

## **Construction Standards**

**Section 1: Side Sewer – Connection to gravity sewer**

**Section 2: Side Sewer – Grinder pump package  
connection to gravity or force main**

**Section 3: Criteria - Grinder pump package**

**Samish Water District  
2195 Nulle Road  
Bellingham, WA 98229-9329**

**SAMISH WATER DISTRICT**  
**CONSTRUCTION STANDARDS – Section 1**  
January 2004

**SECTION 1 - SEWER SIDE SERVICES – CONNECTION TO GRAVITY SEWER INTERCEPTOR**

The following general standards of materials and construction are set forth here as a guide for Samish Water District sanitary service extensions.

1. All side sewer work must be done by a Contractor that is pre-approved with the District. Work shall be performed in accordance with these Standards.
2. Side sewers shall not be backfilled prior to cleaning, inspection and testing. Sewer cleaning and testing shall be performed in accordance with WSDOT Section 7-17.3(2). District staff will perform inspections and must witness cleaning and testing.
3. Side sewers shall not be constructed on private property prior to completion and acceptance of the main line and side sewer stub unless approved in writing by the District.
4. Downspouts, footing drains, basement drains and pumps, crawl space drains or outside drains **shall not** be connected to the sewer line.
5. A recorded easement agreement will be required when any portion of the side sewer is installed on property that is not part of the legal description of the lot being served, or part of a public right-of-way.
6. Side sewer from main to property line shall maintain a minimum cover of 2 feet under ditches unless otherwise approved in writing by the District.
7. Side sewers from property line to house shall maintain a minimum cover of 18 inches.
8. Survey staking of lots and/or property line to assure correct sanitary service locations is the responsibility of the Developer and/or Property Owner. Errors due to failure to provide a property survey or due to changing lot locations during final plat approval shall be corrected by the Developer and/or Property Owner immediately.
9. Metallic tracer tape or insulated wire shall be centered over buried PVC pipe at a location of one foot above pipe.
10. Gravity Section of Side Service Line with Grinder Pump (reference Exhibit 2.01).
  - A. Service line shall be six (6) inch minimum from main to property line.
  - B. From the sewer main to the property line, parallel side sewer lines and water service lines shall maintain a minimum horizontal separation of ten (10) feet and a vertical separation of eighteen (18) inches with water installed above sewer (reference WA State Dept. of Ecology's Criteria for Sewage Works Design). From the property line to the residence or development, parallel side sewer lines and water service lines shall maintain horizontal and vertical separation distances in accordance with the County plumbing permit issued for the project. Service lines shall be installed in separate trenches.
  - C. Service pipe from the main to the property line shall be PVC and shall conform to the requirements of ASTM D3034 SDR 35. Sewer pipe shall have flexible gasketed joints.
  - D. Service shall have a minimum slope of 2%.
  - E. Changes in direction of side sewers shall be made by use of standard bends with the exception of 90 degree bends which are not approved. A

**SAMISH WATER DISTRICT  
CONSTRUCTION STANDARDS – Section 1**  
January 2004

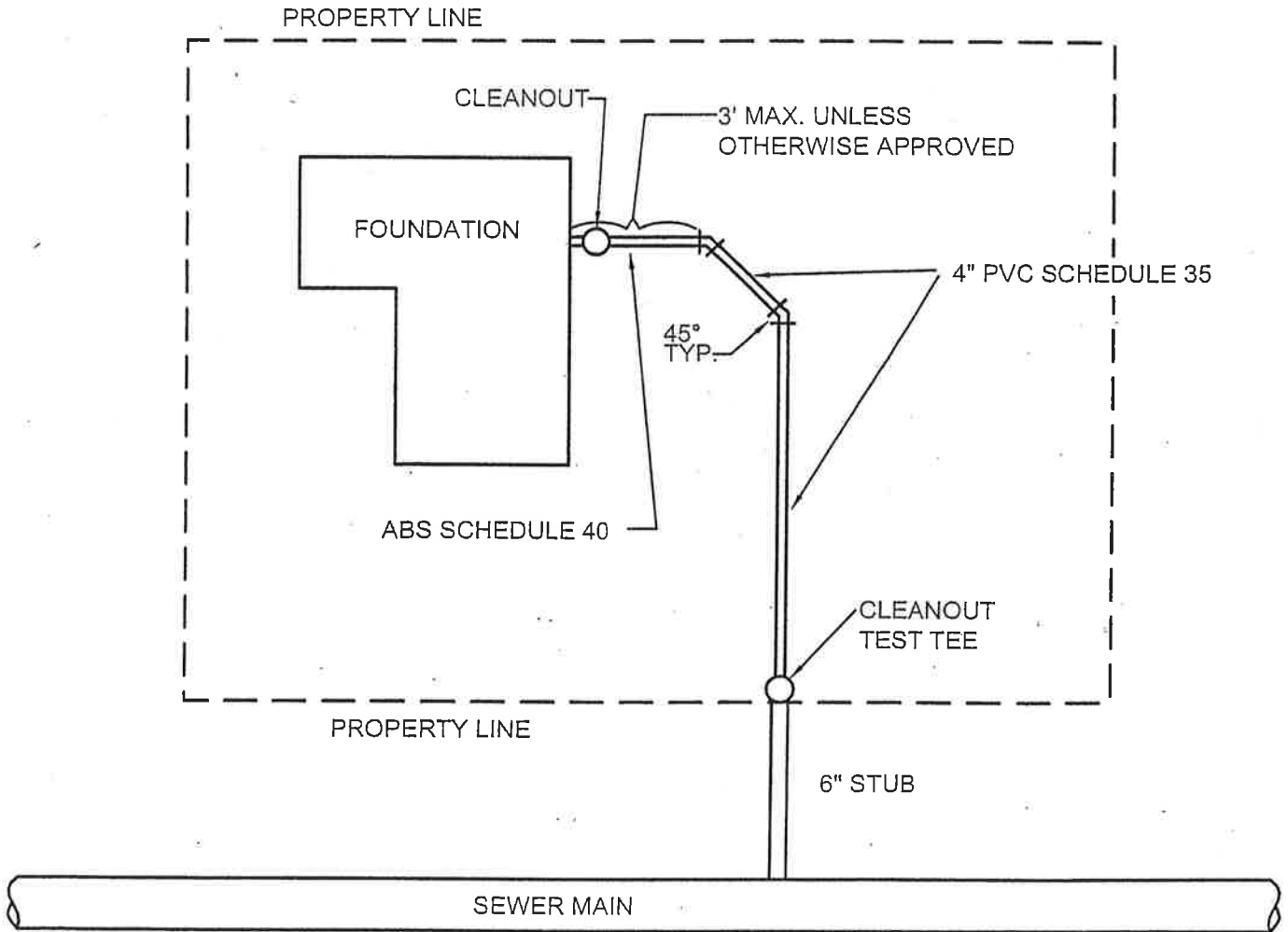
90 degree turn can be achieved with a 45 degree bend, a straight section of a two (2) foot minimum length, and another 45 degree bend.

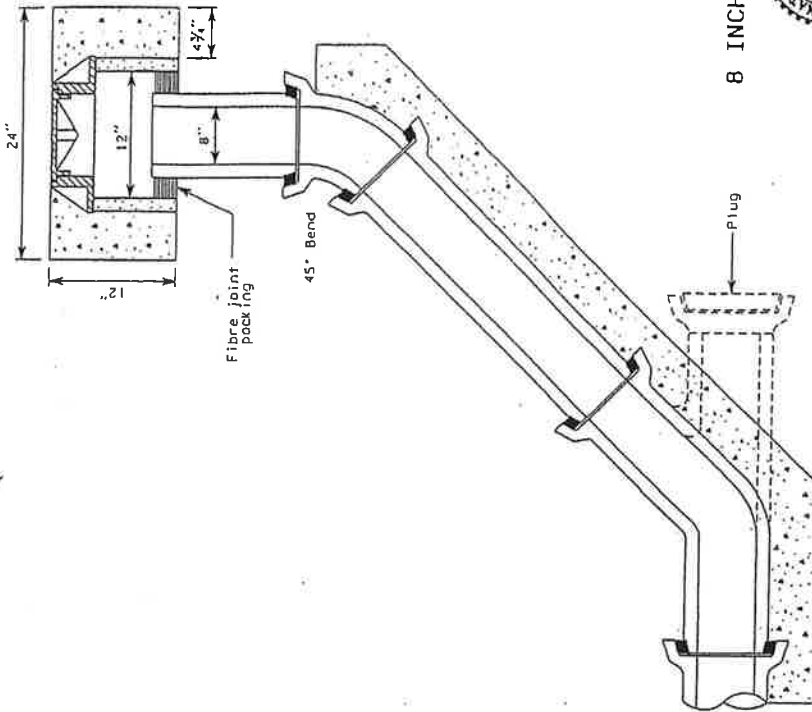
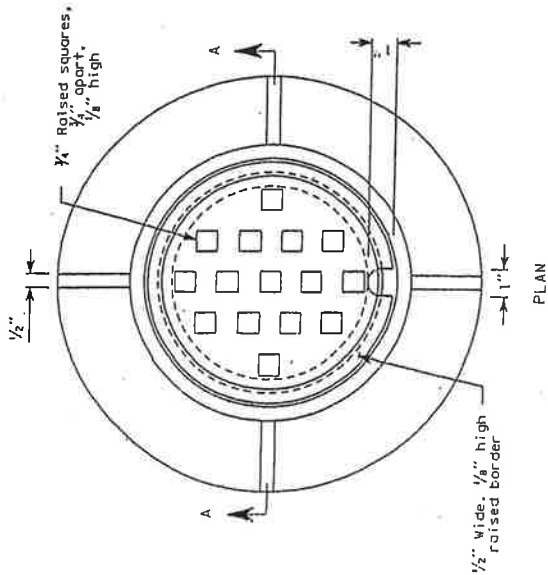
- F. Cleanouts on service lines shall be in accordance with UPC Section 707. A cleanout shall be provided for every change in alignment or grade in excess of twenty-two and one half (22 ½ ) degrees and in no case shall the spacing of cleanouts exceed 100 feet. As a minimum, a cleanout shall be located at the property line, and another within 2 feet of the house. Cleanouts shall consist of a wye branch in the side sewer with a plug. Cleanouts shall be full side sewer diameter. Cleanouts at house shall be extended to grade. All other cleanouts shall be extended to a point not less than 6 inches nor more than 12 inches below the finished ground surface and shall be plugged with a removable stopper which will prevent passage of dirt or water. When required by the District, the Developer shall install an approved casting to provide ready access to the cleanout stopper.

Exhibits included with this section are:

- Exhibit 1.01 – Gravity Side Sewer – General Layout for Connection to Gravity Sewer Interceptor,
- Exhibit 1.02 – Gravity Side Sewer - Connection Detail to Gravity Sewer Interceptor,
- Exhibit 1.03 – Typical Cleanout Detail,
- Exhibit 1.04 – Typical Sewer Trench Detail.

# SIDE SEWER REQUIREMENTS





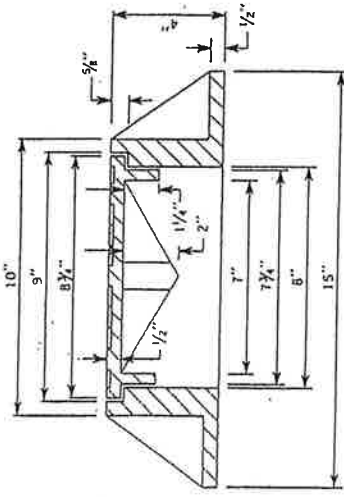
8 INCH CLEAN-OUT



COVER DET. 18B

STANDARD PLAN B-18b

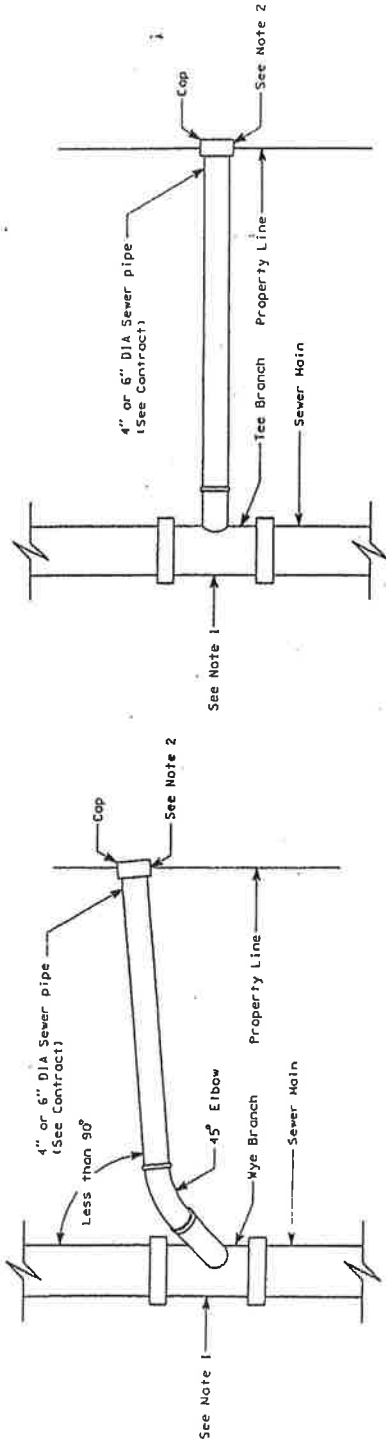
APPROVED FOR PUBLICATION  
 DATE: \_\_\_\_\_  
 BY: \_\_\_\_\_  
 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS



The current version of WSDOT/APWA Standard Plan B-18b is adopted as the District Standard Detail for Six-Inch Cleanouts.  
 The WSDOT/APWA Standard Plan above is included here for reference. The Developer or Contractor is responsible for obtaining the latest revision of this plan.  
 Note: House sewer cleanouts require sewer gasketed caps.

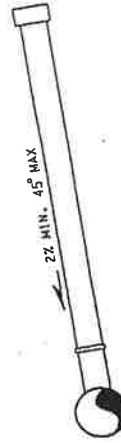
NOTES

1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.
2. Mark location of sewer stub in accordance with Contracting Agency requirements.

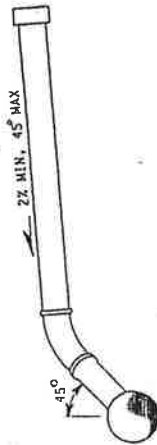


PLAN

PLAN



ELEVATION  
TEE CONNECTION



ELEVATION  
WYE CONNECTION

4/23/99

APPROVED FOR PUBLICATION  
*Clayton M. ...*  
 CIVIL ENGINEER  
 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION  
 OLYMPIA, WASHINGTON

EXPIRES JULY 1, 1999  
**SIDE SEWER**  
**STANDARD PLAN B-29**

The current version of WSDOT/APWA Standard Plan B-29 is adopted as the District Standard Detail for Side Sewers.

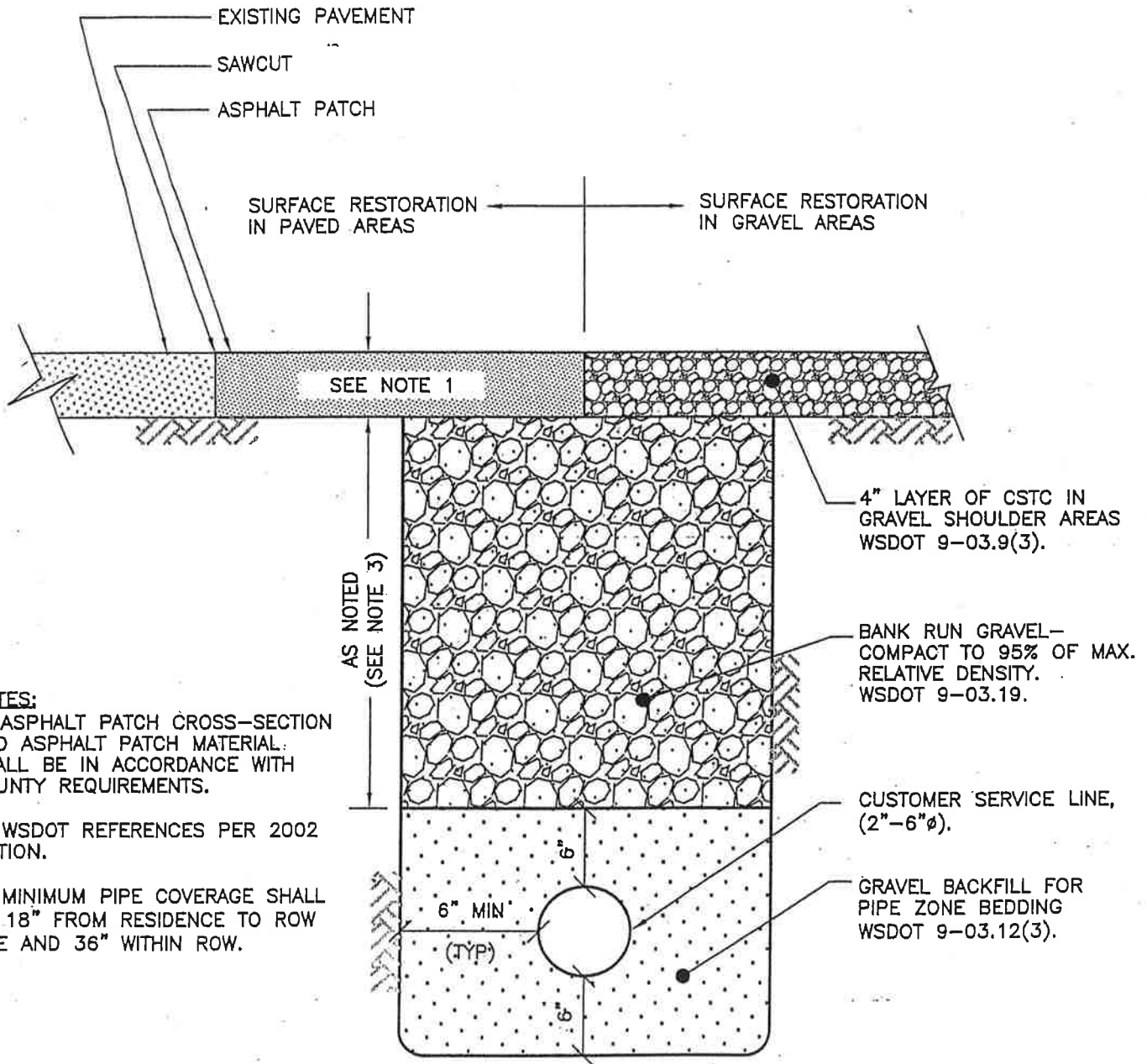
The WSDOT/APWA Standard Plan above is included here for reference. The Developer or Contractor is responsible for obtaining the latest revision of this plan.

DATE	JAN 2004	SHEET	1
SCALE	N.T.S.	OF	1
JOB NUMBER	2003-002		

**SECTION 2 - SEWER SIDE SERVICES WITH GRINDER PUMP PACKAGES –  
CONNECTION TO GRAVITY SEWER INTERCEPTOR OR  
BURLINGTON FORCE MAIN**

The following general standards of materials and construction are set forth here as a guide for Samish Water District sanitary service extensions.

1. All side sewer work must be done by a Contractor that is pre-approved with the District. Work shall be performed in accordance with these Standards.
2. Side sewers shall not be backfilled prior to cleaning, inspection and testing. Sewer cleaning and testing shall be performed in accordance with WSDOT Section 7-17.3(2) for gravity sewers and WSDOT Sections 7-11.3(11) and 7-11.3(12) for pressure rated sewers. District staff will perform inspections and must witness cleaning and testing.
3. Side sewers shall not be constructed on private property prior to completion and acceptance of the main line and side sewer stub unless approved in writing by the District.
4. Downspouts, footing drains, basement drains and pumps, crawl space drains or outside drains **shall not** be connected to the sewer line.
5. A recorded easement agreement will be required when any portion of the side sewer is installed on property that is not part of the legal description of the lot being served, or part of a public right-of-way.
6. Side sewer from main to property line shall maintain a minimum cover of 2 feet under ditches unless otherwise approved in writing by the District.
7. Side sewers from property line to house shall maintain a minimum cover of 18 inches.
8. Survey staking of lots and/or property line to assure correct sanitary service locations is the responsibility of the Developer and/or Property Owner. Errors due to failure to provide a property survey or due to changing lot locations during final plat approval shall be corrected by the Developer and/or Property Owner immediately.
9. Metallic tracer tape or insulated tracer wire shall be centered over buried PVC pipe at a location of one foot above pipe.
10. Customer service shutoff valve shall be marked with a valve marker in conformance with Exhibit 2.05.
11. Force Main Section of Private Side Service Line with Grinder Pump (reference Exhibits 2.01 & 2.02).
  - A. Service line shall be one (1) inch minimum.
  - B. From the sewer main to the property line, parallel side sewer lines and water service lines shall maintain a minimum horizontal separation of ten (10) feet and a vertical separation of eighteen (18) inches with water installed above sewer (reference WA State Dept. of Ecology's Criteria for Sewage Works Design). From the property line to the residence or development, parallel side sewer lines and water service lines shall maintain horizontal and vertical separation distances in accordance with the County plumbing permit issued for the project. Service lines shall be installed in separate trenches from water service lines.



**NOTES:**

1) ASPHALT PATCH CROSS-SECTION AND ASPHALT PATCH MATERIAL SHALL BE IN ACCORDANCE WITH COUNTY REQUIREMENTS.

2) WSDOT REFERENCES PER 2002 EDITION.

3) MINIMUM PIPE COVERAGE SHALL BE 18" FROM RESIDENCE TO ROW LINE AND 36" WITHIN ROW.



**SAMISH WATER DISTRICT**  
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February 2004

- C. Pressure sewer service pipe shall be high-density polyethylene (HDPE) manufactured from high molecular weight, high density PE 3408 HDPE conforming to the requirements of ASTM D-3350. Piping shall be SDR 11, IPS (OD) conforming to the requirements of AWWA C901 and ASTM F714. Piping shall be installed from continuous coil with fusion weld joints. Fittings will only be allowed as shown on the attached Exhibits or as specially approved by the District. Piping shall be DriscoPlex 4200 or approved equal.
- D. Service piping immediately adjacent to the customer service shutoff valve shall be red brass, DN 300 standard weight, in accordance with ASME B31.9. Fittings shall be cast bronze, Class 125, threaded fittings in accordance with ANSI B16.15-85. Flanges shall be cast bronze, Class 150 in accordance with ANSI B16.24-91.
- E. Flanged connections shall be made utilizing stainless steel backup ring in conjunction with an HDPE flange adapter butt fused to the service pipe.
- F. Fittings for connecting HDPE to red brass piping shall be compression type fittings suitable for SDR 11 HDPE pressure piping applications. Fittings shall be polypropylene body with a size range to accommodate ½" to 2" IPS (OD) pipe sizes in accordance with ASTM F714 and ASTM D3035. Fittings shall have a working pressure rating of 200 psi at 73° F. Fittings shall be ISO 9002 certified. Compression fittings shall be Cepex PP compression fittings or approved equal.
- G. Upon special request and approval from Samish Water District, the Contractor may substitute polyvinyl chloride (PVC) for HDPE for the pressure service pipe. PVC service piping shall conform to the requirements of ASTM D2241 SDR 21. Sewer pipe shall have flexible gasketed joints conforming to ASTM F477. Joint design shall be tested to the requirements of ASTM D3139. Fittings shall be Schedule 80 PVC in accordance with ASTM D-1784 with solvent weld or threaded joints. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming ASTM D2564.
- H. Service line shutoff gate valves shall be two (2) inch, resilient wedge type in conformance with AWWA C509. Gate valves shall be suitable for sewage service and be equipped with transition gaskets where needed. Valves shall be fusion bonded epoxy coated inside and out meeting AWWA C550.
- I. Service saddles shall be bronze double strap service saddles with a threaded bronze saddle body and stainless steel straps.
- J. Valve operators shall open by turning counterclockwise. Depending upon valve type, size and operating torques, gear operators shall be provided as needed so as to permit operation of the valve under full operating head with a maximum pull of 40 pounds on the hand wheel. The valve operators shall be of the self-locking type to prevent the wedge from creeping. Self-locking worm gears shall be one-piece design of gear bronze material, accurately machine cut.
- K. Valve boxes for buried service shall be two-piece screw type, cast iron, with 5 ¼ inch shaft and shall be of appropriate length for the installation. Extension pieces where required shall be the manufacturer's standard

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February 2004

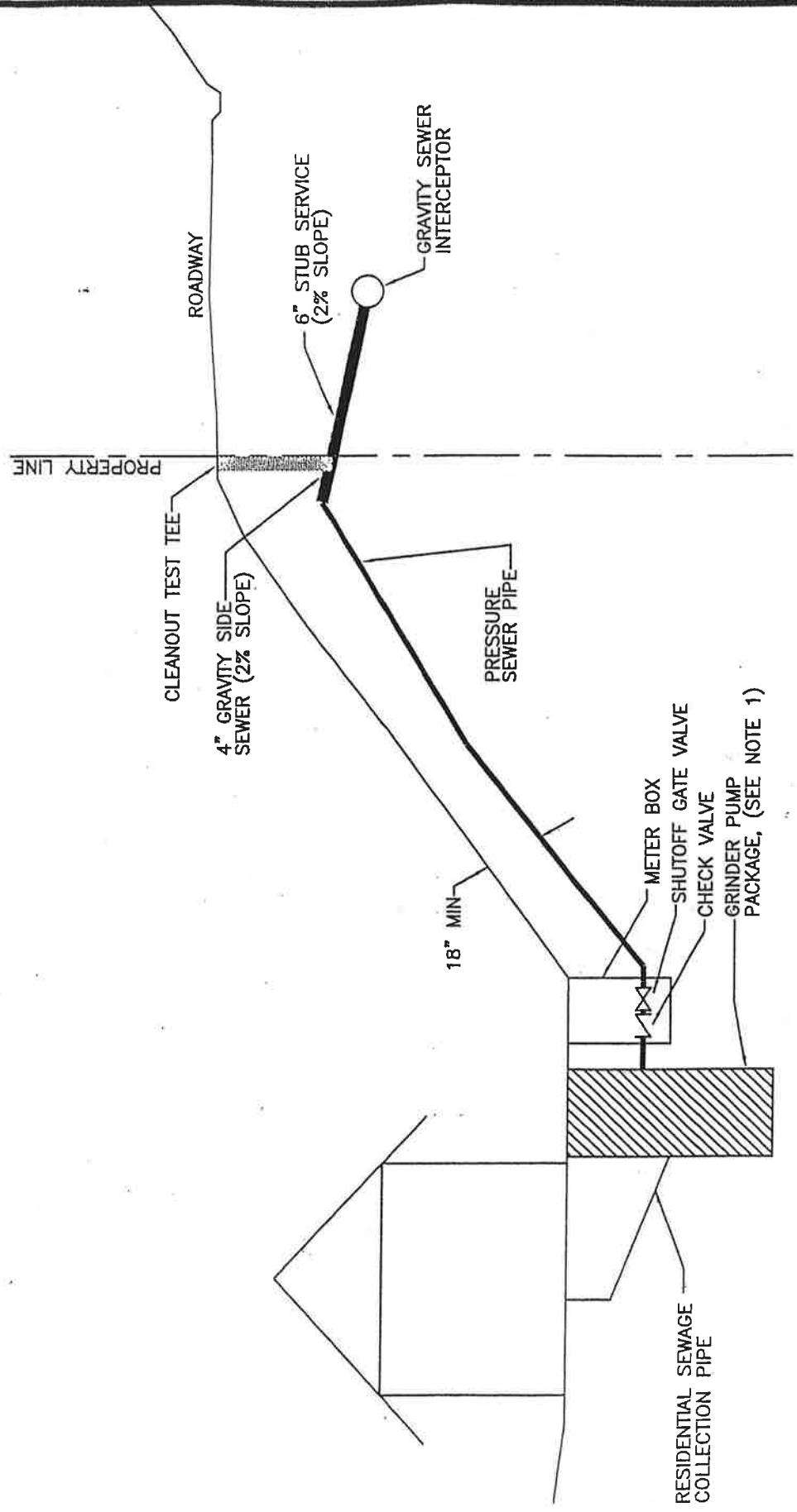
- type. Valve boxes shall have locking covers so as to be tamper resistant. Valve covers shall have the word "SEWER" cast into the cover.
- L. Service saddles shall be bronze double strap service saddles with a threaded bronze saddle body and stainless steel straps.
  - M. Flexible couplings for use with PVC or brass piping shall have steel (ASTM A 120) or ductile iron (ASTM A 536, Grade 65-45-12) center rings and ductile iron (ASTM A 536, Grade 65-45-12) end rings. Gaskets shall be virgin SBR per ASTM D 2000 MBA 710. Sleeve bolts shall be trackhead bolts with heavy hex head nuts with UNC 5/8" rolled thread, high strength and constructed of Type 304 stainless steel. End and center rings shall be fusion epoxy lined and coated.
  - N. Package grinder pump station design and mechanical components shall conform to the Washington State Dept. of Ecology's Criteria For Sewage Works Design, Sections C1-10.1 and C1-10.2.
11. Gravity Section of Side Service Line with Grinder Pump (reference Exhibit 2.01).
- A. Service line shall be six (6) inch minimum from main to property line.
  - B. From the sewer main to the property line, parallel side sewer lines and water service lines shall maintain a minimum horizontal separation of ten (10) feet and a vertical separation of eighteen (18) inches with water installed above sewer (reference WA State Dept. of Ecology's Criteria for Sewage Works Design). From the property line to the residence or development, parallel side sewer lines and water service lines shall maintain horizontal and vertical separation distances in accordance with the County plumbing permit issued for the project. Service lines shall be installed in separate trenches.
  - C. Service pipe from the main to the property line shall be PVC and shall conform to the requirements of ASTM D3034 SDR 35. Sewer pipe shall have flexible gasketed joints.
  - D. Service shall have a minimum slope of 2%.
  - E. Changes in direction of side sewers shall be made by use of standard bends with the exception of 90 degree bends which are not approved. A 90 degree turn can be achieved with a 45 degree bend, a straight section of a two (2) foot minimum length, and another 45 degree bend.
  - F. Cleanouts on service lines shall be in accordance with UPC Section 406. A cleanout shall be provided for every change in alignment or grade in excess of twenty-two and one half (22 ½) degrees and in no case shall the spacing of cleanouts exceed 100 feet. As a minimum, a cleanout shall be located at the property line, and another within 2 feet of the house. Cleanouts shall consist of a wye branch in the side sewer with a plug. Cleanouts shall be full side sewer diameter. Cleanouts at house shall be extended to grade. All other cleanouts shall be extended to a point not less than 6 inches nor more than 12 inches below the finished ground surface and shall be plugged with a removable stopper which will prevent passage of dirt or water. When required by the District, the Developer shall install an approved casting to provide ready access to the cleanout stopper.

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February 2004

Exhibits included with this section are:

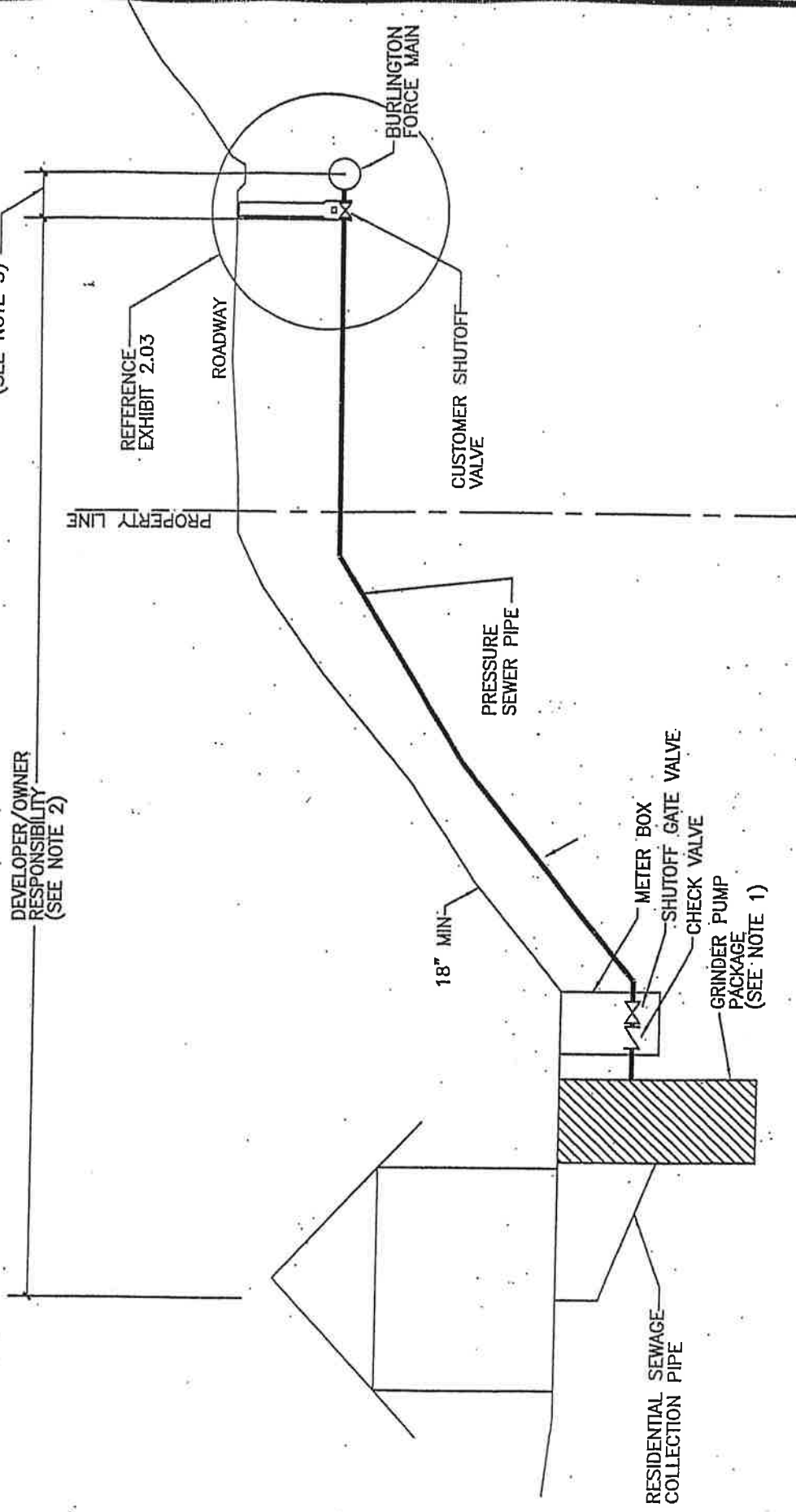
- Exhibit 2.01 – Side Sewer With Grinder Pump – General Layout for Connection to Gravity Sewer Interceptor,
- Exhibit 2.02 – Side Sewer With Grinder Pump – General Layout for Connection to Burlington Force Main,
- Exhibit 2.03 – Side Sewer With Grinder Pump – Connection Detail to Burlington Force Main.
- Exhibit 2.04 – Typical Sewer Trench Detail
- Exhibit 2.05 – Valve Marker

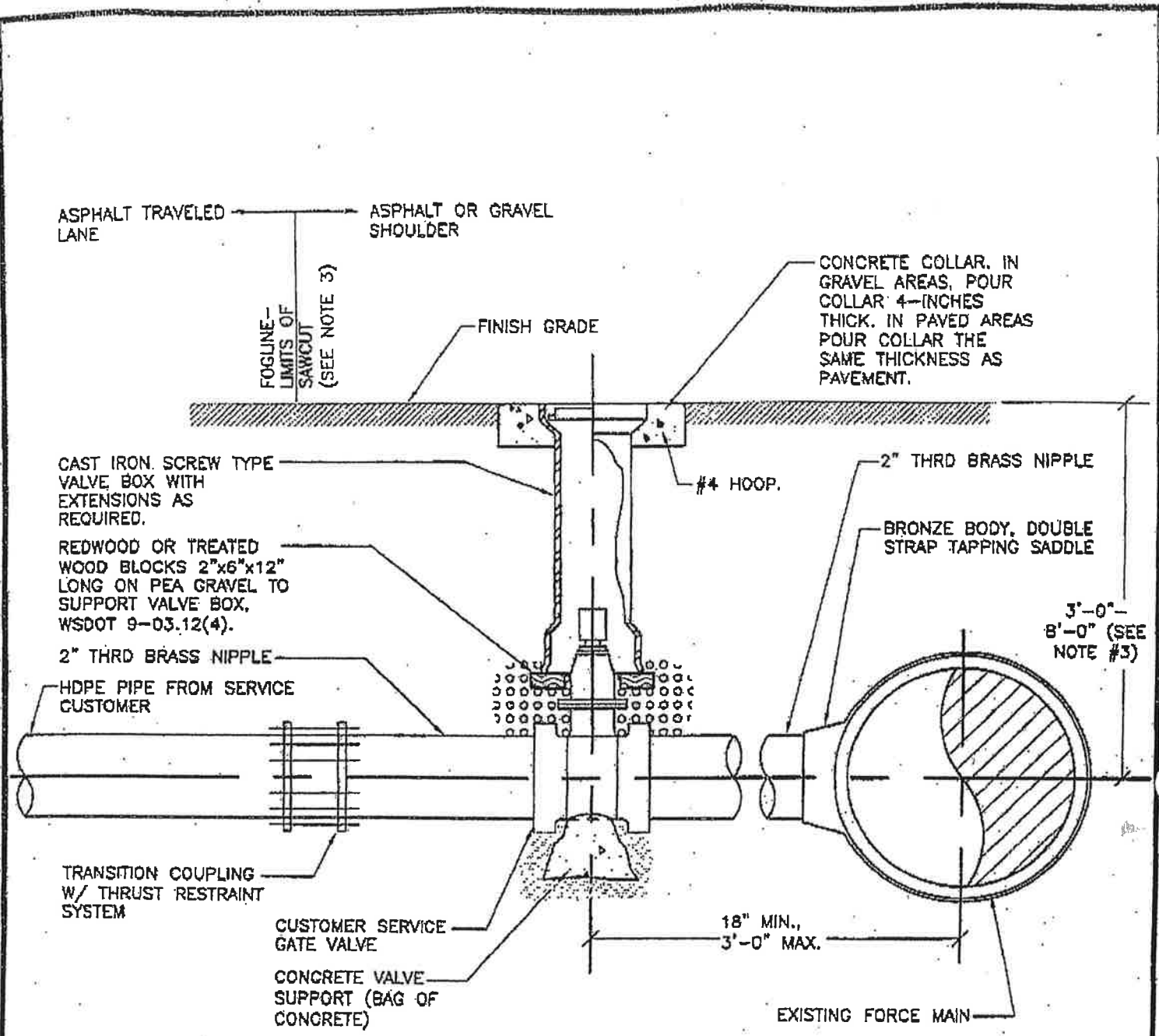
NOTES:  
 1. SEE DOE'S CRITERIA FOR SEWAGE WORKS DESIGN, SECTIONS C1-10.1 & C1-10.2 FOR GRINDER PUMP COMPONENT INFORMATION. DOE REQUIRES TWO (2) CHECK VALVES DOWNSTREAM OF THE PUMP STATION. ONE OF THE TWO REQUIRED CHECK VALVES SHALL BE LOCATED IN A METER BOX ADJACENT TO THE PUMP STATION, AS SHOWN.



NOTES:

1. SEE DOE'S CRITERIA FOR SEWAGE WORKS DESIGN, SECTIONS 1-10.1 & C1-10.2 FOR GRINDER PUMP DESIGN & COMPONENT INFORMATION. DOE REQUIRES TWO (2) CHECK VALVES DOWNSTREAM OF THE PUMP STATION. ONE OF THE TWO CHECK VALVES SHALL BE LOCATED IN A METER BOX IMMEDIATELY ADJACENT TO THE PUMP STATION, AS SHOWN.
2. DEVELOPER/OWNER SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF SIDE SERVICE PIPING, VALVES AND GRINDER PUMP PACKAGE FROM THE RESIDENCE TO THE RESIDENCE SIDE OF THE SERVICE SHUTOFF VALVE.
3. DEVELOPER/OWNER SHALL BE RESPONSIBLE FOR THE INSTALLATION OF THE SIDE SERVICE PIPING AND SERVICE SHUTOFF VALVE FROM THE FORCE MAIN THROUGH THE SERVICE SHUTOFF VALVE. DISTRICT SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE SIDE SERVICE PIPING AND SERVICE SHUTOFF VALVE FROM THE FORCE MAIN THROUGH THE SERVICE SHUTOFF VALVE AFTER INSTALLATION.





**NOTES**

- 1) A VALVE MARKER POST SHALL BE INSTALLED AT EACH CUSTOMER SERVICE VALVE LOCATION. SEE EXHIBIT 2.05.
- 2) FOR SURFACE RESTORATION AND TYPICAL TRENCH DETAIL SEE EXHIBIT 2.04.
- 3) FOR VALVES TO BE LOCATED IN THE ASPHALT SHOULDER, LIMIT SAWCUT TO THE SHOULDER SIDE OF THE FOG LINE.
- 4) WSDOT REFERENCE PER 2002 EDITION.

**Wilson Engineering**  
CONSULTING ENGINEERS & SURVEYORS

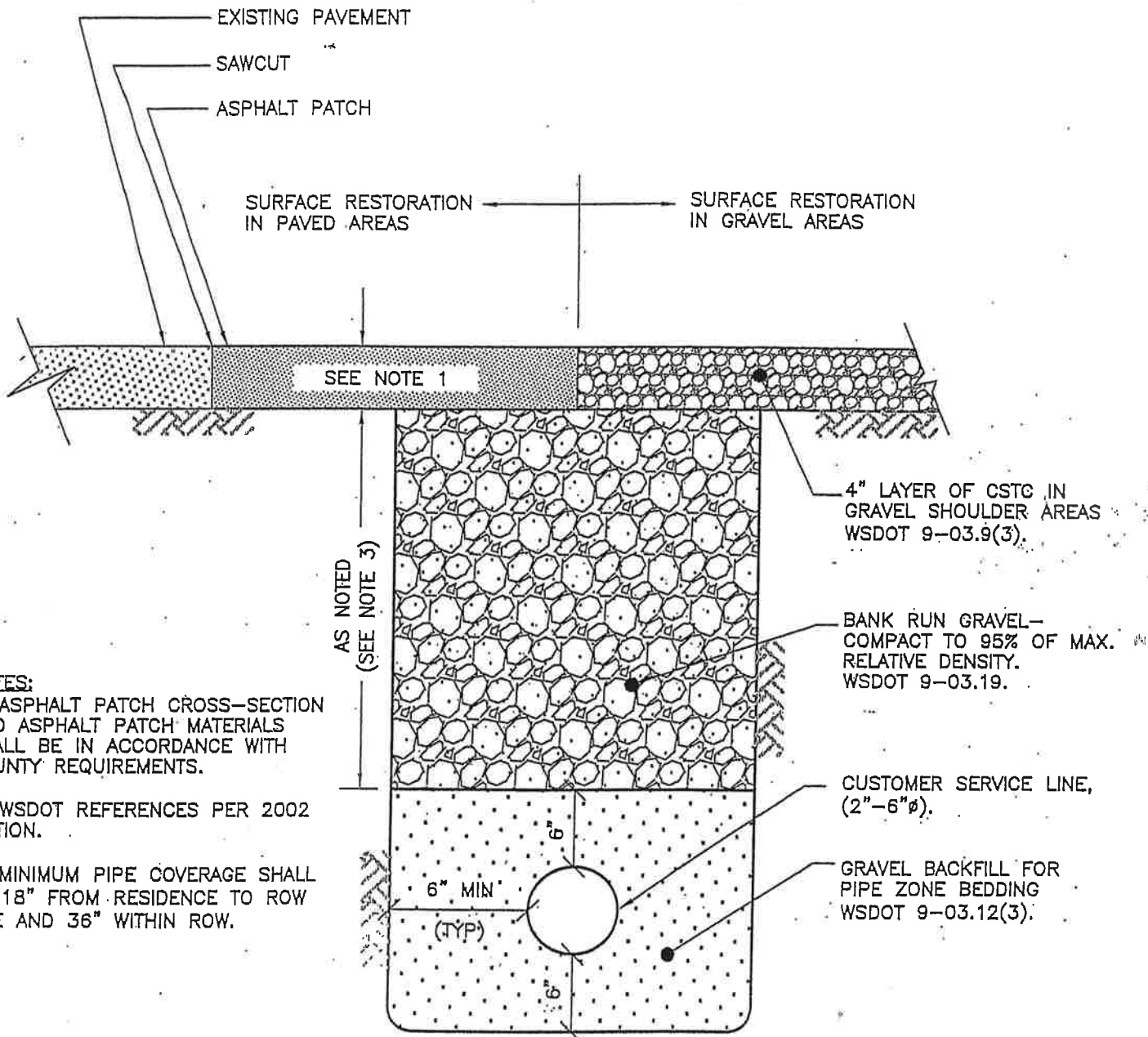
405 DUPONT STREET  
BELLINGHAM, WA 98225  
(360) 733-8100  
FAX: (360) 617-9801

**SANISH WATER DISTRICT**

BIRMINGHAM COUNTY WASHINGTON

**EXHIBIT 203**  
SIDE SEWER WITH GRINDER PUMP  
FORCE MAIN CONNECTION DETAIL

DATE	NO.
JUN 1994	1
SCALE	
DATE	
REVISED	
2002-06-01	1



**NOTES:**

1) ASPHALT PATCH CROSS-SECTION AND ASPHALT PATCH MATERIALS SHALL BE IN ACCORDANCE WITH COUNTY REQUIREMENTS.

2) WSDOT REFERENCES PER 2002 EDITION.

3) MINIMUM PIPE COVERAGE SHALL BE 18" FROM RESIDENCE TO ROW LINE AND 36" WITHIN ROW.

AS NOTED  
(SEE NOTE 3)

4" LAYER OF CSTG IN GRAVEL SHOULDER AREAS WSDOT 9-03.9(3).

BANK RUN GRAVEL— COMPACT TO 95% OF MAX. RELATIVE DENSITY. WSDOT 9-03.19.

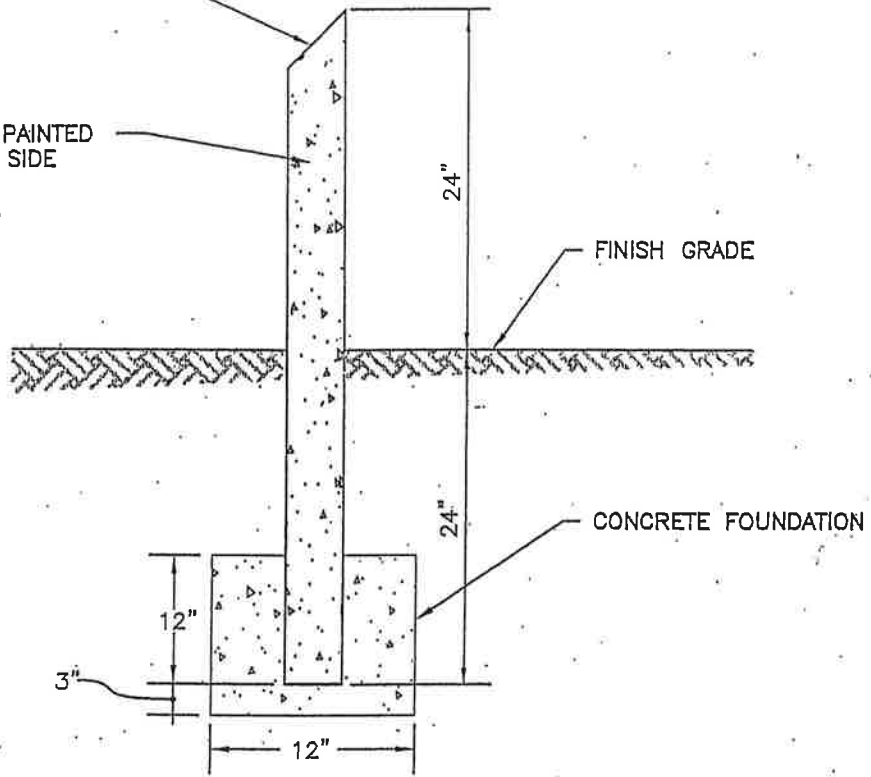
CUSTOMER SERVICE LINE, (2"-6"Ø).

GRAVEL BACKFILL FOR PIPE ZONE BEDDING WSDOT 9-03.12(3).

6" MIN  
(TYP)

SLOPE AT 45° AND INSCRIBE  
W/ "V"

4"x4" CONC. POST PAINTED  
WHITE. STENCIL ON SIDE  
SIZE OF VALVE AND  
DISTANCE TO VALVE.



**NOTES:**

1. STENCIL THE FOLLOWING INFORMATION ALONG THE SIDE OF MARKER POST:

- SIZE AND VALVE SERVICE (IE. 2" SEWER)
- DISTANCE FROM MARKER POST TO VALVE.

2. VALVE MARKER POST SHALL BE PLACED AS CLOSE AS IS PRACTICAL TO THE VALVE WITH A MAXIMUM DISTANCE OF TEN FEET FROM VALVE LOCATION. FINAL LOCATION OF VALVE MARKER SHALL BE DETERMINED IN THE FIELD BY THE OWNER.



**SECTION 3 - CRITERIA FOR RESIDENTIAL SEWER GRINDER PUMP PACKAGES**

The following general standards of materials and construction are set forth here as a guide for the installation of residential sewer grinder pump packages on side-sewer sanitary service lines for Samish Water District.

1. A Grinder Pump Sewer Service shall be installed only with the prior written approval of Samish Water District and shall consist of an E-One Model 2010-IDU Package Grinder Pump System or approved equivalent, pressure pipe and required appurtenances.
2. Package Grinder Pump System shall be installed indoors (e.g., in garage, mechanical room, utility room, or basement), unless otherwise approved by the County Department of Health and Samish Water District.
3. Grinder Pump System electrical panel shall include a generator transfer switch and receptacle for emergency operation of system.
4. Grinder Pump System electrical panel shall include battery-backup operation for the high wet well alarm.
5. Grinder Pump System shall be equipped with an in-house alarm.
6. Grinder pump package design shall be performed by a professional engineer licensed in the State of Washington. Owner/Developer shall provide hydraulic analysis calculations, including the fixture count used for pump selection, to Samish Water District for review.
7. Package Grinder Pump System shall be installed only by a licensed plumber who is also a Samish Water District certified Side-Sewer Contractor.
8. Inspection and operational testing of Package Grinder Pump System shall be done by Building Services Department regardless of whether the pump is installed inside or outside of the building.
9. A document/covenant shall be recorded against the property (attached to the deed) disclosing that the residence's sewer service includes a grinder pump and that the homeowner/property owner shall be held responsible for any sewage spills, including any fines resulting from spills. The document/covenant shall also include a copy of the Owner's Manual for the Package Grinder Pump System installed.
10. Package Grinder Pump System design, components, and installation shall be accordance with Department of Ecology's Criteria for Sewage Works Design, Sections C1-10.1 and C1-10.2, The Uniform Plumbing Code, Samish Water District Design and Construction Standards, and the following Samish Water District and Manufacturer's grinder pump specifications and standards. Non-standard installations shall require stamped engineering plans.

## **Indoor Grinder Pump Stations Manufacturer's Specifications**

### **1.0 GENERAL**

**1.01 GENERAL DESCRIPTION:** The MANUFACTURER shall furnish complete factory-built and tested Grinder Pump Station(s), each consisting of grinder pump(s) suitably mounted in a basin constructed of high density polyethylene (HDPE), pump removal system, shut-off valve, anti-siphon valve, check valve assembled within the basin and all necessary internal wiring and controls.

The grinder pump shall be designed specifically for indoor applications. The grinder pump shall be model 2010-IDU, as manufactured by Environment One Corporation, 2773 Balltown Road, Niskayuna, New York, 12309, or approved equivalent.

**1.02 SHOP DRAWINGS:** After receipt of notice to proceed, the MANUFACTURER shall furnish a minimum of six (6) sets of shop drawings detailing the equipment to be furnished including dimensional data and materials of construction. The ENGINEER shall promptly review this data, and return two (2) copies as accepted, or with requested modifications. Upon receipt of accepted shop drawings, the MANUFACTURER shall proceed immediately with fabrication of the equipment.

**1.03 MANUFACTURER:** The equipment specified shall be a product of a company experienced in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. The company shall submit detailed installation and user instructions for its product; submit evidence of an established service program including complete parts and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts. The MANUFACTURER shall provide a reference and contact list from three of its largest contiguous grinder pump installations.

**1.04 OPERATING CONDITIONS:** The pumps shall be capable of delivering the rated flow and total dynamic head as determined and supplied by Samish Water District for the subject connection point. The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

**1.05 WARRANTY:** The grinder pump MANUFACTURER shall provide a part(s) and labor warranty on the complete station, for a period of sixty (60) months after notice of OWNER'S acceptance, but no greater than sixty-three (63) months after receipt of shipment. Any defects found during the warranty period will be reported to the MANUFACTURER by the OWNER.

### **2.0 PRODUCT**

**2.01 PUMP:** The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. The material shall be suited for domestic waste water service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, good aging properties, and outstanding wear resistance.

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**2.02 GRINDER:** The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece stainless steel motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft. The grinder will be of the rotating type with a stationary hardened and ground stainless steel shredding ring spaced in accurate close annular alignment with the driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars.

This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
2. The inlet shroud shall have a diameter no less than 5 inches.
3. At maximum flowrate through the cutting mechanism must not exceed 4 feet per second.
4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, rubber and the like, to finely divided particles which will pass freely through the passages of the pump and the 1 1/4" diameter discharge piping.

**2.03 ELECTRIC MOTOR:** As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, squirrel cage induction type with a low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and approved by Underwriters Laboratories, Inc., for the application.

**2.04 MECHANICAL SEAL:** The core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

**2.05 TANK:** The tank shall be made of rotationally molded high density polyethylene, with a melt index of 2.0 grams/10 minutes or lower to assure high environmental stress cracking resistance. The tank shall have a nominal thickness of 0.50".

The tank shall be furnished with one 4" inlet valve for connection to PVC building sewer (4.650 OD). Tank capacity shall be 91 gallons. The tank must be capable of withstanding static heads of 10 feet without leaking or causing permanent structural damage.

An aesthetically pleasing, rotationally molded cover shall be supplied with the tank to protect and conceal the pump core, discharge valve and diagnostic control center.

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The station shall have all necessary penetrations molded in and factory sealed. No field penetrations shall be acceptable.

All discharge piping shall be constructed of 304 Series Stainless Steel or PVC and terminate with a 1 1/4" female NPT fitting. The discharge piping shall include a PVC ball valve rated for 200 psi WOG.

The tank shall also include a 2" PVC vent to prevent sewage gases from accumulating in the tank.

**2.06 CHECK VALVE:** The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Working parts will be made of a 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A non-metallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back pressure. The valve body shall be an injection molded part made of glass filled PVC.

**2.07 CORE UNIT:** The Grinder Pump Station shall have cartridge type easily removable core assemblies containing pump, motor, grinder, all motor controls, pump diagnostics center, check valve, anti-siphon valve, and wiring. The watertight integrity of each core unit, shall be established by 100% factory test at a minimum of 5 PSIG.

**2.08 CONTROLS:** All necessary controls shall be located in the top housing of the core unit. The top housing will be attached with stainless steel fasteners.

Non-fouling waste water level detection for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air-bell level sensor connected to a pressure switch. The level detection device shall have no moving parts in direct contact with the waste water. High-level sensing will be accomplished in the manner detailed above by a separate air-bell sensor and pressure switch of the same type.

**2.09 DIAGNOSTICS CENTER:** Each Package Grinder Pump System shall include a 4 7/8" H x 4 1/2" W diagnostics center that displays the present operating condition of the grinder pump station. This display shall be located on the top of the grinder pump core and shall be readily visible when the grinder pump station cover is removed. The diagnostic center shall consist of (5) circular light emitting diode (LED) displays measuring 0.25" in diameter each. One 0.50" diameter circular touch pad shall also be included in this display.

The Diagnostics Center shall visually and audibly indicate the present operating condition of the Package Grinder Pump System as described below.

1. **POWER** — A solid green LED indicates that the proper electrical supply voltage is present at the grinder pump station. A blinking green LED indicates that the electrical supply voltage being supplied to the station is too low.
2. **PUMP RUN** — A solid green LED illuminates when the grinder pump is running.
3. **HIGH WATER ALARM** — If the sewage level in the Package Grinder Pump Tank reaches 20" from the bottom of the tank basin a blinking red LED is illuminated. Two

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minutes after this condition has been reached a 75 dB buzzer will be energized. If the power to the station is interrupted, the blinking LED and a 65 dB piezo-electric buzzer will operate via an 8.4-volt nickel metal hydride rechargeable battery.

4. **NO POWER ALARM** — If the power to the pump is interrupted a red LED will blink and a 62 dB piezo-electric buzzer will be energized.
5. **SERVICE REQUIRED** — If the rechargeable battery voltage is low a blinking yellow LED will be illuminated and a 62 dB piezo-electric buzzer will be energized with short beeps; the 75dB AC buzzer will also sound short beeps.
6. **SILENCE/PTR** — Pressing the silence/PTR button will silence all high water level alarms. It will not silence the low supply or battery voltage alarms. Pressing this button and holding it compressed for 5 seconds or more will manually start and run the pump until the button is released.

The 8.4-volt nickel metal hydride rechargeable battery shall be located on the top of the grinder pump core so that it may be easily replaced. Complete recharge of the battery shall take no longer than 48 hours. All alarms energized by the rechargeable battery shall operate for at least 24 hours.

**2.10 SERVICEABILITY:** The grinder pump core unit shall have two hand holds to facilitate easy core removal when necessary. All mechanical and electrical connections must provide easy disconnect accessibility for core unit removal and installation. A push to run feature will be provided for field trouble shooting. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

**2.11 SAFETY:** The Grinder Pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired Grinder Pump Station shall be listed by Underwriters Laboratories, Inc., to be safe and appropriate for the intended use.

The grinder pump shall meet accepted standards for plumbing equipment for use in residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications.

### **3.0 EXECUTION**

**3.01 FACTORY TEST:** Each grinder pump shall be submerged and operated for 5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, level sensors and each unit's dedicated controls. All factory tests shall incorporate each of the above-listed items. Certified test results shall be available upon request showing the operation of each grinder pump at two (2) different points on its curve, with the maximum pressure no less than 60 psi. The ENGINEER reserves the right to inspect such testing procedures with representatives of the OWNER, at the GRINDER PUMP MANUFACTURER'S facility.

**3.02 DELIVERY:** All Grinder Pump units will be delivered to the job site, 100% completely assembled, including testing, ready for installation. Grinder pump units will be individually mounted on wooden pallets.

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**3.03 INSTALLATION:** Installation shall be per all manufacturer's installation instructions. User instructions shall be given to the homeowner.



## APPROVED GRINDER PUMP STATIONS

H. D. Fowler Company Grinder Pump Station Basin  
Model # HDFPG 246  
H. D. Fowler Company, Bellingham, WA. 360-734-8400

Environment One Corporation  
E-One Model # 2010  
Correction Equipment, Inc., Redmond, WA. 425-869-1233

Myers Pumps  
Myers Grinder Pump Package Model RG10-A-21  
Familian NW, Bellingham, WA. 360-733-3222

Zoeller Pump Company  
Pump System & Reversing Controls Package 840 Series Pump  
For local dealer: 1(800) 928-PUMP or <http://www.zoeller.com>

Dayton Residential/Commercial Submersible Grinder Pumps  
Grainger Item & Manufacture Model: 3BB97, 2HP, 230 Volt Single Phase  
Grainger Item & Manufacture Model: 3BB98, 2HP, 480 Volt Three Phase  
For local dealer: Grainger.com

Goulds Pumps Residential Submersible Grinder Pumps  
Grainger Item & Manufacture Model: 4NE67 & RGS2012  
2HP, 208/230 Volt Single Phase  
For local dealer: Grainger.com







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Familian NW, Bellingham, WA. 360-733-3222

Zoeller Pump Company  
Pump System & Reversing Controls Package 840 Series Pump  
Pump System & Controls Package 820 Series Pump  
For local dealer: 1(800) 928-PUMP or <http://www.zoeller.com> or  
H. B. Jaeger, 1687 Port Drive, Burlington, WA  
360-707-5958

Dayton Residential/Commercial Submersible Grinder Pumps  
Grainger Item & Manufacture Model: 3BB97, 2HP, 230 Volt Single Phase  
Grainger Item & Manufacture Model: 3BB98, 2HP, 480 Volt Three Phase  
For local dealer: Grainger.com

Goolds Pumps Residential Submersible Grinder Pumps  
Grainger Item & Manufacture Model: 4NE67 & RGS2012  
2HP, 208/230 Volt Single Phase  
For local dealer: Grainger.com

Liberty Pump 2448 – Series Simplex Grinder Package  
HD Supply – Waterworks, Bellingham, WA 98226  
360-734-4210

