Kitsap County

Department of Public Works

Standards for Sanitary Sewer Extensions

1996

KITSAP COUNTY
STANDARDS FOR SANITARY SEWER EXTENSIONS

TABLE OF CONTENTS

DIVISION VI - INDIVIDUAL GRINDER PUMP INSTALLATIONS

STANDARD DETAILS

DIVISION I
GENERAL PROVISIONS

I-1.000 DESCRIPTION

1.010 General
1.020 Introduction
1.030 Submittal Procedure

I-2.000 DEVELOPER'S CHECKLIST

2.010 General
2.020 Developer's Checklist

I-3.000 GENERAL PLAN FORMAT

3.010 General
3.020 Horizontal Plan Elements
3.030 Profile Plan Elements
Agreement

DIVISION I
GENERAL PROVISIONS

I-1.000 DESCRIPTION

1.010 General

Kitsap County was founded in 1857 and was originally named Slaughter County. It is now home to over 200,000 people. These people are represented by three County Commissioners and are served by a variety agencies and government departments, including Public Works. Kitsap County occupies a unique portion of the State of Washington, directly between the urban areas of Seattle and Tacoma and the wilderness of the Olympic Mountains. It is bounded by Hood Canal on the west, Puget Sound on the east, and Mason and Pierce Counties to the south.

1.020 Introduction

The purpose of the Standards for Sanitary Sewer Extensions is to provide minimum design and construction requirements for the extension of and connection to Kitsap County sewer facilities. It also specifies documentation and administration requirements necessary for obtaining approval and acceptance of sewers. These Standards shall govern all construction and upgrading of sewer systems and facilities conveyed to Kitsap County, except where otherwise provided for in other ordinances.

Divisions II through VI of these Standards implement, and are intended to be consistent with, the latest edition of the Washington State Department of Ecology's "Criteria for Sewage Works Design." Except where provided otherwise in these Standards, construction details, workmanship, and materials shall be in accordance with the most recent edition of the "Standard Specifications for Road, Bridge, and Municipal Construction," prepared by the Washington State Department of Transportation and the American Public Works Association.

Variances from these Standards will only be granted by Kitsap County upon evidence that such variances are in the public interest and based on sound engineering judgment. The requirements for safety, function, appearance, and maintainability shall be fully met. Variances must be approved in writing prior to construction.

Failure to comply with these Standards shall be cause for withholding all approvals associated with the sewer facilities proposed.

1.030 Submittal Procedure

Whenever a property owner, individual, business, corporation, or other entity desires to connect to the County's sanitary sewer system an Application to Construct Sanitary Sewer Extension shall be provided with the first Construction Plan submittal. A Project Proponent's Checklist is presented in Section I-2.020 to assist the proponent of the project.

When commercial or industrial property is involved, information shall be provided on a plan sheet showing the floor plan and square footage of the proposed structures and the intended use of the structure. The seating capacity shall be indicated for all restaurants and taverns and the number of units shall be shown for all motel/hotel or multiple family structures. Plan, profile, and detail sheets shall conform to Section I-3.000, General Plan Format.

In order to coordinate the review of Construction Plans for all projects in Kitsap County, the Department of Public Works has implemented a standard procedure for plan submittals. All construction plans are to be submitted to the Plans Coordinator at the main counter on the third floor of the Public Works Building. The Project Proponent's Checklist provides information on the number of prints to be supplied with each submittal.

I-2.000 DEVELOPER'S CHECKLIST

2.010 General

The checklist is a general checklist to assist the proponent of the project through the sanitary sewer extension approval and acceptance process. Since the following checklist is general, it does not cover all possible situations, thus the County reserves the right to deviate from the checklist if the County feels the project warrants such. A copy of each document identified in the Developer's Checklist appears in Division 1F, Forms and Agreements.

2.020 Developer's Checklist

A. During the initial planning stages of a project, all projects proposed to be served by County sewers will be required by the Department of Community Development to provide a copy of an executed Sewer Availability

Agreement. The project proponent may request a blank Sewer Availability Agreement from the Wastewater Division of Public Works and submit the completed form to the Assistant Director of Public Works/Utilities for signature. The executed Sewer Availability Agreement will be valid for three years.

B. Project proponents submit an Application to Construct Sanitary Sewer Extension together with 9 copies of sanitary sewer plans, profiles, detail sheets, and specifications to the Public Works Plans Coordinator. Refer to Section I-3.000 General Plan Format for format requirements. Additional information shall be provided for:

i. **Industrial and commercial properties** - floor plan and square footage of the proposed structures and intended use of the structure.

ii. **Restaurants and theaters** - seating capacity.

iii. **Motels/Hotels or multiple family structures** - number of dwelling units.

C. Submitted materials are reviewed by the County and a set of preliminary check prints, and marked specifications are returned to the proponent along with a Sewer Assessment Agreement.

D. Project proponents submit 9 sets of revised plans and all applicable fees to the Public Works Plans Coordinator and an executed copy of the Sewer Assessment Agreement to the Wastewater Division.

E. County submits plans to the Department of Ecology for approval.

F. Project proponent receives approved plans from the County.

G. Project proponent obtains all necessary County, State, and Federal permits.

H. Project proponent's contractor arranges for pre-construction conference with county inspector in attendance.

I. Contractor notifies the County Inspector 48 hours in advance of construction start.

J. Underground utilities location to be requested two days in advance of construction by contractor.

K. County approval of installation obtained upon completion of construction and system passes all required tests and inspections.

L. Project proponent furnishes the County with a completed Conveyance of Sanitary Sewer Lines and Facilities document, necessary easements, maintenance bond and recording fees.

M. Project proponent obtains a letter of Acceptance of Sanitary Sewer Facilities for Maintenance and Operation from the County.

N. Sanitary sewer system is approved for hookups by the County.

O. Final warranty inspection made by the County prior to end of 24 month bond warranty period.

P. Release of bond by the County.

I-3.000 GENERAL PLAN FORMAT

3.010 General

The General Plan Format shall be used in conjunction with the Department of Ecology's most current version of Criteria for Sewage Works Design. Since the following requirements are general and do not cover all possible situations, the County reserves the right to deviate from the following if the County feels the project warrants such.

Sheet sizes shall be either 24" x 36" or 18" x 24" at the discretion of the County.

3.020 Horizontal Plan Elements

A. Sanitary sewer alignments with stationing at manholes, size and length of main lines, and distance references to the main line from road centerlines, right of way lines, property lines and/or ties to section or quarter corners.

B. Provide township, section, and range in which project is located.

C. Bearing on road centerlines, property lines or section lines, keyed to State coordinate system when data is available.

D. All existing utilities and proposed utilities (power-with vault locations, water gas, storm, telephone, etc.)

E. Identification of all roads, adjoining subdivisions and properties with property owners' names show.

F. Horizontal scale at 1" = 50' is preferred.Details for clarification may be shown at a convenient scale.

G. Show north arrow.

H. When more than two sheets are used, a key plan shall be provided showing the complete development with existing and proposed sanitary sewer layout together with an index.

I. Provide all easement locations and dimensions.

J. Station all side sewers.

K. Construction details of standard manholes, drop connections, cleanouts, sidesewers, construction specifications, etc., applicable to the proposed project shall be shown on the plans.

3.030 Profile Plan Elements

A. Original ground line at 100' stations and at significant ground breaks and topographic features, with accuracy to within 0.1 foot.

B. Final sanitary sewer profile with stationing same as horizontal plan.

C. Datum used and all bench marks, which must refer to established control when available. Mean sea level datum preferred.

D. Vertical scale at 1" = 10' is preferred. Details for clarification may be shown at a convenient scale.

E. Provide invert elevations of the main at inlet and outlet of each manhole, slope of the main, length of main, size and type of pipe, and rim elevations of manhole covers. Provide a minimum of 0.1 foot drop across manholes from inlet to outlet.

DIVISION IF
FORMS AND AGREEMENTS

IF-1.000 DESCRIPTION

1.010 General

IF-2.000 FORMS AND AGREEMENTS

2.010 Wastewater Division Developer's Checklist
2.020 Schedule of Fees for County Sewage Systems
2.030 Sewer Availability Agreement
2.040 Application To Construct Sanitary Sewer Extension
2.050 Sewer Assessment Agreement
2.060 Phased Development Contract/Lien
2.070 Application for Developer Extension Payback Agreement
2.080 Contract for Reimbursement Under Municipal Water and Sewer Facilities Act (Payback Agreement)
2.090 Conveyance Of Sewer Facility
2.100 Sanitary Sewer Maintenance Bond, Irrevocable Letter of Credit or Assignment of Account
2.110 Perpetual Easement
2.120 L.I.D. Segregation Certificate
2.130 Sewage Pump Installation, Operation, And Maintenance Agreement

DIVISION IF
FORMS AND AGREEMENTS

IF-1.000 DESCRIPTION

1.010 General

The County forms and agreements identified in Section I-2.020 are presented in the following sections.

IF-2.000 FORMS AND AGREEMENTS

2.010 Wastewater Division Developer's Checklist

The Wastewater Division Developer's Checklist is a general checklist to assist the proponent of the project through the sanitary sewer extension approval and acceptance process. The checklist may not cover all situations, thus the County reserves the right to deviate from the checklist if the County feels the project warrants such.

2.020 Schedule of Fees for County Sewage Systems

The Newcomer Assessment fees were set in 1994 by County Resolution No. 137-1994. Under the provisions of that resolution, the fees are to be adjusted on March 1 of each year (starting in 1996) by an amount equal to the average annual Consumer Price Index for All Urban Customers (CPI-U) for the Seattle area. Please contact the Wastewater Division of Public Works at (360) 337-5777 for the current fees. The Wastewater Division should also be contacted for information regarding monthly fees, permit, plan review and inspection fees.

2.030 Sewer Availability Agreement

The Sewer Availability Agreement guarantees reservation of sewage treatment capacity at the County's wastewater treatment plants. As such, this agreement is required as proof of public sewer commitment when presenting a project for initial review with the Department of Community Development. The Sewer Availability Agreement has replaced the Letter of Availability in this role. A developer or project proponent should request a Sewer Availability Agreement early in the project planning stage so that capacity can be reserved at the applicable treatment plant.

2.040 Application to Construct Sanitary Sewer Extension

The Application to Construct Sanitary Sewer Extension provides essential information for a complete review of the project plans, details, and specifications. The Application to Construct Sanitary Sewer Extension should be submitted with the first submission of plans to the Public Works Plans Coordinator.

2.050 Sewer Assessment Agreement

The Sewer Assessment Agreement legally obligates the developer to pay all necessary fees and assessments. It obligates the County to accept and treat the sewage under the specified conditions.

2.060 Phased Development Contract/Lien

The Phased Development Contract/Lien provides the developer the opportunity to pay the fees and assessments at the time each phase or unit of a project actually receives sewer service. The fee is normally collected when the Building Side Sewer Permit is issued. Unpaid assessments are held as a lien against the units until the fee is collected.

2.070 Application for Sanitary Sewer Extension Payback Agreement

Any project proponent utilizing funds to install sanitary sewer improvements with construction costs more than $100,000 on public right of way and/or dedicated easements may submit to the county an Application for Sanitary Sewer Extension Payback Agreement for recovery of a pro rata share of the cost of constructing said public improvements from other properties that will later derive a benefit from said improvements. No Application for Sewer Extension Payback Agreement shall extend for a period longer than ten years from the date of final County acceptance of the improvements. The County shall have discretion to authorize or not to authorize an Application for Sewer Extension Payback Agreement on a case by case basis.

The Application for Sanitary Sewer Extension Payback Agreement form shall be submitted to the Public Works Department accompanied by:

1. Preliminary sanitary sewer design drawings.
2. Itemized/quantified estimate of construction costs, prepared and signed by a licensed civil engineer or firm.

3. Scaled vicinity drawing of 8 ½ inch by 11 inch mylar, stamped by a licensed civil engineer or licensed land surveyor showing the sewer improvement, location, and proposed benefited area including dimensions and County Assessor' numbers of each tax parcel, size of parcels, useful elevations as necessary for determining benefit.
4. Legal description of developers parcel and legal description of benefited property.

Upon approval of the application by the County and completion of construction, the project proponent shall submit itemized documentation on the cost of the improvement. Documentation shall include a letter from the Contractor stating they have been paid in full for the itemized construction costs. All costs shall be directly related to the construction of the improvement to be covered by the agreement. The project proponent shall pay all engineering consultant fees and recording fees associated with the improvements, which will not be subject to pro rata payback.

2.080 Contract for Reimbursement Under Municipal Water and Sewer Facilities Act (Payback Agreement)

The Contract for Reimbursement Under Municipal Water and Sewer Facilities Act is the document to execute a payback agreement applied for through the prior submittal and approval of the Application for Sanitary Sewer Extension Payback Agreement. See Section I-4.060. The contract establishes the basis for the potential pro rata recovery of sanitary sewer construction costs from a "benefited property." It describes the sanitary sewer facilities constructed by the Owner, defines the Owner's property, defines a "benefited property", and states that the capacity to serve a "benefited property" through the sanitary sewer facilities constructed by the Owner. The contract defines how the payback agreement may become activated through later connection to the constructed facilities but limits the effect of the agreement to ten (10) years from the date of execution.

2.090 Conveyance of Sewer Facility

The Conveyance of Sewer Facility form is used by the project proponent to convey all rights, title, and interest in a sanitary sewer facility to the County. Conveyance to the County may be executed after the approval of the Application to Construct Sanitary Sewer Extension form (see Section I-4.030), but before use of the facilities to transmit sewerage. The County shall have access to conveyed sewer facilities, satisfactory to the County and

including rights-of-way or recorded easements (see Section I-4.100). All sewer facilities to be conveyed shall meet the requirements of the current Kitsap County Sanitary Sewer Guidelines and Standards manual, and be inspected by the County prior to acceptance. When the facilities to be conveyed to the County include pipe systems, the pipe system shall have collection mains with an 8-inch minimum diameter serving three of more residences, and shall include all collection mains, manholes, side sewers, and cleanouts within the public rights-of-way or recorded easements.

2.100 Sanitary Sewer Maintenance Bond, Irrevocable Letter of Credit, or Assignment of Account

The proponent of the project shall be required to furnish to the County a maintenance warranty in a form acceptable to the County, upon approval of a sanitary sewer extension of facilities and construction completion of any sanitary sewer extension or facilities, but before any sewage is discharged or transmitted. The maintenance warranty shall be either a bond with surety, an irrevocable letter of credit, or an assignment of account.

The amount of the bond shall be equal to ten (10) percent of the cost of the extension but not less than Two Thousand Five Hundred Dollars ($2500). The bond shall indemnify and save harmless the County from any defects in the workmanship, equipment, or materials used in the sewer extension or facilities that shall develop or be discovered within twenty-four (24) months following the date the instrument is executed.

2.110 Perpetual Easements

The Project Proponent shall obtain any required easements not shown and addressed on the face of an approved final plat. A copy of such easement on the standard Kitsap County form shall be delivered to the County prior to the time Project Proponent commences construction of sanitary sewer facilities. The original easement recorded with Kitsap County named as grantee shall be delivered to the County upon completion of construction and prior to acceptance of the sanitary sewer facilities by the County in accordance with the provisions hereof. The Project Proponent shall provide all necessary easements at this sole cost, together with evidence of title and a title insurance policy in a sum of not less than $1,000 per 500 feet of easement, establishing clear title of the grantor.

Easements are required for all sanitary sewer mains installed outside of County rights of way. No permanent structures or fences are allowed on the easement. The Public Works Department will determine width of easements. Widths are dependent upon the depth of the sanitary sewer main, but ten (10) feet shall be considered a minimum for all easements. Easement widths shall be increased an additional two feet horizontally for every one foot increment of vertical depth increase over ten feet.

Location of sanitary sewer facilities within all easements shall be verified and certified in writing by a licensed land surveyor.

2.120 L.I.D. Segregation Certificate

An L.I.D. Segregation Certificate form is used to segregate a parcel of land into Local Improvement District (L.I.D.). The project proponent shall complete and submit an L.I.D. Segregation Certificate form along with the following information:

1. Name of person requesting the segregation with date of request shown.
2. Original LID account number, assessment, and legal description together with name and address of legal owner.
3. Name and address of owners of new parcels together with new legal descriptions, new assessor's tax lot numbers, and assessments for all parcels in segregation.
4. Include work sheets showing area of original parcel, areas of new parcels together with calculations used to arrive at segregated assessments. Include sketch with dimensions and pertinent information shown.

A three-dollar fee ($3.00) shall be tendered for each additional account made under the segregation, payable to the county Treasurer. In addition to such charge, actual costs, including salary related benefits of Public Works Department engineering and clerical time to process said segregations, shall be paid prior to approval of the segregation by the County. A deposit of estimated costs shall be required to be paid prior to commencing segregation proceedings.

2.130 Sewage Pump Installation, Operation and Maintenance Agreement

A Sewage Pump Installation, Operation, and Maintenance Agreement form is used to assign responsibilities when a sewage pump station is constructed by an "owner" to discharge into the

County's sanitary sewer collection system. It is required when an owner cannot serve a property by gravity system and must therefore install a sewage pump station. It places the installation, operation, and maintenance responsibilities on the owner, and states the condition when the County can charge the owner or lien the property when the owner's responsibilities are not fulfilled.

2.140 Prohibited Waste Discharge Permit

A person producing prohibited wastes may discharge such into a public sewer if a permit to do so is first obtained from the Director. The application for such permit shall include the following information; name and address of applicant, location of sewage production, process that produces sewage, volume of anticipated discharge, specific type and degree of prohibited sewage characteristic, other information deemed necessary by the Director. The Director may approve the application if the sewage treatment plant affected has sufficient capacity to handle the increased treatment load and if the contemplated discharge will not be unnecessarily harmful to the public sewer or unreasonably detrimental to the public health, safety or welfare. A person discharging prohibited waste pursuant to a permit shall pay County for the increased costs of the treatment thereof in addition to the regular monthly or bimonthly charge.

The charge for treating such wastes pursuant to the permit shall be as follows:

$0.02 per gallon for 0-10,000 gallons
$0.04 per gallon for 10,001-20,000 gallons
$0.06 per gallon for 20,001-30,000 gallons
$0.08 per gallon for 30,001-40,000 gallons

The maximum allowable discharge shall be limited to 40,000 gallons. A $50 fee will be charged for the permit to defray administrative costs.

The Director may revoke a permit upon sixty (60) days written notice to the person discharging the prohibited waste if it is found that the waste discharged has significantly increased in volume or degree of prohibited sewage characteristic, that the particular variety of prohibited characteristics has changed, or that the sewage treatment plant affected no longer has the capacity to handle the prohibited waste.

KITSAP COUNTY PUBLIC WORKS - Wastewater Division
Developer Checklist

1. Submit "Application to Construct Sanitary Sewer Extension" together with sanitary sewer plans to Plans Coordinator per Kitsap County Guidelines (County format, bldg., floor plan required on commercial developments. Restaurants - one year's water usage for similar sized restaurant).

2. Plans reviewed for compliance by County and preliminary check prints returned to developer.

3. Sewer assessment agreement and letter goes to developer documenting plan review, field inspection, and newcomer assessment fees.

4. Developer submits revised plans and executed "sewer assessment agreement" with applicable fees (5 sets of prints).

5. County submits plans to Department of Ecology for approval, if applicable. (2 - 4 weeks)

6. Approved plans received by developer from Public Works/Wastewater.

7. Developer obtains all necessary county, state and/or federal permits.

8. Developer's contractor arranges for pre-construction conference. County inspectors to be in attendance.

9. Developer's contractor to notify county inspectors 48 hours in advance of starting construction.

10. Underground utilities location to be requested two days in advance of construction by developer's contractor.

11. County approval of installation obtained upon completion of construction and system passes all required tests and inspections.

12. Final letter to developer asking for "conveyance of sewer facility" to be signed, notarized, and returned along with a $33.00 recording fee, a reproducible mylar of sewer "as-built" installation, a $2500 maintenance bond, and any recorded easements.

13. When all paperwork has been received, sewer system approved for connections by county.

14. Final warranty inspection will be made by county prior to end of 24-month warranty period.

15. Release of bond by county.

***This checklist pertains only to Wastewater Division approval. All other projects are processed through the Public Works Plans Coordinator.**

KCPWFORM
(REV 09/99)

KITSAP COUNTY PUBLIC WORKS - Wastewater Division
Schedule of Fees for County Sewage Systems

Newcomer Assessments:	See Current Resolution in Effect
Monthly Sewer Fees:	See Current Resolution in Effect
Sewer Availability Agreements:	See Current Resolution in Effect

Building Side Sewer Permit Fees:

Building Sewer (1) $50.00 - Disconnect Fee $50.00 - Stub Fee $150.00

(1) Add an additional $25.00 to fee shown for each additional connection where a building has more than one connection to the public sewer system.

Plan Review and Inspection Fees:
Residential, multi-family, & commercial – plan review & inspection

Plan Review, Administration, & Legal:	$0.50 per L.F. of sewer (minimum of $225.00)+ $270.00 per Pump Station
Field Inspection: Gravity Sewer- includes 1 TV inspection	$1.25 per L.F. of sewer (minimum of $380.00)+ $400.00 per Pump Station
Force Mains:	$.085 per L.F. of Force Main
Additional TV Inspection:	$0.40 per L.F. of sewer

Effective Date: Aug 1, 1996

Kitsap County Department of Public Works – Wastewater Division

Sewer Availability Agreement

KCPWFORM 4023 (REV 4/05)

Section 1 – General Information

Name and address of property owner (hereinafter Owner):

_____

_____

_____

Phone number:

_____

Tax Assessor's Number: _____

Intended use:

_____

Project name: (if applicable):

_____

WHEREAS, Owner desires sanitary sewer collection and treatment from Kitsap County (hereinafter County); and

WHEREAS, County is currently willing and able to reserve and maintain sanitary sewer collection and treatment capacity in accordance with applicable rules, regulations, ordinances, and statutes; and

WHEREAS, Owner is willing to pay County various fees pursuant to County ordinance to reserve and maintain sanitary sewer collection and treatment capacity; and

NOW, THEREFORE, in consideration of the mutual covenants contained herein it is agreed as follows:

Section 2 – Residential Equivalent Units

Owner use of the parcel will generate _____ residential equivalent units of sanitary sewage.

Section 3 – Available Fee

If Owner desires to reserve sanitary sewage collection and treatment capacity in the County's sewage system, Owner shall pay a monthly sewer availability fee for reservation and maintenance of the residential equivalent unit capacity stated in Section 2 of this document. The parties have agreed that the sewer availability fee for each residential equivalent unit shall be in accordance with the fee schedule established and modified from time to time by the Board of County Commissioners.

Section 4 – Payment of Sewer Availability Fee

The County shall bill the Owner bi-monthly. Payment is due within thirty (30) days of billing. If payment is not made within sixty (60) days of billing, this sewer agreement becomes null and void.

Section 5 – Application of Fees

That portion of the fee that is applied to debt coverage shall be applied to offset the newcomer's assessment for each residential equivalent unit, provided that connection is made within the time period that is agreement is in effect. The newcomer assessment charged shall be that in effect at the time of connection to the system. If connection is not made during the time that is agreement is in effect, all of the collected fee shall remain with the County.

Section 6 – Time Limits

The following time limits are agreed to by the Owner and County:

a. Owner shall have ninety (90) days from the time he/she signs and returns this agreement to the County before the first sewer availability fee is billed. If Owner obtains a side sewer permit or elects to terminate this agreement prior to that time, no fee for availability shall be imposed.
b. This agreement shall be null and void if Owner is more than sixty (60) days delinquent in paying the bi-monthly bill.
c. When the Owner obtains the side sewer permit associated with a specific residential equivalent unit, the sewer availability fee shall continue to be in effect for sixty (60) days, at which time the fee shall convert to the regular monthly user fee for sanitary sewer service in accordance with applicable County ordinances.
d. This agreement is in effect for three (3) years from the time of execution and becomes null and void at the end of the three (3) year period. This agreement may be renewed for one (1) year periods thereafter, at the County's discretion.

<continued on back>

Section 7 - Assignability

This agreement shall not be transferable to any other parcel(s) or persons. When ownership of a parcel changes, the new owner is guaranteed the number of residential equivalent units specified in Section 2 of the original agreement, so long as the new owner performs the following procedures:

a. The new owner shall obtain, execute and submit a new agreement within sixty (60) days following the date of purchase.
b. The new owner shall notify County the new agreement is a result of change in ownership.

The original agreement shall be terminated on the date of sale. Any fees accumulated on the original agreement shall remain with County. Any segregation, combination, lot line adjustment, or other action affecting the integrity of the subject parcel and occurring before approval of the new agreement, will render the guaranteed status of the residential equivalent unit(s) void.

Section 7a – Segregation / Combination Event

In the event of segregation, combination, lot line adjustment or other event affecting the integrity of the parcel, the resulting parcel(s) is guaranteed the number of residential equivalent units specified in Section 2 of the original agreement, so long as the owner performs the following procedures:

a. The owner shall obtain, execute and submit a new agreement for the resulting parcel(s) within sixty (60) days of the event. One agreement shall be submitted for each parcel.
b. The new agreement(s) shall be accompanied by a "Segregation Certificate for Sewer Availability". The certificate instructs County to distribute the guaranteed residential equivalent units among the resulting parcel(s). Any fees accumulated on the original agreement will follow the residential equivalent units. One certificate is sufficient for each event.

The original agreement shall be terminated upon execution of a new agreement pursuant to Section 7a, above. The total number of guaranteed residential equivalent units shall not exceed the total number of residential equivalent units on the original agreement.

Section 8 – Modifications of Contract

This contract may be modified to change residential equivalent units reserved provided the County has the system capacity available, and the Owner pays the sewer availability fee retroactive to the time of execution of original agreement.

Section 9 – Duty of County

County shall reserve and maintain collection and treatment capacity in the County's sanitary sewer and collection system for the number of residential equivalent units specified in this agreement, so long as:

a. The Owner pays the sewer availability fee when it is due.
b. Customer abides by the rules, ordinances, regulations, and statutes concerning sanitary sewage.

Section 10 – Conditions for Connection

All lines must gravity flow into County main lines or approved pressure connection. All lines and appurtenances must be installed in accordance with County regulations and specifications and conform to the Comprehensive Land Use Program.

The County may terminate this agreement if sewer service is no longer available due to a change in the law or zoning. The County will refund the applicant the sewer availability fee with 5% interest, calculated on a per annum basis.

Section 11 – Agreement Termination

The Owner may terminate this agreement at any time by submitting in writing a request to terminate the agreement with the effective date noted. Termination of this agreement does not entitle the Owner with reimbursement of any fees paid.

EXECUTED this _____ day of _____, _____.

Owner: Owner:

_____ _____

EXECUTED this _____ day of _____, _____.

Kitsap County, Senior Program Manager, Wastewater Utilities Division

_____

KITSAP COUNTY PUBLIC WORKS - Wastewater Division

Application to Construct Sanitary Sewer Extension

The undersigned, hereinafter referred to as "Developer", hereby makes application to Kitsap County for permission to construct and install a sanitary sewer extension in the public right-of-ways and/or easements which are subject to County approval, and to connect to the County's sewage collection system in accordance with Kitsap County "Guidelines for Sanitary Sewer Extensions" and applicable ordinances.

Development Name: _____

Development Address: _____

Customer Name: _____
Address: _____
City, State, Zip: _____
Phone No: _____

Contact Person: _____ Phone: _____

Engineer: _____
Address: _____
Contact Person: _____ Phone: _____

Total Legal Description: _____
_____
_____
_____

Parcel Tax Assessor's Number: _____

TYPE OF USE

Single Family Dwellings - number of lots _____

Multiple Family Dwellings/Hotel/Motel/ - number of units _____

Commercial Office/Retail Building - square footage _____

Restaurant/Tavern/Theater - seating capacity _____

School/Day Care - number of students _____

Pipe size _____ Pipe quantity _____ Manhole quantity _____

_____
APPLICANT'S SIGNATURE DATE

KITSAP COUNTY PUBLIC WORKS - Wastewater Division
Sewer Assessment Agreement

WHEREAS, _____, (hereinafter referred to as the "Owner") desires to obtain sanitary sewer service from Kitsap county (hereinafter referred to as the "County") to serve the Owner's real property (hereinafter referred to as the "Subject Property") and generally known as, _____; and

WHEREAS, the Owner has the full authority to bind the Subject Property with the covenants contained in this Agreement; and

WHEREAS, the County is willing to provide sanitary sewer service to the Owner in accordance with applicable rules, regulations ordinances, and statutes; and

WHEREAS, the Owner agrees to install any necessary sanitary sewer facilities in accordance with the requirements specified in the County's "Standards for Sanitary Sewer Extensions"; and

WHEREAS, in order to connect to County's sewage system, the Owner is obliged to pay County various assessments pursuant to Ordinance No. 113;

NOW, THEREFORE, in consideration of the mutual covenants contained herein it is agreed as follows:

Section 1. General Information:

a. Name and address of Customer:

b. Description of Subject Property:

c.

Qtr: Qtr: Section: Township: Range:

c. Tax Assessor's Number:

d. Intended Use of property to be served:

Section 2. Residential Equivalent Units. The Owner's intended use of the property to be served will generate _____ residential unit of sewage.

Section 3. Newcomer's Assessment. If the Owner will be connecting to an existing County sewage system, the Owner shall pay a newcomer's assessment. The newcomer's assessment shall be calculated pursuant to the Resolution in effect at the time of connection.

Section 4. Latecomer's assessment. If the Owner desires to connect to a County sewage system through facilities paid for by local district assessments, by developer sewer extensions, or by County anticipation of increased demand, the Owner shall pay a latecomer's assessment. The parties have agreed the Owner shall pay a latecomer's assessment of $ 0 .

Section 5. Developer Payback Assessment. Developer's payback fee attributable to each phase or discreet unit for this project shall be in the amount of $ 0 .

Section 6. Payment of Assessments. The Owner shall pay the assessments required hereby prior to any connection to County's sewage system.

Section 7. Future Utility Local Improvement Districts. In the event the County shall forma Utility Local Improvement District (U.L.I.D.) that includes the Subject Property, the Owner agrees not to object to the formation of the Utility Local Improvement District.

Section 8. Duty of County. County shall accept and treat the sanitary sewage delivered by the Owner so long as:

a. The sewage does not exceed the amount specified by Section 2.
b. Customer pays when due the monthly user fee; and
c. Customer abides by the rules, regulations, and ordinances and statutes concerning sanitary sewage.

Executed this_____ day of _____, _____.

Customer:_____

Customer:_____

Executed this _____ day of _____, _____.

_____
Kitsap County, Senior Program Manager

Return Address:
Kitsap County Public Works
Mail Stop #27

Senior Program Manager

KITSAP COUNTY PUBLIC WORKS

PHASED DEVELOPMENT CONTRACT/LIEN

WHEREAS, _____, (Developer) and Kitsap County (hereinafter County) have entered into a Phased Development Contract executed by County, pertaining to Developer's project which is known as _____, and

WHEREAS, Developer's project is one which will be developed in phases or one in which discreet unit of the project will be sold or occupied at different times; and

WHEREAS, Developer desires to utilize the phased development provisions of Ordinance No. 113, Section 16, whereby sewer assessments shall be paid at such times as the phases or discreet units receive sewer service;

NOW THEREFORE, in consideration of the mutual covenants contained herein, it is hereby agreed as follows:

Section 1. General Information.

a. Name and address of Developer:

b. Development:

c. Tax Account No:

d. A description of the nature and number of phases or discreet units for the entire development:

e. Legal description of the development:
Qtr: Qtr: Section: Township: Range:

f. Amount of newcomer's assessment attributable to each phase of development or discreet unit is pursuant to the Resolution in effect at the time of connection.

g. Amount of latecomer's assessment is: $ 0 .

h. Developer's payback fee attributable to each phase of development or discreet unit: $

Section 2. Prohibition upon Sewer Service. Developer shall not be provided sewer service for any phase or discreet unit of the development without paying to County the assessments due for the phase or discreet unit.

Section 3. Lien for Unpaid Assessments. The unpaid assessments shall be a lien upon all of the property which is part of the development and upon all of the property described in Section 1; Provided, the lien hereby created shall not extend to property for which releases have been given by County pursuant to Section 4.

Section 4. Lien Releases. Upon payment of the assessments attributable to a phase or discreet unit of the development, County shall, upon application therefore, release its lien upon the property that encompasses the phase or discreet unit. The application for a release shall contain the legal description of the property for which the release is sought.

Executed this _____ day of _____, _____.

_____ _____

Signature of Developer Title

STATE OF WASHINGTON)
SS)
County of Kitsap)

I certify that I know or have satisfactory evidence that the above signed this instrument, on oath stated that he/she/they was/were authorized to execute this instrument and acknowledged it to be the free and voluntary act for the uses and purposes mentioned in this instrument.

SUBSCRIBED AND SWORN to before me this_____ day of _____, _____.

_____

NOTARY PUBLIC in and for the State of Washington, residing at

_____.

My appointment expires:_____

KITSAP COUNTY PUBLIC WORKS - Wastewater Division

Application for Developer Extension Payback Agreement

In accordance with Kitsap County requirements establishing procedures regarding Developer Extension Payback Agreements, application is hereby made as follows:

.....

Applicant/Owner:_____

Sewer Size/Material Length:

_____

_____

_____

Equivalent residential units at attributable to developer_____

Total equivalent residential units to be served _____

The following shall accompany this application:

- Application Fee Deposit
- Preliminary Sewer Design Drawings
- Itemized/Quantified estimate of construction costs, prepared and signed by a licensed civil engineer or firm.
- Scaled vicinity drawing on 8.5 x 11 mylar, stamped by a licensed civil engineer or licensed land surveyor showing the sewer improvement, location, and proposed benefited area including dimensions and County assessor's number of each tax parcel, size of parcels, useful elevations as necessary for determining benefit.
- Legal description of developer's parcel and legal description of benefited property.

Applicant / Owner Contact:_____
Address:

_____

_____Telephone: _____

_____

Applicant's Signature Date

Return Address:
Kitsap County Public Works
Mail Stop #27

Senior Program Manager

CONTRACT FOR REIMBURSEMENT UNDER MUNICIPAL WATER AND SEWER FACILITIES ACT

THIS AGREEMENT, made this _____ day of _____, _____, between _____, hereinafter called "Owner" and KITSAP COUNTY, Washington, hereinafter called the "County".

R E C I T A L S

A. The County owns and operates Sanitary Sewer facilities within its boundaries.

B. The County is authorized pursuant to PCW 35.91 to contract with owners of real estate for construction of sewer facilities to serve such owner□s property whereby such property owners may be reimbursed by owners of real estate who did not contribute to the cost of construction when such latter owners come to connect their properties to such facilities.

C. The Owner owns certain real property located within Kitsap County boudaries, including the portion particularly described as follows:

D. The Owner has constructed or will construct sewer facilities to sewer the real property described in Paragraph C, said sewer facilities being more particularly described as follows:

E. The sewer facilities are located in the area described as follows:

F. The sewer facilities are located within the area described in Paragraph E served by County and has not been accepted by the County for maintenance and operation.

The following description is to replace the description in the original contract. The utility is capable of serving the Owner's property and the "benefited property." The "benefited property" being more particularly described as follows:

10. This Agreement shall be unenforceable against any party unless Owner has caused the same to be filed with the Kitsap County Auditor pursuant to RCW 35.91.020. Recording costs shall be borne by the Owner.

11. All other terms and conditions of the original agreement remain in effect.

EXECUTED this _____ day of _____, _____.

_____

OWNER: DATE:

ADDRESS:

_____

_____

_____

STATE OF WASHINGTON)
SS)
COUNTY OF KITSAP)

I certify that I know or have satisfactory evidence that he/she/they signed this instrument, on oath stated that he/she/they was/were authorized to execute the instrument and acknowledged it to be the free and voluntary act of his/hers/theirs for the uses and purposed mentioned in this instrument.

SUBSCRIBED AND SWORN to before me this ____ day of _____, _____.

_____
NOTARY PUBLIC in and for the State of Washington,
Name: _____
My appointment expires:_____

Return Address:
Kitsap County Public Works
Mail Stop #27

Senior Program Manager

KITSAP COUNTY PUBLIC WORKS
CONVEYANCE OF SEWER FACILITY

FOR VALUABLE CONSIDERATION, receipt of which is hereby acknowledge _____, hereby grants, bargains, sells and conveys to KITSAP COUNTY PUBLIC WORKS DEPARTMENT, the following described property located in KITSAP COUNTY, WASHINGTON: All of the Sewer System heretofore constructed to serve _____, as in records of Kitsap County, Washington.

The Sewer System is more specifically described as follows:

PIPE SIZE	APPROX. LENGTH	ON:	FROM:	TO:

including manholes, side sewers, tees, wyes and other appurtenances, all within public right-of-way and/or easements.

In making the conveyance, the undersigned warrants to the District, that all claims for labor, materials or taxes, and other indebtedness that might be a lien against said sewer system, have been paid, and further guarantees to the District for the period of twenty four (24) months from the date of this instrument, that the said sewer system be free of defects in labor and materials.

The undersigned further warrant to the District that he owns said sewer system free and clear of all encumbrances, and has full right.

DATED this _____ day of _____, 2_____.

_____
OWNER OR AGENT

_____
TITLE

STATE OF WASHINGTON)
ss)
COUNTY OF KITSAP)

On this _____ day of _____, _____, before me the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, appeared the real person with signature above.

_____
NOTARY PUBLIC in and for the State of Washington. Residing at:

_____

My appointment expires: _____

KITSAP COUNTY PUBLIC WORKS – Wastewater Division
Maintenance Bond for Sanitary Sewer

Project Name:

_____

File Number: _____

Know All Men By These Presents:

That _____ as Principal, and _____ _____, a corporation organized and existing under and by virtue of the laws of the State of Washington and authorized to do the business of surety in the State of Washington under the laws thereof, as Surety, are held and firmly bound unto the **BOARD OF COUNTY COMMISSIONERS OF KITSAP COUNTY** in the full and just sum of **2,500.00**, lawful money of the United States of America, for the payment of which sum, well and truly to be made, we hereby bind ourselves, our and each of our heirs, executors, administrators, successors and assigns jointly and severally, firmly by these presents.

The Condition Of The Above Obligation Is Such, that the above-named principals are about to file a plat named _____ located in Section _____, Township _____ North, Range _____ of W.M., Kitsap County, Washington, and in the judgement of the Director of Public Works are required to file a bond in the sum above-named, conditioned that the Principal will warrant the performance and guarantee lines, manholes and side sewers by making repairs, correcting deficiencies and performing emergency maintenance on subject sanitary sewer system for a period of not less than twenty-four months from the date of connection to public system. Principal further agrees to promptly reimburse Kitsap County for all emergency repairs and/or maintenance necessary, to preserve and maintain public safety and welfare. All necessary repairs shall be performed by the Principal on receipt of seven (7) days written notice from the Director of Public Works directing the performance of such work. At the end of the twenty-four month period of maintenance by the Principal, the Director of Public Works will, upon request by the Principal, inspect subject sanitary sewer system and, if in condition satisfactory to the said Director of Public Works, then this obligation shall be void; otherwise to remain in full force and effect.

In Witness Whereof, the Seal and signature of said Principal is hereto affixed and attested to by its duly authorized Attorney-in-Fact and Agent at _____ _____this _____ day of _____, _____.

_____
Principal

BY: _____

_____
Surety

BY: _____

KITSAP COUNTY PUBLIC WORKS – Wastewater Division
Maintenance Irrevocable Letter of Credit

Project Name: _____
File Number: _____

Issued in Favor of: Kitsap County Public Works, Wastewater Division
614 Division Street MS#27, Port Orchard, WA 98366

We hereby establish our Irrevocable Letter of Credit in favor or you, the Kitsap County Public Works Wastewater Division for a minimum of two (2) years for warranty of sanitary sewer construction per Ordinances 55 & 113, and hereby authorize you to draw on ourselves from the account of _____ up to the aggregate amount of _____ available by your drafts at sight when accompanied by the documents specified below:

Documents Required: A signed statement by Kitsap County stating as follows:

> "We certify that _____ has failed to complete and/or pay for improvements at _____."

Special Instructions:

- Only Kitsap County Public Works Wastewater Division has authority to release this Letter of Credit upon approval and acceptance of the improvements.
- The deposit will be released to Kitsap County after thirty (30) days notice on demand and with no other condition of release.

We hereby agree with the drawers, endorsers, and bona fide holders of drafts drawn under and in compliance with the terms of this credit that they shall be duly honored on presentation at or before 4:00 p.m. on _____ at _____.

_____ _____
Name of Bank Authorized Signature

_____
Corporate Authorization

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH:

The Principal will warrant the performance and guarantee lines, manholes, and side sewers, by making repairs and deficiencies and performing emergency maintenance on subject sanitary sewer system for a period of not less than twenty-four months from the date executed below. Principal further agrees to promptly reimburse Kitsap County within thirty (30) days notice on demand, for all emergency repairs and/or maintenance necessary, to preserve and maintain public safety and welfare. All necessary repairs shall be performed by the Principal, the Director of Public Works will, upon request by the Principal, inspect subject sanitary sewer system and, if in condition satisfactory to the said Director of said Public Works, then this obligation shall be void; otherwise to be in full force and effect.

KITSAP COUNTY PUBLIC WORKS – Wastewater Division
Performance Assignment of Account

Project Name: _____
File Number: _____

This assignment is for the purpose of fulfilling the requirements of the Standard of Sanitary Sewer Extensions, Ordinance 55 & 113. The undersigned does hereby assign, transfer, and set over unto Kitsap County all rights, title, and interest in the amount of _____ (total) _____ thousand and no/100 Dollars in the bank named _____ in the name of applicant/assignor, _____ with full power and authority to demand, collect, and receive said deposit, and to give receipt and acquittance therefore, of the uses and purposes prescribed for sanitary sewer construction. It is understood and agreed that the referenced bank will hold account for a minimum of not less than twenty-four months from the date signed below and until a release of this assignment is received from Kitsap County.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH:

The Principal will warrant the performance and guarantee lines, manholes, and side sewers, by making repairs and deficiencies and performing emergency maintenance on subject sanitary sewer system for a period of not less than twenty-four months from the date executed below. Principal further agrees to promptly reimburse Kitsap County within thirty (30) days notice on demand, for all emergency repairs and/or maintenance necessary, to preserve and maintain public safety and welfare. All necessary repairs shall be performed by the Principal, the Director of Public Works will, upon request by the Principal, inspect subject sanitary sewer system and, if in condition satisfactory to the said Director of said Public Works, then this obligation shall be void; otherwise to be in full force and effect.

Signed and dated this _____day of _____, 2_____.

ACCEPTANCE

_____
The Undersigned hereby Accepts
Assignment of Account or Time Deposit

_____
Signature of Depositor

_____
Account Number

_____
Address

In the amount of: _____

_____
City State Zip

Date: _____

NOTARIZED SIGNATURE OF AUTHORIZED BANK PERSONNEL

_____
Signature of Authorized Personnel

_____
City State Zip

Subscribed and sworn to before me this _____
day of _____, _____.

_____
Notary Public in and for the State of Washington,
residing at _____
Title: _____
My Commission expires: _____

Return to:
Kitsap County Public Works
Mail Stop #27

KITSAP COUNTY PUBLIC WORKS - Wastewater Division
Perpetual Easement

KNOW ALL MEN BY THESE PRESENTS, that _____
_____, herein after referred to as GRANTOR(s), do hereby grant and warrant unto Kitsap County, to have and to hold forever, permanent and perpetual right, permit and easement in the lands hereinafter described, to construct and maintain a sewer main with the necessary appurtenances through, over, and across the following described property situated in Kitsap County, Washington, more particularly described as follows:

The GRANTOR (s) further grants to Kitsap County a temporary easement on adjoining property to be used only during construction of the above sewer main, said temporary easement to cease upon acceptance of the sewer main for maintenance and operation by Kitsap County. The said temporary easement shall be over and across the following described property situated in Kitsap County, Washington, more particularly described as follows:

Kitsap County shall have the right at times, as may be necessary, to enter upon property of the GRANTOR (s), their successors, heirs and assigns, for the purpose of constructing, repairing, altering or reconstructing said sewer main, or making any connections therewith, provided that such constructing, repairing, altering, or reconstructing of said sewer main shall be accomplished in such a manner that the private improvements existing in this right-of-way shall not be disturbed or destroyed, or in the event they are disturbed or destroyed, they will be replaced in as good a condition as they were immediately before the property was entered upon by Kitsap County.

The GRANTOR (s) shall retain the right to use the surface of said easement, so long as said use does not interfere with the installation and maintenance of the sewer main and so long as no permanent building or structures are erected on said easement.

EXECUTED this _____ day of _____, _____.

GRANTOR (s) _____

_____

_____

STATE OF WASHINGTON)
SS)
COUNTY OF KITSAP)

I certify that I know or have satisfactory evidence that _____
_____ signed this instrument and acknowledged it to be the free and voluntary act of himself/herself for the uses and purposes mentioned in this instrument.

DATED this _____ day of _____, _____.

_____
NOTARY PUBLIC in and for the
STATE OF WASHINGTON, residing at:

_____

My appointment expires: _____

KITSAP COUNTY
L.I.D. SEGREGATION CERTIFICATE

DATE: SUBMITTED BY: NAME OF LOCAL IMPROVEMENT DISTRICT:		
Owners Name:	LID Account: Real Property Account:	Original Assessment
Original Description:		
Name & Address:	**New Descriptions:**	**Assessment:**
Engineers Approval:	**Commissioners Approval:** This is to certify that the above parcels of land, as segregated, are sufficient security for the assessment liens charged thereon. _____ Commissioner	

Return Address:
Kitsap County Public Works
Mail Stop #27

Senior Program Manager

KITSAP COUNTY PUBLIC WORKS
WASTEWATER DIVISION

Sewage Pump Installation, Operation, and Maintenance Agreement

WHEREAS, _____, hereinafter known as the "OWNER", does enter into an agreement with KITSAP COUNTY, hereinafter known as the "COUNTY", this _____ day of _____, _____.

WHEREAS, Owner is possessed of certain real property located at the following address, and legally described as follows:

Qtr: _____ Qtr: _____ Section: _____ Township:_____ Range: _____

Plat or Short Plat: _____ Tax Parcel No.: _____

and is within the area served by Kitsap County sewer system, and,

WHEREAS, the sewer trunk line is at an elevation adjacent to the real property of Owner that it cannot be served by gravity and necessitates the use of a sewer pump, and

WHEREAS, Owner agrees with the County to install an approved pump according to specifications of the County and to keep and maintain said pump and associated equipment in good working order. In the event repairs and maintenance of said pump and associated equipment is required of the County for any reason whatever not the fault of the County, the reasonable cost of said work shall be charged back against the Owner and may become a lien upon said real property.

The parties understand the foregoing, do now therefore AGREE:

1. That Owner shall furnish and install approved sewer pump and associated equipment according to specifications and subject to installation approval of the County.

2. That said pump and associate equipment shall be maintained in operating condition by the Owner and in the event the County is called upon to maintain, repair or replace said pump or associated equipment, said County may charge back the cost of said work performed, it being the understanding that the total cost of installation, maintenance and operation of said pump and associated equipment shall be at the risk of Owner.

This agreement shall bind the Owner, his heirs or assigns of said property and is designed to hold the County harmless.

EXECUTED this _____ day of _____, _____.

_____
Owner

STATE OF WASHINGTON)
ss)
COUNTY OF KITSAP)

I certify that I know or have satisfactory evidence that _____ signed this instrument, on oath, and acknowledged it to be his/her free and voluntary act for the uses and purposes mentioned in this instrument.

SUBSCRIBED AND SWORN before me this _____ day of _____, _____.

_____
NOTARY PUBLIC

_____
Title:
Residing at:
_____.

My appointment expires: _____.

DIVISION II
SANITARY SEWER MAINS

II-1.000 DESCRIPTION

1.010 General
1.020 Sewer Mains
1.030 Force Mains
1.040 Manhole and Cleanouts
1.050 Stream Crossings
1.060 Separation Between Water and Sewer Mains
1.070 Underground Utility Locations
1.080 County Inspections

II-2.000 MATERIALS

2.010 General
2.020 Pipes and Fittings
2.030 Mainline Cleanouts
2.040 Manholes
2.050 Bedding and Backfill
2.060 Miscellaneous

II-3.000 INSTALLATION

3.010 General
3.020 Trenching
3.030 Bedding
3.040 Pipe Installation
3.050 Manhole and Cleanout Installation
3.060 Backfill

II-4.000 TESTING

4.010 General
4.020 Exfiltration Test
4.030 Infiltration Test
4.040 Air Pressure Test
4.050 Hydrostatic Pressure Test
4.060 Television Inspection
4.070 Deflection Test for Flexible Pipe

DIVISION II
SANITARY SEWER MAINS

II-1.000 DESCRIPTION

1.010 General

A. Any extension of the Kitsap County sanitary sewer system shall be completed in accordance with the applicable forms and agreements from Division I General Provisions of this document.

B. Prior to construction, the County shall have an approved set of plans from Washington State Department of Ecology (Ecology) on file in the County offices.

C. Except where otherwise indicated, the following sections are intended to be consistent with Ecology's "Criteria of Sewage Works Design."

D. Except where provided otherwise, construction details, workmanship, and materials shall be in accordance with the latest edition of "'Standard Specifications for Road, Bridge, and Municipal Construction" prepared by the Washington State Chapter of the American Public Works Association.

1.020 Sewer Mains

A. Pipe used for sanitary sewers shall be either cement mortar lined ductile iron or PVC (Polyvinyl Chloride) pipe. It is not intended that materials listed herein are to be necessarily considered equal or generally interchangeable for all applications. For design and evaluation of design purposes, ductile iron pipe shall be considered rigid conduit, while PVC shall be considered flexible conduit. Calculations supporting pipe or bedding classifications specified shall be submitted to the County by the developer's engineer, when requested. All fittings, unless otherwise noted herein, shall be the same material as the mainline pipe.

B. Either tees or wyes shall be used for side sewer connections to new sewer mains. Saddles fastened to pipe with external bands shall not be acceptable on any new system.

C. Mainline pipes shall be 8-inch minimum diameter.

D. The minimum flow velocity for sanitary sewers shall be 2.0 feet per second. Calculations supporting that a minimum 2.0 feet per second velocity can be achieved as designed, shall be submitted to the County by the Developer's Engineer, when requested. In no case will slopes less than the following minimum slopes be allowed for sewer mains:

Sewer Size (inches)	Minimum Slope (feet per 100 feet)
8	0.40
10	0.28
12	0.22
14	0.17
15	0.15
16	0.14
18	0.12
21	0.10
24	0.08
27	0.07
30	0.06
36	0.05

For pipe sizes not shown, use a Manning's "n" value of 0.013 and full flow velocity of 2.0 feet per second to determine allowable minimum slope.

E. The minimum sewer main depth shall be 4 feet, as measured from finish grade to top of pipe. Below 16 feet of depth ductile iron pipe is required.

F. Gravity sewer mains shall be designed with straight alignment between manholes. However, curved sewer mains may be approved where circumstances warrant.

G. Sanitary sewer mains shall be laid with uniform slope between manholes. Sewers on 20% slope or greater shall be anchored securely with pipe anchors. Pipe anchors shall conform to County Standard Plans and spacing shall be as follows:

1. Not over 36 feet center to center on grades 20% and up to 35%.

2. Not over 24 feet center to center on grades 35% and up to 50%.

3. Not over 16 feet center to center on grades 50% and over.

H. Check dams as per the County Standard Detail shall be placed along the pipe at intervals of 100 feet on sewer mains laid on slopes of 6.0% or greater. Check dam spacing shall be shown on the Plans.

I. Sanitary sewer mains shall be extended to the furthest property lines for future extensions to adjacent properties, when required by the County.

J. Pipe bedding and trench requirements shall be as indicated in the County Standard Details for "typical trench section" for the different type pipes and laying conditions.

1.030 Force Mains

A. The minimum size pressure main shall not be less than 4-inch diameter, except for grinder pump installations which shall be 1-1/2-inch diameter. Pressure mains shall be laid with a minimum cover of 3 feet.

B. Acceptable pressure pipe material shall be PVC (polyvinyl chloride) pipe or cement morter lined ductile iron pipe. Pipe loading shall be considered in specifying the type and class of pipe to be used. Design calculations shall be submitted to the County for approval, if requested.

C. At pumping capacity, the self scouring flow velocity shall be between 2 to 8 feet per second.

D. Air and vacuum release valves shall be placed at all high points in the pressure main and shall conform to the County Standard Details for "air and vacuum release assembly."

E. Low points in the force main vertical alignment shall be equipped with a tee and blowoff assembly matching the force main pipe material. The blow off assembly shall be constructed in conformance with County Standard Details.

F. Pipe bedding and trenching requirements shall be indicated on the Plans for "typical trench section" for the different type pipe and laying conditions.

G. Thrust blocks, restrained joints, and/or tie rods and shackles shall be provided at all bends or at points where restraint is needed along the pressure main.

H. Pressure mains that do not discharge directly into a manhole shall be equipped with both a launch station and a recovery station for a pipeline cleaning device commonly referred to as a pig. Construction shall be in conformance with County Standard Details.

1.040 Manholes and Cleanouts

A. Manholes shall be 48-inch minimum inside diameter precast concrete units with eccentric cones. Larger manholes may be required depending on pipe size and pipe configuration.

B. Manholes will be required at any change in slope, change in alignment or change in pipe size.

C. No horseshoe or saddle manholes will be allowed. Where a new manhole needs to be cut into the existing mainline, flow shall be temporarily rerouted and a new manhole constructed.

D. Maximum spacing of manholes shall be 400 feet. Manholes shall be at end of pipe runs over 150 feet. All manholes shall be accessible by maintenance vehicles.

E. Cleanouts installed, from wye fitting with plug and cap at the end of a main, will only be acceptable in lieu of a manhole when installed on a dead end main and the line is not more than 150 feet with a minimum slope of 1.0% from the next adjacent manhole.

F. Manholes over 20 feet deep shall have intermediate safety platforms as per County Standard Detail.

G. All connections to manholes shall be at the manhole base using approved connectors. Rechanneling may be required.

H. Drop manhole connections shall be made with cement mortar lined ductile iron materials including a minimum of one full length of pipe from undisturbed soil. The precast manhole base shall have an external ledge integrally cast around the outside of the manhole to transfer the vertical loads from the drop manhole connection. Fittings shall be outside the manhole and fully supported by concrete encasement as per the County Standard Detail.

1.050 Stream Crossings

A. Sewers entering or crossing streams shall be constructed of watertight pipe. The pipe and joints shall be tested in place, shall exhibit "0" infiltration, and shall be designed, constructed, and protected against anticipated hydraulic and physical, longitudinal, vertical, and horizontal loads, erosion, and impact. Sewers laid on piers across ravines or streams shall be allowed only when it can be demonstrated that no other practical alternative exists. Such sewers on piers shall be constructed in accordance with the requirements for sewers entering or crossing under streams. Construction methods and materials of construction shall be such that sewers will remain watertight and free from change in alignment or grade. A minimum cover of 5 feet for stabilized channels and 7 feet for shifting channels shall be provided.

B. Permits from other agencies or departments are required for work in or adjacent to waterways.

1.060 Separation Between Water and Sewer Mains

A. To protect public health, water mains and sanitary sewer mains shall be separated in both the horizontal and vertical directions, with sewers always lower than water mains.

B. Parallel construction: Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge.

C. Perpendicular construction: Sewers crossing water mains shall be laid below the water mains to provide a separation of at least 18 inches between the invert of the water pipe and the crown of the sewer pipe, whenever possible.

D. Exceptions: Certain local conditions may create a situation where there is no alternative but to install sewer lines at less than the required separation. In such cases, more rigid construction requirements must be met as specified in Section 2.414 of the Washington State Department of Ecology Criteria for Sewage Works Design.

1.070 Underground Utility Locations

A. It shall be the responsibility of the sewer contractor making the sanitary sewer extension to verify the exact locations of all existing utilities prior to commencing any work. The Developer shall contact the utilities underground location center, 1-800-424-5555, a minimum of two days prior to commencing work.

1.080 County Inspections

A. All sewer installation inspections and test observations shall be made at Kitsap County Department of Public Works. The county inspector shall be notified a minimum of two working days in advance of commencing work on a sanitary sewer extension. Prior to final acceptance of all installations the County shall conduct an inspection of all main lines by the use of television equipment. Final acceptance of sewer installations will not be made until tests and inspections are complete and prove satisfactory.

II-2.000 MATERIALS

2.010 General

A. The Developer shall submit information from the material manufacturer or fabricator showing that the materials meet the requirements of the design and pertinent specifications. The developer shall provide submittals to the County on all materials to be used.

2.020 Pipes and Fittings

A. Ductile iron pipe for gravity sanitary sewer pipe and pressure pipe shall conform to Class 50 AWWA C 151 and shall be cement mortar lined, push-on joint, or mechanical joint. Joints for ductile iron pipe shall be rubber gasketed conforming to the requirements of AWWA C 111.

B. Side sewer tee or wye fittings for ductile iron gravity pipes shall be rubber gasket push-on joint or mechanical joint ductile iron fittings. Saddles fastened to pipe with external bands shall not be acceptable on any new system. Fittings shall have sufficient strength to withstand handling and load stresses normally encountered.

C. Fittings for ductile iron gravity and pressure pipe shall meet the requirements of AWWA C110 or AWWA C153. Fittings shall be cement mortar lined, meeting the requirements of AWWA C 104.

D. Polyvinyl chloride (PVC) gravity sanitary sewer pipes shall conform to the requirements of ASTM D 3034, SDR 35 for pipe up to 15 inches diameter and ASTM F 679, Type 1 only, for pipe sizes 18 inches to 27 inches. Joints for PVC gravity sewer pipe shall be push-on type with a restrained elastomeric ring gaskets conforming to ASTM D 3212. Gaskets shall conform to ASTM F 477.

E. Side sewer fittings for PVC pipes shall made of PVC plastic having a cell classification of 12454-B, 12454-C, or 13343-C, as defined in ASTM D 1784. Fittings shall have sufficient strength to withstand handling and load stresses normally encountered.

F. Polyvinyl chloride (PVC) pressure sanitary sewer pipes shall meet the requirements of AWWA C900, Class 200, DR14. PVC pipe shall have the same outside dimensions as ductile iron pipe.

G. Joints for PVC pressure pipe shall be push-on type meeting the requirements of ASTM D 3139 using a restrained rubber gasket conforming to ASTM F 477. Solvent welded pipe joints are not permitted.

H. Pressure pipe transition couplings, elbows, tees, reducing couplings, transition-reducing couplings, and flexible couplings shall be compression type, constructed with ductile iron or steel sleeves and ductile iron followers. Bolts and nuts shall be ductile iron. Factory finish shall be the standard of the manufacturer. Couplings shall be Romac, Smith-Blair or equal.

I. Manhole adapters shall be provided where connecting PVC pipe to concrete manholes. Manhole adapters shall be rubber gasketed GPK sand collar, asbestos-cement collar, or approved equal.

2.030 Mainline Cleanouts

A. Cleanouts shall be constructed of the same material as the sewer main and shall conform to the County Standard Details. Cast iron frame and covers for cleanouts shall be two bolt locking type, Olympic Foundry type M1025, or equal. Locking lids will be required on all 8-inch or larger main line cleanouts.

2.040 Manholes

A. Manhole sections shall be of the offset type and shall meet the requirement of AASHTO M 199. The diameter of the bottom precast unit may be in excess of 48 inches, but provide a fixed opening of 24 inches at the top. The joints shall be of tongue and groove type with rubber gaskets conforming to the applicable requirements of AASHTO M 198.

B. 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.

C. Manhole frames shall be gray-iron conforming to the requirements of AASHTO M 105, Grade 30B. Covers shall be ductile iron conforming to ASTM A 536, Grade 80-55-06. Repair of defects shall not be permitted.

D. Manhole covers shall be interchangeable within the dimensions shown in the County Standard Plans. Manhole frames and covers shall meet the strength requirements of Federal Specification RR-F-621E. All mating surfaces shall be machined finished to ensure a nonrocking fit.

E. Covers shall be locked to the frames by three 5/16-inch countersunk stainless steel bolts. Covers shall have the word "SEWER" in 2-inch raised letters cast in them.

F. Manhole steps shall be deformed steel reinforcing bars or polypropylene coated steel. All steps shall measure 13 inches center to center between the legs of the step, and be designed to withstand pullout forces of 1,500 pounds. All steps shall be factory installed. In no case shall the steps be allowed to penetrate through the wall of the manhole section.

   i. Deformed steel reinforcement bars shall be No. 8 (1-inch diameter) bent to form a step. The reinforcement bars shall be hot dip galvanized after bending.

ii. Polypropylene steps shall have a serrated tread and be made of a copolymer polypropylene encapsulating a bent step shaped 1/2-inch steel reinforcing Type II, Grade 16906, and the steel shall meet the requirements of ASTM A 615, Grade 60. The copolymer plastic shall conform to requirements of ASTM D 4101.

G. Steel manhole ladders shall be prefabricated of No. 7 (7/8-inch diameter) smooth steel bar for side rails and No. 8 (1-inch diameter) deformed reinforcing bar for rungs. Ladders shall be hot-dip galvanized after fabrication. Ladders shall hang from the lower step and be embedded in the channel.

H. Polypropylene ladder shall conform to Polypropylene ASTM D 4101 1/2-inch, Grade 60 reinforcing bar ASTM A 615, 9/16-inch Cold Drawn Bar ASTM C 1018.

2.050 Bedding and Backfill

A. Foundation Material

9.03.17 —

Foundation material shall meet the requirements of Section 9-03.17, Class B, of the Standard Specifications for Road, Bridge, and Municipal Construction.

B. Bedding for Rigid Pipe

9-03.12 —

Unless approved otherwise for special cases, bedding material for rigid pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.15.

C. Bedding for Flexible Pipe

9.03.13 —

Unless approved otherwise for special cases, bedding material for flexible pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.16.

D. Check Dams

The design shall specify a check dam material of either native clay material, a mixture of pipe bedding material and imported bentonite clay material, or control density fill material. Check dam material approval by the County is required prior to construction.

E. Crushed Surfacing Top Course

Imported crushed surfacing top course shall meet the requirements of Section 9-03.9(3) of the Standard Specifications for Road, Bridge, and Municipal Construction.

F. Bank Run Gravel for Trench Backfill

Bank run gravel for trench backfill shall conform to Section 9-03.19 of the Standard Specifications for Road, Bridge, and Municipal Construction.

G. Control Density Fill

1. Control density fill material (CDF) shall be composed of portland cement, aggregate, fly ash, and water and shall conform to the following requirements:

   a. Portland Cement: ASTM C 150, Types I or II.

   b. Aggregate: Sand with or without fine gravel, maximum size 1 inch. Aggregate shall be free of foreign material, roots, clay balls, trash, debris, and organics and shall have less than 15% finer than the No. 200 sieve. Material passing the No. 40 sieve shall be nonplastic.

   c. Water (potable).

   d. Fly ash: Class F ASTM C 618, unless otherwise approved.

   e. Admixture: As necessary to develop flowability without segregation.

2. CDF shall be proportioned to be a flowable, nonsegregating, self-consolidating, low shrink slurry with an unconfined compressive strength as specified below. The mix design shall be prepared for a range of aggregate gradations that are expected to be used. The Developer and its supplier shall determine the materials and proportions used to meet the requirements of these Specifications. The CDF mix for each strength class shall meet the flowability, pumpability, and set time requirements for each design application.

3. No CDF shall be placed until the County has approved the mix design. The County's approval of the mix design will be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field installations for conformance with these Specifications.

4. With the County's approval, the Developer may be allowed the option of processing the native sands for CDF aggregate. If the Developer elects to use onsite sands for producing CDF, Developer shall make its own determination as to the quantity of suitable sands and amount of processing required and shall bear all costs associated with using native materials.

5. Class 100 CDF shall have an unconfined compressive strength at 28 days of 100 psi, per ASTM D 4832, (+50 psi, -20 psi). Maximum density 125 pcf.

6. Class 300 CDF shall have an unconfined compressive strength at 28 days of 300 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

7. Class 1000 CDF shall have an unconfined compressive strength at 28 days of 1,000 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

2.060 Miscellaneous

A. Concrete thrust blocks for pressure force mains shall be Class B concrete poured in place, per County Standard Details.

B. Pipe anchors shall be constructed of Class C concrete with 1-inch diameter galvanized steel rod tie downs. The anchors shall be constructed per County Standard Details.

II-3.000 INSTALLATION

3.010 General

A. The developer shall complete the proposed sanitary sewer construction in accordance with the approved construction drawings, details, specifications, state requirements, and local regulatory requirements. The developer shall implement the runoff and erosion control plan that was approved by the County.

B. Survey line and grade control hubs shall be provided by the developer's engineer in a manner consistent with accepted practices. Developers shall provide all required staking and grades for the proper installation. No deviation shall be allowed without prior approval of the County. Staking shall be provided at the minimum of 50 feet intervals. All staking shall be under the supervision of a licensed land surveyor or a professional engineer.

C. All existing sewer lines shall be kept in service at all times. Provision shall be made for disposal of sewage flow if any existing sewers are damaged. Damage to existing sewers shall be repaired by the Developer to a condition equal to or better than their condition prior to the damage. Water accumulating during construction shall be removed from the new sewers but shall not be permitted to enter the existing system. The developer shall be responsible for flushing out and cleaning any existing sewers, into which gravel, rocks, or other debris has entered as a result of the work, and shall repair lift stations or other facilities damaged by the work at the developer's expense.

D. The physical connection to an existing manhole or sewer shall not be made until authorized by the County. Such authorization will not be given until all upstream lines have been completely cleaned and tested.

3.020 Trenching

A. The maximum permissible trench widths in the pipe zone shall be according to the County Standard Details. If the maximum trench width is exceeded without authority of the County the developer shall provide pipe of higher strength classification or provide higher class bedding, as required by the County. Above the pipe zone the trench may be any width.

B. The developer shall provide all materials, labor, and equipment necessary to shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe work conditions in the trench. The developer may elect to any combination of shoring and overbreak, tunneling, boring, sliding trench shield, or other method of accomplishing the work consistent with applicable local, state and federal safety codes.

C. Upon completion of work, the developer shall remove all shoring unless indicated otherwise on the approved plans or as directed by the County. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the developer.

D. The developer shall furnish, install, and operate all necessary equipment to keep excavation above the foundation level free from water during construction, and shall dispose of the water so as not to cause injury to public or private property or nuisance to the public. Sufficient pumping equipment in good working condition shall be available at all times for emergencies, including power outage, and shall have available at all times competent workers for the operation of the pumping equipment.

E. Excavation for manholes and other structures connected to the pipelines shall be sufficient to provide a minimum of 12 inches between their surface and the sides of the excavation.

3.030 Bedding

A. Bedding of the class or classes shown on the plans shall be installed in accordance with the County Standard Details. Bedding shall provide a uniform support along the entire pipe barrel, without load concentration at joint collars or bells. Bedding disturbed by pipe movement, or by removal of shoring or movement of the trench shield or box shall be reconsolidated prior to backfill.

B. Bedding shall be placed in more than one lift, the first lift is to provide at least 4 inches of bedding under any portion of the pipe and shall be placed before the pipe is installed, and shall be spread smoothly so that the pipe is uniformly supported along the barrel. Subsequent lifts of the not more than 6 inches thickness shall be installed to a depth of 6 inches over the crown of the pipe. Each lift shall be compacted to 90% of maximum density as determined by ASTM D 1557. Densities shall be determined by the sand-cone method, ASTM D 1556 or by nuclear methods, ASTM D 2922.

3.040 Pipe Installation

A. The sewer pipe shall be laid up grade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end pointed upgrade. When pipe laying is not in progress the forward end of the pipe shall be kept tightly closed with an approved temporary plug. A temporary plug shall be provided at the point of connection to the existing sewer and shall not be removed until the new lines have been flushed, cleaned, tested and approved for use.

B. After an accurate grade line has been established, the pipe shall be laid in conformity with the established line and grade in the properly dewatered trench. Mud, silt, gravel, and other foreign material shall be kept out of the pipe and off the jointing surfaces. The invert line may vary from the true line and grade within the limits stated to develop uniformity, concentricity, and uniform compression of jointing material provided such variance does not result in a reverse sloping invert. The limit of the variance at the invert shall not exceed plus or minus 0.03 foot at the time of backfill. Line and grade shall be maintained with a laser beam operated by a qualified person. Checking of the invert elevation of the pipe may be made by calculations from measurements on the top of the pipe. Pipes with an invert variance greater than allowed shall be relaid.

C. Where pipelines are to be laid on specified curves of sufficiently short radius to deflect the pipe joints in an amount greater than recommended by the manufacturer, the curves shall be achieved by increasing the number of joints and shortening the individual pipe lengths through the entire curve, as required to deflect pipe joints less than recommended by the manufacturer and subject to the approval of the county. No shop fabricated bends shall be accepted in the sewer main.

D. All pipe material between manholes shall be the same material, except for drop connections. All connections to manholes shall be made with manhole adapters. Manhole adapters shall be watertight with voids around manhole adapters thoroughly grouted and sealed inside and outside of the manhole walls and installed in accordance with manufacturer's recommendations.

E. Concrete thrust blocks for pressure mains shall be placed at bends, trees, dead ends, and crosses. Concrete thrust blocks shall bear against solid undisturbed earth at the sides and bottom of the trench.

F. The check dams shall be a minimum of 2 feet in length and keyed into the bottom and sides of the trench a minimum of 1 foot and extended 1 foot over top of pipe as per County Standard Details.

G. Sewer line connections to trunks, mains, laterals or side sewers shall be left uncovered until after an acceptance inspection has been made by the County.

H. Pipe zone backfill for rigid pipe shall be imported crushed surface top course or control density fill. However, pipe zone backfill material where depth of trench (pipe invert to finish grade) exceeds 24 feet deep shall be CDF.

I. Pipe zone backfill for flexible pipe shall be the same as the bedding material.

J. Concrete pipe anchors shall be placed on sewer mains where slopes exceed 20 percent. Anchors shall be placed on 36-foot centers for slopes 20 to 35 percent, on 24-foot centers for slopes 35 to 50 percent, and on 16-foot centers for slopes 50 percent and greater.

3.050 Manhole and Cleanout Installation

A. Precast base sections shall be set on a prepared bedding material. Before the precast base is set in place, the bedding material shall be carefully leveled to provide full bearing for the entire base section.

B. Manhole sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the steps and ladders.

C. 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 part of plaster sand. The outside and inside of the manhole adjusting bricks, lift holes, and precast concrete section joints shall be mortared and troweled smooth with 1/2-inch (minimum) of mortar in order to attain a water tight surface. Infiltration through any joints will be repaired as required, and to the satisfaction of the County.

D. The channels in manholes shall conform accurately to the sewer grade and shall be brought together smoothly with well-rounded junctions satisfactory to the County. The channels shall be field poured after the inlet and outlet pipes have been laid and firmly grouted into place at the proper elevation. Allowances shall be made for a minimum of one-tenth foot drop in elevation across the manhole in the direction of flow. The maximum allowable drop in invert elevation across the manhole in the direction of flow shall be 2 feet. Channel sides shall be carried up vertically from the invert to the crown elevation of the various pipes. The concrete shelf shall be warped evenly and sloped 3/8-inch per foot to drain. Rough, uneven surfaces will not be permitted. Channels shall be constructed to allow the installation and use of a mechanical plug of the appropriate size.

E. PVC pipe connections to manholes shall be made with rubber gasketed coupling or sand collar which can be mortared directly into the manhole wall. Ductile iron pipes shall be mortared directly into the manhole wall.

F. Manholes manufactured with cast-in place rubber boots such as "A-lock'," are acceptable.

G. All stubbed out sewer pipes placed through manhole walls for future connections shall be suitably plugged and blocked in a manner acceptable to the County.

H. Drop manholes shall be constructed as a standard manhole, but as modified by Section II-1.040H and as shown on the County Standard Detail.

I. All lift holes shall be completely filled from the outside with expanding mortar and smoothed both inside and out to insure water tightness. All steel loops must be removed flush with the manhole wall. The steel stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

J. A cleanout shall be provided for each total change of 90 degrees of grade or alignment and in no case shall the spacing of cleanouts exceed 150 feet. A 1/8-bend shall be used to deflect as shown on the County Standard Details.

K. For grade adjustments of manhole frame and cones, a minimum of 8 inches and a maximum of 16 inches shall be provided between the top of the manhole cone or slab and the top of the manhole frame.

L. Manhole rims and cleanouts in undeveloped areas shall be constructed to an elevation from finish grade to no more than 6 inches above finish grade.

M. Existing manholes and cleanouts shall be adjusted to finish grade when the surface is altered by construction activity.

N. The cover assembly of a manhole shall not be grouted to final grade until the final elevation of the pavement, gutter, ditch, or sidewalk in which it is to be placed has been established, and until permission thereafter is given by the County to grout the assembly in place. Cover shall be seated properly to prevent rocking

3.060 Backfill

A. Sewer trenches shall be backfilled as soon after the pipe laying as possible. The Developer shall have no more than 200 feet of trench open in which the sewer has been completed, except by permission of the County.

B. Backfilling of trenches in the vicinity of manholes will not be permitted until the concrete or mortar has become thoroughly hardened.

C. Backfill above the pipe shall be accomplished in such a manner that the pipe will not be shifted out of position nor damaged by impact or overloading.

D. Backfill shall be compacted to at least 85 percent maximum density in trenches in unpaved areas, and to at least 95 percent maximum density in trenches in paved areas. Densities shall be determined by the sand-cone method, ASTM D 1556 or by nuclear methods, ASTM D 2922.

E. In unimproved areas all trench zone backfill shall be select native material obtained from the trench excavation that meets the requirements of bank run gravel for trench backfill or imported bank run gravel for trench backfill. In paved areas all trench zone backfill below the pavement materials shall be imported bank run gravel for trench backfill.

F. Warning tape shall be placed approximately 2 feet above the top of all sanitary sewer pipes and shall extend its full length. The warning tape shall be green in color and shall have the words "Caution Sewer Line Buried Below" printed continuously along the full length. Warning tape shall be Terra Tape or equal. A metal tracer wire shall be laid in the trench directly above all PVC pipe and shall extend its full length.

II-4.000 TESTING

4.010 General

A. All constructed sanitary sewer installations shall be cleaned and backfilled prior to tests. For gravity sewer systems, the Developer may use either the exfiltration or low pressure air method, except where the ground water table is such that the County may require the infiltration test. The Hydrostatic Pressure Test method is required for force mains. T.V. inspection of force mains will not be required.

B. The required test methods are derived from 1994 WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction. As the Standard Specifications are updated there may be discrepancies between the County test methods and the most current Standard Specifications. If such cases arrise, the most stringent test methods shall be adhered to.

C. Developer shall conduct preliminary tests and be assured that the section to be tested is in an acceptable condition before requesting the County to witness the test.

D. For gravity sanitary sewer systems, the system may be pretested any time during the construction process after at least two feet of backfill has been placed over the pipe. However, the first run of pipe of at least 300 feet but no more than 400 feet, installed by each crew, shall be tested in order to qualify the crew and/or the materials. Successful test results from this first of pipe installation shall be a prerequisite to further pipe installation by the crew. The County shall require final testing for County acceptance after backfilling has been completed and all other utilities have been installed.

E. If any sanitary sewer installation fails to meet the requirements of the test method used, the Developer shall repair or replace all defective materials or workmanship at no expense to the County.

F. For gravity sanitary sewer systems, if the Developer elects to test one pipe joint at a time, leakage allowances shall be converted from per 100 feet to per joint by dividing by the number of joints occurring in 100 feet.

G. For force mains, the sections to be pretested shall normally be limited to 1,500 feet. The first run of pipe of not less than 1,000 feet installed by each crew shall be tested in order to qualify the crew and the materials. Force main pipe laying shall not be continue more than an additional 1,000 feet until the first section has been tested successfully. Final testing for County acceptance is required after backfill has been completed and all other utilities have been installed.

4.020 Exfiltration Test

A. Prior to making exfiltration leakage tests, the Developer shall fill the pipe with clear water to permit normal absorption into the pipe walls provided, however, that the pipe leakage test shall be within 24 hours after filling. The allowable leakage for the exfiltration test shall be limited according to the provisions which assume pre-wetted pipe.

B. Leakage shall be no more than 0.28 gallons per hour per inch diameter per 100 feet of sewer, with a water surface 6 feet above the crown at the upper end of the test section, or above the natural groundwater table at the time of test, whichever is higher. The length of pipe tested shall be limited so that the pressure at the lower end of the Section tested does not exceed 16 feet of head above the invert.

C. Where the water surface depth is other than 6 feet, the measured leakage shall not exceed 0.28 gallons per hour per inch diameter per 100 feet times the ratio of the square root of the test head to the square root of 6.

$$\text{Leakage maximum} = 0.28 \times \frac{\sqrt{H}}{\sqrt{6}} = 0.114\sqrt{H}\ \text{gph / inch / 100 / feet}$$

D. When the test is to be made one joint at a time, the leakage per joint shall not exceed the computed allowable leakage per length of pipe.

4.030 Infiltration Test

A. Infiltration test leakage shall not exceed 0.16 gallons per hour per inch diameter per 100 feet, when the natural groundwater head over the pipe is 2 feet or less above the crown of the pipe at the upper end of the test section. The length of pipe tested shall not exceed 700 feet or the distance between manholes when greater than 700 feet.

B. Where the natural groundwater head is more than 2 feet, the measured leakage shall not exceed 0.16 gallons per hour per inch diameter per 100 feet times the ratio of the square root of the natural groundwater head to the square root of 2.

$$\text{Leakage maximum} = 0.16 \times \frac{\sqrt{H}}{\sqrt{2}} = 0.114\sqrt{H}\ \text{gph / inch / 100 / feet}$$

C. When a suitable head of groundwater exists above the crown of the pipe and when the pipe is large enough to work inside, acceptance may be based on the repair of visible leakage by means satisfactory to the County.

4.040 Air Pressure Test

A. Pipelines may be tested with low pressure air by the pressure drop method, in lieu of a water exfiltration test. The pressure drop shall be from 3-1/2 to 2-1/2 psig greater than the average back pressure of groundwater above the centerline of the pipe. At the Developer's option, pipe may be tested without pre-wetting; however, the test allowances herein assume pre-wetted pipe.

B. All wyes, tees or the end of the side sewer stubs shall be plugged with flexible joint caps or acceptable alternative, 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.

C. The allowable rate of air loss shall be 0.003 cubic feet per minute per square foot of internal pipe surface, but the total calculated air loss shall be not less than 2 cfm nor more than 3.50 cfm. In the event that the Developer should elect to test air-permeable pipe without pre-wetting, during dry pipe and dry ground conditions, alternate air loss allowances may be substituted as may be approved by the County, provided it can be demonstrated that the alternate criteria correlates with the standard criteria for wetted pipe.

D. The test equipment to be used shall include a pressure gauge suitable to measure between a range of 0 to 15 psi and be furnished by the Developer. The test equipment shall be inspected and approved by the County prior to use. The County may at any time require a calibration test of gauges or other instrumentation that is incorporated in the test equipment.

E. The Developer shall be solely responsible for Safety Provisions. Plugs used to close the sewer pipe for the air test must be securely braced to prevent the unintentional release of a plug which can become a high velocity projectile. Gauges, air piping manifolds, and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole where a plugged pipe is under pressure. (Four psig air pressure develops a force against the plug in a 12-inch diameter pipe of approximately 450 pounds). Air testing apparatus shall be equipped with a pressure release device such as a rupture disk or a pressure relief valve designed to relieve pressure in the pipe under test at 6 psi.

F. Pipe under 36 inches in diameter may be tested from manhole to manhole or such shorter lengths determined by the Developer. Pipe 36 inches in diameter and over shall be tested one joint at a time. Each joint must show no appreciable loss of pressure when held for 30 seconds.

4.050 Hydrostatic Pressure Test

A. All force mains shall be tested in sections of convenient length to a hydrostatic pressure of 100 PSI in excess of operating pressure but in no case less than 150 PSI.

B. The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer shall furnish and install temporary blocking and remove it after testing.

C. A positive displacement type pump shall be furnished by the Developer for the testing. Feed for the pump shall be from a container wherein the actual amount of "makeup" water can be measured.

D. The pipe section to be tested shall be filled with water and allowed to stand under pressure to allow venting of air at all high points and the lining of the pipe to absorb water.

E. The test shall be accomplished by pumping pipe section up the required pressure, stopping the pump for 60 minutes, and then pumping the main up to the test pressure again.

F. The quantity of water lost from the main shall not exceed the number of gallons per hour as determined by the formula:

$$L = \frac{ND\sqrt{P}}{7400} \qquad \frac{90 \cdot 6 \cdot \sqrt{150}}{7400} = 0.893 \text{ gph}$$

L = Allowable leakage, gallons/hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, PSI

4.060 Television Inspection

A. All sanitary sewer lines shall be inspected by the use of a television camera before final acceptance. The costs incurred in making the initial inspection shall be included in the initial inspection fee charged by the County for the project.

B. The Developer shall bear all costs incurred in correcting any deficiencies found during television inspection including the cost of any additional television inspection that may be required by the County to verify the correction of said deficiency.

C. The Developer shall be responsible for all costs incurred in any television inspection performed solely for the benefit of the Developer.

4.070 Deflection Test For Flexible Pipe

A. Sanitary sewers constructed of flexible pipe shall be tested for deflection not less than 30 days after the trench backfill and compaction has been completed. The test shall be conducted by pulling a properly sized "go-nogo" mandrel through the completed pipeline. Testing shall be conducted on a manhole-to-manhole basis and shall be done after the line has been completely flushed out with water.

B. The mandrel shall be a rigid, nonadjustable mandrel having an effective length of not less than its normal diameter and an odd number of legs (9 legs minimum). Minimum diameter at any point along the full length of the mandrel shall be 95% of the base inside diameter of the pipe being tested.

C. Base inside diameter is derived by subtracting a statistical tolerance package from the average inside diameter. The tolerance package is defined as the square root of the sum of squared manufacturing tolerances. The tolerance package for controlled outside diameter pipe consists of (1) outside diameter tolerance specified in applicable ASTM Standard, (2) 12% of one wall thickness specified in applicable ASTM Standard, and (3) out of roundness tolerance listed in appendix of applicable ASTM Standard. The items in the tolerance package for controlled inside diameter pipe consists of (1) inside diameter tolerance listed in appendix of applicable ASTM Standard and (2) out of roundness tolerance listed in appendix of applicable ASTM Standard. When out of roundness tolerance is not listed, use 3% of average inside diameter.

D. The average inside diameter for pipe with controlled outside diameter shall be equal to the average outside diameter as specified in applicable ASTM Standard minus two minimum wall thickness as specified in applicable ASTM Standard and minus two times excess wall tolerance of 6%. The average inside diameter for pipes with controlled inside diameter shall be the average inside diameter as specified in applicable ASTM Standard.

E. The Developer shall be required, at no expense to the County, to locate and uncover any sections failing to pass the test and, if not damaged, reinstall the pipe. The use of a vibratory re-rounding device or any process other than removal or reinstallation shall not be acceptable. The Developer shall retest the section after replacement of the pipe.

F. Pipe large enough to work inside of may be accepted on the basis of direct measurement.

DIVISION III
SIDE SEWERS AND BUILDING SEWERS

III-1.000 DESCRIPTION

1.010 General
1.020 Side Sewers
1.030 Building Sewers
1.040 Cleanouts
1.050 Underground Utility Locations
1.060 County Inspections

III-2.000 MATERIALS

2.010 General
2.020 Pipes and Fittings
2.030 Side Sewer and Building Sewer Cleanouts
2.040 Bedding and Backfill
2.060 Miscellaneous

III-3.000 INSTALLATION

3.010 General
3.020 Trenching
3.030 Bedding
3.040 Pipe Installation
3.050 Cleanout Installation
3.060 Backfill

III-4.000 TESTING

4.010 General
4.020 Inspection
4.030 Testing
4.040 Approvals

DIVISION III
SIDE SEWERS AND BUILDING SEWERS

III-1.000 DESCRIPTION

1.010 General

A. All connections to public sanitary sewers, by connecting to an existing side sewer or building sewer, or by tapping an existing public sanitary sewer line shall be completed in acordance with the applicable forms and agreements from Division 1, General Provisions of this document.

B. A side sewer is considered to be that portion of a sewer line that will be constructed between a main sewer line and the property line or easement line (whichever is further) of a residence or other building in which the sanitary sewage originates.

C. A building sewer is considered to be that portion of a sanitary sewer line that will be constructed from the end of the side sewer to the residence or building in which the sewage originates.

1.020 Side Sewers

A. A maximum of two residential units or, depending on design flow, one commercial or multi-family building shall be allowed to connect to each side sewer

B. The minimum side sewer pipe size shall be 6 inch for a single residence and 6 inch for a commercial or multi-family service. Residential side sewers serving two residences may be a single 6-inch side sewer to the property line; branching into two 4-inch building sewers to the two residences, as shown on the County Standard Details.

C. The minimum grade shall be 2%. Special circumstances may require consideration of grades less than 2% but will require approval of the County.

D. The maximum grade shall be 45%. Grades in excess of 45% will be considered only to resolve exceptionally steep site conditions, and only with the installation of pipe anchors at no more than 16-foot centers in accordance with the County Standard Details

E. The minimum side sewer depth shall be 4 feet, as measured from finish grade to the top of pipe. The design and installation shall anticipate the crossing of other utilities in the right-of-way, with the side sewer typically crossing under these utilities.

F. No domestic side sewer connections shall be made directly to any manhole.

G. Each side sewer will terminate with a test tee and 6-inch cleanout located at the property/easement line for each lot/building/dwelling to be served, as shown on the County Standard Details.

H. A side sewer serving a commercial/industrial building or facility which has the potential of discharging grease, oil and/or chemicals to the sanitary sewer shall indicate so on the permit application. These properties will require the applicant to submit plans indicating the type of and location of grease traps or pretreatment devices installed as part of the building plumbing and a scheduled maintenance plan.

I. Pipe bedding and trench requirements shall be as indicated in the County Standard Details for "typical trench section" for the different type pipes and laying conditions.

1.030 Building Sewers

A. A maximum of one residential unit or one commercial/multi-family building shall be allowed for each building sewer.

B. The minimum building sewer pipe size shall be 4 inch for a single residence and 6 inch for a commercial or multi-family service.

C. Minimum grade is 2%. Special circumstances may require consideration of grades less than 2% but will require approval of the County.

D. Maximum grade is 45%. Grades in excess of 45% will be considered only to resolve exceptionally steep site conditions, and only with the installation of pipe anchors at no more than 16-foot centers in accordance with the County Standard Details

E. Check dams as per the County Standard Detail shall be placed along the pipe at intervals of 100 feet on sewer mains laid on slopes of 6.0% or greater. Check dam spacing shall be shown on the Plans.

F. The building sewer shall be connected to the test tee located at the end of the side sewer and extend to the building to be served.

G. No connections from downspouts, gutters, basement sump pumps or outside drains or an other feature receiving or exposed to rain or groundwater shall be connected to the building sewers.

H. PVC building sewer pipes shall not be installed less than 18 inches below the surface of the finished grade and closer than 30 inches from a building.

1.040 Cleanouts

A. Cleanouts shall be installed when a side sewer branches to serve two residences, at the property/easement line for each building sewer, at a 100-foot spacing of straight building sewer alignment, and at building connections, or as directed by the County.

B. Cleanouts shall be installed at all fitting combinations within an aggregate change in directions in excess of 45 degrees. If combinations of bends have straight pipe turns of 4 feet or greater between bends, that shall not be considered an aggregate change of direction.

C. Cleanouts installed in roads, driveways or walkways, paved or unpaved, shall have a frame and cover in accordance with Section III 2.030.

1.050 Underground Utility Locations

A. It shall be the responsibility of the Developer making the side sewer or building sewer installation to verify the exact locations of all existing utilities prior to commencing any work. The Developer shall contact the utilities underground location center, 1-800-424-5555, a minimum of two days prior to commencing work.

1.060 County Inspections

A. All side sewer and building sewer installation inspections and test observations shall be made at Kitsap County Department of Public Works. The county inspector shall be notified a minimum of two working days in advance of commencing work on a sanitary sewer extension. Prior to final acceptance of all side sewer and building sewer installations in new sewer mains, the County shall conduct an inspection of the sewer mains by the use of television equipment. Final acceptance of side sewer and building sewer installations will not be made until tests and inspections are complete and prove satisfactory.

III-2.000 MATERIALS

2.010 General

A. The Developer shall submit information from the material manufacturer or fabricator showing that the materials meet the requirements of the design and pertinent specifications. The developer shall provide submittals to the County on all materials to be used.

2.020 Pipes and Fittings

A. Ductile iron pipe for gravity sanitary side sewer and building sewer pipe and pressure pipe shall conform AWWA C 151 Class 50 and shall be cement mortar lined, push-on joint, or mechanical joint. Joints for ductile iron pipe shall be rubber gasketed conforming to the requirements of AWWA C 111.

B. Side sewer and building sewer tee or wye fittings for ductile iron gravity pipes shall be rubber gasket push-on joint or mechanical joint ductile iron fittings. Saddles fastened to the sewer main with external bands shall not be acceptable on any new system. Fittings shall have sufficient strength to withstand handling and load stresses normally encountered.

C. Fittings for ductile iron gravity and pressure pipe shall meet the requirements of AWWA C 110 or AWWA C 153. Fittings shall also be cement mortar lined, meeting the requirements of AWWA C 104.

D. Polyvinyl chloride (PVC) gravity side sewer and building sewer pipes shall conform to the requirements of ASTM D 3034, SDR 35 for pipe up to 15 inches diameter. Joints for PVC gravity sewer pipe shall be push-on type with restrained elastomeric ring gaskets conforming to ASTM D 3212. Rubber gaskets shall conform to ASTM F 477.

E. Side sewer and building sewer fittings for PVC pipes shall be made of PVC plastic having a cell classification of 12454-B, 12454-C, or 13343-C, as defined in ASTM D 1784. Fittings shall have sufficient strength to withstand handling and load stresses normally encountered.

F. Sanitary sewer forcemains for building sewers shall be a minimum of 1-1/4-inch-diameter, Schedule 80 polyvinyl chloride (PVC) pipe.

G. Pressure pipe transition couplings, reducing couplings, transition-reducing couplings, and flexible couplings shall be compression type, constructed with ductile iron or steel sleeves and ductile iron followers. Bolts and nuts shall be ductile iron. Factory finish shall be the standard of the manufacturer. Couplings shall be Romac, Smith-Blair or equal.

2.030 Side Sewer and Building Sewer Cleanouts

A. Cleanouts shall be constructed of the same material as the side sewer and building sewer and shall conform to the County Standard Details. Cast iron frame and covers for cleanouts shall be two bolt locking type, Olympic Foundry type M1025, or equal. Locking lids will be required on all 8-inch or larger main line cleanouts.

2.040 Bedding and Backfill

A. Foundation Material

Foundation material shall meet the requirements of Section 9-03.17, Class B, of the Standard Specifications for Road, Bridge, and Municipal Construction.

B. Bedding for Rigid Pipe

Unless approved otherwise for special cases, bedding material for rigid pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.15.

C. Bedding for Flexible Pipe

Unless approved otherwise for special cases, bedding material for flexible pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.16.

D. Check Dams

The design shall specify a check dam material of either native clay material, a mixture pipe bedding material and imported bentonite clay material, or control density fill material. Check dam material approval by the County is required prior to construction.

E. Crushed Surfacing Top Course

Imported crushed surfacing top course shall meet the requirements of Section 9-03.9(3) of the Standard Specifications for Road, Bridge, and Municipal Construction.

F. Bank Run Gravel for Trench Backfill

Bank run gravel for trench backfill shall conform to Section 9-03.19 of the Standard Specifications for Road, Bridge, and Municipal Construction.

G. Control Density Fill

1. Control density fill material (CDF) shall be composed of portland cement, aggregate, fly ash, and water and shall conform to the following requirements:

   a. Portland Cement: ASTM C 150, Types I or II.

   b. Aggregate: Sand with or without fine gravel, maximum size 1 inch. Aggregate shall be free of foreign material, roots, clay balls, trash, debris, and organics and shall have less than 15% finer than the No. 200 sieve. Material passing the No. 40 sieve shall be nonplastic.

   c. Water (potable).

d. Fly ash: Class F ASTM C 618, unless otherwise approved.

e. Admixture: As necessary to develop flowability without segregation.

2. CDF shall be proportioned to be a flowable, nonsegregating, self-consolidating, low shrink slurry with an unconfined compressive strength as specified below. The mix design shall be prepared for a range of aggregate gradations that are expected to be used. The Developer and its supplier shall determine the materials and proportions used to meet the requirements of these Specifications. The CDF mix for each strength class shall meet the flowability, pumpability, and set time requirements for each design application.

3. No CDF shall be placed until the County has approved the mix design. The County's approval of the mix design will be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field installations for conformance with these Specifications.

4. With the County's approval, the Developer may be allowed the option of processing the native sands for CDF aggregate. If the Developer elects to use onsite sands for producing CDF, Developer shall make its own determination as to the quantity of suitable sands and amount of processing required and shall bear all costs associated with using native materials.

5. Class 100 CDF shall have an unconfined compressive strength at 28 days of 100 psi, per ASTM D 4832, (+50 psi, -20 psi). Maximum density 125 pcf.

6. Class 300 CDF shall have an unconfined compressive strength at 28 days of 300 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

7. Class 1000 CDF shall have an unconfined compressive strength at 28 days of 1,000 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

2.050 Miscellaneous

A. Concrete thrust blocks for pressure force lines shall be Class B concrete poured in place, per County Standard Details.

B. Pipe anchors shall be constructed of Class C concrete with 1-inch diameter galvanized steel rod tie downs. The anchors shall be constructed per County Standard Details.

III-3.000 INSTALLATION

3.010 General

A. The Developer shall complete the proposed sanitary sewer construction in accordance with the approved construction drawings, details, specifications, state requirements, and local regulatory requirements.

B. The Developer shall provide all required staking and grades for the proper installation. No deviation shall be allowed without prior approval of the County. Staking shall be provided at the maximum of 50 feet intervals.

C. All existing sewer lines shall be kept in service at all times. Provision shall be made for disposal of sewage flow if any existing sewers are damaged. Damage to existing sewers shall be repaired by the Developer to a condition equal to or better than their condition prior to the damage. Water accumulating during construction shall be removed from the new sewers but shall not be permitted to enter the existing system. The developer shall be responsible for flushing out and cleaning any existing sewers, into which gravel, rocks, or other debris has entered as a result of the work, and shall repair lift stations or other facilities damaged by the work at the Developer's expense.

D. Connection of a side sewer to an existing sewer main where an in-line tee or wye is not available will be made by the use of an approved saddle which will be furnished and installed by the County crews once the Developer has exposed the sewer main and provided any shoring necessary to provide for safe working conditions and upon the Developer obtaining the necessary permits.

3.020 Trenching

A. The maximum permissible trench widths in the pipe zone shall be according to the County Standard Details. If the maximum trench width is exceeded without authority of the County, the Developer shall provide pipe of higher strength classification or provide higher class bedding, or as required by the County. Above the pipe zone the trench may be any width.

B. The Developer shall provide all materials, labor, and equipment necessary to shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe work conditions in the trench. The Developer may elect to any combination of shoring and overbreak, tunneling, boring, sliding trench shield, or other method of accomplishing the work consistent with applicable local, state and federal safety codes.

C. Upon completion of work, the Developer shall remove all shoring unless indicated otherwise on the approved plans or as directed by the County. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Developer.

D. The Developer shall furnish, install, and operate all necessary equipment to keep excavation above the foundation level free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property or nuisance to the public. Sufficient pumping equipment in good working condition shall be available at all times for emergencies, including power outage, and shall have available at all times competent workers for the operation of the pumping equipment.

3.030 Bedding

A. Bedding of the class or classes shown on the plans shall be installed in accordance with the County Standard Details. Bedding shall provide a uniform support along the entire pipe barrel, without load concentration at joint collars or bells. Bedding disturbed by pipe movement, or by removal of shoring or movement of the trench shield or box shall be reconsolidated prior to backfill.

B. Bedding shall be placed in more than one lift, the first lift is to provide at least 4 inches of bedding under any portion of the pipe and shall be placed before the pipe is installed, and shall be spread smoothly so that the pipe is uniformly supported along the barrel. Subsequent lifts of the not more than 6 inches thickness shall be installed to a depth of 6 inches over the crown of the pipe. Each lift shall be compacted to 90% of maximum density as determined by ASTM D 1557. Densities shall be determined by the sand-cone method, ASTM D 1556 or by nuclear methods, ASTM D 2922.

3.040 Pipe Installation

A. The sewer pipe shall be laid up grade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end pointed upgrade. When pipe laying is not in progress the forward end of the pipe shall be kept tightly closed with an approved temporary plug. A temporary plug shall be provided at the point of connection to the existing sewer and shall not be removed until the new lines have been flushed, cleaned, tested and approved for use.

B. After an accurate grade line has been established, the pipe shall be laid in conformity with the established line and grade in the properly dewatered trench. Mud, silt, gravel, and other foreign material shall be kept out of the pipe and off the jointing surfaces. The invert line may vary from the true line and grade within the limits stated to develop uniformity, concentricity, and uniform compression of jointing material provided such variance does not result in a reverse sloping invert. The limit of the variance at the invert shall not exceed plus or minus 0.03 foot at the time of backfill. Line and grade shall be maintained with a laser beam operated by a qualified person. Checking of the invert elevation of the pipe may be made by calculations from measurements on the top of the pipe. Pipes with an invert variance greater than allowed shall be relaid.

C. Where pipelines are to be laid on specified curves of sufficiently short radius to deflect the pipe joints in an amount greater than recommended by the manufacturer, the curves shall be achieved with a series of tangents and shop-fabricated bends, subject to the approval of the county.

D. Concrete thrust blocks for pressure lines shall be placed at bends, trees, dead ends, and crosses. Concrete thrust blocks shall bear against solid undisturbed earth at the sides and bottom of the trench.

E. The check dams shall be a minimum of 2 feet in length and keyed into the bottom and sides of the trench a minimum of 1 foot and extended 1 foot over top of pipe as per County Standard Details.

F. Sewer line connections to sewer mains, side sewers, or building sewers shall be left uncovered until after an acceptance inspection has been made by the County.

G. Pipe zone backfill for rigid pipe shall be imported crushed surface top course or control density fill.

H. Pipe zone backfill for flexible pipe shall be the same as the bedding material.

3.050 Cleanout Installation

A. Cleanouts shall be installed per Section III - 1.040 and County standard details. Cleanouts installed in areas to be paved shall be brought to grade level as per County Standard Details.

B. The side sewer 6-inch cleanout shall be brought to within 6-inches of finished grade, plugged with a threaded plug and enclosed in a cast iron valve box with cover. See County Standard Details.

C. The building sewer cleanout shall be full building sewer diameter and shall be extended to a point not less than 6-inches or more than 12 inches below the finished ground surface and shall be plugged with a removable threaded watertight plug.

3.060 Backfill

A. The location of the end of side sewers shall be marked by the developer at the property line by a 2- by 4-foot wooden stake 4 feet long buried in the ground 3 feet. The lower end shall have a 2- by 4-foot cleat nailed to it to prevent withdrawal of the stake. The exposed 1 foot shall be painted white and the depth to the side sewer or tee indicated in black paint.

B. All trenching shall be completely backfilled as soon as after inspection as practicable.

C. Adequate precaution shall be taken to insure proper compactness of backfill around piping without damage to such piping.

D. Trenches shall be backfilled in layers no thicker than 8 inches to an elevation 12 inches above the top of piping with clean earth with shall not contain stones, boulders, cinderfill, or other material which would damage or break the piping or cause corrosive action.

E. Fill shall be properly compacted and suitable precautions shall be taken to insure permanent stability for pipe laid in filled or made ground.

III-4.000 TESTING

4.010 General

A. All side sewers shall be inspected by the County prior to backfilling. Any work that has been covered and which the County did not inspect shall be uncovered to allow for inspections and testing.

B. Person authorized to complete the work shall be present during all inspection and testing.

C. Notices of corrections or deficiencies shall be given at the time of inspection or written and delivered to the developer. All corrections and/or deficiencies noted by the County shall be corrected prior to scheduling a re-inspection.

4.020 Inspection

A. Visual inspections shall be conducted on all alignment, grade, backfill, etc., and other items the County deems relevant. When inspection is required to be done on the weekend or holidays, the developer will be charged for the inspector's overtime.

4.030 Testing

A. The side sewer shall be tested in its entirety or in sections as directed by the County.

B. All side sewers constructed in conjunction with the sewer mains shall be tested by the low pressure air method specified in Section II-4.040.

C. When side sewers and building sewers are not tested simultaneously with the test of the sewer mains, a test tee shall be installed at he first pipe out of the sewer main tee or wye branch so that plug can be inserted for sealing off the side sewer for testing.

D. The test tees provided at all junctions of all building sewers with a side sewer shall be used to insert a plug to test the building sewer.

E. Water tests shall be completed by plugging the side/building sewer and filling with water to the point of overflow at the cleanout.

F. Water shall be kept in the side sewer for a minimum of 15 minutes. The system shall be water tight with no visual or measurable leakage.

G. An alternative to water testing is a standard air pressure test of 4 psi of pressure for a 5 minute period with no measurable loss of pressure.

4.040 Approvals

A. Upon the satisfactory testing and upon satisfactory evidence that all interior plumbing has been approved, the side sewer shall be approved for use and operation by the County and allowed to discharge into the County sanitary sewer system.

DIVISION IV
SUBMERSIBLE TYPE SEWAGE PUMP STATION

IV-1.000 DESCRIPTION

1.010 General
1.020 Site Work
1.030 Pump Station
1.040 Piping and Control Facilities

IV-2.000 MATERIALS

2.010 General
2.020 Site Work
2.030 Pump Station
2.040 Piping and Control Facilities

IV-3.000 INSTALLATION

3.010 General

IV-4.000 TESTING

4.010 General
4.020 Hydrostatic Pressure Test

DIVISION IV
SUBMERSIBLE TYPE SEWAGE PUMP STATION

IV-1.000 DESCRIPTION

1.010 General

A. Except where otherwise indicated, the following sections are intended to be consistent with Ecology's "Criteria of Sewage Works Design."

B. Except where provided otherwise, construction details, workmanship, and materials shall be in accordance with the latest edition of "Standard Specifications for Road, Bridge, and Municipal Construction" prepared by the Washington State Chapter of the American Public Works Association.

C. Prior to construction, the County shall have an approved set of plans from Washington State Department of Ecology (Ecology) on file in the County offices.

D. Any extension of the Kitsap County sanitary sewer extension shall be completed in accordance with the applicable requirements of the Standards for Sanitary Sewer Extensions, Division I, Section I-4.000, Forms and Agreements.

E. The station's operational components shall be located at an elevation that is not subjected to the 100 year frequency storm flood and associated wave action, or shall be otherwise adequately protected as certified by a professional engineer registered in the State of Washington.

F. Final acceptance of the completed pump station shall include approval of construction and testing by the County Inspector, providing the County with 5 copies of the facility's operation and maintenance manual, and providing the following spare parts:

2 each - all gaskets and O-rings
2 each - all bearings
1 each - mechanical seal
2 each - oil seals, inboard
2 each - oil seals, outboard

Provide one set of spare parts for each set of 2 or less pumps of the same model. The set of spare parts shall be as recommended by the manufacturer. The spare parts shall be packed in a hinged wooden box with hasp and clearly labeled for contents.

G. The following chart indicates permissible operational ranges for a submersible type sewage pump station.

1.020 Site Work

A. The driving area into the pump station shall be paved with asphalt and shall support vehicles with a gross vehicle weight of 50,000 pounds.

B. All pump station sites shall have a minimum of 1 manual switch with a minimum of two 75 watt bulbs in adjustable flood lights for night visibility at the control panel. No lighting shall be installed inside the pump station wet well.

C. Each station shall have a pig launch station as shown in the County Standard Detail.

D. Pump station may discharge to a manhole or directly to a mainline pipe depending on the application.

E. Non-driving areas shall receive a 6-inch thickness of crushed surfacing top course material.

F. A 6 foot chain link fence, with 16 foot wide double swing access gate shall be provided around the pump station site, two feet inside the property line.

G. Landscaping shall be on the outside of the fence to screen the site. Any planting shall be low maintenance.

H. When 100 or more equivalent residential units are to be connected to a pump station a 3/4-inch non-freeze post hydrant shall be provided on site.

1.030 Pump Station

A. The design capacity of a pump station shall be computed on the basis of the total area and projected population that can be served by the pump station (based on the most current zoning projections). Method of calculation shall be consistent with Criteria for Sewage Works Design Section 3.12.

B. Pump station design shall include provisions for operating and maintaining the facilities without needing to comply with confined space entry requirements.

C. At least two pump units shall be provided. The two pumps shall be designed to fit actual flow conditions and must each be capable of handling the expected maximum peak sewage flow.

D. Where three or more pump units are provided, they shall have the capacity that with any one unit out of service, the remaining units will have capacity to handle the maximum peak sewage flow.

E. Submersible pumps shall be readily removable and replaceable without dewatering the wet well or requiring personnel to enter the wet well. Other pump units at the same station shall continue to be operable while one pump is maintained. Pump unit lifting devices shall be included in the design.

F. Pumps shall be capable of passing spheres of at least 3 inches in diameter. Pump suction and discharge openings shall be at least 4 inches in diameter.

G. When less than 100 equivalent residential units are served by the pump station, on-site generators or a second power source are not required, but storage within an overflow tank shall be provided for an 8 hour peak flow as shown in the County Standard Detail.

H. The design of the submersible pump station shall provide for a "lead pump" cycle time of no more than six cycles per hour during peak wet weather flow design conditions, and no less than one cycle per hour during minimum dry weather flow design conditions.

1.040 Piping and Control Facilities

A. Electrical control equipment shall be housed above ground level in an enclosed structure. The cabinet door should face away from prevailing winds if possible.

B. When 100 or more equivalent residential units are served by the pump station an emergency power source or auxiliary pumping equipment shall be provided to ensure continuous operability for a minimum of 48 hours.

C. Where less than 100 equivalent residential units are to be connected to a pump station, a power transfer switch and receptacle compatible with the County's portable generators shall be provided.

D. Each control panel shall have a "Hand-Off-Auto" selector switch to select the modes of station operation.

E. For each pump there shall be a:

a) Combination circuit breaker/ overload unit providing overload protection.
b) Short circuit protection.
c) Reset and disconnect for all phases.
d) Across the line magnetic contactor.
e) 120 volt AC control power transformer.
f) Overload relay to be precalibrated to match motor characteristics.
g) Thermal overtemp relay and thermal overtemp reset pushbutton, each factory sealed to insure trip setting is tamperproof.
h) Elapse time meter that will count the time pump magnetic starter is engaged. The timer shall count in hours and tenth of an hour.

F. Variable frequency, variable speed drive units for the pumps shall be arranged to control the pumps such that the pumping rate will match the in-flow rate.

G. Variable frequency, variable speed drive wet well level indicator shall provide continuous level monitoring throughout the intended operational range of the wet well.

H. Discrete level sensors shall only be used for non-variable speed drive and pump station assemblies. Level sensors shall be either ball float or bubbler systems.

I. An alarm system shall be provided for all pumping stations. Alarm system activation shall be required for high water, low water, line loss, pump fail, gas leak, power fail, generator run, and generator fail. Consideration of telemetry alarm to 24 hour monitoring stations or telephone alarms to duty personnel should be given when reliability classification or the potential for property damage warrants it.

J. When telemetry is not required by the County, an audio- and/or visual alarm shall be installed at the station for external observation.

K. If wet well ventilation is required, the ventilation may be either continuous or intermittent. Continuous ventilation systems shall provide at least 12 complete air changes per hour. Intermittent ventilation systems shall provide at least 30 complete air changes per hour.

L. Odor control requirements, if any, shall be evaluated by the design engineer, but will be determined by the County on a case by case basis.

M. Odor control equipment shall be enclosed in an above grade structure within the pump station site.

N. Suitable devices for measuring sewage flow should be provided at pumping stations with flow capacity greater than 1.0 mgd. Hour meters (totalizers) shall be installed on all pumps unless otherwise approved by the County.

O. All control valves on the discharge line for each pump shall be placed in an adjacent accessible location outside the wet well in separate vault and be protected from weather and vandalism.

P. Control valves and piping shall be designed to prevent backflow through the inactive piping, and to allow isolation and removal of inactive valves or equipment.

Q. The County may require additional or specialty valves such as air cushion swing check valves, ball check valves, electric check valves, rotary ball valves, and surge relief valves, as needed for special conditions.

IV-2.000 MATERIALS

2.010 General

A. The developer shall submit information from the material manufacturer or fabricator showing that the materials meet the requirements of the design and pertinent specifications. The developer shall provide submittals to the County on all materials to be used.

2.020 Site Work

A. Foundation Material

Foundation material shall meet the requirements of Section 9-03-17, Class B, of the Standard Specifications for Road, Bridge, and Municipal Construction.

B. Bedding for Rigid Pipe

Unless approved otherwise for special cases, bedding material for rigid pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.15.

C. Bedding for Flexible Pipe

Unless approved otherwise for special cases, bedding material for flexible pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.16.

D. Crushed Surfacing Top Course

Imported crushed surfacing top course shall meet the requirements of Section 9-03.9(3) of the Standard Specifications for Road, Bridge, and Municipal Construction.

E. Bank Run Gravel for Trench Backfill

Bank run gravel for trench backfill shall conform to Section 9-03.19 of the Standard Specifications for Road, Bridge, and Municipal Construction.

F. Control Density Fill

1. Control density fill material (CDF) shall be composed of portland cement, aggregate, fly ash, and water and shall conform to the following requirements:

   a. Portland Cement: ASTM C 150, Types I or II.

   b. Aggregate: Sand with or without fine gravel, maximum size 1 inch. Aggregate shall be free of foreign material, roots, clay balls, trash, debris, and organics and shall have less than 15% finer than the No. 200 sieve. Material passing the No. 40 sieve shall be nonplastic.

   c. Water (potable).

   d. Fly ash: Class F ASTM C 618, unless otherwise approved.

   e. Admixture: As necessary to develop flowability without segregation.

2. CDF shall be proportioned to be a flowable, nonsegregating, self-consolidating, low shrink slurry with an unconfined compressive strength as specified below. The mix design shall be prepared for a range of aggregate gradations that are expected to be used. The Developer and its supplier shall determine the materials and proportions used to meet the requirements of these Specifications. The CDF mix for each strength class shall meet the flowability, pumpability, and set time requirements for each design application.

3. No CDF shall be placed until the County has approved the mix design. The County's approval of the mix design will be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field installations for conformance with these Specifications.

4. With the County's approval, the Developer may be allowed the option of processing the native sands for CDF aggregate. If the Developer elects to use onsite sands for producing CDF, Developer shall make its own determination as to the quantity of suitable sands and amount of processing required and shall bear all costs associated with using native materials.

5. Class 100 CDF shall have an unconfined compressive strength at 28 days of 100 psi, per ASTM D 4832, (+50 psi, -20 psi). Maximum density 125 pcf.

6. Class 300 CDF shall have an unconfined compressive strength at 28 days of 300 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

7. Class 1000 CDF shall have an unconfined compressive strength at 28 days of 1,000 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

G. Concrete thrust blocks for pressure force mains shall be Class B concrete poured in place, per County Standard Details.

2.030 Pump Station

A. Wet well shall be of precast or cast in place reinforced concrete or stainless steel construction. The wet well floor shall be sloped to the pump suction to minimize grit accumulation. The wet well shall be water tight.

B. Motors shall be explosion proof and designed for 240/480 volts, 3 phase with single phase protection. Motor shall be nonoverloading at all points of pump curve. Motors shall be specified which allow unsubmerged operation for extended periods of time.

C. Wear rings shall be provided for both the impeller and the suction of each pump. Wear rings shall be removable.

D. All bearings shall be rated in accordance with USASI B3.11 for a continuous (24 hours/day) duty life of not less than 50,000 hours at the worst condition of service.

E. The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two sections with registered fit.

F. Pump shafts shall be stainless steel ANSI 431.

G. All metal parts in wet well shall be aluminum or stainless steel. Metal outside the wet well shall be aluminum, stainless steel or hot dipped galvanized following fabrication.

H. Hatches shall be rectangular aluminum, Bilco style or equal. Hatches shall work with the pump rails in the wet well to provide unobstructed removal of pumps. Hatches shall have hasp type locking mechanism.

2.040 Piping and Control Facilities

A. Pump control panel for submersible pump station with no control room shall be a NEMA 4 enclosure mounted on a pedestal above ground. Panel door shall face away from prevailing winds to minimize water entering the enclosure and shall be a minimum of 10 feet from the fence to minimize vandalism. There shall be a heater strip to prevent condensation accumulation in the enclosure. All other components of the pump station shall be below ground.

B. All wire shall be copper, and all conduits shall be galvanized and rigid.

C. All components within the pump station system, including both internally and face-mounted instrumentation and devices, shall be clearly identified with phenolic name plates of black background with white letters.

D. Power receptacle compatible with the County's portable generator shall be receptacle number AR1041S22-1972, 100 amp, 4 wire and 4 pole.

E. Valve vaults shall be precast or cast in place concrete.

F. Ductile iron pressure pipe shall conform AWWA C 151 Class 50 and shall be cement mortar lined, push-on joint, or mechanical joint. Joints for ductile iron pipe shall be rubber gasketed conforming to the requirements of AWWA C 111.

G. Fittings for ductile iron pressure pipe shall meet the requirements of AWWA C 110 or AWWA C 153. Fittings shall also be cement mortar lined, meeting the requirements of AWWA C 104.

H. Polyvinyl chloride (PVC) pressure sanitary sewer pipes shall meet the requirements of AWWA C900, Class 200, DR14. PVC pipe shall have the same outside dimensions as ductile iron pipe.

I. Joints for PVC pressure pipe shall be push-on type meeting the requirements of ASTM D 3139 using a restrained rubber gasket conforming to ASTM F 477. Solvent welded pipe joints are not permitted.

J. Pressure pipe transition couplings, reducing couplings, transition-reducing couplings, and flexible couplings shall be compression type, constructed with ductile iron sleeves and ductile iron followers. Bolts and nuts shall be ductile iron. Factory finish shall be the standard of the manufacturer. Couplings shall be Romac, Smith-Blair or equal.

K. Check valves 2 inches or larger, unless otherwise approved by the County, shall be iron body, brass trimmed, swing type, balanced, external spring loaded, with a clear opening equal to or greater than the connecting pipe. The spring and lever shall be with extra heavy duty stainless-steel shaft and keys.

L Isolation valves shall be eccentric plug valves with full opening ports and shall have synthetic rubber coated, valve plugs with stainless steel seats and driptight shutoff with pressure in either direction.

M. Eccentric plug valves 6 inches and smaller shall be lever operated. Larger valves shall have totally enclosed worm gear operates with handwheel, operating nut, or chainwheel as required.

N. Air release valves shall be for sewage and designed to prevent clogging due to solids in the fluid. The float and ball shall be constructed of stainless steel and attached to a stainless steel lever mechanism with an external shaft. Buna-N seat shall be attached to the lever mechanism for drop-tight closure.

O. All new pump stations requiring chlorine odor control shall use hypochlorite odor control systems.

P. Non-freeze post hydrants shall be Zurn, Model Z-1385 (3/4-inch), or equal.

IV-3.000 INSTALLATION

3.010 General

A. The developer shall complete the proposed sanitary sewer construction in accordance with the approved construction drawings, details, specifications, state requirements, and local regulatory requirements. The developer shall implement the runoff and erosion control plan that was approved by the County.

B. The developer shall provide all materials, labor, and equipment necessary to shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe work conditions in the trench. The developer may elect to any combination of shoring and overbreak, tunneling, boring, sliding trench shield, or other method of accomplishing the work consistent with applicable local, state and federal safety codes.

C. The developer shall furnish, install, and operate all necessary equipment to keep excavation above the foundation level free from water during construction, and shall dewater dispose of the water so as not to cause injury to public or private property or nuisance to the public. Sufficient pumping equipment in good working condition shall be available at all times for emergencies, including power outage, and shall have available at all times competent workers for the operation of the pumping equipment.

D. All existing sewer lines shall be kept in service at all times. Provision shall be made for disposal of sewage flow if any existing sewers are damaged. Damage to existing sewers shall be repaired by the Developer to a condition equal to or better than their condition prior to the damage. Water accumulating during construction shall be removed from the new sewers but shall not be permitted to enter the existing system. The developer shall be responsible for flushing out and cleaning any existing sewers, into which gravel, rocks, or other debris has entered as a result of the work, and shall repair lift stations or other facilities damaged by the work at the developer's expense.

E. The physical connection to an existing manhole or sewer shall not be made until authorized by the County. Such authorization will not be given until all upstream lines have been completely cleaned and tested.

F. Excavation for a precast concrete wet well shall be sufficient to leave 1 foot clearance between the wet well outer surface and the earth bank. Excavation for a cast in place concrete wet well shall allow enough space for form work.

G. The wet well shall be set in place or formed on a prepared foundation material with a minimum thickness of 6 inches, or thicker as per the design engineer. Before the wet well is set in place or formed, the foundation material shall be carefully leveled and compacted to a minimum of 95% compaction to provide full bearing for the entire base section.

H. Backfill with bank run gravel for trench backfill material shall be placed in loose lifts of 10 inches maximum thickness and compacted to at least the percentage of the maximum dry density as shown on the approved plans (as determined by ASTM D 1557).

I. For cast in place and precast concrete wet wells, pipes, castings, or conduits shall be placed in the forms before pouring concrete wherever possible. Alternatively, knock-out panels or sleeves shall be designed into the structure. If an unanticipated wall penetration is required, a core drill installation will be acceptable on an exception basis.

J. PVC pipe connections to the wet well shall be made with a rubber gasketed coupling or sand collar which can be mortared directly into the manhole to provide a watertight seal. Ductile iron pipes shall be mortared directly to the wet well wall, or installed with modular mechanical seal assemblies with stainless steel bolts and nuts, as required to provide a water tight seal.

K. Bedding of the class or classes of pipes shown on the plans shall be installed in accordance with the County Standard Details. Bedding shall provide a uniform support along the entire pipe barrel, without load concentration at joint collars or bells. Bedding disturbed by pipe movement, or by removal of shoring or movement of the trench shield or box shall be reconsolidated prior to backfill.

L. Bedding shall be placed in more than one lift, the first lift is to provide at least 4 inches of bedding under any portion of the pipe and shall be placed before the pipe is installed, and shall be spread smoothly so that the pipe is uniformly supported along the barrel. Subsequent lifts of the not more than 6 inches thickness shall be installed to a depth of 6 inches over the crown of the pipe. Each lift shall be compacted to 90% of maximum density as determined by ASTM D 1557. Densities shall be determined by the sand-cone method, ASTM D 1556 or by nuclear methods, ASTM D 2922.

M. Concrete thrust blocks for pressure mains shall be placed at bends, trees, dead ends, and crosses. Concrete thrust blocks shall bear against solid undisturbed earth at the sides and bottom of the trench.

N. Pipe zone backfill for rigid pipe shall be imported crushed surface top course or control density fill. However, pipe zone backfill material where depth of trench (pipe invert to finish grade) exceeds 24 feet deep shall be CDF.

O. Pipe zone backfill for flexible pipe shall be the same as the bedding material.

P. Upon completion of work, the developer shall remove all shoring unless indicated otherwise on the approved plans or as directed by the County. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the developer.

Q. All electricals and controls shall be furnished and installed in accordance with the applicable Federal, State and local codes and standards including but not limited to the following:

National Electrical Code (NEC)
Occupational Safety & Health Act (OSHA)
National Electrical Safety Code (NESC)
National Electrical Manufactures Association (NEMA)
Underwriters Laboratory (UL)
Insulated Power Conductor Engineering Association (IPCEA)
American National Standards Institute (ANSI)
Institute of Electrical & Electronic Engineers (IEEE)

IV-4.000 TESTING

4.010 General

A. The completed pump station shall be given an operational test of all equipment for leaks in all piping and seals, and for correct operation of the automatic control system and all auxiliary equipment. Developer shall conduct preliminary tests and be assured that the section to be tested is in an acceptable condition before requesting the County to witness the test.

B. The pump suction and discharge shall be coupled to a reservoir, and the pumps shall recirculate water for at least one hour under simulation service conditions.

C. The hydrostatic pressure test method is required force mains and fittings.

D. If any sanitary sewer installation fails to meet the requirements of the test method used, the developer shall repair or replace all defective materials or workmanship at no expense to the County.

E. Final testing for County acceptance is required after backfill has been completed and all other utilities have been installed.

F. Only after final testing and acceptance by the County is the pump station allowed to pump sanitary sewage into the County system.

4.020 Hydrostatic Pressure Test

A. All force mains shall be tested in sections of convenient length to a hydrostatic pressure of 150 PSI in excess of operating pressure but in no case less than 200 PSI.

B. The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer shall furnish and install temporary blocking and remove it after testing.

C. A positive displacement type pump shall be furnished by the Developer for the testing. Feed for the pump shall be from a container wherein the actual amount of "makeup" water can be measured.

D. The pipe section to be tested shall be filled with water and allowed to stand under pressure to allow venting of air at all high points and the lining of the pipe to absorb water.

E. The test shall be accomplished by pumping pipe section up the required pressure, stopping the pump for 60 minutes, and then pumping the main up to the test pressure again.

F. The quantity of water lost from the main shall not exceed the number of gallons per hour as determined by the formula:

$$L = \frac{ND\sqrt{P}}{7400}$$

L = Allowable leakage, gallons/hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, PSI

DIVISION V
WET WELL/DRY WELL TYPE SEWAGE PUMP STATION

V-1.000 DESCRIPTION

1.010 General
1.020 Site Work
1.030 Pump Station
1.040 Odor Control and Ventilation

V-2.000 MATERIALS

2.010 General
2.020 Site Work
2.030 Wet and Dry Wells
2.040 Pump and Motors
2.050 Valves
2.060 Electricals and Controls

V-3.000 INSTALLATION

3.010 General

V-4.000 TESTING

4.010 General
4.020 Testing
4.030 Acceptance

DIVISION V
WET WELL/DRY WELL TYPE SEWAGE PUMP STATION

V-1.000 DESCRIPTION

1.010 General

A. Any extension of the Kitsap County sanitary sewer system shall be completed in accordance with the applicable requirements of the Standards for Sanitary Sewer Extensions, Division I, Section I-4.000, Forms and Agreements

B. Prior to construction, the County shall have an approved set of plans from Washington State Department of Ecology (Ecology) on file in the County offices.

C. Except where otherwise indicated, the following sections are intended to be consistent with Ecology's "Criteria of Sewage Works Design."

D. Except where provided otherwise, construction details, workmanship, and materials shall be in accordance with the latest edition of "Standard Specifications for Road, Bridge, and Municipal Construction" prepared by the Washington State Chapter of the American Public Works Association.

E. The station's operational components shall be located at an elevation that is not subjected to the 100 year frequency storm flood and associated wave action, or shall be otherwise adequately protected as certified by a professional engineer registered in the State of Washington.

F. Final acceptance of the completed pump station shall include approval of construction and testing by the County Inspector, providing the County with 5 copies of the facility's operation and maintenance manual, and providing the following spare parts:

2 each - all gaskets and O-rings
2 each - all bearings
1 each - mechanical seal
2 each - oil seals, inboard
2 each - oil seals, outboard

Provide one set of spare parts for each set of 2 or less pumps of the same model. The set of spare parts shall be as recommended by the manufacturer. The spare parts shall be packed in a hinged wooden box with hasp and clearly labeled for contents.

1.020 Site Work

A. A 6-foot chain link fence, with 16 foot wide double swing access gate shall be provided around the pump station site, two feet inside the property line.

B. Landscaping shall be on the outside of the fence to screen the site. Any planting shall be low maintenance.

C. The driving area into the pump station shall be paved with asphalt and shall support vehicles with a gross vehicle weight of 50,000 pounds.

D. Non-driving areas shall receive a 6-inch thickness of crushed surfacing top course material.

E. All pump station sites shall have a minimum of 1 manually controlled flood lights for night visibility over the entrance door and inside the pump and control building. No lighting shall be installed inside the pump station wet well.

F. Pump station may discharge to a manhole or directly to a mainline pipe depending on the application.

G. Each station shall have a pig launch station as shown in the County Standard Detail

1.030 Pump Station

A. The design capacity of a pump station shall be computed on the basis of the total area and projected population (based on the most current zoning projections) that can be served by the pump station. Method of calculation shall be consistent with Criteria for Storage Works Design Section 3.12.

B. Station may discharge to a manhole or directly to a mainline pipe depending on the application.

C. At least two pump units shall be provided, each capable of handling the expected maximum flow. The station design flow capacity shall be according to Ecology's standards.

D. Where three or more pump units are provided, they shall be designed to fit actual flow conditions and must be of such capacity that with any one unit out of service, the remaining units will have capacity to handle the maximum sewage flow.

E. Pumps shall be capable of passing spheres of at least 3 inches in diameter. Pump suction and discharge openings shall be at least 4 inches in diameter.

F. Control valves and piping shall be designed to prevent backflow through the inactive piping, and to allow isolation and removal of inactive valves or equipment.

G. Suitable devices for measuring sewage flow should be provided at pumping stations with flow capacity greater than 1.0 mgd. Hour timers (totalizers) shall be installed on all pumps unless otherwise approved by the County.

H. An alarm system shall be provided for all pumping stations. Alarm system activation shall be required for high water, low water, line loss, pump fail, gas leak, power fail, generator run, and generator fail. Consideration of telemetry alarm to 24 hour monitoring stations or telephone alarms to duty personnel should be given when reliability classification or the potential for property damage warrants it.

I. When telemetry is not required by the County, an audio- and/or visual alarm shall be installed at the station for external observation.

J. When 100 or more equivalent residential units are served by the pump station an emergency power source or auxiliary pumping equipment shall be provided to ensure continuous operability for a minimum of 48 hours.

K. Where less than 100 equivalent residential units are to be connected to a pump station, a power transfer switch and receptacle compatible with the County's portable generators shall be provided.

L. Where on-site generators are not provided, storage with in the station wet well shall be provided for an 8 hour peak flow.

M. The design of the wet well shall provide for a "lead pump" cycle time of no more than six cycles per hour during peak wet weather flow design conditions, and no less than one cycle per hour during minimum dry weather flow design conditions.

N. The design of the wet well/dry well station for the hydraulic and pump systems, shall be a single structure, with adjoining contiguous chambers above and below grade.

O. Electrical control equipment shall be housed above ground level in an enclosed structure that also protects the wet well and dry well equipment.

1.040 Odor Control and Ventilation

A. Odor control for pump stations are not automatically required and will be reviewed by the County on a case by case basis.

B. All new pump stations requiring chlorine odor control shall use hypochlorite odor control systems.

C. Odor control shall be in an above grade structure.

D. Wet well ventilation may be either continuous or intermittent. Ventilation, if continuous, shall provide at least 12 complete air changes per hour; if intermittent, at least 30 complete air changes per hour.

E. Dry well ventilation may be either continuous or intermittent. Ventilation, if continuous, should provide at least 6 complete air changes per hour; if intermittent, at least 30 complete air changes per hour.

IV-2.000 MATERIALS

2.010 General

A. The material manufacturer or fabricator shall furnish appropriate certification, based on manufacturer's routine quality control tests, that the materials meet the requirements of the pertinent specifications. The developer shall provide submittals to the County on all materials to be used.

B. All existing line sewers shall be kept in service at all times. Provisions shall be made for disposal of sewage flow if any existing sewers are damaged. Damages to existing sewers shall be repaired by the developer to a condition equal to or better than their condition prior to the damage. Water accumulating during construction shall be removed from the new sewers but shall not be permitted to enter the existing system. The developer shall be responsible for flushing out and cleaning any existing sewers into which gravel, rocks, or other debris has entered as a result of the work, and shall repair lift stations or other facilities damaged by the work at the developer's expense.

C. The physical connection to an existing manhole or sewer shall not be made until authorized by the County. Such authorization will not be given until all upstream lines have been completely cleaned and tested.

2.020 SITE WORK

A. Foundation Material

Foundation material shall meet the requirements of Section 9-03-17, Class B, of the Standard Specifications for Road, Bridge, and Municipal Construction.

B. Bedding for Rigid Pipe

Unless approved otherwise for special cases, bedding material for rigid pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.15.

C. Bedding for Flexible Pipe

Unless approved otherwise for special cases, bedding material for flexible pipes shall conform to Standard Specifications for Road, Bridge, and Municipal Construction Section 9-03.16.

D. Crushed Surfacing Top Course

Imported crushed surfacing top course shall meet the requirements of Section 9-03.9(3) of the Standard Specifications for Road, Bridge, and Municipal Construction.

E. Bank Run Gravel for Trench Backfill

Bank run gravel for trench backfill shall conform to Section 9-03.19 of the Standard Specifications for Road, Bridge, and Municipal Construction.

F. Control Density Fill

1. Control density fill material (CDF) shall be composed of portland cement, aggregate, fly ash, and water and shall conform to the following requirements:

   a. Portland Cement: ASTM C 150, Types I or II.

   b. Aggregate: Sand with or without fine gravel, maximum size 1 inch. Aggregate shall be free of foreign material, roots, clay balls, trash, debris, and organics and shall have less than 15% finer than the No. 200 sieve. Material passing the No. 40 sieve shall be nonplastic.

   c. Water (potable).

   d. Fly ash: Class F ASTM C 618, unless otherwise approved.

   e. Admixture: As necessary to develop flowability without segregation.

2. CDF shall be proportioned to be a flowable, nonsegregating, self-consolidating, low shrink slurry with an unconfined compressive strength as specified below. The mix design shall be prepared for a range of aggregate gradations that are expected to be used. The Developer and its supplier shall determine the materials and proportions used to meet the requirements of these Specifications. The CDF mix for each strength class shall meet the flowability, pumpability, and set time requirements for each design application.

3. No CDF shall be placed until the County has approved the mix design. The County's approval of the mix design will be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field installations for conformance with these Specifications.

4. With the County's approval, the Developer may be allowed the option of processing the native sands for CDF aggregate. If the Developer elects to use onsite sands for producing CDF, Developer shall make its own determination as to the quantity of suitable sands and amount of processing required and shall bear all costs associated with using native materials.

5. Class 100 CDF shall have an unconfined compressive strength at 28 days of 100 psi, per ASTM D 4832, (+50 psi, -20 psi). Maximum density 125 pcf.

6. Class 300 CDF shall have an unconfined compressive strength at 28 days of 300 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

7. Class 1000 CDF shall have an unconfined compressive strength at 28 days of 1,000 psi, per ASTM D 4832, (+100 psi, -50 psi). Maximum density 125 pcf.

G. Concrete thrust blocks for pressure force mains shall be Class B concrete poured in place, per County Standard Details.

2.030 Wet and Dry Wells

A. Wet well shall be of a single precast or cast in place reinforced concrete structure. The wet well floor shall have a minimum slope of 1:1 to the hopper bottom to minimize grit accumulation. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the inlet. Both wet and dry wells shall be water tight.

B. For cast in place concrete wet wells, where pipes, or castings are to pass through walls, the pipes and castings shall be placed in the forms before pouring concrete.

C. Conduit penetrations for concrete wet wells, are not permitted. Pipe penetrations shall be trimmed flush with the inside walls.

D. PVC pipe connections to a precast wet well shall be made with a rubber gasketed coupling or sand collar which can be mortared directly into the manhole to provide a watertight seal. Ductile iron pipes shall be mortared directly to the wet well wall, or installed with modular mechanical seal assemblies with stainless steel bolts and nuts, as required to provide a water tight seal.

E. All hatches shall be rectangular aluminum, Bilco style or equal. Hatches shall be placed to provide unobstructed removal of pumps and other equipment. Hatches shall have hasp type locking mechanism.

F. All metal parts in wet well shall be aluminum or stainless steel. Metal outside the wet well shall be aluminum, stainless steel or hot dipped galvanized following fabrication.

G. A separate sump pump should be provided in the dry wells to remove leakage or drainage with the discharge above the overflow level of he wet well. All floor and walkway surface should have an adequate slope to a point of drainage.

H. Both the wet and dry wells shall have either steel reinforcement bar or polypropylene coated steel steps. All steps shall be factory installed for precast structures and embedded at time of casting for cast in place structures.

1. Steel reinforcement bars shall be No. 8 (1-inch diameter) bent to form a step. The reinforcement bars shall be hot dip galvanized after bending.

2. Polypropylene steps shall be made of a copolymer polypropylene encapsulating a bent step shaped 1/2-inch steel reinforcing Type II, Grade 16906, and the steel shall meet the requirements of ASTM A 615, Grade 60.

2.040 Pumps and Motors

A. Motors shall be explosion proof and design for 240/480 volts, 3 phase with single phase protection. Motor shall be nonoverloading at all points of pump curve.

B. Thermal protection shall be provided for all motors.

C. The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two sections with registered fit.

D. Wear rings shall be provided for both the impeller and the suction of each pump. Wear rings shall be removable.

E. All bearings shall be rated in accordance with USASI B3.11 for a continuous (24 hours/day) duty life of not less than 60,000 hours at the worst condition of service.

F. Pump shafts shall be stainless steel ANSI 431.

G. Each vertical pump shall be provided with a clean-out type cast-iron reducing suction elbow which is bolted directly to the pump suction flange. The cleanout handhold shall be provided with a removable cover of the largest diameter possible.

2.050 Valves

A. Check valves unless otherwise approved by the County, shall be iron body, brass trimmed, swing type, balanced, external spring loaded, with a clear opening equal to or greater than the connecting pipe. The spring and lever shall be with extra heavy duty stainless-steel shaft and keys.

B. Eccentric plug valves shall be synthetic rubber coated, semisteel eccentric plugs with circular port, which shall be completely out of the flow stream when fully open, and shall be driptight shutoff with pressure in either direction.

C. Eccentric plug valves 6 inches and smaller shall be lever operated. Larger valves shall have totally enclosed worm gear operator with handwheel, operating nut, or chainwheel as required.

D. Air release valve shall be for sewage and designed to prevent clogging due to solids in the fluid. The float and ball shall be constructed of stainless steel and attached to a stainless steel lever mechanism with an external shaft. Buna-N seat shall be attached to the lever mechanism for drop-tight closure.

E. The County may require additional or specialty valves such as air cushion sewing check valves, ball check valves, electric check valves, rotary ball valves and surge relief valves, as needed for special conditions.

2.060 Electricals and Controls

A. All electricals and controls shall be furnished and installed in accordance with the applicable Federal, State and local codes and standards including:

National Electrical Code (NEC)
Occupational Safety & Health Act (OSHA)
National Electrical Safety Code (NESC)
National Electrical Manufactures Association (NEMA)
Underwriters Laboratory (UL)
Insulated Power Conductor Engineering Association (IPCEA)
American National Standards Institute (ANSI)
Institute of Electrical & Electronic Engineers (IEEE

B. Pump control panel shall be a NEMA 1 enclosure. There shall be a heater strip to prevent condensation accumulation in the enclosure.

C. Each control panel shall have a "Hand-Off-Auto" selector switch to select the modes of station operation.

D. All components within the pump station system, including both internally and face-mounted instrumentation and devices, shall be clearly identified with phenolic name plates of black background with white letters.

E. For each pump there shall be a:

a. Combination circuit breaker/ overload unit providing overload protection
b. Short circuit protection
c. Reset and disconnect for all phases
d. Across the line magnetic contractor
e. 120 VAC control power transformer
f. Overload relay to be precalibrated to match motor characteristics
g. Thermal overtemp relay, thermal overtemp reset pushbutton, and factory sealed to insure trip setting is tamperproof
h. Elapse time meter that will count time the pump magnetic starter is engaged. The timer shall count in hours and tenth of an hour.

F. All wire shall be copper, and all conduits shall be galvanized and rigid.

G. Variable frequency, variable speed drive unit for the pumps shall be arranged to control the pumps such that the pumping rate will match the in-flow rate.

H. Variable frequency, variable speed drive wet well level indicator shall provide continuos level monitoring through out the intended operational range of the wet well

I. Discrete level sensors shall only be used for non-variable speed drive and pump station assemblies. Level sensors shall be either ball float or bubbler systems.

V-3.000 INSTALLATION

3.010 General

A. The developer shall provide all materials. labor, and equipment necessary to shore excavations to protect the work, existing property, utilities, pavement, etc., and to provide safe working conditions in the excavation.

B. The developer shall furnish, install, and operate all necessary equipment to keep excavation above the foundation level free from water during construction, and shall dewater dispose of the water so as not to cause injury to public or private property or nuisance to the public. Sufficient pumping equipment in good working condition shall be available at all tomes for emergencies, including power outages, and shall have available at all times competent workers for the operation of the pumping equipment.

C. Excavation for precast concrete wet and dry wells shall be sufficient to leave 1 foot in the clear between the wet and dry well outer surfaces and the earth bank. The excavation for cast in place concrete wet and dry wells shall allow enough space for form work.

D. For precast concrete wet and dry wells, the assembly shall be set in place on a prepared bedding material. For cast in place concrete, the wet and dry well structure shall also be set on a prepared bedding material. Before the structure is placed or formed, the bedding material shall be carefully leveled to provide full bearing for the entire base section.

E. Backfill shall be placed in loose lifts or 10 inches maximum thickness and compacted to at least 95 percentage of the maximum dry density as determined by ASTM D 1557 and as shown on the approved plans.

V-4.000 TESTING

4.010 General

A. The completed pump station shall be given an operational test of all equipment for leaks in all piping and seals, and for correct operation of the automatic control system and all auxiliary equipment. Developer shall conduct preliminary tests and be assured that the section to be tested is in an acceptable condition before requesting the County to witness the test.

B. The pump suction and discharge shall be coupled to a reservoir, and the pumps shall recirculate water for at least one hour under simulation service conditions.

C. The hydrostatic pressure test method is required force mains and fittings.

D. If any sanitary sewer installation fails to meet the requirements of the test method used, the developer shall repair or replace all defective materials or workmanship at no expense to the County.

E. Final testing for County acceptance is required after backfill has been completed and all other utilities have been installed.

F. Only after final testing and acceptance by the County is the pump station allowed to pump sanitary sewage into the County system.

4.020 Testing

A. The complete pump station shall be given an operational test of all equipment for leaks in all piping and seals, and for correct operation of the automatic control system and all auxiliary equipment.

B. The pump suction and discharge shall be coupled to a reservoir, and the pumps shall recirculate water for at least one hour under simulation service conditions.

4.030 Acceptance

A. All irregularities shall be corrected by developer prior to acceptance by the County.

B. Only after acceptance by the County is the pump station allowed to pump sanitary sewage into the County system.

DIVISION VI
INDIVIDUAL GRINDER PUMP INSTALLATIONS

DIVISION VI
INDIVIDUAL GRINDER PUMP INSTALLATIONS

VI-1.000 DESCRIPTION

1.010 General

A. Any extension of the Kitsap County sanitary sewer extension shall be completed in accordance with the applicable requirements of the Standards for Sanitary Sewer Extensions, Division I, Section I-4.000, Forms and Agreements. Together with submittal of the individual sewage pump installation plans for approval, the property owner shall also submit two signed copies of the "Sewage Pump Installation, Operation, and Maintenance Agreement" together with a $10.00 filing fee.

B. The station's operational components shall be located at an elevation that is not subjected to the 100 year frequency storm flood and associated wave action, or shall be otherwise adequately protected as certified by a professional engineer registered in the State of Washington.

1.020 Individual Grinder Pump Stations

A. Only one residence is allowed per grinder pump station. It will be the responsibility of the home owner to maintain the grinder station and the forcemain on their property. Areas with up to 10 homes (without further possibility of expanding) shall be served by individual grinder pump stations and shall be reviewed and approved by Kitsap County on a case by case basis. Developments with more than 10 homes will use a commercial pump station maintained by the County.

B. It will be the property owners responsibility to obtain preliminary approval of the concept for their particular situation. Upon preliminary approval, the property owner will be required to submit an engineered plan of the proposed installation showing all pertinent information together with specifications of all materials to be used.

VI-2.000 MATERIAL AND CONSTRUCTION

2.010 General

A. The developer shall submit information from the material manufacturer or fabricator showing that the materials meet the requirements of the design and pertinent specifications. The developer shall provide submittals to the County on all materials to be used.

2.020 Pump Station

A. The individual sewage pump installation shall consist of a single two horsepower grinder pump, tank, system controls, valves and piping.

B. The grinder pump shall be two horsepower grinder pump designed to grind solids normally contained in domestic and commercial wastes. A pump curve indicating the pump capacity at design head for the pump to be installed shall be included with submittal.

C. Tanks shall be either fiberglass, steel with protective coating for underground installations, or concrete meeting the dimensions shown on the standard plan. Tanks shall be watertight.

2.030 Piping and Control Facilities

A. System controls shall consist of a high water alarm light, one circuit breaker per pump, 120V AC control voltage transformer, starters, NEMA 3R enclosure for electrical control circuits which shall be mounted on the building adjacent to the pump unit, three liquid level control floats (pump off, pump on, high water alarm) and necessary wiring and appurtenances for a complete installation.

B. The service piping from the pump unit to the county pressure main shall be a minimum of 1-1/4 inch diameter schedule 80 PVC. A minimum burial depth of 24 inches shall be maintained.

C. Where a gravity sewer main exists in the public right-of-way, building sewer pressure lines shall discharge into gravity side sewers at the property/easement line as per County Standard Detail.

VI-3.000 INSTALLATION

3.010 General

A. A check valve and a gate valve shall be provided inside the tank with a union or quick disconnect fitting provided for easy removal of the pump. An appropriate size saddle shall be provided where the service line connects to the county pressure main and shall be provided with a corporation stop, check valve and valve box installed over the corporation stop as shown on the County Standard Details.

B. No individual sewage pump shall be installed on the discharge side of an existing septic tank. Pumping units shall be connected directly to the building sewer line.

VI-4.000 TESTING

4.010 General

A. The completed grinder pump station shall be given an operational test of all equipment for leaks in all piping and seals, and for correct operation of the automatic control system and all auxiliary equipment. Developer shall conduct preliminary tests and be assured that the section to be tested is in an acceptable condition before requesting the County to witness the test.

B. Only after final testing and acceptance by the County is the grinder pump station allowed to pump sanitary sewage into the County system.

DIVISION VII
STANDARD DETAILS

PIPE DETAILS

PD-1 Pipe Trench
PD-2 Pipe Anchor
PD-3 Check Dam
PD-4 Pipe Casing
PD-5 Vertical Thrust Blocks
PD-6 Horizontal Thrust Blocks
PD-7 Side Sewer Connection
PD-8 Side Sewer Plan
PD-9 Building Sewer Connection
PD-10 Individual Pump Installation A
PD-11 Individual Pump Installation B
PD-12 Cleanout And Street Use Cover
PD-13 Easement Cleanout Cover
PD-14

MANHOLES & VAULTS

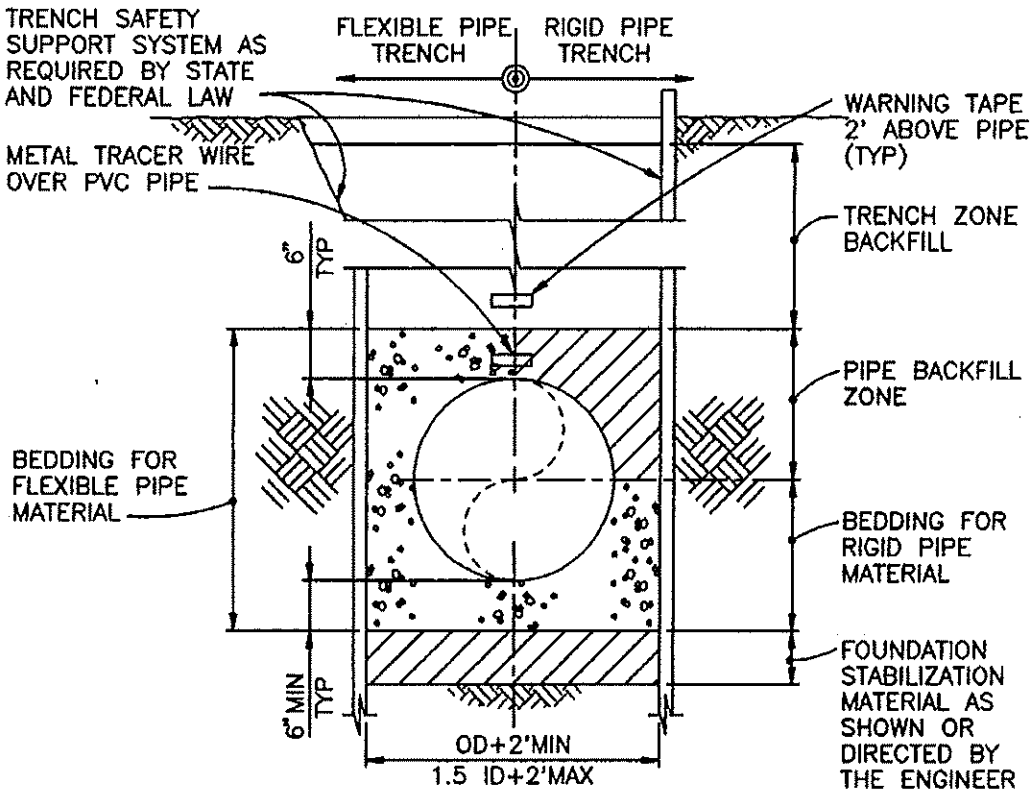
MV-1 Type I Manhole
MV-2 Deep Manhole
MV-3 Manhole Frame And Cover
MV-4 Drop Manhole Connection
MV-5 Rubber Boot Manhole Insert
MV-6 Existing Manhole Connection
MV-7 Polypropylene Safety Step
MV-8 Manhole Ladder
MV-9 Manhole/Vault Handhold
MV-10

PUMP STATIONS

PS-1 Individual Sewage Pump
PS-2 Submersible Pump Station
PS-3 Submersible Pump Valve Vault
PS-4 Pump Station Storage Tank
PS-5 Wetwell/Drywell Pump Station

MISCELLANEOUS DETAILS

MD-1 General Construction Notes
MD-2 Pig Launch Station
MD-3 Pig Launch Tube
MD-4 Pig Recovery Manhole
MD-5 Air Release Assembly
MD-6

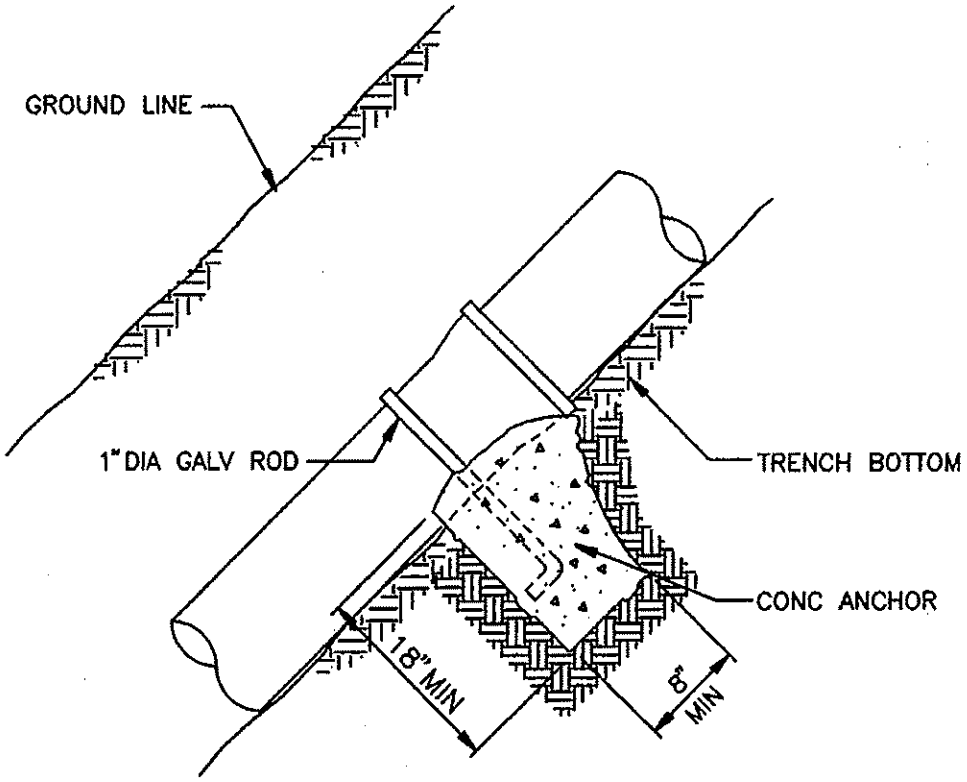


TYPICAL PIPE TRENCH

NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	PIPE TRENCH	DETAIL PD-1



GENERAL NOTES:

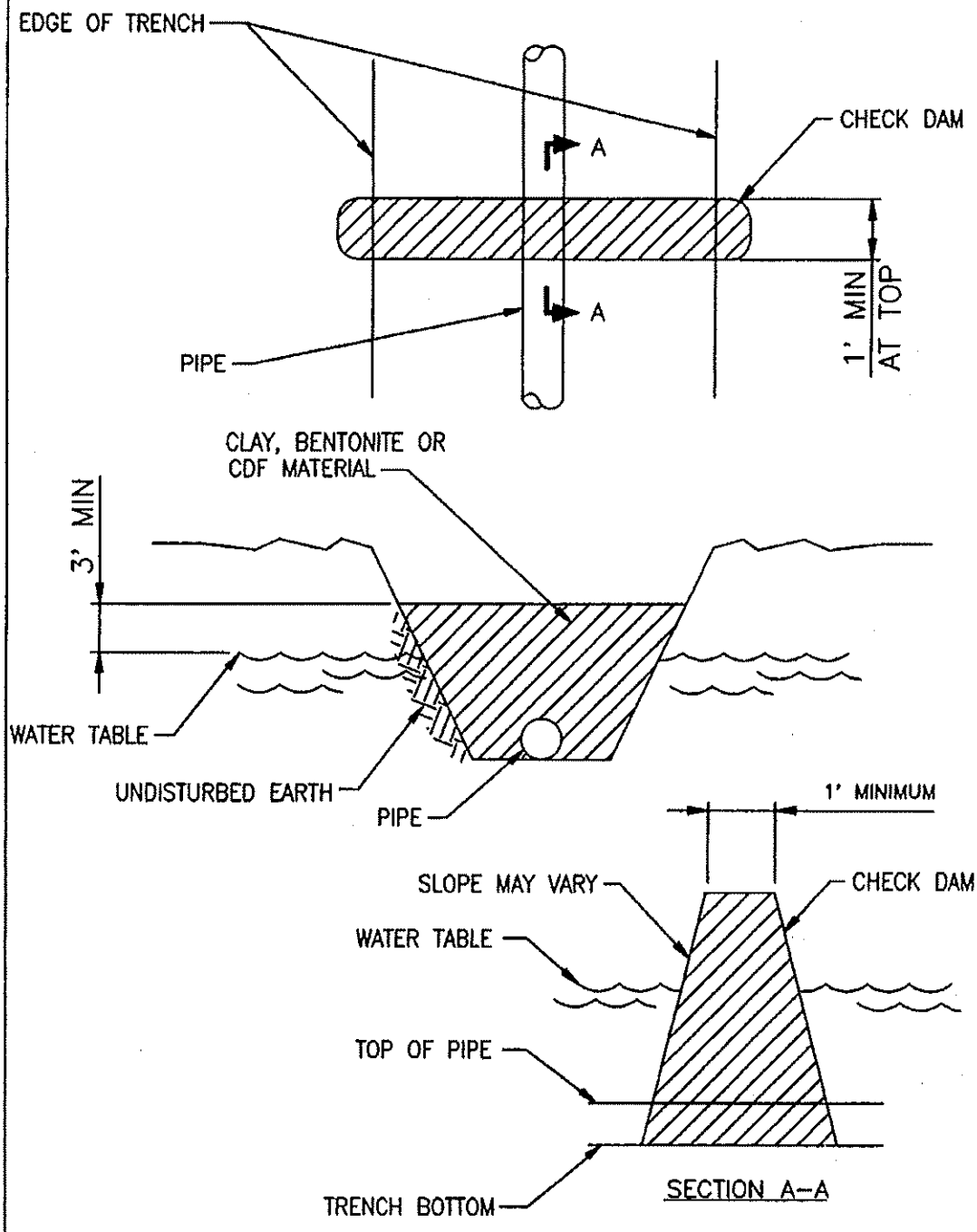
1. MINIMUM ANCHOR BLOCK SIZE 8"x12"x18" UNLESS OTHERWISE NOTED.
2. BLOCKING SHALL BE POURED AGAINST UNDISTURBED SOIL.
3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

PIPE ANCHOR

NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	PIPE ANCHOR	DETAIL PD-2

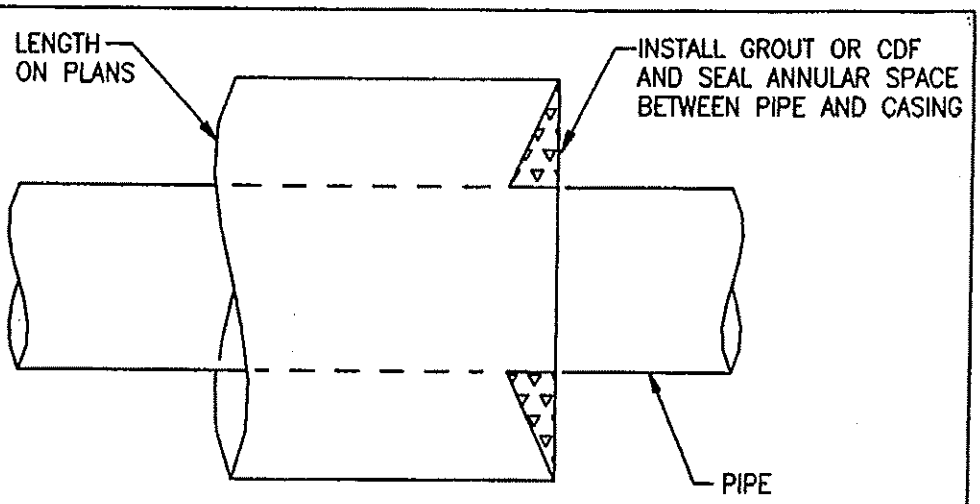


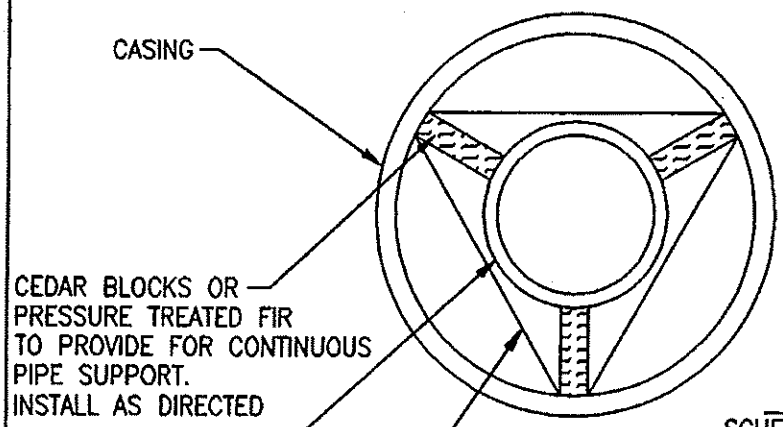
CHECK DAM

NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	CHECK DAM	DETAIL PD-3





CASING TABLE
SCHEDULE 20 STEEL PIPE
UNLESS OTHERWISE INDICATED

PIPE DIAMETER	MIN. CASING DIAMETER
6	12
8	14
10	16
12	18
14	20
16	22

NOTES:

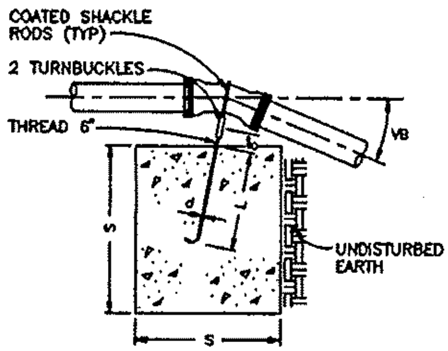
1. COMPLY WITH ALL REGULATORY REQUIREMENTS OF JURISDICTIONAL AUTHORITY.
2. CASING SPACERS CAN BE SUBSTITUTED FOR BLOCKING.
3. PRESENT PROPOSED METHOD FOR BLOCKING AND SUPPORTING PIPE WITHIN CASING TO ENGINEER FOR APPROVAL.

PIPE CASING

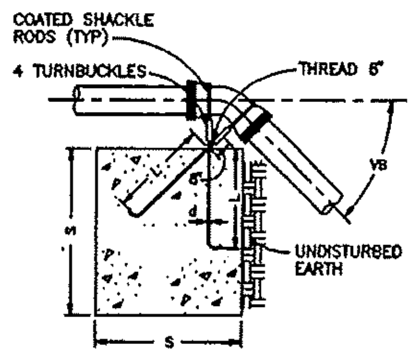
NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	PIPE CASING	DETAIL PD-4



TYPE A



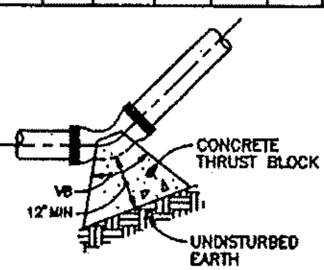
TYPE B

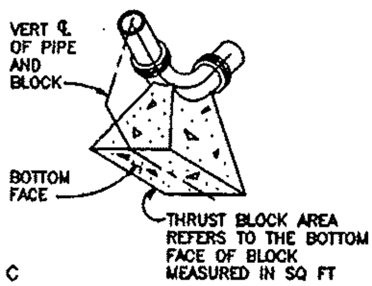
TYPE "A" BLOCKING FOR 11 1/2" AND 22 1/2" VERTICAL BLOCKS

		VB		S	d	L
PIPE SIZE NOM DIAMETER-INCHES INCHES	TEST PRESSURE PSI	VERTICAL BEND DEGREES	NO OF CU FT OF CONC BLOCKING INCHES	SIDE OF CUBE FEET	DIAMETER OF SHACKLE RODS (2) INCHES	DEPTH OF RODS IN CONCRETE INCHES
4"	300	11 1/4°	8	2	5/8"	18
		22 1/2°	12	2'-3"		24
6"	300	11 1/4°	12	2'-3"	5/8"	24
		22 1/2°	27	3		
8"	300	11 1/4°	16	2'-8"	5/8"	24
		22 1/2°	43	3'-6"		
12"	300	11 1/4°	64	4	3/4"	24
		22 1/2°	125	5	7/8"	36

TYPE "B" BLOCKING FOR 45° VERTICAL BENDS

		VB		S	d	L
PIPE SIZE NOM DIAMETER-INCHES INCHES	TEST PRESSURE PSI	VERTICAL BEND DEGREES	NO OF CU FT OF CONC BLOCKING INCHES	SIDE OF CUBE FEET	DIAMETER OF SHACKLE RODS (4) INCHES	DEPTH OF RODS IN CONCRETE INCHES
4"	300	45	27	3	5/8"	20
6"	300	45	64	4	5/8"	20
8"	300	45	125	5	5/8"	20
12"	300	45	216	6	7/8"	30





TYPE C

TYPE "C" BLOCKING FOR 11 1/4°, 22 1/2°, 45°, AND 90° VERTICAL BENDS

THRUST BLOCK AREA IN SQUARE FEET

SOIL	Firm silt or firm silty sand			Compact sand			Compact sand and gravel		
FITTING →	90° Bend	Tee 45° Bend and Dead End	11 1/4° and 22 1/2° Bend	90° Bend	Tee 45° Bend and Dead End	11 1/4° and 22 1/2° Bend	90° Bend	Tee 45° Bend and Dead End	11 1/4° and 22 1/2° Bend
4"	5.8	4.2	1.7	2.9	2.1	1.0	2.2	1.6	1.0
6"	13.3	9.4	3.8	6.7	4.7	1.9	5.0	3.5	1.4
8"	23.3	16.7	6.7	11.7	8.4	3.4	8.8	6.3	2.5
12"	53.0	37.5	15.0	26.5	18.8	7.5	20.0	14.0	5.6

AREAS CALCULATED ON 300psi TEST PRESSURE AND 36" MIN COVER.

NOTES:

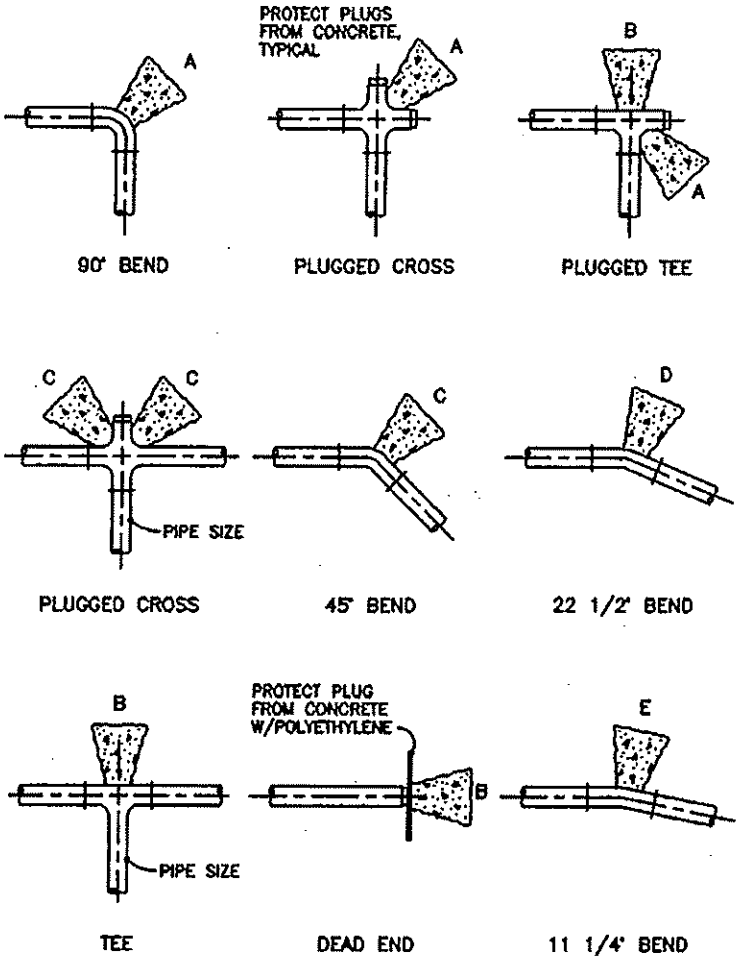
1. LOCATION AND SIZE OF BLOCKING FOR PIPE LARGER THAN 12" AND FOR SOIL TYPES DIFFERENT THAN SHOWN SHALL BE DETERMINED BY THE ENGINEER.
2. ALL BLOCKING FOR VERTICAL FITTINGS (POURED IN PLACE) SHALL BEAR AGAINST UNDISTURBED NATIVE GROUND.
3. ALL POURED THRUST BLOCKS SHALL BE IN PLACE AND SUFFICIENT TIME SHALL BE ALLOWED FOR THE CONCRETE TO CURE AND TRENCH SHALL BE BACKFILLED AND COMPACTED PRIOR TO PRESSURE TESTING.
4. ALL BLOCKING TO BE 3000 PSI CONCRETE.
5. AFTER INSTALLATION, SHACKLE RODS AND TURNBUCKLES SHALL BE CLEANED AND COATED WITH 2 COATS OF ASPHALTIC VARNISH, ROYSTON ROYKOTE #612XM OR APPROVED EQUAL.
6. SHACKLE RODS SHALL BE ROUND MILD STEEL, ASTM A-36 WITH THREADS ON ENDS ONLY.
7. BLOCKING AGAINST FITTINGS SHALL BEAR AGAINST THE GREATEST FITTING SURFACE AREA POSSIBLE, BUT SHALL NOT COVER OR ENCLOSE BELL ENDS, JOINT BOLTS OR GLANDS.

VERTICAL THRUST BLOCKS

NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	VERTICAL THRUST BLOCKS	DETAIL PD-5



BLOCK LETTER	CONCRETE AREA IN SQ FT AGAINST SOIL FOR EACH PIPE SIZE				
	4"	6"	8"	10"	12"
A	2.0	3.5	6.5	10.5	15.0
B	1.5	2.5	4.5	7.5	10.5
C	1.0	2.0	3.5	5.0	8.0
D	1.0	2.0	3.5	5.0	4.0
E					

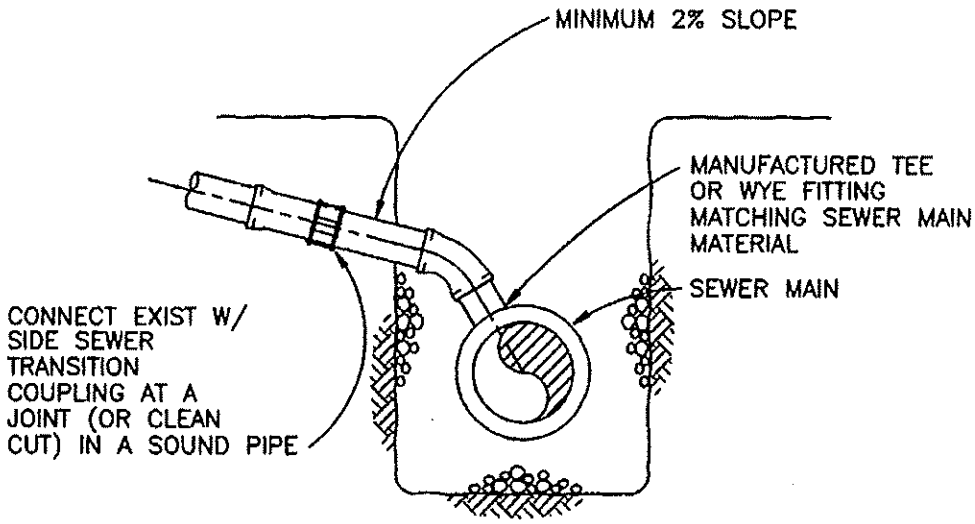
NOTE:
CONCRETE THRUST BLOCK SHALL EXTEND FROM PIPE FITTING TO UNDISTURBED SOIL. THE AREA IN SQUARE FEET OF THE CONCRETE AT THE END LAYING AGAINST THE UNDISTURBED SOIL SHALL NOT BE LESS THAN THE TABULAR VALUES SHOWN.

HORIZONTAL THRUST BLOCKS

NO SCALE

2585003/KCPW1 12-95

KITSAP COUNTY Dept. of Public Works	HORIZONTAL THRUST BLOCKS	DETAIL PD-6

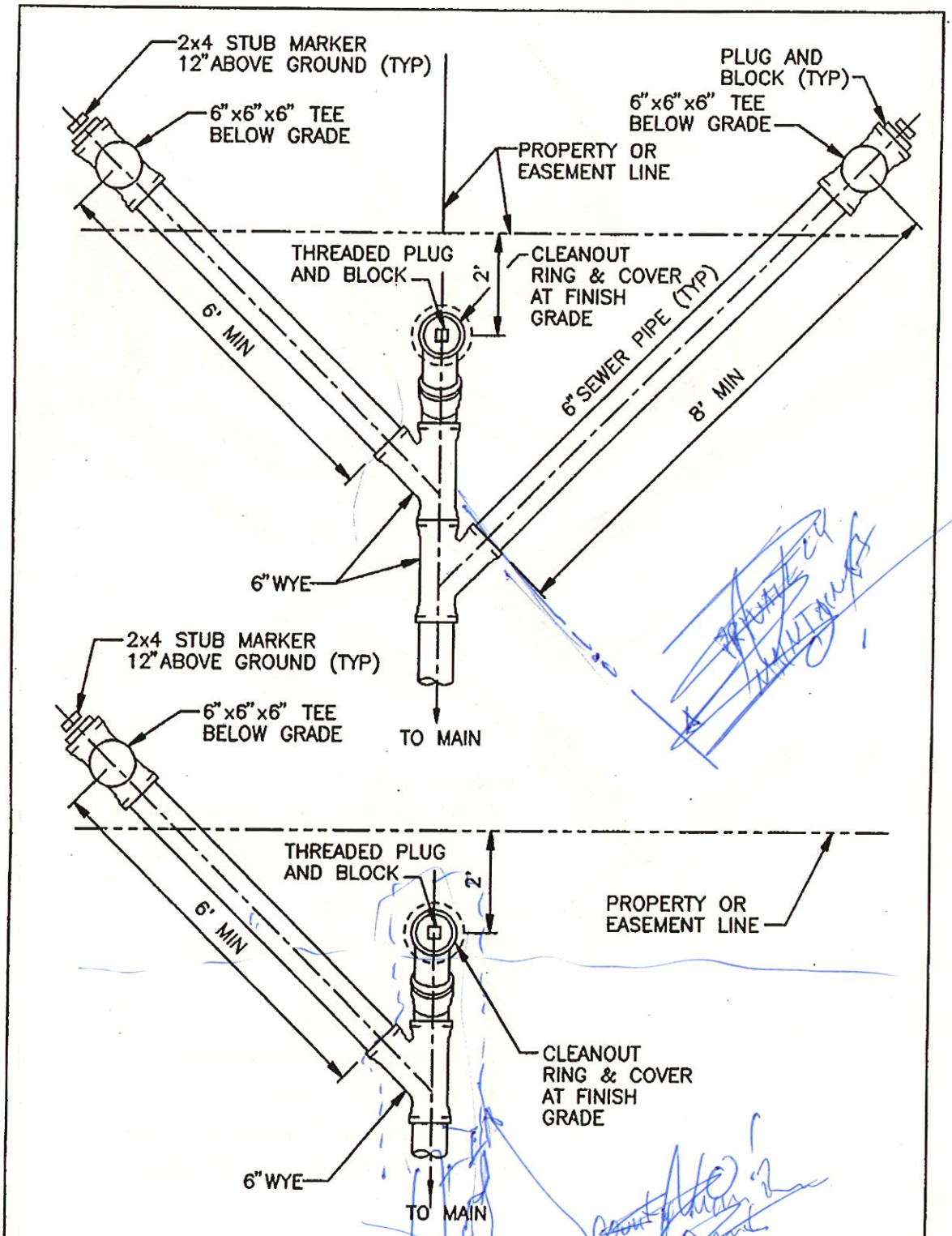


SIDE SEWER CONNECTION

NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	SIDE SEWER CONNECTION	DETAIL PD–7

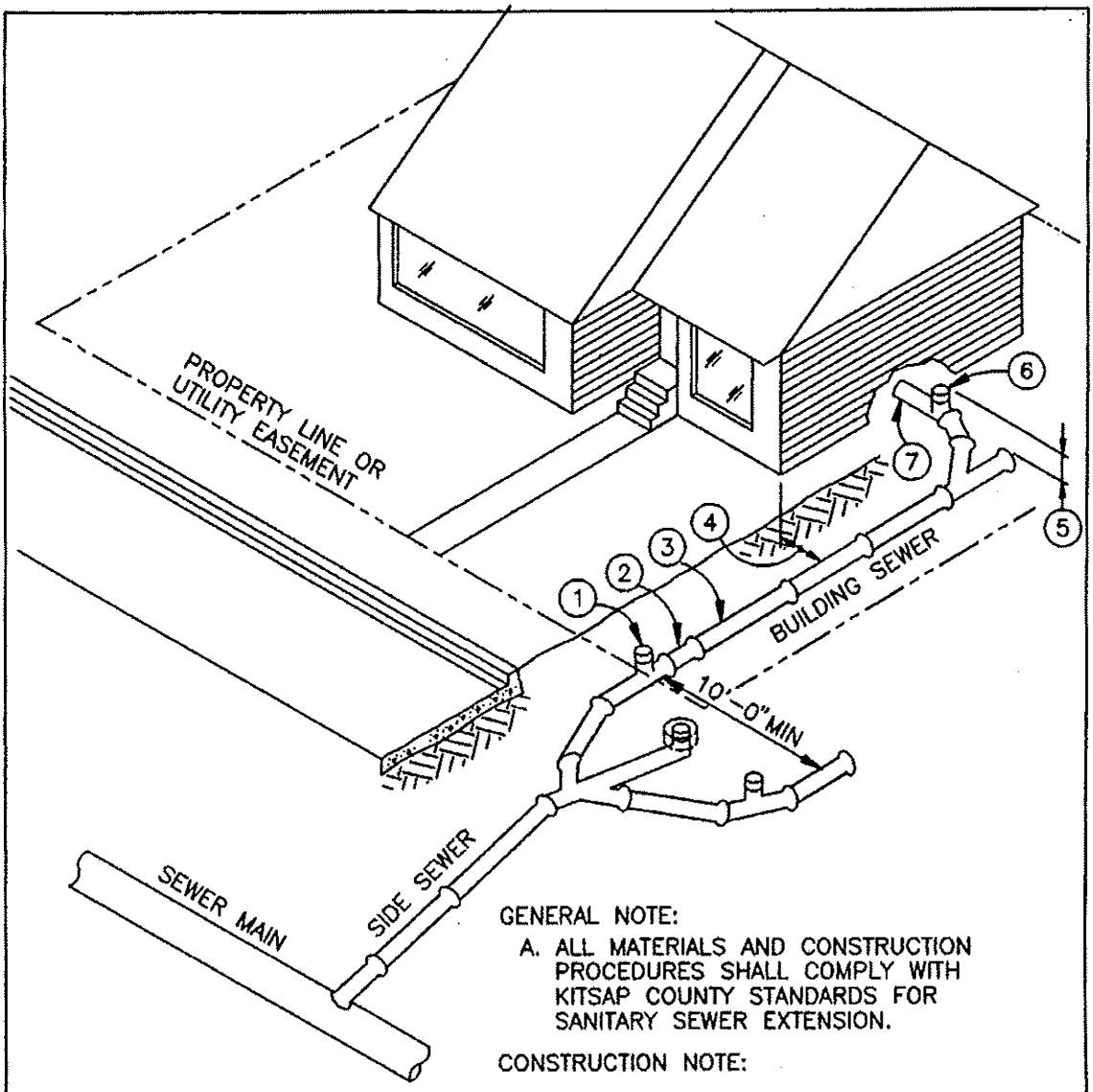


SIDE SEWER PLAN

NO SCALE

2585003/KCPW1 12.95

KITSAP COUNTY Dept. of Public Works	SIDE SEWER PLAN	DETAIL PD-8



GENERAL NOTE:

A. ALL MATERIALS AND CONSTRUCTION PROCEDURES SHALL COMPLY WITH KITSAP COUNTY STANDARDS FOR SANITARY SEWER EXTENSION.

CONSTRUCTION NOTE:

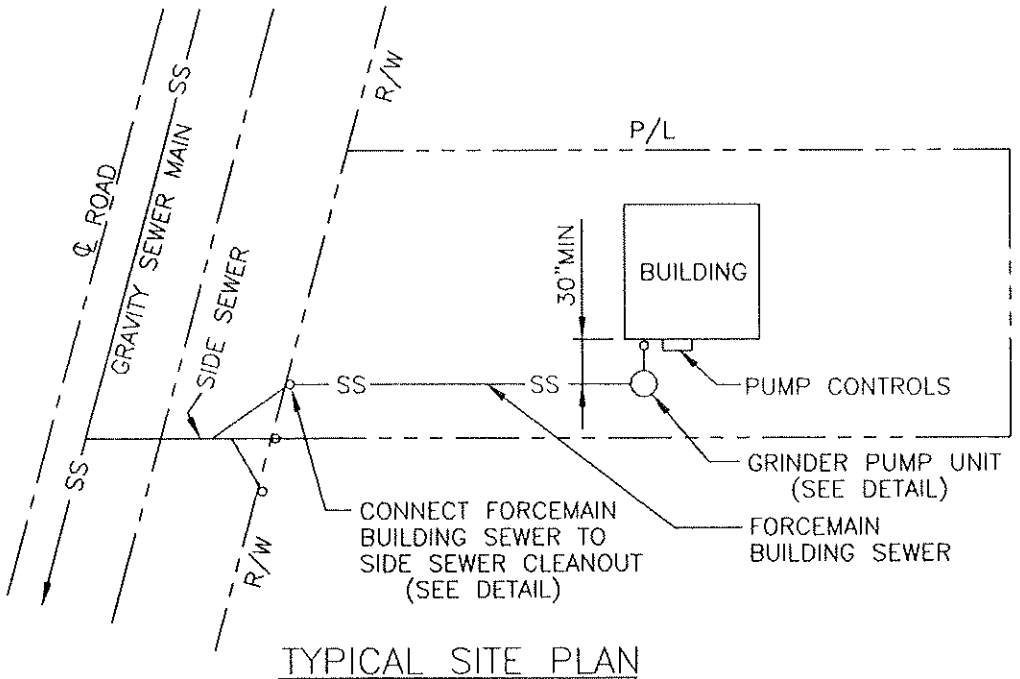
1. 6"x6"x6" TEE BELOW GRADE
2. 6"x4" REDUCER
3. 4" BUILDING SEWER
4. 30" MINIMUM FROM BUILDING
5. 18" MINIMUM DEPTH
6. CLEANOUT WITH THREADED PLUG
7. RUBBER COUPLING AT BUILDING

BUILDING SEWER CONNECTION

NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	BUILDING SEWER CONNECTION	DETAIL PD-9



TYPICAL SITE PLAN

NO SCALE

PUMP REQUIREMENTS

STATIC HEAD _____ FT.

DYNAMIC HEAD _____ FT. @ _____ GPM

TOTAL HEAD _____ FT

DISCHARGE VELOCITY _____ FPS

POWER REQUIREMENTS _____ V, _____ ø

RECOMMENDED PUMP:

TYPE – GRINDER PUMP

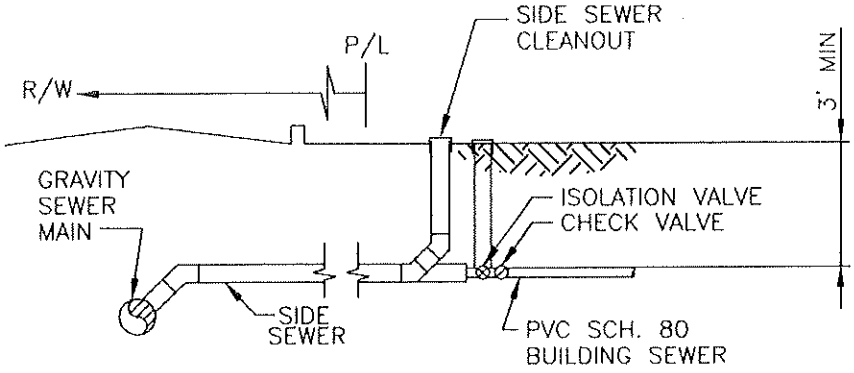
HP – _____

MODEL – _____

MFGR. – _____

SUPPLIER – _____

FLOW @ HEAD – _____ GPM @ _____ FT

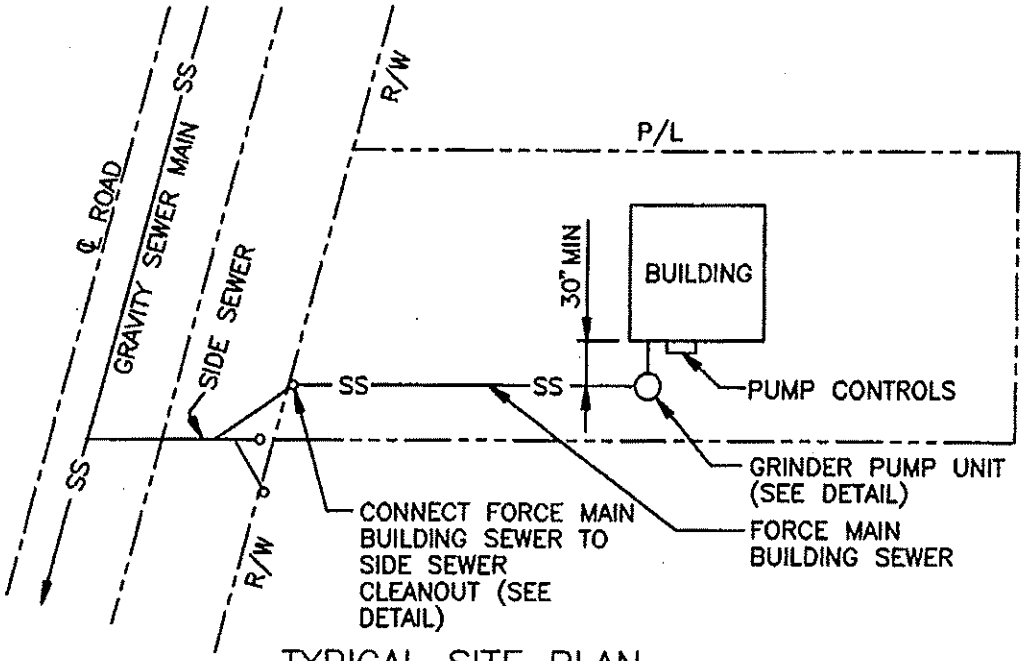


SEWER CONNECTION

NO SCALE

2585003/KCPW2 Rev. 5/97

KITSAP COUNTY Dept. of Public Works	INDIVIDUAL PUMP INSTALLATION A	DETAIL PD–10



TYPICAL SITE PLAN
NO SCALE

PUMP REQUIREMENTS

STATIC HEAD _____ FT.

DYNAMIC HEAD _____ FT. @ _____ GPM

TOTAL HEAD _____ FT

DISCHARGE VELOCITY _____ FPS

POWER REQUIREMENTS _____ V, _____ ø

RECOMMENDED PUMP:

TYPE – GRINDER PUMP

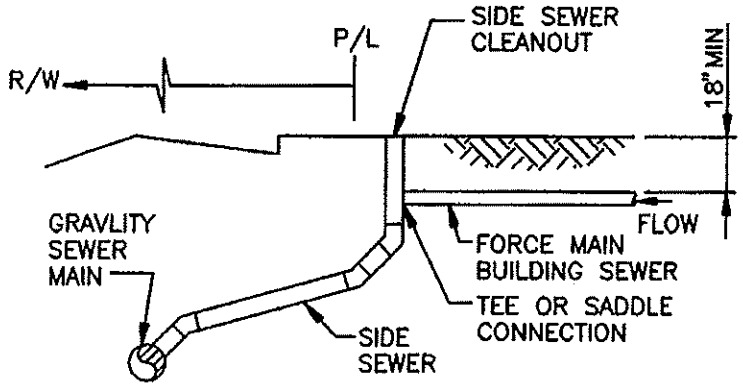
HP – 2 HORSE POWER

MODEL – _____

MFGR. – _____

SUPPLIER – _____

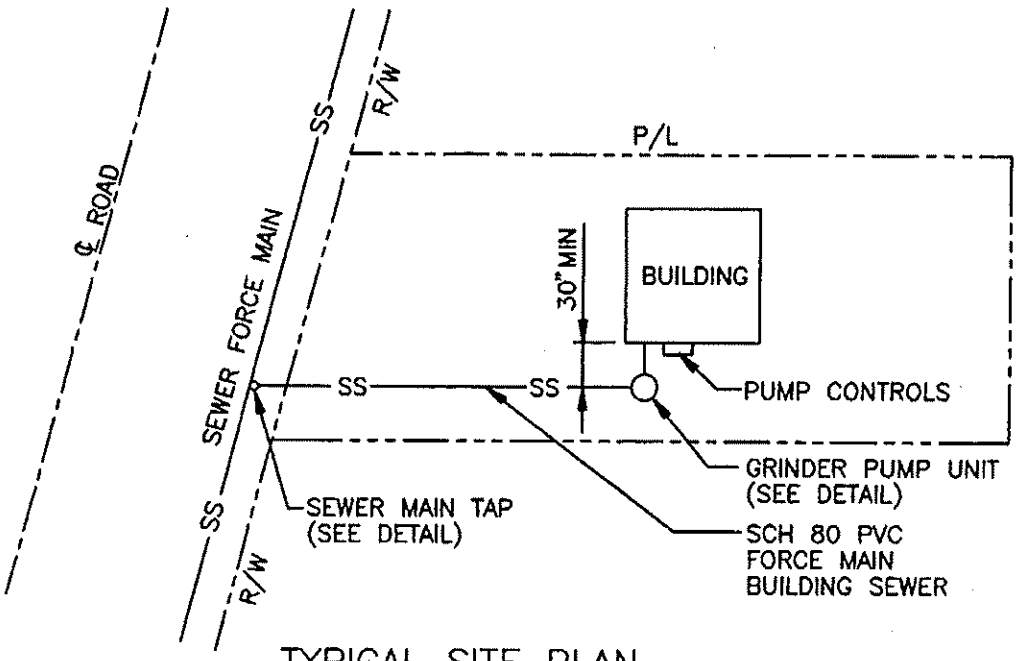
FLOW @ HEAD – _____ GPM @ _____ FT



SEWER CONNECTION
NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	INDIVIDUAL PUMP INSTALLATION A	DETAIL PD–10



TYPICAL SITE PLAN
NO SCALE

PUMP REQUIREMENTS

STATIC HEAD _____ FT.

DYNAMIC HEAD _____ FT. @ _____ GPM

TOTAL HEAD _____ FT

DISCHARGE VELOCITY _____ FPS

POWER REQUIREMENTS _____ V, _____ ø

RECOMMENDED PUMP:

TYPE – GRINDER PUMP

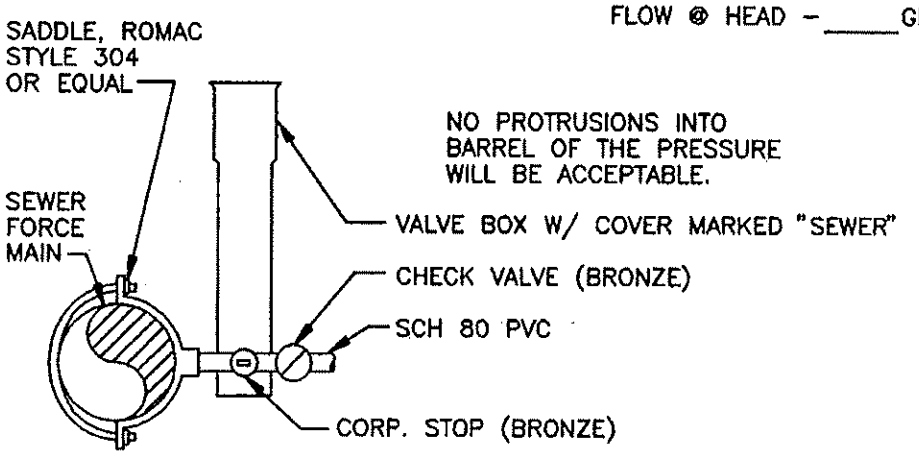
HP – 2 HORSE POWER

MODEL – _____

MFGR. – _____

SUPPLIER – _____

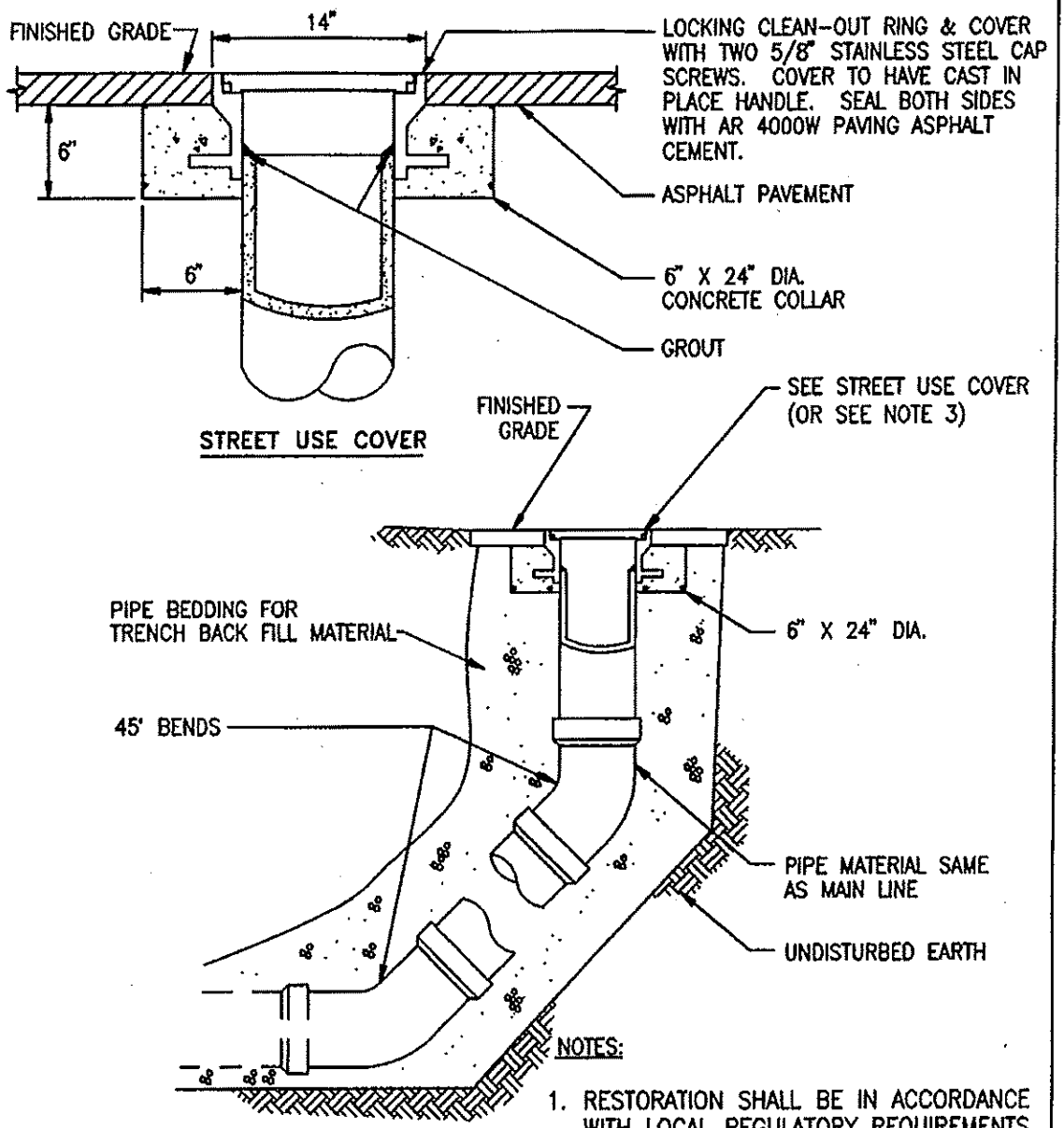
FLOW @ HEAD – _____ GPM @ _____ FT



FORCE MAIN CONNECTION
NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	INDIVIDUAL PUMP INSTALLATION B	DETAIL PD–11



NOTES:

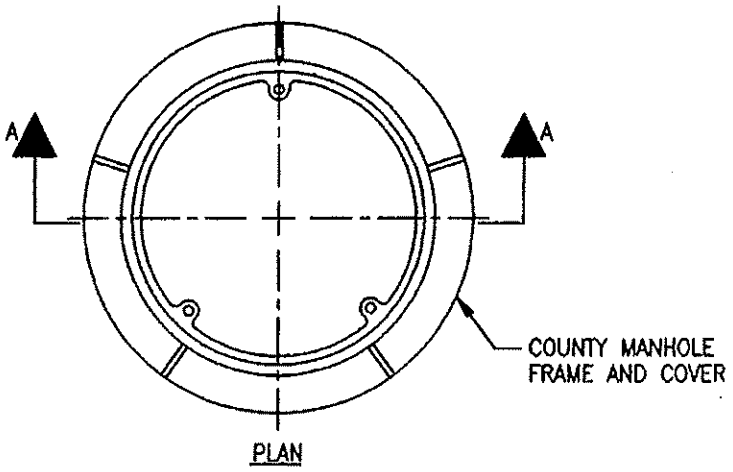
1. RESTORATION SHALL BE IN ACCORDANCE WITH LOCAL REGULATORY REQUIREMENTS.
2. TRENCH BACKFILL SHALL BE COMPACTED AND TESTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND LOCAL REQULATORY REQUIREMENTS.
3. SEE EASEMENT CLEANOUT FRAME & COVER DETAIL FOR CLEANOUTS LOCATED IN EASEMENTS

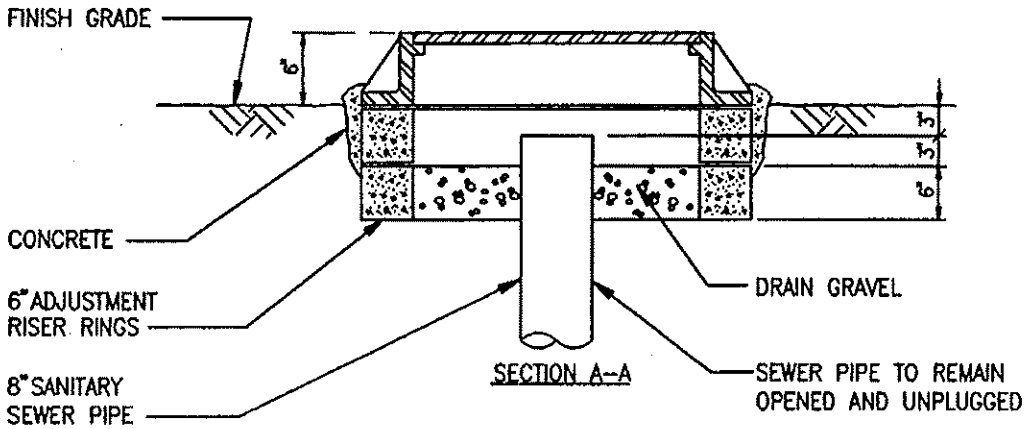
CLEANOUT

NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	CLEANOUT AND STREET USE COVER	DETAIL PD-12



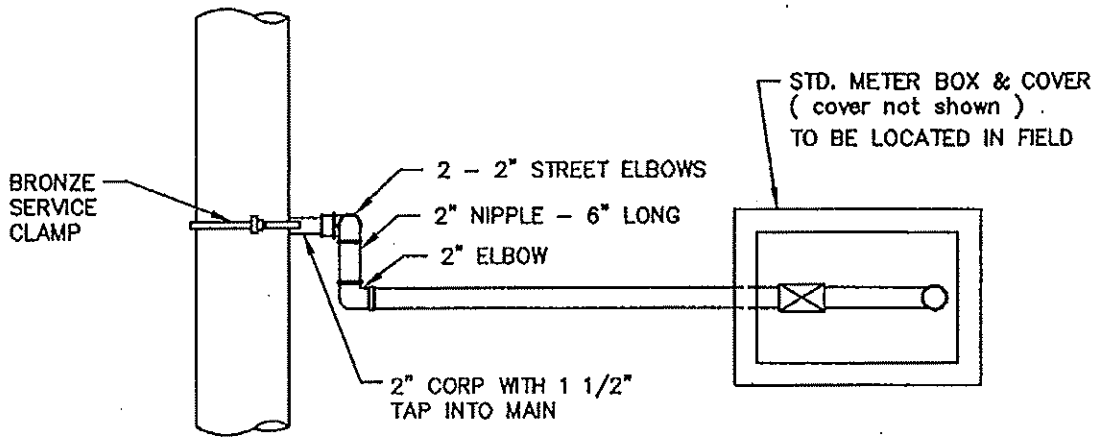


EASEMENT CLEANOUT COVER

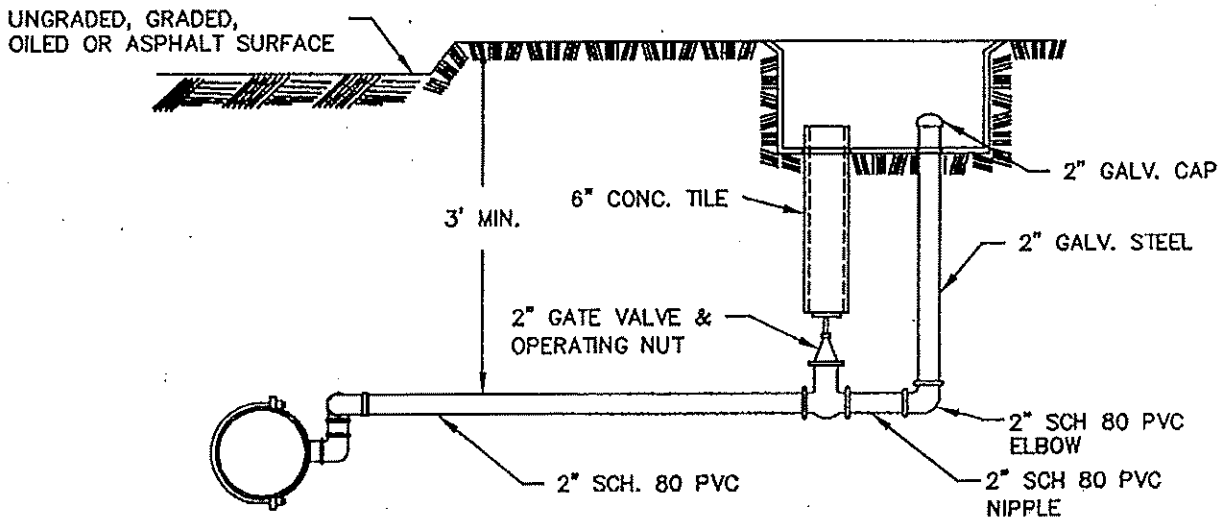
NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	EASEMENT CLEANOUT COVER	DETAIL PD–13



PLAN VIEW



ELEVATION VIEW

KITSAP COUNTY Dept. of Public Works	BLOW OFF ASSEMBLY	DETAIL PD-14

DIVISION VII
STANDARD DETAILS

PIPE DETAILS

PD-1 Pipe Trench
PD-2 Pipe Anchor
PD-3 Check Dam
PD-4 Pipe Casing
PD-5 Vertical Thrust Blocks
PD-6 Horizontal Thrust Blocks
PD-7 Side Sewer Connection
PD-8 Side Sewer Plan
PD-9 Building Sewer Connection
PD-10 Individual Pump Installation A
PD-11 Individual Pump Installation B
PD-12 Cleanout And Street Use Cover
PD-13 Easement Cleanout Cover
PD-14 Blow Off Assembly

MANHOLES & VAULTS

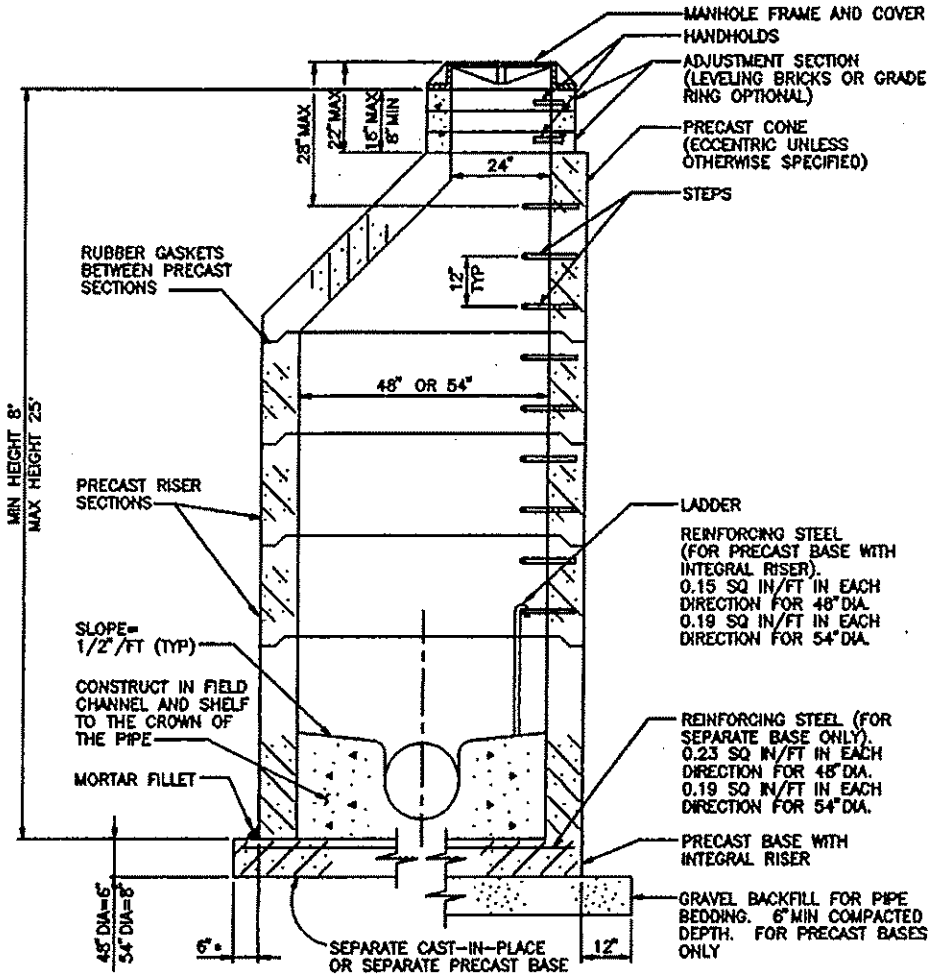
MV-1 Type I Manhole
MV-2 Deep Manhole
MV-3 Manhole Frame And Cover
MV-4 Drop Manhole Connection
MV-5 Rubber Boot Manhole Insert
MV-6 Existing Manhole Connection
MV-7 Polypropylene Safety Step
MV-8 Manhole Ladder
MV-9 Manhole/Vault Handhold

PUMP STATIONS

PS-1 Individual Sewage Pump
PS-2 Submersible Pump Station
PS-3 Submersible Pump Valve Vault
PS-4 Pump Station Storage Tank
PS-5 Wetwell/Drywell Pump Station

MISCELLANEOUS DETAILS

MD-1 General Construction Notes
MD-2 Pig Launch Station
MD-3 Pig Launch Tube
MD-4 Pig Recovery Manhole
MD-5 Air Release Assembly



* FOR SEPARATE CAST-IN-PLACE ONLY

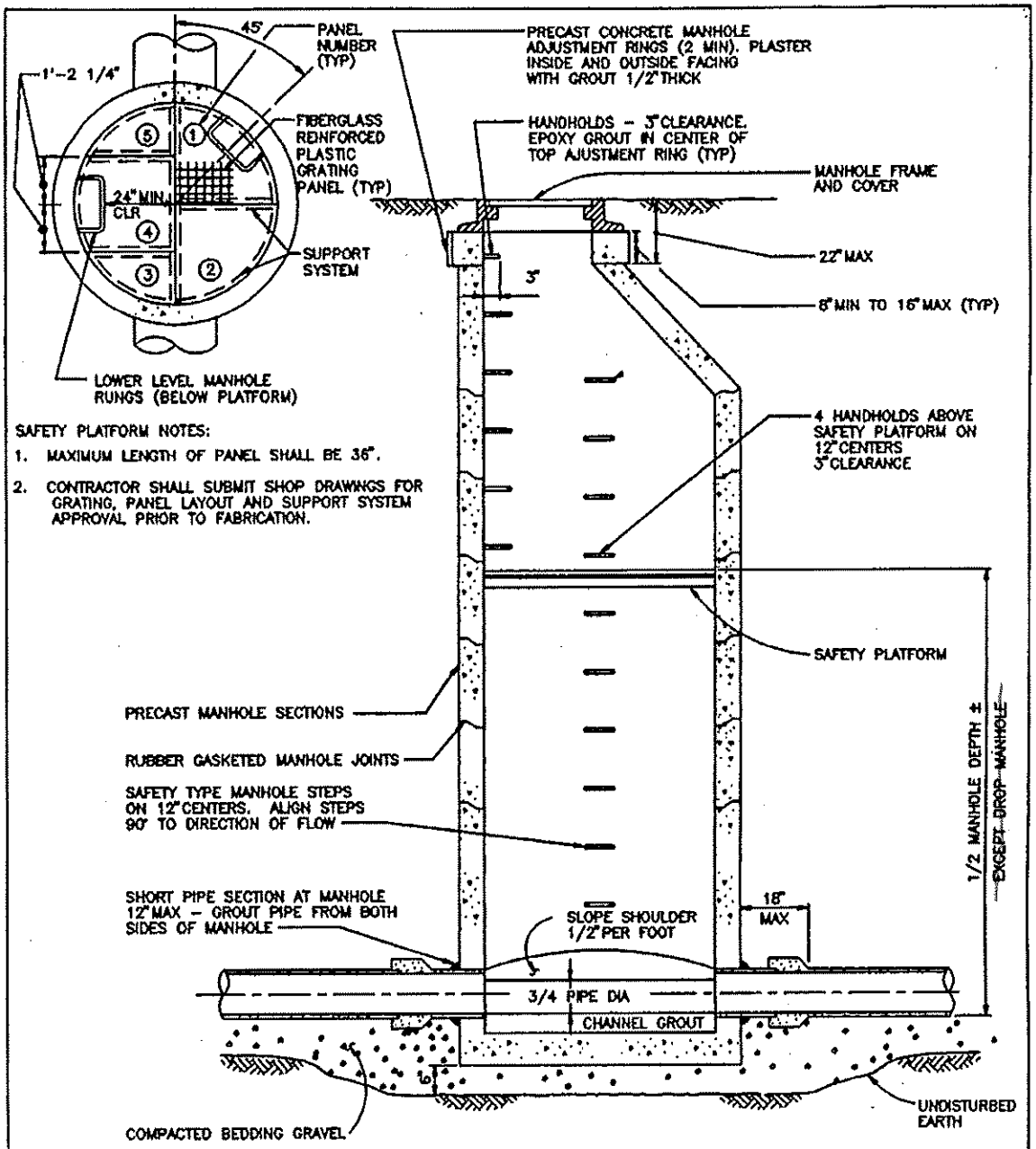
DESIGN NOTES:
HEIGHT: 8' TO 12': SOIL BEARING VALUE EQUALS 3300#/FT^2 (MIN)
HEIGHT: OVER 12' TO 25': SOIL BEARING VALUE EQUALS 3800#/FT^2 (MIN)

TYPE 1

NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	MANHOLE TYPE 1	DETAIL MV-1



SAFETY PLATFORM NOTES:

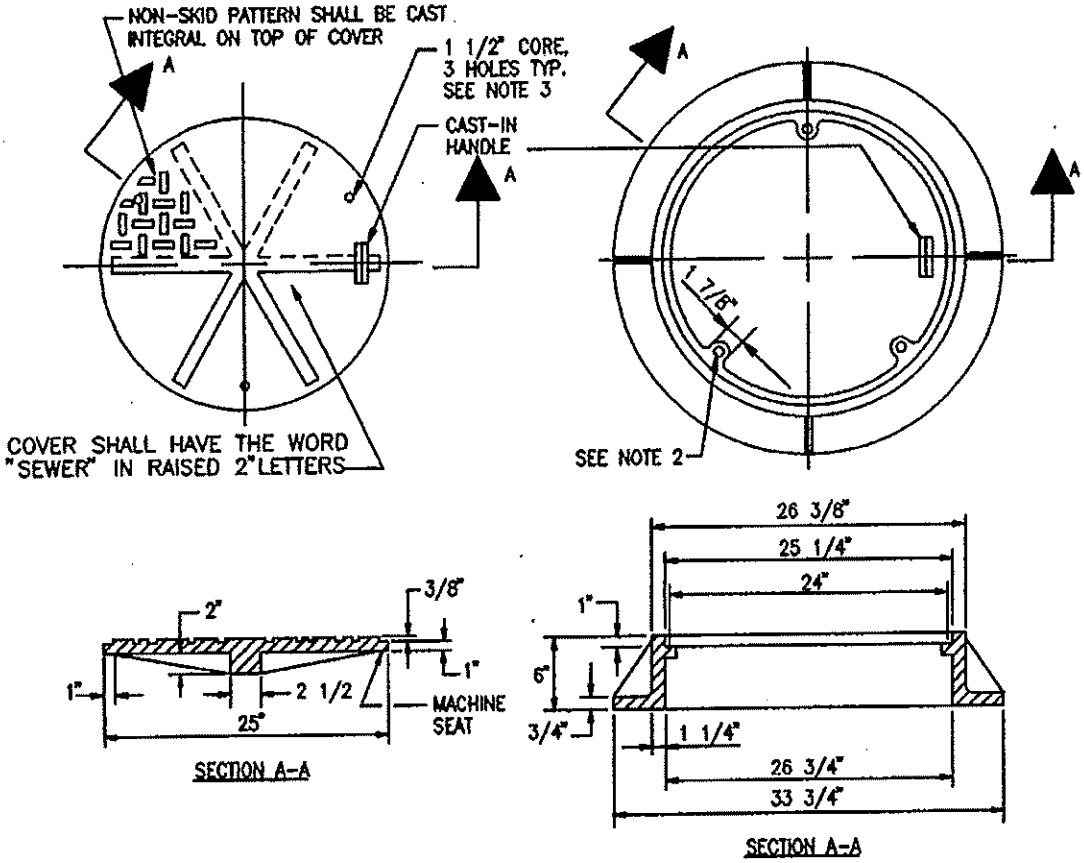
1. MAXIMUM LENGTH OF PANEL SHALL BE 36".
2. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR GRATING, PANEL LAYOUT AND SUPPORT SYSTEM APPROVAL PRIOR TO FABRICATION.

DEEP MANHOLE

NO SCALE

2585003/KCPW2 12.95

KITSAP COUNTY Dept. of Public Works	DEEP MANHOLE	DETAIL MV-2



APPROXIMATE WEIGHT:

FRAME - 215 LBS
COVER - 150 LBS

NOTES:

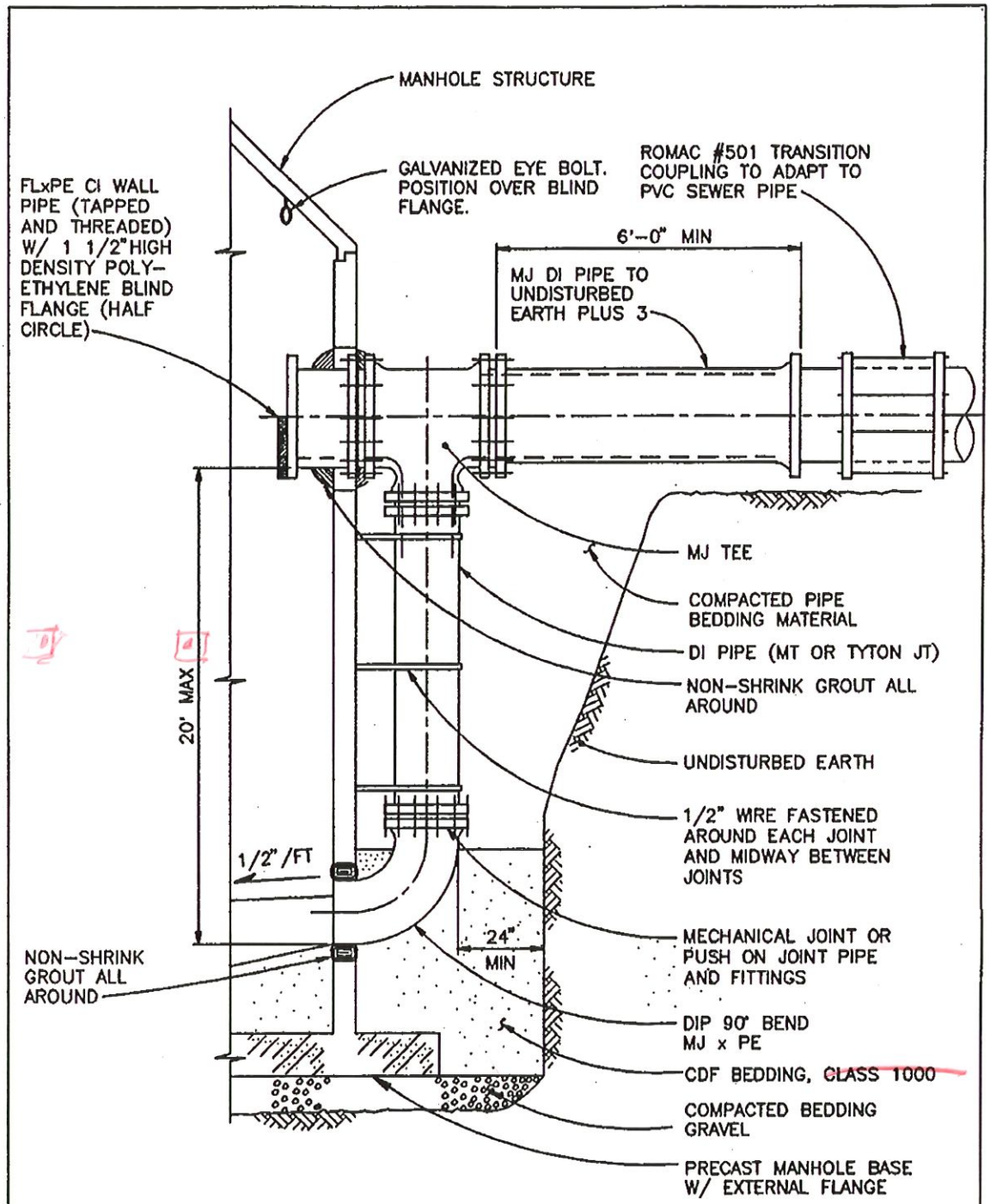
1. MATERIALS ARE CAST IRON ASTM A-48 CLASS 30 APWA STD 42.
2. DRILL AND TAP 5/8" - N.C. ON 23" B.C. (3 REQUIRED).
3. FOR 5/8" - 11 N.C. x 1 1/4" S.S. SOC. HD. CAPSCREW (3 REQUIRED).
4. OLYMPIC FOUNDRY NO. MH30D/T OR EQUAL.
5. MANHOLES LOCATED WITHIN NON-PAVED AREA SHALL REQUIRE THE INSTALLATION OF MARKER POSTS AS MANUFACTURED BY CARSON TYPE CS-225 AND MARKED SEWER (DECAL 37-A).

MANHOLE FRAME AND COVER

NO SCALE

2585003/KOPW2 12.95

KITSAP COUNTY Dept. of Public Works	MANHOLE FRAME AND COVER	DETAIL MV-3

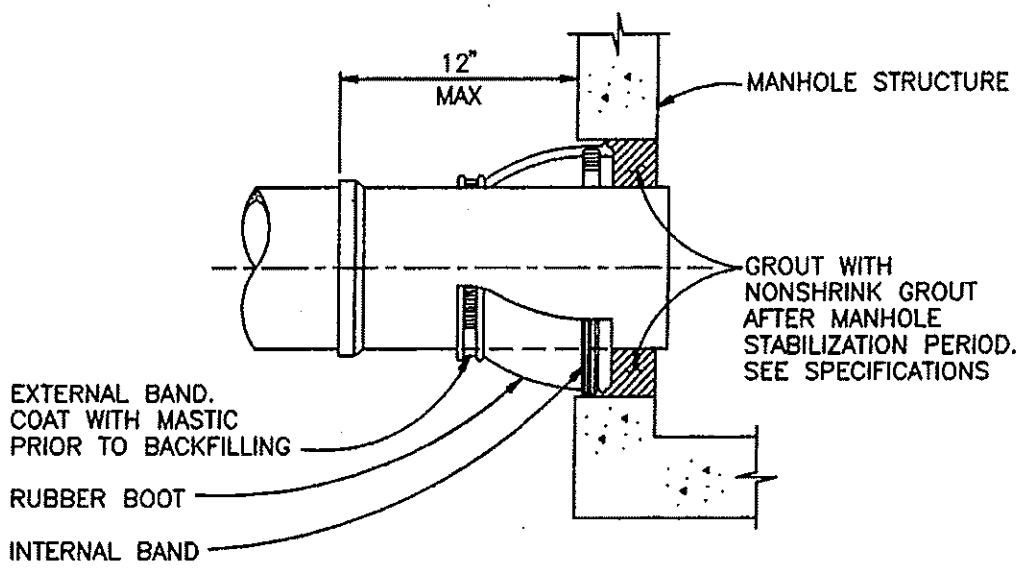


DROP MANHOLE CONNECTON

NO SCALE

2585003/KCPW3 12.95

KITSAP COUNTY Dept. of Public Works	DROP MANHOLE CONNECTION	DETAIL MV-4

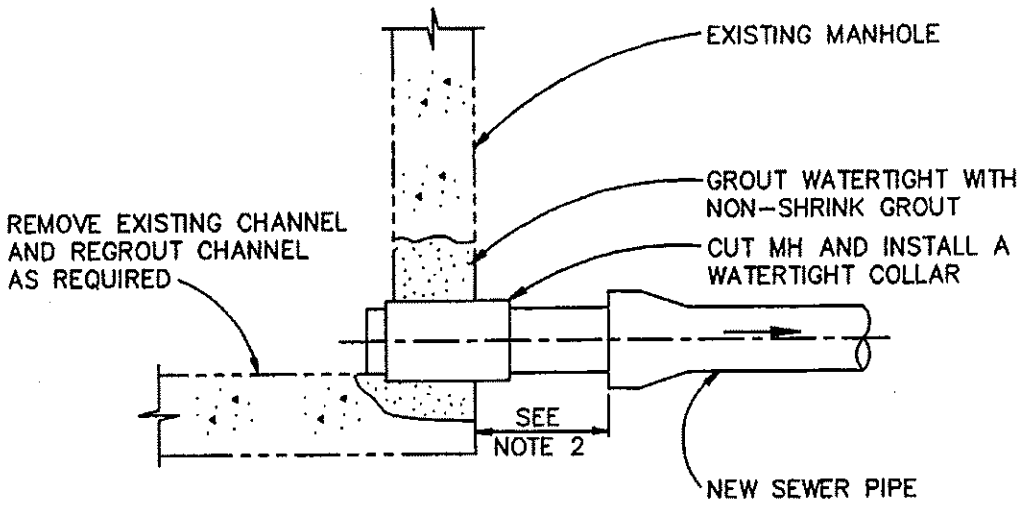


RUBBER BOOT MANHOLE INSERT

NO SCALE

2585003/KCPW3 12.95

KITSAP COUNTY Dept. of Public Works	RUBBER BOOT MANHOLE INSERT	DETAIL MV-5



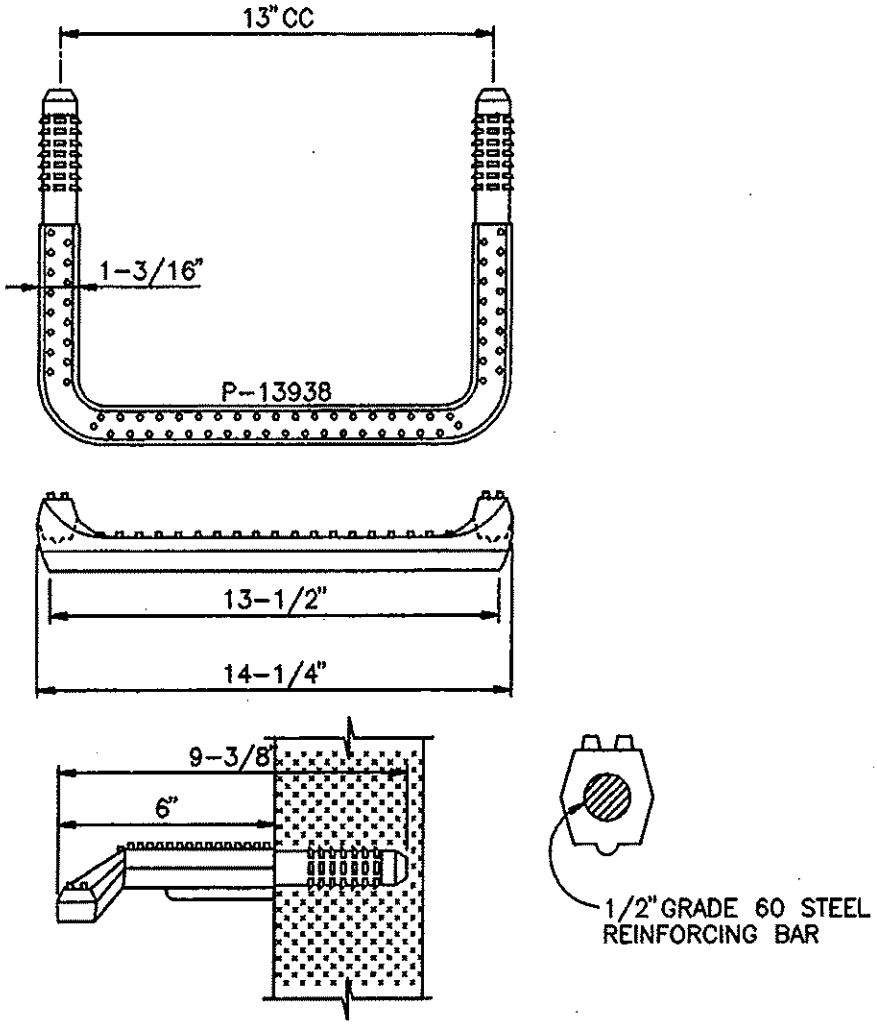
1. THE OPENING SHALL PROVIDE A MINIMUM CLEARANCE OF 2"AROUND THE CIRCUMFERENCE OF THE PIPE.
2. ALL PIPES SHALL BE PROVIDED WITH A FLEXIBLE JOINT WITHIN 1/2 OF A PIPE DIAMETER OR 12", WHICHEVER IS GREATER.

CONNECTION TO EXISTING MANHOLE

NO SCALE

2585003/KCPW3 12.95

KITSAP COUNTY Dept. of Public Works	CONNECTION TO EXISTING MANHOLE	DETAIL MV-6

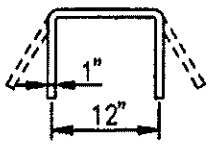


POLYPROPYLENE SAFETY STEP

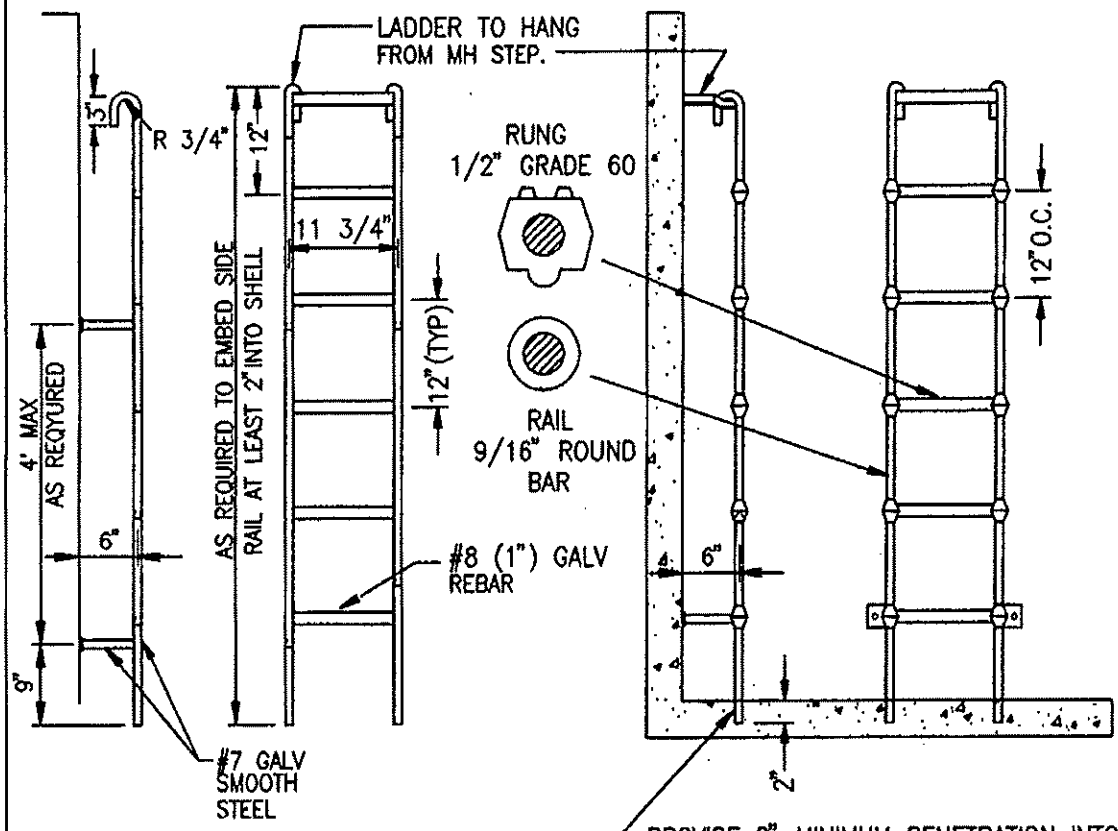
NO SCALE

2585003/KCPW3 12.95

KITSAP COUNTY Dept. of Public Works	POLYPROPYLENE SAFETY STEP	DETAIL MV-7



LEGS MAY BE PARALLEL OR APPROX RADIAL AT OPTION OF MANUFACTURER EXCEPT THAT ALL STEPS IN ANY MANHOLE SHALL BE SIMILAR



PROVIDE 2" MINIMUM PENETRATION INTO MANHOLE BASE. PROVIDE MEANS TO SECURELY ANCHOR INTO MANHOLE BASE.

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

STEEL MANHOLE LADDER

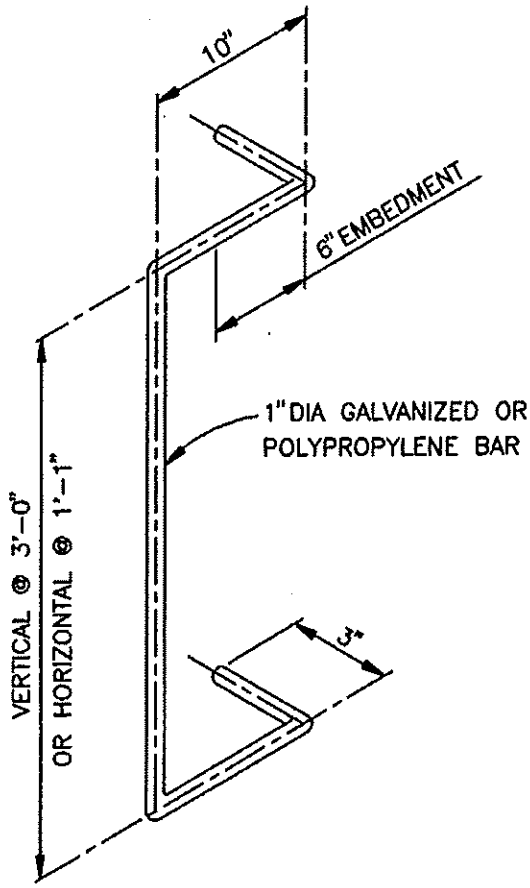
NO SCALE

POLYPROPYLENE LADDER

NO SCALE

2585003/KCPW3 12.95

KITSAP COUNTY Dept. of Public Works	MANHOLE LADDER	DETAIL MV-8



MANHOLE/VAULT HANDHOLD

NO SCALE

2585003/KCPW3 12.95

KITSAP COUNTY Dept. of Public Works	MANHOLE/VAULT HANDHOLD	DETAIL MV-9

DIVISION VII
STANDARD DETAILS

PIPE DETAILS

- PD-1 Pipe Trench
- PD-2 Pipe Anchor
- PD-3 Check Dam
- PD-4 Pipe Casing
- PD-5 Vertical Thrust Blocks
- PD-6 Horizontal Thrust Blocks
- PD-7 Side Sewer Connection
- PD-8 Side Sewer Plan
- PD-9 Building Sewer Connection
- PD-10 Individual Pump Installation A
- PD-11 Individual Pump Installation B
- PD-12 Cleanout And Street Use Cover
- PD-13 Easement Cleanout Cover

MANHOLES & VAULTS

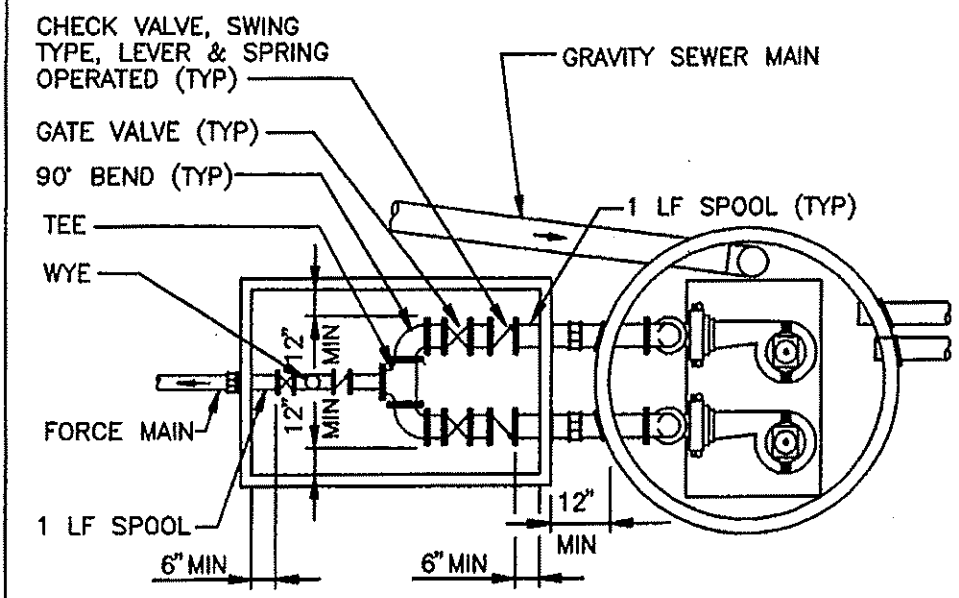
- MV-1 Type I Manhole
- MV-2 Deep Manhole
- MV-3 Manhole Frame And Cover
- MV-4 Drop Manhole Connection
- MV-5 Rubber Boot Manhole Insert
- MV-6 Existing Manhole Connection
- MV-7 Polypropylene Safety Step
- MV-8 Manhole Ladder
- MV-9 Manhole/Vault Handhold

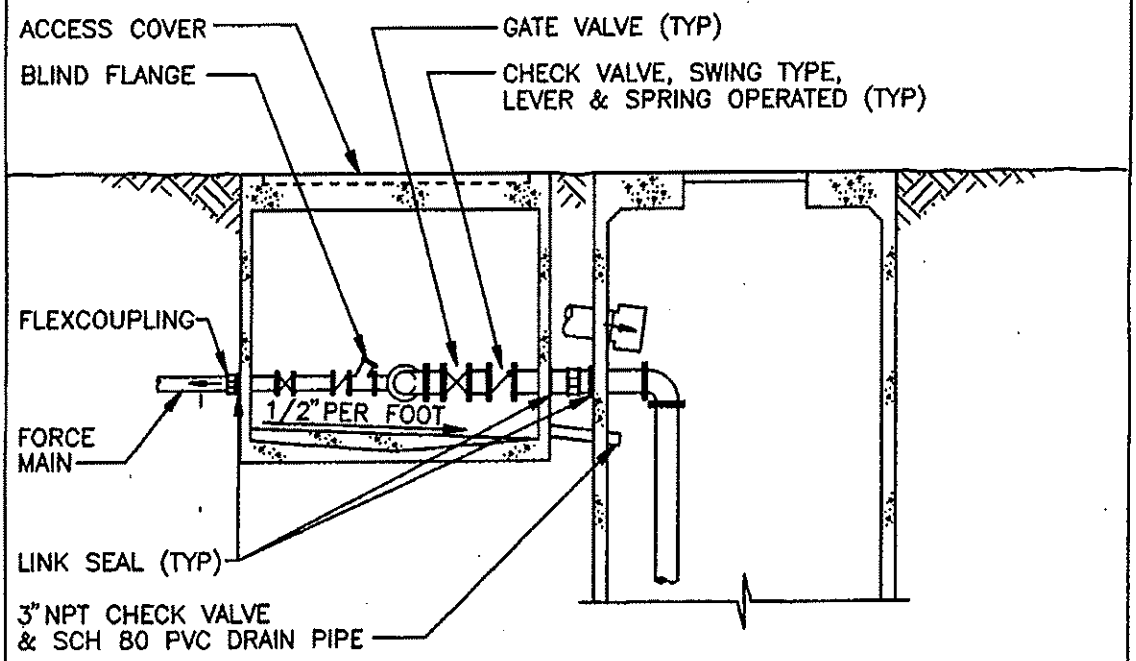
PUMP STATIONS

- PS-1 Individual Sewage Pump
- PS-2 Submersible Pump Station
- PS-3 Submersible Pump Valve Vault
- PS-4 Pump Station Storage Tank
- PS-5 Wetwell/Drywell Pump Station

MISCELLANEOUS DETAILS

- MD-1 General Construction Notes
- MD-2 Pig Launch Station
- MD-3 Pig Launch Tube
- MD-4 Pig Recovery Manhole
- MD-5 Air Release Assembly



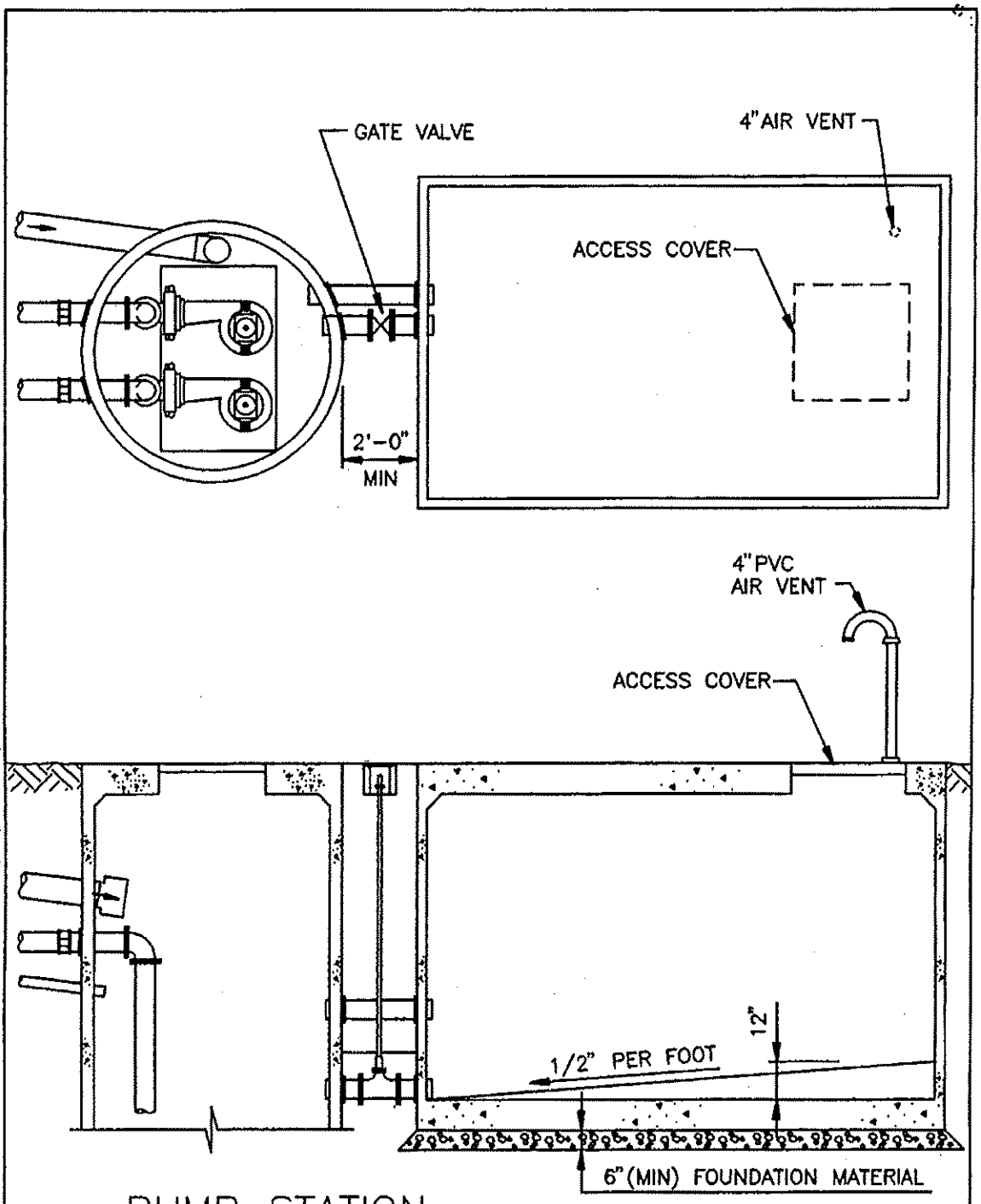


SUBMERSIBLE PUMP VALVE VAULT

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	SUBMERSIBLE PUMP VALVE VAULT	DETAIL PS-3

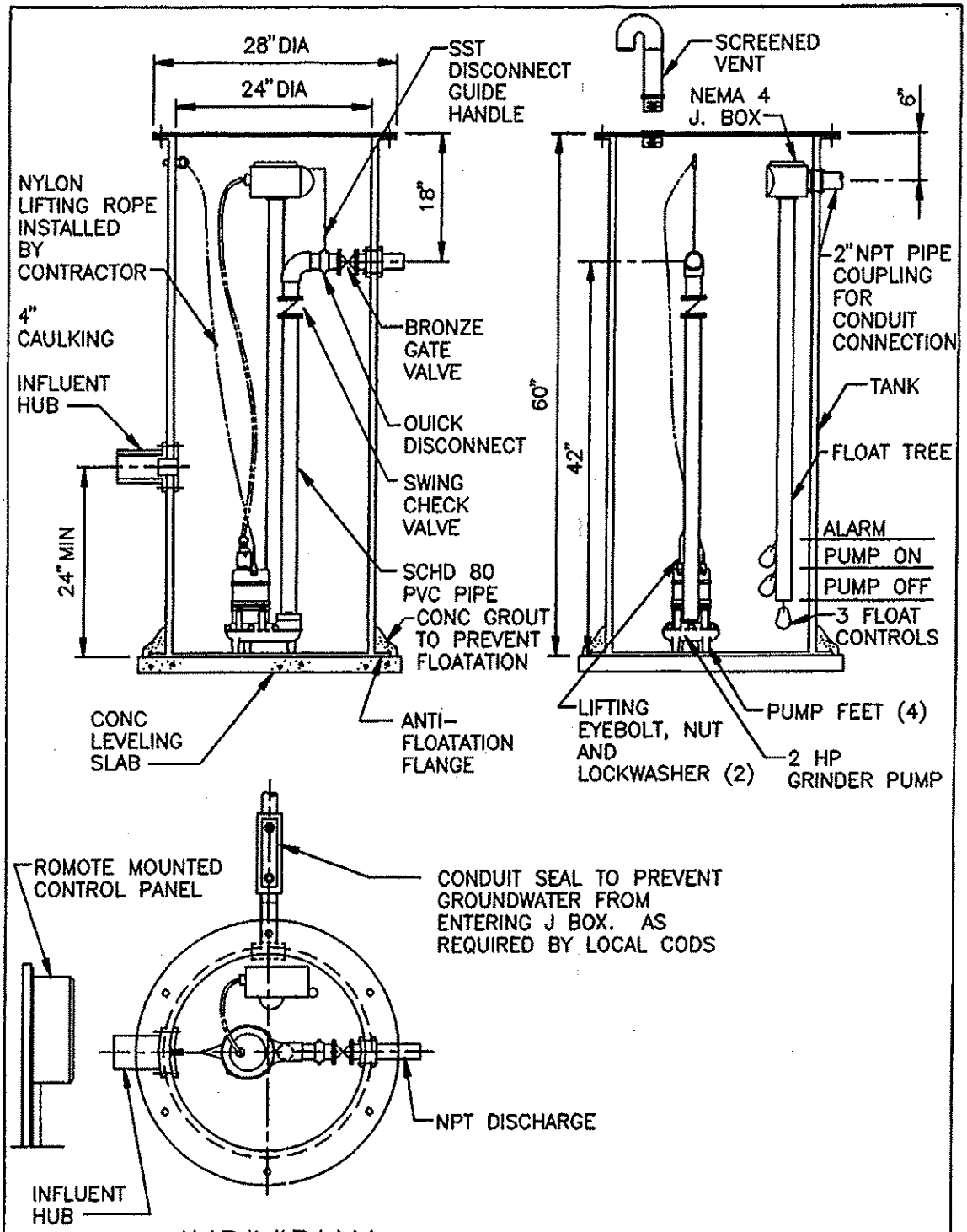


PUMP STATION STORAGE TANK

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	PUMP STATION STORAGE TANK	DETAIL PS-4

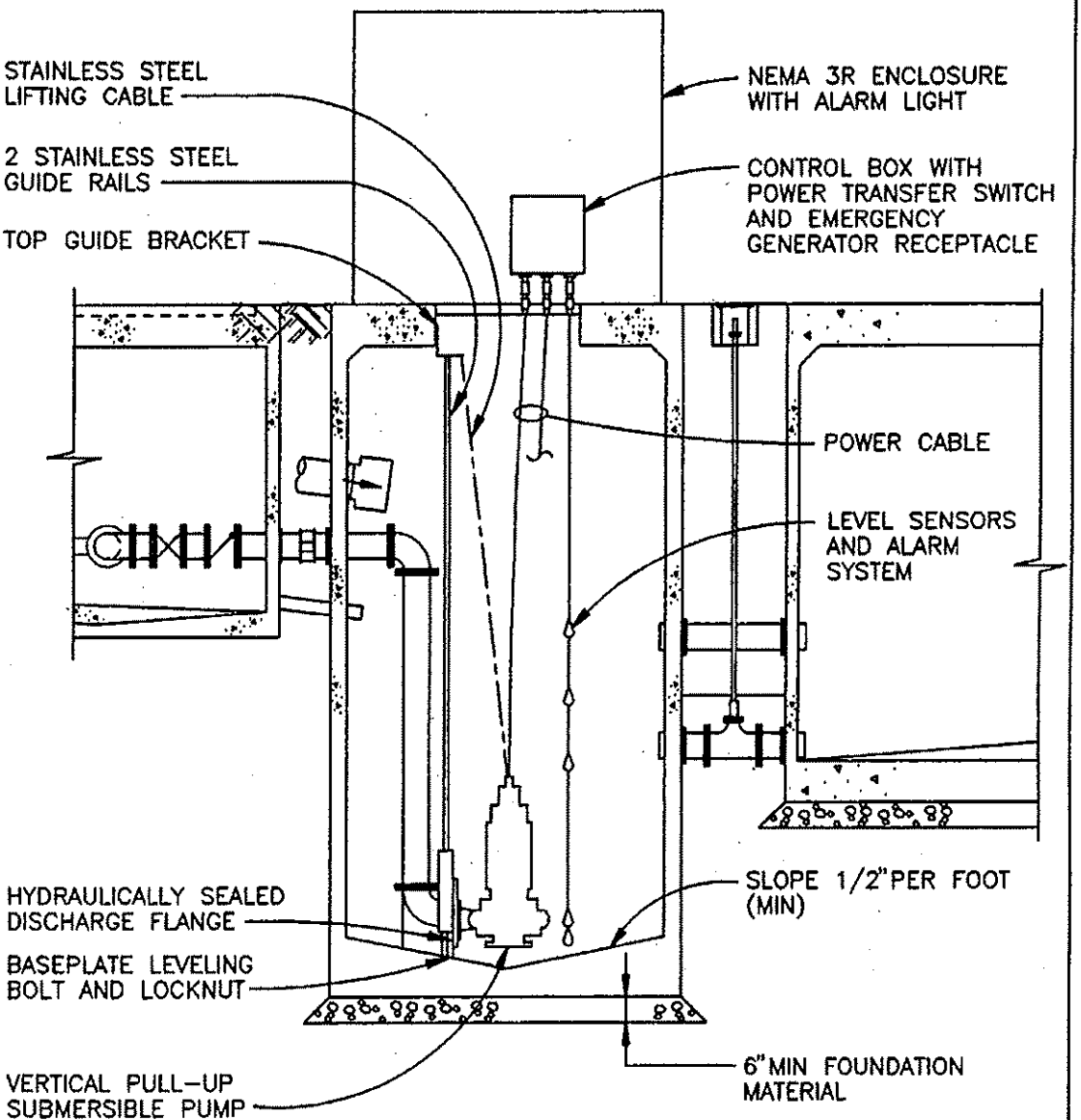


INDIVIDUAL SEWAGE PUMP

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	INDIVIDUAL SEWAGE PUMP	DETAIL PS-1

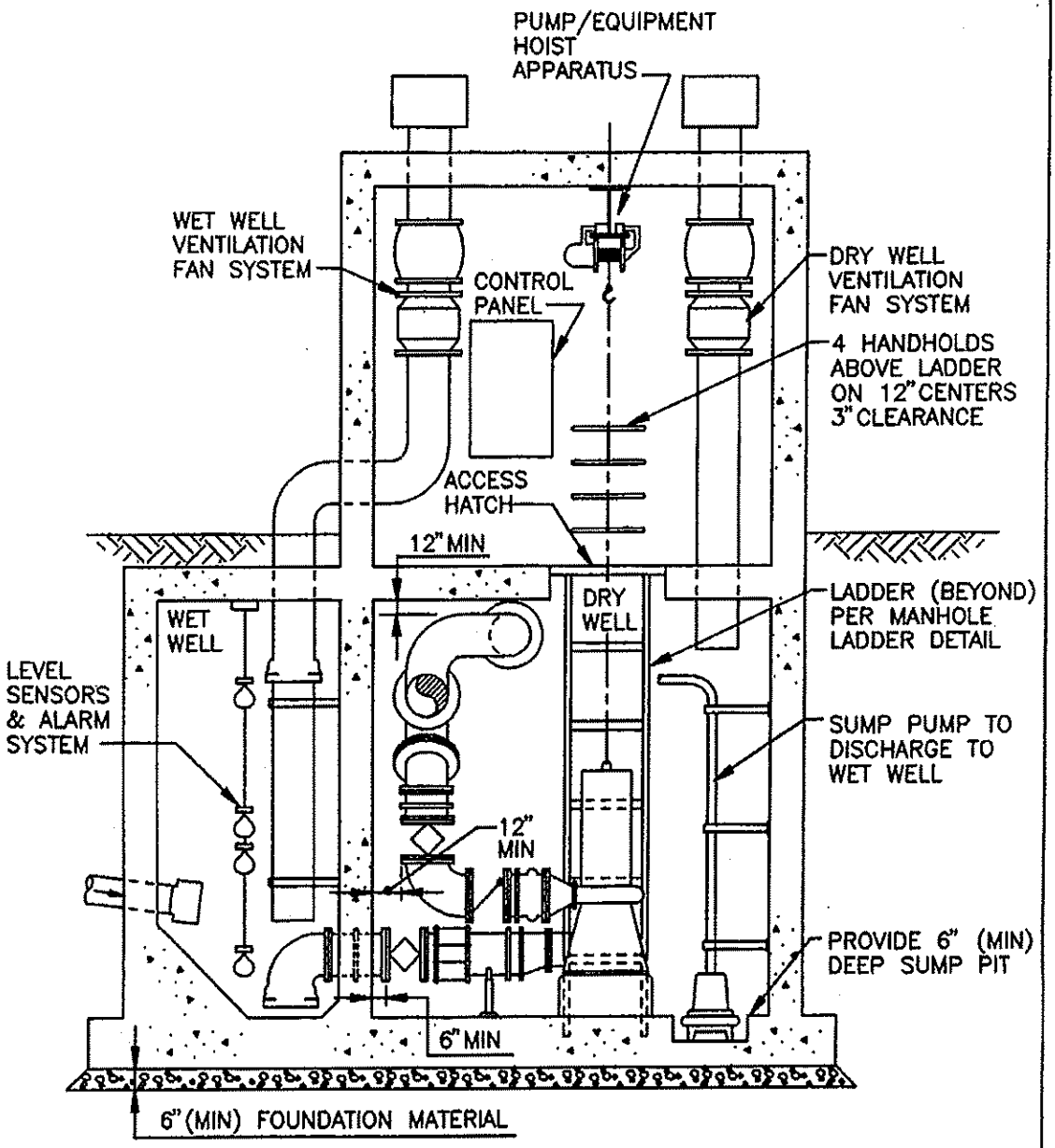


SUBMERSIBLE PUMP STATION

NO SCALE

25B5003/KCPW4

KITSAP COUNTY Dept. of Public Works	SUBMERSIBLE PUMP STATION	DETAIL PS-2



WETWELL/DRYWELL PUMP STATION

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	WETWELL/DRYWELL PUMP STATION	DETAIL PS-5

DIVISION VII
STANDARD DETAILS

PIPE DETAILS

- PD-1 Pipe Trench
- PD-2 Pipe Anchor
- PD-3 Check Dam
- PD-4 Pipe Casing
- PD-5 Vertical Thrust Blocks
- PD-6 Horizontal Thrust Blocks
- PD-7 Side Sewer Connection
- PD-8 Side Sewer Plan
- PD-9 Building Sewer Connection
- PD-10 Individual Pump Installation A
- PD-11 Individual Pump Installation B
- PD-12 Cleanout And Street Use Cover
- PD-13 Easement Cleanout Cover

MANHOLES & VAULTS

- MV-1 Type I Manhole
- MV-2 Deep Manhole
- MV-3 Manhole Frame And Cover
- MV-4 Drop Manhole Connection
- MV-5 Rubber Boot Manhole Insert
- MV-6 Existing Manhole Connection
- MV-7 Polypropylene Safety Step
- MV-8 Manhole Ladder
- MV-9 Manhole/Vault Handhold

PUMP STATIONS

- PS-1 Individual Sewage Pump
- PS-2 Submersible Pump Station
- PS-3 Submersible Pump Valve Vault
- PS-4 Pump Station Storage Tank
- PS-5 Wetwell/Drywell Pump Station

MISCELLANEOUS DETAILS

- MD-1 General Construction Notes
- MD-2 Pig Launch Station
- MD-3 Pig Launch Tube
- MD-4 Pig Recovery Manhole
- MD-5 Air Release Assembly

GENERAL CONSTRUCTION NOTES

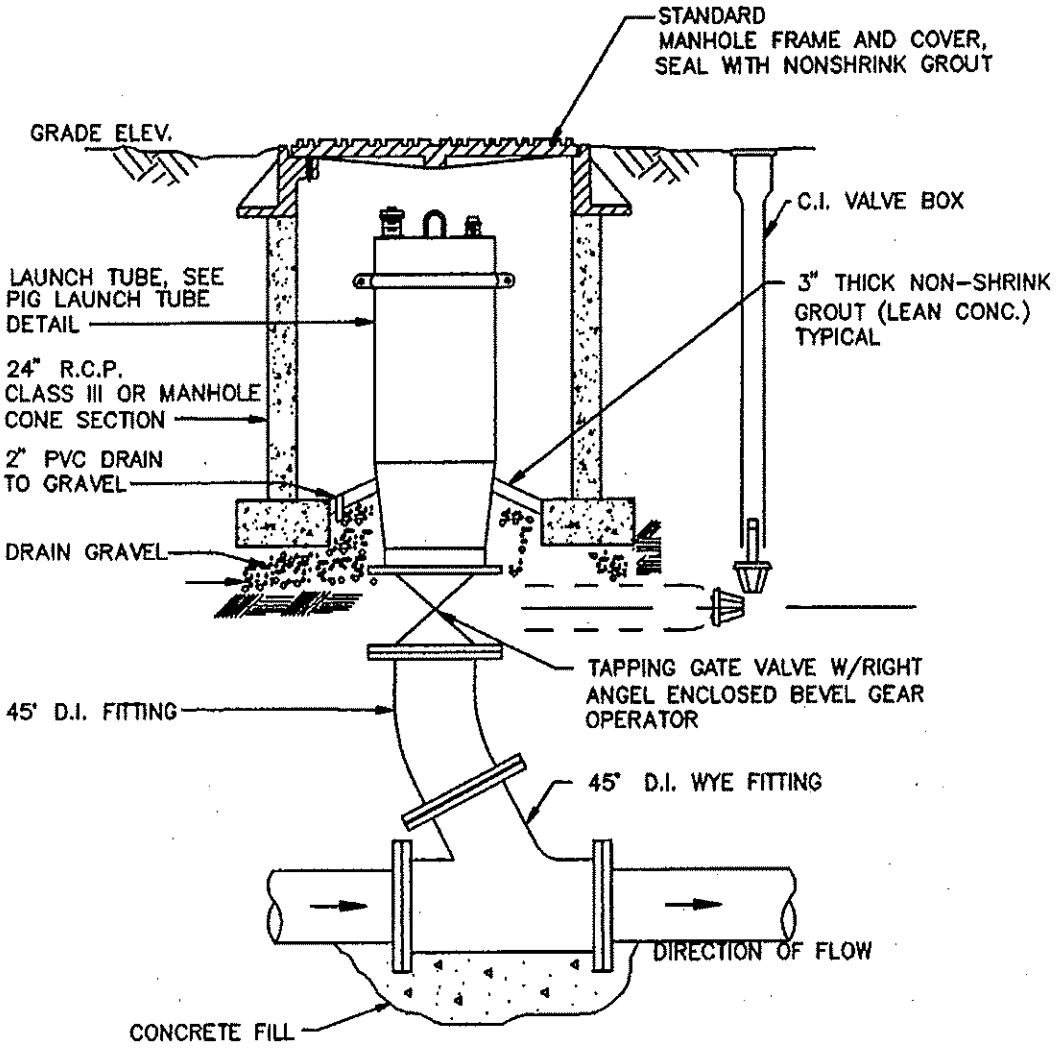
1. Construction materials and workmanship shall conform to the requirements of the most recent edition of "Kitsap County Department of Public Works Standards for Sanitary Sewer Extensions" in conjunction with the most recent edition of "The Standard Specifications For Road, Bridge, and Municipal Construction" prepared by the Washington State Chapter of the American Public Works Association.
2. The contractor shall arrange for a preconstruction conference prior to commencing construction. The engineer and/or inspector for the Wastewater Division of the Kitsap County Public works Department shall be in attendance.
3. All sewer installation inspections and test observations shall be made by Kitsap County Department of Public Works Wastewater Division. The County inspector shall be notified two days in advance of commencing work on a sanitary sewer extension. Prior to final acceptance of all installations, the County shall conduct an inspection of all main lines by the use of television equipment. Final acceptance of sewer installations will not be made until tests and inspections are complete and prove satisfactory.
4. (Pipe requirements)
5. (Bedding requirements)
6. (Backfill material and compaction requirements)
7. The physical connection to an existing manhole or sewer shall not be made until authorized by the County. Such authorization will not be given until all upstream lines have been completely cleaned and all debris removed.
8. Gravity mains shall be tested by the low pressure air method. Pressure mains shall be tested by the hydrostatic test method. All tests shall be made in the presence of the County inspector.
9. Drop manholes shall, in all respects, be constructed as a standard manhole with the exception of the outside drop connection as shown on the standard plan "Drop Manhole Connection".
10. Manholes shall be precast reinforced concrete units with eccentric cones conforming to the standard plan "Type 1 Manhole". Joints between precast wall sections shall be confined O-ring type.
11. Manhole frame and covers shall be cast iron, three bolt locking type, Olympic Foundry type MH30D/T, or equal. Bolts shall be 5/8" stainless steel socket head, countersunk. The cover shall have the word "SEWER" in 2" raised letters cast in it.
12. Cleanout frame and covers shall be cast iron two bolt locking type, Olympic Foundry type M1025, or equal. Bolts shall be 5/8" stainless steel socket head, countersunk.
13. All side sewers shall be 6" diameter minimum and laid on a minimum slope of 2 percent. All side sewers shall be provided with a cleanout and test tees for each lot to be served.
14. Check dams shall be placed at 100 foot intervals on gravity mains laid on 6 percent or greater slopes.
15. Concrete pipe anchors shall be placed on sewer mains where slopes exceed 20 percent. Anchors shall be placed on 36 foot centers for slopes 20 to 35 percent, on 24 foot centers for slopes 35 to 50 percent, and on 16 foot centers for slopes 50 percent and greater.

GENERAL CONSTRUCTION NOTES

NO SCALE

2585003/KCPW4

KITSAP COUNTY Dept. of Public Works	GENERAL CONDITIONS/NOTES	DETAIL MD-1

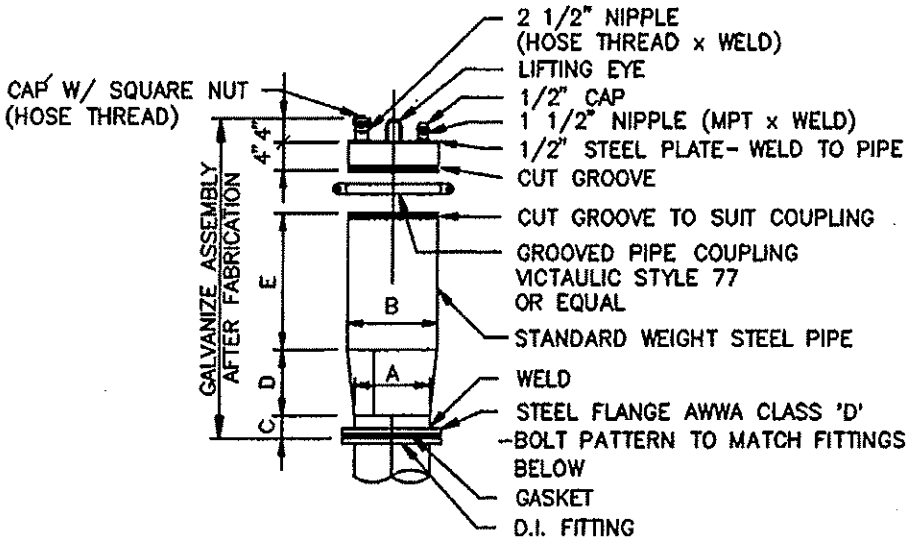


PIG LAUNCH STATION

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	PIG LAUNCH STATION	DETAIL MD-2



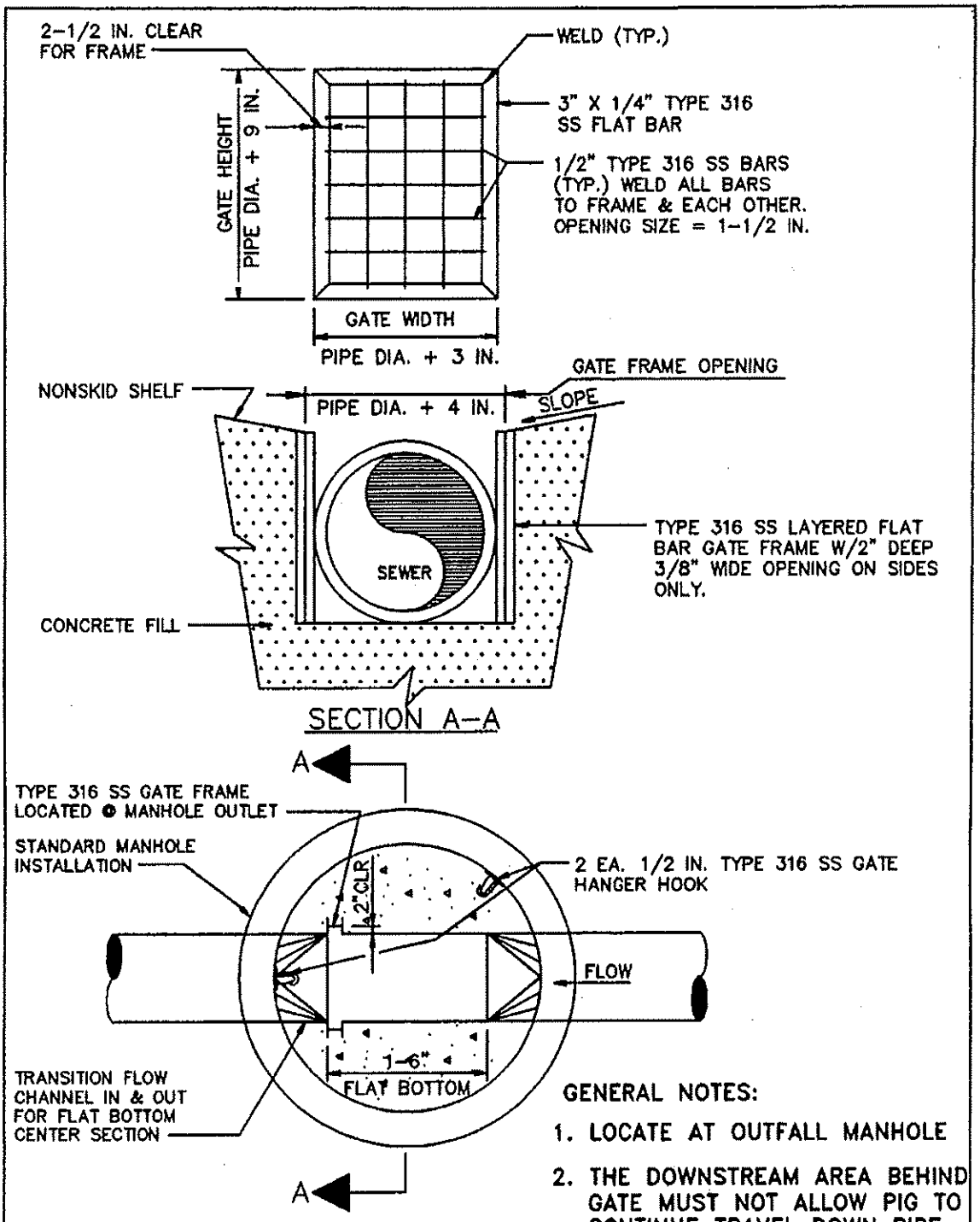
FORCE MAIN SIZE	A	B	C	D	E
14"	14"	16"	4"	10"	20"
12"	12"	14"	4"	8"	16"
8"	8"	10"	4"	6"	12"
6"	6"	8"	4"	4"	8"
4"	4"	6"	4"	4"	8"

PIG LAUNCH TUBE

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	PIG LAUNCH TUBE	DETAIL MD-3



GENERAL NOTES:

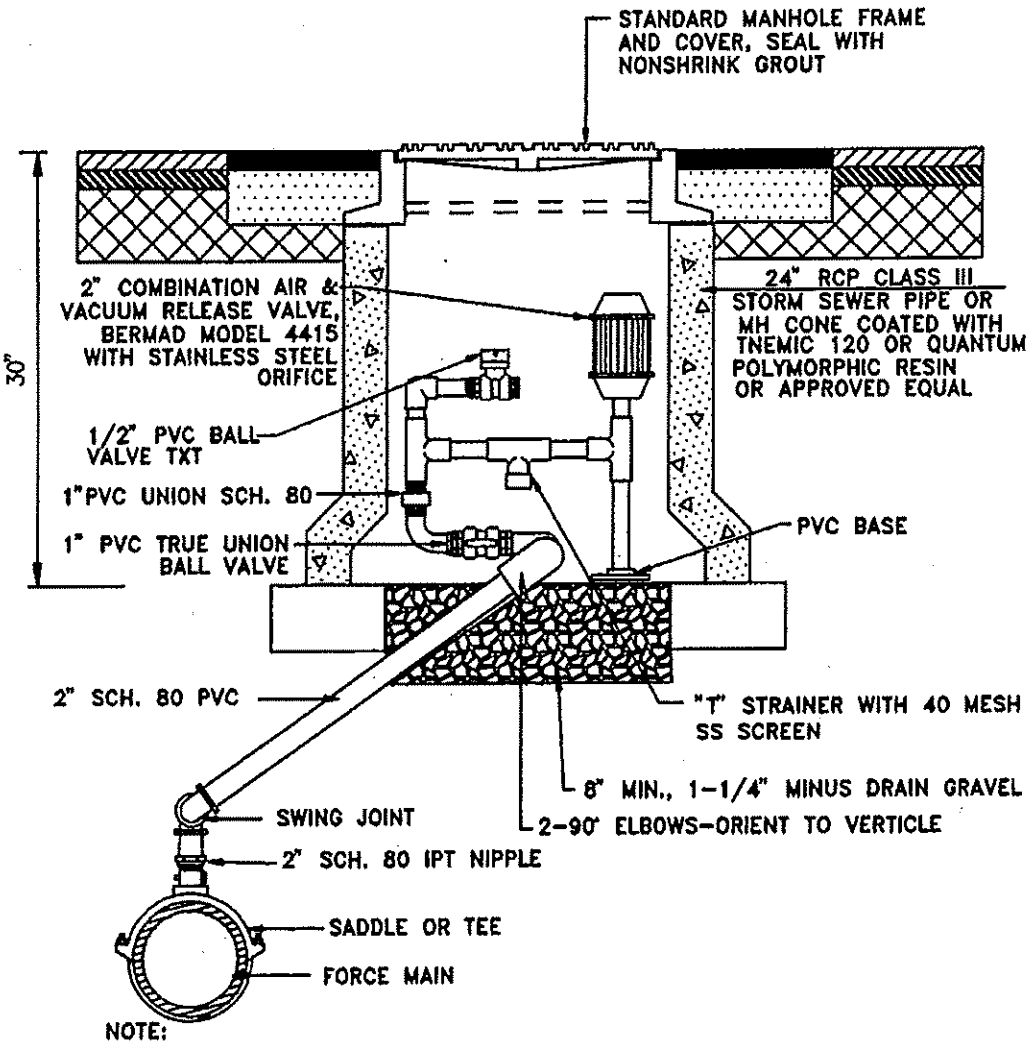
1. LOCATE AT OUTFALL MANHOLE
2. THE DOWNSTREAM AREA BEHIND GATE MUST NOT ALLOW PIG TO CONTINUE TRAVEL DOWN PIPE.

PIG RECOVERY MANHOLE

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	PIG RECOVERY MANHOLE	DETAIL MD-4



NOTE:

1. LOCATE AIR RELEASE ASSEMBLY IN SIDEWALK WHEN POSSIBLE.

AIR RELEASE ASSEMBLY

NO SCALE

2585003/KCPW4 12.95

KITSAP COUNTY Dept. of Public Works	AIR RELEASE ASSEMBLY	DETAIL MD-5