes.

Wyes shall be installed in sanitary sewers so as to properly serve each existing house, active service or inactive, and each vacant lot facing or abutting on the street or alley in which the sewer is being laid and at such other locations as may be designated by Integra Water's Representative. Vacant lot wyes shall be properly plugged. The exact location of each connection shall be recorded by the Contractor before backfilling and indicated on the As-Constructed Plans.

Wyes for new sewer pipe shall be ductile iron, mechanical joint.

### 3.30 CONNECTING RISERS

Where shown on the Plans, included in the Special Conditions, or directed by Integra Water's Engineer, and where the depth of cut is over 8 feet or where the grade of a sanitary sewer is lower than necessary to drain abutting property, and at such other locations as may be designated by Integra Water's Engineer, connecting risers shall be installed to serve each existing house and each vacant lot facing or abutting on the street on which the sewer is being laid.

Connecting risers shall be sized in accordance with the plumbing code in effect at the time of construction but shall not be smaller in size than shown on the Plans. Risers shall be installed from a tee connection to the elevation shown on the Plans, or as directed by Integra Water's Engineer. Open ends of connecting risers shall be closed with approved stoppers and be physically restrained. Backfilling shall be carefully done around these risers using materials specified and, compacted to the equivalent density of the surrounding undisturbed material. The Engineer may direct that connecting risers be constructed of ductile iron pipe when, in his opinion, such materials are necessary because of special or unusual conditions. Risers shall not be constructed on an angle exceeding 60 degrees as measured from the horizontal.

### 3.31 SERVICE LINES

Service lines shall be installed from the sanitary sewer to all adjacent lots and individual properties; additional connections shall be installed when directed by Integra Water's Representative. Service line cleanouts or low pressure service boxes shall be installed within 1' of the back of the Utility and Drainage easement and 6' from the side lot line. Service laterals shall not be installed beneath driveways or transformers. At the time of final inspection, any laterals found beneath driveways or transformers shall be relocated by the developer

Service lines shall not be more than seven (7) feet Below the top of curbs or pavement edges. The open end of such stubouts shall be closed with approved stoppers properly restrained. It shall be the

responsibility of the Contractor to install and mark the location of all stubouts. Marking shall be accomplished by placing a 2" diameter circular metal marker etched with the letter "S", or a 2" diameter green colored circular plastic marker, in the top of curb, with the top of the marker flush with the top of the curb.

Backfilling for service lines shall commence immediately upon acceptance by Integra Water's Representative. Backfill materials shall be as specified and shall be compacted to the equivalent density of the surrounding undisturbed material.

#### Gravity Service Laterals

House service laterals shall consist of four-inch (4") diameter sewer pipes, and service lines for multiple dwelling units or non-residential units served by a single line shall consist of six-inch (6") diameter sewer pipes, constructed as specified herein. If the plumbing code in effect at the time of construction specifies larger pipe, then the larger pipe shall be installed.

Cleanouts shall be installed for each continuous run of 100 feet and at each change in horizontal or vertical direction. Cleanouts shall be constructed in accordance with the Standard Details. Cleanouts shall be plugged with approved stoppers in accordance with the local Plumbing Code. Stoppers shall be properly restrained.

#### Low Pressure Service Laterals

House service lines shall consist of 1-1/4" diameter sewer pipes unless otherwise specified by pump manufacturer. Service laterals shall be HDPE DR 11 with a green stripe.

### 3.32 CONNECTING NEW SEWERS TO EXISTING SEWERS

Connections shall be made to all existing sewer lines in the vicinity of the work, as shown on the Plans or as directed by Integra Water's Engineer, and with the written approval of Integra Water. Connections shall be made by the construction of a manhole or utilization of an existing manhole.

Connections to existing manholes shall be made by boring an opening in the wall of the existing structure, installing a flexible manhole sleeve ("boot") in the opening, inserting a minimum length of eighteen (18) feet of ductile iron sewer pipe into the hole, and sealing around same with non-shrinking grout. Connections of new sewers to existing sewers shall be plugged and shall remain plugged until final acceptance by Integra Water.

### 3.33 PIPE PROTECTION

Sewer pipe which, when completed, will have less than 18 inches of cover shall be constructed of ductile iron pipe or encased in concrete, as shown on the Plans or as directed by Integra Water's Engineer.

Where foundation conditions are not satisfactory, as determined by Integra Water, sewer pipe shall be either laid on a concrete cradle, on Class A bedding as shown in the Standard Details, or on Foundation Backfill as specified in Article 2 in these Specifications, or shall be constructed of ductile iron pipe, with proper pipe protection as shown on the Plans or as directed by Integra Water's Engineer.

Plain concrete ditch checks may be required by Integra Water's Engineer on steep slopes and other locations to prevent erosion of the backfilled trench.

When formed, reinforced concrete shall be as shown on the Plans for reinforced cradles and reinforced concrete encasement

Integra Water's engineer may require plain concrete encasement or cradles for pipe protection.

### 3.34 MANHOLES

## ARTICLE 4 - SERVICE CONNECTIONS

### 4.1 GENERAL

“As-Built” drawings submitted to Integra Water shall indicate the service line locations in such a manner that they can be accurately located in the field using information shown on the drawings and metal detection equipment.

A 3/8” to 1/2” steel rod shall be driven at the end of each service line stubout. The rod shall be 24” long and be covered/backfilled 4” to 6”.

At locations where curb and gutter, valley gutter, etc. are installed, appropriate permanent markings shall be placed in the concrete to indicate the service connection location.

### 4.2 GRAVITY SERVICE LATERALS

For Gravity Sewer Collection Systems, service connections maintained by Integra Water are assumed to begin at the cleanout. The cleanout shall be installed within 1’ of the back of the Utility and Drainage Easement and 6’ from the side lot line. Service laterals shall not be installed beneath driveways or transformers. At the time of final inspection, any laterals found beneath driveways or transformers shall be relocated by the developer. The cleanout shall be installed in an access box labeled “Sewer” as shown in the Standard Details.

### 4.3 LOW PRESSURE SERVICE LATERALS

Low pressure sewer service lines shall be provided as shown on the plans or as directed Integra Water. Service connections shall consist of piping as required to complete the sewer service connection. Service pipe from each grinder pump installation to the service box shall be the responsibility of the customer and consistent with the requirements of the grinder pump manufacturer.

Pressure service lines from the main to the service box shall be a minimum of 1 1/4 inch, HDPE DR 11 with a green stripe, unless otherwise specified in the plans and shall be laid to follow the ground profile with a minimum cover of 18 inches. All long side service laterals beneath roads shall be cased from right of way to right of way with a 2” PVC pipe (green or green stripe). Service connection saddles, corporation stops, check valve, and curb stop shall be a minimum of 1-1/4”. Service boxes shall be installed within 1’ of the back of the Utility and Drainage easement and 6’ from the side lot line. Service laterals shall not be installed beneath driveways or transformers. At the time of final inspection, any laterals found beneath driveways or transformers shall be relocated by the developer.

### 4.4 GRINDER PUMP STATION

The standard simplex grinder pump station shall consist of a single grinder style submersible pump housed in a fiberglass or HDPE wetwell having a watertight cover and complete with all the appurtenances required for a fully operable pumping system. Pump level controls, starter, alarm, piping, fittings, valves, and all accessories shall be furnished as a part of the factory fabricated package so that burying the wetwell, the field connection of the gravity inlet line, discharge line and electrical service line to the control box will complete the installation of the grinder station.

Each grinder pump station shall be manufactured and assembled by a single manufacturer and shall be shipped ready complete and ready for installation. The pump shall have an integrally built grinder unit and submersible type pump. The pump shall be installed on a lift-out rail system in such a way that solids are fed in an upflow direction to the grinder impeller with no feet, rails or other obstruction below the grinder inlet. Manufacturer shall be Environment-One.

All grinder pumps shall be capable of operating at any point on the hydraulic performance curve without