



Memo

Date: 8/22/2006

To: Mayor Cohen, Oak Harbor City Council, Connie Wheeler, City Clerk,

Cc: Cathy Rosen, Interim City Administrator, Steve Powers, Development Service Director, Phil Bleyhl, City Attorney, Engineering Division Staff, Public Works

From: Eric Johnston, PE, City Engineer

RE: Sewer Standards

Attached are the new City of Oak Harbor Standards for sewer construction inside City limits. The City of Oak Harbor Municipal Code (OHMC) under section 14.03.280 authorizes the City Engineer to set standards for the construction of private and public sewer lines and connections. These sewer standards shall take precedence over the OHMC as allowed under OHMC 14.03.280. These standards are needed to protect the public health safety and welfare and are consistent with local and industry wide standards of engineering and construction practices. These standards were prepared by engineering division staff and were routed to local engineering and construction companies for review and comment.

These standards will become effective September 11, 2006 unless abrogated by the City Council as outlined in OHMC 14.03.280. Electronic versions of the standards will be available on the City website as Adobe Acrobat (pdf) files. Print versions and alternate forms will be available in the Engineering Division.

These sewer standards are labeled as Chapter 4 of the Development Standards Handbook which is currently under development. The remaining chapters covering water, street and storm drainage improvements are currently in various stages of draft and review and are not ready for release at this time.

Please contact me at 360-279-4522 if you have any questions.

4 Sewer Systems

4.1 General Requirements

The standards established by this chapter are intended to represent the minimum standards for the design and construction of sanitary sewer facilities and are authorized per OHMC 14.03.280. Greater or lesser requirements may be mandated by the City due to localized conditions. Washington State Department of Ecology's Criteria for Sewage Works Design (Orange Book) and the current version of the Washington State Department of Transportation (WSDOT) and American Public Works Association (APWA) Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT Standard Specs) shall be used for design of system connections, extensions, and/or modifications. Where the Orange Book and WSDOT Standard Specifications use the passive verb forms "should, can or may", the City of Oak Harbor has, as a general rule, substituted the active verb forms "shall, will and must".

Where design or construction requirements conflict or information is omitted, the order of precedence of reference application used shall be the following:

1. City of Oak Harbor Development Standards
2. Oak Harbor Municipal Code
3. The current version of the WSDOT Standard Specifications
4. The Washington State Department of Ecology's Criteria for Sewage Works Design, commonly referred to as the "Orange Book"

Special or unique circumstances may cause the City Engineer to allow or require deviations from the above design and construction requirements.

4.2 Consistency with Comprehensive Plan

All public sewer mains, lift station and appurtenant facilities shall be planned, designed and constructed consistent with the most recent version of the City of Oak Harbor Comprehensive Sewer Plan and amendments or updates thereto.

Where extension of the public system occurs in an area not served by the Oak Harbor Sanitary Sewer System (OHSS), the system shall be designed to serve the basin(s) as outlined in the Comprehensive Sewer Plan. Gravity mains, interceptors or laterals shall be designed and constructed for the ultimate build out of the basin to be served. Mains and manholes shall be constructed at sufficient depth to allow for the basin to be served. Pump stations and force mains shall be likewise constructed to serve the entire basin.

The City may consider improvements that deviate from the Comprehensive Sewer Plan on a case by case basis. A variance will be granted only upon a finding that, because of the size of the tract to be subdivided, its topography, the condition or nature of adjoining areas, or the existence of unusual physical conditions, strict compliance with the comprehensive sewer plan would cause unusual and unnecessary hardship on the Proponent.

4.3 Service Area

The City of Oak Harbor Sanitary Sewer Service area is defined, as general policy, by the Oak Harbor Municipal Code as the current City limits.

Within the corporate City limits where a public sewer is available it must be used except as allowed by OHMC 14.03.060. "Available" is generally defined as the existence of a main within 200-ft of the property to be served. If there is no main along the property frontage, the main shall be extended to and along the property frontage.

New septic systems within the Oak Harbor City limits are not allowed on existing parcels if a public sewer is available for connection. New lots created through a subdivision, short plat or other land use action shall provide sewer connection to each new lot.

4.4 Construction Plans and Plan Review

Detailed engineering plans prepared by an Engineer licensed in the State of Washington shall be submitted for the City's review. The plans shall indicate the location, size, and the type of pipe material for the proposed sewers and the connection with existing sewers. Submitted plans and the associated profiles shall show:

1. Location of existing or proposed streets, rights-of-way, easements, utilities, sewers and all significant surface features.
2. Existing and proposed 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. In addition, plans shall show the locations of associated facilities such as cleanouts, traps, interceptors, sampling facilities and fixtures to be connected therewith.
3. Where there is a question as to whether the proposed sewer main is sufficiently deep to serve all residential or commercial facilities, the elevation and location of the basement floor, if basements are served, shall be plotted on the profile. The engineer shall confirm in writing, that all

sewers are sufficiently deep to serve adjacent basements, except where otherwise noted on the plans.

4. All known existing utilities and structures, both above and below ground, including but not limited to, water mains, gas mains, storm drain, overhead and underground power lines, telephone lines, and television cables.
5. Details which clearly show special sewer joints and cross-sections, and sewer appurtenances such as manholes, trenching, pavement restoration, backfill and bedding and other related items as well as all other items as required by the City to clearly identify construction materials, and methods.
6. Sewer plans and profiles shall be drawn at commonly accepted horizontal and vertical scales.

4.4.1 General Notes

The following general notes are to be included on **ALL** sanitary sewer construction plans submitted to the City of Oak Harbor Engineering Division for review.

1. All workmanship and materials shall be in accordance with City of Oak Harbor Utility Standards and the most recent copy of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.
2. City of Oak Harbor datum, NGVD 1929 Mean Sea Level (MSL) plus 100.00 feet, shall be used for all vertical control [0.00,ft. NGVD 1929 Mean Sea Level = 100.00 ft., City of Oak Harbor Datum].
3. All approvals and permits required by the City of Oak Harbor shall be obtained by the Contractor prior to the start of construction. All Contractors working within City Limits are required to have a City of Oak Harbor business license and be bonded and insured.
4. Contractor shall perform the work in compliance with all federal and state safety regulations, including, but not limited to, trenching and confined space entry.
5. A preconstruction meeting shall be held with the City of Oak Harbor Engineering Inspector prior to the start of construction. Requests to schedule preconstruction meetings shall be in advance of the meeting date by 7 calendar days.
6. The City of Oak Harbor Engineering Division shall be notified a minimum of 48 hours in advance of a tap or connection to an existing sanitary sewer main. The inspector shall be present at the time of the tap or connection.
7. The Contractor shall be fully responsible for the location and protection of all existing utilities. The Contractor shall verify all utility locations prior

- to construction and call the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation.
8. For pipe diameters 12-inches or less and depths up to 15-ft, all gravity sewer pipe shall be PVC, ASTM D 3034 SDR 35 with flexible gasketed joints. Installation shall comply with WSDOT Standard Specs, Section 7-17 .
 9. Precast manholes shall meet the requirements of WSDOT Standard Specs 9-12.4. Joints shall be rubber gasketed conforming to WSDOT Standard Specs 9-04.4. Lift holes shall be grouted both on the outside and inside of the manhole. Manholes frames and covers shall be Olympic Foundry MH52, or equivalent.
 10. Side sewer services shall be PVC, ASTM D 3034 SDR 35 with flexible gasketed joints. Side sewer connections shall be made by a tap to an existing main or a 90-degree sanitary tee from a new main connected above the spring line of the pipe. Connections to existing mains shall be made by machine tap and shall use a fully gasketed fitting, Romac Style “CB” sewer saddle or equivalent.
 11. Side sewers shall be installed at the time of new sewer main installation and shall be coordinated for clearance with power, telephone, and other utilities.
 12. All sewer mains shall be field staked for grades and alignment prior to construction by, or under the direction of, a licensed engineer or licensed surveyor qualified to perform such work. Prior to constructing any sewer, the lot corners shall be staked and sewer line location established by survey.
 13. All sewer pipe, both mains and side sewers, shall be installed with continuous 12-gauge green insulated tracer wire. Side sewer tracer wires shall be brought to the surface and wrapped around the side sewer marker.
 14. Each side sewer location shall be marked with a pressure treated 2x4 marker. The marker shall be a minimum of 4-feet long and shall extend a minimum of 1-foot above the ground surface. Marker shall be placed in contact with the end of the side sewer stub. A 2x4 cleat shall be nailed to the bottom of marker to prevent withdrawal. Above the ground surface, the marker shall be painted “green” with “S/S” and the depth to the side sewer shall be indicated, in feet, stenciled in black letters 2-inches in height.
 15. All side sewers shall be installed 10 feet into each lot as shown on the approved sewer plan and staked at the upstream end. Inspection tees shall be installed within the standard utility easement that fronts the property per the City’s Standard Detail, “Typical Side Sewer”.
 16. All pipes shall be installed in accordance with WSDOT Standard Specifications for Section 7-08.3 except where City Standard Trench Details exceed WSDOT bedding and backfill specifications. Installation of pipe shall include necessary leveling of the trench bottom or foundation

materials as well as placement and compaction of required bedding material to uniform grade so that the entire length of the pipe will be supported on a uniformly dense unyielding base.

17. Sediment laden water, gravel, rocks, soil, trash, or other debris accumulated during construction shall be removed from the new sewers and shall not be permitted to enter the existing system. A plug, cap or screen shall be installed to prevent such debris from entering the existing system.
18. The Contractor shall be responsible for all flushing, cleaning or repairs to any existing sewer facility into which gravel, rocks, or other debris has entered the system or which has been damaged as a result of the Contractor's operations.
19. Traffic control plan(s) in accordance with the current Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Standard Plans are required for any work within City Rights-of Way. Traffic control plans are required to be approved by the City Engineer prior to the start of work.
20. The Contractor shall have a copy of the approved construction plans on site at all times.
21. Any changes to the approved design shall first be reviewed and approved by the design engineer and the City Engineer.
22. Prior to backfill, all mains and appurtenances shall be inspected and approved for backfill by the City Engineering Division. Approval to backfill shall not relieve the Contractor of responsibility for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the Contractor's responsibility to notify the City of Oak Harbor for the required inspections.
23. All lines shall be flushed, cleaned and pressure tested prior to paving in conformance with the above referenced specifications. Testing of the public sanitary sewer mains and private laterals shall include video camera inspection by the City. Video camera inspection shall take place after installation of all underground utilities and compaction of the subgrade is completed. Immediately prior to video camera inspection, enough water shall be run down the line so it comes out the lower manhole.

4.5 Design Standards

The design of any sewer extension/connection shall conform to City Standards, Department of Ecology's "Criteria for Sewage Works Design," and any applicable standards as set forth herein.

As required by OHMC section 14.03.070 the layout of extensions shall provide for the future continuation of the existing system as determined by the City. Sewer mains shall extend the entire frontage of each lot to be served.

New gravity sewer systems shall be designed on the basis of an average daily per capita flow of sewage of not less than 65 gallons per day (65 gpcd). Consideration shall be made for infiltration and inflow. A peaking factor of 2.11 should be used for major sewerage areas. Other guidelines for peaking factors and design flows are contained in the DOE "Criteria for Sewage Works Design", see Table G2-1.

When deviations from the foregoing per capita rates and peaking rates are used, a description of the procedure used for sewer design shall be submitted to the Engineering Division for review and approval.

Construction of new sewer systems or extensions of existing systems will be allowed only if the existing receiving system is capable of supporting the added hydraulic load.

Collection and interceptor sewers shall be designed and constructed for the ultimate development of the tributary areas.

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

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, extra-strength pipe shall be used.

4.6 Existing Utilities

Conflicts with existing utilities shall be avoided where possible in the design of new sewers. Where conflicts with existing utilities are unavoidable, minimum separation shall be provided. All sewer pipes (mains and side sewers) shall be separated from water pipes (mains and services) a minimum of 10-ft horizontally and 1.5-ft vertically, measured from edge of pipe to edge of pipe. Where unusual conditions exist, separation from other utilities shall be provided as outlined in the DOE "Criteria for Sewage Works Design."

Side sewer services shall be separated from gas lines, cable, telephone, power and other underground utilities, excluding water, a minimum of 18-inches, edge to edge. Where side sewer lines cross underground utilities, except for water, (or vice versa) with less than 6-inches of vertical separation a styrofoam block shall be used to separate the lines. Common trenching is permissible provided the minimum separation described herein is maintained.

4.7 Staking

All construction surveying and staking shall be performed under the supervision of a Professional Engineer or Professional Land Surveyor licensed by the State of Washington.

The minimum staking of sewer lines shall be as follows or as directed by the City Engineer:

1. Stake location of mainline pipe and laterals every 50 feet with cut or fill to invert of pipe, or utilize a calibrated, accurate pipe laser.
2. Stake location of all manholes for alignment and grade with cut or fill to rim and invert of pipes.
3. Front lot corners shall be staked prior to construction for side sewer location or actual side sewer locations shall be staked.
4. Lot corners shall be located prior to connection of side sewer to building sewer.

4.8 Gravity Sewers

4.8.1 Mains

The minimum size for sewer mains is 8-inches in diameter.

All sewer pipe materials shall meet the requirements contained in the current version of the WSDOT Standard Specifications and amendments thereto. For pipe diameters 12-inches or less and depths up to 15-ft, all gravity sewer pipe shall be PVC, ASTM D 3034 SDR 35. Material for other diameters, depths or other special conditions, shall be appropriate for the application, and may include: PVC, Ductile Iron, Concrete, Vitrified Clay, ABS or polyethylene as approved by the City Engineer. Construction methods, trenching, backfilling, pipe laying and other construction methods shall meet the requirements contained in the current version of the WSDOT Standard Specifications and amendments thereto except where City Standard Trench Details exceed WSDOT bedding and backfill specifications.

4.8.2 Manholes

Precast manholes shall be provided at a maximum of 400-foot intervals, at intersections, and at changes in direction, grade, or pipe size. Manholes shall be provided at the end of all sewer mains to facilitate maintenance, access and future extension. Cleanouts are not acceptable substitutes for manholes at the end of public sewer mains or private laterals.

When the practicality of extension is limited, the City Engineer may, at his/her discretion, authorize the use of cleanouts for termination of 8-inch sewer lines no more than 150-feet from the nearest manhole.

A minimum drop of 0.1-feet, from invert in to invert out, shall be provided for all manholes and connections thereto.

Side sewers shall not directly connect to manholes.

Where a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

The minimum manhole diameter is 48-inches. Type I Manholes shall not be less than 8 feet in depth and Type III shall not be more than 8 feet in depth. Diameter of new manholes shall be determined by the following criteria:

48" Manhole

- 2 connecting pipes, 8 inch to 12 inch diameter
- 3 connecting pipes, 8 inch to 10 inch diameter, perpendicular
- 4 connecting pipes, 8 inch diameter, perpendicular

54" Manhole

- 2 connecting pipes, 8 inch to 12 inch with more than 45 degree deflection
- 3 connecting pipes, 10 inch to 12 inch diameter, perpendicular
- 4 connecting pipes, 10 inch to 12 inch diameter, perpendicular

72" Manhole

- 2 connecting pipes, 15 inch to 18 inch diameter with less than 45 degree deflection
- 3 connecting pipes, 15 inch diameter, perpendicular
- 4 connecting pipes, 15 inch diameter, perpendicular

In the above criteria "deflection" refers to the angle between any 2-pipe channels in the manhole. For other pipe configurations, the City shall approve the size of the manhole.

Precast manholes shall meet the requirements of the current version of the WSDOT Standard Specifications. Pipe connection to precast manholes shall be made using a cast in place manhole coupling; or by a machine core with a water

tight flexible rubber boot, KOR-N-SEAL pipe to manhole connector, or equal, in manhole wall.

Manhole channels shall be either precast or cast in place. Cast in place channels and benches shall be constructed using "Commercial Concrete," Quick set grout shall not be used for channel construction. Cast in place channeling shall be constructed in accordance with WSDOT Standard Specifications. Grouting of manhole connections, joints, risers etc., shall be performed in accordance with WSDOT Standard Specifications. Grout shall be installed per manufacturer specifications and shall at no time be retempered.

Eccentric manhole cones shall be offset so as not to be located in the tire track of a traveled lane and shall be oriented to permit access to manhole ladder rungs. Ladder rungs shall be positioned on the side of the manhole with largest channel shelf and inline with the vertical wall of the eccentric cone. The first ladder rung shall be installed in the eccentric cone and be no more than 28-inches below grade. No ladder rungs shall be installed in manhole adjustment rings.

Manhole frames and covers shall be cast iron casting marked "Sewer" conforming to the requirements of ASTM A-30, Class 25, and shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability. The minimum clear opening in the manhole frame shall be 24 inches. Manhole frames and covers shall be Olympic Foundry Part No. MH52, MH52A or equivalent. Repairs of defects by welding or by the use of smooth-on or similar material will not be permitted. Manhole rings and covers shall be machine-finished or ground-on seating surfaces so as to assure non-rocking fit in any position and interchangeability. Manhole frames and covers shall be installed on a minimum of 8-inches of standard radial manhole adjustment rings. All new manholes in pedestrian paths, cross walks, road shoulders, or outside the roadway shall be equipped with bolt down, or locking, covers.

4.8.3 Drops

Straight grades between invert out of last manhole and connection to existing are preferred over drops whenever possible. Care must be taken when designing steep grades so as not to create a situation of excessive velocity or excavation. Grade changes associated with "sweeps" shall not be allowed unless otherwise approved by the City Engineer.

A drop connection shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall have a fillet to prevent solids deposition. For new construction, drop connections shall be of the outside type.

Outside drop structures shall be constructed consistent with WSDOT Standard Specifications and Plans.

4.8.4 Slopes

Minimum slopes of sewer mains shall be as recommended in DOE "Criteria for Sewage Works Design."

Under special conditions, slopes slightly less than those listed in the Orange Book may be permitted by the City Engineer. Whenever decreased slopes are proposed, the design engineer shall furnish justification, with the plans, and including computations of the depths of flow in such pipes at minimum, average, and daily or hourly rates of flow.

Sewers shall be laid with uniform (constant) slope between manholes.

4.8.5 Private Sewers (Side Sewers and Laterals)

A private sewer is defined as that portion of a side sewer connection beginning two feet outside the inner face of the wall and ending at the connection to the publicly owned sewer main. Private sewers for single connections shall be 6-inch diameter from the public main to the property line. Cleanouts shall be provided at the edge (property line) of the public right-of-way, utility easement, or the public sewer easement and at a distance of no more than 36 inches from the exterior wall of the structure. Maintenance of the private sewer is the responsibility of the property owner. A permit must be obtained from the City prior to connection, repair or modification to a private sewer.

Commercial, multi-family, industrial and all other non-single family properties shall have 6-inch side sewers from the property line to the building sewer. Side sewers for single family residences can be 4-inch diameter from the property line to the building sewer. The minimum slope for all side sewers is 2%.

Side sewer connections to new mains shall be made with a sweep 90 type tee. Connections to existing main shall be made with a machine tap and a fully gasketed sewer saddle, Romac Style "CB" sewer saddle or equivalent.

Side sewer trenches shall be bedded with clean sand. Bedding shall extend 6-inches below the invert and 4-inches above the crown of the pipe and shall extend the full width of the trench.

Inspection tees and cleanouts shall be installed not less than 6-inches and no more than 12-inches below final grade. Cleanouts shall be spaced at no more than 90-

foot intervals and at each total change of 90 degrees of grade or alignment. Sanitary tees and/or wye type fittings are acceptable for cleanouts and inspection tees.

For new main construction each side sewer location shall be marked with a pressure treated 2x4 marker. The marker shall be a minimum of 4-feet long and shall extend a minimum of 1-foot above the ground surface. A 2x4 cleat shall be nailed to the bottom of marker to prevent withdrawal. Above the ground surface, the marker shall be painted “green” with “S/S” and the depth to the side sewer be indicated, in feet, stenciled in black letters 2-inches in height.

The City Engineer may authorize or require the construction of private laterals to serve more than one connection from a single property. Private laterals shall be designed and constructed to the same standard as public sewer mains. The minimum size for private laterals is 8-inches. Private laterals shall connect to the public system with a manhole and terminate with a manhole.

When the practicality of extension is limited, the City Engineer may at their discretion authorize the use of cleanouts for termination of 8-inch laterals no more than 150-feet from the nearest manhole.

Private side sewers shall not cross adjacent parcels without approval of the City Engineer. Easements for sewers crossing private property shall be filed with the County prior to installation. Side sewer connections shall be contained on the lot to be served and shall directly connect to the public main at the most practical frontage. Gravity connections are preferred and private pumps are to be avoided where possible. Where approved for use by the City Engineer, private pump systems shall be designed by a licensed professional engineer in accordance with the DOE “Criteria for Sewage Works Design” and Section 4.9. A schematic of a typical residential pump is shown in Standard Detail SS-2.

4.9 Pressure systems

Pressure sewer systems serving two or more connections must meet site specific design criteria. The standards presented here are the minimum standards for pump stations and pressure sewers. Site specific criteria dictates that pump stations and force mains be designed to meet the basin needs. This information is generally intended to be schematic in order to illustrate the minimum necessary components and not to dictate layout or design. Due to changing technologies, the City Engineer may request the alteration of design specifics. All pressure systems require design by a licensed Professional Engineer.

4.9.1 Pump systems

Pump systems shall be designed in accordance with the Department of Ecology's "Criteria for Sewage Works Design" Chapter C2-1 and C2-2.

The number of pumps shall not be less than two. Where only two pumps are provided (duplex system), they shall be of the same type, size and capacity.

Pump stations smaller than 15 horsepower per pump shall have suction lift pumps and shall be manufactured by Smith and Loveless, Inc. Equivalent systems by other manufacturers may be acceptable provided that the City's maintenance capabilities are compatible. Pump type and manufacturer for stations with greater than 15 horsepower pumps shall be designed and reviewed on a case by case basis.

All pump stations shall have area lighting for security and maintenance purposes and a potable water service for wash down and flushing of wet well. For a duplex system, the peak pumping capacity is defined as the capacity of the station with one of the pumps out of service.

An operations and maintenance manual shall be submitted to the City prior to acceptance of any new pump station.

4.9.2 Force Mains

Force Mains shall be designed in accordance with Chapter C2-3a of the Orange Book.

The minimum size of force mains shall be 4-inches.

Pressure rated cleanouts shall be provided at 1,000 foot intervals. A cleaning pig device launching port shall be provided.

4.9.3 Power

Pump stations shall be designed and built for the most efficient power use. Pump stations shall use 3 phase power supplies.

4.9.4 Controls

The pump controls and control panel shall include the following functions:

1. Hand-Off-Auto (H-O-A) selector switches for each pump.
2. Run lights. Lights to show that a pump is running, pump failure and high water in lift station.
3. High water alarm.
4. Auxiliary contacts for telemetry (telemetry by others).

5. Mini-CAS relay for moisture detection.
6. One elapsed time meter for each pump.
7. An ultrasonic level control device or mechanical floats shall be provided and set for lead pump on, lag pump on, high water alarm and pump off.
8. Phase monitor.
9. Inner door.
10. Wire diagrams.
11. Convenience outlet 110V 15 amps.
12. Manual transfer switch with a generator receptacle or on site generation (See Section 4.9.5).
13. Anti-condensation heaters.
14. An electronic alternator providing automatic alternation of the pumps under normal operating conditions and allowing both pumps to operate simultaneously if there are high inflow conditions.

4.9.5 Emergency backup

On site self contained diesel power generating equipment shall be provided for all lift stations where any single pump is rated at 20 horsepower or greater. On site generators shall include automatic transfer switching and generator exercising capabilities. In addition all lift stations, regardless of size, shall be equipped with an emergency bypass access point to allow for connection of a temporary portable bypass pump. The pig launching port described in Section 4.9.2 can also serve as the bypass port.

4.9.6 Security

Sufficient measures shall be provided to protect any lift station or waste water pump from unauthorized access, vandalism, theft, sabotage, terrorism etc. Security measures for all public lift stations shall include 24-hr remote monitoring including unauthorized entry and operation trouble alarms. The facility shall be located off the traffic way of streets and alleys. Security fencing and access hatches with locks shall be provided. Developers shall be responsible for all costs of installing and activating security monitoring. Developers shall be responsible for monitoring and power costs until the City formally accepts the improvement.

4.10 Inspections and Testing

4.10.1 Gravity Sewer

Prior to acceptance of the project, the gravity sewer pipe shall be subject to a low-pressure air test per WSDOT/APWA Standards Section 7-17.3(2). The Contractor shall furnish all equipment and personnel for conducting the test under

the observation of the City inspector. The testing equipment shall be subject to the approval of the City.

The Contractor shall make an independent air test prior to notifying the City to witness the test. The acceptance air test shall be made after trench is backfilled and compacted and the roadway section is completed to subgrade.

Side sewer stubs shall be tested concurrent with main testing. All wyes, tees, and end of side sewer stubs shall be plugged with flexible joint caps, or acceptable alternates, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.

Testing of the sewer main shall include a video camera inspection by the City. The cost for video camera inspection by the City shall be included in the sewer permit issued by the City of Oak Harbor Engineering Division.

Video Camera Inspection Check List

1. Air test is preformed and passed.
2. All utilities within the roadway area are installed and backfilled
3. Sewer lines and manholes are cleaned and flushed as needed
4. Immediately prior to a video camera inspection, enough water shall be run down the line so it comes out the lower manhole.
5. Video Camera Inspection.
6. Roadway is paved.

No ponding shall be permitted within any new sanitary sewer line.

The City may require infiltration, exfiltration or deflection testing where sewer facilities are constructed in areas of high groundwater, questionable soil conditions or when the construction methods are suspect.

4.10.2 Side Sewer

For new or planned construction, notice in writing must be given to the City Engineer's Inspector at his office by any person desiring to make connection with the public sewer 2 business days prior to the time such work will be ready for inspection.

Side sewers from the property line to the building shall be inspected and pressure tested prior to backfill. Side sewer pressure tests shall be air tested or exfiltration tested per WSDOT Standard Spec. 7-17.3(2).

An 8.5x 11 –inch record drawing shall be provided to the City inspector at the time of inspection. Side sewer record drawings shall indicate the building footprint, location and depth of side sewer and location and depths of cleanout.

4.10.3 Pressure Sewer

Pressure sewer systems and lift station shall be tested in accordance with WSDOT specifications and the recommendations contained in the Orange Book. Lift stations controls and alarms shall be tested prior to acceptance. The City Inspector shall be present to observe the controls and alarm testing. An operations and maintenance walk through shall be conducted by the design engineer for the benefit of City Maintenance crews upon successful completion of all pressure, control systems, and alarm systems testing. The O&M walk through shall include a description of the operation theory, maintenance schedules and an overview of the control panel operation.

4.11 Pretreatment

4.11.1 Application

As established by OHMC 14.09 Fat, Oils and Grease (FOG) pretreatment is required for many service connections. The following uses shall meet the requirements of this chapter whether or not they are otherwise required by state or federal law to pretreat sewerage:

1. Restaurants, school kitchens, cafes, butcher shops, delicatessens, lunch counters, cafeterias, bars, hospitals, nursing homes, senior centers, hotels with dish washing capabilities;
2. Hotels, grocery stores, factories, or other establishments that prepare, serve or sell food or related cleanup, where grease may be introduced to the sewer system.

Exceptions to required FOG pretreatment are restaurants, delicatessens, grocery stores, lunch counters, cafeterias, bars, clubs, hotels, hospitals, sanitariums, factories or school kitchens which meet all of the following criteria:

1. Do not do any preparation or cooking of meats and do no food cleanup of any sort; or
2. Which only use prepackaged foods and serve beverages.

See OHMC 14.09 BOD, TSS AND FOG CONTROL for more specific information.

4.12 Standard Details

Side sewer connection	SS-1
Residential sewage grinder pump	SS-2
Type I Manhole	SS-3
Type III Manhole	SS-4
Manhole Ladder	SS-5
Outside Drop Connection Type III Manhole	SS-6

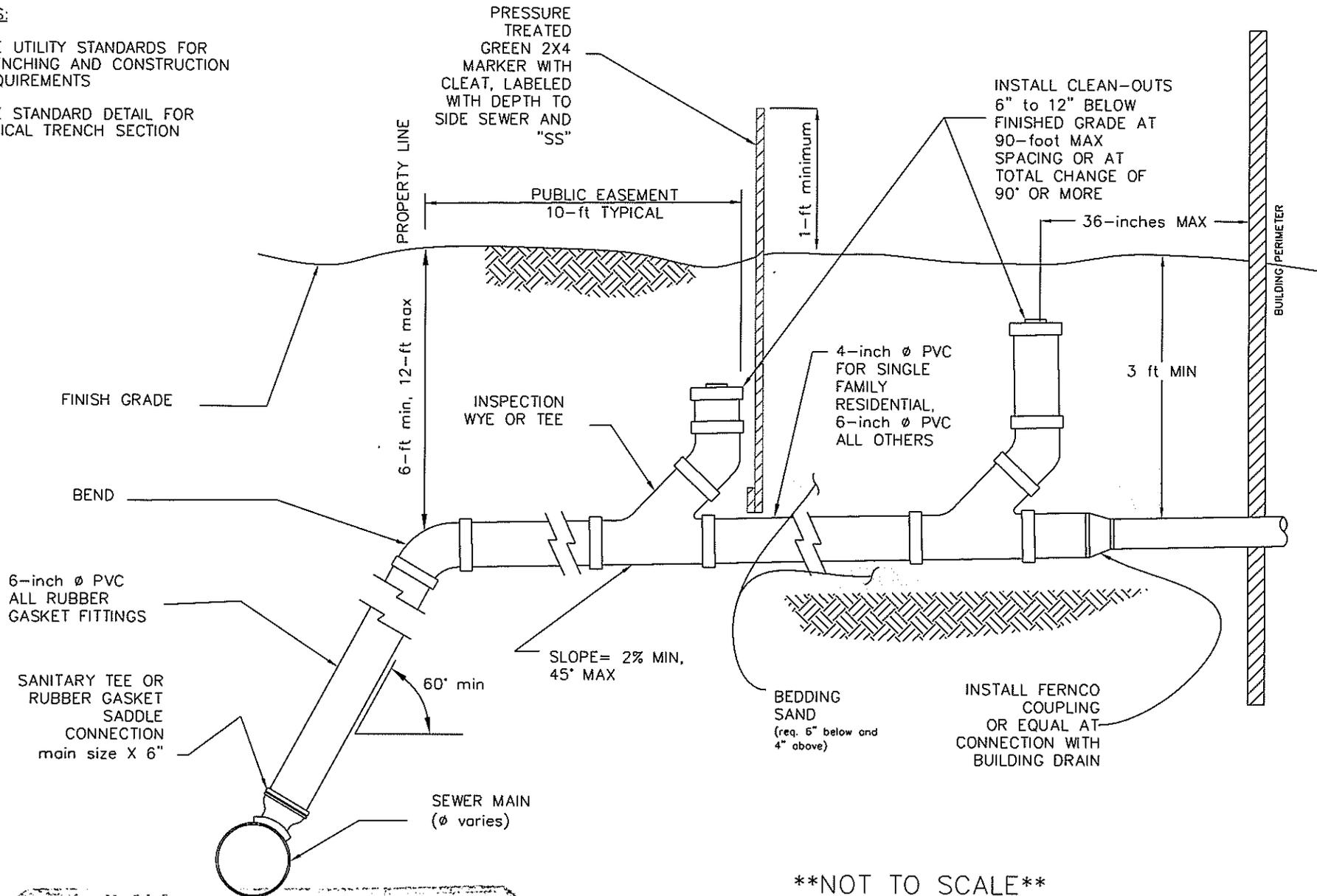
4.13 Sewer plan checklist

Any item marked **NO** requires approval of City Engineer.

Y	N	
<input type="checkbox"/>	<input type="checkbox"/>	Existing main, side sewer connections and easements shown
<input type="checkbox"/>	<input type="checkbox"/>	Proposed main connections shown
<input type="checkbox"/>	<input type="checkbox"/>	Proposed facility is consistent with Comprehensive plan
<input type="checkbox"/>	<input type="checkbox"/>	Proposed new service is inside Sewer Utility Service Area
<input type="checkbox"/>	<input type="checkbox"/>	Calculation on design flow and capacity of new main included with plans
<input type="checkbox"/>	<input type="checkbox"/>	Is there adequate capacity in the downstream system
<input type="checkbox"/>	<input type="checkbox"/>	Is the proponent requesting a reimbursement agreement or city participation
<input type="checkbox"/>	<input type="checkbox"/>	If yes is there a regional benefit and has agreement been approved
<input type="checkbox"/>	<input type="checkbox"/>	New facilities are located in right of way or recorded easement approved by City Engineer
<input type="checkbox"/>	<input type="checkbox"/>	Plan shows plan and profile with existing and proposed ground surface
<input type="checkbox"/>	<input type="checkbox"/>	Plan is prepared and stamped by a registered Engineer
<input type="checkbox"/>	<input type="checkbox"/>	Plan is to scale, legible, and identifies all existing structures and utilities
<input type="checkbox"/>	<input type="checkbox"/>	Applicable Oak Harbor standard details or equivalent are included in plans
<input type="checkbox"/>	<input type="checkbox"/>	New/Existing main extends frontage of all properties to be served
<input type="checkbox"/>	<input type="checkbox"/>	Use of private laterals to serve multiple buildings on one lot approved by City Engineer
<input type="checkbox"/>	<input type="checkbox"/>	Maintenance agreements are in place for private laterals
<input type="checkbox"/>	<input type="checkbox"/>	Single side sewer connection to each lot shown
<input type="checkbox"/>	<input type="checkbox"/>	New main meets minimum size and slope requirements
<input type="checkbox"/>	<input type="checkbox"/>	Pipe type is specified and is acceptable
		Manholes:
<input type="checkbox"/>	<input type="checkbox"/>	400-ft max spacing
<input type="checkbox"/>	<input type="checkbox"/>	at end of all mains
<input type="checkbox"/>	<input type="checkbox"/>	at changes in grade or direction
<input type="checkbox"/>	<input type="checkbox"/>	at all street intersections
<input type="checkbox"/>	<input type="checkbox"/>	at change in diameter of pipe
<input type="checkbox"/>	<input type="checkbox"/>	Drops are consistent with Oak Harbor standard
<input type="checkbox"/>	<input type="checkbox"/>	6-inch side sewers shown with wye connection to main
<input type="checkbox"/>	<input type="checkbox"/>	Side sewers stub outs meet minimum depth requirements
<input type="checkbox"/>	<input type="checkbox"/>	Side sewers to serve property can connect with minimum 2% slope
<input type="checkbox"/>	<input type="checkbox"/>	Typical trench section and backfill requirements are specified
<input type="checkbox"/>	<input type="checkbox"/>	Oak Harbor General notes are included
<input type="checkbox"/>	<input type="checkbox"/>	FOG pretreatment required
<input type="checkbox"/>	<input type="checkbox"/>	Pretreatment device with maintenance agreement is adequate
<input type="checkbox"/>	<input type="checkbox"/>	Are there private single user grinder pumps proposed
		IF YES SPECIAL REVIEW IS REQUIRED
<input type="checkbox"/>	<input type="checkbox"/>	Is there a large pump station
		IF YES SPECIAL REVIEW IS REQUIRED.

NOTES:

1. SEE UTILITY STANDARDS FOR TRENCHING AND CONSTRUCTION REQUIREMENTS
2. SEE STANDARD DETAIL FOR TYPICAL TRENCH SECTION



NOT TO SCALE

APPROVED
 City of Oak Harbor
 Engineering Dept

Signature

6/8/06
 Date



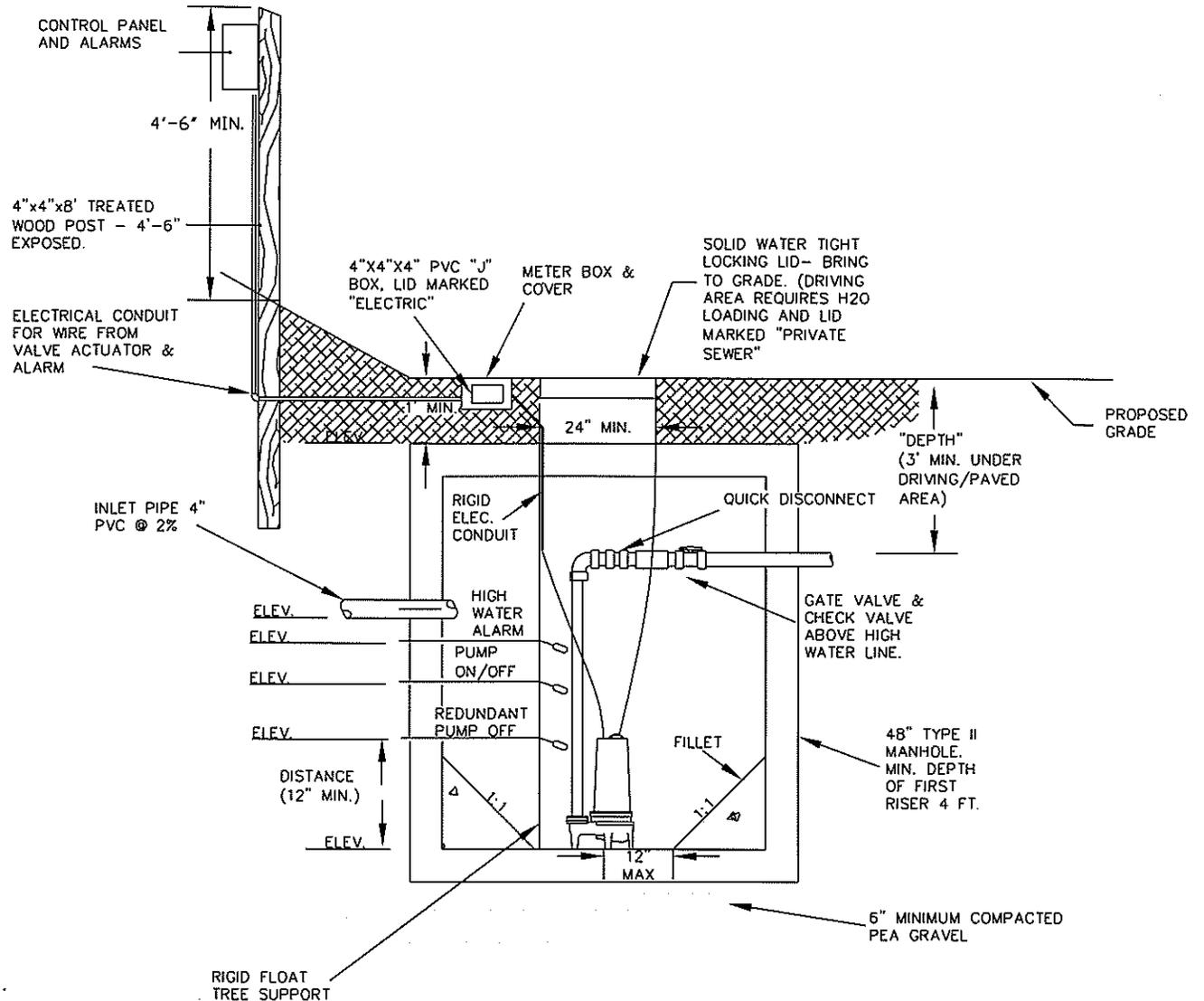
City of
 Oak Harbor
 ENGINEERING DEPARTMENT
 865 SE Barrington Drive
 Oak Harbor, WA 98277

TYPICAL SIDE SEWER

SS-1Typical Side sewer.dwg
 REVISED 2-24-06

NOTES:

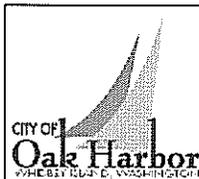
1. AN OPERATIONAL CHECK OF THE PUMP, ON/OFF SWITCH, FLOATS AND ALARM SYSTEM SHALL BE REQUIRED AS PART OF THE TESTING PROCEDURES.
2. GRAVITY SEWER PIPE SHALL BE CONSIDERED AS PART OF THE RESIDENTIAL SEWER PUMP INSTALLATION. TESTING OF GRAVITY LINES SHALL BE COMPLETED AT THE TIME THE FORCE MAIN IS TESTED.
3. THE ALARM MUST BE IN A CONSPICUOUS LOCATION AND MUST CONSIST OF BOTH AUDIO AND VISUAL ALARMS.
4. WET WELL MUST BE WATERTIGHT.
5. THE GRINDER PUMP WET WELL SHALL BE INSTALLED ON LEVEL UNDISTURBED SOIL WITH A MINIMUM TOTAL LOAD BEARING CAPACITY OF 2000 POUNDS PER SQUARE FOOT. THE GRINDER PUMP WET WELL SHALL BE SET ON A LAYER OF PEA GRAVEL A MINIMUM OF 6 INCHES COMPACTED DEPTH.
6. ELECTRICAL INSPECTION SHALL BE COMPLETED AND APPROVAL POSTED AT JOB SITE PRIOR TO CALLING FOR INSPECTION BY CITY INSPECTOR.
7. THE PUMPING CHAMBER SHALL BE ADEQUATELY VENTED. VENTING MAY BE ACCOMPLISHED THROUGH THE BUILDING OR STRUCTURE PLUMBING VENTS WHERE THE SYSTEM VENTING HAS BEEN APPROVED BY THE LOCAL JURISDICTION AUTHORITY OR BY A DIRECT 2" MINIMUM VENT TO THE ATMOSPHERE.
8. EQUIPMENT THAT IN NORMAL OPERATION MAY CAUSE AN ARC OR SPARK SHALL NOT BE INSTALLED IN ANY PUMPING CHAMBER.
9. FLOAT SWITCHES INSTALLED IN AN UNCLASSIFIED LOCATION SHALL BE HERMETICALLY SEALED TO PREVENT THE ENTRANCE OF GASES OR VAPORS.
10. WHERE A CONDUIT SYSTEM IS INSTALLED BETWEEN THE PUMPING CHAMBER AND THE CONTROL PANEL, MOTOR DISCONNECT, OR POWER SOURCE, AN APPROVED SEALING FITTING SHALL BE INSTALLED TO PREVENT THE MIGRATION OF GASES OR VAPORS FROM THE PUMPING CHAMBER, AND SHALL REMAIN ACCESSIBLE.
11. WIRE SPLICES IN JUNCTION BOXES INSTALLED IN PUMPING CHAMBERS, SHALL BE SUITABLE FOR WET LOCATIONS.
12. SUBMERGENCE OF THE PUMPING MOTOR SHALL BE GUARANTEED BY THE DESIGN OF THE PUMP OR BY REDUNDANT OFF FLOATS.



APPROVED
City of Oak Harbor
Engineering Dept

Signature

6/8/06
Date



City of
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**RESIDENTIAL SEWER
GRINDER PUMP**

SS-2Residential Sewer Grinder Pump.dwg

REVISED 3-20-06

4"X 24" PRECAST CONCRETE ADJUSTMENT RINGS. 8" MIN. 18" MAX. GROUT INSIDE AND OUT BRUSH FINISH INSIDE

MANHOLE FRAME AND COVER OLYMPIC FOUNDRY PART NO. MH52, MH52A OR EQUIVALENT.

FINISHED GRADE

28" MAX. TO FIRST STEP

8' - 0" MINIMUM
25' - 0" MAXIMUM

48" TO 24" ECCENTRIC CONE

PRECAST MANHOLE
MANHOLE LADDER

PROVIDE RUBBER GASKET AND GROUT AT ALL JOINTS.

GROUT ALL LIFT HOLES

CONSTRUCT CHANNEL AND SHELF IN FIELD SMOOTH FINISH WITH CLASS 3000 CONCRETE

PIPE CONNECTION TO MANHOLE BY CAST IN PLACE COUPLING OR CORED WATER TIGHT BOOT, KOR-N-SEAL OR EQUAL

COMPACTED FOUNDATION GRAVEL 8" MINIMUM

UNDISTURBED EARTH

NOTES:

1. DROP OF GRADE THROUGH MANHOLE SHALL BE 0.1-FT UNLESS OTHERWISE APPROVED BY CITY ENGINEER.

2. MANHOLES SHALL COMPLY WITH WSDOT STANDARD SPECIFICATIONS FOR TYPE I MANHOLES

3. PIPES SHALL PROTRUDE NO MORE THAN 1-inch INTO MANHOLE.

4. ECCENTRIC CONE SHALL BE PLACED OUT OF TIRE TRACK AND SUCH THAT THE LADDER LANDS ON THE LARGEST SHELF

APPROVED
City of Oak Harbor
Engineering Dept

Signature

6/8/06
Date

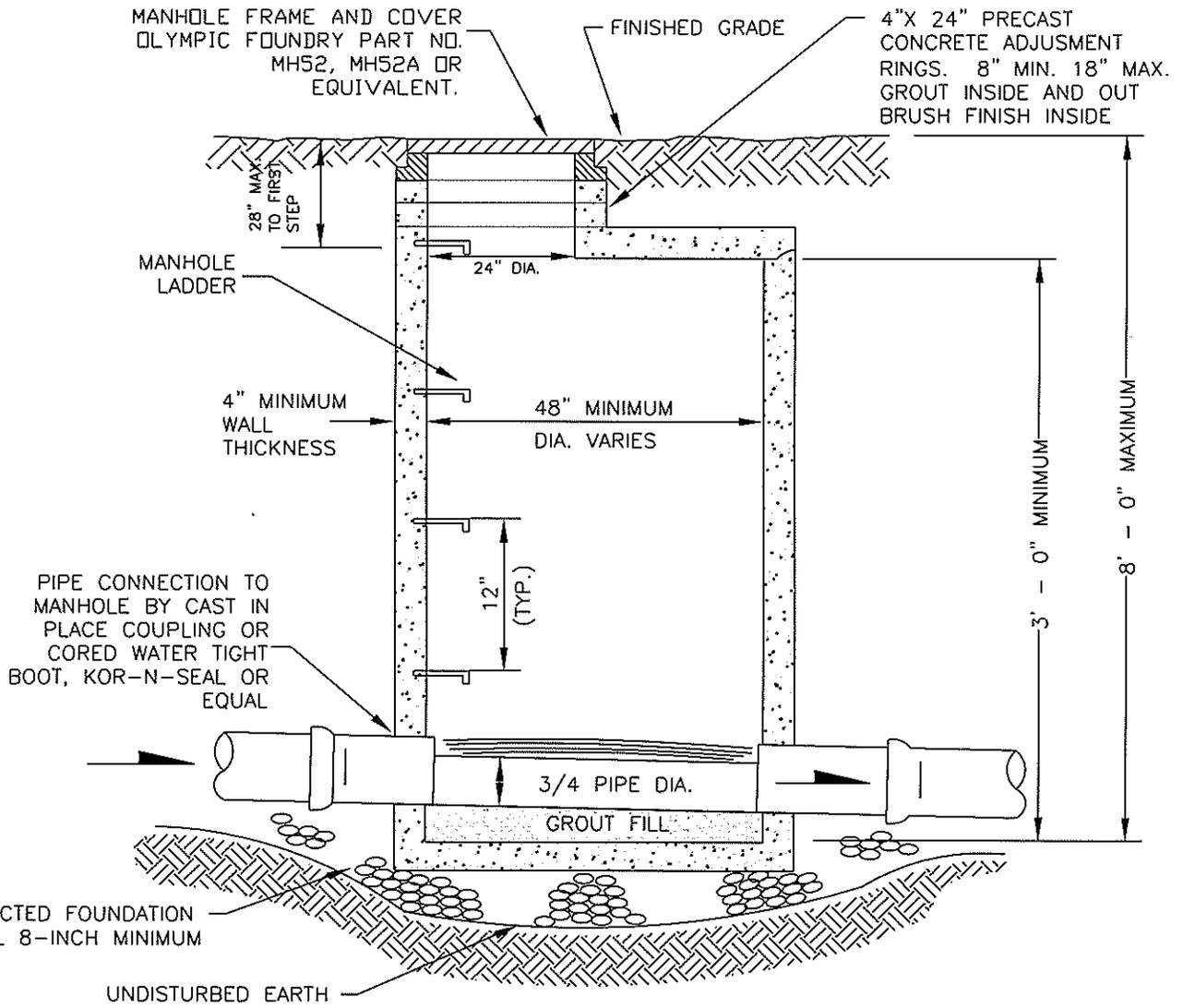


City of
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865 SE Barrington Drive
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TYPICAL SECTION
TYPE 1 MANHOLE

SS-3Typical Type 1 Manhole.dwg

REVISED 3-20-06



NOTES:

1. DROP OF GRADE THROUGH MANHOLE SHALL BE 0.1-FT UNLES OTHERWISE APPROVED BY CITY ENGINEER.
2. MANHOLES SHALL COMPLY WITH WSDOT STANDARD SPECIFICATIONS FOR TYPE III MANHOLES
3. PIPES SHALL PROTRUDE NO MORE THAN 1-inch INTO MANHOLE.

APPROVED
 City of Oak Harbor
 Engineering Dept

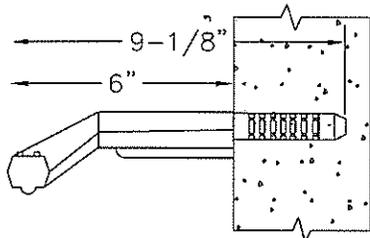
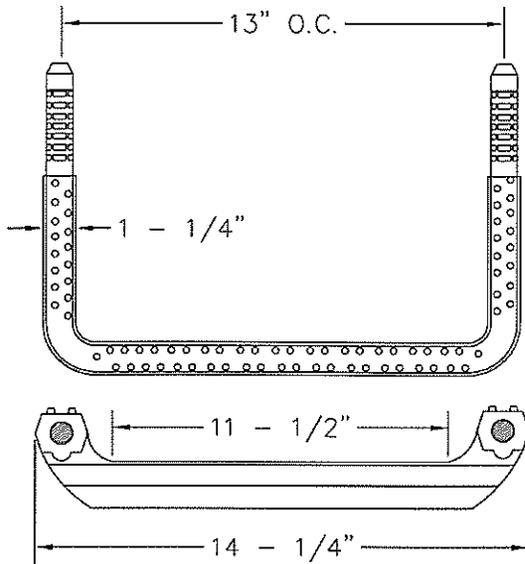
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6/8/06
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 Oak Harbor, WA 98277

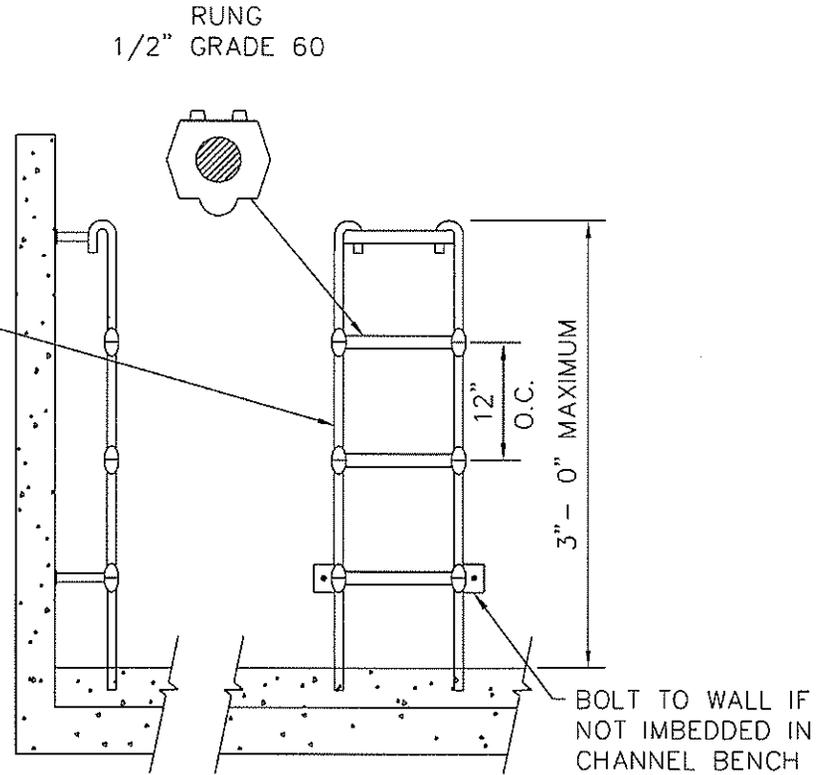
TYPE III MANHOLE



POLYPROPYLENE STEP, LANE NO. P-13938 OR EQUAL

POLYPROPYLENE
MANHOLE STEPS

RAIL
9/16" ROUND
BAR



LADDER SHALL CONFORM TO
POLYPROPYLENE ASTM D-1401
1/2" GRADE 60 REINFORCING
BAR A-615 9/16" COLD DRAWN
BAR C-1018.

POLYPROPYLENE LADDER

Signature _____

APPROVED
City of Oak Harbor
Engineering Dept

Date 6/9/06

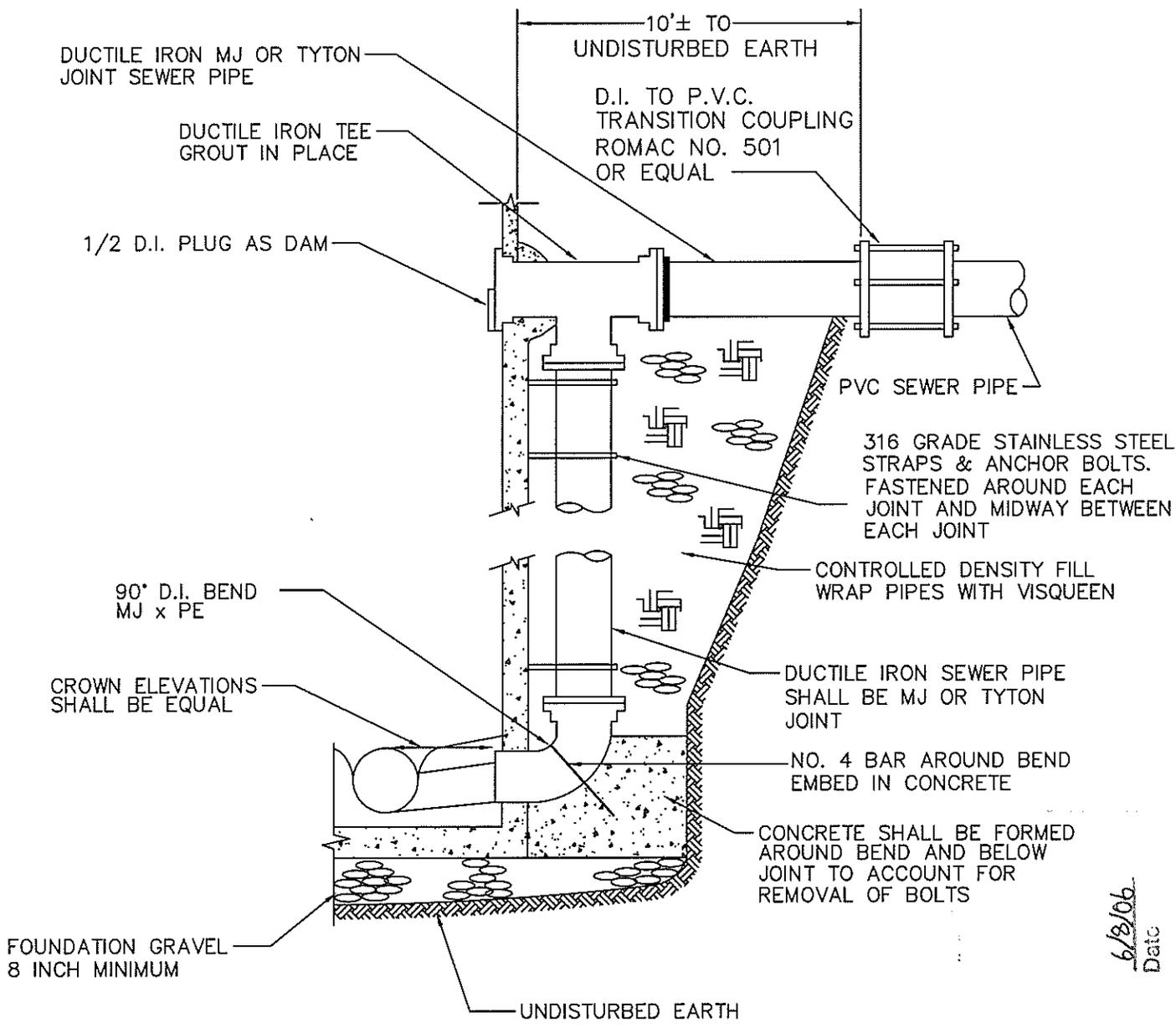


City of
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865 SE Barrington Drive
Oak Harbor, WA 98277

TYPICAL MANHOLE
LADDER STEPS

SS-5Typ Manhole Ladder & Steps.dwg

REVISED 3-28-06



NOTES:

1. DROP OF GRADE THROUGH MANHOLE SHALL BE 0.1-FT UNLES OTHERWISE APPROVED BY CITY ENGINEER.
2. MANHOLES SHALL COMPLY WITH WSDOT STANDARD SPECIFICATIONS FOR TYPE III MANHOLES
3. PIPES SHALL PROTRUDE NO MORE THAN 1-inch INTO MANHOLE.

6/8/06
Date

APPROVED
City of Oak Harbor
Engineering Dept.

Signature

City of Oak Harbor
ENGINEERING DEPARTMENT
865 SE Barrington Drive
Oak Harbor, WA 98277

**TYPICAL SECTION
OUTSIDE DROP CONNECTION
TYPE III SEWER MANHOLE**