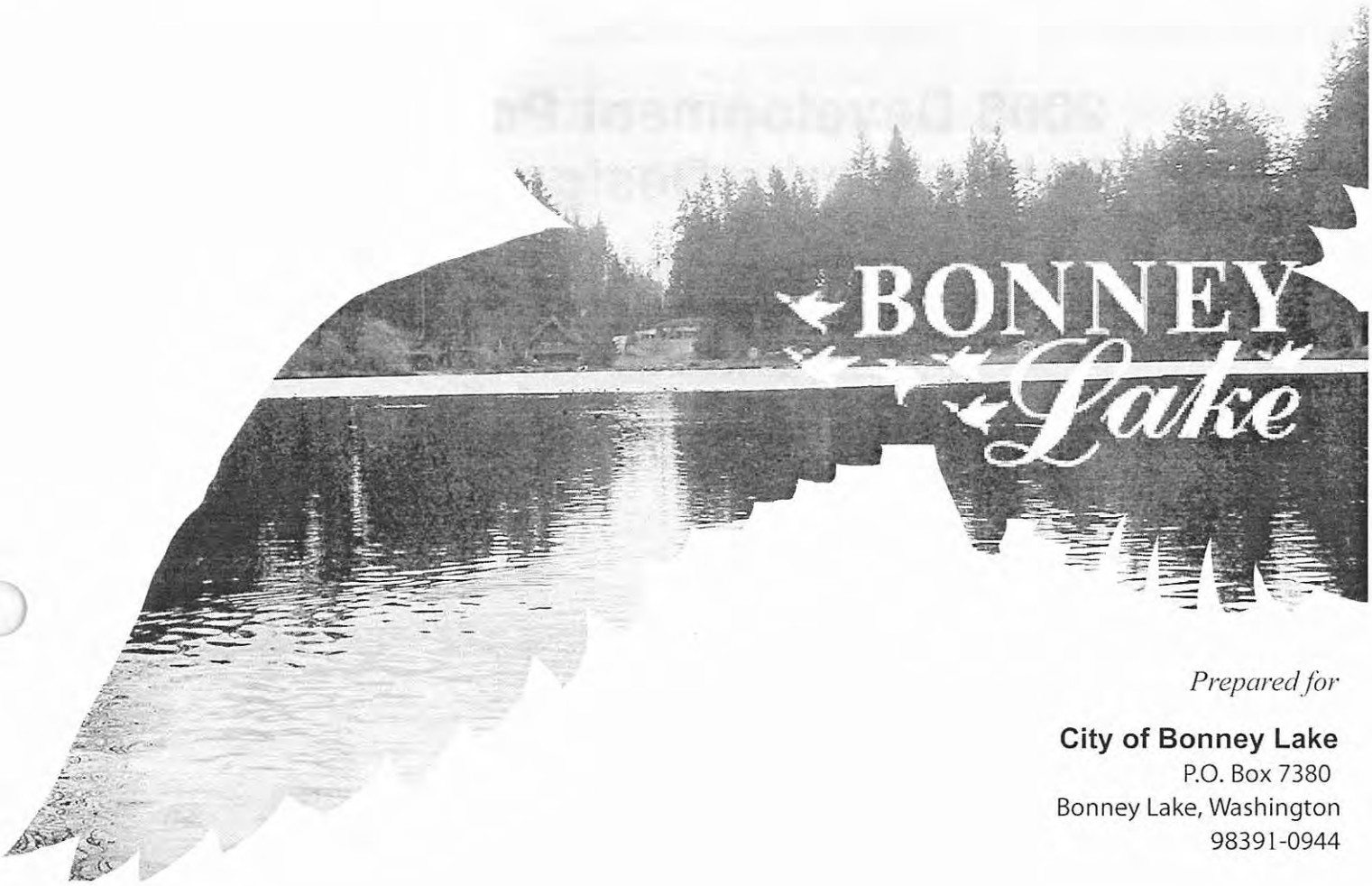
APPENDIX F
STANDARD DETAILS



Prepared for

City of Bonney Lake
P.O. Box 7380
Bonney Lake, Washington
98391-0944

2008 Development Policies and Public Works Design Standards

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Ordinance No. 1126, 1261

Prepared for

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SECTION 500 – SANITARY SEWER STANDARDS

501 GENERAL

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of sanitary sewer facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. The following design and construction considerations shall apply.

It is the intent of the City of Bonney Lake to have all buildings connected to a gravity sewer collection system. Line extensions may be required to provide service to developments instead of septic systems. **It is the intent of these Standards to implement improvements to the City's sanitary sewer system consistently with the most recent City of Bonney Lake Sanitary Sewer Comprehensive Plan. Unless otherwise approved by the City, sanitary sewer lift stations will only be allowed as provided in the most recent City of Bonney Lake Sanitary Sewer Comprehensive Plan. Therefore, longer routes may be required to avoid lift stations and pressurized main lines.** The City will support right-of-way acquisitions and cost recovery agreements to facilitate the intent.

502 GENERAL REQUIREMENTS

1. Procedural Notes:

   a. At the time that the preliminary proposal is submitted to the City, a letter requesting the availability of sewer service should be submitted to the City for approval. A map showing the area to be served should accompany this request. The City shall be required to evaluate the capacity of the system downstream of a proposed sewer main extension. The Developer shall reimburse the City for all costs it incurs to evaluate the downstream system.

   b. Prior to the design review of sewer mains a Developer's Agreement for Sewer Main Extensions must be signed by the Developer, and approved by the City Council. The Agreement should be accompanied by an application fee in the amount as set forth by current City ordinance. After the agreement is approved by the City Council, the Developer may authorize his/her consulting engineer to proceed with design and furnish the City six copies of the preliminary drawings. After review and approval by all applicable agencies the Developer's engineer shall provide six copies of the final sewer system extension design to the City.

2. Sewer plans shall be consistent with the requirements specified in Section 200. Additional plan requirements are as follows:

   a. Ground surface, pipe type, class and size, manhole stationing, invert and surface elevation at each manhole, and grade of sewer between adjacent manholes. All manholes shall be numbered on the plans and correspondingly numbered on the profile. Where there is any question of the sewer being sufficiently deep to serve any residence, the Developer shall indicate building and basement floor elevations in the profile.

   b. Details (to scale drawings) which clearly show special sewer joints, connections, and cross-sections, and sewer appurtenances such as manholes and related items and all other items as required by the City to clearly identify construction items, materials, and/or methods.

3. Construction of new sewer systems or extensions of existing systems will be allowed only if the existing and downstream receiving systems are capable of supporting the added hydraulic load. Sewer facilities shall be designed and installed to service tributary areas.

4. Analyses required to evaluate the capacity of the system downstream of a proposed sewer main extension shall be conducted by the City. The Developer shall reimburse all costs incurred by the City to perform said analysis.

5. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public sewer systems of the type being proposed for construction. No contractor shall perform work prior to obtaining a City business license.

6. Prior to any work being performed, the Contractor shall contact the City Engineer to set forth his/her proposed schedule.

7. Contractor shall obtain approval of materials to be used from the City prior to ordering or delivery of materials.

8. Sewer pipelines shall be installed within public rights of way, tract areas that will be dedicated to the City or easements that will be granted to the City and are consistent with the requirements in Section 300. The City shall reserve the right to determine where easements will be provided in lieu of tract areas.

9. All side sewer laterals shall be of the same material as the main line and shall be provided with a 6 inch by 6 inch tee with an approved watertight cap located within the public right-of-way to be utilized as a clean out. A watertight 6-inch capped stub shall be installed, which extends vertically from the 6 inch by 6 inch tee to within 18 inches of finished grade. **All side sewer laterals shall be privately owned and maintained.**

10. Each side sewer lateral shall have an approved watertight cap at the termination of the stub; it shall be adequately "blocked" to satisfactorily resist the air pressure testing.

11. Each side sewer lateral shall have a treated 2-inch by 4-inch wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to 24 inches above finished grade. Above the ground surface, it shall be painted "white" with "S/S" and the depth (in feet) stenciled in 2-inch-high black letters.

12. Front lot corners shall be staked prior to construction for side sewer tee location.

13. All side sewers shall be a minimum of 5 feet below finished grade and extended a minimum of 5 feet past the street right-of-way line (or property line).

14. Side sewer connections, if allowed directly into manholes, shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.

15. Manholes, where sewer extension may occur, shall be provided with either a knock-out(s) and channeled accordingly.

16. Manholes shall be provided with a 0.10-foot drop across the channel.

17. Locking lids shall be provided for all manholes located outside pavement areas, and all manhole lids shall have the word "sewer" cast integrally onto its surface.

18. Pipe connections to **existing** manholes shall be as follows:

    a. PVC Pipe: Cast or grout a watertight manhole coupling into manhole wall.

    b. D.I. Pipe: Bell and spigot joint or flexible coupling; either shall be 12 inches maximum distance from manhole wall.

    c. PVC and D.I. Pipe (Optional): Core the manhole and connect sewer pipe with a watertight flexible rubber boot in manhole wall; Kor-N-Seal boot or equal. Special approval by the Operations and Maintenance Supervisor required.

19. Provide the City Engineer a copy of the cut sheets prior to construction.

20. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City's Inspector.

21. Final air testing shall not be accepted until after the asphalt treated base or first lift of finished paving is accomplished, all other underground utilities have been installed, and the lines have been satisfactorily flushed, cleaned, deflection tested and television inspected.

22. Manhole rim and invert elevations shall be field verified after construction by the Developer's engineer(s) and the "as constructed" drawings individually stamped by a Washington State licensed professional engineer, which shall attest to the fact that the information is correct. As builts shall be to City datum and must be submitted in a format as outlined in Section 300, "Public Works Considerations."

23. Prior to final inspection, all pipelines shall be tested, flushed, and cleaned and all debris removed and disposed of at a location approved by the City. A pipeline "cleaning ball" of the proper diameter for each size of pipe, shall be flushed through all pipelines, or the pipe shall be cleaned with a jet truck prior to final inspection. Hydrant meters shall be acquired from the City and utilized by the Contractor for all water withdrawn from the City's system for flushing and cleaning purposes.

24. Before sewer lines are accepted, the Contractor/Developer shall perform a complete video inspection of the sewer pipe and appurtenances and shall provide to the City a recording on a digital video disc(s) (DVD). The recording shall be the final product and must be edited by the Contractor/Developer such that the recording progresses in a consistent manner from start to finish throughout the improvements. All equipment and materials shall be compatible with existing City equipment. It shall be the Contractor/Developer's responsibility to confirm equipment compatibility with the City prior to inspection.

25. Prior to acceptance, the Developer/Contractor shall verify that the line and grade of the main meets the standards herein. Immediately prior to starting the video inspection, the Developer/Contractor shall flush the mains and insert a visible dye (color as approved by the City) into the mains to aid in identifying the depths of any ponds encountered during the inspection. Ponded depths that exceed 1/2 inch will require the main to be repaired unless otherwise approved by the City. Television inspections and taping may be conducted prior to paving but not prior to completion of all backfills.

26. At all times during the televised inspection process, the City's Inspector shall be present. The City Engineer shall be notified 48 hours prior to any televised inspection.

27. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades, and cross sections for a new roadway consistent with the original section.

28. The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City with a maintenance bond as specified in Section 300, "Public Works Considerations," of these standards.

503 DESIGN STANDARDS

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems shall conform to minimum City Standards set forth herein.

1. The sewage facilities shall be constructed in conformance with standards herein and current amendments thereto, and other applicable standards as allowed by the City.

2. If future extensions of the system are deemed probable by the City, the proposed systems shall be designed and sized to service tributary areas and also be extended to "far" property line(s) so as to provide access to future development. Easements shall be provided to facilitate same.

3. Collection and interceptor sewers shall be designed and constructed for the ultimate development of the tributary areas and as may be further established in the City's Sewer Comprehensive Plan.

4. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow. Sewers installed below water table shall require special design and inspections.

5. Computations and other data used for design of the sewer system shall be submitted to the City for approval.

6. All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of trench should be made. When standard-strength sewer pipe is not sufficient, PVC C900 or ductile iron sewer pipe shall be used. Pipe material specifications shall be as stated herein.

7. All pipes shall be laid in straight lines and at uniform rate of grade between manholes. Variance from City's approved established line and grade shall not be greater than 1/2 inch, provided that such variation does not result in a level or reverse sloping invert. Any corrections required in line and grade shall be reviewed by the City Engineer and shall be made at the expense of the Developer and/or Contractor.

8. The sewer pipelines shall be located in roadways when at all possible 5 feet southerly or westerly of street centerline. The sewer main shall maintain a minimum 10-foot-horizontal separation from proposed or existing water mains.

9. The maximum distance between manholes shall be 400 feet unless specifically approved otherwise by the City Engineer.

10. The allowable cover (finished grade) for the various types of pipe are:

PVC Pipe:	3 feet to 25 feet
PVC C900 or D.I. Pipe:	2 feet to 3 feet (if allowed)
	25 feet and above
	Slopes of 18 percent or greater
HDPE	Force Mains

All pipe shall have a minimum of 36 inches of cover (24 inches in the case of a side sewer on private property), unless otherwise approved by the City.

11. Minimum Slope:

    a. The minimum slope for 6-inch side sewer laterals shall be 2.0 percent.

    b. The minimum slope for 8-inch gravity mains shall be 0.5 percent.

    c. The minimum slope for 10-inch gravity mains shall be 0.4 percent.

    d. The minimum slope for 12-inch gravity mains shall be 0.3 percent.

12. Minimum slope shall be maintained unless specifically waived by the City Engineer. All mains shall be designed to have a minimum scouring velocity of 2 feet per second (fps).

504 MATERIALS AND TESTING

1. All work shall be constructed in conformance with the most current *Standard Specifications for Road, Bridge and Municipal Construction* and current amendments thereto, State of Washington revised as to form by the APWA Supplement to make reference to local governments, herein referenced to as "Standard Specifications" and the "Conditions and Standards" as adopted by the City, shall be included as part of the "Specifications." Where the Standard Specifications and the "Conditions and Standards" conflict with one another, the "Conditions and Standards" shall take precedence.

2. Sewer Mains and Force Mains: PVC pipe shall be a minimum Class S.D.R. 35, be **green** in color, and be manufactured in accordance with the Standard Specifications. The pipe and fittings shall be furnished with bells and spigots, which are integral with the pipe wall. Pipe joints shall use flexible elastomeric gaskets conforming to the Standard Specifications. Nominal laying lengths shall be 20 feet.

   Ductile iron (D.I.) pipe shall be Class 50 and conform to the standard specifications and current amendments thereto. Nominal laying length shall be 18 feet.

   Restrained joint pipe, where required, shall be push-on joint pipe with "Fast Tight" gaskets as furnished by U.S. Pipe (or equal) for 12-inch-diameter and smaller pipe, and "TR FLEX" as furnished by U.S. Pipe (or equal) for 16-inch- and 24-inch-diameter pipes. Mechanical joint pipe with retainer glands (grip rings) as manufactured by "Romac" may also be required at the discretion of the City. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.

The sewer pipe, unless otherwise approved by the City Public Works Director and/or City Engineer, shall be laid upgrade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with an approved temporary plug. Wherever movable shoring (steel box) is used in the ditch, pipe shall be restrained by use of a winch mounted in the downstream manhole and a line of sufficient strength threaded through the pipe and set tight before each move. Any indication that joints are not being held shall be sufficient reason for the City to require restraints, whether or not movable shoring is being used.

For the joining of dissimilar pipes, suitable adapter couplings and gaskets shall be used which have been approved by the City Engineer.

All gravity sewer pipe shall be bedded with pea gravel in a manner consistent with and to the depths indicated in the Standard Details.

Clay or Bentonite dams shall be installed across the trench and to the full depth of the granular material in all areas of steep slopes, stream crossings, and wetland to prevent migration of water along the pipeline as directed by the City of Bonney Lake Public Works Department.

All backfill shall be placed and compacted in accordance with City, County, or State requirements as may be applicable. Unless otherwise approved in writing by the City Engineer, compaction of trench material is required. The density of compacted backfill material shall meet requirements outlined in the Standard Specifications, or as otherwise approved in writing by the City. The City will employ an independent soils laboratory to perform density test of areas specified by the City. **The Developer shall pay all costs incurred by the City to employ the soils laboratory**. In areas where it is demonstrated that the compaction standards have not been met, the area shall be excavated and recompacted to the satisfaction of the City.

3. Manholes: Manholes shall be of the offset type and shall be precast concrete sections. Joints between precast wall sections shall be confined O-ring, or as otherwise specified.

   For connections to existing systems, a concrete coring machine, suitable for this type of work, shall be utilized in making the connection. The existing manhole shall be rechanneled, steps realigned, top cone section rotated, etc., all as required for a suitable installation. The new pipe connection shall be plugged (watertight) until the new pipe system has been installed, tested, and approved. The Contractor shall be responsible for any existing defects in the existing manhole unless these defects are witnessed by a representative of the City prior to any work being performed to make the connection. The Contractor shall be required to remove any and all deleterious material in the existing manhole and downstream reaches as a result of his/her work.

   a. Manhole Sections: Manhole sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the ladder steps. The completed manhole shall be rigid, true to dimension, and be watertight. Rough, uneven surfaces will not be permitted.

      The mortar used between the joints in the precast sections and for laying manhole adjusting bricks shall be composed of one part cement to two parts of plaster sand. All joints shall be thoroughly wetted and completely filled with mortar, with a brushed finish on the inside and smooth on the outside to ensure watertightness.

b. Manhole Steps: Manhole steps shall be polypropylene, Lane International Corp. No. P13938, or equal. Ladders (maximum 3-foot length) shall be polypropylene Lane International Corp., or equal, and shall be compatible with steps.

c. Grade Adjustment: Not less than 18 inches, or more than 26 inches, shall be provided between the top of the cone or slab and the top of the manhole frame. Masonry units (manhole adjusting brick) shall conform to the ASTM C32, Grade MA. The outside and inside of manhole adjusting bricks and the joints of precast concrete sections shall be plastered and troweled with 1/2 inch (minimum) of mortar in order to attain a watertight surface. The mortar finish shall be brushed on the inside and smooth on the outside.

d. Channels: Channels shall be as shown in the Standard Details, made to conform accurately to the sewer grade, and shall be brought together smoothly with well rounded junctions, satisfactory to the City Inspector.

e. Drop Manholes: Drop manholes shall be as specified in the Standard Details.

f. Lift Holes and Steel Loops: All lift holes shall be completely filled with expanding mortar, smoothed both inside and outside, to ensure watertightness. All steel loops shall be removed, flush with the manhole wall. The stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

g. Frames and Covers: Frames and covers shall be as specified in the Standard Plans. Castings shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects that would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material, will not be permitted. Frames and covers shall be machine finished or ground on seating surfaces so as to assure nonrocking fit in any position and interchangeability of covers. Frames and covers outside of paved areas shall be provided with three-bolt locking lids. In unpaved areas, rings and covers shall be positioned so one of the three locking bolts is located over the manhole steps and shall be adjusted to conform to the final finished surface grade of the street or easement to the satisfaction of the City or agent for the City. Manhole frames and covers shall be as specified in the Standard Details.

4. Side Sewer Lateral: A side sewer lateral is considered to be that portion of a sewer line that will be constructed between a main sewer line and a property line or easement limit line.

Side sewers shall be for a single connection only and be a minimum 6-inch-diameter pipe. Side sewers shall be connected to the tee, provided in the sewer main where such is available, utilizing approved fittings or adapters. The side sewer shall rise at a maximum of 45 degrees and a minimum of 2 percent from the sewer main to provide each lot with the deepest sewer possible.

Where no tee or wye is provided or available, connection of a side sewer shall be made by machine-made tap and saddle in accordance with the standard details. The City shall review the exact location and material list in evaluating proposed connections. The maximum bend permissible at any one fitting shall not exceed 45 degrees. The maximum bend of any combination of two adjacent fittings shall not exceed 45 degrees (1/8 bend) unless straight pipe of not less than 3 feet in length is installed between such adjacent fittings. Fittings shall be avoided where possible. Cleanouts are required at all bends greater than 11.25 degrees.

5. Private Side Sewers: Private side sewers are the extension of side sewer laterals located outside of the public rights-of-way or easements granted to the City.

   a. Side sewer pipe located on private property shall be 4 inches minimum, ductile iron, or PVC ASTM 3034 (green in color), and shall be installed at 2 percent minimum grade (1/4 inch fall per foot), per the Standard Detail. Construction on private property may be performed by owner, but requires a permit.

   b. Pipe shall be bedded with pea gravel or clean, free draining sand.

   c. Private yard sewers shall be installed per the Uniform Plumbing Code.

   d. Side sewer shall be inspected by the City's Representative/Inspector prior to backfilling. Side sewer shall be plugged and tested in the presence of the City Inspector by filling with water. Leakage rate shall not exceed 0.31 gallon per hour for 4-inch pipe and 0.47 gallon per hour for 6-inch pipe, per 100 feet of pipe.

   e. On private property, minimum cover shall be 24 inches over top of pipe from the point which is 30 inches out from house and continuing to the connection with the City's sewer system.

   f. Parallel water and sewer lines shall be 10 feet apart horizontally wherever possible and have a vertical separation of 18 inches if a vertical crossing is necessary.

   g. No more than 100 feet is allowed between cleanouts. Cleanouts are required for bends equal to or greater than 45 degrees. Cleanout shall be a watertight plugged gasketed tee or wye lateral.

   h. Provide "grease trap" of a size and type approved by the City at all such locations as may be deemed necessary by the City. Grease trap shall be sized and stamped by Developer's Engineer. Design Calculations shall be provided to the City upon request.

   i. A cleanout shall be installed for maintenance purposes.

   j. Private grinder pump installations shall require the following:

      - An interior failure alarm.
      - Be equipped with an exterior main disconnect switch.
      - Pass a pressure test to the 6 inch cleanout at the right-of-way line.

   k. Provide the City with an as-built drawing(s) in conformance with these standards (see Section 300, "Public Works Considerations").

   l. Unless otherwise approved by the City Engineer, private side sewers shall be television inspected upon completion in accordance with Section 506 below.

505 TESTING GRAVITY SEWERS FOR ACCEPTANCE

The Contractor and/or Developer shall furnish all facilities and personnel for conducting tests under the observation of the City Engineer or City Inspector. Prior to testing, the completed gravity sewer, including side sewer stubs after completion of backfill and cleaning, shall be television inspected (see

Section 506 below). The following tests shall be completed to the satisfaction of the City Engineer prior to acceptance of the sanitary sewer improvements:

1. Low-Pressure Air Test: A low-pressure air test shall be conducted in conformance with the Standard Specifications. All testing must be completed in the presence of the City Engineer or his/her representative(s). Testing shall not be conducted until after a successful television inspection has been conducted and the first lift of final pavement (or asphalt treated base) has been completed.

2. Deflection Test: A deflection test for thermoplastic pipe shall be conducted in conformance with the Standard Specifications. All testing must be completed in the presence of the City Engineer or his/her representative(s). If preapproved by the City, deflection testing can be completed in conjunction with the television inspection.

The City will not accept results of a low-pressure air test prior to the completion of the first lift of final pavement (or asphalt treated base). Therefore, the City encourages the Developer/Contractor to perform preliminary tests as needed to provide assurance of a successful test upon completion of the first lift of final pavement. The City need not be present for the completion of preliminary testing and will not accept the results of any preliminary testing in lieu of a satisfactory final test.

506 VIDEO TAPING

Upon completion, all sewer mains and side sewer laterals shall be internally televised by a qualified firm providing said services. The recording shall be the final product and must be edited by the Contractor/Developer such that the recording progresses in a consistent manner from start to finish throughout the improvements. All equipment and materials shall be compatible with existing City equipment. It shall be the Contractor's/Developer's responsibility to confirm equipment compatibility with the City prior to inspection. A DVD, together with a written log of the television inspection, shall be submitted to the City for their review and approval, and if accepted, shall be retained in the City's files. This work can be performed prior to paving. The City's inspector shall be notified of the date of the television inspection to ensure his availability and on-site witnessing of the event during this time.

The City requires the use of a test ball or test slug (1 inch in diameter, graduated with 1/4-inch markings) to identify the depth of any ponding encountered during the television inspection. A maximum of 1/2 inch of ponding is acceptable. Immediately prior to the video inspection, a minimum of 10 gallons of dyed water shall be run through the pipe that will subsequently be videotaped.

After a period of no less than 18 months, but prior to 2 years, the Developer is required to perform an additional internally televised inspection of all sewer mains and side sewer laterals. The recording shall be delivered to the City's satisfaction as provided above. The City will not release the maintenance bond issued for the sanitary sewer improvements until a second television inspection has been successfully performed and any defects found during the inspection are corrected by the Developer and accepted by the City.

507 CROSSINGS

All state highways, stream crossings, and other road crossings when directed by the City, shall be encased with a steel casing, as approved by the City and prevailing regulatory agencies. The welded steel casing or sleeve shall be of sufficient diameter size and strength to enclose the sewer pipe and to withstand maximum highway or railroad loading. Sizing and wall thickness of casing is subject to approval by the City Engineer. Casing spacers and end seals (Cascade or equivalent) shall be required.

508 STAKING

All surveying and staking shall be performed by an engineering or surveying firm employed by the Developer and capable of performing such work. The engineer or surveyor directing or performing such work shall be currently licensed by the State of Washington to perform said tasks.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

Unless otherwise approved by the City, the minimum staking of sanitary sewer systems shall be as follows:

1. Stake centerline alignment at a minimum of 50 foot intervals unless otherwise approved by the City.

2. Stake location of all manholes and side sewer laterals for grade and alignment.

3. Stake all property corners.

4. Provide a copy of "cut sheets" to City inspector.

5. Stake finished manhole rim elevation and invert elevations of all pipes in manholes.

509 TRENCH EXCAVATION

1. Clearing and grubbing (where required) shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.

2. Trenches shall be excavated to the line and depth designated by the City to provide a City-approved minimum of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench, and under no circumstances is water (either groundwater or surface water) to be allowed to enter the pipe. The owner shall maintain sufficient pumping equipment on the job to ensure that these provisions are carried out.

3. The contractor shall perform all excavation of every description and whatever substance encountered; and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a sufficient depth below sewer line grade. Where materials are removed from below pipe grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

4. **Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with all state and federal regulations.**

5. When after excavating to the foundation level, the material remaining in the trench bottom is determined to be unsuitable by the City, excavation shall be continued to such additional depth and width as required by the Design Engineer. Unsuitable foundation materials shall be disposed of at a suitable site. The trench foundation shall be backfilled to the bottom of the pipe zone with gravel backfill for foundations, gravel backfill for pipe zone bedding, or other suitable material and compacted to form a uniformly dense, unyielding foundation.

510 BEDDING

Gravel backfill for pipe bedding shall be installed in conformance with the Specifications herein, or other approved applicable standards approved by the City.

1. Bedding for Sewer Pipe: Gravel backfill for rigid pipe bedding shall consist of pea gravel. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

Sieve Size	Percent Passing*
3/4-Inch Square	100
3/8-Inch Square	95 to 100
U.S. No. 8	0 to 10
U.S. No. 200	0 to 3
Sand Equivalent	35 Minimum

*All percentages are by weight.

511 STREET PATCHING AND RESTORATION

See Section 600, "Streets."

512 ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO GRADE

This work consists of constructing and/or adjusting all new and existing utility structures encountered on the project to finished grade.

1. Asphalt Concrete Paving Projects: On asphalt concrete paving projects, the manholes shall not be adjusted until the pavement is completed, at which time the center of each manhole lid shall be relocated from references previously established by the Developer and/or Contractor. The pavement shall be cut as further described and base material removed to permit removal of the cover. The manhole shall then be brought to proper grade.

   Prior to commencing pavement operations, a plywood and Visqueen cover (as approved by the City Inspector) shall be placed over the manhole base and channel to protect them from debris.

   The asphalt concrete pavement shall be cut and removed to a neat circle, the diameter of which shall be 18 inches from the outside diameter of the ductile iron frame. The ductile iron frame shall be brought up to desired grade, which shall conform to surrounding road surface and the Standard Details. **In no instance shall the casting be below the asphalt grade.**

Adjustment to desired grade shall be made with the use of concrete or bricks. No cast or ductile iron adjustment rings will be allowed. An approved class or mortar (one part cement to two parts of plaster sand) shall be placed between manhole sections; adjustment rings or bricks, and ductile iron frame to completely fill all voids and to provide a watertight seal. No rough or uneven surfaces will be permitted inside or out. Adjustment rings or brick shall be placed and aligned so as to provide vertical sides and vertical alignment of manhole steps and ladder.

Check manhole specifications for minimum and maximum manhole adjustment and step requirements. Special care shall be exercised in all operations in order not to damage the manhole, frames and lids, or other existing facilities.

As soon as the street is paved past each manhole, the asphalt concrete mat shall be scored around the location of the manhole. After rolling has been completed and the mat has cooled, it shall be cut along the scored lines. The manholes shall then be raised to finished pavement grade, and the annular spaces filled as shown in the Standard Details.

2. Adjustment of Manholes in Easements: Manholes in easement areas shall be adjusted to ensure drainage away from the manhole frame and cover. The manhole frame and cover shall be set approximately 0.1 foot above finished grade. Concrete collars shall be set about the structure, as detailed herein, in all nonpaved areas.

3. Adjustment of Valve Box Castings: Adjustment of valve box castings (force main valving) shall be made in the same manner as for manholes.

513 FINISHING AND CLEANUP

Before acceptance of sewer system construction, all pipes, manholes, catch basins, and other appurtenances shall be cleaned of all debris and foreign material. After all other work on this project is completed, and before final acceptance, the entire area including the roadway, planting, sidewalk areas, shoulders, driveways, alley and side-street approaches, slopes, ditches, utility trenches, and construction areas shall be cleaned and neatly finished to the lines, grades, and cross sections of a new roadway consistent with the original section, and as hereinafter specified.

On sewer construction where all or portions of the construction is in undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that upon completion, the area will present a uniform appearance, blending into the contour of the adjacent properties as indicated in the approved plans. All other requirements outlined previously shall be met.

All excavated material at the outer lateral limits of the project shall be removed entirely. Trash of all kinds resulting from clearing and grubbing or grading operations shall be removed and not placed in areas adjacent to the project. Where machine operations have broken down brush and trees beyond the lateral limits of the project, the Developer and/or Contractor shall remove and dispose of same and restore said disturbed areas at his/her own expense.

All pavements and oil mat surfaces, whether new or old, shall be thoroughly cleaned. Existing improvements, such as Portland cement concrete curbs, curb and gutters, walls, sidewalks, and other facilities which have been sprayed by the asphalt cement shall be cleaned to the satisfaction of the City Inspector and/or City Engineer.

Castings for manholes, valves, lamp holes, vaults, and other similar installations, which have been covered with the asphalt material, shall be cleaned to the satisfaction of the City.

514 PRESSURE SEWER SYSTEMS

Pressure sewer systems, when allowed by the City, shall be designed in conformance with the most current Washington State Department of Ecology regulations and all applicable City, State, and Federal regulations. The following are additional requirements for pressure sewer systems.

1. General: Low pressure grinder pump systems shall only be considered for exceptional situations. Step systems or septic tank effluent pump systems shall not be allowed, except for special or exceptional situations. The City shall be the sole judge in determining allowance for same.

2. Design Standards: The design of systems shall provide for the future expansion of the system to serve tributary areas as determined by the City. Consequently, main extensions shall be extended to far property lines to facilitate future extensions. Mains shall be designed and sized for upstream flows/capacity as well. Easements shall be so granted to the City for this purpose.

   New sewer systems shall be designed by methods in conjunction with the basis of per capita flow rates. Methods shall include the use of peaking factors for the contributing area, allowances for future commercial and industrial areas, and modification of per capita flow rates based on specific data. Documentation of the designs methods used shall be provided along with plans.

3. Material: Pressured sewer lines shall be HDPE (a minimum of SDR 7, or as approved by the City), ductile iron AWWA C151 Class 52 or in special circumstances and if specifically approved by the City, PVC C900 with ductile iron fittings and gasketed joints. All ductile iron pipe and fittings shall be epoxy coated or PE lined and designed for use with corrosive materials. Pipes shall have a minimum 36 inches of cover.

4. Air/Vacuum Valves: Air release valves and air/vacuum valves shall be located at the high points of the line within a standard 48-inch manhole or a comparable sized, approved vault. Air release valves shall be fitted with an activated carbon canister to absorb compounds with disagreeable odors prior to releasing the air to the surrounding area. Grades shall be designed to minimize the need for air/vacuum valves when practical. Valve stations shall be located in public right-of-way.

5. Main Drains: Provisions to drain a pressure system to facilitate repairs or to temporarily remove line from service shall be provided at all low points. This is accomplished through the use of a three-valved tee connected to a sump manhole at the low point of the line. A manhole shall also be set over the force main at the valved tee.

6. Thrust Blocking: Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class 3000 poured against undisturbed earth. Size of block to be designed by Developer's engineer. A plastic barrier shall be placed between all thrust blocks and fittings.

   Designed and approved restraining joint systems may be allowed in lieu of thrust blocking. Restraining joint brand, type, and size shall be specified on the plans.

7. Line Termination: Hydrogen sulfide odors (H_2S) and the buildup of sulfuric acid (H_2S0_4) may occur in the operation of pressurized lines. To mitigate these conditions, some type of odor control method shall be used. This may include chemical addition at the pump station and/or the reaeration of the wastewater at or near the terminus.

At a minimum, the manhole at the terminus and the first manhole downstream of the terminus shall be coated with Tnemec 120 vinyl ester, Quantum polymorphic resin, or approved equal which is resistant to sulfuric acid and hydrogen sulfide.

Design of line termination should provide for a smooth transition between force main (pressure flow) and gravity to reduce turbulence and odors.

8. Grinder Pump System: Operation and maintenance of the tank, grinder pump, pump controls, check valves, and line to main sewer line shall be the responsibility of the property owner.

515 SANITARY SEWER LIFT STATIONS

1. General Requirements:

   a. General:

      (1) Sanitary sewer lift stations and associated appurtenances shall be designed by the City. All expenses associated with the design of sanitary sewer lift stations shall be paid by the Developer to the City prior to the delivery of design documents and construction of the facility. The City requires a deposit (amount as determined by the City Engineer) to be paid by the Developer prior to commencing the design of a facility.

      (2) Unless otherwise approved by the City, sanitary sewer lift stations will only be allowed in the locations indicated in the most recently adopted Sanitary Sewer Comprehensive Plan. If the proposed project will convey sewage to a location indicated in the Comprehensive Plan, the City recommends that the Developer contact the City as early as possible to begin the design process.

      (3) The City may require the Developer to provide detailed plans for the installation of pressurized sewer mains from a sanitary sewer lift station to an approved connection to an existing or proposed gravity system. The City will determine the pressurized sewer main diameter and material specifications. The preparation of said plans shall be in conformance with the Specifications above and Section 300, "Public Works Considerations." All plans must be approved by the City prior to construction.

      (4) Upon payment from the Developer to the City as compensation for the design and plan preparation, the City will furnish Plans and Specifications to the Developer for construction. It will be the Developer's responsibility to retain the services of a licensed and bonded Contractor qualified to perform the work required in the approved Plans. During construction, all materials must be approved by the City or its representatives prior to installation. The Developer is responsible for the installation of all components shown in the approved Plans. The City, at the Developer's expense, will program and start up the telemetry system.

      (5) Sanitary sewer improvements will not be accepted until all facilities, including sanitary sewer lift stations, are complete. **Completion of a sanitary sewer lift station includes the successful start-up of the facility and activation of the remote telemetry system.**

      (6) To better ensure an efficient review of sanitary sewer lift stations (or pump stations) and force mains, the design requirements below shall be met unless otherwise directed by the City.

b. Review Process: Each submittal shall consist of a minimum of three (3) copies of all documents to be used in the City review process, based on one copy for City files, one copy for City's review engineer file, and one copy to be returned to the Developer.

(1) Preliminary Design Review Meeting: The Developer shall schedule a preliminary design review meeting at the City. The purpose of the preliminary design review meeting will be to confirm the design parameters (flow parameters, force main sizing, etc.), equipment requirements, lift station siting, and force main alignment. At least four (4) weeks prior to the meeting date, the Developer shall submit the following documents to the City for review:

- Preliminary flow and pumping head calculations and associated reports.
- Conceptual siting plan.
- Preliminary process diagram.
- Preliminary equipment list.
- Proposed force main alignment.

(2) Design Review: Upon completion of the preliminary Design Review meeting, the Developer shall prepare plans and calculations in accordance with these Standards and Section 200 of the City of Bonney Lake Development Policies and Public Works Design Standards. Any City comments shall be responded to, in writing, for review in the subsequent submittal. Depending on the scope of the City's comments, the City may schedule a Design Review meeting. The Design Review processing fee allows for the following maximum number of submittals:

(a) Submittal 1 – Concept Design: Includes site layout, equipment list, process and instrumentation diagram, and preliminary mechanical and electrical plans.

(b) Submittal 2 – Final Design: Includes final calculations and detailed design drawings and specifications for the lift station, incorporating the earlier comments from the City.

(3) Final Plans for Approval: The Developer shall address each of the City's comments to the City Engineer's satisfaction and submit final drawings, specifications, and design calculations, each sealed by a professional engineer in the state of Washington, for approval by the City Engineer. A minimum of three (3) copies of the sealed drawings shall be included with the signed documents. One set of the sealed drawings will be returned to the Developer, at which time a preconstruction meeting may be scheduled. No work shall commence until all necessary permits have been obtained, a deposit in the amount determined by the City Engineer for inspection fees has been delivered to the City, and the preconstruction conference has been completed.

c. Applicable Standards: Sewage lift stations shall be designed in accordance with applicable City of Bonney Lake and Washington State standards. In addition, lift stations shall be designed in accordance with the following standards:

(1) Department of Ecology's *Criteria of Sewage Works Design* (most current edition).

(2) EPA-430-99-74-001 *Design Criteria for Mechanical Electric, and Fluid System and Component Reliability*.

(3) International Building Code 2003 (or most current edition).

(4) National Electric Code (most current edition).

d. Standard Design Functionality and Components: The functionality and components of each sewage lift station shall be in conformance with the standard process and instrumentation diagrams shown in the Sanitary Sewer Standard Details SS15 or SS16, and SS17, as applicable.

e. Design Life: Lift stations shall be designed for a 20-year minimum design life for all mechanical and electrical components. The building and wet well shall be sized for a 40-year design life, unless otherwise approved by the City.

f. Design Flow: Design flow for the station shall be 20 years minimum with one pump off line and in accordance with the City's most current revision of its Sewer Comprehensive Plan.

g. Reliability and Redundancy: Lift stations shall provide Class I Reliability in accordance with EPA-430-99-74-001 *Design Criteria for Mechanical Electric, and Fluid System and Component Reliability*, as recommended by the Department of Ecology's *Criteria of Sewage Works Design*.

h. Wet Well Storage: The lift station wet well shall be designed for adequate storage while minimizing solids deposition. It shall be capable of storing a volume above the high wet well level equal to that of the force main. If this requirement leads to a volume substantially larger than is realistic for construction, upon City approval, it will be acceptable to use isolation valves to separate the force main into sections of smaller volumes that the wet well is capable of storing. The wet well storage shall also be sized to prevent an excessive number of pump motor starts per hour, meeting NEMA and the pump manufacturer's requirements. To minimize solids deposition, the side slopes in the wet well design must be a minimum of 60 degrees from horizontal, and the flat area at the bottom of the wet well shall be no larger than the pumps and discharge elbow base plus 8 inches of clearance.

i. Major Components of a "Standard Sanitary Sewer Lift Station" shall include the following:

(1) Wet well with locking access hatch and safety grate fall protection system.

(2) Submersible sewage pumps.

(3) Valve vault with locking access hatch.

(4) Station flow meter with vault with locking access hatch.

(5) Pig launch system.

(6) Pole-mounted exterior lighting located over wet well and valve vault.

(7) Standby diesel generator with weatherproof sound attenuated enclosure.

(8) Building:

(a) Construction: Split-face (exterior side) concrete masonry units (CMU) walls with a metal roof.

(b) 480 V electric power system including service entrance panel, automatic transfer switch, and distribution panels.

(c) Control panel for pumping system complete with radio telemetry system.

(d) Storage closet with 16 square feet (minimum) of floor space.

(e) Water system with backflow preventer, freeze-proof wall hydrant to exterior of building, utility sink with hot and cold heater sources, and splash guard to protect nearby electrical equipment.

(f) HVAC system including unit heater for freeze protection and air conditioning for summer operation and ventilation fan system.

(9) Site fencing.

(10) Station utility power transformer.

(11) Paved parking and access.

2. Site Construction:

a. Fencing: The lift station site shall be fully fenced with chain-link fencing that is both galvanized and powder coated (color shall be as directed by the City). Fencing shall be 8 feet high and above grade. Pipes for posts, rails, braces, and gate frames shall be Schedule 40 and shall conform to ASTM 120.

b. Truck Access and Parking: The lift station shall have an access road with easement capable of supporting 20,000-pound axle loads throughout the year. This road shall connect to the nearest public road and will be used for the maintenance of the station. Access shall be designed to allow a City service truck with hoist to be appropriately situated to lift the pumps from the wet well. On-site parking shall be provided for a minimum of two vehicles.

c. City Water: City water shall be provided to the station for hose-down purposes. A wash-down system shall be sized for 20 gallons per minute minimum. A Washington-State-Department-of-Health-approved backflow prevention device shall be provided on the water supply line to protect the public water system. The backflow device will be tested and certified by the City's Cross-Connection Specialist prior to the acceptance of the system. The backflow device shall be located inside the building to prevent freezing, and provided with a drain and appropriate clearances to avoid damage to other equipment and to conform to inspection requirements.

3. Concrete:

   a. Wet Well Coating: Wet well shall be provided with a coating suitable for the application. Coordinate with City in coating selection.

   b. Vaults: Valve and flow meter vaults shall be precast concrete with polypropylene encased and provided with ladder steps. Vaults shall have lockable aluminum access hatches.

4. Masonry:

   a. Concrete Masonry: The building shall be constructed of split-face (exterior side) concrete masonry units (CMU) with a band of flat-faced CMU approximately 9 feet above grade for mounting of exterior electrical fixtures.

5. Metals:

   a. Miscellaneous and Structural Steel: Metal structures and supports within the building or on site shall be galvanized steel, except in the wet well where these items shall be Type 316 stainless steel.

6. Woods and Plastics:

   a. Sheathing: If used, wood sheathing shall be minimum 15/32-inch-thick CDX or better.

   b. Trusses and Cross Bracing: If used, prefabricated trussed and cross-bracing shall be designed and certified by the truss manufacturer to meet the design loads.

7. Thermal and Moisture Protection:

   a. Roofing: Metal roofing system shall consist of 24-gauge, or thicker, factory formed, prefinished panels with major ribs not less than 1-5/8 inches in height.

   b. Insulation: Interior ceiling insulation Kraft paper faced bats, R-value of 38 minimum, and shall meet current building code requirements.

8. Doors and Windows:

   a. Natural Lighting: The building shall be provided with natural lighting designed to minimize vandalism and prevent the ability to look into the building.

   b. Doors: Exterior doors shall be weathertight, flush construction, fabricated from 16-gauge minimum, galvanized steel, 1-3/4 inches thick, and insulated with solid polyurethane or urethane foam core. Door shall have key cylinders and dead-bolt keyed to City's standard core.

   c. Access Hatches: The access hatch for the wet well, valve vault, and flow meter vault shall be constructed of stainless steel hardware and shall have a diamond plate cover and recessed padlock hasp. The hatch shall be double leaf and have a spring-assisted operator that reduces the lifting force to a maximum of 15 pounds. The hatch shall be rated for H20 loading. The access hatch for the wet well shall be provided with hinged safety grate for a fall protection system by Halliday Products Series X Retro Grate or equal.

9. Finishes:

    a. Painting: Before beginning any painting or coating, a list of coating and manufacturers shall be submitted for review and approval by the City.

10. Specialties:

    a. Signage: There shall be signage on the fence and building consistent with City Standards.

11. Equipment:

    a. Identification Numbering:

        (1) All equipment and valves shall be numbered and shall include stainless steel nameplates.

        (2) The wet well cover shall include permanent labels identifying each pump number.

        (3) Containers for spare parts shall be labeled with equipment name and number.

    b. Pumps: Sewage pumps shall be Flygt submersible with permanent stainless steel guide bars and accessories for automatic connection to the discharge elbow as the pumps are lowered into place. Pumps shall pass a minimum 3-inch spherical solid and shall be designed for pumping raw sewage. Pumps shall include moisture and over-temperature protection module. Pump motor shall be 480 V, 3-phase. Pump cables shall extend to disconnect switches located on exterior of station building.

12. Furnishings:

    a. Shelving: Permanently mounted shelving shall be provided and shall be suitable for storage and easy access to all operation and maintenance manuals and spare parts.

13. Special Construction (Not Used)

14. Conveying Systems:

    a. Pump Lifting Mechanisms: Pumps shall be provided with SST cables, rather than chains, to assist the pump removal process. The pump shall be capable of being lifted by the standard Bonney Lake truck hoist and lifting mechanism.

15. Mechanical:

    a. General: See Process and Instrumentation Diagrams SS15, SS16, and SS17.

    b. Isolation Valves: All sewage isolation valves for the lift station and force main shall be eccentric plug valves, unless otherwise shown in the City standards.

c. Building and Vault Drains: Floor drains with p-traps shall be provided for the building and the vaults. Air separation shall be provided between the wet well and the vaults and between the wet well and building. This shall be accomplished in one of the following ways:

(1) Sump pump(s) that discharge(s) from the floor drains system(s) to the wet well.

(2) Provision of a deep seal p-trap, ProSet Trap Guard, or equal, for each cast iron floor drain that drains directly to the wet well.

(3) Provision of a valve priming piping on a solenoid and timer that maintains a water seal in each p-trap on floor drains connected directly to the wet well.

d. Wet Well Flush Pipe: A 4-inch wet well flush pipe with an isolation valve shall be provided at the lift station to recycle sewage from the valve vault piping back to the bottom of the wet well.

e. Temporary Bypass Connection: A connection for portable bypass pumping between the wet well and the force main shall be provided. The connection shall be suitable for a City standard quick connect and housed in a shallow vault.

f. Pig Launch: The pig launch shall be provided, separated from the force main using isolation valves on the upstream and downstream side of the pig launch piping. It shall have a 4-inch drain line that drains directly into the wet well and is controlled by an isolation valve. The pig launch shall be one pipe size larger than the force main.

g. Odor Control Scrubber: The station shall contain a Biocube odor-control unit. The size of the unit shall be approved by the City. At a minimum, the blower on the unit shall provide air flow of 100 feet per minute through the influent pipe during low flows and maintain a negative pressure in the wet well.

h. HVAC: The Electrical Room in the building shall be air-conditioned sized to maintain room temperature below 70 degrees F during full-load operation at the pump station and hottest expected weather. Provide wall-mounted unit heater sized to maintain the room at a minimum of 50 degrees F in the coldest expected weather. Provide wall-mounted thermostats for each unit. Also, provide an exhaust-fan ventilation system with wall-mounted operator-accessible 24–hour timer.

i. Plug Valves: Eccentric plug valves shall have a lever operator. Buried plug valves shall be provided with a cast iron valve box. Valves shall be Miliken Millcentric.

j. Backflow Preventer: The backflow preventer shall be provided in the Control Building for freeze protection. Unit shall be Watts Series 009, model number updated as required to meet current listing and standards from Washington State Department of Health.

k. Swing Check Valves: Check valves shall be full-port and full-face flanged. The valves shall have an external level and weight or level and spring. Check valves shall comply with AWWA C508, Swing Check Valves for Waterworks. Provide factory-installed magnetic proximity limit switch rated for Class 1, Division II. Valves shall be CCNE 8000.

l. Vacuum Relief: Unless demonstrated as not required, each force main system shall be provided with two vacuum-relief valves, GA FIG 991, or City approved equal, to assist with water hammer protection.

m. Wash Down Hydrant: Each pump station shall be provided with a 1-inch outdoor freeze proof wall hydrant. Install hydrant through a CMU wall in the building and provide shut-off valve inside building. Include 1-inch hose long enough for wash-down of all equipment at the pump station, including the wet well. Provide wall-mounted stainless steel hose rack.

n. Utility Sink: Each pump station shall be provided with a utility sink in the building with hot and cold water.

16. Electrical:

a. General: All electrical equipment, including controls, shall have Testing Organization Approval as required by Washington State Labor and Industries.

b. Standby Generator: Each lift station shall be provided with a standby diesel engine generator and fuel tank in an enclosure designed for outdoor use and noise control. The fuel tank shall be double-walled with leak detection and shall be sized for all pumps running for 24 hours at 75 percent of full load (all pumps on). The top of the display on the control panel for the generator shall be no higher than 6 feet 6 inches. The generator:

(1) Shall be diesel powered, rated to provide 480 V at 60 Hz with a power output rating to operate all raw sewage pumps simultaneously.

(2) Shall be located outdoors and shall have sound-attenuated, weatherproof enclosures. Enclosure shall be rated for 73 dBA maximum at 7 meters.

(3) Assembly shall be UL 2200 rated.

(4) Shall provide the following status and alarm contacts to the telemetry system: Running, Trouble, Failure (Shutdown), and Low Fuel.

c. Automatic Transfer Switch: The station shall be provided with an automatic transfer switch with microprocessor-based controller to provide transfer on loss of power and scheduled testing. Include manual bypass switch, ASCO 7000 or approved equal.

d. Motor Control: Pump motor starters and circuit breakers may be located in a common motor control center or in the pump control panel.

e. Pump Disconnect Switches: A lockable (both positions), 3-phase, 316 stainless steel disconnect switch shall be provided for each raw sewage pump. The disconnect switches shall be mounted on the outside of the lift station building adjacent to the station wet well with the bottom of the switch more than 24 inches above the ground. The submersible pump cables shall be terminated in the disconnect switches. The cables shall be protected from vandalism by installing a sight-proof louver over the exposed pump cable. Louver shall be installed with anti-vandalism screw fasteners.

f. Raceways and Conductors:

(1) All conduits shall be Schedule 40 minimum wall thickness unless otherwise noted.

(2) EMT will be allowed only when used within the building CMU walls.

(3) PVC conduit will be allowed for floor slabs.

g. Low-Voltage Wire and Cable:

(1) Power – No. 12 AWG and larger stranded copper for motor and power circuits.

(2) Control – No. 14 AWG and larger stranded copper for control and alarm circuits.

(3) Lighting – No. 12 and No. 10 AWG solid copper for lighting circuits.

(4) Instrumentation Wiring:

(a) All single analog signal cables shall be two-conductor or three-conductor No. 16 AWG minimum stranded copper with 90 degree C, 600 V rating.

(b) Multi-pair cables shall be No. 20 AWG minimum with cable rating of 90 degrees C, 600 V.

(5) All field and control panel conductors shall be clearly labeled with sleeve-type wire markers with numbers as shown on the electrical drawings.

h. Outdoor Enclosures and Boxes: Shall be NEMA 4X, 316 SS.

i. Lighting Panel Board: A wall-mounted 120/240 V panel board shall be provided in the building to power the station electrical power and lighting loads.

j. Lighting:

(1) Interior Lighting:

(a) Fluorescent fixtures shall be surface or pendant mounted, 4 feet long with high efficiency ballast.

(b) Provide a minimum of one surface-mounted emergency fixture with battery pack.

(2) Exterior Lighting:

(a) All exterior lights shall be controlled from a common photo cell. A lighting control panel with a HAND-OFF-AUTO selector switch to control all exterior lights shall be located in the Control Building.

(b) Provide pole-mounted light(s) directly over the wet well and valve vault. The lights shall be constructed of tapered aluminum and be equipped with 12 W halogen lamps. Lights shall have ON-OFF switches located in the adjacent Control Building and

shall be clearly labeled with 1-inch by 3-inch engraved nameplates identifying the service.

k. Building Heater(s): Space (unit) heaters shall be 480 V, 3-phase powered, ceiling-mounted complete with 480 V contactor, disconnect switch, and thermostat.

17. Instrumentation and Controls:

a. General:

(1) The lift station control system designs shall conform to the following Piping and Instrumentation Drawings, which can be found in the Sanitary Sewer Standard Details section of this document.

Drawing No.	Description
SS15	Two-Pump SS Lift Station
SS16	Three-Pump SS Lift Station

When a two-pump control system is being installed with plans for a future third pump, the original design and control panel wiring shall be designed as a three-pump lift station. This includes installing and wiring all necessary push buttons, selectors, indicating lights, meters, starters, relays, etc., for the future third pump. This is to ensure that the station will not have to be shut down for major control modifications when the third pump is installed.

b. Control Strategy: The Developer shall provide a detailed narrative of the pump station control strategy. The control strategy shall include a high-level overview plus a description of the operation of each relay and rung in the control system.

c. Control Panel:

(1) Panel shall be located in lift station building.

(2) Panel shall be a free-standing (no leg kits), NEMA 12 painted steel. The panel shall have front doors and padlock hasp. Operator controls shall be located on the front door.

(3) Panel shall be mounted on 4-inch-high curb or pad.

(4) Panel shall be anchored to the floor and wall and shall meet the requirements of International Building Code. Proposed mounting details with equipment weights shall be submitted to the City for review and approval by the City's structural engineer.

(5) Panel shall be constructed and labeled per UL-508.

(6) Panels shall contain a thermostatically controlled fan to circulate air within the enclosure for cooling.

(7) Control system shall be relay-based unless prior approval was given by the City Maintenance Department.

(8) Programmable Logic Controllers for telemetry system shall be Allen Bradley model approved by the City.

(9) Operator Interfaces (graphic terminals) shall be color touch-screen Allen Bradley PanelView Plus 1000 Color with 128 MB memory minimum and ethernet/RS-232 communications.

(10) When future upsizing of pump(s) are planned, motor starters of the size for the future pumps shall be provided as part of the original design. This is to ensure that adequate space and equipment is provided to minimize shutdown and rewiring when the future pump(s) are added.

(11) The control panel shall have an intrusion circuit with panel-mounted "ON-OFF" selector switch and separate indicating lights for each intrusion switch. The circuit shall sound a siren, mounted on the outside of the building, whenever a door or hatch has been open for more than 1 minute. The intrusion switch shall only disable the siren. Each limit-switch signal and a horn-sounding alarm shall be sent to the telemetry system for monitoring by the City's SCADA system.

(12) The control panel shall have an alarm annunciator system with individual lights or illuminated windows for each process alarm and common intrusion alarm and "test and silence" push buttons. The system shall illuminate a vandal-proof red warning light mounted in a conspicuous location on the outside of the building. Each process alarm shall be sent to the telemetry system for remote monitoring by the City's SCADA system.

d. Flow Meters:

(1) Raw Sewage:

(a) Flow Tubes:

(i) Siemens 5100W flange mounted with Type 316 SS electrodes.

(ii) Connection box shall be potted for moisture protection.

(b) Flow Transmitters:

(i) Siemens model to match flow tube. Transmitter shall be panel mounted located on the front door of the control panel. Under no condition shall the transmitter be located outside or in underground vaults.

(ii) Transmitter shall be calibrated to display both flow rate and total flow. The flow rate output signal shall be 4 to 20 mA and be input to the telemetry system.

e. Float Switch: The float switch shall be Anchor Scientific Roto-Float Type "S" or City-approved equal.

f. Limit Switches:

(1) Intrusion limit switches shall be installed on each building exterior door and the first hatch on all vaults.

(a) Vault door limit switches shall be Topworx, GO Switch 10-20 Series magnetic lever-less type rated with screw terminals and Class 1, Div II rating.

(b) Building door limit switches shall be Topworx, GO Switch 10-20 Series magnetic lever-less type rated with screw terminals.

(2) Valve or check valve vault door limit switches shall be magnetic lever-less type rated with screw terminals and Class 1, Div II rating.

g. Pressure Gauges:

(1) 4-1/2-inch minimum nominal diameter liquid filled 1 percent accuracy gauge with 1/2-inch NPT stem.

(2) On raw sewage applications, a Red Valve Model 742 diaphragm seal shall be provided and assembled to back-connected gauge. Pipe to provide water or air back-purging to eliminate solids plugging.

h. Telemetry System:

(1) Telemetry system shall include the following components:

(a) Radio Wireless Modem DataRadio TR with RS-232 connection to the Remote Telemetry Unit.

(b) Remote Telemetry Unit: Siemens (Autocon) with extender I/O cards as required.

(c) Antenna mast shall be per City Standard Detail 1701. Mast height and base depth shall be submitted to the City for approval.

(d) An uninterruptible power supply shall be provided to power the telemetry system during power transfer between utility and generator power and to provide a power failure alarm in the event of loss of both station utility and generator power.

(e) Telemetry and Control System Programming:

(i) Programming of the controls or telemetry system at the lift station is the direct responsibility of the Developer.

(ii) Addition of programming to the City's central SCADA computer will be provided by the City's Systems Integrator and billed by the City to the Developer's project.

(2) Telemetry system standards are presently under review by the City. Submit a request to the City Operations and Maintenance Department for current telemetry system standards and approved equipment list prior to design and/or purchase of the equipment.

516 STANDARD SEWER NOTES

The following notes shall be included in the plans:

1. Prior to any construction activity, the Developer shall arrange and attend a preconstruction conference with the City of Bonney Lake.

2. An approved copy of these Plans must be on the jobsite whenever construction is in progress.

3. All work and materials shall be in accordance with the most current City of Bonney Lake Development Policies and Public Works Design Standards, and the amendments thereto.

4. Work shall not commence until approval is received from the State Department of Ecology.

5. Front property corners shall be set by a land surveyor licensed in the State of Washington prior to the start of construction.

6. Notify the City of Bonney Lake 72 hours (3 working days) prior to beginning construction and for any restarts of work.

7. For aid in utility location, call 1-800-424-555, 48 hours (2 working days) prior to beginning of construction. Existing utilities, whether shown or not, shall be located prior to construction, so as to avoid damage or disturbance, and the Developer shall assume all responsibility and costs connected therewith to protect, maintain and repair, where necessary.

8. Pipe length, manhole depths, etc., (as shown) are approximate. Developer is responsible for supplying proper quantities of materials.

9. Provide the City's inspector with a copy of all cut sheets prior to construction.

10. Connection to an existing main shall be done so as to prevent any foreign materials from entering existing sewers.

11. A minimum horizontal distance of 10 feet shall be maintained between all sewer and water mains.

12. In the event that an existing utility is damaged during construction, the Developer/Contractor shall notify the City and the Utility Company (if applicable) immediately.

13. All sewer lines shall be cleaned and tested in accordance with City of Bonney Lake Standards and Specifications.

14. Prior to acceptance, the Developer/Contractor shall verify that the line and grade of the main meets the City of Bonney Lake Standards. Immediately prior to starting the video inspection, the Developer/Contractor shall flush the mains and insert a visible dye (color as approved by the City) into the mains to aid in identifying the depths of any ponds encountered during the inspection. Ponded depths that exceed 1/2 inch will require the main to be repaired unless otherwise approved by the City.

15. Manhole covers located in asphalt areas shall not be adjusted until the final lift of pavement is in place.

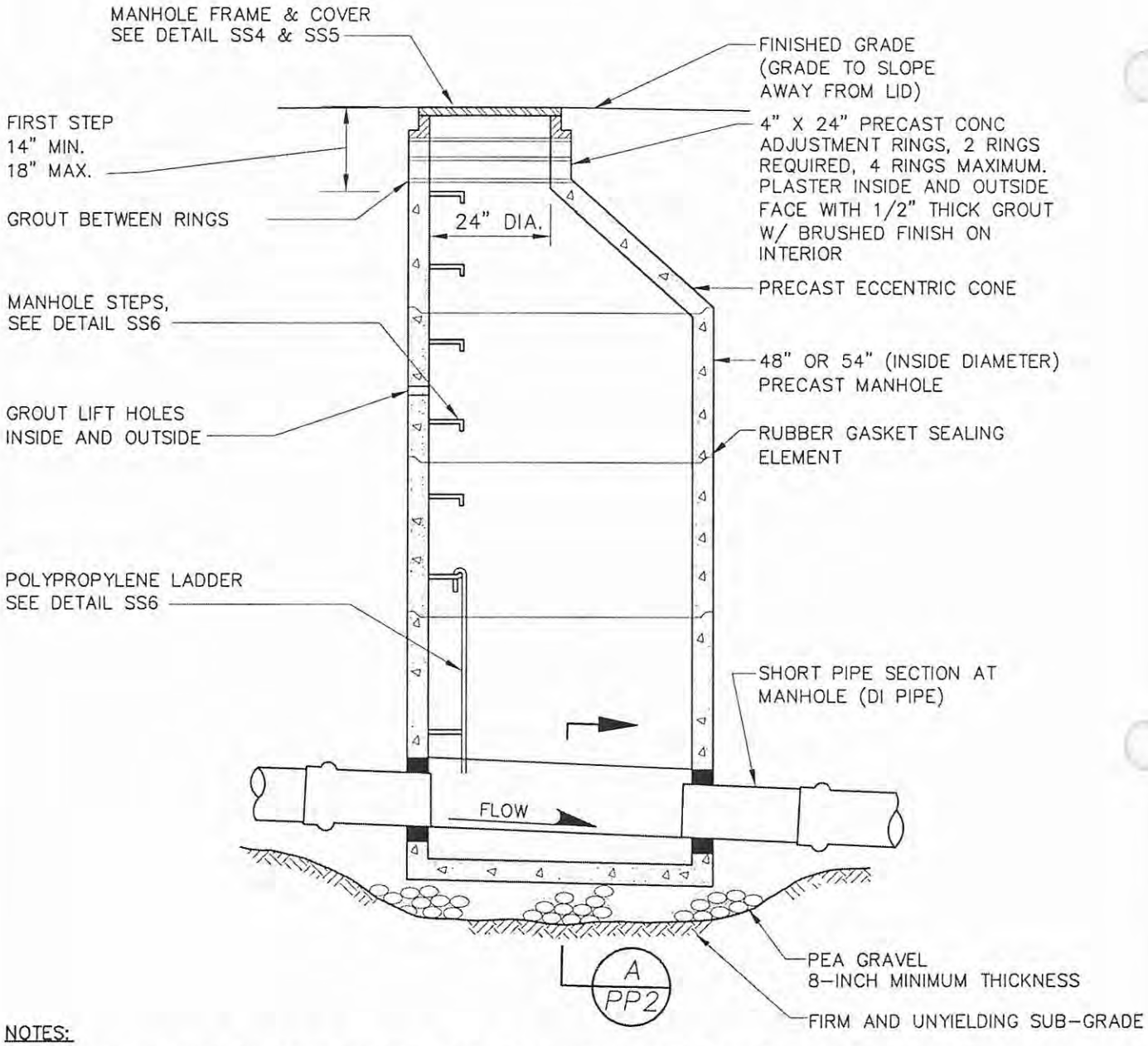
16. The Contractor shall take all steps necessary to ensure that the existing facilities remain fully operational during all stages of construction.

17. The Contractor shall be responsible for notifying homeowners of the intended construction schedule.

18. The Contractor shall completely restore the site to existing or superior condition prior to moving to another project site.

SANITARY SEWER STANDARD DETAILS

TYPICAL PRECAST MANHOLE	SS1
OUTSIDE DROP MANHOLE	SS2
INSIDE DROP MANHOLE	SS3
MANHOLE FRAME AND COVER	SS4
MANHOLE FRAME COLLAR	SS5
POLYPROPYLENE LADDER AND MANHOLE STEPS	SS6
SANITARY SEWER TRENCH SECTION	SS7
PRESSURE LINE AND FORCE MAIN TRENCH SECTION	SS8
SEWER MAIN TAP	SS9
SIDE SEWER DETAIL	SS10
STANDING SIDE SEWER	SS11
PRIVATE SIDE SEWER INSTALLATION	SS12
SMALL DIAMETER FORCE MAIN CONNECTION	SS13
GREASE INTERCEPTOR	SS14
2-PUMP SANITARY SEWER LIFT STATION SCHEMATIC	SS15
3-PUMP SANITARY SEWER LIFT STATION SCHEMATIC	SS16
SCHEMATIC LEGEND AND ABBREVIATIONS	SS17
CONCEPTUAL LIFT STATION SITE PLAN	SS18
CONCEPTUAL LIFT STATION BUILDING FLOOR PLAN	SS19
PIG LAUNCH	SS20



NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT, "A" LOCK, OR EQUAL.
2. MANHOLES SHALL BE PRE-CHANNELED BY THE MANUFACTURER WITH A DROP OF GRADE THRU MANHOLE OF 0.10-FEET (SEE PAGE 2). FIBERGLASS CHANNELS ARE ACCEPTABLE.
3. LARGER MANHOLES WILL BE REQUIRED AT THE DISCRETION OF THE CITY ENGINEER BASED ON PIPE SIZE, NUMBER AND ORIENTATION OF PIPE(S).
4. MANHOLE COATINGS MAY BE REQUIRED IF DIRECTED BY THE CITY OR IF SPECIFIED IN SECTION 500.

Rev No.	Revisions	Date
1	Ladder Reference to SS6	12/7/07

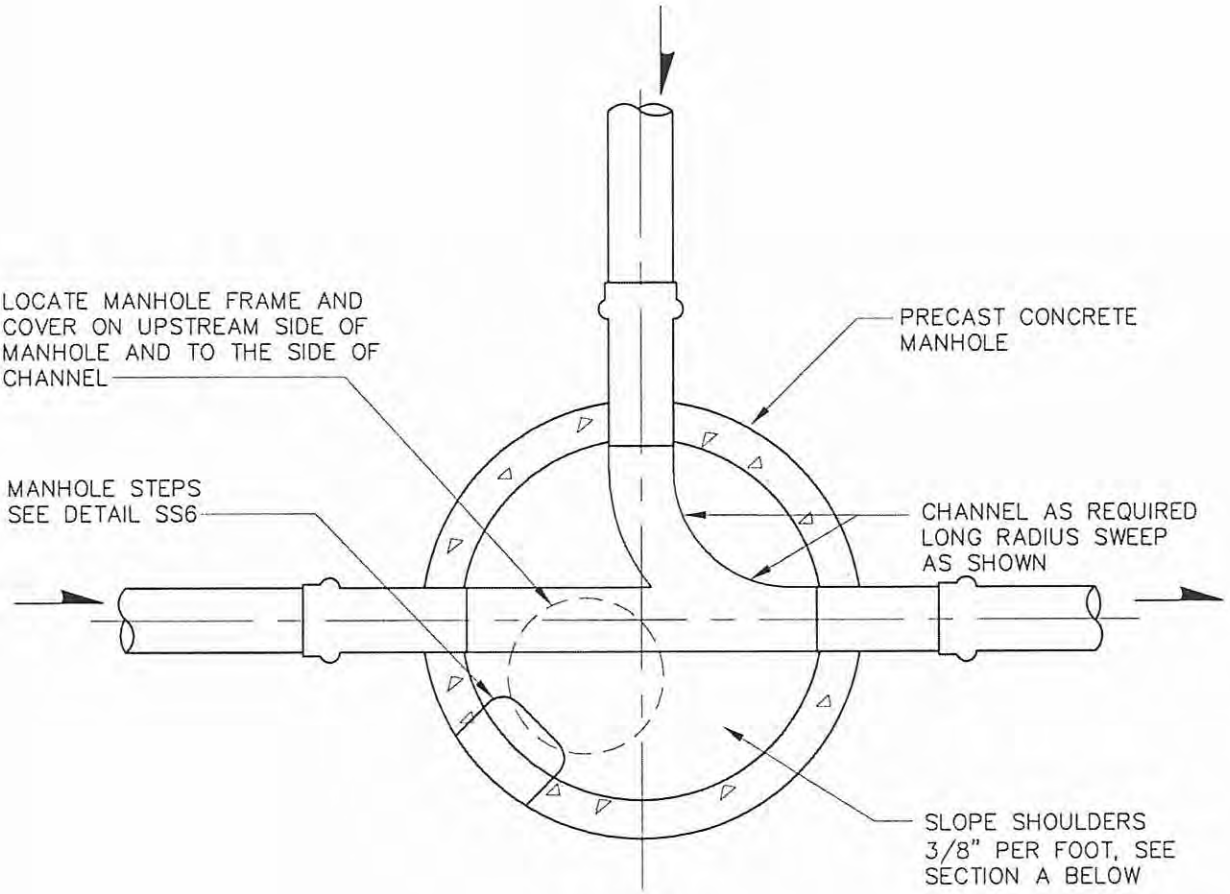
Approved: June 17, 2005
City Engineer Date

SANITARY SEWER STANDARD DETAIL

City of BONNEY Lake

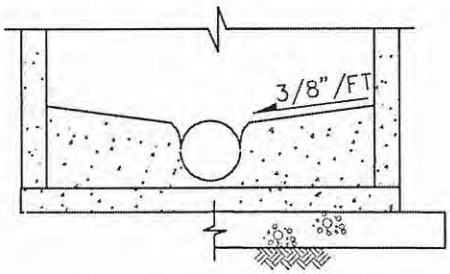
Dwg No: SS1

TYPICAL PRECAST MANHOLE



PLAN

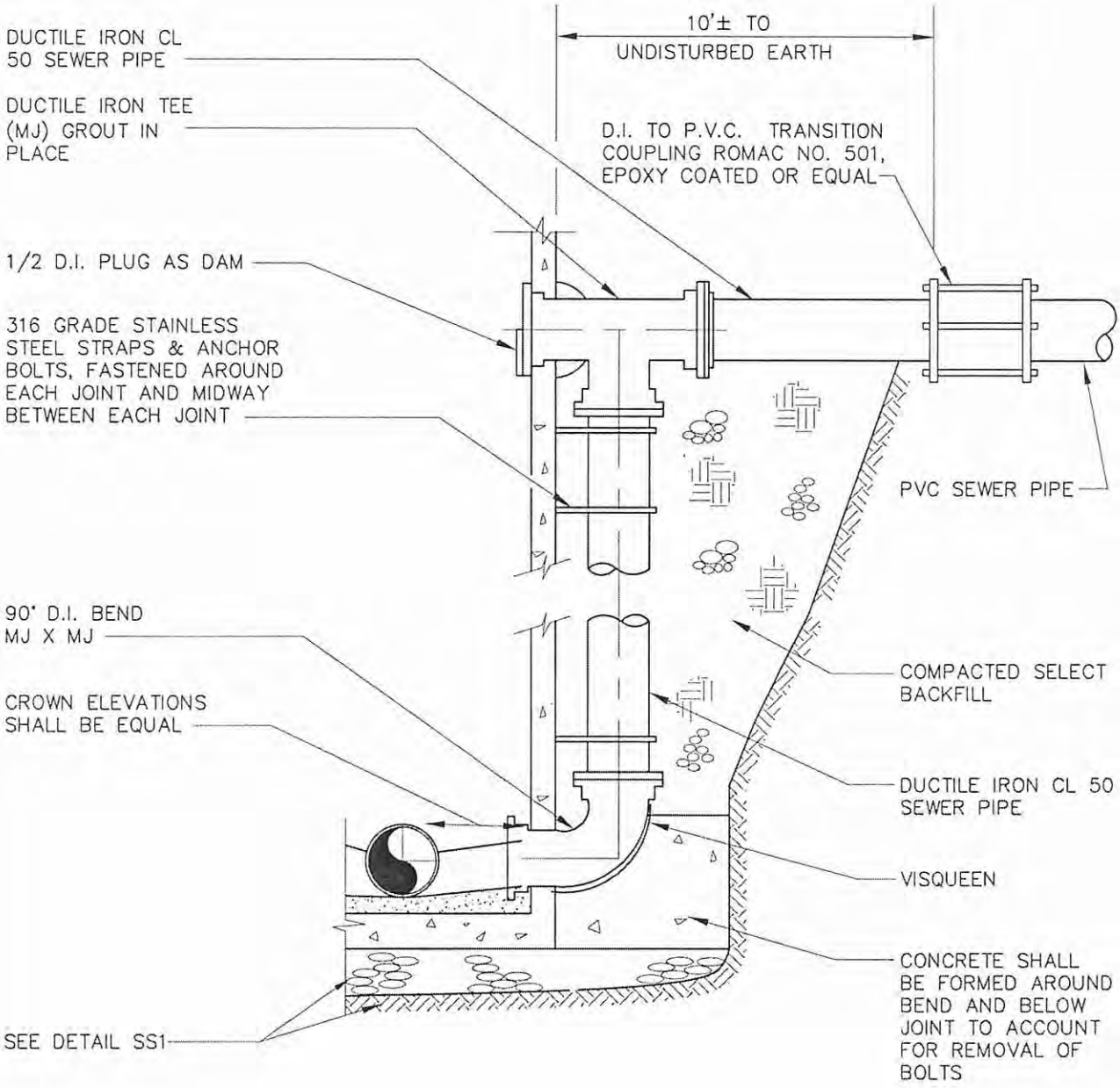
NO SCALE



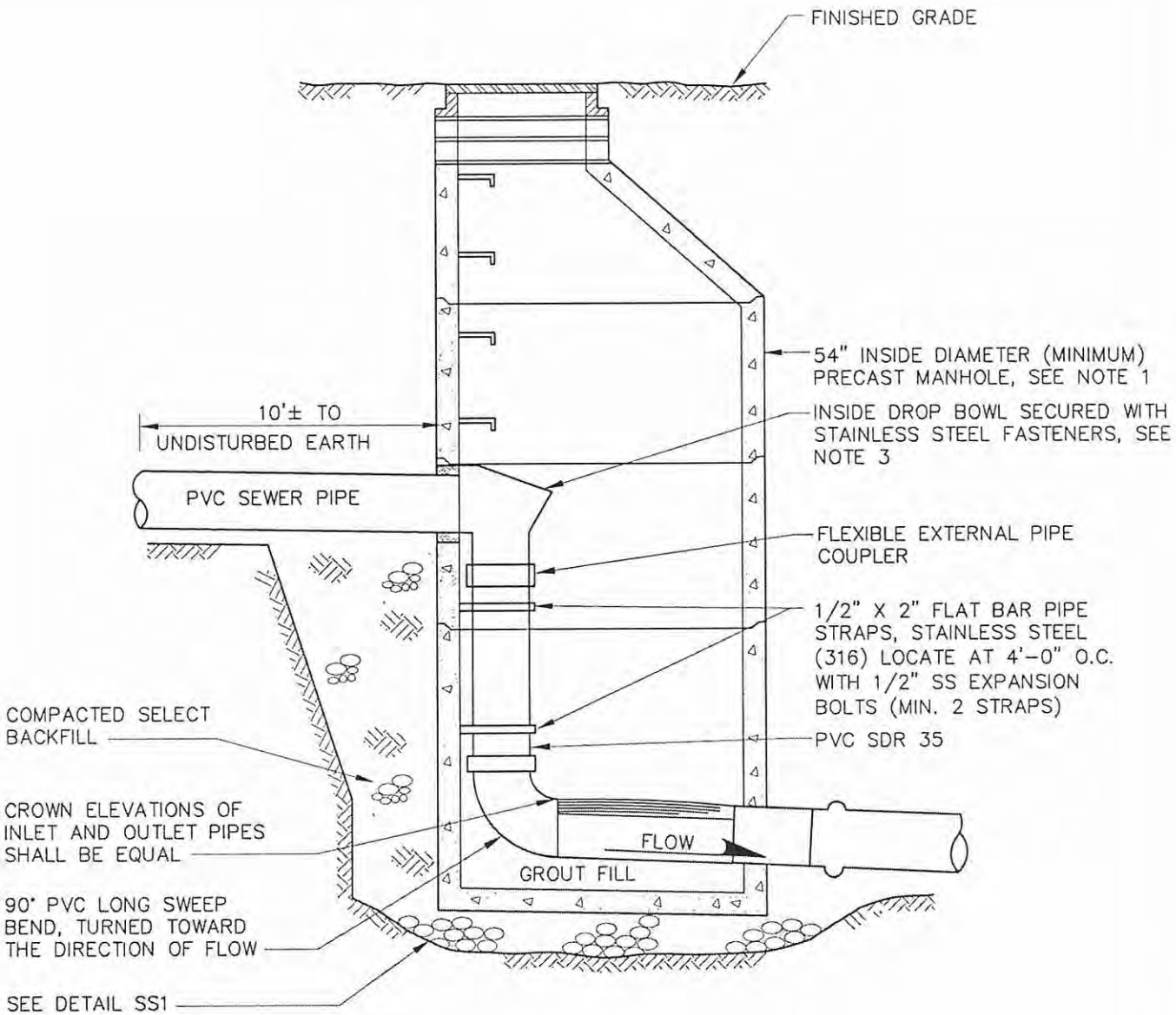
PRECAST CHANNEL SECTION A

NO SCALE

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS1 TYPICAL PRECAST MANHOLE



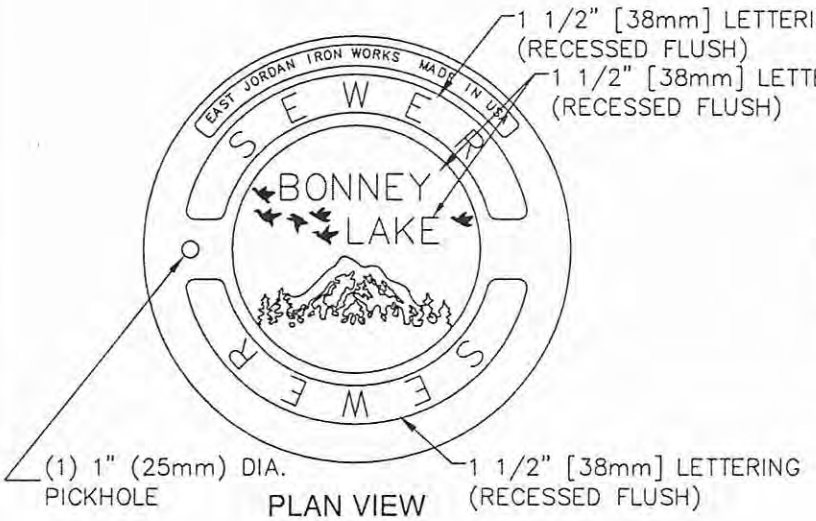
Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS2 OUTSIDE DROP MANHOLE



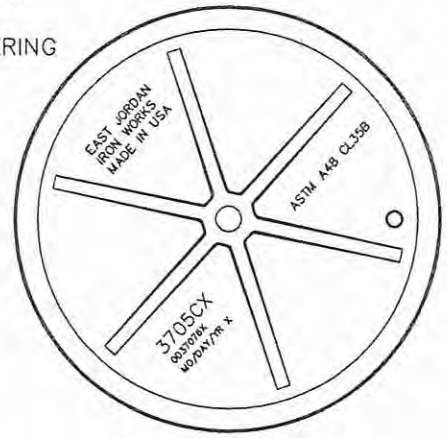
NOTES:

1. INSIDE DROP INSTALLATION IS FOR PRE-APPROVED 54-INCH DIA. AND 60-INCH DIA. MANHOLES ONLY, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
2. ALL OTHER ELEMENTS OF MANHOLES NOT SPECIFICALLY SHOWN ABOVE ARE PER DETAIL SS1.
3. DROP BOWL SHALL BE "RELINER-DURAN, INC." BRAND OR APPROVED EQUAL. SELECT A SIZE APPROPRIATE TO FLOWRATE AND PIPE DIAMETER. CENTER BOWL DIRECTLY UNDER INLET PIPE, ALLOW APPROXIMATELY 1" CLEARANCE BETWEEN PIPE AND BOWL. ATTACH BOWL TO MANHOLE WALL WITH 3/8" DIA. STAINLESS STEEL BOLTS INTO LEAD EXPANSION ANCHORS.
4. TRIM INLET PIPE SO THAT 2" PROTRUDES INTO MANHOLE. FOR IMPROVED FLOW CONTROL, CUT A 1" LONG 'V' SHAPED NOTCH AT BOTTOM EDGE OF INLET PIPE.

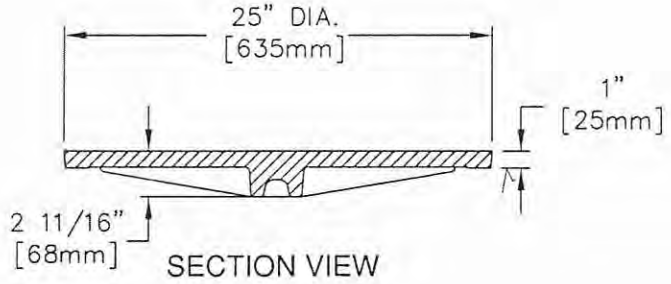
Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS3 INSIDE DROP MANHOLE



PLAN VIEW



BOTTOM VIEW



SECTION VIEW

√ MACHINED SURFACE

NOTES:

1. PRODUCTS MANUFACTURED BY EAST JORDAN IRON WORKS INC., P.O. BOX 439, EAST JORDAN, MI. 49727, 1-800-874-4100. APPROPRIATE FRAME SHALL BE AS SPECIFIED BY EAST JORDAN IRON WORKS INC.
2. MATERIALS ARE GRAY IRON ASTM A48 CL35B.
3. PRODUCT NO. 0037076X, CATALOG NO. 3705CX.
4. LOAD RATING IS HEAVY DUTY, COVER WEIGHT IS APPROXIMATELY 141 LBS.
5. WATERTIGHT MANHOLE FRAME AND COVERS ARE REQUIRED AS DIRECTED BY THE CITY AND IN ALL LOCATIONS WHERE THE MANHOLE RIM IS SET BELOW FINISHED GRADE.
6. ALL MANHOLES LOCATED OUTSIDE PAVEMENT AREAS SHALL BE PROVIDED WITH LOCKING MANHOLE FRAME AND COVER. MANHOLES LOCATED IN PAVED AREAS REQUIRE NON-LOCKING MANHOLE FRAME AND COVER

Rev No.	Revisions	Date
1	Modified Pickhole	07/14/06

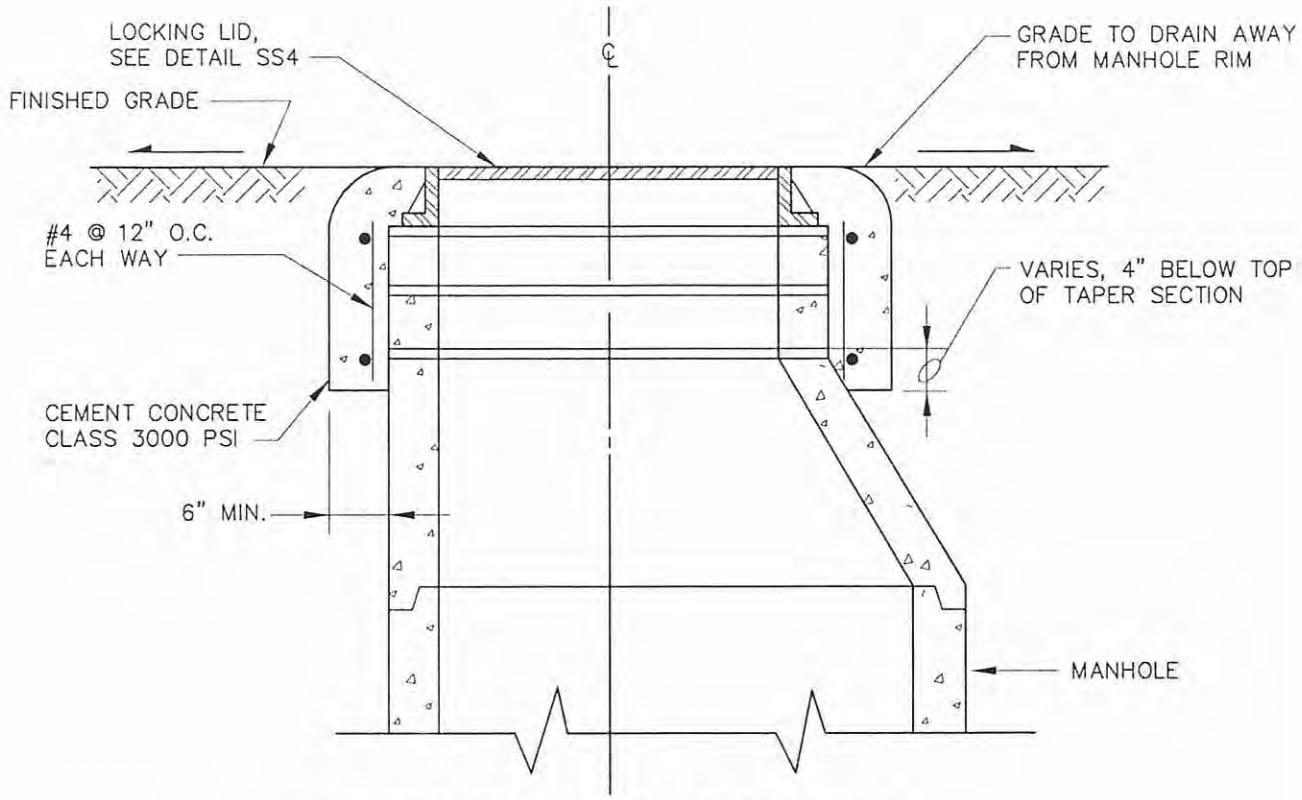
Approved: June 17, 2005
City Engineer Date

SANITARY SEWER STANDARD DETAIL

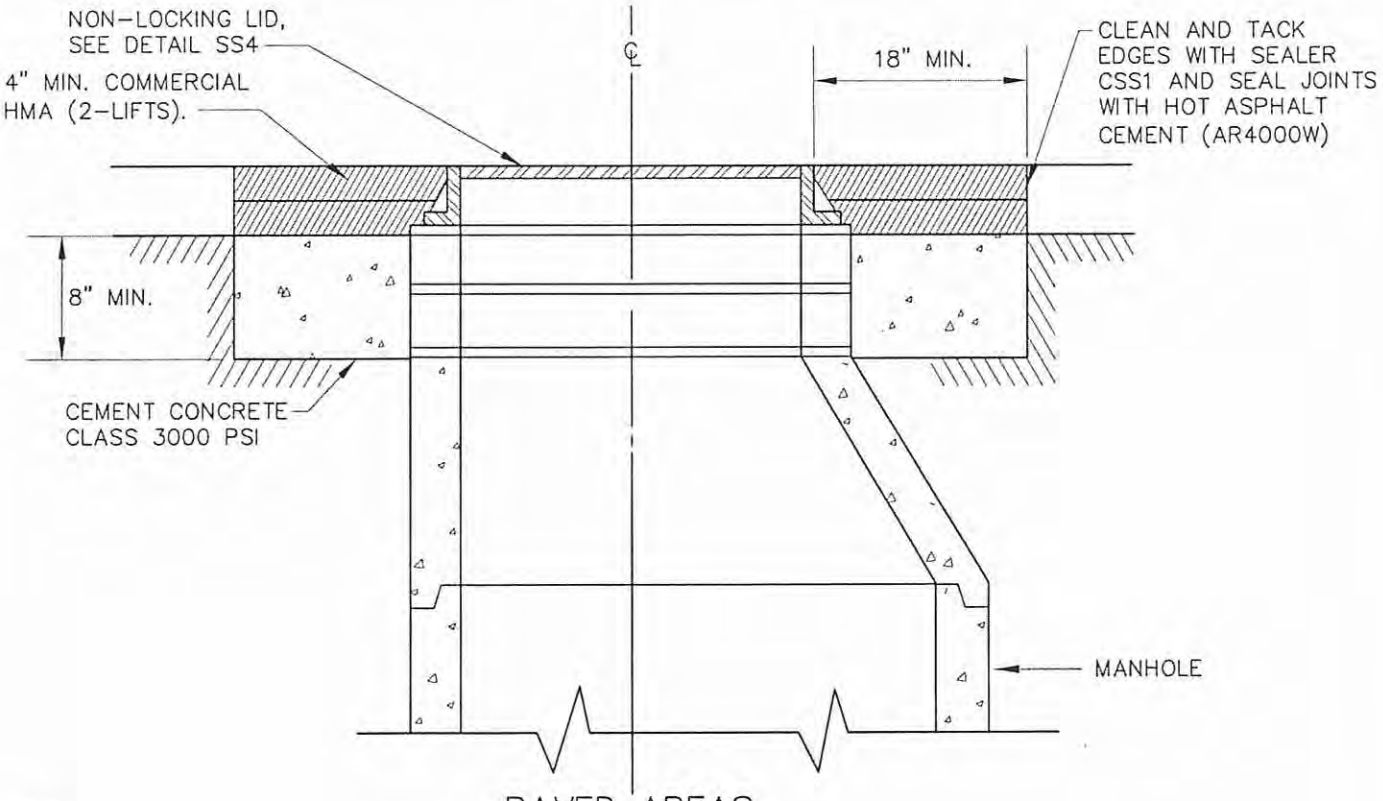
City of BONNEY Lake

Dwg No: SS4

MANHOLE FRAME AND COVER

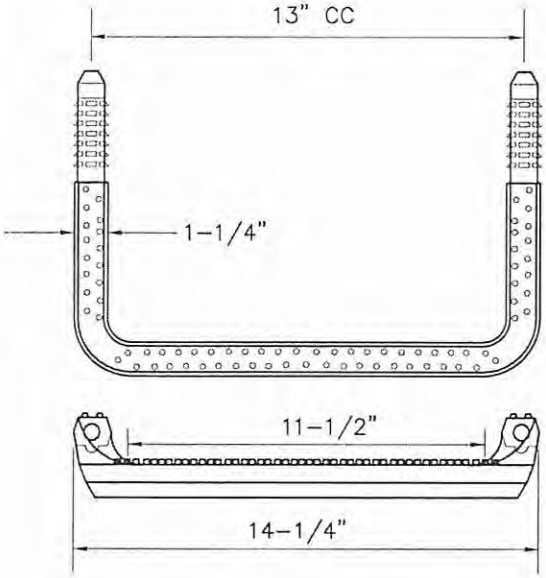


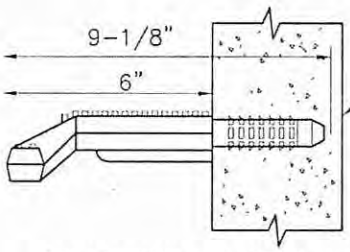
UNIMPROVED (UN–PAVED) AREAS



PAVED AREAS

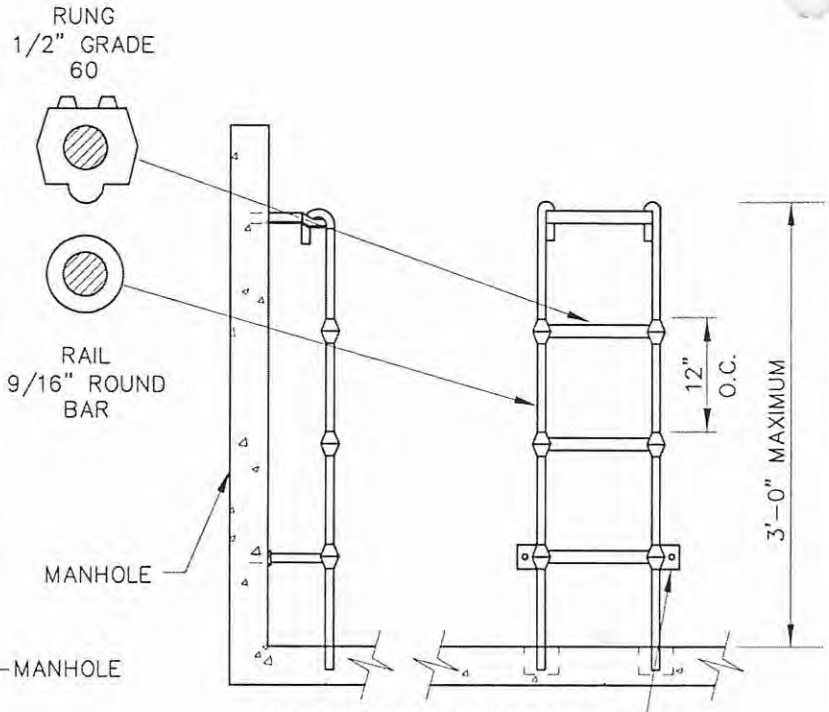
Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS5 MANHOLE FRAME COLLAR





POLYPROPYLENE STEP, LANE NO. P-13938 OR EQUAL

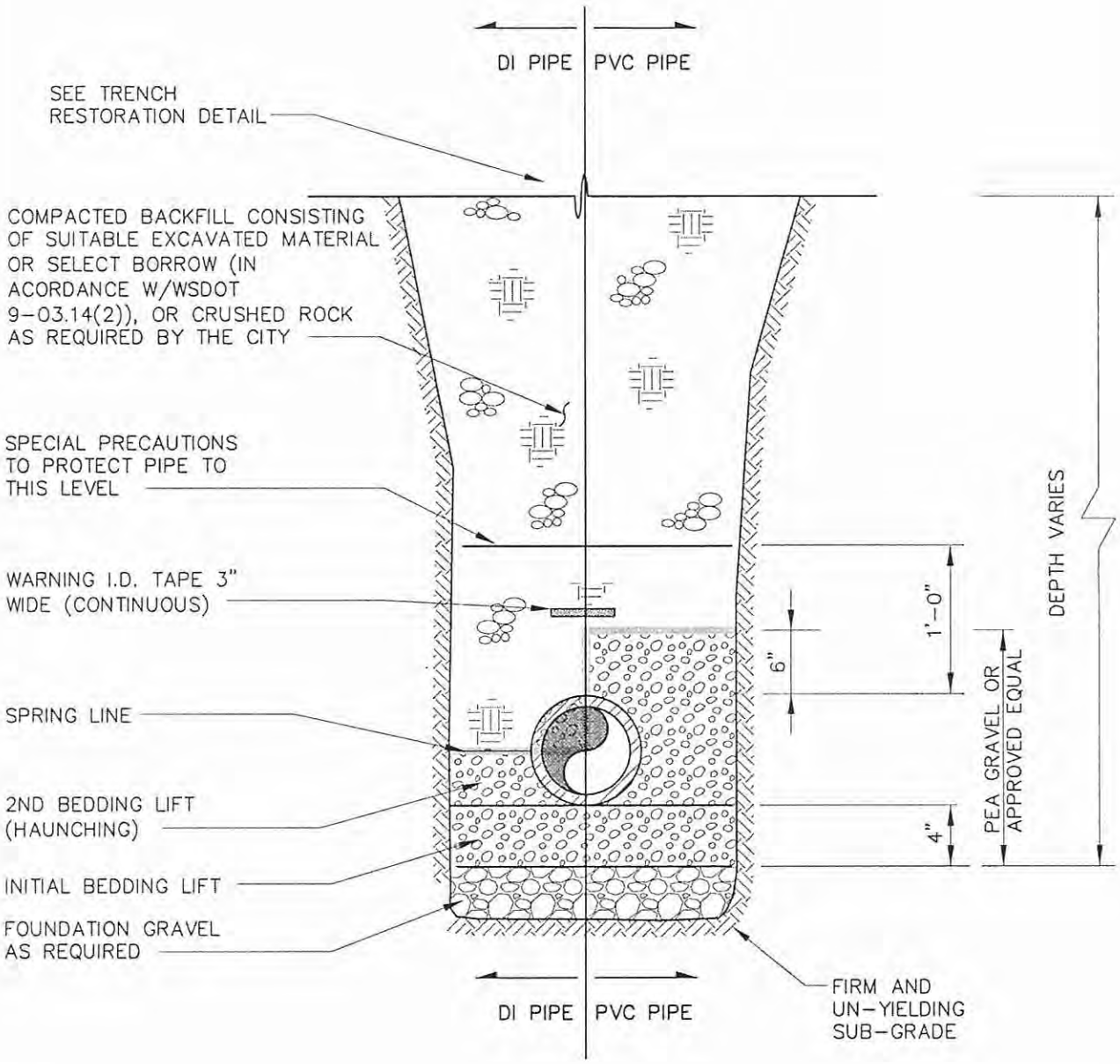
POLYPROPYLENE MANHOLE STEPS



LADDER SHALL CONFORM TO POLYPROPYLENE ASTM D-4101 1/2" GRADE 60 REINFORCING BAR A-615 9/16" COLD DRAWN BAR C-1018

POLYPROPYLENE LADDER

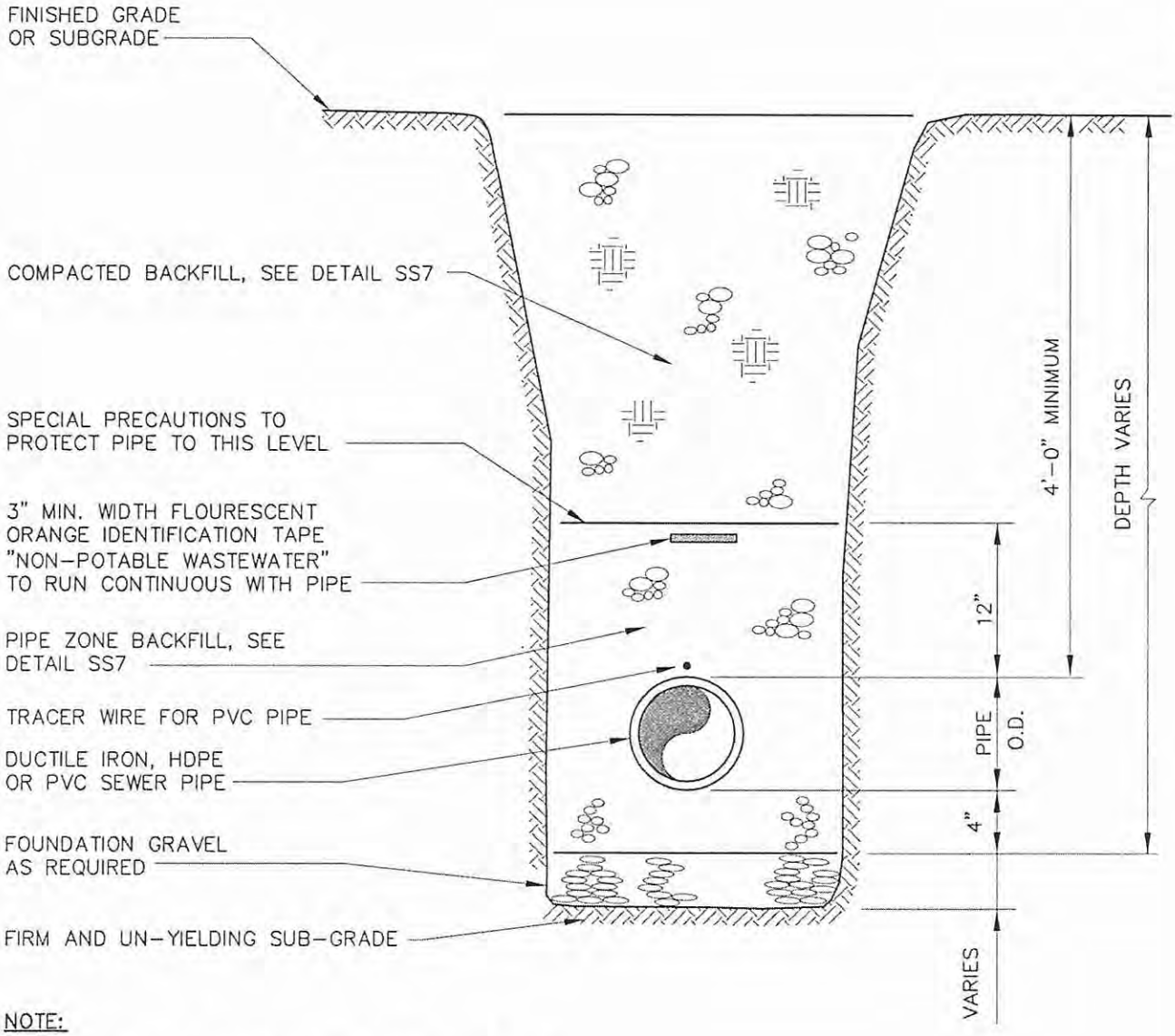
Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS6 POLYPROPYLENE LADDER AND MANHOLE STEPS



NOTE:

1. TRENCH SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH WSDOT 7-08.3(3).
2. BEDDING MATERIAL SHALL BE PEA GRAVEL OR APPROVED EQUAL. PIPE ZONE BACKFILL SHALL BE PEA GRAVEL (OR APPROVED EQUAL) TO THE SPRING LINE FOR DUCTILE IRON PIPE AND TO A DEPTH OF 6" ABOVE THE CROWN FOR PVC PIPE AS SHOWN ABOVE.

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS7 SANITARY SEWER TRENCH SECTION



NOTE:

TRACER WIRE (10 GA) SHALL BE TERMINATED IN A MANHOLE, VAULT, OR OTHER APPROVED LOCATION ON A TERMINAL BLOCK WITHIN 18" OF THE LID OR RIM OF THE STRUCTURE.

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS8 PRESSURE LINE AND FORCE MAIN TRENCH SECTION

CONNECTING TAPS ON EXISTING SEWER MAINS

1. THE TEE FITTING SHALL BE A ROMAC INDUSTRIES STYLE "CB" SEWER SADDLE (OR APPROVED EQUAL). ONLY NEW SADDLE AND PARTS SHALL BE INSTALLED. DUE TO PIPE SIZE, MATERIALS OR PIPE CONDITION, THE CITY ENGINEER MAY REQUIRE AN ALTERNATE METHOD/MATERIAL BE USED.

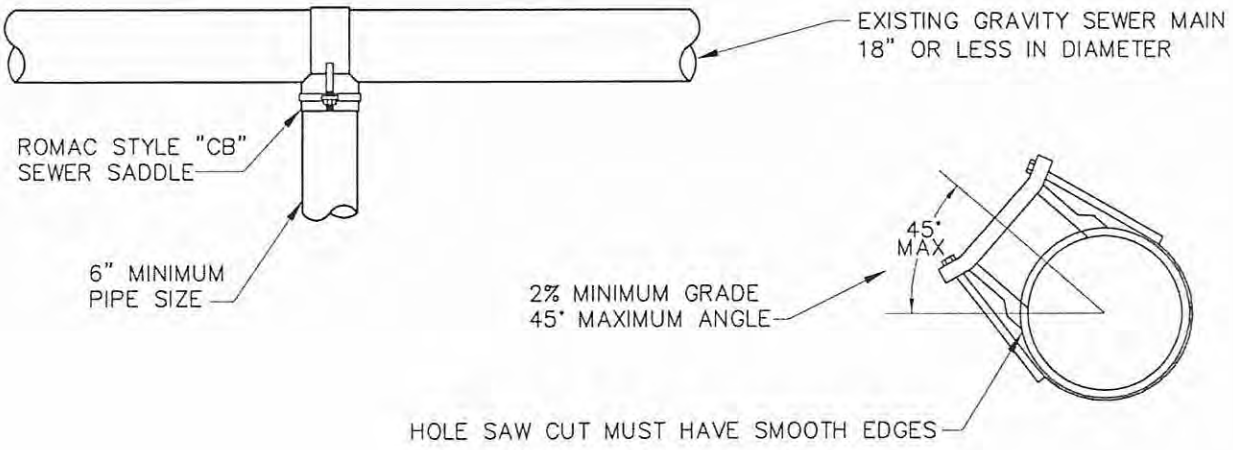
2. THE SEWER MAIN TAP SHALL BE CUT WITH A SEWER PIPE TAPPING MACHINE (HOLE SAW) CAPABLE OF RETAINING THE COUPON.

3. THE ROUND HOLE CUT INTO THE SEWER MAIN SHALL BE NO LARGER THAN THE INSIDE DIAMETER OF THE SADDLE GASKET. THE HOLE SAW CUT EDGES SHALL BE SMOOTH.

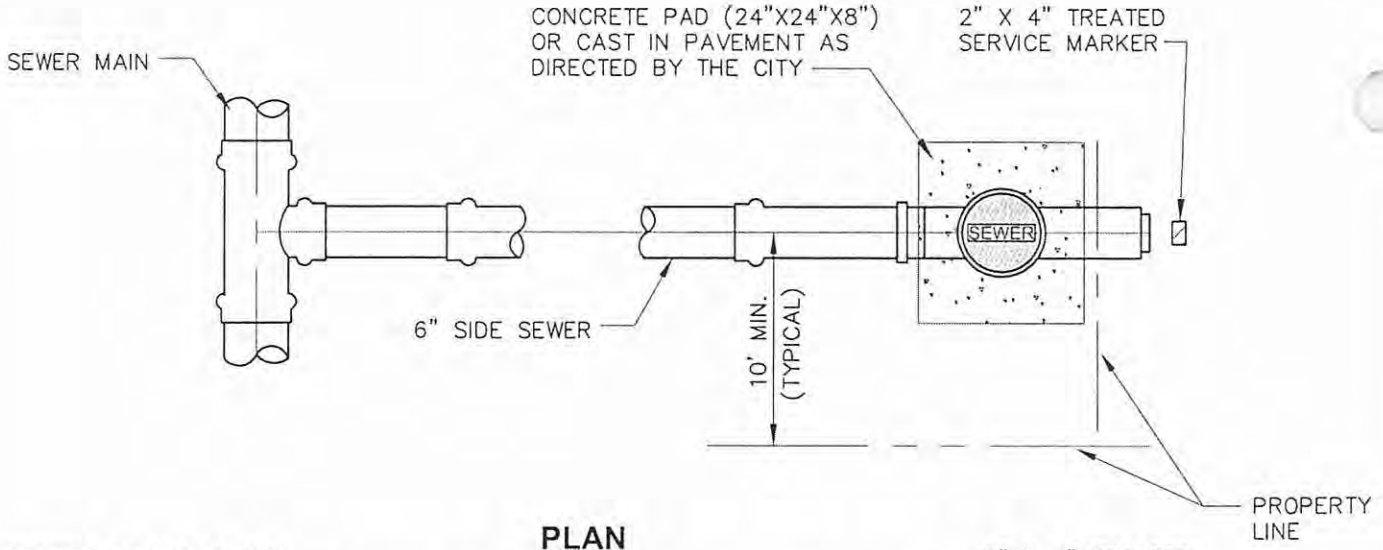
4. THE COUPON SHALL BE RETAINED AND SURRENDERED TO THE INSPECTOR. THE DEVELOPER WILL PAY ALL COSTS ASSOCIATED WITH THE LOCATION AND RETRIEVAL OF A LOST COUPON. ADDITIONALLY THE DEVELOPER WILL BE HELD LIABLE FOR ANY SUBSEQUENT DAMAGES CAUSED BY A LOST COUPON.

5. BOLTS SHALL BE TORQUED TO MANUFACTURER SPECIFICATIONS, THEN RETORQUED AFTER 10 MINUTES.

6. NO TAPS SHALL BE ALLOWED ON EXISTING SEWER MAINS OVER 18" IN DIAMETER. CONNECTIONS INTO SEWER MAINS OVER 18" IN DIAMETER SHALL INTERSECT THE SEWER MAIN IN A MANHOLE, UNLESS OTHERWISE APPROVED BY THE CITY.



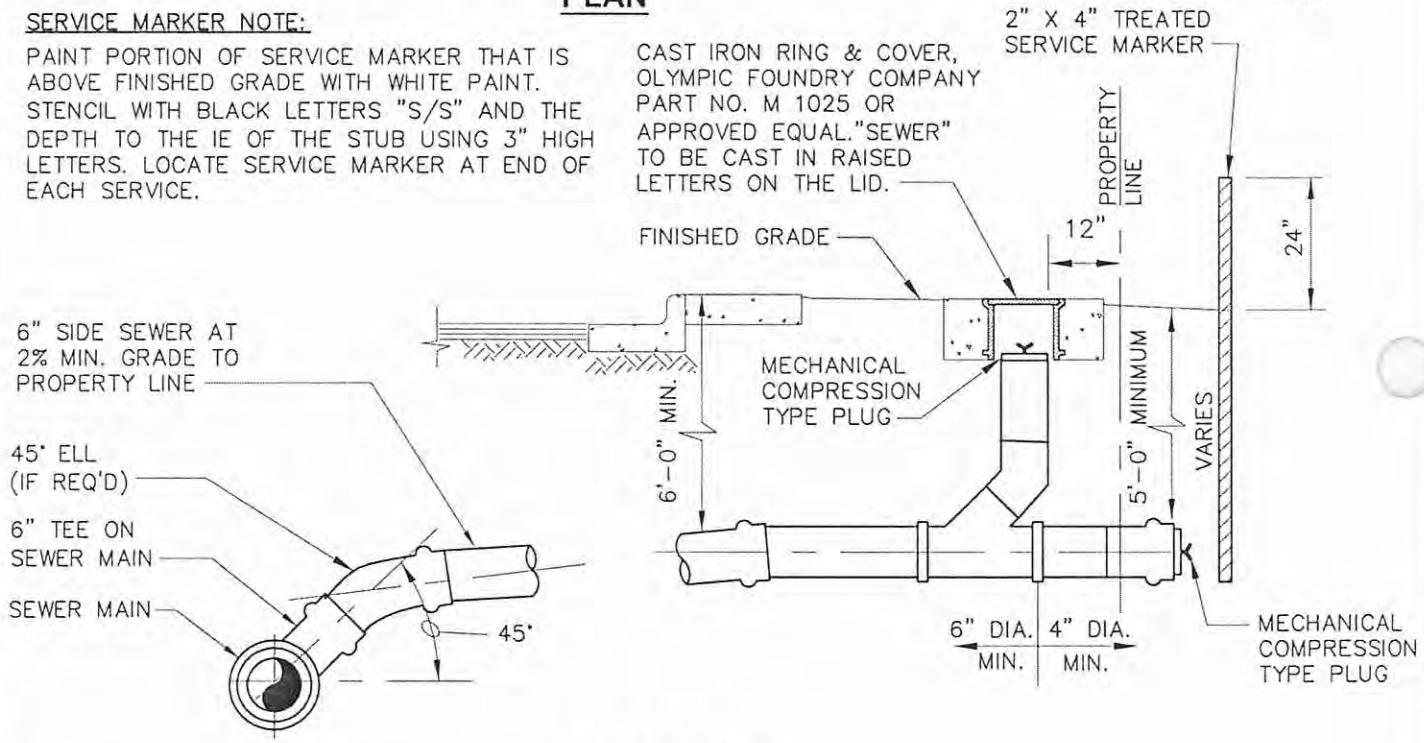
Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS9 SEWER MAIN TAP



PLAN

SERVICE MARKER NOTE:

PAINT PORTION OF SERVICE MARKER THAT IS ABOVE FINISHED GRADE WITH WHITE PAINT. STENCIL WITH BLACK LETTERS "S/S" AND THE DEPTH TO THE IE OF THE STUB USING 3" HIGH LETTERS. LOCATE SERVICE MARKER AT END OF EACH SERVICE.

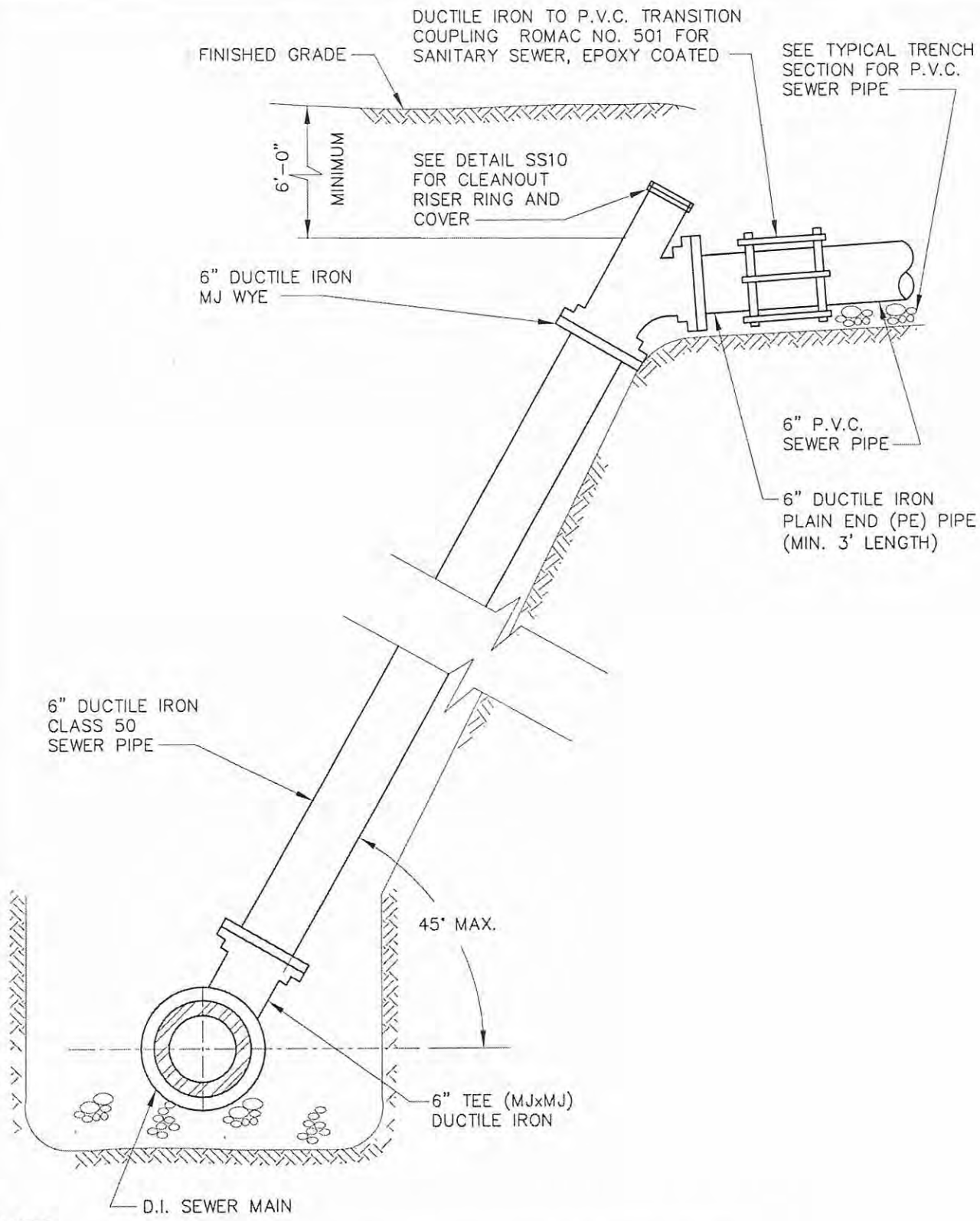


ELEVATION

NOTES:

1. MAXIMUM DEFLECTION NOT TO EXCEED PIPE MANUFACTURER RECOMMENDATIONS.
2. SIDE SEWER LATERAL SHALL BE THE SAME MATERIAL AS THE MAIN LINE SEWER (GREEN IN COLOR).
3. PIPE TO BE BEDDED IN PEA GRAVEL.
4. CONNECTIONS TO EXISTING MAINS SHALL BE MADE WITH AN APPROVED SADDLE, SEE DETAIL SS9.

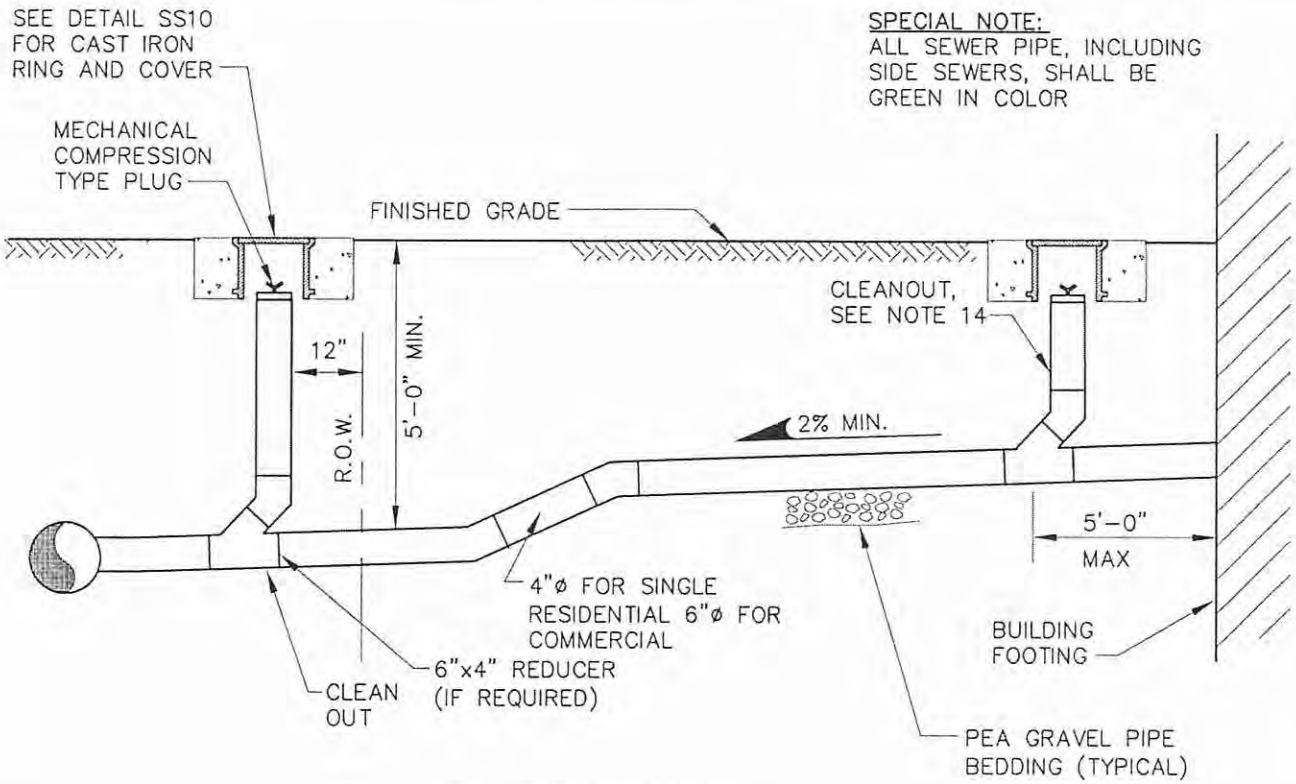
Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS10 SIDE SEWER DETAIL



NOTES:

1. STANDING SIDE SEWERS ONLY ALLOWED IN CASES WHERE THE DEPTH OF THE MAIN EXCEEDS 25-FEET.
2. SEE TYPICAL TRENCH SECTION FOR DUCTILE IRON SEWER PIPE.
3. LOCATION OF STANDING SIDE SEWERS MUST BE APPROVED BY CITY PRIOR TO INSTALLATION.

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS11 STANDING SIDE SEWER

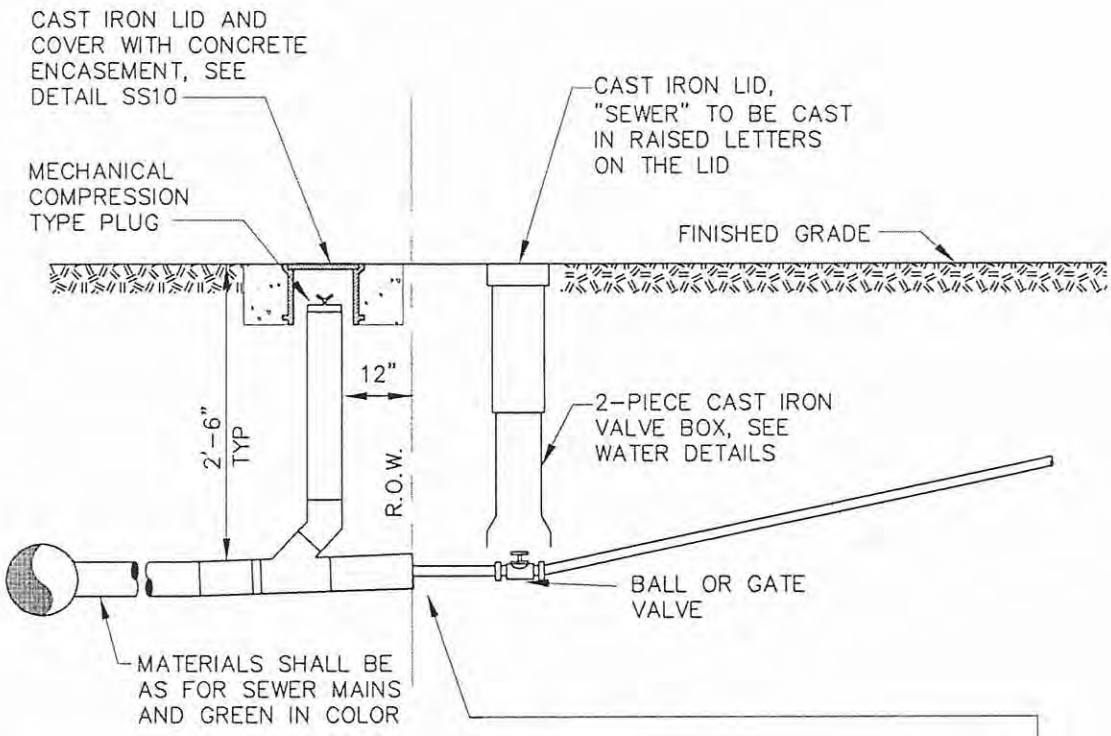


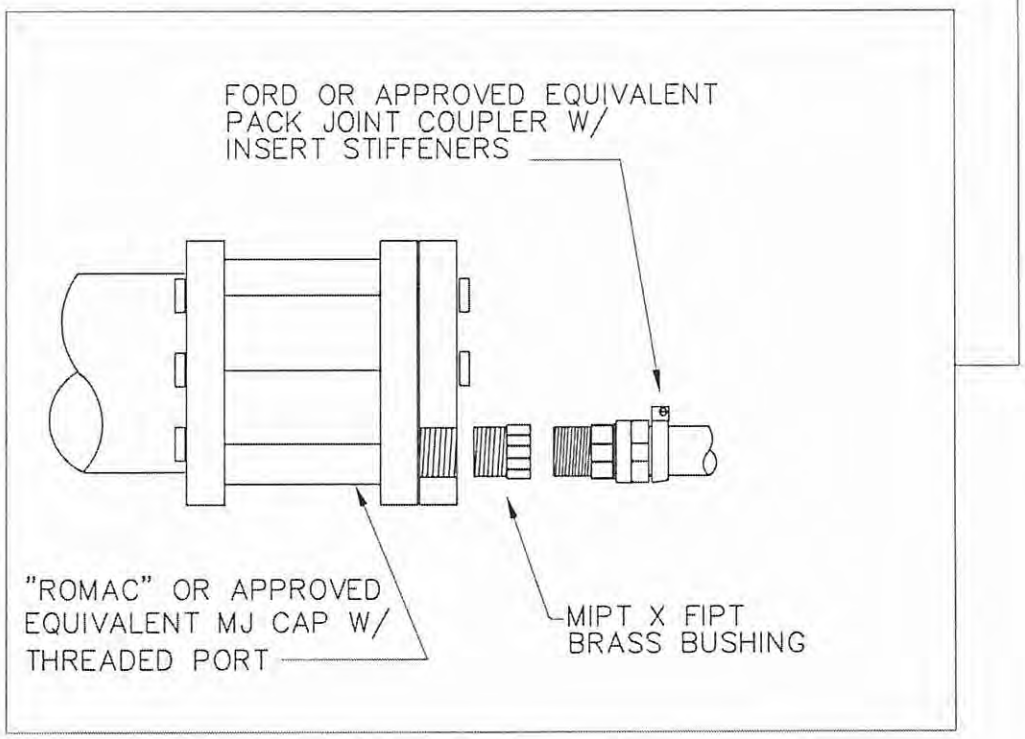
ELEVATION

NOTES:

1. AS-BUILT DRAWING SHOWING LOCATION OF SIDE SEWER IN RELATION TO THE HOUSE IS REQUIRED AFTER INSTALLATION.
2. CLEAN OUT IS REQUIRED FOR EACH PIPE LENGTH GREATER THAN 100' AND AT ALL BENDS GREATER THAN 11 1/4 DEGREES.
3. RIGHT-OF-WAY RESTORATION SHALL MATCH OR EXCEED THE ORIGINAL CONDITION.
4. BACKFILL FOR PAVED AREAS SHALL BE AS SPECIFIED IN SECTION 500 AND 600 OF THESE STANDARDS.
5. ALL PLUMBING OUTLETS SHALL BE CONNECTED TO THE SEWER. NO DOWNSPOUTS OR STORM DRAINAGE MAY BE CONNECTED TO THE SEWER SYSTEM.
6. 18" MINIMUM COVERAGE OF PIPE.
7. 5' MINIMUM COVERAGE AT PROPERTY LINE.
8. LAY PIPE IN STRAIGHT LINE BETWEEN BENDS. MAKE ALL CHANGES IN GRADE OR LINE WITH AN ELBOW OR WYE. 90° CHANGE WITH AN ELBOW AND WYE.
9. 6" SEWER PIPE MINIMUM SIZE IN RIGHT-OF-WAY 2% MINIMUM GRADE, 45% MAXIMUM.
10. 4" SEWER PIPE MINIMUM SIZE ON PRIVATE RESIDENTIAL PROPERTY. 6" SEWER PIPE MIN. SIZE ON COMMERCIAL PROPERTIES. 2% MINIMUM GRADE, 45° MAXIMUM.
11. CONSTRUCTION IN RIGHT-OF-WAY SHALL BE PERFORMED BY A REGISTERED LICENSED CONTRACTOR.
12. ALL CONSTRUCTION REQUIRES A PERMIT AND PAYMENT OF FEE. COMPLETE LEGAL DESCRIPTION OF PROPERTY AND DIMENSIONS.
13. BENDS SHALL NOT BE GREATER THAN 45°.
14. CLEANOUT SHALL HAVE CAST IRON FRAME AND COVER CAST INTO A 24" x 24" x 8" CONCRETE COLLAR OR BE CAST INTO PAVED AREAS, SEE DETAIL SS10.
15. WHEN MULTIPLE UNITS OR DWELLINGS WILL BE SERVED BY A SINGLE SIDE SEWER BACKFLOW PREVENTION IS REQUIRED FOR EACH INIDIVIDUAL SERVICE.
16. A SEPARATE SERVICE LINE IS REQUIRED FOR EACH DETACHED UNIT WHETHER LOCATED ON A SINGLE PARCEL OR MULTIPLE PARCELS. NO MORE THAN ONE (1) RESIDENTIAL UNIT MAY BE SERVED BY A 4" DIA. SERVICE LINE AND NO MORE THAN FOUR (4) UNITS MAY BE SERVED BY A 6" DIA. SERVICE LINE.

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS12 PRIVATE SIDE SEWER INSTALLATION

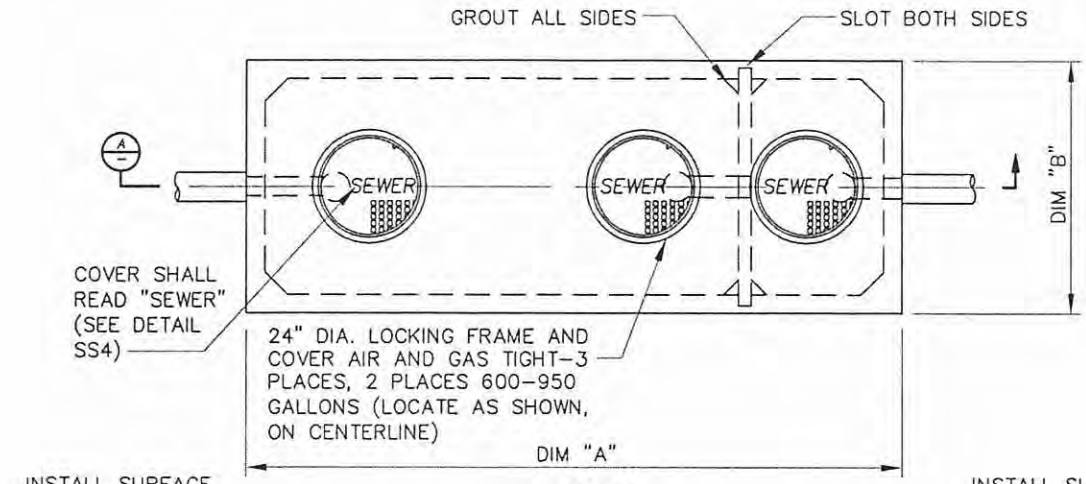




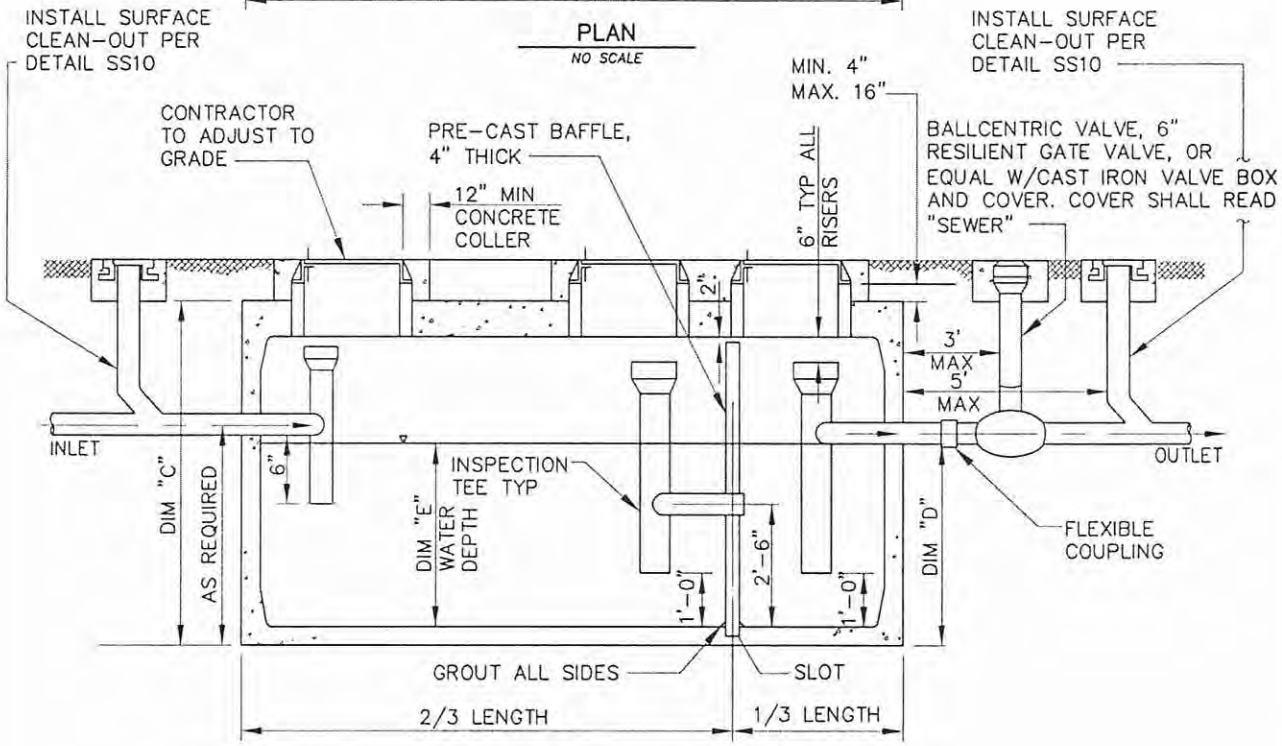
NOTE:

CHECK VALVE REQUIRED BETWEEN PUMP AND BALL VALVE

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS13 SMALL DIAMETER FORCE MAIN CONNECTION



PLAN
NO SCALE



SECTION A
NO SCALE

(INTERIOR PIPING SHOWN FULL SECTION FOR CLARITY)

GALLON CAPACITY	600	750	950	1000	1250	1500	1750	2000	2500	2750	3000	4000	5000	6000
DIM "A"	7'-0"	7'-0"	7'-0"	9'-0"	9'-0"	11'-2"	11'-2"	12'-8"	12'-8"	12'-8"	15'-7"	15'-7"	19'-11"	19'-11"
DIM "B"	4'-8"	4'-8"	4'-8"	5'-0"	5'-0"	5'-8"	5'-8"	6'-8"	6'-8"	6'-8"	9'-7"	9'-7"	9'-11"	9'-11"
DIM "C"	7'-0"	7'-0"	7'-0"	7'-2"	7'-2"	7'-2"	7'-2"	8'-0"	8'-0"	8'-0"	8'-6.5"	8'-6.5"	8'-11"	8'-11"
DIM "D"	3'-6"	4'-3"	5'-3"	4'-2"	5'-2"	4'-4"	4'-11"	4'-7"	5'-6"	6'-0"	5'-0"	6'-3"	6'-2"	7'-2"
WATER DEPTH DIM "E"	3'-2"	3'-11"	4'-11"	3'-10"	4'-10"	4'-0"	4'-7"	3'-10"	4'-9"	5'-3"	3'-9"	5'-0"	4'-9"	5'-9"

Rev No.	Revisions	Date
1	Added Inlet Clean-Out	03/17/07

Approved: June 17, 2005
City Engineer Date

SANITARY SEWER STANDARD DETAIL

City of BONNEY Lake

Dwg No: SS14

GREASE INTERCEPTOR

EXTERIOR GREASE INTERCEPTOR NOTES:

1. LOCATE STRUCTURE ADJACENT TO DRIVE FOR ACCESS BY MAINTENANCE VEHICLE AND A MINIMUM OF 5-FEET FROM ANY BUILDING FOUNDATION.
2. FILL WITH CLEAN WATER PRIOR TO START UP OF SYSTEM.
3. INTERCEPTOR AND APPURTENANCES TO CLEANOUT SHALL BE MAINTAINED BY PRIVATE OWNER AND AN ANNUAL MAINTENANCE REPORT SHALL BE SUBMITTED TO THE CITY OF BONNEY LAKE.
4. CONNECTIONS TO VAULT WALLS WITH PVC PIPE SHALL BE MADE USING KOR-N-SEAL BOOT OR EQUAL. SEAL ALL PIPE CONNECTIONS WITH NON-SHRINK GROUT.
5. 6" PVC SHALL BE USED THROUGHOUT. TYPE OF PIPE PER CITY OF BONNEY LAKE STANDARDS.
6. TOP OF "TEES" TO BE KEPT OPEN.
7. A BALLCENTRIC VALVE SHALL BE LOCATED IN THE DISCHARGE PIPING, A MAXIMUM OF 3 FEET FROM THE GREASE INTERCEPTOR UPSTREAM OF THE CLEANOUT. THIS VALVE SHALL BE CLOSED WHEN CLEANING OR SERVICING THE DEVICE.
8. GRAY WATER ONLY. BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER. A CLEAN-OUT SHALL BE INSTALLED DOWNSTREAM OF BALLCENTRIC VALVE PER DETAIL SS10.
9. THE PLANS SHALL ILLUSTRATE PROPERTY BOUNDARIES, PIPING/DRAINAGE DETAILS AND CONNECTIONS TO THE SANITARY SEWER. DETAIL AND ELEVATION DRAWINGS OF THE GREASE INTERCEPTOR SHALL INCLUDE UPC APPENDIX 'H' DESIGN CALCULATIONS TO SHOW CAPACITY, DETENTION TIME AND REMOVAL EFFICIENCIES.

   NO. OF MEALS/PEAK HOUR X WASTE FLOW RATE X RETENTION TIME X STORAGE FACTOR = CAPACITY IN GALLONS
10. EFFLUENT FROM GREASE INTERCEPTORS SHALL NOT EXCEED 100 mg/l FAT, OIL AND GREASE DISCHARGED TO THE SANITARY SEWER.
11. GREASE INTERCEPTORS INSTALLED IN PAVED AREAS SHALL COMPLY WITH H-20 LOADING.
12. PLUMBING/PIPING SHALL BE CONSTRUCTED TO ESTABLISH "PARALLEL FLOW" (90 TO THE TANK BAFFLE) THROUGH THE GREASE INTERCEPTOR. NO RADIUS, BEND OR ELBOW SHALL BE ALLOWED IN THE INLET PIPE, FOR A MINIMUM OF 10 FEET OR 20 PIPE DIAMETERS, WHICHEVER IS GREATER, UPSTREAM OF THE INTERCEPTOR.
13. VENTING OF THE INTERCEPTOR SHALL BE IN ACCORDANCE WITH THE CURRENT UNIFORM PLUMBING CODE.
14. FINAL INSPECTION IS REQUIRED BY THE CITY OF BONNEY LAKE PRIOR TO CONNECTION TO THE SANITARY SEWER.
15. CONCRETE: 28 DAY COMPRESSIVE STRENGTH fc = 4500 psi
16. REBAR: ASTM A-615 GRADE 60
17. MESH: ASTM A-185 GRADE 65
18. DESIGN: ACI-318-83 BUILDING CODE ASTM C-857 "MINIMUM STRUCTURAL DESIGN LOADING FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES"

Approved: June 17, 2005 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS14 GREASE INTERCEPTOR

CITY SUPERVISORY CONTROL SYSTEM

PUMP STATION CONTROL PANEL

FIELD

HIGH/HIGH LAHH 10

LOW/LOW LALL 10

OVER RUN KA 01

RUNNING YI 01C

OVER RUN KA 02

RUNNING YI 02C

INTRUSION ZA 43

PUMP 1 FAILURE ZA 21B

PUMP 2 FAILURE ZA 22B

STATION ALARM FLASHING XA 50B

TOTAL FIQ 20

RATE FI 20

LOW FLOW FAL 20

GEN RUNNING YA 41A

GEN TROUBLE YA 41B

GEN FAILURE YA 41C

GEN LOW FUEL YA 41D

UTILITY POWER FAILURE YA 42A

OPERATING ON GEN YA 42B

PHASE FAILURE YA 42C

MOISTURE MAH 01B TEMP TAH 01B

MOISTURE MAH 02B TEMP TAH 02B

PANIC XA 40

COMM FAILURE XA 45B

COMM ENABLE XA 45B

HS 10

RUN YI 01A RDY YI 01B HOA HS 01

RUN YI 02A RDY YI 02B HOA HS 02

MAH 01A TAH 01A

MAH 02A TAH 02A

KI 01 II 01 ETM AMP

KI 02 II 02 ETM AMP

ZA 43B

ZA 43C

ZA 43A

HS 43 OO

ZA 21A

ZA 22A

FIT 20 FOI 20

HS 40

TELEMETRY

LY 10 LY 10D LY 10C LY 10B LY 10A

ATMOS

ODOR SCUBBER F-01

LSHH 10 LSH 10 LSM 10 LSL 10 LSLL 10

VERY HIGH LEVEL ALARM START BOTH PUMPS

START LAG PUMP

START LEAD PUMP

STOP BOTH PUMPS

STOP BOTH PUMPS AND VERY LOW LEVEL ALARM

ZS 43C CONT BLDG

INTRUSION SIREN

XA 50 STROBE LIGHT

A-01 GENERATOR

A-02 ATS

ZS 43B HATCH

ZS 43A HATCH

ZS 21

RS

STATION BYPASS QUICK CONNECT

FE 20

M

PIG LAUNCHER

TO FORCEMAIN

PI 21

PI 22

ZS 22

FLOW METER VAULT

VALVE VAULT

3" D

FROM BUILDING FLOOR AND SINK DRAINS

4" RS PIG LAUNCH/FORCE MAIN DRAIN

FROM SEWER COLLECTION SYSTEM

ME 01 TE 01

ME 02 TE 02

WET WELL

P-01 PUMP 1

P-02 PUMP 2

RS WET WELL FLUSH

CITY WATER

WATER METER VAULT

1" W

BACKFLOW PREVENTER

1" WN

1/2" WN

WATER HEATER

TO UTILITY SINK

TO OUTDOOR FREEZE PROOF WALL HYDRANT

INTERLOCK NOTES:

1 PUMP FAILURE ALARM WHEN PUMP IS RUNNING AND CHECK VALVE IS CLOSED FOR MORE THAN 10 SECONDS.

I-2 PUMP CONTROL-FILL AND DRAW WITH PUMPS OPERATING IN LEAD-LAG MODE. HS-10 SELECTS BETWEEN "ALT", "PUMP 1" OR "PUMP 2". WHEN "ALT" IS SELECTED, LEAD AND LAG PUMPS ARE SWITCHED EACH PUMP CYCLE. NORMALLY ONLY ONE PUMP OPERATES AT A TIME.

I-3 PUMP STATION COMMON TROUBLE ALARM. TURNS ON OUTSIDE STROBE LIGHT FOR ALL PUMP STATION ALARMS INCLUDING INTRUSION.

I-4 INTRUSION SIREN SOUNDS 30 SECONDS AFTER BUILDING DOORS OR VAULT HATCHES ARE OPENED. HS-43 DISABLES HORN ONLY.

NOTES:

1. SEE SS17 FOR LEGEND AND ABBREVIATIONS.
2. ALL EQUIPMENT NUMBERS AND INSTRUMENT LOOP NUMBERS HAVE A PREFIX NUMBER THAT IS ASSIGNED BY THE CITY OF BONNEY LAKE EG P-01= P-XX01 WHERE XX IS THE PREFIX.

Approved: October 31, 2007

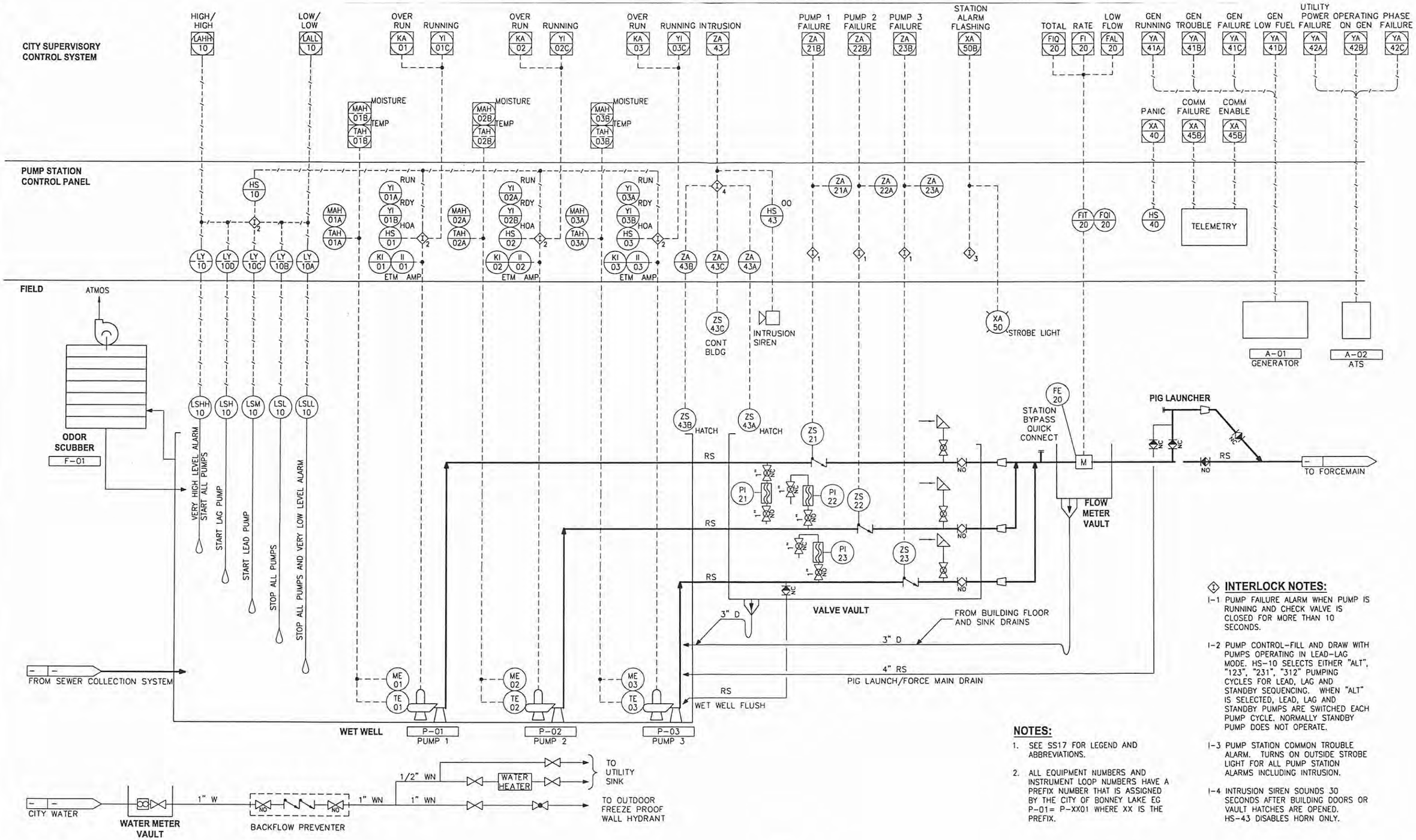
City Engineer Date

SANITARY SEWER STANDARD DETAIL

City of BONNEY Lake

Dwg No: SS15

2 PUMP SS LIFT STATION SCHEMATIC



INTERLOCK NOTES:

I-1 PUMP FAILURE ALARM WHEN PUMP IS RUNNING AND CHECK VALVE IS CLOSED FOR MORE THAN 10 SECONDS.

I-2 PUMP CONTROL-FILL AND DRAW WITH PUMPS OPERATING IN LEAD-LAG MODE. HS-10 SELECTS EITHER "ALT", "123", "231", "312" PUMPING CYCLES FOR LEAD, LAG AND STANDBY SEQUENCING. WHEN "ALT" IS SELECTED, LEAD, LAG AND STANDBY PUMPS ARE SWITCHED EACH PUMP CYCLE. NORMALLY STANDBY PUMP DOES NOT OPERATE.

I-3 PUMP STATION COMMON TROUBLE ALARM. TURNS ON OUTSIDE STROBE LIGHT FOR ALL PUMP STATION ALARMS INCLUDING INTRUSION.

I-4 INTRUSION SIREN SOUNDS 30 SECONDS AFTER BUILDING DOORS OR VAULT HATCHES ARE OPENED. HS-43 DISABLES HORN ONLY.

NOTES:

1. SEE SS17 FOR LEGEND AND ABBREVIATIONS.
2. ALL EQUIPMENT NUMBERS AND INSTRUMENT LOOP NUMBERS HAVE A PREFIX NUMBER THAT IS ASSIGNED BY THE CITY OF BONNEY LAKE EG P-01= P-XX01 WHERE XX IS THE PREFIX.

Approved: October 31, 2007
City Engineer Date

SANITARY SEWER STANDARD DETAIL

City of BONNEY Lake

Dwg No: SS16

3 PUMP SS LIFT STATION SCHEMATIC

INSTRUMENT IDENTIFICATION LETTERS (NOTE 2)

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR PROCESS VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE,RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, OR LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

GENERAL INSTRUMENT OR FUNCTION SYMBOLS (NOTE 2)

	FIELD MOUNTED	PRIMARY LOCATION, ACCESSIBLE TO OPERATOR	AUXILIARY LOCATION, ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE OR BEHIND THE PANEL
DISCRETE INSTRUMENTS				
SHARED DISPLAY, SHARED CONTROL				
COMPUTER FUNCTION				
PROGRAMMABLE LOGIC CONTROL				

C / A B / E D

A INSTRUMENT IDENTIFICATION LETTERS (SEE TABLE ABOVE)
B LOOP NUMBER
C MODIFIER
D SEQUENCE
E USER

PIPE SIZE, SERVICE, AND MATERIAL IDENTIFICATION

(FOR REFERENCE ONLY. SEE SITE AND MECHANICAL DRAWINGS)

NOMINAL PIPE DIAMETER IN INCHES — 4" RS — FLOW STREAM ABBREVIATION

LINE SYMBOLS

LINE	DESCRIPTION
	MAIN PROCESS FLOW (WITH TYPICAL DIRECTION OF FLOW SHOWN)
	MAIN (EXISTING)
	SUBSIDIARY PROCESS FLOW
	SUBSIDIARY (EXISTING)
	INSTRUMENT SUPPLY, PROCESS TAPS, NON PROCESS FLOW
// //	PNEUMATIC SIGNAL (ANALOG)
	ELECTRIC SIGNAL (ANALOG)
-X- -X-	PNEUMATIC SIGNAL (DISCRETE)
-/---/---/---	ELECTRIC SIGNAL (DISCRETE)
-x- -x-	CAPILLARY TUBE OR FILLED SYSTEM
	ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
~ ~	ELECTROMAGNETIC OR SONIC SIGNAL (UNGUIDED)
	SOFTWARE OR DATA LINK
	MECHANICAL LINK
	HYDRAULIC
120V	ELECTRIC POWER SUPPLY 120VAC, 60HZ U.N.O.
XX	SERVICE AIR OR INSTRUMENT AIR SUPPLY
	STRUCTURES AND SPECIAL EQUIPMENT

MECHANICAL — OR — CONNECTED — NOT CONNECTED — ELECTRICAL

FLOW ELEMENTS

- ORIFICE PLATE
- SINGLE PORT PITOT TUBE OR PITOT–VENTURI TUBE
- AVERAGING PITOT TUBE
- FLUME
- WEIR
- TURBINE OR PROPELLER–TYPE PRIMARY ELEMENT
- ROTAMETER
- POSITIVE DISPLACEMENT TYPE FLOW TOTALIZING INDICATOR
- VORTEX SENSOR
- TARGET TYPE SENSOR
- FLOW NOZZLE
- MAGNETIC FLOWMETER
- SONIC FLOWMETER
- DENSITY METER
- VENTURI

VALVES

- GATE VALVE
- 3 WAY VALVE
- BALL VALVE
- 3 WAY BALL VALVE
- GLOBE VALVE
- 3 WAY GLOBE VALVE
- PLUG VALVE
- ECCENTRIC PLUG VALVE
- NEEDLE VALVE
- BUTTERFLY VALVE
- DIAPHRAM VALVE
- SWING CHECK VALVE
- WAFER CHECK VALVE
- BALL CHECK VALVE
- PINCH VALVE
- REGULATED SIDE
- SELF ACTUATED REGULATING VALVE
- SELF ACTUATED REGULATING VALVE W/ EXTERNAL TAP
- COMBINATION AIR/VAC RELEASE VALVE
- PRESSURE SAFETY VALVE
- MUD VALVE
- AIR RELEASE VALVE
- VACUUM RELEASE VALVE

VALVE IDENTIFIERS

B / C / A

A = TAG
B = SIZE
C = NORMAL STATE

VALVE OPERATORS

- HAND
- M — MOTORIZED
- CYLINDER OPERATOR
- S — SOLENOID
- DIAPHRAGM

INSTRUMENT & MECHANICAL EQUIPMENT SYMBOLS & MISCELLANEOUS

- CENTRIFUGAL PUMP
- SUBMERSIBLE PUMP – RAIL MOUNTED
- VERTICAL PUMP
- METERING PUMP
- PROGRESSING CAVITY PUMP
- SUBMERSIBLE PUMP
- ROTARY PUMP
- BLOWER
- CALIBRATION CHAMBER
- SILENCER
- MOTOR
- SUBMERSIBLE MIXER
- INTAKE SCREEN/FILTER
- EXPANSION JOINT, FLEXIBLE SPOOL
- HOSE
- IXXX (E) (N) — INTERFACE CONTROL (E) = EXISTING (N) = NEW
- MIXER
- SLUICE GATE — NO NC
- FLAP GATE
- SLIDE GATE — NO NC
- STOP GATE — NO NC
- INJECTOR
- F — FILTER OR SEPARATOR
- T — DRIP TRAP
- HOSE BIBB CONNECTION
- DIAPHRAGM SEAL
- RUPTURE DISK, PRESSURE
- RUPTURE DISK, VACUUM
- IN–LINE PRESSURE SENSOR
- PUMP SEAL OR VALVE WATER SUPPLY, PLANT WATER
- FLANGE
- UNION
- Y STRAINER
- FLOW STRAIGHTENING VANE
- HOSE CONNECTION
- CAP OR PLUG
- BLIND FLANGE
- P — PURGE
- DRAIN
- THERMOWELL
- AIR COMPRESSOR
- PULSATION DAMPENER
- REDUCER
- STATIC MIXER
- HEAT TRACE
- 3 — INTERLOCK, NUMBER IS THE NOTE IDENTIFIER (NOTE 2)
- X | DWG # / DESCRIPTION — CONNECTION TO PROCESS WITHIN PROJECT
- SYSTEM CONNECTION OUTSIDE PROJECT

ABBREVIATIONS

AAS – ALKALINITY ADJUSTMENT SOLUTION
AC – ACID
AL – ALUM
AMP – AMPERE
AS – AIR SUPPLY
BW – BELT WASH WATER
BWR – BELT WASH WATER RECYCLE
CD – CONDENSATE
CDR – CONDENSER RETURN
CDS – CONDENSER SUPPLY
CP – CONTROL PANEL
CWR – CHILLED WATER RETURN
CWS – CHILLED WATER SUPPLY
D – GRAVITY DRAIN
DE – DISINFECTED EFFLUENT
DIS – DISTILLED WATER
DS – DIGESTED SLUDGE
ECR – EFFLUENT COOLING RETURN
ECS – EFFLUENT COOLING SUPPLY
ED – EQUIPMENT DRAIN
EE – ENGINE EXHAUST
EFF – EFFLUENT
ETM – ELAPSED TIME METER
ES – ELECTRICAL SUPPLY
F – FIRE SPRINKLER
FC – FAIL CLOSED
FD – FLOOR DRAIN
FE – FINAL EFFLUENT
FIL – FILTRATE
FO – FAIL OPEN
FOR – FUEL OIL RETURN
FOS – FUEL OIL SUPPLY
FV – FUEL OIL, GASOLINE OR OIL VENT
GR – GRIT
GRC – GAS RECIRCULATION
HOA – HAND–OFF–AUTO
HOH – HIGH PRESSURE HYDRAULIC OIL
HOL – LOW PREDDURE HYDRAULIC OIL
HOR – HAND–OFF–REMOTE
HRR – HEAT RESERVOIR RETURN
HRS – HEAT RESERVOIR SUPPLY
HWS – DOMESTIC HOT WATER SUPPLY
IA – INSTRUMENT AIR
I/O – ON/OFF
JOR – JOG–OFF–REMOTE
LCP – LOCAL CONTROL PANEL
LOR – LOCAL–OFF–REMOTE
LSR – LOWER–STOP–RAISE
ML – MIXED LIQUOR
MUD – MUD VALVE
MV – MOTORIZED VALVE
NaOH – SODIUM HYDROXIDE
NC – NORMALLY CLOSED
NG – NATURAL GAS
NO – NORMALLY OPEN
OA – ODORUS AIR
OF – OVERFLOW
OO – ON–OFF
OSC – OPEN–STOP–CLOSE
PA – PROCESS AIR
PD – PUMPED DRAINAGE
PLC – PROGRAMMABLE LOGIC CONTROLLER
POL – POLYMER SOLUTION
PRS – PROCESS SAMPLING
PSV – PRESSURE SAFETY VALVE
PV – PNEUMATIC VALVE
PVC – POLYVINYL CHLORIDE
RP – RAW POLYMER
RS – RAW SEWAGE
SA – SERVICE AIR
SC – SCUM
SD – SANITARY DRAIN
SE – SECONDARY EFFFLUENT
SG – SLUICE GATE
SLG – SLIDE GATE
SN – SUPERNANANT
SRS – SCREENED/DEGRITTED RAW SEWAGE
STD – STORM DRAIN
STG – STOP GATE
SV – SOLENOID VALVE
TD – TANK DRAIN
THS – THICKENED SLUDGE
TO – THICKENER OVERFLOW
TURB – TURBIDITY
UNO – UNLESS NOTED OTHERWISE
V – VENT
VAC – VACUUM
VFD – VARIABLE FREQUENCY DRIVE
W1 – POTABLE
WN – NON–POTABLE
WAS – WASTE ACTIVATED SLUDGE
WML – WASTE MIXED LIQUOR

NOTES:

1. THIS IS A GENERALIZED LEGEND SHEET. THIS PROJECT MAY NOT USE ALL INFORMATION SHOWN.
2. INSTRUMENT SYMBOLS AND IDENTIFICATION ARE BASED ON INSTRUMENT SOCIETY OF AMERICA STANDARD ANSI/ISA 5.1–1984 (R 1992)

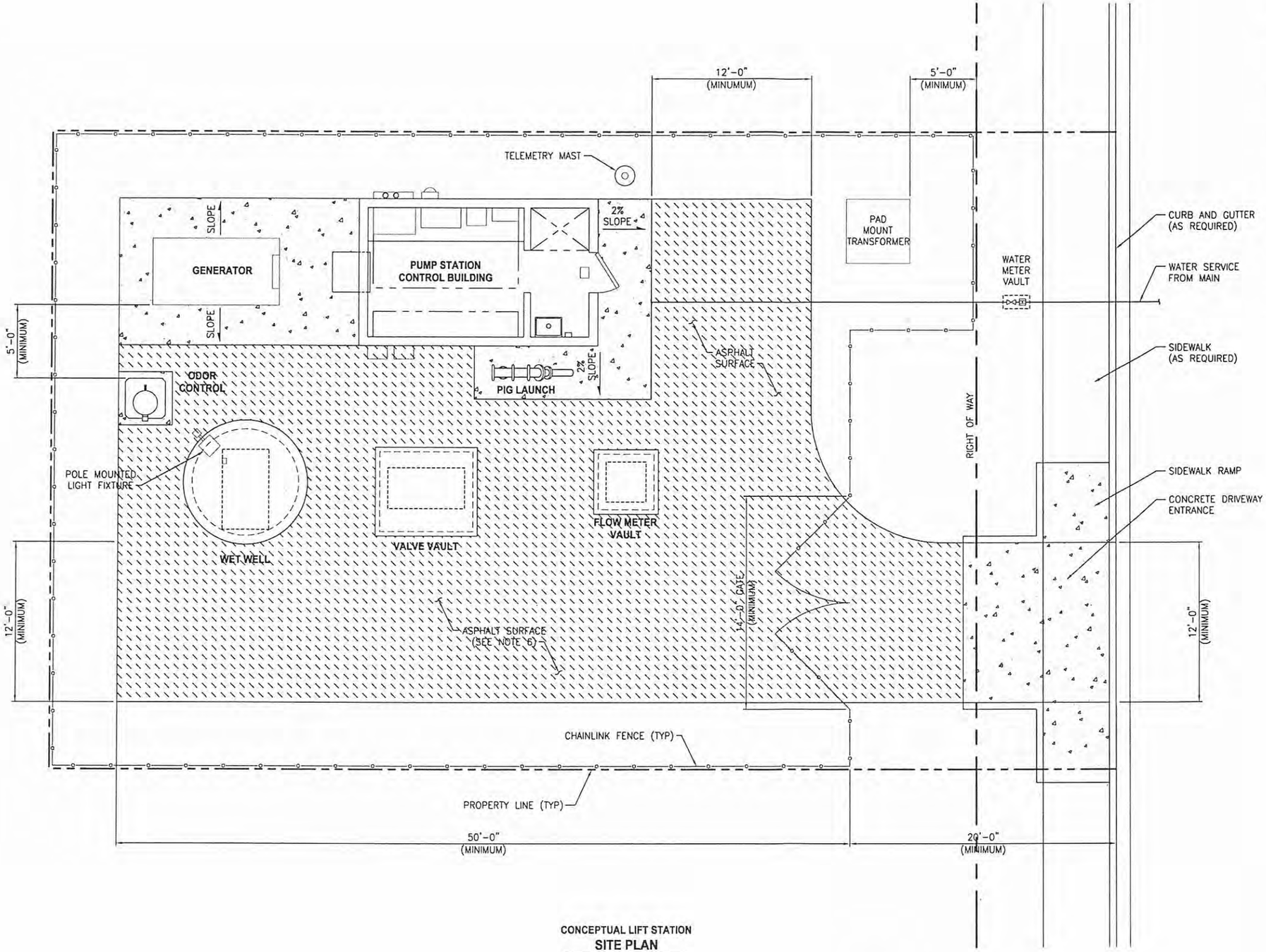
Approved: October 31, 2007
City Engineer Date

SANITARY SEWER STANDARD DETAIL

City of BONNEY Lake

Dwg No: SS17

SCHEMATIC LEGEND AND ABBREVIATIONS

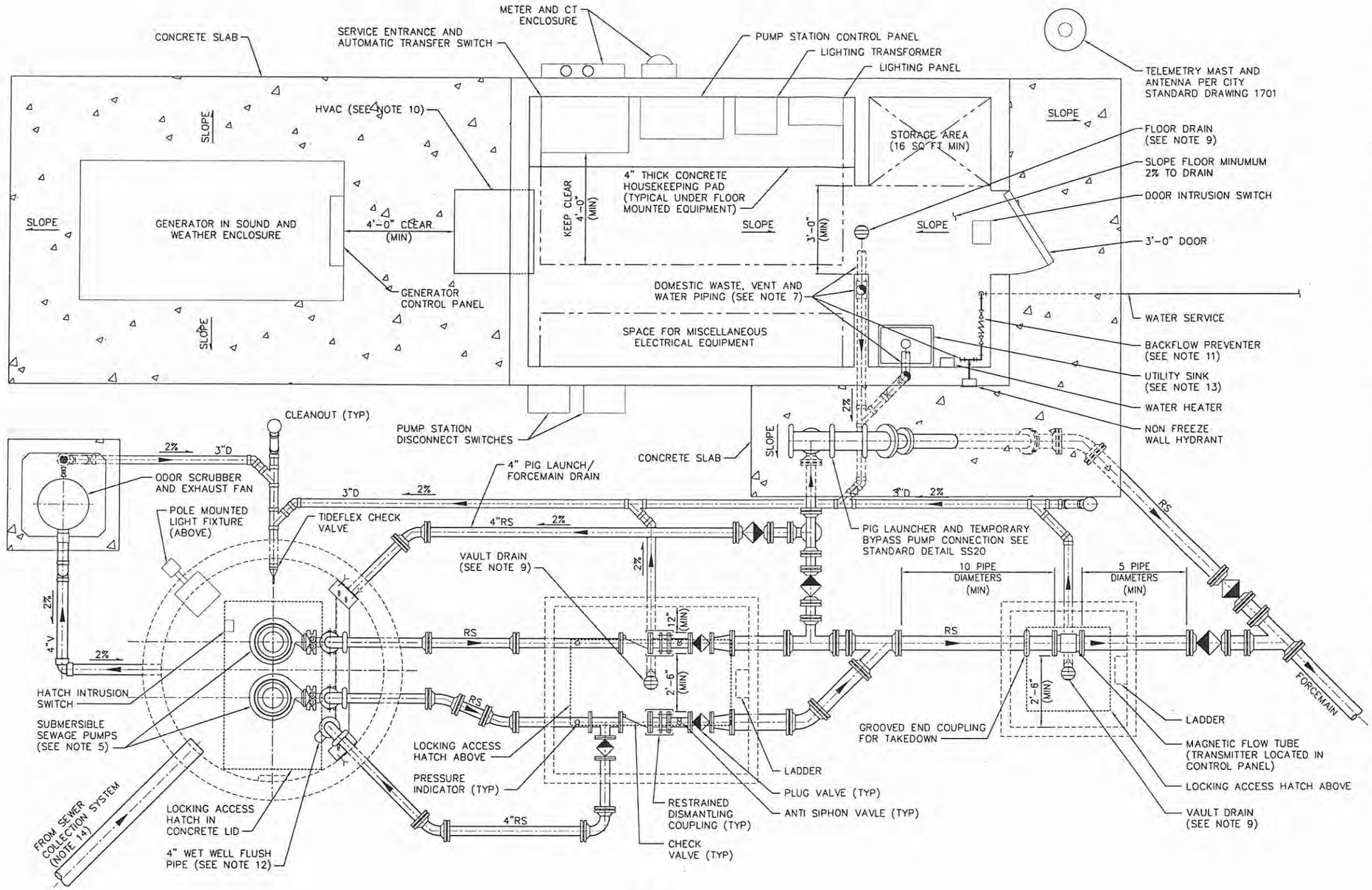


CONCEPTUAL LIFT STATION
SITE PLAN
NO SCALE

NOTES:

1. LIFT STATION SITE LAYOUT SHOWN IS THE MINIMUM REQUIREMENT PER THE CITY OF BONNEY LAKE. ACTUAL LAYOUT MAY VARY DEPENDING ON LIFT STATION SIZE AND ACTUAL SITE CONFIGURATION.
2. REFER TO CITY OF BONNEY LAKE PUBLIC WORKS DESIGN STANDARDS SECTION 515 – "SANITARY SEWER STANDARDS" FOR ADDITIONAL REQUIREMENTS NOT SHOWN.
3. SEE STANDARD DETAIL SS19 FOR CONTROL BUILDING AND UNDERGROUND PIPING LAYOUT.
4. ALL ACCESS HATCHES IN ASPHALT SURFACING SHALL BE FLUSH TO GRADE. ALL ACCESS HATCHES SHALL BE SUITABLE FOR H-20 WHEEL LOADING.
5. WATER SERVICE PIPING SHALL PER CITY OF BONNEY LAKE PUBLIC WORKS DESIGN STANDARDS SECTION 400 – "WATER SYSTEM STANDARDS".
6. ALL IMPERVIOUS SURFACES SHALL BE SLOPED TO DRAIN AWAY FROM EQUIPMENT, BUILDING, VAULTS AND WET WELL.
7. PROPERTY LINE SETBACKS NOT SHOWN. SEE ZONING REQUIREMENTS.
8. STORMWATER MITIGATION NOT SHOWN.

Approved: October 22, 2007 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: SS18	CONCEPTUAL LIFT STATION SITE PLAN



PLAN
NO SCALE

NOTES:

1. LIFT STATION BUILDING AND PIPING LAYOUT SHOWN ARE THE MINIMUM REQUIREMENTS PER THE CITY OF BONNEY LAKE. ACTUAL LAYOUT MAY VARY DEPENDING ON LIFT STATION SIZE AND SITE CONFIGURATION.
2. LIFT STATION ARRANGEMENT SHOWN IS FOR A 2 PUMP CONFIGURATION. FOR A 3 PUMP CONFIGURATION MODIFY PROCESS PIPING PER STANDARD DETAIL SS16.
3. REFER TO CITY OF BONNEY LAKE PUBLIC WORKS DESIGN STANDARDS SECTION 515 – "SANITARY SEWER STANDARDS" AND STANDARD DETAILS SS15 AND SS16 FOR ADDITIONAL REQUIREMENTS NOT SHOWN.
4. PROVIDE RESTRAINED FLEXIBLE COUPLINGS AT ALL PIPE PENETRATIONS THRU CONCRETE STUCTURES AND BUILDINGS TO ALLOW FOR DIFFERENTIAL SETTLEMENT.
5. PUMPS AND WET WELL PIPING ARRANGEMENT SHALL BE IN ACCORDANCE WITH THE HYDRAULIC INSTITUTE STANDARDS AND SHALL MEET THE REQUIREMENTS OF THE PUMP MANUFACTURER.
6. ALL UNDERGROUND PROCESS PIPE AND FITTINGS SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS. UNDERGROUND VALVES SHALL BE RESTRAINED JOINT WITH CAST IRON VALVE BOXES PER CITY REQUIREMENTS. EXPOSED PIPING SHALL BE FLANGED OR GROOVED END WITH FLANGED VALVES.
7. ALL DOMESTIC WASTE, VENT AND POTABLE WATER PIPING TO BE INSTALLED PER UNIFORM PLUMBING CODE (LATEST EDITION). PLUMBING PIPING SHOWN IS FOR REFERENCE ONLY ACTUAL PLUMBING LAYOUT MAY VARY.
8. BELOW GRADE WATER PIPING SHALL PER CITY OF BONNEY LAKE PUBLIC WORKS DESIGN STANDARDS SECTION 400 – "WATER SYSTEM STANDARDS". ABOVE GRADE WATER PIPING TO BE COPPER TYPE L WITH SOLDERED FITTINGS. ABOVE GRADE WATER VALVES SHALL BE FORGED BRASS BALL VALVES WITH SOLDERED ENDS.
9. BUILDING AND VAULT WASTE AND VENT PIPE AND FITTINGS SHALL BE SCHEDULE 40 PVC DWV (DRAIN, WASTE, AND VENT). ALL DRAINS SHALL BE EQUIPPED WITH DEEP SEAL TRAPS AND TRAPGUARDS.
10. HVAC SYSTEM SHALL BE DESIGNED PER CITY DESIGN STANDARDS AND SHALL MEET THE REQUIREMENTS OF THE UNIFORM MECHANICAL CODE AND CONSTRUCTED AND INSTALLED PER SMACNA (SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION) GUIDELINES.
11. REDUCED PRESSURE BACKFLOW PREVENTER SHALL BE PER DEPARTMENT OF HEALTH REQUIREMENTS. INSTALL MINIMUM 18" FROM FLOOR AND 6" MINUMUM FROM WALL. MAINTAIN 12" MINIMUM WORKING CLEARANCE IN FRONT OF BACKFLOW PREVENTER.
12. WET WELL FLUSH PIPE TO BE TERMINATED 12" ABOVE BOTTOM OF WET WELL WITH A 45° FITTING DIRECTED PARALLEL TO WET WELL WALL.
13. WALL MOUNTED STAINLESS STEEL UTILITY SINK WITH FAUCET (24"X20"X12"DEEP MINIMUM). PROVIDE INSTANTANEOUS ELECTRIC WATER HEATER BELOW UTILITY SINK.
14. LOCATE INFLUENT SEWER(S) ON OPPOSITE HALF OF WET WELL FROM PUMP DISCHARGE PIPES.
15. CITY OF BONNEY LAKE RESERVES THE RIGHT TO REQUIRE A TOILET ROOM IN BUILDING DEPENDING ON LOCATION OF LIFT STATION.

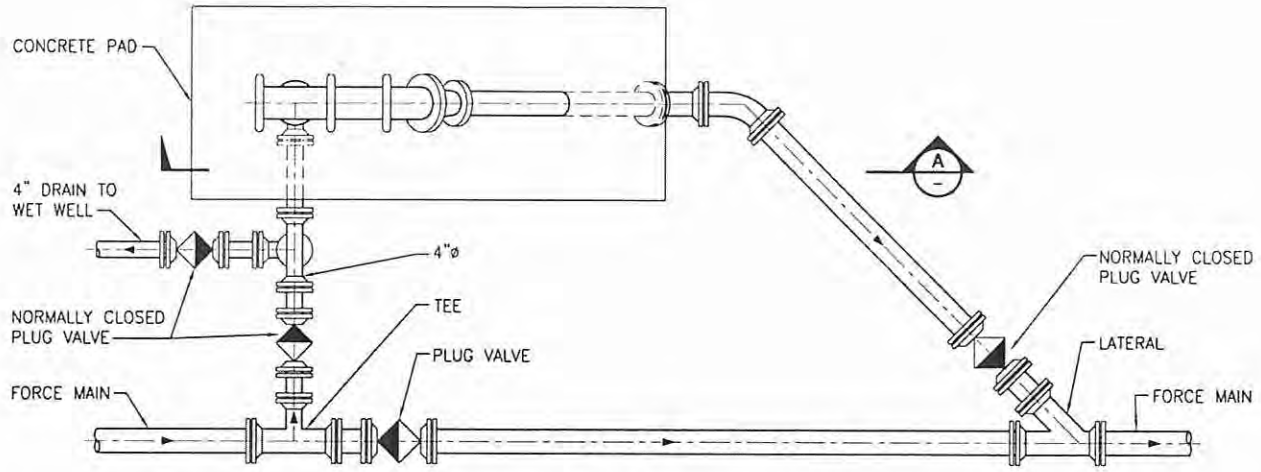
Approved: October 22, 2007
City Engineer Date

SANITARY SEWER STANDARD DETAIL

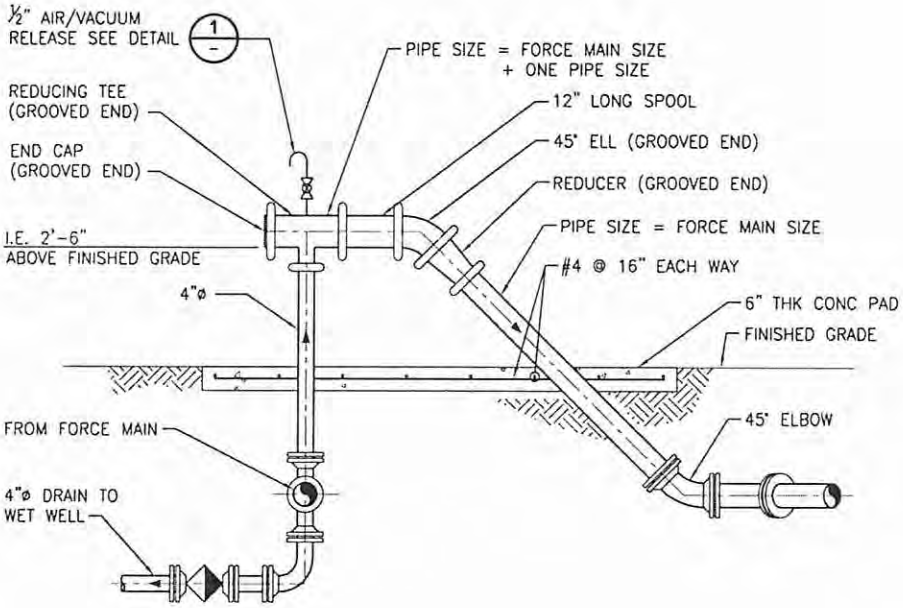
City of BONNEY Lake

Dwg No: SS19

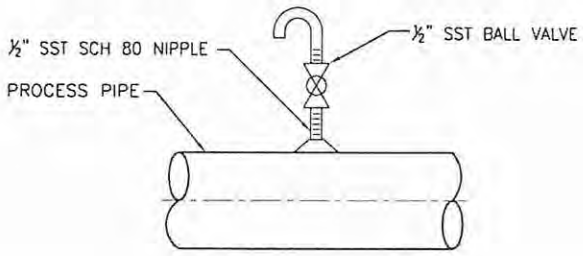
CONCEPTUAL LIFT STATION BUILDING FLOOR PLAN



PIG LAUNCH
PLAN
NOT TO SCALE



PIG LAUNCH
SECTION A
NOT TO SCALE



AIR/VACUUM RELEASE
DETAIL 1
NO SCALE

NOTES:

1. ALL UNDERGROUND PROCESS PIPE AND FITTINGS SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS. UNDERGROUND VALVES SHALL BE RESTRAINED JOINT WITH CAST IRON VALVE BOXES PER CITY REQUIREMENTS. EXPOSED PIPING SHALL BE GROOVED END WITH FLANGED VALVES.
2. PIG LAUNCH SHALL ALSO BE SUITABLE FOR TEMPORARY BYPASS PUMP CONNECTION BY CITY

Approved: October 22, 2007 City Engineer Date SANITARY SEWER STANDARD DETAIL	City of BONNEY Lake	Dwg No: **SS20** **PIG LAUNCH**