EXECUTIVE SUMMARY

The City of Gig Harbor originally adopted the 1993 version of the Public Works Standards under the direction of the Director of Public Works, Ben Yazici, PE. The adoption occurred through council action (Resolution No. 403) and was eventually re-adopted by ordinance (Ordinance No. 712) in January 1996.

As time passed, Public Works Staff saw the need to update sections of the 1993 Standards with minor amendments requiring immediate attention to implement current standards and City policies. These amendments have resulted in Standards that are fragmented as they have not been incorporated in a single comprehensive published document. The result is a document that is cumbersome to read and implement. This fragmentation, along with continued developments in engineering, construction, and City policies, compelled the creation of the proposed 2014 Public Works Standards.

The 2014 Standards provide for current engineering principles and practices, such as traffic control devices, wastewater pumping, record drawing standards, and back flow prevention. The 2014 Standards also allow or require the incorporation of improved construction materials and techniques. This includes use of recycled materials, energy conserving equipment such as LED elements, pavement marking materials, and computer-based infrastructure mapping. Lastly, the 2014 Standards memorialize and clarify policies set by elected officials and Public Works Staff, including process to obtain water and sewer service, establishment of a visible identity of the City (unique cross walks, street lights, etc.), relocation of existing utilities, and defining private ownership of travel ways.

Through the creation of the 2014 Standards, the City has provided multiple opportunities for input. Draft versions of the 2014 Standards were presented to the Operations and Public Project’s Committee, posted on the City’s website for review and comment by developers, engineers, and the general public, submitted for State Environmental Policy Act (SEPA) review, and submitted to the Washington State Department of Commerce for review as a development regulation amendment. Finally, a public hearing and adoption of ordinance will enforce the implementation of the 2014 Standards.

While we accept the 2014 Standards will become outdated as time progresses, Public Works Staff hopes the 2014 Standards will be easily amendable and will assist in providing a comprehensive reference for developing high standards of public works infrastructure within the City of Gig Harbor.

JEFF LANGHELM, PE
PUBLIC WORKS DIRECTOR
CITY OF GIG HARBOR
JANUARY 1, 2014
Mayor

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Prepared by:
PUBLIC WORKS DEPARTMENT
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CHAPTER 1

1.0 GENERAL PUBLIC WORKS CONSIDERATIONS

1.005 Applicability

These City of Gig Harbor Public Works Standards are applicable in varying locations, depending on the service area of the City facility or service. In general, the following Chapters are applicable in the specific locations of each facility or service provided by the City as noted below.

Chapter 2 – Transportation: Incorporated limits of the City of Gig Harbor
Chapter 3 – Stormwater: Incorporated limits of the City of Gig Harbor
Chapter 4 – Water: Water Service area of the City of Gig Harbor Water Department
Chapter 5 – Wastewater: Urban growth area of the City of Gig Harbor and special service areas as determined by Pierce County and the City of Gig Harbor

1.010 Standard Specifications

Design detail, workmanship, and materials shall be in accordance with the most current edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and the Standard Plans for Road, Bridge and Municipal Construction all written and promulgated by the Washington State Chapter of the American Public Works Association and the Washington State Department of Transportation, except where these standards provide otherwise. (Section 13.12.010 GHMC)

All applicable rules of Washington State shall be adhered to with respect to safety, construction methods, and other state requirements. This includes, but is not limited to the Revised Code of Washington (RCW) and the Washington Administrative Code (WAC).

The following specifications shall be applicable when pertinent, when specifically cited in the standards or when required by a higher funding authority:

A. Conditions and standards as set forth in the most current edition of the City of Gig Harbor Water System Plan.

B. Conditions and standards as set forth in the most current edition of the City of Gig Harbor Wastewater Comprehensive Plan.


D. Conditions and standards as set forth in the most current edition of the City of Gig Harbor Parks, Recreation and Open Space Plan.
E. Conditions and standards as set forth in the most current edition of the Gig Harbor Peninsula Community Plan.

F. Rules and regulations as adopted in the City of Gig Harbor Municipal Code (GHMC).

G. Conditions and standards as set forth in the most current edition of the City of Gig Harbor Transportation Plan.


I. City and County Design Standards for the Construction of Urban and Rural Arterial and Collector Roads Promulgated by the City Engineers Association of Washington, most current edition.

J. U.S. Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD), as amended and approved by Washington State Department of Transportation.

K. Washington State Department of Transportation Design Manual as amended and approved by Washington State Department of Transportation (WSDOT).

L. Washington State Department of Transportation Construction Manual as amended and approved by WSDOT.

M. Washington State Department of Transportation Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans) as amended and approved by WSDOT.


O. Conditions and standards as set forth by the State of Washington, Department of Labor and Industries.

P. Conditions and standards as set forth in the most current adopted edition of the International Fire Code.


S. Criteria set forth in Transportation and Land Development by V.G. Stover and F. Koepke and the Institute of Transportation Engineers.

U. Design criteria of federal agencies including the Department of Housing, Urban Development and the Federal Housing Administration.

V. *Rules and regulations of the State Board of Health regarding public water supplies*, as published by the State Department of Health and the American Water Works Association.

W. Spellings shall be defined by the Oxford Advanced American Dictionary.

W. Other specifications not listed above may apply when required by the City of Gig Harbor.

1.015 Shortened Designation

These Public Works Standards shall be cited routinely in the text as the "Standards." This is not to infer that the guideline portion of this book constitutes Standards, this is simply a shortened designation for the name of this document.

1.020 Applicability

These standards shall govern all new construction and upgrading of facilities both in the right-of-way and on-site for transportation and transportation related facilities, storm drainage facilities, sewer and water improvements, landscape and irrigation, park, recreation, and open-space facilities within the City of Gig Harbor and the City of Gig Harbor Urban Growth Area.

1.025 Definitions and Terms

"Access Way" - Travel way with private ownership and maintenance where general public use is allowed.

"City Engineer" -- The City Engineer or his/her duly authorized representative.

"City Inspector" -- The City of Gig Harbor inspector or his/her duly authorized representative.

"Curb Cut" – An access without a curb radius, generally used where lower traffic volumes are anticipated.

"Curb Return" – An access with a turning or curb radius. A curb return is generally used for higher traffic volumes to enable vehicles to turn safely off the roadway.

"Developer" -- Any person, firm, partnership, association, joint venture, corporation or any other entity responsible for a given project.
“Easement” -- The right to use a defined area of property for specific purpose/purposes as set forth in the easement document, on a plat or short plat, or as required for purposes as set forth herein.

“Engineer” -- Any Washington State licensed professional Engineer who represents the developer.

“ERU” -- The unit used to calculate sewer consumption. One Equivalent Residential Unit (ERU) equals 150 gallons of water consumed per day. (GHMC 13.32.060)

“Force Main” -- Any sewer main that transports wastewater under pressure.

“GHMC” -- City of Gig Harbor Municipal Code.

“Grease Interceptor” -- An interceptor of at least 750 gallon capacity to serve one or more fixtures and which shall be remotely located.

“Grease Trap” -- A device designed to retain grease from one to a maximum of four fixtures.

“Grinder Pump” -- A pump that grinds sewage waste into a fine slurry and then pressurizes it to permit transport through small diameter sewer force main pipes.

“Half-Street” -- Street improvements constructed along the entire property frontage utilizing half the regular width of the right-of-way and permitted as an interim facility pending construction of the other half of the street by the adjacent owner. In some instances, it may be necessary to construct more than half the street depending on the classification of the street.

“Interceptor” -- A sewer that receives flow from a number of main or trunk sewers, force mains, etc.


“Latecomers Agreement” -- A written contract between the City and the developer(s) providing the partial reimbursement of the cost of constructing the water and/or sewer facilities. (GHMC 13.35)

“Lateral” -- That section of the sewer line extending from the City's main to the right-of-way or easement line (i.e., the building sewer) that has no other common sewers discharging into it.

“Lot or Street Frontage” -- The distance between the two points where the lot lines intersect the boundary of public street right-of-way.

“Peak Hour” -- The 60 minute period with the greatest sum of traffic volumes on a roadway segment or passing through the area of a project.
“Planning Director” – the City of Gig Harbor Planning Director or his/her duly authorized representative.

"Plans" -- The plans, profiles, cross sections, elevations, details, and supplementary specifications, signed by a licensed professional engineer and approved by the Planning Director and the City Engineer, which show the location, character, dimensions, and details of the work to be performed.

“Private Driveway” - Travel way with private ownership and maintenance that has limited or restricted access by the ownership for no more than two tax parcels or no more than two residential units.

"Private Roadway" -- Travel way with private ownership and maintenance where general public use is limited or restricted at the discretion of the private ownership.

"Private Sewer" -- That portion of the system located on private property where no easements are granted to the City. Maintenance of a private sewer shall be the responsibility of the property owner(s).

"Project" -- General term encompassing all phases of the work to be performed and is synonymous to the term "improvement" or "work".

"Public Sanitary Sewer" -- A sewer in which all owners of abutting properties have equal rights, and which is controlled by public authority.

"Public Street" -- Publicly owned and maintained street.

"Right-of-Way" -- A general term denoting public land, property, or interest therein (e.g., an easement) acquired for or devoted to a public street, public access or public use.

"Road" -- Used interchangeably with street.

"Road or Driveway" – A traveled surface used to represent an access point onto the roadway.

"Sewer Main" or "Trunk" -- A sewer that receives flow from one or more mains.

"S.T.E.P. Main" -- Septic Tank Effluent Pumping main. A low pressure, sewer force main that transports only effluent from S.T.E.P. tanks.

"Street" -- Used interchangeably with road.


"Use of Pronoun" -- As used herein, the singular shall include the plural, and the plural the singular; any masculine pronoun shall include the feminine or neuter gender and vice versa; and the term "person" includes natural person

"Planning Director” -- the City of Gig Harbor Planning Director or his/her duly authorized representative.

"Plans" -- The plans, profiles, cross sections, elevations, details, and supplementary specifications, signed by a licensed professional engineer and approved by the Planning Director and the City Engineer, which show the location, character, dimensions, and details of the work to be performed.

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"Street" -- Used interchangeably with road.


"Use of Pronoun" -- As used herein, the singular shall include the plural, and the plural the singular; any masculine pronoun shall include the feminine or neuter gender and vice versa; and the term "person" includes natural person
or persons, firm, co-partnership, corporation or association, or combination thereof.

"Utility" -- A company providing public service including, but are not limited to, gas, oil, electric power, street lighting, telephone, telegraph, water, sewer, or cable television, whether or not such company is privately owned or owned by a governmental entity.

1.030 Changes to Standards

These Standards are adopted by ordinance and may only be amended upon approval by the City Council.

1.035 Variances

A. Submittal Requirements. A request for a variance from the Public Works Standards must be submitted in writing to the City Engineer for review. A complete application for a variance shall consist of:

1. Completed variance application;
2. Two (2) sets of the site plan;
3. A letter describing the variance requested, explaining the reasons for the requested variance, and addressing each of the criteria for approval. The letter must be sealed by a registered engineer licensed in the state of Washington; and
4. Payment of the filing fee as established by the City.

B. Processing. A variance from the Public Works Standards is a Type II application (see GHMC § 19.01.003). Because the technical nature of a variance request may require review by an outside consultant, variance requests shall not be subject to the deadline for issuance of a final decision in GHMC § 19.05.008 and RCW 36.70B.090. However, the variance is subject to the determination of application completeness in GHMC § 19.02.003, optional consolidated permit processing procedures in GHMC § 19.01.002, the notice of application procedures in GHMC § 19.02.003 and the issuance of a notice of written notice of decision in GHMC § 19.05.008. The remaining sections of Title 19 GHMC are optional for the processing of a variance under this section.

C. Criteria for Approval. Variances from the Public Works Standards may be granted by the City Engineer if the applicant presents substantial evidence to demonstrate that all of the following criteria for approval are satisfied:

1. Strict compliance with the public works standards is undesirable or impractical because of impracticality or undesirable conditions;
2. The proposed variation(s) are functionally equivalent to and are consistent with the intent of the Public Works Standards, and/or provide compensating benefits to the City and the public;
3. The proposed variation(s) are based on sound engineering judgment;
4. The proposed variations have not been made necessary by actions of the applicant or property owner; and
5. Safety, function, appearance and economical maintenance requirements are met with the proposed variation(s).
D. Final Decision. The City Engineer shall issue his/her findings and conclusions on the variance in writing, and shall immediately provide a copy to the applicant as well as all persons requesting notification. If the application does not satisfy all of the above criteria, the City Engineer shall deny the application. A variance may be conditioned to the extent necessary to address any engineering, public health, safety, or welfare concerns, and as allowed by applicable law.

E. Appeals. Appeals of a variance shall be filed and processed as described in Title 19 GHMC for a Type II application.

1.040 Design Standards

A. Detailed plans, prepared by a licensed engineer, must be submitted to the City for plan review and approval prior to the commencement of any construction. The applicant's engineer shall be a Professional engineer, registered as such in the State of Washington. All plans must be checked, signed and stamped by the applicant's engineer prior to submittal for plan review. Final plans shall be approved by the Planning Director and the City Engineer prior to the start of construction.

B. The number and size of plans shall be published in a checklist by the City Engineer and available on the City webpage and at the Public Works Department.

C. Separate plan and profile drawings are required for all proposed transportation-related improvements, street illumination, traffic signalization, storm drainage facilities (whether public or private), and sewer and water improvements. For specific minimum requirements, contact the City of Gig Harbor Engineering Department for the latest version of the Plan Check List. Some items of the checklist, though called for, may be unnecessary for a given project. This will be decided during the Site Plan Review or the Engineering Plan Review stage.

D. Specifications shall be required and submitted with the plans if General Notes do not adequately cover the project requirements.

E. Signed originals of all necessary easements and/or right-of-way dedication documents meeting all the current recording Standards must be reviewed, approved and recorded prior to receiving signed approved plans.

F. A copy of the Maintenance Schedule for Drainage Systems can be found in Chapter 8 of the City of Gig Harbor Stormwater Management and Site Development Manual.

G. An Engineer's Estimate prepared by an engineer licensed in the State of Washington shall be required prior to Engineering plan approval.

H. All entrances onto public right-of-way must have a sight distance certification and be stamped and signed by a licensed...
The design criteria must adhere to the guidelines set forth by *A Policy on Geometric Design of Highways and Streets* by ASHTO.

I. Please contact the City of Gig Harbor Engineering Department for a copy of the most current Plan Review Application and Plan Review Checklist.

1.050 Plan Review

A. Preliminary Civil Plan Review
All plans and related documents are to be submitted to the Planning Department along with payment of the plan review fee, as required in Section 1.070. The Public Works Department will review the plans in accordance with the City’s municipal code.

B. Civil Construction Plan Review
All plans and related documents are to be submitted to the Public Works Department along with payment of the plan review fee, as required in Section 1.070. The Public Works Department and other appropriate City Departments will review the plans in accordance with the City’s Municipal code.

Any necessary easements or dedications shall be signed and notarized and submitted in a recordable format along with the plans. An engineer’s estimate shall be submitted prior to plan approval. City staff will make a cursory check of the plans against the plan’s checklist on the preceding pages. Plans that meet the minimum checklist requirements as to context will be routed to the appropriate City staff and the Plan Review Process will begin.

The initial turn-around time for the first review of plans submittal is normally three weeks. The Engineer is then requested to submit the original drawings for approval or is notified of additional required revisions. For subsequent reviews, the Engineer will submit three sets of drawings for re-review or will be notified of additional required revisions. Additional review time will be required if revisions are necessary.

If the City’s comments are not adequately addressed at a second review, a third submittal is required and additional fees for review of a third submittal will be levied, as established by resolution of the city council. "Third Submittal" shall mean the third and any subsequent submittal of construction drawings, specifications, drainage calculations, and/or other information that requires additional plan checking even when plans have otherwise been approved.

Approved plans will be returned to the Engineer only after the plan check, construction inspection, and utility connection fees have been
paid and any required agreements, easements or dedications have been signed and notarized by the developer.

Plans that have been approved more than 180 days before construction begins (i.e., a preconstruction meeting scheduled and inspection fees paid) shall be subject to re-review.

1.055 Construction Control

Work performed for the construction or improvement of City roads and utilities whether by or for a private developer, by City employees, or by a City contractor, shall be done to the satisfaction of the City and in accordance with approved plans. It is emphasized that no work shall be started until such plans are approved. Any revision to such plans shall be approved by the City before being implemented. Failure to receive the City's approval can result in removal or modification of construction at the contractor's or developer's expense to bring it into conformance with approved plans.

The developer, contractor or their agents shall purchase and have on site during the entire construction the most current copy of the City of Gig Harbor Public Works Standards along with an approved, signed set of construction drawings and any necessary permits required for the project. A pre-construction meeting shall be required prior to the beginning of any construction and at which time the approved sets of construction drawings will be provided. Call the City of Gig Harbor Engineering Department to schedule a pre-construction meeting at (253) 851-6170.

1.060 Inspection

All work performed within the public right-of-way or easements, or as described in these Standards or Title 12 of the GHMC, whether by or for a private developer, by City employees, or by a City contractor, shall be completed to the satisfaction of the City and in accordance with the WSDOT Standard Specifications, any approved plans and these Standards. Unless otherwise approved, any revision to construction plans must be approved by the City before being implemented. Revisions shall be prepared by the developer's engineer and submitted to the City for review and approval. City plan approval is required prior to construction.

It is the responsibility of the developer, contractor, or their agents to notify the City in advance of the commencement of any authorized work. A preconstruction meeting and/or field review shall be required before the commencement of work. Inspection fees shall be paid prior to the preconstruction meeting. Any necessary easements or dedications are required before plan approval.

The City shall have authority to enforce these Standards as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants and inspectors as necessary to inspect the work and they will exercise such authority as the City Engineer may delegate.

All specific inspections, test measurements or actions required of all work and materials are set forth in their respective sections herein. Tests shall be performed at the developer or contractor's expense.
Failure to comply with the provisions of these Standards may result in stop work orders, removal of work accomplished, or other penalties as established by ordinance.

A project is considered final when the City Counsel has accepted the project as complete and a maintenance bond for the project has been accepted by the City.

### 1.065 Record Drawings

Record drawings shall be required whenever field changes are made to approved plans. The record drawing shall be completed and certified and sealed by a professional engineer currently licensed in the State of Washington. The record drawing shall be submitted on paper and on a read/write CD in AutoCAD compatible format unless otherwise approved by the City. The digital format of the drawings shall be in AutoCAD compatible file and include all improvements in the right of way an all storm water, water, and sewer utilities. The horizontal datum shall be NAD1983 HARN State Plane South FIPS 4602, or as otherwise approved by the City Engineer. The vertical datum shall be NGVD 29, or as otherwise approved by the City Engineer. Final City project approval will not be granted until the record drawing is submitted.

#### Construction Features

1. Record drawings will show accurate locations of storm, sewer, water mains and other water appurtenances, structures, conduits, power poles, light standards, power service cabinets, vaults, width of streets, sidewalks, landscaping areas, building footprints, channelization and pavement markings, property lined, easements, storm ponds etc.

2. The following is a list of the tolerance limits and construction features to be incorporated into the record drawings:

   **Tolerance Limits:**
   - Surveyed sewer and storm water elevations..................+/-0.01’
     Includes pipe invert elevations, top of casting (manhole, Inlets, etc.)
   - Surveyed water elevations............................................+/-0.25’
   - Horizontal and vertical alignment...............................+/-0.10’

#### Storm Drainage

Storm drainage features are intended to move rainwater and/or groundwater. Record drawings shall indicate all necessary information about the storm drainage system to evaluate whether the constructed features will be able to function as intended by the design. Information shall be field verified and/or surveyed as outlined in the following table. Generally the following information is required who should provide the information is shown in parentheses:
### Figure 1.1 Storm Drainage

<table>
<thead>
<tr>
<th>Storm Drainage Features</th>
<th>Field Verify</th>
<th>Survey</th>
<th>Indicate on Record Drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mark on field drawing plan set all changes from design drawings (Contractor and Inspector)</td>
<td>(Licensed Surveyor)</td>
<td>(Record Drawing Preparer/Engineer)</td>
</tr>
<tr>
<td>Pipes</td>
<td>Material, Diameter</td>
<td>Inverts- (All pipe ends in structures of out) <strong>Location of Ends</strong>- (Not in Structures)</td>
<td>Redraw pipe on drawings if it moved two ft. or more. <strong>Recalculate</strong> slope based on record length and surveyed inverts. <strong>Indicate</strong> new information on plans (ex. Slope, length, diameter, etc.)</td>
</tr>
<tr>
<td>CB's/manholes/inlets</td>
<td>Size, type</td>
<td><strong>Rim Elevation</strong> <strong>Location of Structure</strong></td>
<td>Redraw Structure on drawings if it moved two ft. or more. <strong>Indicate</strong> new information on plans</td>
</tr>
<tr>
<td>Culverts</td>
<td>Material/ size</td>
<td><strong>Location of ends</strong> <strong>Inverts</strong>- (Of structure ends and of stream if flow line natural or filled with earth)</td>
<td>Redraw culvert on drawings if it moved two ft. or move two ft. or more. <strong>Recalculate</strong> slope based on record length and surveyed inverts. <strong>Indicate</strong> new information on plans (ex. Slope, length, diameter, etc.)</td>
</tr>
<tr>
<td>Under drains</td>
<td>Pipe location, material, cleanout locations</td>
<td></td>
<td>Redraw under drains on drawings if it moved two ft. or more.</td>
</tr>
<tr>
<td>Other drainage features</td>
<td></td>
<td></td>
<td>Redraw feature on drawings if it moved two ft. or more.</td>
</tr>
</tbody>
</table>
Stormwater Management

Stormwater Management features are intended to control the rate and/or quality of the rainwater runoff. Record drawings shall indicate all necessary information about the stormwater management system to evaluate whether the constructed features will be able to function as intended by the design. Information shall be field verified and/or surveyed as outlined in the following table. The record drawings must include a Storm Pond Certification Letter stamped and signed by the engineer of record. This letter must state that the pond was constructed per the engineer’s design and that the as-built size meets or exceeds the designed storage capacity. Generally the following information is required who should provide the information is shown in parentheses:

**Figure 1.2 Stormwater Management**

<table>
<thead>
<tr>
<th>Storm drainage features</th>
<th>Field verify</th>
<th>Survey</th>
<th>Indicate on record drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mark on field drawing plan set all changes from design drawings (Contractor and Inspector)</td>
<td>Control structure location</td>
<td>Redraw structures on drawings if it moved two ft. or more.</td>
</tr>
<tr>
<td>Vaults</td>
<td>Material, type, size, control systems (orifice size, weir dimensions)</td>
<td>Control elevations (orifice inverts, weir elevations) Bottom elevation Access locations</td>
<td>Indicate new information on plans (ex. size type, ect.)</td>
</tr>
<tr>
<td>Ponds</td>
<td>Size, shape, letter from engineer of record certifying the construction and size of the storm pond.</td>
<td>Control structure location</td>
<td>Redraw pond on drawings if moved ten ft. or more. Recalculate size based on water surface shape.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control elevations (orifice inverts, weir elevations) Overflow elevation Bottom elevation Water surface shape (spot locations around edge of water surface – enough to indicate shape/ location six shots minimum)</td>
<td>Indicate new information on plans (ex. size, shape, ect.)</td>
</tr>
<tr>
<td>Bio filters/ swales</td>
<td>Length, width</td>
<td>Inlet invert Outlet invert</td>
<td>Redraw biofilter/swale on drawings if it moved two ft. or more.</td>
</tr>
<tr>
<td>Infiltration systems/ French drains</td>
<td>Material, size, pipe (size, type, diameter)</td>
<td>Inlet invert Bottom elevation</td>
<td>Redraw feature on drawings if moved two ft. or more.</td>
</tr>
</tbody>
</table>
Natural Resources

Natural resources features are non-structural features that convey and/or hold water. Record drawings shall indicate all necessary information about the natural resource to evaluate whether the constructed features will be able to function as intended by the design. Information shall be field verified and/or surveyed as outlined in the following table. Generally the following information is required who should provide the information is shown in parentheses:

**Figure 1.3 Natural Resources**

<table>
<thead>
<tr>
<th>Natural Resources feature</th>
<th>Field verify</th>
<th>Survey</th>
<th>Indicate on record drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mark on field drawing plan set all changes</td>
<td>(Licensed Surveyor)</td>
<td>(Record Drawing Prepare/Engineer)</td>
</tr>
<tr>
<td></td>
<td>from design drawings (Contractor and Inspector)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streams</td>
<td>Centerline of stream</td>
<td>Redraw stream on drawings if it moved two ft. of more</td>
<td></td>
</tr>
<tr>
<td>Wetlands</td>
<td>Boundary of created of modified wetlands, and boundary of current wetlands</td>
<td>Redraw wetland in drawings if it moved ten ft. or more. Recalculate size based on wetlands shape. Indicate new information on plans (ex. size, shape, ect.)</td>
<td></td>
</tr>
</tbody>
</table>
**Water System**

Water system features are intended to move or hold potable water. Record drawings shall indicate all necessary information about the water system to evaluate whether the constructed features will be able to function as intended by the design. Information shall be field verified and/or surveyed as outlined in the following table. Generally the following information is required who should provide the information is shown in parentheses:

**Figure 1.4 Water System**

<table>
<thead>
<tr>
<th>Water system feature</th>
<th>Field verify</th>
<th>Survey</th>
<th>Indicate on record drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipes and fittings</td>
<td>1) Material, size, joint type, and fitting</td>
<td>Horizontal location of main:</td>
<td>Redraw pipe on drawings if it moved two or more ft. horizontally.</td>
</tr>
<tr>
<td></td>
<td>2) Crossing invert location and invert of any utility crossings</td>
<td>1) Outside of ROW-every 100 ft.</td>
<td>Indicate new information on plans (ex. diameter, horizontal and vertical location of pipe, length between fittings, joint type, etc.)</td>
</tr>
<tr>
<td></td>
<td>3) Depth of pipes at every fitting</td>
<td>2) Within ROW-distance off centerline of road. (Use pipe locator for location.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valves (Gate valves GV,</td>
<td>Size, type, length of valve extension used</td>
<td>Horizontal locations as follows:</td>
<td>Redraw valve on drawings if it moved two ft. or more.</td>
</tr>
<tr>
<td>Butterfly Valves BFV, Air</td>
<td></td>
<td>1) GV –center of valve (same as center of box)</td>
<td>Indicate new information on plans (ex. size, type, etc.)</td>
</tr>
<tr>
<td>Vac AV, fire line detector</td>
<td></td>
<td>2) BFV –center of valve box</td>
<td></td>
</tr>
<tr>
<td>check valves, and Blow Offs</td>
<td></td>
<td>3) AV –center of meter box assembly</td>
<td></td>
</tr>
<tr>
<td>BO</td>
<td></td>
<td>4) BO –center of meter box assembly</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrants</td>
<td>Hydrant bury depth</td>
<td>Horizontal location of hydrant (center of valve stem)</td>
<td>Redraw hydrant on drawings if it moved two ft. of more.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indicate new information on plans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service lines</td>
<td>Material, size, location</td>
<td></td>
<td>Redraw service line on setter on drawings if it moved two ft. or more.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indicate new information on plans (ex. size, type, etc.)</td>
</tr>
<tr>
<td>Component</td>
<td>Details</td>
<td>Instructions</td>
<td></td>
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<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Meters</td>
<td>Type, size, vault or box and size</td>
<td>Redraw box or vault on drawings if it moved two ft. or more. Indicate new information on plans (ex. size, type, ect.)</td>
<td></td>
</tr>
<tr>
<td>PRV (Pressure Reducer Valve)</td>
<td>Size, vault size, vault drain data</td>
<td>Redraw vault on drawings if it moved two ft. or more. Indicate new information on plans (ex. size, type, ect.)</td>
<td></td>
</tr>
<tr>
<td>Fire system (PIV post indicator valve, FDC fire dept. connection)</td>
<td>Material, size, locations of pipe and appurtenances</td>
<td>Redraw pipe, vault, PIV, FDC, on drawings if it moved two ft. or more. Indicate new information on plans (ex. size, type, ect.)</td>
<td></td>
</tr>
<tr>
<td>Private fire line</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back flow devices</td>
<td>Device type, size, service line size, location of drain</td>
<td>Redraw vault or box on drawings if moved two ft. or more. Indicate new information on plans (ex. size, type, ect.)</td>
<td></td>
</tr>
</tbody>
</table>
Sanitary Sewer

Sanitary sewer features are intended to transport sanitary waste into a collection system. Record drawings shall indicate all necessary information about the sanitary sewer system to evaluate whether the constructed features will be able to function as intended by the design. Information shall be field verified and/or surveyed as outlined in the following table. Generally the following information is required who should provide the information is shown in parentheses:

**Figure 1.5 Sanitary Sewer**

<table>
<thead>
<tr>
<th>Sanitary Sewer Feature</th>
<th>Field Verify</th>
<th>Survey</th>
<th>Indicate on record drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mark on field drawing plan set all changed from design drawings (Contractor and Inspector)</td>
<td>1) Horizontal location of center of manhole. 2) Rim elevation and all pipe invert elevations.</td>
<td>Note all changes and correct elevations</td>
</tr>
<tr>
<td>Manholes</td>
<td>Manhole diameter, type</td>
<td>Length (horizontal length if pipe from center of manhole to center of manhole.)</td>
<td>Redraw pipe on drawings if it moved two ft. or more. <strong>Recalculate</strong> slope based on record length and surveyed inverts. <strong>Indicate</strong> new information on plans (ex. slope, length, diameter, ect.)</td>
</tr>
<tr>
<td>Pipe (Gravity Sewer Main)</td>
<td>Material, size, Distance to each side sewer tee location from the down stream manhole.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe and fittings (Force Main)</td>
<td>1) Material, size, joint type, fittings 2) Measure distance between fittings from center of fittings. 3) Crossing information – location of any utility crossings 4) Depth of force main</td>
<td>Horizontal location of main: 1) Outside of ROW- every 100 ft. 2) Within ROW- distance off centerline of road. (Use pipe locator for location.)</td>
<td>Redraw pipe on drawings if moved two ft. or more. <strong>Indicate</strong> new information on plans (ex. size, length, ect.)</td>
</tr>
<tr>
<td>Side Sewer</td>
<td>Plats</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>------------</td>
<td></td>
</tr>
</tbody>
</table>
|            | Pipe material, size, length of side sewer stub. | 1) Pipe material and size.  
2) Length of side sewer stub. 
3) Distance between each cleanout. |
|            | 1) Location of end of side sewer (marked by 4x4.) | Horizontal location and ground elevation of all side sewer surface cleanouts. |
|            | 1) Note all changes.  
2) Show side sewer tee station. | 1) Note all changes.  
2) Show location and ground elevation of side sewer cleanouts.  
3) Side sewer as-built |

| Valves | Size, type, length of valve nut extension used | 1) Horizontal location of GV –center of valve box  
2) AV –center of meter box assembly and center of stand pipe at post  
3) BO –center of meter box assembly | Redraw valve on drawings if moved two ft. or more.  
Indicate new information on plans (ex. size, type, ect.) |
|        | 1) Horizontal location of center of meter box assembly and center of stand pipe of post. | Redraw air vac on drawings if moved two ft. or more.  
Indicate new information on plans (ex. size, type, ect.) |

| Air Vacs | Size, type | 1) Horizontal location of center of meter box assembly and center of stand pipe of post. | Redraw air vac on drawings if moved two ft. or more.  
Indicate new information on plans (ex. size, type, ect.) |

| Cleanouts | Size | 1) Rim elevation of center of cleanout.  
2) Horizontal location of center of cleanout. | Redraw cleanout on drawings if moved two ft. or more.  
Indicate new information on plans. |

| Grease Interceptor/ Oil Water Separators | 1) Pipe material, size  
2) Vault dimensions and size | Horizontal location of center of vault | Redraw structures on drawings if moved two ft. or more.  
Indicate new information on plans (ex. size, type, ect.) |
Transportation

Transportation features are surface structures that are intended to help facilitate the movement of the general public. Record drawings shall indicate all necessary information about the transportation features to evaluate whether the constructed features will be able to function as intended by the design. Information shall be field verified and/or surveyed as outlined in the following table. Generally the following information is required who should provide the information is shown in parentheses:

**Figure 1.6 Transportation**

<table>
<thead>
<tr>
<th>Transportation Features</th>
<th>Field verify</th>
<th>Survey</th>
<th>Indicate on record drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mark on field drawing plan set all changed from design drawings (Contractor and Inspector)</td>
<td>(Licensed Surveyor)</td>
<td>(Record Drawing Preparer/Engineer)</td>
</tr>
<tr>
<td>Pavement</td>
<td>Material, depth, width</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curb and Gutter</td>
<td>Location of face of curb, type, and top of curb elevations</td>
<td></td>
<td>Redraw structure on drawings if moved two ft. or more</td>
</tr>
<tr>
<td>Driveways</td>
<td>Location, width, type, curve and line information</td>
<td></td>
<td>Redraw structure on drawings if moved two ft. or more</td>
</tr>
<tr>
<td>Channelization</td>
<td>Materials and layout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signage</td>
<td>Location, size, type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street Lighting</td>
<td>Height, wattage</td>
<td>Pole location, service cabinet location, j-boxes</td>
<td>Redraw structure on drawings if moved two ft. or more</td>
</tr>
<tr>
<td>Sidewalk</td>
<td>Location, width</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Signals</td>
<td>Pole locations, signal cabinets, j-boxes, traffic loops</td>
<td></td>
<td>Redraw structure on drawings if moved two ft. or more</td>
</tr>
<tr>
<td>Monument Cases</td>
<td>Location</td>
<td>Horizontal coordinates, and vertical elevation</td>
<td></td>
</tr>
<tr>
<td>Conduit</td>
<td>Location, size, type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junction Boxes</td>
<td>Location, type</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.070 Fees

Fees, charges or financial guarantee requirements shall be as established by the city council by the passage of a resolution adopting a fee, charge, and financial guarantee requirement schedule except where specifically set forth in the City of Gig Harbor Municipal Code (GHMC). It is the applicant's responsibility to verify the current fee schedule.

All plan review fees are due upon submittal of plans for review.

All remaining plan check fees are due prior to the release of approved plans.

All inspection fees are due before final, approved plans are released.

In addition, there are various service and connection fees and charges. We strongly urge all applicants to request an estimate of these fees and charges from the City’s Public Works and Planning and Building Departments as soon as practical.

1.080 Permits

Before any person, firm or corporation shall commence or permit any other person, firm or corporation to commence any work to grade, pave, level, alter, construct, repair, remove, excavate or place any pavement, sidewalk, crosswalk, curb, driveway, gutter, drain, sewer, water, conduit, tank, vault, street banner or any other structure, utility or improvement located over, under or upon any public right-of-way or easement in the City of Gig Harbor, or place any structure, building, barricade, material, earth, gravel, rock, debris or any other material or thing tending to obstruct, damage, disturb, occupy, or interfere with the free use thereof or any improvement situate therein, or cause a dangerous condition, a permit shall be obtained in accordance with Title 12 of the Gig Harbor Municipal Code. A separate permit shall be obtained for each separate project.

In the case of work contracted with the City, the signing of the contract shall constitute an Encroachment Permit.

Much of the work covered under these Standards will require multiple permit authority reviews and approvals. Several types of permits and approvals require prior approval from the authority before a building or other permit can be issued. Any questions regarding information about permits, approvals and agreements should be directed to the appropriate departments.

The following general categories describe some of the permits, approvals and agreements, along with issuing permit/code authority identified in parentheses:

A. Environmental Review

For most projects, a SEPA Environmental Checklist must be completed by the applicant and submitted along with plans, specifications and other information when approval or permits are being requested for a project. Environmental reviews are conducted by the SEPA responsible official.
B. Construction Permits


2. Building Permit (Building Division). A Building Permit is required for most construction work including alteration, repairs and demolition.

3. Encroachment Permit (Engineering Division of the Public Works Department). An Encroachment Permit is required for any work within the right-of-way as set forth in Section 12.02 of the GHMC. Such work may include: utilities work, lane closures, driveways, curbs, sidewalks, and haul routes. Permission to temporarily close a street or portion thereof for construction activities or special events is obtained through the Encroachment Permit.

4. Civil Permit. A Civil Permit is required for any site development activity, including construction activity. Site development activities requiring a Civil Permit are listed in GHMC 12.06.

C. Approvals and other Permits

There are several other permits or approvals that may be required and referred to in these Standards which include but are not limited to: Site Plan Review, Design Review Board, plat and short plat approvals, and Certificate of Occupancy.

In addition, there are several other City approvals (land use) which may have to be obtained prior to the above listed permits and which may affect the Standards as contained in this document and which include, but are not limited to, Variance; Conditional Use; Planned Residential Development; Planned Unit Development; Shoreline Substantial Development Permit or any other State or Federal permits.

1.090 Financial Guarantees

Bonds or other allowable financial securities may be required by the City to guarantee the performance of or maintenance of required work. A guarantee shall be required for maintenance as outlined in Section 12.06.100 of the City of Gig Harbor Municipal Code and Stormwater Management and Site Development Manual. The type and amount of security shall be per code, or, if not specified, be at the discretion of the City. Types of securities include but are not limited to a bond with a surety qualified to do a bonding business in this state, a cash deposit, an assigned savings account, or cash set aside. For bond forms, contact City of Gig Harbor Engineering Department.

Final City acceptance shall not be given until all the required work is complete and approved by the City and the maintenance financial guarantee(s) are in place.

1.100 Utility Locations

A. Applicants shall call 811 for utility locates for design purposes and show existing utilities on application materials using the best information available. Additional
verification may be required during design, including excavation (potholing), if utilities are shown to be in conflict with the proposed design or may not meet minimum cover depths during construction.

B. Proposed and existing utilities within a proposed or existing public right-of-way or public easement shall be located (or relocated) as shown in the Details. Deviations from the Details will be allowed as follows:

1. Where frontage improvements are not required in accordance with Section 2B.080 existing utilities may remain in their original location; or

2. Where the public right of way frontage along the developing property is less than 200 ft. long the existing overhead utilities may remain overhead; or

3. Where existing utilities are converted from overhead to underground beyond the frontage of the developing property the relocated utility may be located within the right-of-way under the sidewalk; or

4. Where the existing overhead utility contains electrical voltage at or above medium voltage distribution as defined by IEEE, the City Engineer shall consult with the franchise utility regarding relocation of the overhead utility lines. The City Engineer shall approve a deviation where:
   i. The franchise utility plans to relocate the existing overhead utility to underground within seven (7) years of the date of the underlying project permit decision as depicted in the utility's Reliability Plan. If the franchise utility determines the project falls within said Plan, the developer will only be responsible for the installation of the required underground utility civil infrastructure and the franchise utility will be required to complete the job according to the established Plan; or
   ii. The franchise utility identifies substantial operational impacts to the franchise utility infrastructure caused by relocating existing overhead utility to underground.

5. Any deviation approved through subsection B shall become a condition of the underlying project permit application and may be appealed with any appeal of the underlying project permit application as prescribed in Title 19 of the Gig Harbor Municipal Code.

C. All costs associated with installing new utilities, undergrounding existing overhead utilities, and relocating existing overhead utilities shall be paid fully by the developer in accordance with Section 12.18.260 GHMC. Where, for operational purposes, the utility requires extending undergrounding or relocating their utility line beyond the frontage of the developing property, those additional expenses shall also be paid fully by the developer.

D. An Encroachment Permit is required of any existing utility work in accordance with Title 12 GHMC and Section 1.080.
1.110 Easements

A. Where public utilities and/or their conveyance systems cross private lands, an easement must be granted to the City. The Public Works Department will generally process, record and file all easements. If the property is to be platted, the easement must be conveyed when the short plat or final plat is filed. All easements not shown on a plat must be prepared by a licensed land surveyor.

B. Easement widths shall be 15 ft. for a single utility and 20 ft. for dual utilities. Temporary construction easements shall be 30 ft. minimum in total width, including the permanent easement. When trench depths dictate or where pipe diameter or vault widths exceed four ft., a wider easement may be required by the City Engineer.

C. Easements are required to be submitted in draft, unsigned, for review and approval by the City Attorney prior to plan approval. Signed, notarized easements are required prior to plan approval. Any change in design which places an amenity i.e., water, sewer, sidewalk, etc. outside of the easement may necessitate stopping of construction until plans and easements can be resubmitted and approved. A plan review fee shall be based on the rate as established for resubmittals. Easements will be filed by the City upon plan approval.

1.120 Latecomers Agreements

Any person who constructs a water or sewer main extension may, with the approval of the City Engineer and the City Council, execute a Latecomer Agreement for water and/or sewer facilities. (GHMC 13.35)

The water and/or sewer facility to be constructed must be consistent with the City’s latest adopted version of the Comprehensive Plan and shall be within the City or within ten miles of the City corporate limits and connecting with the City public water or City sewage system to serve the area in which the real estate owned by the latecomers is located.

The applicant must comply with all the terms and conditions of Section 13.35 GHMC.

1.130 Utility Extension

A. Utility mains shall be extended to and through the extremes of the property being developed when the following situations occur:

1. Roadway frontage improvements are required in accordance with Section 2B.080; or

2. The extension will allow for a future loop connection, benefit public health or safety, or due to impacts from the development.

In all other cases utility mains shall, at a minimum, be extended to the location of the perpendicular utility connection to the building(s).
B. Owners of properties lying outside of the current city limits, but within the City’s Utility Service Area, may connect to City utilities contingent on approval of a City-provided utility extension agreement in accordance with Chapter 13.34 GHMC.

1.140 Traffic Control

See Chapter 2, Section 2B.126.

1.150 Call Before You Dig

All developers/contractors are responsible for timely notification of all utilities in advance of any construction in right-of-way or utility easements. The utilities one-call Underground Location Center phone number is 811 or www.wucc.org.
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<th>Title</th>
<th>Page</th>
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<td>2C.040</td>
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2.000 TRANSPORTATION

2A GENERAL CONSIDERATIONS

2A.010 General

The overall goal of this section is to encourage the uniform development of an integrated, fully accessible public transportation system that will facilitate present and future travel demand with minimal environmental impact to the community as a whole. All design standards shall follow accepted engineering practices with an emphasis on safety. Safety shall override the supplemental standards as outlined in this document.

This section provides minimum development standards supplementing the applicable standards as set forth in Section 1.010.

2B ROADWAYS

2B.010 General

Roadway design must provide for the maximum loading conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

2B.020 Design Standards

The design of roadways shall depend upon their functional classification and usage. The design elements of city roadways shall conform to City standards as set forth herein and current design practice as set forth in Section 1.010. Standard design cross-sections and structures are shown in the details at the end of this section. Alternate structural sections may be used based on the criteria as outlined in Section 2B.160. Safety shall be paramount in any roadway design.

Federally classified roadways on the National Highway System shall meet the design standards required for those roadways. Any modification to those standards shall comply with the deviation process as established by the WSDOT Local Agency Guidelines Manual. Deviations require justification with safety being a prime consideration.

The layout of roadways shall be based on their functional requirements, i.e., the grouping of roadways based on the service they provide. See Section 2B.025 for Access Management criteria and 2B.030 for Functional Classification applications. See the Minimum Roadway Design Standards table, Figure 2.1, for design criteria.

The layout of roadways shall provide for the continuation of existing principal roadways in adjoining subdivisions or for their proper projection when
adjoining property is not subdivided. Minor roadways, which serve primarily to provide access to abutting property, shall be designed to discourage through traffic.

GENERAL ROADWAY LAYOUT REQUIREMENTS ARE AS FOLLOWS:

A. Alignment. Alignment of boulevards, principal arterials and collectors shall conform to the Transportation Comprehensive Plan. The City of Gig Harbor City Engineer shall approve deviations to the Transportation Element of the Comprehensive Plan.

B. Grade. Roadway grade should conform closely to the natural contour of the land. In some cases a different grade may be required by the City Engineer. See the Minimum Roadway Design Standards table for specifics.

C. Width. The pavement and right-of-way width depend on the roadway classification and functional requirements. See roadway details for specifics. Roadway widths shall be measured from face-of-curb to face-of-curb on roadways with a cement concrete curb and gutter. The table of Minimum Roadway Design Standards show the minimum widths allowed.

D. The general notes listed below on the following pages shall be included on any plans dealing with roadway design in addition to all applicable requirements in Section 1.040.

GENERAL NOTES (ROADWAY CONSTRUCTION)

1. All workmanship and materials shall be in accordance with City of Gig Harbor standards and the most current copy of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction. In cases of conflict, the most stringent standard shall apply.

2. The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the Washington State Department of Labor and Industries.

3. The contractor shall be responsible for all traffic control in accordance with the WSDOT Standard Plans for Road, Bridge and Municipal Construction (all applicable “K” plans) and/or the Manual on Uniform Traffic Control Devices (MUTCD). Prior to disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

4. All curb and gutter, roadway grades, sidewalk grades and any other vertical and/or horizontal alignments shall be staked by a registered surveyor licensed in the State of Washington.

5. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction.
6. If construction is to take place in other jurisdiction’s right-of-way (i.e., Pierce County, the State, or other adjacent municipalities), the contractor shall notify the City. All the required approvals and permits shall be obtained prior to starting work. The contractor shall reimburse the City for associated permit fees.

7. A pre-construction meeting shall be held with the City of Gig Harbor Construction Inspector a minimum of 72 hours prior to the start of construction.

8. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate line at 811 a minimum of 48 hours prior to any excavation.

9. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.

10. All surveying and staking shall be performed per the corresponding section of the City of Gig Harbor Public Works Standards.

11. Temporary erosion control/water pollution prevention measures shall be required in accordance with Section 1-07.15 of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and the City of Gig Harbor Stormwater Management and Site Development Manual. At no time will silts and debris be allowed to drain into an existing or newly installed facility unless special provisions have been designed. Projects that exceed one acre or more in size are required to obtain a General Construction Storm Water permit through the Department of Ecology. A copy of this permit must be submitted to the City prior to the start of any construction.

12. Where new asphalt joins existing, the existing asphalt shall be cut to a neat vertical edge and tacked with Asphalt Emulsion type CSS-1 in accordance with the standard specifications. The new asphalt shall be feathered back over the existing to provide for a seal at the saw cut location and the joint is to be sealed with grade AR-4000W paving asphalt.

13. Compaction of sub-grade, rock, and asphalt shall be in accordance with the most current adopted version of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.

14. Form and sub-grade inspection by the City is required before pouring concrete. 24 hours notice to the City is required for form inspection.

15. See the City of Gig Harbor Public Works Standards, Section 2B.200, for testing and sampling frequencies.

16. All sign sheeting shall be high intensity prismatic and in conformance with the Manual on Uniform Traffic Control Devices (MUTCD).
## Figure 2.1 Minimum Roadway Design Standards

<table>
<thead>
<tr>
<th>DESIGN STANDARD</th>
<th>Arterials</th>
<th>Major Collectors</th>
<th>Minor Collectors</th>
<th>Major Local Residential</th>
<th>Minor Local Residential</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESIGN LIMITATIONS</strong></td>
<td></td>
<td></td>
<td>Access and intersections are limited.</td>
<td>Access limited to one driveway per SF residential lot.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MINIMUM STRUCTURAL DESIGN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MINIMUM RIGHT-OF-WAY</strong></td>
<td></td>
<td></td>
<td></td>
<td>See Details 2-01 through 2-08</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MINIMUM PAVEMENT WIDTH</strong></td>
<td></td>
<td></td>
<td></td>
<td>See Details 2-01 through 2-08</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PARKING LANE</strong></td>
<td>None allowed</td>
<td>Allowed on Type I where bulb-out parking is provided.</td>
<td>Prohibited on Type II</td>
<td>Bulb-out parking required except in intersection transition section</td>
<td>Prohibited</td>
<td>Bulb-out parking allowed except in intersection transition section</td>
</tr>
<tr>
<td><strong>MINIMUM GRADE</strong></td>
<td>With curb and gutter or concrete roadway, minimum grade 0.5%</td>
<td>On ACP roadway with no curb and gutter or curb and gutter on one side only, minimum grade 1.0%</td>
<td>See Details 2-01 through 2-08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MAXIMUM GRADE</strong></td>
<td>8.0%</td>
<td>10.0%</td>
<td>12.0%</td>
<td>15.0%</td>
<td>15.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td><strong>CURB</strong></td>
<td>Longitudinal slope minimum 0.5% on tangents</td>
<td>Minimum curb return grade to catch basin 1.0%</td>
<td>See Details 2-01 through 2-10 for width variances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIDEWALKS</strong></td>
<td>See Details 2-01 through 2-10 for width variances</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INTERSECTION CURB RADIUS</strong></td>
<td>The minor intersecting roadway shall control the curb radii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>W/O MEDIAN</strong></td>
<td>35'</td>
<td>30'</td>
<td>30'</td>
<td>25'</td>
<td>20'</td>
<td>10'</td>
</tr>
<tr>
<td><strong>WITH MEDIAN</strong></td>
<td>35'</td>
<td>35'</td>
<td>35'</td>
<td>30'</td>
<td>25'</td>
<td>15'</td>
</tr>
<tr>
<td><strong>DESIGN SPEED NEW ROAD</strong></td>
<td>35 mph</td>
<td>30 mph</td>
<td>30 mph</td>
<td>25 mph</td>
<td>20 mph</td>
<td>20 mph</td>
</tr>
<tr>
<td><strong>DESIGN SPEED EXISTING RDS</strong></td>
<td>5 mph above posted speed limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MINIMUM CENTERLINE RADIUS</strong></td>
<td>455' @ 30 mph</td>
<td>1,120' @ 45 mph</td>
<td>195' @ 20 mph</td>
<td>100'</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INTERSECTION</strong></td>
<td>630' @ 35 mph</td>
<td>1,430' @ 50 mph</td>
<td>305' @ 25 mph</td>
<td>Res. = 100' Com. = 195' Industrial = 195'</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SUPER-ELEVATION</strong></td>
<td>Requires approval of the City Engineer. If allowed, design shall be per AASHTO with the maximum super elevation not to exceed 4%</td>
<td>Not allowed</td>
<td>See Details 2-01 through 2-08</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**TRANSPORTATION**

2-6
2B.025 Access Management

The City has adopted these Access Management guidelines. City facilities shall meet these standards in addition to the access requirements as set forth in RCW 47.50, WAC 468-51, WAC 468-52 and all other applicable RCW’s and WAC’s.

Access Management is a tool to address traffic congestion, crashes, and loss of roadway capacity. The intent of Access Management is to provide access for land development while preserving the flow of traffic in terms of safety, capacity and speed of travel.

The benefits of access management include:

- Safety – by reducing the number and severity of crashes;
- Operation – by reducing delays while maximizing the roadway potential capacity;
- Environmental – by lowering the amount of air pollution caused by stop-and-go operation thereby increasing fuel economy;
- Economics – by preserving public investment in the roadway infrastructure, avoiding the need for roadway widening or other roadway improvements.

The objective of access management include:

- Establish guidelines for location and design of driveways
- Provide access from public roadways
- Define an access control hierarchy for all roadways
- Regulate access location and design; intersections, signal and access spacing standards; corner clearances; joint and cross access; functional areas of an intersection and medians
- Provide connectivity between neighborhoods and adjoining land uses

A. Determination of Access Classification

Determination of access shall be the responsibility of the City. The developer shall provide the following information at the time of Civil Plan Permit Application along with recommendations to assist the City in determining access locations:

1. City of Gig Harbor land use plans, zoning, and land development regulations as set forth in adopted comprehensive plans.

2. The current and potential functional classification of the roadway. See Section 2B.030.

3. Existing and projected traffic volumes, accident history, and other operational considerations.
4. Existing and projected state, local, and regional planning organization transportation plans and needs, including considerations of new or improved facilities.

5. Drainage requirements.

6. The physical features of lands adjoining the roadway.

7. The type and volume of traffic requiring access.

8. The availability of alternative connections to the existing roadway network.

9. The cumulative effect of existing and projected connections on the roadway’s ability to provide safe and efficient movement of people and goods.

B. Access Spacing

Access points shall be located to reduce the possibility of weaving, lane shifts, or other conflicts in the traffic stream. Existing access on both sides of the roadway shall be analyzed to determine proper location for a new access. The following guidelines shall be used for spacing between access points.

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Minimum Spacing* (feet)</th>
<th>Desirable Spacing* (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulevard/Arterial</td>
<td>275</td>
<td>350</td>
</tr>
<tr>
<td>Major Collector</td>
<td>230</td>
<td>300</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>185</td>
<td>235</td>
</tr>
<tr>
<td>Major/Minor Local Residential</td>
<td>150</td>
<td>190</td>
</tr>
</tbody>
</table>

*Desirable spacing will be required except in older developments where insufficient frontage exists

Source: Adapted from Iowa Access Management Handbook

The spacing standards are for full access. Restricted access (i.e. right-in, right-out) shall be half the amount shown in the table above provided that the requirements in 2B.025D can be met.

If the spacing requirements and the connectivity requirements as outlined in this section cannot be met, the access shall be designed by a traffic engineer using the objectives herein. All distances given in this section are measured centerline to centerline.
C. Functional Area

The functional area of an intersection is defined as the area beyond the physical intersection that comprises decision and maneuver distance plus any required vehicle storage length. The “clear area” between functional areas can be defined as the “window” in which direct access can be provided.

See Section 2B.140 for corner clearance restrictions within the functional area of an intersection. See Section 2B.025D for median opening restrictions within an intersection functional area.

D. Medians

Raised or landscaped medians in the center of a road separate opposing lanes of traffic, and shall be used to restrict turning and crossing movements.

Median openings shall not occur within the functional area of an intersection. See Section 2B.025C for more information on functional areas. See Section 2B.140 for driveway restrictions in the functional area of an intersection. A single yellow center stripe is required 6 inches off the face of the median curb unless otherwise approved by the City Engineer.

Medians are required as specified on the applicable roadway detail at the end of this section. Medians shall be designed so as not to limit turning radius or sight distance at intersections. A non-restrictive median or two way left turn lane may be used when special conditions exist. Medians shall be formed in accordance with WSDOT Standard Plans as approved by the City Engineer. Placement of the curbs shall be based on the WSDOT Design Manual requirements. Landscaping and irrigation shall be required. Irrigation shall be installed per Section 4.185.

When retrofitting existing sites where medians cannot be installed because of limited right-of-way, barrier curbs between opposing lanes of traffic shall be installed. The use of a concrete barrier island used to divert traffic (i.e. a “pork chop” shaped barrier) restricting turns to right-in, right-out only, generally need to be combined with a barrier curb or other appropriate treatment as determined by the City Engineer.

2B.030 Functional Classification and Connectivity

Roadway hierarchy based on functional classification provides a network of roadways based on distinct travel movements and the service they provide. Roadway layout shall be based primarily on the safety, efficiency of traffic flow, and functional use of the roadway. Roadways are divided into boulevards, arterials, major and minor collectors, major and minor local residential, private roadways, and alleys.
Roadways of all classifications shall be planned to provide for connectivity of existing and proposed roadways in relation to adjoining parcels and possible future connections as approved by the City. New development roadway systems should be designed so as to minimize pedestrian travel to bus stops.

Roadway classifications have been identified in the most current adopted version of the City of Gig Harbor Transportation Plan. The City Engineer will classify all new roadways according to the factors set below:

Boulevards and arterials are intended for the efficient movement of people and goods and have the highest level of access control. They have limited access and accommodate controlled intersections. Collectors generally connect commercial, industrial, and residential projects to other collectors, arterials and boulevards and have a moderate level of access control. Minor collectors may be used if turn lanes are not required. If the collector connects to another collector or to an arterial, the roadway shall be a major collector. The City will determine if a collector is a major or a minor, type I or type II, based on a review of the development potential of all contributing properties, the existing right-of-way, if it is an existing roadway, and the necessity of turn lanes. Auxiliary left turn lanes are desired when connecting to boulevards, arterials, and major collectors.

Major and minor local residential roadways shall interconnect with each other and with minor collectors and have a minimum level of access control. Alleys in residential neighborhoods are encouraged. If the local residential roadway connects to a major collector or to an arterial, the roadway shall be a major local residential. In such developments, connectivity shall be a key design factor, although the internal flow shall be discontinuous to discourage cut-through traffic movement and excessive speed. Traffic calming techniques shall be designed into all residential subdivisions. The pedestrian network shall be paramount in the residential roadway network. Minor local residential roadways serve as land access from residences and generally connect with major local residential and minor collectors. Safety is always the major consideration when determining intersection locations and connectivity.

2B.035 Traffic Impact Analysis / Trip Generation and Distribution Study

A. Introduction

A Traffic Impact Analysis (TIA) or Trip Generation and Distribution Report is a specialized study of the impacts a certain type and size of development will have on the surrounding transportation system. The purpose of these reports are to determine what impact development traffic will have on the existing and proposed roadway network and what impact the existing and projected traffic on the roadway system will have on the “new development”.

These guidelines have been prepared to establish the requirements for a Traffic Impact Analysis or Trip Generation and Distribution Study. The City Engineer
will be the person responsible under SEPA as well as City ordinances for determining the need for a Traffic Impact Analysis.

B. Level of Analysis
To adequately assess a new development’s traffic impact on the transportation system and level of traffic service, the City Engineer may require a TIA. The developer of a proposed development or redevelopment has the responsibility of preparing, for City review, a Traffic Impact Analysis as required below:

- Level I TIA. Trip Generation and Distribution Study. (Exhibit A shows a Level I TIA Sample Outline- actual report contents may vary.)

- Level II TIA. Traffic Impact Analysis. (Refer to Exhibit B for Sample Outline- actual report contents may vary.)

C. Conditions for Level I Traffic Impact Analysis
A complete Level I TIA shall be required if any one of the following conditions are met:

- The project generates 11 or more PM peak hour trips; or

- The project requires a SEPA review.

- Other conditions that require this level of analysis as determined by the City Engineer.

A Level I TIA may be required by the City to determine the need and scope of a Level II TIA. A Level I TIA may be expanded to a Level II TIA if any of the conditions in Section D are met.

D. Conditions for Level II Traffic Impact Analysis
The following is a list of specific conditions that may dictate the requirement for preparing a Level II TIA. The City Engineer may require the preparation of a TIA if one or more of the following conditions are satisfied:

- The project generates more than 15 PM peak hour trips.

- The City has required that an Environmental Assessment or Environmental Impact Statement be prepared;

- A re-zone of the subject property is being proposed;

- Current traffic problems exist in the local area as identified by the City or a previous traffic study, such as a high-accident location, poor roadway alignment, or capacity deficiency;

- Adjacent neighborhoods or other areas are perceived to be impacted;
The current or projected level of service of the roadway system in the vicinity of the development is perceived to be significantly affected, or is expected to exceed City adopted level of service standards;

The new development may potentially affect the implementation of the roadway system outlined in the Transportation Element of the comprehensive plan, the Transportation Improvement Program, or any other documented transportation project;

The original TIA is more than 2 years old or the proposed land use intensity increased by more than 10 percent.

The “new development” is within an existing or proposed transportation benefit area. This may include Latecomer Agreements, Local Improvement Districts (LID), or local/state transportation improvement areas programmed for development reimbursements.

The “new development” generates more than 25 percent of site-generated peak hour traffic through a signalized intersection or the “critical” movement at an un-signalized intersection.

Other conditions that require additional study as determined by the City Engineer

E. Estimating Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual provides trip generation rates for a variety of land uses, consisting of average rates or fitted curve equations. Unless otherwise proposed by the applicant and approved in writing by the City Engineer; the latest edition of the ITE Manual shall be used to estimate the number of trips for a proposed development.

F. Report Certification

Traffic Impact Analyses (TIA) and Trip Generation and Distribution Studies shall be conducted under the direction of a responsible individual or firm acceptable to the City Engineer. The TIA shall be prepared by a registered engineer licensed in the State of Washington with special training and experience in traffic engineering and who is a member of the Institute of Transportation Engineers (ITE). The developer shall provide the City Engineer with the credentials of the individual(s) selected to perform the TIA.

G. Extent of Study Area

The study area shall include all site access drives, adjacent driveways, adjacent roadways, and major roadways and intersections in all directions from the site that are impacted by 15 or more inbound and outbound PM peak hour trips, or less as required by the City. Once the trip distribution for the new development has been approved by the City Engineer, a formal “scoping” meeting shall be conducted to clearly identify study area and contents expected in the TIA.
H. Scope of Work

The level of detail and scope of work of a TIA (Level I or II) may vary with the size, complexity, and location of the “new development”. A TIA shall be a thorough review of the immediate and long-range effects of the “new development” on the transportation system.

- Mitigation

The TIA shall include a proposed mitigation plan. The mitigation may be either the construction of necessary transportation system improvements and/or contributions to the City for the new development’s fair share cost of identified future transportation improvements. Mitigation measures shall be required to the extent that the transportation facilities operate at or above the City’s adopted Level of Service (LOS) standards.

I. Access Management

Requests for site access shall be addressed in the Traffic Impact Analysis. Recommendations shall include site access and transportation improvements needed to maintain traffic flow to, from, within, and past the site at an acceptable and safe level of service.

J. Peak Traffic Hours

For traffic analysis, the PM peak hour conditions shall be used. The PM peak hour is defined as the 60-minute period between 4:00 p.m. and 6:00 p.m. with the greatest sum of traffic volumes on a roadway segment or passing through the area of the project. Reversed flow at intersections from morning to afternoon, and other unusual conditions, shall require analysis for both AM and PM peak hour conditions, as required by the City.

K. Estimation of Pass-by Trips

Adjustments to trip generation made for “pass-by” or “mixed-use” traffic volumes shall follow the methodology outlined in the latest edition of the ITE Trip Generation Manual.

L. Traffic Distribution

The directional distribution of traffic to and from the project shall be estimated using local traffic volume data provided by the City of Gig Harbor, Pierce County, and the Washington State Department of Transportation Traffic Data Office.

The City Engineer shall approve the trip distribution for a “development” after the project has been included in the City Traffic Model and the proposed distribution compared to the distribution shown in the Concurring Evaluation Report.

A graphical distribution map shall be submitted showing site-generated PM peak hour traffic. Generally, traffic shall be distributed to one PM peak trip within the
Transportation Plan Area if a generic distribution is not used (15 trips if a generic distribution is used). This map shall clearly identify all traffic movements and the percentage of site traffic.

M. Minimum Levels of Service

The minimum level of service (LOS) for roads within the city limits shall be as shown in the transportation element of the city's comprehensive plan.
EXHIBIT A – TRANSPORTATION IMPACT ANALYSIS

LEVEL I STUDY REPORT FORMAT

I. Introduction and Summary

1. Report Certification
2. Purpose of Report and Study Objectives

II. Proposed Development

1. Description
2. Location and Vicinity Map
3. Site Plan
4. Proposed Zoning
5. Proposed Land Use and Intensity
6. Phasing and Timing of the Project

III. Existing Conditions

1. Study Area
   a. Limits of traffic study
   b. Existing zoning
   c. Existing land uses
   d. Accident History
   e. Existing Access

2. Site Accessibility
   a. Area roadway system
   b. Transit service
   c. Pedestrian and Bicycle Facilities

IV. Trip Generation and Distribution

1. Trip Generation
2. Trip Distribution
3. Estimate of non-motorized trip generation / distribution

V. Access Classification Information

VI. Appendices

1. Trip Generation Calculations
2. Pass-by and Origin-Destination Studies
3. References

EXHIBIT B - TRANSPORTATION IMPACT ANALYSIS

LEVEL II STUDY REPORT FORMAT

I. Introduction
1. Report Certification
2. Project Overview
   a) Site vicinity map
3. Study Context

II. Project Description

1. Development proposal
   a) Site plan
   b) Proposed zoning
   c) Proposed land use and intensity
   d) Phasing and timing of project

III. Background Information

1. Area Land Uses
2. Roadway and Existing Access Inventory
3. Traffic Volume Data
   a) Figure illustrating existing PM peak hour traffic volumes
4. Public Transportation
5. Accident History

IV. Traffic Generation and Distribution

1. Traffic Generation
2. Traffic Distribution
3. Figure illustrating project traffic on roadway network
4. Estimate of non-motorized trip generation / distribution

V. Future Traffic Conditions

1. Roadway Improvements
2. Pipeline Development Projects
   a) Figure showing pipeline projects traffic volumes at study intersections
3. Future Traffic Volumes
   a) Figure illustrating projected traffic without project
   b) Figure illustrating projected traffic with full project
   c) Figure illustrating projected non-motorized use

VI. Traffic Operations Analysis (Existing & Future)

1. Capacity Analysis
2. Signalized Intersections
3. Un-signalized Intersections
4. Project Driveways

VII. Access Classification Information / Access Management

VIII. Safety Analysis
IX. Mitigation

X. Appendices

1. Trip generation calculations
2. Turning Movement Count worksheets
3. Passer-by and origin-destination studies
4. Pipeline traffic volumes worksheets
5. Capacity analysis worksheets
2B.040 Naming

Roadways (ways-of-travel) shall be named according to the following specific criteria: (GHMC 12.12)

A. Streets are major ways-of-travel which run in an east/west direction;
B. Avenues are major ways-of-travel which run in a north/south direction;
C. Drives are winding major ways-of-travel or other major ways-of-travel, as designated by the Gig Harbor City Council;
D. The designation “road,” as determined by the City Council, shall be used only where the name has long-standing meaning or public sentiment;
E. “Places” shall be permanently closed avenues which run in a north/south direction;
F. “Courts” shall be permanently closed roadways which run east-west, such as a cul-de-sac;
G. Boulevards and Parkways may run north, south, east and west, or diagonally and shall be named. Boulevards and Parkways shall be functionally classed as a major collector or an arterial and shall contain a landscaped median.
H. Loops shall be small loop-type roadways to carry the name of the roadway from which they originate;
I. Lanes shall be private roads;

All proposed names for new or existing ways-of-travel and private roads must be reviewed and approved by the Gig Harbor City Council (private driveways are exempt).

City ways-of-travel shall not have a number or “N.W.” as a designator.

An address number will be assigned to all new buildings at the time of final plat, Site Plan Review, or at the time the building permit is issued. It is then the owner's responsibility to see that the house numbers are placed clearly and visibly at the main entrance to the property or at the principal place of ingress (GHMC 12.12).

The developer must check with the Building Official regarding the naming of roadways. This should be done at the time the preliminary plat is submitted and again upon approval of the final plat. The Building Official will insure that the name assigned to a new roadway is consistent with policies of the City (GHMC 12.12).
2B.050 Signing

The developer/contractor is responsible for providing, installing, and maintaining all construction signs and temporary traffic control devices. These shall comply with the provisions as established by the US Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD) and the WSDOT Standard Plans for Road, Bridge and Municipal Construction. All signs shall be High Intensity Prismatic Sheeting of one of the following grades, Type III, IV or VIII and also conform to the MUTCD requirements.

2B.060 Right-of-Way

Right-of-way shall be dedicated for a subdivision, short subdivision, a binding site plan for a project that triggers Site Plan Review or for a conditional use permit. The requirement to dedicate right-of-way shall be determined by the City or Regional Transportation Plans, by a Traffic Impact Analysis, or as determined by the Public Works Department. Although a right-of-way dedication may be required, frontage improvements may be deferred per Section 2B.080 of the Public Works Standards.

Right-of-way is determined by the functional classification of a roadway. See details at the end of this section for specific right-of-way widths. See 2B.090 for radius requirements at a cul-de-sac "bulb." Right-of-way at a "bulb" shall be increased accordingly.

Right-of-way requirements may be increased if additional lanes, pockets, intersection treatments, transit lanes, bus loading zones, bus shelters, loading zones, operational speed, bike lanes, utilities, schools or other factors and/or future planned improvements are required as determined by the City Engineer. The right-of-way boundaries at intersections shall be sufficient to contain all portions of the sidewalk, curb ramps, all signal and lighting appurtenances and any other appurtenance associated with a public utility.

Right-of-way shall be conveyed to the City on a recorded plat right-of-way dedication deed. If the dedication is by deed, the deed shall be submitted to the City and approved before construction begins; before a building permit is issued; before a tenant improvement is issued; or prior to certificate of occupancy, whichever comes first.

When right-of-way is conveyed to the City by plat or by dedication deed, the right-of-way centerline or other appropriate control line shall be monumented by a registered Professional Land Surveyor licensed in the state of Washington. A monumentation plan shall be submitted to the Public Works Department for approval prior to placement of the monument positions. Contact the City of Gig Harbor Public Works Department for an example of a Right-of-Way Dedication Deed.

2B.070 Private Roadways

Private roadways are defined in Section 1.025.
A. Criteria for allowing private roadways.

1. Private roadways will be allowed only if the City Engineer makes a determination that the private roadway is not needed for traffic circulation under the criteria set forth in this Section, the City’s Public Works Standards and the Transportation Element of the City’s Comprehensive Plan.

2. Private roadways will not be allowed (a) when the roadway connects two public roadways; and (b) when in conflict with the adopted arterial plan or roadway circulation plan, adopted in the City’s Transportation Element of the Comprehensive Plan.

3. Private roadways shall be located within separate tracts or parcels.

4. Private roadways shall be no longer than 500 ft (measured from edge of public right of way to furthest edge of cul-de-sac or turn around area).

5. Private roadways shall use curb cuts at public roadways.

6. Private roadways shall be named. See Chapter 12.12 GHMC.

7. When three or more lots or dwelling units are served on a dead-end greater than one hundred and fifty feet (150) feet in length, a turnaround having an improved radius of forty-five (45) feet, or an equivalent, workable maneuvering area approved by the City Building Official, shall be provided at the end of the private roadway.

B. Maintenance - The City will not maintain private roadways, signs or drainage improvements on private roadways. As a condition of constructing a private roadway, the City requires owners of the private roadway enter into a private maintenance agreement between themselves describing their responsibilities and providing notice to subsequent purchasers that the City does not own or maintain the private roadway. The agreement must be on a form approved by the City Attorney and recorded with the Pierce County Auditor. The agreement shall contain the following specific terms: (1) the responsibilities of the individual owners for maintenance, repair and reconstruction of the private roadway; (2) maintenance methods; (3) standards of maintenance; (4) distribution of expenses; (5) remedies for noncompliance with the agreement; (6) exchange of right of use easements; and (7) the creation of a private roadway maintenance fund and the annual assessment.

C. Notice on the final plat regarding Private Roadways - Each development, plat or short plat with a private roadway shall contain a notice to the
public/purchasers, which shall contain the following language, “The City of Gig Harbor has no responsibility to build, improve, maintain or otherwise serve any private roadways providing access to the property described in this plat. Any private access roadway shall remain a private roadway unless it is upgraded to public roadway standards at the expense of the developer or adjoining lot owners and the City chooses to accept such private roadway for public ownership and maintenance.”

D. Gates - Private roadways may use gates to restrict access.

E. Utilities – City water and sewer utilities located within public roadways within a plat, short plat or development shall be owned and maintained by the City. If the City owns utilities within the development and the development is served by a private road, then an easement shall be granted to the City over the road to access, operate and maintain its utilities.

F. Signs - Private roadway signs with roadway designations shall be provided by the developer at the intersection of private roadways with other private roadways and public roadways. Such signs shall meet the specifications in the City’s Public Works Standards and in the case of intersections with public roadways; signs shall either be located within the public right-of-way or within a separate maintenance easement. Maintenance and repair of such roadway signs shall be included in the maintenance agreement between the private property owners.

G. Bonds - All private roadways shall be constructed prior to the time that the developer makes application for final plat approval. Bonds or other methods of assuring construction of improvements shall not be allowed for the future construction of private roadways after final plat approval.

H. Construction - Private roadways are the responsibility of the developer to construct to the requirements in the City’s Public Works Standards. Upon completion of the required improvements, the developer will be required to submit a statement to the City warranting that the improvements have been completed in accordance with Section 12.06.100 of the Gig Harbor Municipal Code.

2B.072 Private Driveways

Private driveways, also known as “driveways”, are defined in Section 1.025. See Section 2B.025, Access Management, for additional access information and spacing requirements.

All abandoned driveway areas along the frontage of redeveloped property shall be removed and the curbing, planter strip and sidewalk or shoulder and ditch section shall be properly restored. All driveway entrances that are within an existing or proposed sidewalk section shall be constructed of Portland Concrete Cement and shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction.
Joint-use driveways serving two adjacent parcels are encouraged whenever feasible. A joint-use driveway serving two adjacent parcels is required if contiguous property is under the same ownership. Where joint-use driveways are installed an easement and a maintenance agreement shall be recorded for both parcels specifying maintenance and joint usage in perpetuity.

The following criteria shall apply to all residential driveways:

A. All Private Driveways

1. Private driveways shall use driveway entrances at public roadways. Construction details of driveway entrances shall meet the requirements of WSDOT Standard Plans.

2. Private driveway accesses shall meet the sight distance requirements of Section 2B.150 and Figure 2.3 below.

3. Private driveways may be gated.

4. Private driveways shall not be named.

B. Residential Driveways

If these criteria cannot be met for residential driveways the developer will have to hire a traffic engineer to design the most appropriate access with safety being the primary design criteria and obtain a City approved variance.

1. In new construction, residential driveways shall not be permitted to access arterials, major collectors, or minor collectors unless the property has no other reasonable access to the general roadway system. Where this is necessary, the driveway shall access the roadway with the lower functional classification.

2. The maximum residential driveway width onto an arterial or collector shall be 24-feet. The maximum residential driveway width onto any other roadway classification shall be 20-feet.

3. The minimum driveway length shall be 20-feet from the residential structure to the back of walk.
FIGURE 2.3 Drive Approach, On a Downgrade

G - Grade (%)
A - Algebraic Difference in Grades (%)
L - Transition (See Tabulated Lengths):
A ≤ 6%, Transition Curve is Optional
A > 6%, Transition Curve is Required

Source: Adapted from Oregon DOT
C. Commercial Driveways

Commercial driveways shall be those driveways constructed for access to private property to serve commercial, industrial, and multi-family projects. The following criteria shall apply to all commercial driveways.

1. Access to a public roadway shall be limited to one commercial driveway connected to the lowest classified roadway for each tract of property separately owned. Property fronting more than one public roadway may be permitted an access to each public roadway if the City's Traffic Report supports multiple accesses and with the approval of the City Engineer. Properties contiguous to each other and owned by the same person are considered to be one tract.

2. Commercial properties shall provide internal connections between neighboring properties where feasible. Developments must give priority to internal access before access to the public roadway system is permitted. Cross access allows vehicles to circulate between commercial properties without having to re-enter the public roadway system.

3. No commercial driveway shall be approved where backing onto the sidewalk or roadway will occur.

4. Parking lot circulation and signing shall be provided within the site. The public right-of-way shall not be utilized as part of the parking lot flow.

5. Commercial driveway widths and throat length shall be designed in accordance with Chapter 7 of Transportation & Land Development. Widths beyond those identified may be approved by the City Engineer.

2B.075 Access Ways

Access ways are defined in Section 1.025.

A. Criteria for allowing access ways.

1. Access ways shall use driveway entrances at public roadways with dimensions in accordance with Section 2B.140 and WSDOT Standard Plans.

2. Access ways shall not be named.

3. Access ways may include parking lots.

4. Access ways are not limited by dimension.
5. Access ways shall have area for emergency vehicles to maneuver and turn around in accordance with requirements of the City Building Official.

B. Maintenance - The City will not maintain access ways or their related improvements.

D. Gates – Gates shall not be used along access ways.

2B.076 Gated Access

Gates to neighborhoods or gated communities are be allowed only on private roadways or private driveways, both residential and commercial. Access ways are not considered private driveways. The following conditions shall apply for gated access:

A. Private Roadways and Private Commercial Driveways. A turn around area and minimum stacking distance shall be required as depicted in Figure 2.4 below.

![Figure 2.4 Gated Access](image-url)
Intersecting Public Roadway Classification | “X” Distance
--- | ---
Arterial | If only one access use 5-feet per PM peak hour trip. Minimum “x” distance shall be 100.
Major and Minor Collector | 1-foot per PM peak hour trip. Minimum “x” distance shall be 20-feet.
Major and Minor Local Residential and private | 0.5-foot per PM peak hour trip. Minimum “x” distance shall be 10-feet.

B. **Private Residential Driveways.** A minimum stacking distance “x” only per Figure 2.4 shall be required for private residential driveways.

C. Mailboxes meeting U.S. Postal Service standards shall be located on the public side of the gate. See Section 2G.070.

D. Gates shall be equipped with emergency access in accordance with requirements of the City Building Official.

### 2B.080 Roadway Frontage Improvements

Roadway frontage improvements in accordance to this section and the Details at the end of this Chapter shall be installed along the entire public right of way frontage of the property at the time of construction when any one of the following situations occurs:

A. The property received approval of a site plan, planned residential district, planned unit development, subdivision; or short subdivision; or

B. The property contains an existing commercial or multi-family building and alterations or improvements to existing structures on such properties where the estimated cost of the alterations or improvements constitute 25 percent or more of the value of the existing structures on the property.

See also Section 2C.010. Utility relocations shall follow the requirements as outlined in Section 1.100. Utility extensions shall follow the requirements of Section 1.130.

Typical frontage improvements will include but are not limited to: curb and gutter; sidewalk; roadway storm drainage; roadway lighting system; traffic signal relocation, modification or installation, traffic control devices, signal interconnect, public transit amenities; roadway signing; utility undergrounding; planter strips; landscaping and irrigation; and roadway widening. Plans shall
be prepared and signed by a licensed civil engineer registered in the State of Washington.

All frontage improvements shall be made across full frontage of property from centerline to right-of-way line. Widening and/or overlays shall have a minimum new pavement width of one lane to the centerline of the roadway. Off project site frontage improvements may be required if determined by the City for public safety or due to impacts from the development.

Frontage improvements may be deferred by signing a Development Agreement or by paying a fee in lieu of constructing the improvements. If a fee in lieu of is paid, it shall be based on the engineer's estimate and the City will be responsible for constructing said improvements at a later date.

If the frontage improvements are deferred, all necessary right-of-way must be dedicated prior to development approval. If additional right-of-way is required and the side slopes exceed 7:1 slope, then an additional slope easement shall also be required to facilitate construction of future improvements. The dimensions of the slope easement will be determined by the City Engineer. All methods of deferral, and components thereof, must be in place, signed, collected, and processed prior to the project scheduling a preconstruction meeting.

### 2B.090 Cul-de-sac

Cul-de-sacs may be allowed by variance with the approval of the City Engineer where geographical, topographic or environmental conditions preclude connection. When these conditions preclude roadway connections, continuous non-vehicular connections should still be attempted.

Cul-de-sacs may also be allowed for short subdivisions bordered on three sides by properties developed to their maximum use.

Temporary dead-ends or a shared access may be required for subdivisions where the potential for future connectivity exists due to the proximity of underdeveloped properties.

Roadways designed to have one-end permanently closed shall be no longer than 400-feet as measured from the intersecting right-of-way line extended, to the center of the cul-de-sac. At the closed end, there shall be a widened bulb having a minimum paved traveled radius as shown in the Minimum Roadway Design Standards Table. See Section 2B.100 for dead end requirements.

A depressed curb around the cul-de-sac radius shall be required where multiple driveways exist within fifteen-feet of each other as measured from edge of driveway to edge of driveway. This is required to eliminate the “roller coaster” effect of driveway cuts. Cul-de-sacs shall be sloped at a minimum 2 percent from center-to-edge or edge-to-edge to facilitate drainage.
2B.100 Dead End Roadways

Where a roadway is dead-ended, turn around provisions and a type III red-and-white barricade installed for the full width of the roadway must be provided where the road serves more than one lot. See 2-11 and 2-12 Hammerheads will not be allowed on a dead end in a residential area. Hammerheads may be allowed in commercial or industrial areas. Permanent dead ends shall be properly signed per Section 3C-04 of the MUTCD.

At the end of a sidewalk to be extended in the future, a red-and-white type II barricade, the full width of a sidewalk, is required. See Section 2C.030 (9) for interim requirements at a dead-end sidewalk.

2B.110 Half Roadway

A half roadway is an otherwise acceptable roadway section modified to conform to limited right-of-way on the boundary of property subject to development. See definition in Section 1.025.

A. A half roadway may be permitted subject to approval by the City Engineer and the following conditions:

1. There is reasonable assurance of obtaining the prescribed additional right-of-way from the adjoining property suitable for future completion of a full section roadway, and;

2. Such alignment is consistent with or will establish a circulation pattern, and;

3. The right-of-way width of the half roadway is not less than one-half of the proposed total width of the right-of-way and may be required to be greater than one-half the total proposed width to accommodate adequate driving lanes until the other half of the roadway is constructed, and;

4. The traveled way shall be surfaced the same as the designated roadway classification, and;

5. The half roadway shall be graded consistent with the centerline of the ultimate roadway section on the property line, and;

6. The roadway section meets the ultimate roadway section and all applicable stormwater requirements, and

7. Property line edge of the roadway shall be finished with permanent concrete curb and gutter to insure proper drainage, bank stability and traffic safety.

2B.115 Fire Access Roads
Fire Department access roads shall be designed and installed per the most current adopted edition of the Fire Code as adopted and amended by the Gig Harbor Municipal Code and as accepted by the Building Official.

2B.125 Landscape/Planter Areas

Landscape and planter area widths shall be as shown on details at the end of this section. Landscaping methods shall be in compliance with the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.

Landscape and planter areas shall be prepared in the following order: scarify the native soil; install the root barriers; install the irrigation system; add the topsoil; install the landscaping; add a top-dressing if applicable. See Section 4.185 for irrigation system requirements.

Excavate the area to be landscaped to the depth below finished grade as shown in the table below. Scarify or aerate the sub-grade by tilling, disk ing, harrowing, or other method as approved by the City. Remove debris and stones from the surface that are larger than 1 inch in any dimension. Backfill the excavated area with Class I Topsoil to the depth shown in the table below. Remove all rocks, sticks, and other debris 1-inch and larger. The finished grade of topsoil at the curb shall be 1-inch below the top of curb.

**Figure 2.5 Landscape/Planter Areas**

<table>
<thead>
<tr>
<th></th>
<th>Initial Excavation Depth</th>
<th>Topsoil Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medians and Islands</td>
<td>19”</td>
<td>18”</td>
</tr>
<tr>
<td>Perennial Planter Strip</td>
<td>13”</td>
<td>12”</td>
</tr>
<tr>
<td>Grass/Lawn Planter Strip</td>
<td>7”</td>
<td>6”</td>
</tr>
</tbody>
</table>

See Section 2G.090, Roadway Trees, for specific information on tree species, size, location, and spacing. Trees located in tree wells shall be installed per Detail 2-7.

Trees located in planter strips, medians, or islands shall be installed per Detail 2-57 and placed in pits prepared as follows. Excavate pits 12 inches deeper and twice the diameter of the root ball. Thoroughly scarify the bottom of the pit by shovel cutting to a depth of 12 inches. Shovel cut pit sides to help root penetration. Only non-amended, native soil shall be used immediately below the root ball for purposes of establishing plant depth. After the proper depth of the plant material has been established, place the root ball in the center of the hole flush with the finish grade. Release the root covering; spread roots to a natural spread and distribution. Backfill, working the soil around the roots, with Type 1 topsoil. Heels tamp to compact the backfill and provide a slight
depression and watering saucer. Take care to not injure the root system while backfilling.

**Topsoil, Type 1**

Type 1 Topsoil shall be composed of a three-way mix consisting by volume of:

- 2 parts soil
- 2 parts 5/8-inch compost
- 3 parts sand

Soil is classified as gravelly sand, well-graded sand, poorly graded sand, or silt sand.

The compost shall be a weed free, well decomposed, humus-like material derived from the decomposition of grass clippings, leaves, branches, wood and other organic materials. Composts containing shavings, cedar sawdust, or straw will not be permitted. Compost shall be produced at a permitted solid waste composting facility.

Sand shall consist of 100 percent passing the 3/8-inch sieve, minimum 95 percent passing the #4 sieve, and maximum of 5 percent passing the #100 sieve.

**2B.130 Traffic Control**

The contractor shall be responsible for all traffic control in accordance with the most current *WSDOT Standard Plans for Road, Bridge and Municipal Construction “K” plans, and the Manual on Uniform Traffic Control Devices* (MUTCD). Prior to the disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for approval. At no time shall a roadway be blocked without the approval of the City Engineer. No work shall commence until the City has approved the plan and the traffic control is in place.

There shall be no restrictions or interruptions to traffic on Saturdays, Sundays or holidays. In addition, there shall be no restrictions or interruptions to traffic after 12:00 noon on the day prior to a holiday or holiday weekend unless approved by the City Engineer.

There shall be no restrictions or interruptions to traffic on arterial roadways during the peak traffic hours of 7:00 A.M to 9:00 A.M. and from 3:30 P.M. to 6:00 P.M. Monday through Friday, except when deemed necessary by the City. If the City determines the peak hours differ from those specified, the contractor will be required to adjust his working hours accordingly.

No work shall be allowed in or adjacent to a residential zone between the hours of 8:00 P.M. and 7:00 A.M. on weekdays, and between 8:00 P.M. and 8:00 A.M. on weekends and Federal, State or City-observed holidays. A waiver to this ordinance will not be allowed except in the case of an emergency or where operations are necessary during such hours in order to promote the safety of the traveling public.
The City may require roadway work to commence at night when it is in the best interest of the public.

Two-way traffic shall be maintained at all times unless specifically approved in the traffic control plan. Flaggers shall be shown on the traffic control plan except for emergency situations. The developer is responsible for traffic control signing per Section 2B.050, Signing.

All lane restrictions shall be held to a minimum time and length. Lane closures shall comply with the traffic control plans, these specifications, the MUTCD, and the WSDOT Standard Plans. If the City determines that lane restrictions are causing congestion, the contractor will be required to open any lanes, as determined by the City, until the congestion is eliminated.

There shall be no delay to medical, fire, police, or other emergency vehicles with flashing lights or sirens.

The contractor shall maintain pedestrian access through or around the project site at all times without having pedestrians enter the travel lane.

Flaggers shall possess a current flagging card issued by the State of Washington prior to performing any traffic control work on a project. Workers engaged in flagging shall wear reflective clothing and hard hats in accordance with the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and the requirements of the Dept. of Labor and Industry. Flagger’s paddles shall meet MUTCD standards.

Anyone performing the role of a flagger or spotter shall not operate a personal electronic device at any time. The Engineer may remove from the job site immediately and without warning anyone performing the role of a flagger or spotter AND operating a personal electronic device. A two-way radio used for traffic control purposes shall not be considered a personal electronic device.

Temporary traffic control refers to the control of all types of traffic, including vehicles, bicyclists, and pedestrians (including pedestrians with disabilities).

Any sidewalk closures shall be accomplished by a continuous cane-detectable barrier, and the walkway shall be free from any hazards and clear of obstructions such as signs and traffic barriers. Access shall be maintained to temporary transit stops.

2B.140 Intersections

An intersection may be any access point, whether a public roadway or a public or private driveway, onto a public roadway. See Section 2B.025 for Access Management criteria and 2B.030 for intersections as they relate to Functional Classification. See Section 2B.140 for driveway access issues. See Section 2B.150 for sight obstruction criteria.
A. Roadway intersections shall be laid out so as to intersect as nearly as possible at right angles. All intersections shall be designed so as not to create a safety problem. Sharp angled intersections shall be avoided. If through traffic is not desired on the minor legs, for reasons of traffic safety, a "T" intersection (three-legged) is preferable to the crossroad (four-legged) intersection for local access roadways. For safe design, the following types of intersection features shall be avoided unless approved by the City Engineer:

1. Intersections with more than four intersecting roadways;
2. "Y" type intersections where roadways meet at acute angles;
3. Intersections adjacent to bridges and other sight obstructions.

B. On sloping approaches at an intersection, landings shall be provided with grade not to exceed 3 percent slope for a distance of 30-feet approaching any arterial or 20-feet approaching a collector or local access roadway, measured from nearest right-of-way line (extended) of the intersecting roadway.

2B.150 Intersection Sight Distance

The sight distance at all intersections shall meet the requirements of Section 9.5 of AASHTO's Policy on Geometric Design of Highways and Roadways (6th Edition). The criteria in this section shall be applied to all intersections with public roadways, including private roads and private driveway entrances. The criteria shall also apply to potential sight obstructions due to roadwayscape amenities such as signs, trees, fences, bus shelters, etc.

The area within the sight triangle shall be subject to said restrictions to maintain a clear view on the intersection approach. The ultimate roadway width (number of lanes) per the most current version of the City’s Transportation Plan shall be used to calculate the dimensions of the sight distance triangle.

Exclusions. Sight obstructions that may be excluded from these requirements include: utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the roadway centerline, places where the contour of the ground is such that there can be no cross visibility at the intersection, saplings or plant species of open growth habits and not in the form of a hedge which are so planted and trimmed as to leave at all seasons a clear and unobstructed cross view, buildings constructed in conformance with the provisions of appropriate zoning regulations, and preexisting buildings.

The engineer of record shall provide a clear site distance on the plans for each and every driveway intersection and intersection.
2B.160 Surfacing Requirements

The details at the end of this section provide design information on the design methods and pavement requirements for all public roadways. Porous pavements will be evaluated on a case by case basis.

Fire access road structures shall meet the standards provided in Section 2B.115. Alternate materials may be approved by the City of Gig Harbor Building Official.

All other surfacing located in the public right of way shall meet the following requirements:

A. Sidewalks
   Surfacing: 4" Commercial Concrete
   Base: 2" Crushed Surfacing Top Course or well graded sand
   Alt. Surfacing*: 2-1/2" Hot Mix Asphalt

B. Driveway Entrances
   Surfacing: 6" Portland Cement Concrete with 3-day cure at 4,000 psi
   Base: 2" Crushed Surfacing Top Course or well graded sand

C. Class I Bike path
   Surfacing: 4" Commercial Concrete
   Base: 1" Crushed Surfacing Top Course
   Alt. Surfacing: 2-1/2" Porous Hot Mix Asphalt with base per City Stormwater Management and Site Development Manual

*Asphalt sidewalks will not be permitted unless approved in writing by the City Engineer.

Where a variance to the requirements above is desired, the following information shall be submitted with the variance request:

A. Designs shall be based on soil tests to determine the actual Washington stabilometer R-value.

B. One soil sample per every 500 lineal feet of centerline with 3 minimum per project representative of the roadway subgrade shall be taken to determine a statistical representation of the existing soil conditions.

C. Soil tests shall be performed by an engineering firm specializing in soils analysis.

D. The soils report, signed and stamped by a soils engineer licensed by the State of Washington, shall be based on actual soils tests and submitted with the plans. All depths indicated are a minimum compacted depth.
E. Ballast shall consist of crushed, partially crushed, or naturally occurring granular material from approved sources and shall meet the WSDOT Standard Specifications for Road, Bridge and Municipal Construction ballast specification 9-03.9(1) for grading and quality. The City Engineer or his/her representative will determine the exact point of acceptance.

2B.165 Channelization and Pavement Markings

Channelization and pavement markings shall be meet the requirements of this section and shall comply with the WSDOT Standard Plans and all applicable MUTCD, AASHTO, and WAC standards and regulations.

Channelization and pavement markings shall be placed on all roadways in accordance with the Standard Plans unless otherwise noted in Exceptions below. Additional striping and pavement marking requirements shall include the following:

- A blue raised pavement marker is required in the centerline of the traveled roadway at 90 degrees to the location of a fire hydrant.
- A stop bar consisting of 24-inch wide thermoplastic stripe shall be required where a stop sign is required.
- Striping shall be required in conjunction with roundabouts or other traffic calming devices.
- Striping may be required in conjunction with a neighborhood entrance or entrance turn lane.
- Striping shall be required to delineate bulb-out parking except when concrete valley gutters are present.
- The thermoplastic material used to form pavement markings shall be as listed on the most current version of the WSDOT Qualified Products List.
- Pavement markings shall be waterborne paint manufactured by “Ennis” or approved equal.

Exceptions:

Minor Local Roadways. Edge line and centerline striping along minor local roadways may be omitted upon written approval from the City Engineer.

Crosswalks. Stamped and pigmented cement concrete crosswalks as specified in the Details at the end of this chapter shall be installed at all legs of an intersection with a classified roadway. Unless otherwise determined as a condition of permit approval, thermoplastic crosswalk markings may be used in accordance with the Standard Plans for all other locations.
2B.170 Temporary Roadway Patching

All excavations within or across roadways, driveways or failure of the existing pavement which will be exposed to traffic shall be temporarily patched by the end of the working day, or as directed by the City. The patch shall be accomplished by using 2-inch Class B Asphalt Concrete Pavement when available or 2-inch medium-curing (MC-250) Liquid Asphalt (cold mix), 2-inch Asphalt Treated Base (ATB), or steel plates.

Asphalt Treated Base (ATB) used for temporary restoration may be dumped directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with asphalt concrete pavement to provide a smooth riding surface.

The contractor shall maintain all temporary patches until such time as the permanent pavement is in place. If, after reasonable notification, the contractor is unable to maintain a patch for whatever reason, the City will patch it at the contractor’s expense for actual cost plus overhead and materials.

Steel plates may be used in lieu of temporary asphalt with the permission of the City engineer or duly appointed representative. Steel plates must be secured to the ground to ensure that no movement occurs. Cold mix will be placed as a transition ramp on all edges of steel plates where traffic or pedestrians will enter onto and exit off of the steel plates. Appropriate warning signs conforming to the latest version of the MUTCD will be used and maintained as long as steel plates are in use.

2B.180 Trench Backfill and Restoration

Trench restoration shall be either by a patch or patch-plus-overlay as required by the City.

All trench and pavement cuts shall be made by saw cuts. The cuts shall be a minimum of 1 foot outside the trench width.

A. All trenching shall be backfilled as shown in the appropriate trench restoration detail at the end of this section. The trench shall be compacted in accordance with Section 2-03.14 of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.

B. If, when trenching, cement concrete is encountered, cement concrete shall be used to restore the patch. When cement concrete is anticipated or encountered, a trench restoration detail shall be designed by a geotechnical engineer and submitted to the City for review and approval. The geotechnical engineer shall address existing and proposed joint location, load transfer, and joint pinning, if applicable.

Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9.02.1(6) of
the WSDOT Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT Standard Specifications.

C. Asphalt concrete pavement shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the requirements of Section 5-04 of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.

Longitudinal trenching within the traveled roadway shall be subject to a full lane HMA overlay for trench restoration.

D. All joints shall be sealed using paving asphalt AR4000W.

E. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.

F. The final trench patch shall be completed as soon as possible and shall be completed within two weeks after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather or other adverse conditions that may exist. See 2B.160 for inclement weather constraints. Delaying of final patch of overlay work is allowable only subject to the City Engineer approval. The City Engineer may deem it necessary to complete the work within the 3-day time frame and not allow any time extensions. If this occurs, the contractor shall perform the necessary work as directed by the City Engineer.

2B.190 Staking

All surveying and staking shall be performed by a licensed engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.

A pre-construction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction and all cut sheets will be provided to the City inspector.

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

1. Stake centerline every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVC’s, PVT’s, high points and low points, with cuts and/or fills to sub-grade.

2. Stake top of ballast and top of crushed surfacing at centerline and edge of pavement at the above-described intervals.

3. Stake top back of curb at a minimum of 3 foot consistent offset at the above-described intervals with cut or fill to finished grade.
4. Stake water mains to center of pipe every 100 feet and at every fitting along with cut and fill information. Stake location of hydrants, blow offs, air vacs, back flow preventors, water services, and any other appurtenance along with cut and fill information.

5. Stake all storm and sewer structures with rim and invert cut/ fill information.

6. Stake all roadway lights locations, sign locations, channelization markings and monuments.

2B.200 Testing

Testing shall be required at the developers or contractors expense. The testing shall be ordered by the City construction inspector from an approved independent certified testing lab approved by the City. Testing shall be done on all materials and construction as specified in the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and with frequency as specified in “Sampling and Testing Frequency Guide” located in Section 9-5.7 of the WSDOT Construction Manual and the project specifications and/or as requested by the City Engineer.

In addition, the City shall be notified before each phase that roadway construction commences (i.e. staking, grading, sub-grade, ballast, base, top course, and surfacing).
2C SIDEWALKS, CURBS AND GUTTERS

2C.010 General

Portland cement concrete curbs, gutters, and sidewalks in accordance with this section, the WSDOT Standard Plans, and the Details at the end of this Chapter shall be installed along the entire public right of way frontage of a property to establish public access along public rights of way at the time of construction when any of the following situations occur:

A. The property received approval of a site plan, planned residential district, planned unit development, subdivision; or short subdivision; or

B. The property contains an existing commercial or multi-family building and alterations or improvements to existing structures on such properties where the estimated cost of the alterations or improvements constitute 25 percent or more of the value of the existing structures on the property; or

C. The property received any land use or building approval and has frontage along a non-motorized facility as shown in the City’s Non-Motorized Facility Plan.

In cases where an existing sidewalk is located adjacent to the curb and a planter strip is required in accordance with Section 2B.080 and the Details at the end of this Chapter, the existing sidewalk shall be removed and a new sidewalk shall be placed to accommodate a new planter strip.

Sidewalk construction may be deferred with the following conditions:

A. Upon written approval by the City Engineer; and

B. The necessary right-of-way is deeded to the City prior to approval.

Sidewalks shall be located within the right of way at the back of right of way. Sidewalks may be located within an easement with the approval of the City Engineer.

Building footings shall not be located under a public sidewalk.

2C.020 Design Standards

Plans for the construction of sidewalks, curb and gutters are to be submitted as part of the civil permit application when applicable.

The City has set forth minimum standards as outlined in this section which must be met in the design and construction of sidewalks, curbs and gutters.

2C.030 Sidewalks
A. All public roadways shall have sidewalks on both sides of the roadway as shown on the roadway details at the end of this section. See Section 2B.070 for sidewalk requirements on private roadways. For specific driveway requirements, see Section 2B.140. For applicable bike path information, see Section 2D.

B. The design and construction of all sidewalks, curbs, gutters and walkways shall meet the following minimum standards:

1. Sidewalks shall be constructed of commercial concrete a minimum of 4 inches thick. When a portion of the sidewalk functions as a driveway, the sidewalk shall be a minimum 6 inches thick through the driveway section.

2. The design and construction of all sidewalks, curbs, gutters and walkways shall meet the following minimum standards:

   The width of sidewalks shall be 5.5 feet minimum unless otherwise approved by the City Engineer. When the sidewalk, curb and gutter are contiguous, the width of the sidewalk shall be measured from back of curb and gutter to back of sidewalk. Those sidewalks designated in the City’s Non-motorized Facilities Plan as bike paths shall, in addition, meet the minimum width requirements established for said bike paths. The City Engineer shall require that the design of all sidewalks provides for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.

3. If sidewalk widening is required, it shall be accomplished with a monolithic width pour. This may require removal of an existing sidewalk.

4. The City Engineer may reduce the sidewalk width for sidewalks over 6 feet wide if the City does not anticipate probable pedestrian traffic through the horizon year indicated by the traffic analysis. If the width of the sidewalk is reduced, the right-of-way width shall not be reduced. Instead, the planter width shall be increased accordingly.

5. To accommodate bicycles on sidewalks, a minimum design speed of 20 mph shall be used; however, when the grade exceeds 4 percent, a design speed of not less than 30 mph shall be used unless otherwise approved by the City Engineer.

6. All sidewalks must be constructed to provide for curb ramps in accordance with the ADA accessibility criteria access. See Section 2B.070 for curb ramp requirements on private roadways. All ADA ramps shall be designed in accordance with Chapter 1510 (Pedestrian Facilities) of the WSDOT Design Manual showing plan and profile views. All ADA ramps shall be
constructed in accordance with the latest WSDOT Standard Plans for Road, Bridge and Municipal Construction.

7. Form and sub-grade inspection by the City are required before sidewalk and curb access ramps are poured. Forms shall be the same height as the thickness of the sidewalk, curb and gutter, or driveway. Concrete sampling for compressive strength may be required at the discretion of the City Engineer.

8. Monolithic pour of curb, gutter and sidewalk will not be allowed, unless approved by the City Engineer.

9. Sidewalks that dead-end at the project property line shall have a minimum 5-foot wide asphalt concrete pavement ramp constructed, at a maximum 12:1 slope, which abuts the sidewalk and joins to the edge of the roadway. A barricade may be required per Section 2B.100. A 3-foot wide advance-warning strip shall be constructed 5 feet from the end of the sidewalk and prior to the asphalt concrete pavement ramp. When the sidewalk is extended in the future, these interim measures shall be removed.

10. For driveway requirements, see section 2B.140.

2C.040 Curb and Gutter

Portland cement concrete curb and gutter per the details referenced in this chapter shall be used for all roadway edges unless otherwise approved by the City Engineer. See Section 2B.090 and Detail 2-20 for curb requirements around cul-de-sacs.

Form and sub-grade inspection by the City are required before curb and gutter are poured.

The face or top of all new curbs shall be embossed to denote the location of water and sewer services crossings. Water services shall be marked ¼ inch into concrete with a "W" and side sewers shall be marked with an "S".

2C.050 Crosswalks

All crosswalks shall be designed in accordance with Chapter 1510 (Pedestrian Facilities) of the WSDOT Design Manual and the MUTCD. See Figure 2.6

2C.060 Staking

All surveying and staking shall be performed by engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.
A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of curb, gutter and sidewalk shall be as directed by the City Engineer or as described in section 2B-190.

2C.070 Testing

Testing shall be required per Section 2B.200.

In addition, the City shall be notified before each phase of sidewalk, curb and gutter construction commences.

2D PEDESTRIAN FACILITIES

2D.010 General

Pedestrian facilities are to be designed and constructed so they are readily accessible to and usable by persons with disabilities.

2D.020 Design Standards

The design of pedestrian facilities shall be in accordance with Chapter 1510 (Pedestrian Facilities) of the WSDOT Design Manual and the 2005 Edition of the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way. See Figure 2.6 on the following pages.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Width</td>
<td>4 ft Min [1510.05(6)]</td>
<td>4 ft Min</td>
<td>4 ft Min</td>
<td>4 ft Min</td>
<td>4 ft Min</td>
<td>See Curb Ramp or Building and Facilities Ramp requirements</td>
<td>Pass-through: 5 ft Min – Island: 6 ft Min [1510.05(11)]</td>
<td>4 ft Min [1510.05(2)]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td></td>
<td></td>
<td>At least the width of widest ramp run connected to landing – 3 ft Min</td>
<td></td>
</tr>
<tr>
<td>Cross Slope</td>
<td>2% Max [1510.05(6)]</td>
<td>2% Max</td>
<td>2% Max</td>
<td>2% Max</td>
<td>2% Max</td>
<td>2% Max</td>
<td>2% Max</td>
<td>2% Max</td>
<td>2% Max</td>
</tr>
<tr>
<td></td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Running Slope</td>
<td>8.3% Max[^7][^15.3]</td>
<td>5% Max</td>
<td>See Note 6</td>
<td>5% Max</td>
<td>2% Max</td>
<td>5% Max</td>
<td>5% Max</td>
<td>5% Max</td>
<td>Above 5% to 8.3% Max[^6]</td>
</tr>
<tr>
<td></td>
<td>[1510.05(4)]</td>
<td>[1510.05(4)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td>[1510.05(6)]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Vertical Rise</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Landing every 2.5 ft vertical rise [1510.07(2)]</td>
</tr>
<tr>
<td>Grade Break</td>
<td>Flush – See Std Plans</td>
<td>Flush</td>
<td>½ inch between roadway gutter &amp; curb</td>
<td>Flush</td>
<td>Flush</td>
<td>Flush</td>
<td>Flush</td>
<td>Flush</td>
<td></td>
</tr>
<tr>
<td>Surface Discontinuities</td>
<td>N/A</td>
<td>New: Flush Existing: See Note 8</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>New: Flush Existing: See Note 8</td>
<td>New: Flush Existing: See Note 8</td>
</tr>
<tr>
<td>Curb Flare Slope</td>
<td>10% Max</td>
<td>N/A</td>
<td>10% Max[^9]</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>If curb ramp is used, see Curb Ramp requirements</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

[^4]: See referenced chapter sections in table.
<table>
<thead>
<tr>
<th>Design Feature</th>
<th>Curb Ramp</th>
<th>Sidewalk</th>
<th>Driveway Crossing</th>
<th>Crosswalk</th>
<th>Landing</th>
<th>Crossing Through Island/Median</th>
<th>Pedestrian Circulation Path[14]</th>
<th>Building and Facilities Ramp or Independent Walkway</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vertical Clear Area</strong></td>
<td>80 inches Min[19] [1510.06(2)]</td>
<td>80 inches Min[12] [1510.06(2)]</td>
<td>80 inches Min[10] [1510.06(2)]</td>
<td>60 inches Min[10]</td>
<td>80 inches Min[10]</td>
<td>80 inches Min[10]</td>
<td>80 inches Min[10]</td>
<td>80 inches Min[10]</td>
</tr>
<tr>
<td>Counter Slope</td>
<td>5% Max [1510.05(6)]</td>
<td>N/A</td>
<td>N/A</td>
<td>See Curb Ramp</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Landing</td>
<td>Width: Min match curb ramp width</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Detectable Warning Surface</strong></td>
<td>2 ft wide, 6 inches behind face of curb, full width of ramp</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>2 ft wide, each side 6 inches behind face of curb, full width of opening</td>
<td>2 ft wide, full width when path joins roadway shoulder</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Notes**

[1] A ramp with a rise greater than 6 inches in this context is on a walkway on a separate alignment that is not adjacent to or parallel to a roadway; ramps may have slopes greater than 5% and 8.3% max.

[2] Ramps with a rise greater than 6 inches. Also, ramps require edge protection and shall have handrails.

[3] Required sidewalk width: 8 ft when buffer is included, 6 ft when sidewalk is next to curb.

[4] Unmarked crosswalks require a 10 ft wide area across intersection. Marked crosswalks are required to be 8 ft min., 10 ft desirable. (See RCW 46.04.160 and the MUTCD for crosswalks.)

[5] If less than 5 ft wide, provide 5 ft x 5 ft passing areas every 200 ft.

[6] Allowed to match the roadway grade when located adjacent to and parallel to the roadway; landings would not be required.

[7] For Preservation projects: 10% to 8.33% for rises to 6 inches; 12.5% to 10% for rises to 3 inches.

[8] Changes in level of 1/8 inch max are allowed to be vertical; changes between 1/4 inch and 1/8 inch max to be beveled at 2H:1V.

[9] Required when sidewalk is provided behind the driveway.

[10] 7 ft min. vertical clearance required to bottom of signs (see the MUTCD and the Standard Plans).


[12] Shall not reduce the clear width required for pedestrian access routes.

[13] The curb ramp maximum running slope shall not require the ramp length to exceed 15 feet.

[14] For additional shared-use path information, see Chapter 1515.
2E  BICYCLE FACILITIES

2E.010 General

Bikeway construction may be required in conjunction with any new plat or short plat as indicated in the Gig Harbor Transportation Plan. See details at the end of this chapter for bikeway classifications.

Bikeways located outside of the public right-of-way may be located within an easement or dedicated as a separate tract of land to the City of Gig Harbor for public use. The easement or tract shall be 20 feet wide.

2E.020 Design Standards

The design of bicycle paths shall depend upon their type and usage. Bike path surfacing shall be as outlined in Section 2B.160. Bike lanes and shared roadways shall be surfaced the same as the adjacent motor vehicle roadway.

All minimum design standards as set forth in Section 1.040 shall apply.

2E.030 Signing and Marking

In general, all bikeway facilities shall be signed per the MUTCD or as specified herein. The bike lane stripes and pavement markings shall be as shown on the details at the end of this section.

2E.040 Staking and Testing

Staking and testing shall be done in accordance with roadway staking and testing as outlined in Section 2B.190 and 2B.200.

2F  ILLUMINATION

2F.010 General

All new commercial or residential subdivisions, short subdivisions or property development requiring Site Plan Review shall provide roadway lights in accordance with the standards for such improvements of the City and they shall be owned and operated by the City. Illumination within private roadways shall be privately owned and maintained.

2F.020 Design Standards

A roadway lighting plan submitted by the applicant and approved by the City Engineer shall be required for all roadway light installations. Type of installation shall be as set forth in WSDOT Standard Specifications for Road, Bridge and Municipal Construction and as directed by the City except where noted herein.
All public roadway light designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All developments shall submit the lighting plan on a separate sheet. See the Plan Checklist in Section 1.040 for lighting plan and report components. After system is completed and approved, a set of "as-built" drawings, per Section 1.065, shall be submitted to the City as a permanent record.

Lights shall be located in accordance with the illumination standards and the roadway details at the end of this section. In addition, intersections shall be illuminated to 1.5 times the highest foot candle requirement of the roadways surrounding the intersection. Poles shall be opposite across the roadway or on one side of the roadway. Staggered spacing will be allowed. Roadway lighting must be connected to a metered service disconnect.

For the purposes of this section, area classes are determined by zoning as follows:

**Commercial**
- C1 Commercial/Light Industrial
- B1 Retail, Limited
- B2 Retail, General

**Intermediate**
- RB1 Residential Business
- RB2 Residential/Business
- DB Downtown Business
- WC Waterfront Commercial
- WM Waterfront Millville

**Residential**
- R1 Single Family
- R2 Single Family/Duplex
- R3 Multifamily

As new zones are created, they will be classified for the design of illumination by the City Engineer. If road widths differ from those in the Illuminations Standards table, other spacing will be determined by the project engineer and reviewed and approved by the City Engineer using the following criteria:

**FIGURE 2.7 Average Maintained Horizontal Illumination (Foot Candles)**

<table>
<thead>
<tr>
<th>Road Class</th>
<th>AREA CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residential</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Residential/Private</td>
<td>0.4</td>
</tr>
<tr>
<td>Collectors</td>
<td>0.6</td>
</tr>
<tr>
<td>Arterials</td>
<td>0.8</td>
</tr>
<tr>
<td>Boulevards</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Uniformity ratio:  
- 6:1 average: minimum for residential and private  
- 4:1 average: minimum for collector  
- 3:1 average: minimum for arterial and boulevard

Dirt Factor = 0.85, lamp lumen depreciation factor = 0.73  
Min. Weak Point Light = 0.2fc except residential roadway  
Average illumination at intersections 1.5 times the illumination required on the more highly illuminated roadway.

<table>
<thead>
<tr>
<th>Wattage</th>
<th>Initial Lamp Lumens</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td>310</td>
<td>37,000</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>22,000</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>16,000</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>9,500</td>
<td></td>
</tr>
</tbody>
</table>

Line loss calculations shall show that no more than five percent voltage drop occurs in any circuit. Lamp Load factor shall equal 1.2.

Pole foundations shall be per Detail 2-28. Poles located within the clear zone or poles on roadways with no curb shall have break-away foundations per the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.

The General Notes for Street Light Construction need to be included on any plans dealing with street design in addition to all applicable requirements as set forth in Section 1.040.

**GENERAL NOTES (Roadway Illumination Construction)**

1. All workmanship, materials and testing shall be in accordance with the most current WSDOT Standard Specifications for Road, Bridge and Municipal Construction, National Electrical Code or City of Gig Harbor Public Works Standards unless otherwise specified below. In cases of conflict, the most stringent standard shall apply. When the most stringent standard is not clear, the City Engineer will make the determination. The electrical contractor shall be familiar with all above stated publications and guidelines as they will be strictly enforced by the State of Washington Department of Labor and Industries.

2. The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the State of Washington, Department of Labor and Industries.
3. The contractor shall be responsible for all traffic control in accordance with the WSDOT Standard Plans for Road, Bridge and Municipal Construction (all applicable “K” plans) and/or the Manual on Uniform Traffic Control Devices (MUTCD). Prior to disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for review and approval. No work shall commence until all approved traffic control is in place.

4. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction.

5. If construction is to take place in the County and/or Washington State Department of Transportation right-of-way, the contractor shall notify the City. The City shall obtain all the required approvals and permits. The contractor shall reimburse the City for associated permit fees.

6. Electrical permits and inspections are required for all roadway lighting installations within the City of Gig Harbor. The contractor is responsible for obtaining said permits prior to any type of actual construction. These permits are available from the Washington State Department of Labor and Industries. The developer/contractor is responsible for all connection fees associated with the electrical systems and should contact Peninsula Light Co. at (253) 857-1541 for connection requirements and fee amounts.

7. A pre-construction meeting shall be held with the City of Gig Harbor Construction Inspector prior to the start of construction.

8. Prior to installation of any materials, the electrical contractor shall submit for approval by the City three copies of material catalog cuts, specifications, shop drawings and/or wiring diagrams. Any materials purchased or labor performed prior to such approval shall be at the Contractor's risk. Mounting heights, arm length, power source, luminaire type and bolt patterns shall follow City of Gig Harbor Public Works Standards Section 2E.020. Modifications of any portion of the lighting system will not be allowed without prior approval by the City.

9. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.

10. All surveying and staking shall be performed per the corresponding section of the City of Gig Harbor Public Works Standards.

11. Temporary erosion control/water pollution measures shall be required in accordance with Section 1-07.15 of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and the Gig Harbor Stormwater Management and Site Development Manual. At no time will silt and debris be allowed to drain into an existing or newly installed facility unless special provisions have been designed.

12. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate Line at 811 a minimum of 48 hours prior to any excavation. The
contractor will also be responsible for maintaining all locate marks once the utilities have been located.

13. A 500 volt Megger Test will be performed by the contractor on each circuit between conductor and ground prior to acceptance of the lighting system. The insulation resistance shall not be less than 6 megohms to ground for runs over 2,500 ft nor less than 8 megohms for runs under 2,500 ft. A functional test will be performed by the City in which it is demonstrated that each and every part of the system functions as specified or intended herein. WSDOT Standard Specifications for Road, Bridge and Municipal Construction 8-20.3(11). Lamp, photocell and fixture shall be under warranty for a period of two years.

14. All lighting poles shall be as specified in Section 2E.020 of the Gig Harbor Public Works Standards. The Sonotube form shall be removed to below ground level. Pole bases shall be grouted and all luminaire heads shall be plumb and level.

15. Cement concrete bases shall follow City of Gig Harbor Public Works Standards Detail 2-28, Decorative Luminaire Base.

16. The photo cell window shall face north unless otherwise directed by the City. The service disconnect shall not be mounted on the luminaire pole. The service disconnect shall be manufactured by Skyline Electric and MFG. Company, see Detail 2-23.

17. All lighting wire shall be copper with a minimum size of #8. All wire shall be suitable for wet locations. All wire shall be installed in schedule 40 PVC conduit with a minimum diameter of 2 inches. A bushing or bell-end shall be used at the end of a conduit that terminates at a junction box or luminaire pole. Conductor identification shall be an integral part of the insulation of the conductors throughout the system i.e., color coded wire. Equipment grounding conductor shall be #8 copper. All splices or taps shall be made by approved methods utilizing epoxy kits rated at 600 volts (i.e., 3-M 82-A2). All splices shall be made with pressure type connectors (wire nuts will not be allowed). Direct burial wire will not be allowed. All other installation shall conform to NEC, WSDOT and MUTCD standards.

18. Each luminaire pole shall have an in-line, fused, water-tight electrical disconnect located at the base of the pole. Access to these fused disconnects shall be through the hand-hole on the pole. The hand-hole shall be facing away from on-coming traffic. Additional conductor length shall be left inside the pole and pull or junction box equal to a loop having a diameter of one foot. Load side of in-line fuse to luminaire head shall be cable and pole bracket wire, 2 conductor, 19 strand copper #10 and shall be supported at the end of the luminaire arm by an approved means. Fuse size, disconnect installation and grounding in pole shall conform to NEC standards.

19. Approved pull boxes or junction boxes shall be installed when conduit runs are more than 200 feet. In addition, a pull box or junction box shall be located within 10 feet of each luminaire pole and at every road crossing. Boxes shall be clearly and indelibly marked as lighting boxes by the legend, “L.T.” or “LIGHTING”. See WSDOT standard plan J-11a.
20. Any modification to approved lighting plans shall be reviewed and approved by the City prior to installation. Any approved modifications shall be shown on a Mylar Record Drawing supplied to the City after the lighting installation is completed and before final acceptance. It shall be the responsibility of the electrical contractor to ensure these record drawings are provided to the City.

2F.040 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.

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

The minimum staking of luminaries shall be as follows:

1. Location and elevation to the center of every pole base.
2. Location and elevation of each service disconnect.

2F.050 Testing

All illumination systems shall be subject to a Dept. of Labor and Industries electrical inspection which shall include Megger testing and a functional test. Lamp, photocell and fixture shall be under warranty for a period of two years.

2G TRAFFIC CONTROL DEVICES

2G.010 General

Traffic control devices shall be installed per the requirements set forth herein. This work shall consist of furnishing and installing a complete and functional traffic control system, of controllers, signals and appurtenances as required by the City.

Traffic control devices may include, but are not limited to; signals, traffic islands, modern roundabouts, stop or yield control devices, or traffic calming features.

2G.020 Design Standards

If a traffic control device is required, then the developer shall be required to pay the cost for the City’s on-call, contracted traffic services, or, if the City’s schedule allows, shall pay for the City to design the traffic control device. The City shall retain the right to determine the appropriate traffic control device based on an approved Traffic Impact Analysis. Design of appropriate traffic control devices shall be performed by a City approved traffic design consultant.
Signal systems shall be designed in accordance with the specifications as set forth by the City of Gig Harbor, ITE, AASHTO, Pierce County and or WSDOT. The WSDOT Standard Specifications for Road, Bridge and Municipal Construction shall be used unless otherwise authorized by the City. Electrical permits are required for all traffic control devices. The contractor is responsible for obtaining all permits prior to construction.

All new traffic control devices or any alteration or modification to any existing device shall conform to the 2005 Accessible Public Rights of Way Accessibility Guidelines (PROWAG) and shall be equipped with the following APS features; pushbutton locator tone, tactile arrow, audible and vibrotactile walk indications, automatic volume adjustment and countdown signal heads.

All applicable design requirements set forth in Section 1.040 and listed on the plan checklist shall be included. When analyzing intersections for traffic control devices, impacts to the entire roadway corridor shall be considered.

All signal poles and signal bases shall be of the decorative type as described in the City of Gig Harbor Municipal Code and per the construction details at the end of this section. All control cabinets and service cabinets shall be green in color outside to match decorative poles and bases and white on inside.

All specifications and material samples shall be submitted to the City for review and approval prior to installation.

2G.030 Induction Loops

Induction loops shall be constructed per WSDOT Standard Specification 8-20.3(14)C and the following:

A. Loops shall not be cut into final lift of new asphalt.

B. Loops shall be pre-formed in crushed surfacing top course (CSTC) before paving or shall be cut in existing asphalt or leveling course to sub-base before intersection is overlaid.

2G.040 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.

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

The minimum staking of signals shall be as follows:
A. Location, with cut or fill to center of all pole bases.

B. Location of junction box.

C. Location of all corners of controller base.

D. Location of the service disconnect.

2G.050 Testing

All traffic control devices shall be subject to any necessary electrical inspections as well as requirements as set forth in Section 2B.200.

A signal system shall not be approved or accepted by the City until the signal has performed correctly to the City's satisfaction for a 30-day "check-out" period as outlined below.

All traffic signal control equipment shall be tested per section 9-29.13 of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction prior to being installed.

2G.060 Functional Testing

Field testing of illumination, traffic signal systems, and electrical for traffic control systems shall be per Section 8-20 of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction with the following exceptions:

The insulation resistance shall not be less than 50 megaohms between the conductor and ground on all circuits of any length.

A functional test shall be made to demonstrate that each and every part of the system functions as specified.

The contractor shall perform in the presence of the City, frequency response and noise tests between each controller cabinet. The same test shall also be performed on all unused (spare) pairs between the master controller and the most distant cable termination cabinet served by the pair.

The contractor shall perform continuity checks from all wires to ground, to the satisfaction of the City.

The functional test for the traffic signal system shall consist of not less than five days of continuous, satisfactory operation. If unsatisfactory performance of the system develops, the condition shall be corrected and the test shall be repeated until the five days of continuous, satisfactory operation is obtained.

Before initial turn-on, the signal system shall be placed in flashing operation for at least two full working days but no more than five calendar days. The initial turn-on shall be made between 9:00 am and 2:00 pm on a Tuesday,
Wednesday, or Thursday as approved by the City. Prior to turn on, all equipment as shown on the plans shall be installed and operable. This includes pedestrian signals, pedestrian push buttons, vehicle detectors, and roadway lighting. All louvers, visors, and signal heads shall be directed to provide maximum visibility.

Turn on of new or modified traffic signal systems shall be made only after all traffic signal circuits have been thoroughly tested as specified above. Functional tests shall start on any working day except Friday, Monday, or the day preceding or following a legal holiday.

A shutdown of the electrical system resulting from damage caused by public traffic, from a power interruption, or from unsatisfactory performance of City furnished materials may not constitute discontinuity of the functional test.

Turn-on of the new traffic control shall be accomplished by qualified factory signal technicians with three days advance notice to the City. The contractor shall not turn on any signal system or part thereof visible to any traveled roadway without the accompaniment of the City. The temporary and permanent signing and pavement marking shall be installed in accordance with the plans and specifications or as approved by the City before the new traffic controls are turned on.

2H  ROADSIDE FEATURES

2H.010 General

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible.

2H.020 Design Standards

The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature, and, when applicable, to the appropriate standards as set forth in Section 1.010 and 1.040.

2H.030 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.

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

2H.040 Testing

Testing shall be required per Section 2B.200.
2H.050 Survey Monuments

A. All existing survey control monuments which will be disturbed or destroyed during construction shall be referenced by the developer’s professional land surveyor prior to construction and replaced after construction by the developer or a professional land surveyor licensed by the State of Washington. All applicable statutes regulations and ordinances will be complied with, including but not limited to, WAC 332-120, WAC 332-130, and RCW 58.09. The monuments shall be replaced with the proper type as outlined in B or C below at the expense of the responsible builder or developer. As described in Section 332-120 of the WAC, a Remove or Destroy Survey Monument permit is required. This permit application can be obtained at the Public Works Department and is issued through the Washington State Department of Natural Resources. See Detail 2-24 and 2-25.

B. Roadway type: Boulevards, arterials, major collectors, and at the option of the City, bus routes and truck routes.

A poured-in place concrete surface monument per City of Gig Harbor standards is required.

The monument case shall be installed after the final course of surfacing has been placed.

C. Roadway type: Minor collectors; major, minor, local, residential and private roadways and those roadways not specifically outlined in 2G.050B above.

A poured-in-place per City of Gig Harbor standards is required.

D. Monument Locations

Appropriate monuments shall be placed:

1. At all roadway intersections. At intersections when roadways listed in 2G.050C intersect with boulevards, arterials or major collectors, the monuments shall be placed at the intersection of the centerline of the minor roadways (listed in 2G.050C) with the right-of-way line of a boulevard, arterial or major collector;

2. At the PC and PT’s of all horizontal curves or at the PI if it lies in the traveled roadway;

3. At all DLC corners, section corners, quarter corners and sixteenth corners that fall within the subdivision. Where these points fall outside of the pavement or sidewalks, a poured-in-place
monument per City of Gig Harbor standards shall be set so that the top of the monument is one foot below the surface of the ground.

2H.060 Bus Pads, Shelters and Amenities

Different population densities dictate the number and placement of bus stops. The location of Pierce Transit and/or public school district bus pads, shelters, or amenities will be evaluated on a case-by-case basis for each project. Pierce Transit and the school district shall make every effort to coordinate the location of bus stops and shall work with the City to determine the best location for the required amenity.

2H.070 Mailboxes

All access ramps servicing transit stops, park & ride lots, rest areas, buildings, and other facilities shall be designed in accordance with Chapter 1510 of the WSDOT Design Manual.

A. During construction, existing mailboxes shall be accessible for the delivery of mail or, if necessary, moved to a temporary location. Temporary relocation shall be coordinated with the US Postal Service. The mailboxes shall be reinstalled at the original location or, if construction has made it impossible, to a location as outlined below and approved by the U.S. Postal Service.

B. Mailboxes in new developments shall be clustered. Contact the U.S. Postal Service for location details.

C. Mailboxes shall be set on posts strong enough to give firm support but not to exceed 4- by 4-inch wood or one 1 1/2-inch diameter pipe, or material and design with comparable breakaway characteristics.

2H.080 Retaining Walls

Rock walls, brick, concrete building block, or other approved material may be used for erosion protection of cut or fill embankments, for structurally retaining embankments, or as desired for aesthetic purposes.

The height of a retaining wall is that distance as measured from the bottom of the footing, regardless of whether the footing is buried or exposed, to the top of the wall.

Retaining walls on private property shall meet the requirements of the adopted Building Code. Retaining walls located on private property shall be set back from any public right-of-way line a distance at least equal to the height of the wall unless otherwise approved by the City Engineer.

Retaining walls located on private property where the public right-of-way line is closer than the height of the wall shall not exceed 4 feet in height unless the
wall is designed by a Washington State licensed professional engineer and the wall meets all the requirements of the adopted building code. Walls meeting this criteria must be approved by the City Engineer and the Building Official.

Retaining walls over 4 feet in height located on a public right-of-way shall meet or exceed WSDOT design standards and be designed by a Washington State licensed professional engineer.

2H.090 Roadway Trees

All public roadways within the City will be planted with trees to create a distinct and pleasant character for those roadways and shall not be a sight distance impedement. The roadway trees on the following table shall be required in or along the public right-of-way. Contact the City for specific roadway and accent trees in the core area.

See Section 2B.125 “Landscape/Planter Areas” for specific site preparation requirements.

A. Planting theme

B. Planting size: Trees, 2 to 3 inch caliper, measured 6 inches above the base. Ground cover (i.e., kinnikinnick), 4-inch pot spaced 18 to 20 inches on center or 1 gallon pots at 20 inches on center. Low growth shrubs (i.e., Oregon grape), 1 gallon pots at 3 feet on center. Shrubs (i.e., rhododendron), 18 to 24 inches in height at 5 feet on center or 3 gallon pot at 5 feet on center.

C. Location: Trees shall be centered in the median or as shown on the applicable roadway detail. Trees shall be generally spaced 35-feet on center starting 10 to 15 feet from the property line. Exceptions may be made when there are existing sidewalks. Roadway trees may then be planted 3 to 5 feet behind the sidewalk. Tree spacing may be adjusted slightly to allow a minimum of 10-foot spacing on either side of a driveway. Tree spacing may also be adjusted as directed by the City Engineer to accommodate for special circumstances such as parking stalls, roadway light installation, anticipated crown growth etc.

D. Maintenance: All projects, regardless of type or zoning, required to plant roadway trees will also be required to maintain the trees in perpetuity regardless of ownership. Trees shall be maintained per ANSI A300, Standard Practices for Trees, Shrubs and other Woody Plant Maintenance.

All property owners shall be responsible for mowing and weeding planter strips in abutting right of way except owners of single family residential properties that are not part of a home owners association. The City will be responsible for pruning all roadway trees located in the right-of-way. The owner/homeowner’s association is responsible for mowing and
weeding. See Section 4.185 for installation and maintenance of irrigation systems. Medians shall be maintained by the City.

E. Exceptions to the planting theme may be made by the City Engineer. Exceptions include but are not limited to; screening industrial areas; planting around historical sites; maintaining natural vegetation that better serves as roadway landscaping or beautification.

F. Root barriers shall be required to be installed adjacent to back of curb and front of sidewalk. Root barrier shall be “Root Deep 24-2”, “Root Deep 415-437-9700,” Tree Root Guide RS-40 by Root Solutions, or approved equal. Root barrier length will be 15 ft centered on tree trunk.

G. 6 in x 4 in pressure treated wood headers extending from the front of sidewalk to the back of curb at 2 ft on either side of roadway tree is required in landscape strip application. 4 in. of wood mulch shall be places inside of these wood headers and around trunk of tree. See Detail 2-27 for further information on roadway tree installation.

Approved Roadway Tree List

- Albizia julibrissin (silk tree, mimosa)
- Acer campestre (Hedge maple, Queen Elizabeth maple)
- Acer platanoides (Norway Maple)
- Acer pseudoplatanus (Sycamore Maple)
- Acer rubrum (Red Maple)
- Acer truncatum (Norwegian sunset, Waren’s Red Pacific Sunset)
- Carpinus betulus ‘Fastigiata’ (Pyramidal European Hornbeam)
- Cladrastis lutea (Yellow Tree)
- Catalpa speciosa (Western Catalpa)
- Celtis laevigata ‘All Seasons’ (All Season Sugar Hackberry)
- Celtis occidentalis (Common Hackberry)
- Cercidiphyllum japonicum (Katsura Tree)
- Crataegus oxyacantha (Paul’s scarlet)
- Crataegus crus-galli (Thornless Cockspur Hawthorn)
- Crataegus X lavalli (Lavalli Hawthorne)
- Crataegus phaenopyrum (Washington Hawthorn)
- Fraxinus p. ‘Marshall Seedless’ (Marshal Seedless Ash)
- Ginco biloba (males only) (Maidenhair Tree)
- Gleditsia triacanthos (Honey locust)
- Koelreuteria paniculata (Goldenrain Tree)
- Liquidambar styraciflua (sweetgum)
- Magnolia grandiflora (Victoria Magnolia)
- Malus (Tschonoskii)
- Platanus spp. (London plane, sycamore)
- Prunus sargentii ‘Columnar’ (Columnnar Sargent Cherry)
- Prunus X hillieri ‘Spire’
- Pyrus betulifolia (Ornamental Birchleaf Pear)
- Pyrus calleryana ‘Capital’ (pear)
2H.110 Parking Lots

The construction of parking lots within the City shall be reviewed and approved by the Public Works Department. Access and drainage issues are governed by the Public Works Standards. Contact the Public Works Engineering Department to determine if the parking lot requires a Site Plan Review process. Minimum requirements for parking lot capacity shall be determined at Site Plan Review.

The Public Works Department may require plans for the access. Access points to parking lots shall meet all the criteria as outlined in Sections 2B.025, Access Management, and 2B.140, Driveways.

Plans and specifications as required in Section 3, Storm Drainage, shall be required to be submitted for review and approval by the City with respect to storm drainage discharge and on site retention or detention, matching roadway and/or sidewalk grades, access locations, parking layout, and to check for future roadway improvement conformity and City zoning regulations.

Parking lot surfacing materials shall satisfy the requirement for a permanent all-weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable as approved surface material types. Combination grass/paving systems are approved surface material types; however, their use is limited to surplus parking only.

2I ROADWAY SIGNAGE

2I.010 General

All traffic signs must conform to the MUTCD, as adopted by the City of Gig Harbor pursuant to WAC 468-95-010. All traffic signs within the City right of way shall be installed in accordance with the requirements of the City Engineer. All sign sheeting shall be High Intensity Prismatic sheeting of one of the following grades, Type III, VI, or VIII, and also conform to the MUTCD requirements.
2I.020 Stop Signs

Stop signs shall be installed by the developer on all unsignalized local public road approaches to City arterials or State highways, all private road approaches to City arterial roads, and at other locations determined by the City Engineer as soon as the road approach is opened to vehicular use. The stop sign for a private road approach must be maintained by the property owner(s) that have legal access to the private road. Stop sign construction and location must be in accordance with the City of Gig Harbor Standard Drawings.

2I.030 Roadway Name Signs

Roadway name signs for private roads or driveway approaches shall be installed by the developer. Street name signs for private roads and driveway approaches shall be maintained by the property owner(s) that have legal access to the road or approach. Street name signs for public roads will be installed by the developer and maintained by the City. Street name sign construction and location must be in accordance with the City's Standard Drawings. Street names and/or numbers shall be in accordance with Chapter 12.12 Gig Harbor Municipal Code. Street name signs for private roads and driveway approaches shall be installed prior to the final inspection. All signs shall include a serial number, whose number will be provided by the City.
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## CHAPTER 2 - TRANSPORTATION

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NOTES:
1. MOVE STREET LIGHTS TO BACK OF WALK WHERE PLANTER STRIP IS LESS THAN 8'.
2. ON-STREET PARKING PROHIBITED.
3. SEE DETAIL 2-13 FOR PAVEMENT STRUCTURE.
4. MANHOLE LIDS AND WATER VALVE BOXES SHALL BE LOCATED IN THE IN THE MIDDLE OF THE OUTSIDE VEHICLE TRAVEL LANE.
5. STREET TREES IN MEDIAN SHALL BE CENTERED. STREET TREES IN PLANTERS SHALL BE 2.5' FROM EDGE OF SIDEWALK TO CENTERLINE OF TREE.
6. STREET LIGHTS MAY BE REQUIRED IN MEDIAN.
NOTES:
1. BIKE LANE WIDTH TO BE DETERMINED BY THE CITY.
2. SEE DETAIL 2-13 FOR PAVEMENT DESIGN CONSTANTS.
3. MANHOLE LIDS AND WATER VALVE BOXES SHALL BE LOCATED IN THE MIDDLE OF THE OUTSIDE VEHICLE TRAVEL LANE.
4. CATCH BASINS NOT PERMITTED WITHIN VALLEY GUTTERS.
5. THE OPTIONAL VALLEY GUTTERS WILL BE DETERMINED ON A CASE BY CASE BASIS.
6. STREET TREES IN MEDIAN SHALL BE CENTERED. STREET TREES IN 10.5' PLANTER SHALL BE CENTERED 4' FROM SIDEWALK. STREET TREES IN 10.5' WALK SHALL BE CENTERED IN TREE WELL.
NOTES:
1. ON-STREET PARKING PROHIBITED.
2. SEE DETAIL 2-13 FOR PAVEMENT DESIGN CONSTANTS.
3. MANHOLE LIDS AND WATER VALVE BOXES SHALL BE LOCATED IN THE MIDDLE OF THE OUTSIDE VEHICLE TRAVEL LANES.
4. STREET TREES IN MEDIAN SHALL BE CENTERED. STREET TREES IN PLANTERS SHALL BE 2.5' FROM EDGE OF SIDEWALK TO CENTERLINE OF TREE.
5. FOR USE IN LIMITED PEDESTRIAN TRAFFIC AREA.
NOTES:
1. BIKE LANE WIDTH TO BE DETERMINED BY THE CITY.
2. SEE DETAIL 2-13 FOR PAVEMENT DESIGN CONSTANTS.
3. MANHOLE LIDS AND WATER VALVE BOXES SHALL BE LOCATED IN THE MIDDLE OF THE OUTSIDE VEHICLE TRAVEL LANE.
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6. STREET TREES IN 10.5' PLANTER SHALL BE 4' FROM SIDEWALK TO CENTERLINE OF TREE. STREET TREES IN 10.5' SIDEWALK SHALL BE CENTERED IN TREE WELL.
NOTES:
1. ON-STREET PARKING PROHIBITED.
2. BIKE LANE WIDTH TO BE DETERMINED BY THE CITY ENGINEER.
3. SEE DETAIL 2-13 FOR PAVEMENT DESIGN CONSTANTS.
4. MANHOLE LIDS AND WATER VALVE BOXES SHALL BE LOCATED IN THE MIDDLE OF THE OUTSIDE VEHICLE TRAVEL LANES.
5. STREET TREES IN PLANTERS SHALL BE 2.5' FROM EDGE OF SIDEWALK TO CENTERLINE OF TREE.
NOTES:
1. ON-STREET PARKING MAY BE DELETED IF SEPARATE TRACTS ARE DEDICATED TO PARKING WITHIN THE PLAT.
2. TRAFFIC CALMING FEATURES MAY BE REQUIRED ON RESIDENTIAL ROADS CONNECTING PUBLIC ARTERIALS.
3. DELETION OF SIDEWALK ON ONE SIDE OF STREET ALLOWED IF UNITS ARE "SIDE- LOADED" OR AS PERMITTED BY THE CITY ENGINEER.
4. VERTICAL CURB AND CUTTER MEETING FIG. 2-20 REQUIRED BOTH SIDES OF STREET.
5. DECORATIVE LUMEC PED. LIGHTING APPROVED BY THE CITY REQUIRED ON BOTH SIDES OF THE STREETSPACED AT 150’ INTERVALS.
NOTES:

1. ON-STREET PARKING PROHIBITED.
2. LUMEC DECORATIVE STREET LIGHTS APPROVED BY THE CITY REQUIRED ON BOTH SIDES OF THE STREET AT 150' INTERVALS.
3. DELETION OF SIDEWALK ON ONE SIDE OF STREET ALLOWED IF RESIDENTIAL UNITS ARE “SIDE-LOADED” OR AS PERMITTED BY THE CITY ENGINEER.
4. VERTICAL CURB AND GUTTER MEETING FIG. 2–36 REQUIRED ON BOTH SIDES OF STREET.
NOTES:

1. ON-STREET PARKING MAY BE DELETED IF SEPARATE TRACTS ARE DEDICATED TO PARKING WITHIN THE PLAT.
2. TRAFFIC CALMING FEATURES MAY BE REQUIRED ON RESIDENTIAL ROADS CONNECTING PUBLIC ARTERIALS.
3. DELETION OF SIDEWALK ON ONE SIDE OF STREET ALLOWED IF UNITS ARE "SIDE- LOADED" OR AS PERMITTED BY THE CITY ENGINEER.
4. VERTICAL CURB AND GUTTER MEETING FIG. 2-20 REQUIRED BOTH SIDES OF STREET.
NOTES:
1. 4000 PSI WITH FIBER MESH ADDED
2. EXPANSION JOINT 3/8" THICK, FULL DEPTH, SPACED 15' AND SCORE EVERY 5'.
HAMMERHEAD

BARRICADE SEE DETAIL 2-19

PLANTER

IF A HYDRANT IS NOT INSTALLED, THE B.O. ASSEMBLY SHALL BE INSTALLED AT THE MIDDLE OF THE CUL-DE-SAC.

9' R. ISLAND TO BE ADDED WHEN ROAD IS EXTENDED.

DEAD END CUL-DE-SAC AND FUTURE ROUND-ABOUT

NOTES:
1. IF OVERHANG IS GREATER THAN 30", THE 10' SETBACK SHALL BE FROM EDGE OF THE OVERHANG.
2. THE 10' SETBACK MAY BE ENCROACHED UPON BY THE ACCESS ROAD AT THE CURVE RADII.
NOTES:

1. MARKINGS FOR BARRICADE SHALL BE ALTERNATE RED AND WHITE STRIPES (SLOPING DOWNWARD, PER MUTCD, AT AN ANGLE OF 45° TO CURB).
2. THE ENTIRE AREA OF RED AND WHITE STRIPES SHALL BE REFLECTORIZED SO AS TO BE VISIBLE UNDER NORMAL ATMOSPHERIC CONDITIONS FROM A MINIMUM DISTANCE OF 1,000 FEET WHEN ILLUMINATED BY THE LOW BEAMS OF STANDARD AUTOMOBILE HEADLIGHTS. THE PREDOMINANT COLORS FOR OTHER BARRICADE COMPONENTS SHALL BE WHITE.
3. BARRICADE SECTION SHALL EXTEND TO LIMITS OF THE PAVED SURFACE.
4. CONSTRUCT BARRICADE PER MUTCD TYPE 3, SECTION 6C-8.
## AASHTO Flexible Pavement Design Standards

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### Standard Asphalt Pavement Section
- HMA: 8, 6, 6, 6, 5, 4, 2, 2
- CSTC: 2, 2, 2, 2, 2, 2, 2
- CSBC: 14, 14, 9, 8, 10, 6, 2

### Minimum Asphalt Pavement Section with Approved Design
- HMA: 6, 6, 4, 4, 3, 2, 2
- CSTC: 2, 2, 2, 2, 2, 2, 2
- CSBC: 8, 6, 6, 6, 5, 4

### Minimum Concrete Pavement Section with Approved Design
- PCC: 10, 10, 8, 8, 8, 8, 4
- CSBC: 2, 2, 2, 2, 2, 2, 2

**Concrete Streets are allowed with approved supporting design**

### NOTES:

1. Standard Asphalt Pavement Section shall be used when no custom design is provided.
2. Minimum Pavement Sections are the minimum acceptable pavement sections for custom designs.
3. Pavement sections for other facilities, such as low-impact designs and parking lots, shall be substantiated by geotechnical analyses and design documentation.
PERPENDICULAR TRENCH RESTORATION
ARTERIALS, BLVDS., AND COLLECTORS

EMULSIFIED ASPHALT GRADE CSS1 TACK SHALL BE APPLIED TO EDGES OF EXISTING PAVEMENT. ALL JOINTS SHALL BE SEALED USING PAVING ASPHALT AR4000W. APPLY TACK COAT PER WSDOT STANDARDS 9-04

MINIMUM WIDTH OF GRIND SHALL BE 11"  

EXISTING A.C. PAVEMENT

SAW CUT EXISTING PAVEMENT (TYPICAL)

MINIMUM 0.33' 1/2" HMA (COMPACTED DEPTH) OR EXISTING PLUS 0.08', WHICHEVER IS GREATER. APPLIED IN MAXIMUM 3" LIFTS.

PIPE BEDDING SHALL MEET STANDARD SPECIFICATION FOR GRAVEL BACKFILL FOR PIPE ZONE BEDDING 9-03.12(3). NO PEA GRAVEL SHALL BE PERMITTED.

TRENCH BACKFILL SHALL MEET THE STANDARD SPECIFICATION FOR BANK RUN GRAVEL 9-03.19.

VARIES

FONDATION TYPICAL, REQUIRED ONLY WHEN UNSUITABLE MATERIAL ARE ENCOUNTERED AND AS THE ENGINEER DIRECTS.

0.33' MIN.

MAXIMUM TRENCH WIDTH SHALL BE 1.5' PLUS 1/2 TIMES THE OUTSIDE DIAMETER OF THE PIPE OR 2.5', WHICHEREVER IS GREATER (TYPICAL)

NOTES:

1. ALL MATERIALS EXCEPT HMA AND BEDDING MATERIAL SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY AS DETERMINED BY ASTM D1557.

2. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE MOST CURRENT WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF GIG HARBOR STANDARDS.

3. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.

4. SAW CUT PAVEMENT TO MAX. TRENCH WIDTH. BACKFILL AND PAVE TO TOP OF EXISTING PAVEMENT FOR TRENCH WIDTH. ALLOW 24 HOURS MINIMUM FOR TRENCH PATCH TO CURE. GRIND AND PAVE FINAL PATCH AS SHOWN.

5. CDF BACKFILL WILL BE REQUIRED AROUND DUCT BANKS THAT ARE STACKED VERTICALLY.

CITY OF GIG HARBOR
ENGINEERING DIVISION

PERPENDICULAR TRENCH RESTORATION
ARTERIALS, BLVDS., AND COLLECTORS

DETAIL NO.  2-14

APPROVED BY
CITY ENGINEER  DATE  1/1/2014
EMULSIFIED ASPHALT GRADE
CSS1 TACK SHALL BE APPLIED TO EDGES OF EXISTING PAVEMENT. ALL JOINTS SHALL BE SEALED USING PAVING ASPHALT AR4000W. APPLY TACK COAT PER WSDOT STANDARDS 9-04

FULL LANE OVERLAY

SAW-CUT EXISTING PAVEMENT (TYPICAL)
MINIMUM 0.33’ 1/2” HMA (COMPACTED DEPTH) OR EXISTING PLUS 0.08’, WHICHEVER IS GREATER APPLIED IN MAXIMUM 2” LIFTS.

EXISTING A.C. PAVEMENT
GRIND 2” MAX., OR 1½” MIN. FOR PAVEMENT 2” OR LESS
ROADWAY SECTION PER DETAIL 2-21 COMPACTED TO 95%

FOUNDATION TYPICAL REQUIRED ONLY WHEN UNSUITABLE MATERIAL ARE ENCOUNTERED AND AS THE ENGINEER DIRECTS.

.5’ MIN.

VARES

TRENCH BACKFILL SHALL MEET THE STANDARD SPECIFICATION FOR BANK RUN GRAVEL 9-03.19.

VARES

0.33’ MIN.

MAXIMUM TRENCH WIDTH SHALL BE 1.5’ PLUS 1½ TIMES THE OUTSIDE DIAMETER OF THE PIPE OR 2.5’, WHICHER IS GREATER (TYPICAL)

NOTES:
1. ALL MATERIALS EXCEPT A.C.P. AND BEDDING MATERIAL SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY AS DETERMINED BY ASTM D1557.
2. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE MOST CURRENT WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF GIG HARBOR STANDARDS.
3. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
4. SAW-CUT PAVEMENT TO MAX. TRENCH WIDTH. BACKFILL AND PAVE TO TOP OF EXISTING PAVEMENT FOR TRENCH WIDTH.
5. CDF BACKFILL WILL BE REQUIRED AROUND DUCT BANKS THAT ARE STACKED VERTICALLY.

CITY OF GIG HARBOR ENGINEERING DIVISION
PARALLEL TRENCH RESTORATION ARTERIALS, BLVDS., AND COLLECTORS

DETAIL NO. 2-15

APPROVED BY CITY ENGINEER DATE 1/1/2014
TRENCH RESTORATION FOR UNPAVED AREAS

0.33' OF TOPSOIL OR CSTC AS NOTED ON PLAN

3.5' MIN.

0.5' MIN.

PIECE BEDDING SHALL MEET THE STANDARD SPECIFICATION FOR GRAVEL BACKFILL FOR PIPE ZONE BEDDING 9-03.12(3).
No pea gravel shall be allowed.

FOR PVC PIPE AND FOR DUCTILE IRON WHEN NATIVE MATERIAL EXCEEDS 2 INCHES IN ANY DIMENSION

0.34' MIN.

FOUNDATION TYPICAL REQUIRED ONLY WHEN UNSUITABLE MATERIALS ARE ENCOUNTERED AND AS THE ENGINEER DIRECTS

MAXIMUM TRENCH WIDTH SHALL BE 1.5' PLUS 1/2 TIMES OUTSIDE DIAMETER OF PIPE OR 2.5', WHICHEVER IS GREATER (TYPICAL)

NOTES:
1. BEDDING SHALL CONFORM TO SECTION 9-03.12(3) OF STANDARD SPECIFICATIONS.
2. COMPACTION: BEDDING SHALL BE COMPACTED TO 95% MIN. AS DETERMINED BY ASTM D1557.
   BACKFILL SHALL BE COMPACTED TO 85% MIN. IN UNPAVED AREA, AND 95% MIN. IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D1557.
3. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE MOST CURRENT WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF GIG HARBOR STANDARDS.
4. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. A BELL JOINT SHALL BE REQUIRED AT EACH JOINT FOR PROPER SUPPORT. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
NOTES:
1. GRINDING SHALL BE DONE PER WSDOT 5-04.3(14) SPECIFICATIONS.
2. IDENTIFY AND PROTECT ALL LOOP AND LOOP LEAD-INS DURING GRINDING.
3. ALL PAVEMENT MARKINGS SHALL BE REMOVED PRIOR TO PAVING.
4. ALL INDUCTION LOOPS SHALL BE INSTALLED PRIOR TO FINAL OVERLAY.
5. EXISTING A.C.P. SHALL BE TACKED WITH EMULSIFIED ASPHALT TYPE CSS-1 PER WSDOT 5-04.3(5)A.
6. THE TRANSITION JOINT SHALL BE SEALED WITH A SAND SLURRY PER WSDOT 5-04.3(5)C.
NOTES:
1. FOR JOINTS AND SCORINGS SEE DETAIL 2–30.
2. CONCRETE DRIVEWAYS REQUIRE A
   MINIMUM DEPTH OF 6” AT 4000 PSI 3 DAY.
3. SIDE SLOPES ON SWALES WITHIN
   PLANTERS SHALL START A MINIMUM
   OF 1’ BACK FROM SIDEWALK AND CURB.
4. SEE ROADWAY SECTIONS FOR STREET
   TREE LOCATIONS.
NOTES:
1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PRE-MOLDED JOINT FILLER TO FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT OF ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.
4. ALL CONCRETE EDGES AND JOINTS SHALL HAVE A 4" SHINED FINISH APPLIED TO THEM FOLLOWING BROOM FINISH.
NOTES
1. THE INTENT OF THIS DESIGN IS TO FACILITATE THE COMPACTATION OF HOT MIX ASPHALT PAVEMENT ADJACENT TO A DRAINAGE STRUCTURE.
2. THE CENTERLINE OF THE DRAINAGE STRUCTURE MAY DIFFER FROM THE CENTERLINE OF THE FRAME AND GRATE.
NOTES:
1. SEE DEVELOPMENT GUIDELINE 2G.070 FOR ADDITIONAL REQUIREMENTS.
3. CLUSTER STYLE MAILBOX PROHIBITED ON COLLECTOR AND ARTERIAL STREETS.
DOUBLE STAND
NOT TO SCALE

SINGLE STAND
NOT TO SCALE
SERVICE CABINET FOR STREET LIGHTING CONTROL AND TRAFFIC SIGNAL
NOT TO SCALE

COMPONENT SCHEDULE

1. METER BASE: 100 AMP, 4 JAW, AW #114TB, SAFETY SOCKET
   (CONTRACTOR TO VERIFY WITH SERVING UTILITY).
2. PANELBOARD: 120/240 VAC, 100 AMP, 1 PHASE, 3 WIRE,
   COPPER BUS, 12 POLE WESTINGHOUSE BAB BOLT-ON
   BREAKERS:
   1 - 100% MAIN
   2 - 5% ILLUMINATION BRANCH
   3 - 5% SIGNAL BRANCH
   4 - 5% GROUND FAULT RECEPTACLE BRANCH
   5 - 1/8 CONTROL CKT BRANCH
3. CONTACTOR: LIGHTING RATED, 30 AMP, 120 VAC COIL
   - REQUIRED 4 POLE
4. PHOTO ELECTRIC CELL: 1800 VA, 120 VAC, ALR #5ST-IES (PER
   WSDOT SPEC) TO BE PLACED AT TOP OF NEAREST STREET LIGHT POLE
5. PHOTO-CELL BYPASS SWITCH, SPST, 15 AMP, 277 VAC
6. GROUND FAULT RECEPTACLE, 120 VAC, DUPLEX, 20 A

CABINET: NEMA 3R, PADMOUNT, 1/3" TYPE 50502-H32 ALUMINUM
CONSTRUCTION
2 SCREENED AND GASKETED VENTS
DOORS: HEAVY DUTY CONCEALED HINGES (LIFT-OFF
   TYPE) STAINLESS STEEL VAULT HANDLES, PAD-
   LOCKABLE METER DOOR, BEST CX LOCK ON
   DISTRIBUTION DOOR, POLISHED WIRE GLASS
   WINDOW IN METER DOOR, CLOSED CELL NEO-
   PREEN GASKET, CARD HOLDER
FINISH INSIDE: WHITE
FINISH OUTSIDE: HUNTER GREEN

UL LISTED PER STANDARD #508
SUITABLE FOR USE AS SERVICE ENTRANCE
EQUIPMENT

SERVICE CABINET SERIES 58309-GH R3
M.E. BELL S.O. #
SKYLINE ELECTRIC AND MFG COMPANY

CONCRETE BASE PER MANUFACTURERS
RECOMMENDATION OR WSDOT STANDARD PLAN

CITY OF GIG HARBOR
ENGINEERING DIVISION

METERED
SERVICE DISCONNECT
FOR STREET LIGHTING
AND TRAFFIC SIGNALS

DETAIL NO. 2-23

APPROVED BY
CITY ENGINEER DATE 1/1/2014
NOTES:
1. THIS MONUMENT TO BE USED PRIMARILY ON BITUMINOUS OR ASPHALT CONCRETE PAVEMENT FOR USE PRIMARILY IN SUBDIVISIONS AND MINOR ARTERIALS.
2. CONCRETE BASE DIMENSIONS SHOWN ARE MINIMUM. CONCRETE BASE NEED NOT BE FORMED.
3. CAP SHALL BE "BERNTSEN RB SERIES" OR BRASS PLUG MARKER.
4. CONCRETE TO BE PLACED ON A FIRM AND UNYIELDING FOUNDATION.
5. MONUMENT POSITION SHALL BE SET BY A PROFESSIONAL LAND SURVEYOR LICENSED BY THE STATE OF WASHINGTON WHOSE CERTIFICATE NUMBER SHALL BE STAMPED ON THE CAP.
6. SUFFICIENT FERROUS METAL SHALL BE PLACED IN CONCRETE TO ALLOW DETECTION BY A METAL DETECTOR.
NOTES:
1. ESTIMATED WEIGHT:
   COVER = 17 LBS (8 KG)
   FRAME = 16 LBS (7 KG)
   UNIT = 33 LBS (15 KG)
2. MATERIAL SPECIFICATIONS:
   COVER — GRAY IRON, ASTM A48 CL35B
   FRAME — GRAY IRON, ASTM A48 CL35B
3. LOAD RATING: HEAVY DUTY
4. OPEN AREA: N/A
PLANTERS UP TO 7' WIDE

PLANTERS > 7' TO 10' WIDE

PLANTERS > 10' WIDE

CENTER IN PLANTER

CENTER IN PLANTER

STAKES-2 EA.(TYP.)
TREE TIE (TYP.)
TREE TRUNK (TYP.)

CENTER IN PLANTER

8.5'

HEADER (TYP)

CURB & GUTTER

GEOTEXTILE ROOT CONTROL SYSTEM, TREE ROOT GUIDE RS-40 BY ROOT SOLUTIONS, ROOT BARRIER PANEL EP-1250 BY NDS, OR APPROVED EQUAL. 15' O.C. BELOW SURFACE, 2' DEEP, BOTH SIDES (TYP.).

RUBBER TREE TIE (12 GA.)
(FASTEN LOOSELY)
BARK PER WSDOT 9-14.4(3)
1" BELOW HEADER
4" DEEP
FORMED CONCRETE OR 6" x 4" PRESSURE TREATED DOUGLAS FIR HEADER

9/16" PRE-DRILLED HOLE
#5 REBAR 24" LONG
FLUSH WITH TOP OF 6" x 4"
FINISHED GRADE
6" DEEP TOP SOIL

PLANT 2" BELOW TREE WELL GROUND LEVEL
(KEEP MULCH 3" FROM STEM)

ROOT BALL (REMOVE WIRE BASKET OR CONTAINER). REMOVE BURLAP.

(2) 2x2 STAKES OR APPROVED EQUAL SPACED EVENLY OUTSIDE OF ROOT BALL, PARALLEL TO ROAD.

2' x 2' POLYETHYLENE PANELS OR TREE ROOT GUIDE AS NOTED ABOVE

2' MINIMUM

SECTION A-A

NOTES:
1. THE GEOTEXTILE ROOT CONTROL SYSTEM SHALL BE 2' x 2' BIOPOLYMER PANELS, OR 2' x 15' TREE ROOT GUIDE RS-40 BY ROOT SOLUTIONS, OR CITY APPROVED EQUAL.
2. EACH HEADER SHALL BE SECURED WITH TWO #5 REBAR.

CITY OF GIG HARBOR
ENGINEERING DIVISION

TREE PLANTER AND BARRIER IN PLANter STRIP

DETAIL NO. 2-26

APPROVED BY CITY ENGINEER 1/1/2014
GRATE NOTES:
1. INITIAL OPENING FOR TREE SHALL BE 16".
2. GRATES SHALL BE CAST IN TWO PIECES.
3. NO OPENING IN GRATE DESIGN SHALL BE GREATER THAN ½".
4. GRATE SHALL BE CAST IRON PER ASTM A48 CLASS 35b OR BETTER.
5. GRATE SHALL BE 5' SQUARE "FAN" BY URBAN ACCESSORIES OR APPROVED EQUAL GRATES SHALL BE INSTALLED WITH BRACKETS AND/OR FRAMES PER THE MANUFACTURER'S RECOMMENDATION. ALL GRATES SHALL MEET ADA STANDARDS.
NOTE:
1. SIZE OF OCTAGON BASE AND MOWNG STRIP/BORDER, ARE DETERMINED BY SIZE OF STREET LIGHT BASE.
* LUMEC DESCRIPTION OF COMPONENTS:

* OR APPROVED EQUAL

BRACKET: TN12-1A-GN6TX-LMS19550A
ARM: MADE OF CAST ALUMINUM, WELDED.
ADAPTOR: CLAMPS MADE OF CAST ALUMINUM, WELDED TO THE ARM AND MECHANICALLY FASTENED TO THE POLE BY FOUR BOLTS AND NUTS.
POLE: AM8U-15-GN6TX
POLE SHAFT: MADE FROM A ONE-PIECE, SEAMLESS 4” ROUND (102mm) TUBE OF EXTRUDED ALUMINUM WELDED OVER AND IN A 8½” ROUND (219mm) EXTRUDED ALUMINUM POLE BASE. THE ASSEMBLY IS WELDED TO BOTH THE TOP AND BOTTOM OF A CAST ALUMINUM ANCHOR PLATE.
JOINT COVER: MADE FROM TWO PIECES OF CAST ALUMINUM MECHANICALLY FASTENED TO THE JUNCTION WITH STAINLESS STEEL HARDWARE.
POLE BASE: SHALL BE MADE FROM A 219mm HIGH TENSILE STEEL RUBBING BASE HAVING A 0.180” WALL THICKNESS, WELDED TO BOTH THE BOTTOM AND TOP OF THE ANCHOR PLATE.
MAINTENANCE OPENING: THE POLE SHALL HAVE A 4½”x10” (114x254mm) MAINTENANCE OPENING CENTERED 25 1/4” FROM THE BOTTOM OF THE ANCHOR PLATE, COMPLETE WITH A WEATHERPROOF CAST 365 ALUMINUM COVER AND A FACTOR ASSEMBLED COPPER GROUND LUG.
BASE COVER: DECORATIVE BASE COVER MADE FROM CAST ALUMINUM PIECES MECHANICALLY ASSEMBLED TOGETHER WITH STAINLESS STEEL HARDWARE AROUND THE BASE OF THE POLE.
POLE OPTIONS: BANNER ARM MADE OF ALUMINUM TUBING 1½” OUTSIDE DIAMETER, MECHANICALLY ASSEMBLED TO THE POLE. BANNER ARM PLACEMENT TO BE AT 12’ 0” FROM BASE OF POLE.
MISCELLANEOUS:
WIRING: TYPE TIGHT 14 GA. 12” MIN. EXCEEDING TOP OF POLE. ALL ELECTRICAL CONNECTIONS SHALL BE MADE WITH QUICK-DISCONNECT CONNECTORS.
HARDWARE: ALL EXPOSED SCREWS WILL BE STAINLESS STEEL. NEOPRENE AND/OR SILICONE GASKETING IS APPLIED.
COLOR: FOREST GREEN. FINISH: TEXTURED. APPLICATION OF A POLYESTER POWDER COATED PAINT. (5mils/127 microns). THE CHEMICAL COMPOSITION PROVIDED A HIGHLY DURABLE UV AND SALT SPRAY RESISTANT FINISH IN ACCORDANCE TO THE ASTM-B117-73 STANDARD AND HUMIDITY PROOF IN ACCORDANCE TO THE ASTM-D2247-88 STANDARD.
* LUMEC DESCRIPTION OF COMPONENTS:
* OR APPROVED EQUAL

BRACKET: TM12-1A-GN6TX-LMS19650A
ARM: MADE OF CAST 365 ALUMINUM, WELDED.
ADAPTOR: CLAMPS MADE OF CAST ALUMINUM, WELDED TO THE ARM AND MECHANICALLY FASTENED TO THE POLE BY FOUR BOLTS AND NUTS.
POLE: SSMBV-20 MADE FROM A ONE-PIECE, SEAMLESS 5 9/15" ROUND (141mm) HIGH TENSILE CARBON STEEL SHAFT SEALED BY A ROLLED AND FLATTENED VERTICAL WELD SEAM AND WELDED OVER AND IN A 8 5/8" ROUND (219mm) HIGH-TENSILE CARBON-STEEL POLE BASE. THE ASSEMBLY IS WELDED TO BOTH THE TOP AND THE BOTTOM OF A STEEL ANCHOR PLATE. A 4 3/4"x10" (114x254mm) MAINTENANCE OPENING IS COMPLETE WITH COVER AND COPPER GROUND LUG.
JOINT COVER: MADE FROM TWO PIECES OF CAST ALUMINUM MECHANICALLY FASTENED TO THE JUNCTION WITH STAINLESS STEEL HARDWARE.
BASE COVER: DECORATIVE BASE COVER MADE FROM CAST—ALUMINUM PIECES MECHANICALLY ASSEMBLED TOGETHER WITH STAINLESS STEEL HARDWARE AROUND THE BASE OF THE POLE.
MAINTENANCE OPENING: THE POLE SHALL HAVE A 4 3/4"x10" (114x254mm) MAINTENANCE OPENING CENTERED 25 1/4" FROM THE BOTTOM OF THE ANCHOR PLATE, COMPLETE WITH A WEATHERPROOF CAST 365 ALUMINUM COVER AND A FACTOR ASSEMBLED COPPER GROUND LUG.
BASE COVER: DECORATIVE BASE COVER MADE FROM CAST ALUMINUM PIECES MECHANICALLY ASSEMBLED TOGETHER WITH STAINLESS STEEL HARDWARE AROUND THE BASE OF THE POLE.
POLE OPTIONS: BANNER ARM MADE OF ALUMINUM TUBING 1 1/16" OUTSIDE DIAMETER, MECHANICALLY ASSEMBLED TO THE POLE. BANNER ARM PLACEMENT TO BE AT 12° FROM BASE OF POLE.
MISCELLANEOUS:
WIRING: TYPE TEEW 14 GA, 12" MIN. EXCEEDING TOP OF POLE. ALL ELECTRICAL CONNECTORS SHALL BE MADE WITH QUICK-DISCONNECT CONNECTORS.
HARDWARE: ALL EXPOSED SCREWS WILL BE STAINLESS STEEL. NEOPRENE AND/OR SILICONE GASKETING IS APPLIED.
COLOR: FOREST GREEN. FINISH: TEXTURED. APPLICATION OF A POLYESTER POWDER COATED PAINT. (5mils/127 microns). THE CHEMICAL COMPOSITION PROVIDED A HIGHLY DURABLE UV AND SALT SPRAY RESISTANT FINISH IN ACCORDANCE TO THE ASTM—B117—73 STANDARD AND HUMIDITY PROOF IN ACCORDANCE TO THE ASTM—B2247—88 STANDARD.

CITY OF GIG HARBOR
ENGINEERING DIVISION

STANDARD
20 FOOT LIGHT POLE

DETAIL NO. 2-30

APPROVED BY CITY ENGINEER DATE 1/1/2014
LUMEC DESCRIPTION OF COMPONENTS:

* OR APPROVED EQUAL

BRACKET: TN12-1A-0N6TX-LMS19650A
ARM: MADE OF CAST 365 ALUMINUM, WELDED.
ADAPTOR: CLAMPS MADE OF CAST ALUMINUM, WELDED TO THE ARM AND MECHANICALLY FASTENED TO THE POLE BY FOUR BOLTS AND NUTS.
POLE: SSM8+30-BAS22-0N6-TX-LMS19650A. MADE FROM 141mm ROUND HIGH TENSILE CARBON STEEL TUBING, HAVING A 0.250" WALL THICKNESS, WELDED TO THE POLE BASE.
JOINT COVER: TWO-PIECE, ROUND JOINT COVER MADE FROM CAST 365 ALUMINUM, MECHANICALLY FASTENED WITH STAINLESS STEEL SCREWS.
POLE BASE: SHALL BE MADE FROM A 219mm HIGH TENSILE STEEL TUBING BASE HAVING A 0.150" WALL THICKNESS, WELDED TO BOTH THE BOTTOM AND TOP OF THE ANCHOR PLATE.

MAINTENANCE OPENING: THE POLE SHALL HAVE A 4 1/2" x 10" (114 x 254mm) MAINTENANCE OPENING CENTERED 25 1/4" FROM THE BOTTOM OF THE ANCHOR PLATE, COMPLETE WITH A WEATHERPROOF CAST 365 ALUMINUM COVER AND A FACTOR ASSEMBLED COPPER GROUND LUG.
BASE COVER: TWO-PIECE, ROUND BASE COVER MADE FROM SPUN 1100-0 ALUMINUM, MECHANICALLY FASTENED WITH STAINLESS STEEL SCREWS.
BREAK-AWAY COVER: ONE PIECE ROUND BASE MADE FROM SPUN 1100-0 ALUMINUM, MECHANICALLY FASTENED. ONLY ALLOWED ON ROADWAYS WITH POSTED 35 MILE PER HOUR SPEED LIMIT OR GREATER.
POLE OPTIONS: BANNER ARM MADE OF ALUMINUM TUBING 1 1/16" OUTSIDE DIAMETER, MECHANICALLY ASSEMBLED TO THE POLE. BANNER ARM PLACEMENT TO BE AT 20° 0' FROM BASE OF POLE.

MISCELLANEOUS:
WIRING: TYPE TIEW 14 GA. 12" MIN. EXCEEDING TOP OF POLE. ALL ELECTRICAL CONNECTIONS SHALL BE MADE WITH QUICK-DISCONNECT CONNECTORS.
HARDWARE: ALL EXPOSED SCREWS WILL BE STAINLESS STEEL. NEOPRENE AND/OR SILICONE GASKETING IS APPLIED.
NOTES:

NO HORIZONTAL GAPS GREATER THAN 1/2".
NO VERTICAL DISCONTINUITIES GREATER THAN 1/4".
CONCRETE: 3 DAY CURE/4000 PSI
PATTERN: PERMACOLOR
PERMA BUILDING PRODUCTS
RUNNING BOND PT-516
SLATED 12" X 12" PT-330
COLOR: DAVIS BRICK RED OR SOLOMAN CARDINAL CONCRETE FROM PLANT

COMPRESSIVE STRENGTH CYLINDER TEST RESULTS WILL BE REQUIRED BEFORE OPENING TO VEHICULAR TRAFFIC.
WELDS SHALL HAVE A SMOOTH SURFACE AT JOINT TYP ALL WELDED JOINTS

2" O.D. HOT DIPPED GALVANIZED STEEL ROUND PIPE

2" O.D. HOT DIPPED GALVANIZED STEEL ROUND PIPE

5/8" O.D. HOT DIPPED GALVANIZED STEEL ROUND PIPE

R=4"

2" O.D. HOT DIPPED GALVANIZED STEEL ROUND PIPE

GALVANIZED INSERT

PEDESTRIAN GUARD
COUPLED SECTION
CONNECTION DETAIL
NOT TO SCALE

CITY OF GIG HARBOR
ENGINEERING DIVISION

PEDESTRIAN GUARD

DETAIL NO. 2-33

APPROVED BY CITY ENGINEER DATE 1/1/2014
DESCRIPTION OF COMPONENTS:

HOOD: A DIE CAST A360.1 ALUMINUM DOME COMPLETE WITH CAST-IN TECHNICAL RING WITH LATCH AND HINGE. THE MECHANISM SHALL OFFER TOOLFREE ACCESS TO THE INSIDE OF THE LUMINAIRE. AN EMBEDDED MEMORY-RETENTIVE GASKET SHALL ENSURE WATER-PROOFING.

SKIRT: A DIE CAST A360 ALUMINUM SKIRT COMPLETE WITH A CAST-IN TECHNICAL RING.

HOUSING: IN A ROUND SHAPE, THIS HOUSING IS MADE OF CAST 356 ALUMINUM, C/W A WATERTIGHT GROMMET, MECHANICALLY ASSEMBLED TO THE BRACKET WITH FOUR BOLTS 3/16 UNC. THIS SUSPENSION SYSTEM PERMITS FOR A FULL ROTATION OF THE LUMINAIRE IN 90 DEGREE INCREMENTS.

LIGHT ENGINE: LIFELI ED COMPOSED OF 5 MAIN COMPONENTS. ELECTRICAL COMPONENTS ARE ROHS COMPLIANT.
1. LENS: MADE OF SODA-LIME CLEAR TEMPERED GLASS, MECHANICALLY ASSEMBLED AND SEALED ONTO THE LOWER PART OF THE HEAT SINK.
2. LAMP: PHILIPS LUMILEDS REBEL ES, COMPOSED OF 49 HIGH-PERFORMANCE WHITE LEDS, 65W LAMP WATTAGE. COLOR TEMPERATURE OF 4000 KELVIN NOMINAL, 70 CRI. OPERATING LIFESPAN AFTER WHICH THE SYSTEM EMITS 70% OF ITS ORIGINAL LUMEN OUTPUT, ALL OF THOSE PARAMETERS ARE TESTED FOR 100% OF LIGHT ENGINES. USE OF A METAL CORE BOARD ENSURES GREATER HEAT TRANSFER AND LONGER LIFESPAN OF THE LIGHT ENGINE.
3. OPTICAL SYSTEM: (LE3F), I.E.S. TYPE III (ASYMMETRICAL), COMPOSED OF HIGH-PERFORMANCE COLLIMATORS, OPTIMIZED WITH VARYING BEAM ANGLES TO ACHIEVE DESIRED DISTRIBUTION. SYSTEM IS RATED IP66. PERFORMANCE SHALL BE TESTED PER LM63 AND LM 79 (IENSA) CERTIFYING ITS PHOTOMETRIC PERFORMANCE. STREET-SIDE INDICATED.
DESCRIPTION OF COMPONENTS:

HOOD: A DIE CAST A360.1 ALUMINUM DOME COMPLETE WITH A CAST-IN TECHNICAL RING WITH LATCH AND HINGE. THE MECHANISM SHALL OFFER TOOLFREE ACCESS TO THE INSIDE OF THE LUMINAIRE. AN EMBEDDED MEMORY-RETENTIVE GASKET SHALL ENSURE WEATHERPROOFING.

SKIRT: A DIE CAST A 360 ALUMINUM SKIRT COMPLETE WITH A CAST-IN TECHNICAL RING.

HOUSING: IN A ROUND SHAPE, THIS HOUSING IS MADE OF CAST 356 ALUMINUM, C/W A WATERTIGHT GROMMET, MECHANICALLY ASSEMBLED TO THE BRACKET WITH FOUR BOLTS 3/8–16 UNC. THIS SUSPENSION SYSTEM PERMITS FOR A FULL ROTATION OF THE LUMINAIRE IN 90 DEGREE INCREMENTS.

LIGHT ENGINE: LIFELED COMPOSED OF 5 MAIN COMPONENTS. ELECTRICAL COMPONENTS ARE ROHS COMPLIANT.

LENS: MADE OF SODA-LIME CLEAR TEMPERED GLASS LENS, MECHANICALLY ASSEMBLED AND SEALED ONTO THE LOWER PART OF THE HEAT SINK.

LAMP: LAMP TYPE PHILIPS LUMILEDS REBEL ES, COMPOSED OF 49 HIGH-PERFORMANCE WHITE LEDS, 90W LAMP WATTAGE. COLOR TEMPERATURE OF 4000 KELVIN NOMINAL, 70 CRI. OPERATING LIFESPAN AFTER WHICH THE SYSTEM EMITS OVER 70% (L70) OF ITS ORIGINAL LUMEN OUTPUT ALL OF THOSE PARAMETERS ARE TESTED FOR 100% OF LIGHT ENGINES. USE OF A METAL CORE BOARD INSURES GREATER HEAT TRANSFER AND LONGER LIFESPAN OF THE LIGHT ENGINE.

OPTICAL SYSTEM: (LE3F), I.E.S. TYPE III (ASYMMETRICAL). COMPOSED OF HIGH-PERFORMANCE ACRYLIC COLLIMATORS, OPTIMIZED WITH VARYING BEAM ANGLES TO ACHIEVE DESIRED DISTRIBUTION. SYSTEM IS RATED IP66. PERFORMANCE SHALL BE TESTED PER LM63 AND LM79 (IESNA) CERTIFYING ITS PHOTOMETRIC PERFORMANCE. STREET-SIDE INDICATED.

HEAT SINK: MADE OF CAST ALUMINUM OPTIMIZING THE LEDS EFFICIENCY AND LIFE. PRODUCT DOES NOT USE ANY COOLING DEVICE WITH MOVING PARTS (ONLY PASSIVE COOLING DEVICE).

DRIVER: HIGH POWER FACTOR OF 90% ELECTRONIC DRIVER, OPERATING RANGE 50–60 HZ. AUTO-ADJUSTING TO A VOLTAGE BETWEEN 120 AND 277 VOLT AC RATED FOR BOTH APPLICATION LINE TO LINE OR LINE TO NEUTRAL, CLASS II, THD OF 20% MAX. MAXIMUM AMBIENT OPERATING TEMPERATURE FROM –40ºF (–40ºC) TO 130ºF (55ºC). CERTIFIED IN COMPLIANCE TO CULUS REQUIREMENT. DRY AND DAMP LOCATION. ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH TYCO QUICK DISCONNECT PLUG RESISTING TO 221ºF (105ºC) DEGREES.

THE CURRENT SUPPLYING THE LEDS WILL BE REDUCED BY THE DRIVER IF THE INTERNAL TEMPERATURE EXCEEDS 185ºF (85ºC), AS A PROTECTION TO THE LEDS AND THE ELECTRICAL COMPONENTS. OUTPUT IS PROTECTED FROM SHORT CIRCUITS, VOLTAGE OVERLOAD AND CURRENT OVERLOAD. AUTOMATIC RECOVERY AFTER CORRECTION.

SURGE PROTECTOR: LED DRIVER 3 POLES 10KV SURGE PROTECTORS THAT PROTECT LINE–GROUND, LINE NEUTRAL, AND NEUTRAL–GROUND IN ACCORDANCE WITH IEEE/ANSI C62.41.2 GUIDELINES.
DESCRIPTION OF COMPONENTS:

HOOD: CAST 356 ALUMINUM DOME, MECHANICALLY ASSEMBLED ON THE LUMINAIRE.

ACCESS—MECHANISM: A DIE CAST A360 ALUMINUM TECHNICAL RING WITH LATCH AND HINGE. THE MECHANISM SHALL OFFER TOOTFREE ACCESS TO THE INSIDE OF THE LUMINAIRE. AN EMBEDDED MEMORY—RETENTIVE GASKET SHALL ENSURE WEATHERPROOFING.

LENS: MADE OF SODA—LIME CLEAR TEMPERED GLASS LENS, MECHANICALLY ASSEMBLED AND SEALED ONTO THE LOWER PART OF THE HEAT SINK.

LAMP: COMPOSED OF 80 HIGH—PERFORMANCE WHITE LEDS, 135W LAMP WATTAGE. COLOR TEMPERATURE OF 4000 KELVIN NOMINAL, 70 CRI. OPERATING LIFESPAN BASED ON LM80 RESULTS AFTER WHICH 50% STILL EMITS OVER 70% (L70) OF ITS ORIGINAL LUMEN OUTPUT. USE OF A METAL CORE BOARD ENSURES GREATER HEAT TRANSFER AND LONGER LIFESPAN OF THE LIGHT ENGINE. THE LED CIRCUIT BOARD IS INCLUDED WITH A CONNECTOR, (NO CONNECTION WIRE REQUIRED FOR EASE OF REPLACEMENT).

OPTICAL SYSTEM: (LE3S), I.E.S. TYPE III (ASYMMETRICAL). COMPOSED OF HIGH—PERFORMANCE ACRYLIC REFRACTORS LENSES TO ACHIEVE DESIRED DISTRIBUTION OPTIMIZED TO GET MAXIMUM SPACING, TARGET LUMEN'S AND A PERFECT LIGHTING UNIFORMITY. SYSTEM IS RATED IP66. PERFORMANCE SHALL BE TESTED PER LM63 AND LM 79 AND TM15 (IENSA) CERTIFYING ITS PHOTOMETRIC PERFORMANCE.

HEAT SINK: MADE OF CAST ALUMINUM OPTIMIZING THE LEDS EFFICIENCY AND LIFE. PRODUCT DOES NOT USE ANY COOLING DEVICE WITH MOVING PARTS (ONLY PASSIVE COOLING DEVICE).

DRIVER: HIGH POWER FACTOR OF 95% ELECTRONIC DRIVER, OPERATING RANGE 50—60 HZ. AUTO—ADJUSTING TO A VOLTAGE BETWEEN 120 AND 277 VOLT AC RATED FOR BOTH APPLICATION LINE TO LINE OR LINE TO NEUTRAL. CLASSI, THD OF 20% MAX. MAXIMUM AMBIENT OPERATING TEMPERATURE FROM —40°F (—40°C) TO 130°F (55°C). CERTIFIED IN COMPLIANCE TO CULUS REQUIREMENT. WEATHER TIGHTNESS RATING IP66. ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH TYCO QUICK DISCONNECT PLUG RESISTING TO 221°F (105°C).
Main St E

AT LOCAL ROAD INTERSECTIONS ONLY
NOT TO SCALE

Main St E

AT OR ALONG ARTERIALS AND COLLECTORS
NOT TO SCALE

CITY OF GIG HARBOR
ENGINEERING DIVISION

SIGN - PUBLIC ROAD
STREET NAME 2-37

APPROVED BY CITY ENGINEER DATE 1/1/2014
OVERHEAD MOUNT D3-301(mod) SIGN DETAIL

NOT TO SCALE

NOTES:
16 IN. SIGN HEIGHT WITH 8 IN. LETTER/NUMBER UPPER CASE.

NAME OF JURISDICTION LOGO FONT SHALL BE "TIMES NEW ROMAN".

STREET NAME FONT SHALL BE UNITED STATES FEDERAL HIGHWAY ADMINISTRATION "HIGHWAY GOTHIC".

FOR MASTARM SIGNAL LOCATIONS — SIGNS ARE SINGLE SIDED. MOUNT SIGNS PER CURRENT WSDOT STANDARD PLAN G-30.10-XX.

FOR SPANWIRE SIGNAL LOCATIONS — SIGNS ARE DOUBLE SIDED.

* SIGN LENGTH AS REQUIRED FOR LETTER SPACING.

** 8 IN. DESIRED WITH 5.25 IN. MINIMUM UNLESS OTHERWISE APPROVED BY ENGINEER.
OVERHEAD MOUNT SIGN DETAIL
NOT TO SCALE

NOTES:

24 IN. SIGN HEIGHT WITH 12 IN. LETTER/NUMBER UPPER CASE SHALL BE USED AT INTERSECTIONS ON ARTERIALS WITH FIVE LANES OR MORE.

JURISDICTION LOGO FONT SHALL BE "TIMES NEW ROMAN".

STREET NAME FONT SHALL BE UNITED STATES FEDERAL HIGHWAY ADMINISTRATION "HIGHWAY GOTHIC".

FOR MASTARM SIGNAL LOCATIONS – SIGNS ARE SINGLE SIDED. MOUNT SIGNS PER CURRENT WSDOT STANDARD PLAN G-30.10-XX.

* SIGN LENGTH AS REQUIRED FOR LETTER SPACING.

** 12 IN. DESIRED WITH 8 IN. MINIMUM UNLESS OTHERWISE APPROVED BY ENGINEER.
PRIVATE ROAD
342 Av

PRIVATE ROAD
Main St

AT NON-ARTERIAL INTERSECTIONS ONLY
NOT TO SCALE

AT OR ALONG ARTERIALS
NOT TO SCALE
NOTICE SIGN FOR TEMPORARY ROAD CLOSURE
NOT TO SCALE
NOTE
VERIFY AND STAKE LOCATIONS OF TRAFFIC SIGNS FOR ENGINEER APPROVAL AND ADJUSTMENT PRIOR TO INSTALLING.
NOTES:

1) SIGN FACE MATERIAL SHALL BE TYPE IV SHEETING. SIGN POST SHALL BE 4 IN. X 4 IN. UNTREATED WESTERN RED CEDAR OR 2 IN. GALVANIZED METAL AS DIRECTED BY THE COUNTY ENGINEER.

2) THE STOP SIGN SHALL BE VISIBLE FROM A DISTANCE OF AT LEAST 240 FT. BACK ON THE APPROACHING ROADWAY, WHEN THE LEGAL SPEED LIMIT IS 25 M.P.H.

3) ALL CLEARING WITHIN COUNTY RIGHT OF WAY TO MAKE THE SIGN VISIBLE IS THE RESPONSIBILITY OF THE APPLICANT. APPROVED ROAD CONSTRUCTION PLANS OR A PERMIT FROM THE COUNTY IS NECESSARY BEFORE WORK COMMENCES.

4) VARIATION FROM THIS LOCATION BY WRITTEN APPROVAL OF THE COUNTY ENGINEER.

5) MOUNT WITH TWO 3/8 IN. X 3 IN. GALVANIZED LAG SCREW AGAINST 1 IN. DIA. GALVANIZED FLAT WASHER AGAINST 1 IN. DIA. NYLON WASHER.

6) LEGEND, BACKGROUND AND BORDER SHALL MEET WSDOT SIGN FABRICATION MANUAL.
NOTES:

LETTERING REQUIREMENTS
1) STANDARD LETTER SERIES “B” OR "C" FOR POST MOUNTED SIGNS.
2) DO NOT USE ORDINATE SUFFIXES (1ST, 2ND, 3RD, etc.) WITH NUMBERED STREET NAMES (e.g., 110 AV E, NOT 110TH AV E).
3) USE STANDARD ROADWAY DESIGNATION AND AREA ABBREVIATIONS AS LISTED ON THIS SHEET. WHEN STREET NAME WITH STANDARD ROADWAY DESIGNATION AND AREA IS LARGER THAN STANDARD BLANK SIZE THE ROADWAY DESIGNATION AND AREA HEIGHT MAY BE REDUCED BY 25%.

SIGN MATERIAL REQUIREMENTS
1) FOR OVERHEAD SIGNS THE SHEET ALUMINUM SIGN SHALL BE CONSTRUCTED OF ALLOY 6061-T6, 5052-H36 OR 5052-H38 WITH A THICKNESS OF 0.125 IN.
2) FOR POST MOUNTED SIGNS THE SHEET ALUMINUM SIGN SHALL BE CONSTRUCTED OF ALLOY 6061-T6, 5052-H36 OR 5052-H38 WITH A THICKNESS OF 0.080 IN. OR 14 GAUGE.
3) SIGN FACE MATERIAL FOR POST MOUNTED STREET NAME SIGNS SHALL BE TYPE IV WHITE SHEETING OVERLAD WITH GREEN ELECTRO CUT FILM WITH THE STREET NAME CUT OUT. FOR OVERHEAD MOUNTED STREET NAME SIGNS THE MATERIAL SHALL BE TYPE IX SHEETING.

SIGN POST REQUIREMENTS
1) WOOD SIGN POSTS SHALL BE UNTREATED WESTERN RED CEDAR 4 IN. X 4 IN. NOMINAL DIMENSION.
2) GALVANIZED SIGN POSTS SHALL MEET REQUIREMENTS SPECIFIED IN PC.15.5.

HARDWARE PUBLIC ROAD SIGNS
1) SIGN BRACKET SHALL BE DIE CAST HIGH STRENGTH ALUMINUM ALLOY DESIGNED FOR MOUNTING ON TOP OF THE 4 IN. X 4 IN. WOODEN POST. SLOTS FOR SIGNS SHALL HAVE A NOMINAL 6 IN. LENGTH (3 IN. FOR 8 IN. TALL SIGNS) WITH TWO 5/16 IN. ZINC PLATED STANDARD ALLEN WRENCH SET SCREWS.
2) ALL OTHER HARDWARE AND FASTENERS SHALL BE GALVANIZED STEEL.

HARDWARE PRIVATE ROAD SIGNS
1) USE 3/8 IN. X 2 IN. GALVANIZED LAG BOLT WITH NYLON WASHER FOR CENTER MOUNTING HOLE. SUPPLEMENT LAG BOLT WITH FOUR 2-1/2 IN. 8 D GALVANIZED NAILS IN THE OUTER HOLES.

ROADWAY DESIGNATION
ABBREVIATIONS
AVE – AVENUE
ST – STREET
CT – COURT
BLVD – BOULEVARD
DR – DRIVE
PL – PLACE
LN – LANE
RD – ROAD
WAY – WAY
LP – LOOP
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CHAPTER 3

3.000 STORM DRAINAGE

3.010 General

The standards established by this section are intended to represent the minimum standards for the design and construction of storm drainage facilities.

Sizing of storm water conveyance and retention/detention systems are the responsibility of the professional engineer retained by the developer and is subject to approval by the City.

Specific projects may warrant storm drainage facilities be constructed in excess of the requirements of this section, e.g., slopes of 15 degrees or greater will be subject to the criteria of the City’s Critical Areas Ordinance (GHMC 18.08); developments which occur within 200 feet of tidally-influenced waters will require review under the City’s Shoreline Master Program. Generally when this situation occurs, the environmental review (SEPA) will address the requirements of additional storm drainage runoff concerns. The City does, however, reserve the right to impose more stringent storm drainage runoff discharge, retention/detention and infiltration criteria when and so the public interest is best served.

The document, City of Gig Harbor Site Development and Stormwater Management Manual, is considered a part of this section and the Public Works Standards. This Drainage Manual sets forth the minimum drainage and erosion control requirements as supplemented herein. Where conflicting information occurs within this section, known as Section 3 Storm Drainage, the manual shall supersede.

3.020 Design Standards

The design of storm drainage and/or retention/detention system shall depend on their type and local site conditions. The design elements of storm drainage systems shall conform to the City of Gig Harbor Stormwater Design Manual and Section 14.20 of the GHMC.

A. Use of designated open space areas for stormwater detention/retention and for infiltration shall satisfy all conditions of the City of Gig Harbor for usability and landscape conformity. See Section 3.022 for landscape considerations.

In determining usability of open space where drainage concepts are involved, staff will apply two main tests: Orientation of Design and Overall Aesthetic Impression.
Because the primary purpose of consolidated open space is to provide usable area for recreation activities, buffer zones, and green belt areas, the open space must be designed for this intent. Any use of this area for stormwater detention/retention must clearly be subordinate to and not
detract from open space uses. Because active recreation requires primarily flat topography, the usable open space will be predominantly flat. In no event shall slopes exceed 4:1 (horizontal: vertical) where drainage facilities are present and a minimum of 50 percent of the linear slope length shall not exceed 7:1. Design of the combined facility, as well as ease of access into and out of the facility, will be considered by the City in review of the design of such facilities.

Open space also serves an aesthetic function by providing areas of green space that are attractive and an amenity to the project site. The second test applied to open space will be that of the general impression the open space provides. The open space must be designed to give the impression of an attractive open space area available for park uses.

B. Infiltration trenches shall not be located under a public roadway prism. Infiltration trenches and swales may be located within the public right-of-way within a planter strip or green belt as long as the trench or swale does not interfere with the original intent of the planter strip or green belt.

C. Maximum catch basin spacing shall be 300 feet on boulevards, arterials and collectors; and 300 feet on all other street classifications.

The General Notes on the following pages shall be included on any plans dealing with storm systems in the City.

GENERAL NOTES (STORM DRAIN CONSTRUCTION)

1. All workmanship and materials shall be in accordance with City of Gig Harbor standards and the most current copy of the State of Washington WSDOT Standard Specifications for Road, Bridge and Municipal Construction. (WSDOT). In cases of conflict, the most stringent standard shall apply.

2. The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the State of Washington, Department of Labor and Industries.

3. The contractor shall be responsible for all traffic control in accordance with Section 2B.126 of the Gig Harbor Public Works Standards, the WSDOT Standard Plans for Road, Bridge and Municipal Construction (all applicable “K” plans) and/or the Manual on Uniform Traffic Control Devices (MUTCD). Prior to disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

4. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction. A grading permit for storm pond construction may be required.
5. If construction is to take place in the County and/or Washington State Department of Transportation right-of-way, the contractor shall notify the City and the City shall obtain all the required approvals and permits. The contractor shall reimburse the City for associated permit fees.

6. A preconstruction meeting shall be held with the City of Gig Harbor prior to the start of construction.

7. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate line at 811 a minimum of 48 hours prior to any excavation.

8. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.

9. All surveying and staking shall be performed per the corresponding section of the City of Gig Harbor Public Works Standards.

10. Temporary erosion control/water pollution measures shall be required in accordance with the WSDOT Standard Specifications, the Department of Ecology NPDES requirements and the City of Gig Harbor Stormwater Design Manual and as follows:

   A. Soil erosion and water pollution/flood control plans shall be submitted to the City, approved by the City, and implemented by the contractor prior to disturbing any soil on the site. Submittal and approval of these plans shall preclude any construction activity on the site.

   B. All permanent storage and retention/detention areas used as part of the temporary erosion control and water pollution/flood activities and conveyance systems shall be cleaned of all silts, sand, and other materials following completion of construction and the permanent facilities shall then be completed including permanent infiltration areas.

11. Storm drain pipe shall be on the WSDOT Qualified Products list for the specification listed below:

   A. Plain concrete storm sewer pipe or reinforced concrete storm sewer pipe per WSDOT Standard Specification 9-05.7.


   C. Corrugated storm sewer polyethylene pipe per WSDOT Standard Specifications 9-05.20.

   D. PVC storm pipe conforming to ASTM D 3034 SDR or ASTM F 789 with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.

12. All storm drainage systems are required to be air testable at 4 psi per WSDOT testing procedures. All flexible pipes shall be mandrel tested per WSDOT.
standards. Testing shall be done by the contractor, and witnessed by City Inspector.

13. At the discretion of the City Engineer, testing of the storm sewer may also include videotaping of the main by the contractor. Immediately prior to video taping, enough water shall be run down the line so it comes out the lower catch basin. A copy of the video shall be submitted to the City of Gig Harbor. Acceptance of the line will not be made until after the video has been reviewed and approved by the City. Testing shall take place after all underground utilities are installed and compaction of the roadway subgrade is complete. Testing shall occur before placement of any pavement.

14. Special structures, such as oil/water separators and outlet controls, shall be installed per plans and manufacturers’ recommendations.

15. All disturbed areas shall be seeded and mulched. For sites where vegetation has been planted through hydro seeding, the financial guarantee will not be released until the vegetation has been thoroughly established.

16. Where connections require "field verifications", connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.

17. All catch basins/manholes shall have concrete collars per Gig Harbor detail 3-5.

18. Any changes to the design shall first be reviewed and approved by the project engineer and the City Engineer.

19. A stamped and signed letter from the engineer of record attesting to the construction of any storm water facility, and a Pond Volume Certification Letter will be required prior to final acceptance of project.

3.022 Landscape Considerations

The final landscape design shall be prepared by a licensed landscape architect or certified nurseryperson. Wherever possible, existing trees and other native vegetation around the facility shall be saved. This allows for a smooth transition to other undeveloped areas and helps retain the character of the site.

New vegetation will need to be planted regardless of how much is cleared. Plantings should be designed with specific functions in mind: soil preservation, erosion control, evapotranspiration, screening, space definition, sun and shade, and others. Use a combination of trees, shrubs and groundcovers to provide variety and interest. Plant at least three different species of trees and shrubs.

Native plants that will tolerate flooding and wet conditions are preferred. To ensure survival of newly planted native vegetation, it is recommended that the plants be irrigated for the first season. In wet ponds with standing water, wetland herbaceous species (cattails, sedges, rushes, etc.) must be included.

Regional wet ponds located in commercial developments should be designed with consideration for pedestrian and passive recreation facilities. Amenities around regional wet ponds such as picnic tables, benches, gazebos, etc. are
encouraged. Aeration and/or recirculation of the water, such as waterfalls, cascades and fountains, should be considered to reduce the potential for odors to develop during the warmer months, to add visual interest, and to mask unwanted traffic noise.

3.025 Conveyance

Pipe: Storm drain pipe within a public right-of-way or easement shall be sized to carry the maximum anticipated runoff from the possible contributing area using a 25-year, 24-hour storm event model or a continuous time series model with 25-year conditions, whichever is more stringent.

The minimum cover for storm drain pipe shall be 2 feet. Where the minimum depth includes the roadway section, structural calculations for the appropriate H-loading shall be submitted along with the plans. All pipe specified where the cover is 2 feet or less shall be ductile iron of a class determined by the structural calculations.

All pipe for storm mains shall comply with the requirements specified in the Storm General Notes on the previous pages

Channels: The City encourages the use of open vegetated channels to convey stormwater runoff when possible. Open channels shall meet the sizing requirements of piped systems. Any open channels proposed to be located within public right-of-way shall require special approval from City Engineer.

Generally open channels shall not exceed 2.5 feet in depth and shall have maximum 3:1 side slopes. All open channels shall be vegetated with grass or other vegetation as approved by the City. Channel velocities shall be controlled so as to prevent scouring of the channel bottom and sides.

3.030 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.

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

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

A. Stake centerline alignment every 50 feet with station and cut or fill to invert of pipe.

B. Stake location of all catch basins, manholes and other fixtures for grade and alignment with cut or fill to rim and invert of all pipes.
C. Grade stake or slope stake (as appropriate) at intervals, sufficient to control location, size and depth of retention/detention facilities.

3.035 Erosion Control

See Section 14.20 and 14.40 of the GHMC for specific erosion control requirements.

3.040 Trench Excavation

See Section 4.160 for requirements regarding trench excavation.

3.030 Backfilling

See Section 4.170 for requirements regarding backfilling.

3.060 Street Patching and Restoration

See Section 2B.170 and 2B.180 for requirements regarding street patching and trench restoration.

3.070 Clearing of Permanent Retention/Detention Areas

Systems shall be cleared of all silt, sand and other material when the infiltration rate becomes 60 percent of the initial. No vegetation shall be planted in the infiltration area of the retention/detention area.

3.080 Maintenance

The City shall maintain all stormwater system elements such as catch basins, oil water separators, and conveyance systems located within the public rights-of-way. The development’s owner association shall be responsible for maintaining the on-site storm water facilities including, but not limited to, the on-site ponds, catch basins and conveyance system.

Prior to the final acceptance of any private development project, the owner/developer must provide a maintenance schedule and agreement for all the storm water facilities per requirements outlined in the City of Gig Harbor Site Development and Stormwater Management Manual.
# LIST OF DETAILS

## CHAPTER 3 - STORM DRAINAGE

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<thead>
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NOTES:
1. CENTER STENCIL 3” FROM ROADSIDE EDGE OF CATCH BASIN.

2. STENCIL LETTERING MUST BE 2” IN HEIGHT AND INSTALLED AS SHOWN ABOVE.

3. STENCIL LETTERING MUST BE WHITE.
1. MANHOLE RING AND LOCKING COVER BY INLAND FOUNDRY "STORM".

2. ALL CONCRETE MINIMUM 3500 P.S.I. AT 28 DAYS.
20" x 24" METAL GRATE
(WSDOT STANDARD PLAN B-2d or c)
UNLESS NOTED OTHERWISE ON PLAN
WITH "DUMP NO POLLUTANTS" CAST
IN LD.

PRECAST BASE

5"

24" MIN
BOTH SIDES

CEMENT CONCRETE
CURB & GUTTER

GROUT
(TYPICAL)

METAL FRAME SEE WSDOT
STANDARD PLAN B-2d

6" RISER SECTION
SEE WSDOT STANDARD
PLAN B-1z

12" RISER SECTION
SEE WSDOT STANDARD
PLAN B-1z

PRECAST BASE SECTION
SEE WSDOT STANDARD
PLANS

17" MIN.

NOTE:
1. CATCH BASIN SHALL BE CONSTRUCTED IN
   ACCORDANCE WITH SPECIFICATIONS IN
   WSDOT STANDARD PLANS.
2. SEE DETAIL 3-5 FOR PAD REQUIREMENTS.
3. W.S.D.O.T. GRATE B-2C IS FOR BI-DIRECTIONAL
   FLOWS.
4. REMOVABLE SILT TRAP TEES TO BE INSTALLED
   IN ALL CATCH BASINS.
NOTE:
1. FOR STORM MANHOLE LOCATED OUTSIDE ASPHALT, ADD REINFORCING STEEL AND CONCRETE PAD AS SHOWN ABOVE. DEFORMED BAR TO MEET ASTM A615 GRADE 60 FY=60,000 P.S.I.
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CHAPTER 4

4.000 WATER

4.010 General

These standards apply only to the City of Gig Harbor Water Department's Water System. Any extension of the Gig Harbor Water System must be approved by the City Engineer. All extensions must conform to these standards, the Department of Health (DOH) requirements and the most current Gig Harbor Water System Plan. In the event of any conflict between the Public Works Standards and the Water System Plan, the Water System Plan will govern.

In designing and planning for any development, it is the developer's responsibility to see that adequate water for both domestic use and fire protection is attainable. The developer must show in the proposed plans how water will be supplied and whether adequate water flow and pressure will be attained in case of fire. A water hydraulic analysis of the system will be required.

Prior to the release of any water meters, all public works improvements must be completed and approved including granting of right-of-way or easements, and all applicable fees must be paid.

4.020 Design Standards

The design of any water extension/connection shall conform to City Standards and any applicable standards as set forth herein and in Section 1.010 and 1.040.

The layout of extensions shall provide for the future continuation and/or "looping" of the existing system as determined by the City. In addition, main extensions shall be extended as required in Section 1.130.

The General Notes on the following page shall be included on any plans dealing with water system design.

GENERAL NOTES (WATER MAIN INSTALLATION)

1. All workmanship and material shall be in accordance with City of Gig Harbor standards and the most current copy of the WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction. In cases of conflict, the most stringent standard shall apply.
2. The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the Washington State Department of Labor and Industries.

3. The contractor shall be responsible for all traffic control in accordance with Section 2B.126 of the Gig Harbor Public Works Standards, the WSDOT Standard Plans for Road, Bridge and Municipal Construction (all applicable “K” plans) and/or the Manual on Uniform Traffic Control Devices (MUTCD). Prior to disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

4. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction.

5. If construction is to take place in the County and/or Washington State Department of Transportation right-of-way, the contractor shall notify the City. The City shall obtain all the required County and WSDOT permits. The contractor shall adhere to all the permit requirements. The contractor shall reimburse the City for associated permit fees.

6. A pre-construction meeting shall be held with the City of Gig Harbor Construction Inspector prior to the start of construction.

7. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate line at 811 a minimum of 48 hours prior to any excavation.

8. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.

9. All surveying and staking shall be performed per the corresponding chapter of the City of Gig Harbor Public Works Standards.

10. Temporary erosion control/water pollution measures shall be required in accordance with Section 1-07.15 of the WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction and the Gig Harbor Stormwater Management and Site Development Manual. At no time will silts and debris be allowed to drain into an existing or newly installed facility unless special provisions have been designed.

11. All pipe for water mains shall comply with one of the following types:

   Ductile Iron Pipe: Ductile iron pipe may be used on mains up to ten in. diameter. Ductile iron pipe shall be used on mains over ten in. in diameter. Ductile iron pipe shall conform to AWWA C 151 Class 52 and have a cement mortar lining conforming to AWWA C 104. All pipes shall be joined using non restrained joints which shall be rubber gaskets, push on type or mechanical joint, conforming to AWWA C 111.
PVC Pipe: PVC pipe may be used on mains eight in. through 10 in. in diameter. All PVC pipe shall conform to the latest revision of AWWA C900 Class 200 standards, and shall be blue in color. See Section 4.030B for more detailed specifications.

12. Gate valves shall be epoxy coated resilient wedge, NRS (Non Rising Stem) with O-ring seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500. Gate Valves shall be used for all valves: 2 in. to 12 in.: the design, materials and workmanship of all gate valves shall be ductile iron body resilient wedge valves conforming to AWWA C509-80 latest revision. Gate valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500. Butterfly Valves shall be used for all valves larger: Butterfly valves shall conform to AWWA C504, Class 150B, with cast iron short body, O-ring stem seals, geared operator designed for underground installation, and a 2 in. square operating nut. Butterfly valves shall be Mueller, Linseal III, Kennedy, M & H, Pratt Groundhog, or Allis Chalmers.

13. Existing valves shall be operated by City employees only.

14. Hydrants shall be Mueller Centurion, or Clow Medallion or MH EJIW 5CD250. Hydrants shall be bagged until system is approved.

15. All lines shall be disinfected and tested in conformance with the above referenced specification (Note 1) and Section 4.190 of the Public Works Standards. Microbiological testing of disinfected water mains shall be conducted only by laboratories that have been certified by the state Department of Health (DOH) for drinking water analysis. The City will only accept results from samples analyzed using method number 9221D or 9222B from Standard Methods for the Examination of Water and Wastewater, 19th Ed. (APHA et al. 1995), or corresponding methods from later editions. The City of Gig Harbor construction inspector will obtain water samples for microbiological testing and no main will be put into service until a passing test is achieved. It is the contractors/developers responsibility to achieve a passing test.

16. All pipe and services shall be installed with continuous tracer tape installed 12 in. to 18 in. under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install direct bury, U.S.E.14 gauge blue coated copper wire, wrapped around or taped to the pipe, as shown on Detail 4-08. Low voltage grease-type splice kits shall be used on tracer wire. Continuity testing of the wire will be done by the contractor.

17. All service line locations shall be marked on the face of the curb with an embossed "W" 3 in. high and 1/4 in. into concrete.

18. The City will be given 72-hours notice prior to scheduling a main shutdown. Where connections require "field verification", connection points shall be exposed by the contractor and fittings verified 72 hours prior to distributing shut down notices.
19. All water mains shall be staked for grades and alignment by a professional land surveyor capable of performing such work.

20. Separation between water and sewer shall be maintained per Department of Ecology (DOE) standards.

22. A concrete pad per detail 4-08 shall be installed around all valve boxes and blow-offs that are not in a pavement area.

23. No physical connection to the existing water system will be allowed until the new water main has passed a hydrostatic pressure test and microbiological test.

24. The minimum cover depth over all water lines shall be 36 in. unless otherwise noted on the plans.
Figure 4-1 Process to Obtain Water Service

Applicant Requests Water Service Through Water Service CRC Application

NO

Inside City Water Service

YES

Provide Applicant with Responsible Purveyor

NO

Inside City Limits?

YES

Apply for Utility Extension Agreement and Pay Fees

NO

City Council Approves Utility Extension Agreement?

YES

Submit Construction Plans and Pay Fees

NO

Applicant Must Find Alternative Water Source

YES

Pay Inspection Fees and Hold Pre-Construction Meeting

NO

Revise and Resubmit

YES

Plans Approved?

NO

Construct and Inspect Facilities

YES

Testing (Pressure and Bacteriological)

NO

Record Drawings

YES

Meter Installed and Operational
4.025 Wellhead Protection Areas

Private wells within the City of Gig Harbor shall comply with Department of Health and Department of Ecology standards.

The wellhead protection area designated for each of the City’s wells is an irregular boundary determined by topography, water flow patterns (both above and below ground) soil types, flow rates and other criteria. Please contact the Public Works Plan review staff or the Tacoma - Pierce County Health Department to determine if your project is situated within a wellhead protection area. In order to protect the public water supply, the following criteria shall apply to any project or portion of a project which is partially or completely located within a wellhead protection area.

- All storm water shall be directed away from the well’s 100-foot sanitary setback.

- A storm and erosion control plan requiring treatment of storm water is required. Depending on the individual characteristics of the project, and the susceptibility of the particular wellhead to contamination, more stringent treatment requirements than those required in the Gig Harbor Stormwater Management and Site Development Manual may be imposed by the City.

- If the project is to be platted, it must be noted within the covenants of the plat and in the General Notes of any engineering plans that the project is located within the one, five, or ten year time-of-travel zone wellhead protection area.

- All garbage bins and dumpsters, except in single family subdivisions, shall be covered in a manner that prevents rainwater from entering the containers. A sanitary drain shall be provided for compaction-style dumpsters that may generate leachate.

- In commercial projects, where hazardous products are stored or used, a spill and containment plan shall be implemented. Depending on the nature of a project, more stringent spill and containment requirements than those required in the Gig Harbor Management and Site Development Manual may be imposed by the City.

4.030 Main Line

A. Water mains shall be sized in accordance with Chapter 2 of the Water System Plan. Water mains sizes shall be verified by hydraulic analysis to provide adequate domestic flow plus fire flow at the required residual pressure. Fire flow requirements will be determined by the Gig Harbor Fire Marshall and the City of Gig Harbor Water System Plan. Check with Gig Harbor Fire Marshall for Class U requirements. Fire hydrants shall be located on water mains 8 in. diameter or larger.
B. All pipe for water mains shall comply with the City’s General Notes for water main installation.

C. All fittings shall be ductile iron compact fittings conforming to AWWA C 153 or Class 250 gray iron conforming to AWWA C 110 and C 111. All shall be cement mortar lined conforming to AWWA C 104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain ends. All fittings shall be connected by flanges or mechanical joints.

D. All pipe and services shall be installed with continuous tracer tape installed 12 to 18 in. under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge, direct bury, U.S.E. blue coated copper wire, wrapped around or taped to the top of pipe, brought up and tied off at valve body as shown on detail 4-08.

E. The minimum cover for all water mains from top of pipe to finish grade shall be 42 in. unless otherwise approved. If the pipe is offset to the edge of the road, the actual roadway cross grade shall be projected out and used to measure cover to top of pipe.

4.040 Connection to Existing Water Main

The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains. Cut-in tees may be allowed only with the approval of the City Engineer. See detail number 4-07.

It shall be the contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make the connections to the existing mains.

No tap shall be made to an existing main on a Friday without City approval.

A City representative shall be present throughout the entire connection or tapping procedure.

No physical connection to the existing City water system will be allowed until the new main has passed a hydrostatic pressure test, and a microbiological test. Temporary blocking and blow offs will need to be incorporated into the new main construction until these tests have been passed. At that point connecting fittings and pipe will need to be thoroughly cleaned and disinfected prior to the connection to the existing system. The City construction inspector must be present to witness all tie ins.

4.050 Service Interruption

The contractor shall give the City a minimum of 72-hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be
The City will notify customers involved or affected by the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

4.060 Hydrants

A. The lead from the service main to the fire hydrant shall be as specified on detail 4-01.

B. Fire Hydrants shall have two, 2-1/2 in. outlets and one, 4-1/2 in. pumper port outlet fitted with a 5 in. Stortz adapter. All outport threads shall be national standard thread. The hydrant operating nut shall always open counter-clockwise. The valve opening shall be 5-1/4 in. diameter. The hydrant shall have a positive and automatic barrel drain. Hydrant shall be of the "safety" or break-away style. All exposed portions of the hydrants shall be field painted with one coat of paint approved by the City Engineer prior to final acceptance.

C. The Public Works Department and the Gig Harbor Fire Marshall shall work together to insure that adequate hydrant spacing and installation are achieved.

Unless otherwise required by the governing authority, the following guidelines shall apply for hydrant number and location. Spacing shall be measured to the pathway required for the Pierce County Fire District 5 to lay the fire hose. This spacing shall be determined by the Gig Harbor Fire Marshall.

1. At least one hydrant shall be installed at all intersections.

2. Fire hydrant spacing shall conform to the City of Gig Harbor Fire Marshall requirements and Appendix C of the International Fire Code.

3. Where a cul-de-sac or dead end exceeds 200 feet from the center of the intersection to the end of the cul-de-sac, a hydrant shall be located at the intersection and additional hydrants shall be required in accordance with Appendix C of the International Fire Code.

4. Where hydrants are located on private property, easements shall be provided. Easements shall be to the benefit of the City of Gig Harbor and Pierce Co. Fire District #5.

5. A two-way, blue reflective hydrant marker shall be required perpendicular to each hydrant. Hydrant markers shall be placed six in. from the centerline on the same side of the road as the hydrant.
7. In addition to any approvals by the City Engineering Department, installation of all private fire service mains serving fire sprinkler and/or standpipe systems shall require a permit and inspections from the building and fire safety department.

A scaled down plan view of the proposed water system shall be included on the plans. The scale shall be appropriate to show the entire proposed system. This plan view shall show the location of all the proposed hydrants plus the location of the appropriate existing hydrants adjoining the project. If the project only includes the addition of one or two new hydrants, the location of at least two existing hydrants in the project vicinity need to be shown on the plan view.

E. Fire hydrants shall be set as shown in standard detail number 4-01.

F. For requirements regarding use, size and location of a fire department connection (FDC) and/or post indicator valve contact the Gig Harbor Fire Marshall. Location of FDC shall be shown on water plans.

G. Where needed, the Engineering Department or the Gig Harbor Fire Marshall may require hydrants to be protected by two or more bollards. See detail 4-12.

H. Fire hydrants meeting required fire flow must be installed, tested, and accepted prior to the issuance of a building permit in new subdivisions and short plats. Fire hydrants must be installed, tested, and accepted prior to bringing combustible materials on to the site for other construction.

4.062 Hydrant Meters

Hydrant meters may be obtained by completing the required paperwork with the Public Works Department at City Hall. A deposit is required. Once the deposit is made, the meter may be picked up by the applicant at City Hall. A daily fee and charges for the amount of water used and any damages incurred are assessed upon returning the meter to City Hall. Those fees are subtracted from the deposit paid and a refund check is mailed to the applicant.

The contractor shall insure that measures to prevent backflow, cross connections and contamination of the City system comply with the Cross Connection Control Procedures and Practices. When using the hydrant meter to fill a vehicle, the vehicle must be equipped with an approved anti-siphon air gap. The air gap shall be at least twice the diameter of the inlet pipe.

4.065 Sprinkler Underground Line

This section refers to building fire sprinkler lines and not irrigation or landscape sprinkler lines.
A. A permit is required from the building and fire safety department prior to installation of any fire sprinkler or standpipe mains, valves, or other system appurtenances.

B. The City Fire Marshal will witness all testing and flushing of underground sprinkler and standpipe piping. Underground piping shall be installed in accordance with the Gig Harbor Municipal Code and NFPA Standards 13 and 24.

C. The sprinkler underground line shall not be tested until the City has tested and approved the distribution main up to the City valve. See drawing 4-28 for a map clarifying the location of the City valve and the sprinkler or standpipe underground piping.

D. If a double check valve assembly (DCVA) is not located in a public right-of-way, easements for the DCVA to the benefit of the City and Pierce Co. Fire District #5 shall be required. The sprinkler/standpipe underground line shall be that portion of the line located behind the City valve.

E. In no instance shall domestic or irrigation service connections be made to the sprinkler underground line.

F. See Section 4.110 “Backflow Prevention” for additional information.

4.070 Valves

All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends. All existing valves shall be operated by City employees only.

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. Generally, there shall be three valves on each tee and four valves on each cross. Valves installed with tees and crosses shall be flanged together. All valves shall open in a counter-clockwise direction when standing on the ground surface. Specific requirements for valve spacing will be made at the plan review stage.

A. Valve Box: All valves shall have a valve box set to grade with a slip type cast iron base from valve to within 5 in. of valve box top. If valves are not set in paved area, a concrete pad shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. See detail 4-08.

B. Valve Marker Post: Valve marker posts shall be 4 in. x 4 in. reinforced concrete or schedule 40 steel posts 5 feet long stamped with "W" and distance to valve. Post shall be painted with 1 base coat and 2 coats white oil base enamel. The need for valve marker posts will be determined during plan review. See detail 4-12.

4.080 Air and Vacuum Release Valve
Air and vacuum release valves (ARV) shall be as shown on detail 4-15 and 4-16 for mains up to 12 in. in diameter. The engineer shall size the ARV for mains 14 in. in diameter and larger.

ARV’s must be installed so as not to create a cross connection situation.

The installation shall be set at the high point of the line when required. ARV’s shall not be installed in areas subject to high ground water or flooding. Drains may be required to insure that no standing water will accumulate in the air release manhole. Where possible, pipes are to be graded to prevent the need for an air release valve.

4.090 Blowoff Assembly

Blowoff assemblies will not be allowed at the end of dead-end mains unless approved by the City Engineer. Hydrants will be set at the end of all dead-end mains and will act as the blowoff. See Section 4.060 for hydrant requirements.

4.100 Backflow Prevention

Backflow prevention shall be installed in accordance with Title 13 GHMC.

The installation of required backflow devices is necessary to protect the existing water system and users from possible contamination. All water system connections to serve newly constructed and existing buildings; properties with domestic potable water; sprinkler underground lines or irrigation systems shall comply with the minimum backflow prevention requirements as established by the Department of Health (DOH), the American Water Works Association (AWWA) Standards, and the City of Gig Harbor. When a backflow prevention assembly is required, plans must be submitted to the City of Gig Harbor for review prior to installation.

All backflow devices must be inspected and approved by a certified backflow device tester prior to use. Cross connections with the City of Gig Harbor water system shall be prohibited under all circumstances.

The City shall be provided with a successfully completed test report of any backflow prevention device before releasing the certificate of occupancy on any building. See Section 4.065 for additional information regarding sprinkler underground lines.

Refer to Section 4.062 for requirements when filling vehicles with a hydrant meter.

4.110 Service Connection

A. All service connections relating to new development shall be installed by the developer at the time of mainline construction. Services shall not be connected to a hydrant lead or the sprinkler underground line. After all the
public works improvements are approved, the owner may apply for a water meter. Bonding may be allowed for commercial projects only. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after the system is inspected and approved.

B. When water is desired to a parcel fronting an existing main but not served by an existing service line, an application must be made to the City. Upon approval of the application and payment of all applicable fees, the City will tap the main, and install the meter, saddle, service line, box, and setter.

Service taps larger than 2 in., connecting to an existing main, shall be made by the contractor per Section 4.040. Service taps that require crossing an arterial street in excess of two-lane widths shall be made by the contractor. These types of services shall be denoted on the plans.

C. Service lines shall be as specified herein. No glued joints will be accepted. Service lines shall be installed perpendicular to and 22 ½° above horizontal of the main. Tracer tape and wire wrapped around the pipe shall be installed on all service lines. Service line locate wire will be spliced into main line locate wire using low voltage grease type direct bury splice kits.

One inch diameter service lines shall be pressure class 200, polyethylene plastic pipe manufactured from all virgin material, category 5, grade P34, class C high density polyethylene ID ASTM D2239-SDR7 PE3408; cell classification 335434C to 355434C from Philips Driscopipe, Eagle Pacific (3408), Superlon Plastics, or approved equal and shall be BLUE in color.

1 ½ in. to 2 in. diameter service lines shall be pressure class 200, polyethylene plastic tubing manufactured from all virgin material category 5, grade P34, class C high density weight polyethylene OD ASTM D2737-SDR7 PE3408 or ASTM D2239-SDR7 PE3408; cell classification 335434C to 355434C, from Philips Driscopipe, Eagle Pacific (3408), Superlon Plastics, or approved equal and shall be BLUE in color. 2 in. service lines shall have a 2-in. gate valve set on main at point of connection.

D. Master meters will not be allowed for service to more than one per building. Deviations to this may be granted by the City Engineer. An approved backflow prevention assembly must be installed in conjunction with any master meter.

E. When connection to the public water system is desired by a residential customer connected to an existing well, a physical disconnect from the well must be made. This is necessary to assure that an unapproved auxiliary water supply (the customer’s well) will not contaminate the City’s water supply. The customer’s well may be kept serviceable for irrigation purposes provided it is in compliance with DOE setback standards. If the well is not decommissioned per DOE standards upon connection to the City water supply, the customer is required to install an approved reduced pressure (RP) backflow device on the customer side of the meter. No
A water meter will be installed until a cross connection inspection has been completed to the satisfaction of the City.

When connection to the public water system is desired by a commercial customer connected to an existing well, or with a well on site, a physical disconnect from the well must be maintained. The customer’s well may be kept serviceable for irrigation purposes only, provided it is in compliance with DOE setback standards. If a well is going to be used for irrigation, an RP device as approved by DOH shall be required. If an existing well is not going to be used for irrigation purposes, it must be decommissioned per DOE standards. No water meter will be installed until the RP device is installed and a cross connection inspection has been completed to the satisfaction of the City.

F. Lots or pads created by plats, replats, short plats, or binding site plans shall have a water service installed as required below.

In single family subdivisions (including mobile home and manufactured home subdivisions), a service shall be provided to each lot or pad, including open tracts and landscaping in the right-of-way. If a domestic and an irrigation meter are desired at a particular lot or tract, additional services shall be installed.

Duplexes shall have a separate service installed for each living unit regardless of how many duplexes are on a single lot. Example: One duplex on one lot shall have two services, two duplexes on one lot shall have four services and so on. A subdivision of duplexes shall have at least one service installed at all open tracts.

Multi-family and commercial complexes shall have at least one meter installed per separate building and a separate irrigation meter(s) for open spaces and landscaping. Additional meters to a multi-family or commercial building may be installed if desired. At least one service shall be installed at all open tracts. Master meters shall meet the criteria as outlined in 4.120D above.

G. Sample stations per detail 4-19 may be required. The requirement for the location of the sample station will be determined by the City during the plan review. Sample stations shall be located behind the walk, in an open space, or in a utility easement whenever possible and shall generally be centrally located in the project at a low point if possible.

H. Service configuration shall be as shown on details at the end of this chapter. Water meters 4 in. and larger shall not be placed in a traffic bearing location. For services larger than 4 in., the engineer shall submit a detail for approval that addresses the following:

- Meter type (turbine, compound, magnetic etc.) and size
- A valve shall be located on both sides of the meter
- A lockable bypass is required
• Check valves shall be required on the bypass and the meter
• Supports (jack stands) are required under the meter and bypass
• The vault specified shall provide an 18" clear space from the vault wall to the closest edge of the meter, valves, or pipe
• The vault shall have a double lid with a reader lid insert or have a remote readout display
• The distance from the top of the meter to the bottom of the lid shall be 24 in. minimum and 30 in. maximum
• A ladder shall be provided in the vault
• Drainage must be provided for the meter pit

4.120 Construction Water Policy

The goal of this section is to assure a consistent, fair and equitable approach for allowing potable City water to be used for construction purposes. It is the further intent of this policy to ensure the City’s water distribution system is not compromised due to construction practices.

Construction water is not to be used for irrigation purposes.

The use of construction water shall not create a backflow, cross connection or contamination potential with the City water supply.

If the site to be served by construction water is on a STEP sewer system, the STEP sewer system must be installed, tested, and approved prior to the City installing the water meter. Construction water may be used to fill and test the STEP tank provided that it does not create a cross connection potential.

A. Single Family Residential Construction Requirements:

1. The subject parcel is within the City’s water service area.

2. All required Public Works improvements have been completed.

3. Construction water for each individual lot or parcel is required. The City will charge a flat fee for this service for a period not to exceed 90 days.

4. Each individual lot or parcel will pay utility connection charges for water services in addition to the construction water charge. These charges must be paid before a water meter will be dropped. Connection charges include but are not limited to: sewer, stormwater, tap, drop, general facility charges, and latecomer’s fees. The City will require at least 48 hours notice prior to dropping meters. All charges must be paid at City Hall.

5. The builder/developer will supply their own construction bib to obtain water from the setter. A vacuum breaker is required on all construction bibs and must be in place at all times.
B. Commercial Construction Requirements:

1. The subject parcel is within the City’s water service area.

2. All public works improvements have been completed.

3. Construction water may only be obtained through a hydrant meter either supplied by the City or a contractor/developer meter that has been inspected by the City prior to use. The contractor/developer is required to supply a backflow device on all construction meters and must provide a current inspection certification for all backflow devices. All water used for construction must be metered.

4. The City requires a paid deposit prior to releasing the hydrant meter. The City will charge the builder/contractor for construction water based on “before and after” meter readings. (See Section 4.042 Hydrant Meters.)

4.125 Marking Service Lines

The location of all service lines shall be marked on the face or top of the cement concrete curb with a "W" 3 in. in height and 1/4 in. into the concrete. When an asphalt rolled curb is allowed, the water shall be marked with a tag secured with a "PK" nail one-foot toward centerline from the gutter. The tag shall be a minimum 1 1/4 in. diameter, 0.050 in. thick aluminum disk stamped "W" or an unstamped blue plastic equivalent.

4.130 Potable Water/Non-Potable Crossings

Potable water mains are recommended to maintain 10 feet horizontal and 18 in. vertical separation (Note: separation distance should be measured as the distance from the closest sides of the outside of the two pipes) above non-potable pipelines (i.e., sanitary sewers, reclaimed water piping, irrigation lines, etc.) If site conditions do not allow such minimum separations, pipelines may be located closer to each other provided additional precautions are identified and instituted to assure protection of the potable line. At a minimum, potable water mains should maintain a minimum 5 feet horizontal and 12 in. vertical separation clearance from non-potable conveyance systems.

Potable and non-potable pipelines may be located in a common trench if the horizontal spacing between outer pipe walls is at least 5 feet and the vertical spacing is at least 18 in. from the invert wall of the potable line to the crown wall of the non-potable line. The non-potable line should be below the potable line on a ‘bench’ of undisturbed soil. If the minimum separation distances cannot be maintained, one or both of the pipelines should be encased with a structurally sound, material such as portland cement, CDF, or a larger pressure rated pipe (sleeve).

For pipe crossings where the potable line is closer than 18 vertical in. from the non-potable line or the potable line must cross under the non-potable line, the
potable line should be cased with pressure-rated pipe extending a minimum of 10 feet to either side of the crossing. To accommodate crossings, the minimum cover for a water main of 36 in. may be reduced to 24 in. upon approval by the City to provide for as much vertical separation as possible. When a reduced depth is allowed, ductile piping and/or casings may be required.

The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or the sewer service per DOE standards. No concrete shall be installed unless specifically directed by the City.

Taken from: *Criteria for Sewage Works Design*

By: State of Washington Department of Ecology
    December 1998 Edition

Situations not addressed below shall follow the criteria as outlined in the above mentioned document, most current edition.
4.145 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust blocks shall comply with detail number 4-17 and 4-18. Thrust blocks shall consist of Class B concrete poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings. The addition of restrained joint fittings may not eliminate the need for thrust blocking.

4.150 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional land surveyor by the State of Washington.
A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

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

A. Stake centerline alignment every 50 feet with cut or fill to invert of pipe maintaining 36 in. of cover over pipe.

B. Stake location of all fire hydrants, hydrant flange elevations, tees, water meters, setters and other fixtures and mark with cut or fill to finished grade.

4.160 Trench Excavation

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

B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 36 in. of cover over the pipe, as shown in detail 4-05. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 4 in. below water main grade. Where materials are removed from below water main grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA), Washington Department of Labor and Industries (L & I) and the Office of Safety and Health Administration (OSHA) Safety Standards.

E. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length
4.170 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City.

4.175 Street Patching and Restoration

See Section 2 for requirements regarding street patching and trench restoration.

4.180 Testing and Disinfection

Microbiological testing of disinfected water mains shall be conducted only by laboratories that have been certified by the state DOH for drinking water analysis. The City will only accept results from samples analyzed using method number 9221D or 9222B from Standard Methods for the Examination of Water and Wastewater, 19th Ed. (APHA et al 1995), or corresponding methods from later editions.

The water main pipes shall be disinfected and tested before being placed in service. Water for testing and disinfecting shall be obtained by the developer by arrangement with the City. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the developer. Feed for the pump shall be from a barrel or other container, wherein the actual amount of "makeup" water can be measured periodically during the test period. The section to be disinfected shall be thoroughly flushed at maximum flow prior to chlorination.

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. No physical connection to the City’s existing water system will be allowed until a passing microbiological test is acquired.

4.181 Hydrostatic Pressure

Prior to the acceptance of the work, the installed pipeline shall be subjected to a hydrostatic pressure test per Section 7-09.3 of the WSDOT Standard, latest edition. The main shall be pumped up to 150 psi over static line pressure but in no case shall the test pressure be less than 225 pounds per square in. for a period of not less than 15 minutes for all lines. All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed
valve. No physical connection to the City’s existing water system will be allowed until the new line passes hydrostatic test.

Defective materials or workmanship, discovered as a result of the tests, shall be replaced. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be rerun at the developer’s own expense, until a satisfactory test is obtained.

The pipe shall also be disinfected when being tested. As each length of pipe is laid, calcium hypochlorite or other disinfecting agent, having an available chlorine content of about 45 percent shall be placed in the pipe in sufficient quantities to give a dosage of about 50 ppm available chlorine, calculated on the volume of water which the pipe will contain.

The disinfectant may be placed in the upstream or high pressure end of the pipe. The following table shows the amount of high test calcium hypochlorite which should be used in each 20 foot length of pipe of various sizes:

**Figure 4-3 Hydrostatic Pressure**

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>HIGH TEST HYPOCHLORITE REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Inside Diameter in In.)</td>
<td>(Ounces per 20-foot length to give 50 ppm available chlorine)</td>
</tr>
<tr>
<td>2, 3, 4 &amp; 4</td>
<td>0.4</td>
</tr>
<tr>
<td>8</td>
<td>0.7</td>
</tr>
<tr>
<td>10 &amp; 12</td>
<td>1.0</td>
</tr>
<tr>
<td>14</td>
<td>2.0</td>
</tr>
</tbody>
</table>

The calcium hypochlorite or other disinfecting agent used for this purpose shall be furnished by the developer.

When the line is complete and ready to disinfect, water shall be allowed to flow in slowly so not to displace the chlorine agent, until it appears at the far end of the line. The system shall then be flushed through the fire hydrants or into the next section, until a test shows no more than 0.2 ppm available chlorine. If any of the materials need to be replaced, the line shall again be disinfected and tested. The line may be pressure tested. The line may be pressure tested at the same time it is disinfected.

The water system will not be acceptable to the City until a receipt of a satisfactory report from the County or State Department of Health on water samples submitted to that office for bacteriological analysis. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the contractor until satisfactory results are obtained. The sample can only be taken on Mondays, Tuesdays, and Wednesdays until noon. Testing and sampling shall take place after all underground utilities are installed and compaction of the roadway section is complete.
The contractor shall provide all necessary equipment and shall perform all work connected with the tests. The test pump shall be clean and disinfected and shall only be used on potable water supplies. Tests shall be made after all water main and service connections have been made and the roadway section is constructed to subgrade. The contractor shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

See Section 4.110 for testing responsibilities for backflow prevention devices.

4.185 Irrigation

All irrigation systems located within the public right-of-way shall be designed by a State of Washington registered landscape architect or City approved design firm. Parts lists shall be submitted with each project.

The general notes on the following pages are required on all plans for City operated or maintained irrigation systems or on any owner association operated or maintained irrigation systems located within the public right-of-way.

Irrigation systems shall be installed with an approved backflow prevention assembly in accordance with Section 4.110 of this manual and approved by AWWA and the Department of Health. Backflow devices will be required to be tested by a certified tester prior to the setting of irrigation meter and before final acceptance is granted.

The irrigation system shall be installed after the area has been properly prepared. See Section 2B.125 for soil preparation requirements. The pipe trenches shall be no wider than is necessary to lay the pipe or install equipment. The top 4 in. of topsoil shall be kept separate from the subsoil and shall be replaced as the top layer when backfill is made.

Irrigation sprinklers shall be situated so as to not wet any public street or sidewalk. Turf heads shall be 1/2 in. above finished grade as measured from the top of the sprinkler. Shrub heads shall be placed on risers approximately 12-in. above finished grade unless otherwise specified. Drip irrigation emitters shall be installed in accordance with the manufacturer’s recommendations.

Installation and maintenance of irrigation systems in roadway planter strips shall be as shown in the table below. The system maintainer shall be responsible for the on-going water and power expenses incurred.
### General Notes (Irrigation Systems)

1. All workmanship, material and testing shall be in accordance with the City of Gig Harbor Public Works Standards, the National Electrical Code and the most current copy of the "WSDOT Standard Specifications for Road, Bridge and Municipal Construction" unless otherwise specified below. In cases of conflict, the most stringent standard shall apply.

2. The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the Washington State Department of Labor and Industries.

3. The contractor shall be responsible for all traffic control in accordance with Section 2B.126 of the "Gig Harbor Public Works Standards", the "WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction" (all applicable "K" plans) and/or the "Manual on Uniform Traffic Control Devices" (MUTCD). Prior to disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

4. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction.

5. If construction is to take place in the County and/or Washington State Department of Transportation right-of-way, the contractor shall notify the City 10 working days in advance of construction. The City shall obtain all the required County and WSDOT permits. The contractor shall adhere to all the permit requirements. The contractor shall reimburse the City for associated permit fees.

6. A pre-construction meeting shall be held with the City of Gig Harbor Construction Inspector prior to the start of construction.

7. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction.
by calling the Underground Locate line at 811 a minimum of 48 hours prior to any excavation.
8. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.

9. Temporary erosion control/water pollution measures shall be required in accordance with Section 1-07.15 of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and the Stormwater Management and Site Development Manual for Gig Harbor. At no time will silts and debris be allowed to drain into an existing or newly installed facility unless special provisions have been designed.

10. Electrical permits and inspections are required for all irrigation services within the City of Gig Harbor. The contractor is responsible for obtaining all the required permits prior to any type of actual construction. Any materials purchased or labor performed prior to such approval shall be at the contractor’s own risk.

11. A clearly marked service disconnect shall be provided for every automatic irrigation installation unless otherwise stated on a City approved set of plans. The location and installation of the disconnect shall conform to the National Electrical Code (NEC) and City of Gig Harbor standards. The service disconnect shall be Labor and Industries approved.

12. All low voltage wire shall be a minimum size of #14 UF from each control valve to the terminal interface.

13. All low voltage splices shall be of a type equal to a 3-M-BY-054007-09053 or a Labor and Industries approved equal. All splices shall be done in valve control boxes. Direct burial splicing will not be allowed.

14. The automatic controller components shall be approved by the City.

15. The City will be given 72 hours notice prior to scheduling a shutdown. Where connections require “field verification”, connection points will be exposed by the contractor and the fittings verified 48 hours prior to distributing shut-down notices.

16. All irrigation main line and lateral lines shall be sch. 40 PVC piping or better.

A. Layout of Irrigation System

   The contractor shall stake all irrigation heads and mark all proposed trenches within the irrigation system per the approved plans prior to installing the system. Alterations in layout may be expected, i.e., to conform to ground conditions and to obtain full and adequate coverage to the landscaping. However, no alterations shall be made without prior authorization by the City.

B. Excavation

   All soil shall be prepared as specified in 2B.125 prior to trenching. Trenches shall be no wider at any point than is necessary to lay pipe or
install equipment. Trench bottoms shall be relatively smooth and of sand or other suitable material free from rocks, stones, or other material which could damage the pipe. Trenches in rock or similar characteristic ground shall be excavated to 4 in. below the required depth and shall be backfilled to the required depth with sand or other City approved material.

Detectable marking tape shall be placed in the trench 4 in. directly above, parallel to, and along the entire length of all non-metallic water line and non-metallic conduit. The width and depth of the tape shall be as recommended by the manufacturer or the City. Locate wire shall be placed with all nonmetallic water lines. Locate wire will terminate in all control valve boxes and shall be placed in ditch before water lines are backfilled.

C. Piping

The irrigation main line is the line containing the supply usually situated between the irrigation meter and the irrigation control valves. The irrigation lateral lines are the lines between the irrigation control valves and the connections to the irrigation heads. Swing joints, thick walled poly pipe, flexible risers, rigid pipe risers, and associated fittings are not considered part of the lateral line but incidental components of the irrigation heads. All PVC pipe used for irrigation main line or irrigation lateral lines shall be schedule 40 or better.

All water lines shall be a minimum of 18 in. below finished grade as measured from the top of the pipe. Where possible, mains and laterals or section piping shall be placed in the same trench.

If water lines are to be installed under existing pavement, the main shall be installed within a minimum 4-in. diameter conduit. All non-metallic water lines to be installed under areas to be paved shall be placed within a minimum 4-in. diameter conduit. The irrigation conduit shall extend a minimum of 1 foot beyond the structure under which conduit is being jacked or bored.

D. Pipe Connections

During construction, pipe ends shall be plugged or capped to prevent entry of dirt, rocks, or other debris.

PVC pipe, couplings and fittings shall be handled and installed with care and in accordance with the manufacturer’s recommendation. The outside of the PVC pipe shall be chamfered to a minimum of 1/14 in. at approximately 22 degrees. Pipe and fittings shall be joined by solvent welding. Solvents used must penetrate the surface of both pipe and fittings which will result in complete fusion at the joint. The solvent and cement shall be of a type recommended by the pipe manufacturer.

Threaded PVC joints shall be assembled using Teflon tape as recommended by the pipe manufacturer.
On plastic-to-metal connections, work the metal connection first. Use a non-hardening compound on threaded connections. Connections between metal and plastic are to be threaded utilizing female threaded PVC adapters with a threaded schedule 80 PVC nipple only.

E. Electrical Wire Installation

The electrical controller shall be located in an open space or in a utility easement whenever possible.

Wiring between the automatic controller and the automatic valves shall be placed inside a 3/4 in. irrigation conduit, #14 wire and may share a common neutral. A spare #14 UF yellow wire shall be installed from the controller to the furthest valve in each direction, looping through each control valve box. There shall be a 2-foot loop left in each control valve box. Separate control conductors shall be run from the automatic controller to each valve. When more than one automatic controller is required, a separate common neutral shall be provided for each controller and the automatic valve which it controls. Wire shall be installed adjacent to the irrigation pipe. Plastic tape or nylon ty-wraps shall be used to bundle wires together at 10-foot intervals. Detectable marking tape shall be placed over the top of the irrigation conduit.

Wiring placed under pavement and walls or through walls, shall be placed in irrigation conduit. This conduit shall be PVC class 200 and shall not be less than 4 in. in diameter.

Splices will be permitted only at junction boxes, valve boxes, or at control equipment. A minimum of 2-feet of excess conductor wire shall be left at all splices and terminal and control valves to facilitate inspection and future splicing.

F. Material Specifications

As a means of keeping our parts inventory to a minimum and our maintenance personnel familiarized and knowledgeable about product operation, the following is a list of approved products to be used on all jobs in which the City will be responsible for maintenance and operations. Requests for approved equals need to be submitted to the City for review.
### Figure 4-5 Material Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Approved Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pop Up Spray Heads</td>
<td>Rainbird or Hunter products</td>
</tr>
<tr>
<td></td>
<td>• minimum of 4” pop up</td>
</tr>
<tr>
<td></td>
<td>• check valves on all heads</td>
</tr>
<tr>
<td></td>
<td>• pressure regulated spray on pressure over 40 psi</td>
</tr>
<tr>
<td></td>
<td>• installed on Toro or Rain Bird Funny Pipe</td>
</tr>
<tr>
<td>Gear Driven Rotary Heads</td>
<td>Rain Bird or Hunter</td>
</tr>
<tr>
<td></td>
<td>• installed on Funny Pipe or swing joints</td>
</tr>
<tr>
<td></td>
<td>• check valves on all heads</td>
</tr>
<tr>
<td>Remote Control Valve</td>
<td>Rain Bird or Hunter products</td>
</tr>
<tr>
<td>Quick Coupling Valves</td>
<td>West Ag 4V100-R-Y</td>
</tr>
<tr>
<td></td>
<td>• Rainbird 44RC</td>
</tr>
<tr>
<td>Double Check Backflow Preventer</td>
<td>Wilkins 950XLT installed with schedule 80 PVC, or brass union</td>
</tr>
<tr>
<td></td>
<td>• Back flow preventors must be tested and passed prior to setting of irrigation meter</td>
</tr>
<tr>
<td>Flow Sensing Device</td>
<td>Data Industrial IR series</td>
</tr>
<tr>
<td></td>
<td>• installed with master control valve</td>
</tr>
<tr>
<td>Automatic Controller</td>
<td>Rain Bird or Hunter with VRA low profile antenna, install with Data Retrieval Board</td>
</tr>
<tr>
<td></td>
<td>• installed in vandal resistant pedestal</td>
</tr>
<tr>
<td>Valve Boxes</td>
<td>Carson 910-12B for Quick Coupler</td>
</tr>
<tr>
<td></td>
<td>• Carson 1419B for remote control valve</td>
</tr>
<tr>
<td>Shut-Off Valves</td>
<td>Wilkins 215 ball valve</td>
</tr>
<tr>
<td>Description</td>
<td>Approved Device</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Pressure Reducing Valve</td>
<td>Wilkins 600l or approved equal</td>
</tr>
<tr>
<td></td>
<td>• Required if water static</td>
</tr>
<tr>
<td></td>
<td>pressure exceeds 75 psi</td>
</tr>
</tbody>
</table>

G. Flushing

All main supply lines shall receive two fully open flushings to remove debris that may have entered the line during construction. The first flushing shall be completed prior to installing valves or testing.

All lateral lines shall receive one full-open flushing prior to placement of sprinkler heads, emitters, and drain valves. Note, drain valves on main lines are not recommended. It is the City of Gig Harbor’s preference to have quick couplers installed on the down stream side at the cross connection device and at each terminus of the main line from the cross connection device. The flushing shall be of sufficient duration to remove any dirt and debris that have entered the lateral lines during construction.

H. Testing

All gauges used for testing water pressure shall be certified correct by an independent testing laboratory immediately prior to use on the project. Gauges shall be retested when ordered by the inspector.

Automatic controllers shall be tested by actual operation for a period of two weeks under normal operating conditions. Should adjustments be required, the Contractor shall do so according to the manufacturer’s recommendation or under the City’s direction until the operation is satisfactory to the City.

All main lines shall be purged of air and tested with a minimum static water pressure of 150 psi for 40 minutes without introduction of additional service or pumping pressure. Testing shall be done with one pressure gauge installed on the line in a location determined by the City inspector. Lines which show loss of pressure exceeding 5 psi after 40 minutes will be rejected.

All lateral lines shall be purged of air and tested in place at operating line pressure with a pressure gauge and with all fittings capped or plugged. The operating line pressure shall be maintained for 30 minutes with valves closed and without introduction of additional pressure. Lines which show leaks of loss of pressure exceeding 5 psi at the end of specified test period will be rejected.

The contractor shall correct rejected installations and retest for leaks as specified herein.

I. Backfill
Backfill shall not be started until all piping has been inspected, tested and approved by the City inspector, after which, backfilling shall be completed as soon as possible. All backfill material placed within 4 in. of the pipe shall be free of rocks, roots, or other objectionable material which might cut or otherwise damage the pipe.

Backfill from the bottom of the trench to approximately 4 in. above the pipe shall be by continuous compacting in a manner that will not damage pipe or wiring and shall proceed evenly on both sides of the pipe. The remainder of the backfill shall be thoroughly compacted, except that heavy equipment shall not be used within 18 in. of any pipe. The top 4 in. of the backfill shall be of topsoil material.

J. Adjusting System

Before final inspection, the contractor shall adjust and balance all sprinklers to provide adequate and uniform coverage. Spray patterns shall be balanced by adjusting individual sprinkler heads with the adjustment screws or replacing nozzles to produce a uniform pattern.

K. System Operation

The irrigation system shall be completely installed, tested and operable prior to planting unless otherwise specified in the plans or as approved by the City. The contractor shall be responsible for all maintenance, repair, testing, inspecting and automatic operation of the system until all work is considered complete as determined by the final inspection. Developer is responsible for all water service connection and meter installation charges associated with irrigation water meter.

L. Record Drawings

Upon final acceptance of the work, the contractor shall submit two record drawings per Section 1.065.

4.190 Inspection of Work

In no event shall the work or any portion thereof, be covered up until the Construction Inspector has completed inspection and approved the same. If any work should be covered up without prior inspection and approval by the Construction Inspector, it must, if required by the City Engineer, be uncovered for examination at the developer/contractor’s expense. The Construction Inspector shall at all times have access to the work wherever it is in preparation of progress and the developer/contractor shall provide facilities for such access and for such inspection.

If the specifications, laws, ordinances, or any public authority shall require any work to be specially tested or approved, the Construction Inspector shall be given timely notice of its readiness for inspection and, if the inspection is by other authority than the City, the date fixed for such inspection.
All inspections by the Construction Inspector will be made with all reasonable promptness, but in no event shall the lack of prompt inspections be construed to allow the cover up of the work or any portion of it without inspection.

Re-examination of questioned work may be ordered by the City Engineer and, if so ordered, the work must be uncovered by the developer/contractor.
# LIST OF DETAILS
## CHAPTER 4 WATER

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<th>Title</th>
<th>Detail</th>
</tr>
</thead>
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</tr>
<tr>
<td>3/4&quot; or 1&quot; Service Connection</td>
<td>4-02</td>
</tr>
<tr>
<td>1-1/2&quot; and 2&quot; Service Connection</td>
<td>4-03</td>
</tr>
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<td>Standard Plumbing Configuration for 3&quot; and 4&quot; Meters</td>
<td>4-04</td>
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<tr>
<td>Water Main Depth Requirements</td>
<td>4-05</td>
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<td>Ductile Iron Water Main Trench Section</td>
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<td>Connection to Existing Main</td>
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<td>Standard Valve Box and Assembly</td>
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<tr>
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<td>4-09</td>
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<tr>
<td>In-Line Blow-Off Assembly</td>
<td>4-10</td>
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<td>2&quot; Blow-Off Assembly for Dead End Line</td>
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<td>Single Service Double Check Valve Assembly with FDC</td>
<td>4-14</td>
</tr>
<tr>
<td>1&quot; Air and Vacuum Release Assembly</td>
<td>4-15</td>
</tr>
<tr>
<td>2&quot; Air and Vacuum Release Assembly</td>
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<td>4-20</td>
</tr>
<tr>
<td>Fire Sprinkler Underground Testing Limits</td>
<td>4-21</td>
</tr>
</tbody>
</table>
HYDRANT ASSEMBLY

* (OR APPROVED EQUAL)

NOTES:

1. DEAD END MAIN EXTENSIONS OVER 50' SHALL BE 8" MINIMUM.
2. USE PORT 5" STORTZ, MVO 5-1/4", WITH ALL OPERATING NUTS THE SAME SIZE.
3. AN UNOBSTRUCTED THREE FOOT MINIMUM WORKING AREA RADIUS SHALL BE PROVIDED AROUND ALL HYDRANTS.
4. FABRIC TO BE INSTALLED AROUND BASE OF HYDRANT AFTER PLACEMENT OF DRAIN ROCK.
3/4 INCH OR 1 INCH SERVICE CONNECTION

NOTES:
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL COMPRESSION FITTINGS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

CITY OF GIG HARBOR ENGINEERING DIVISION

3/4 INCH OR 1 INCH SERVICE CONNECTION

DETAIL NO. 4-02

APPROVED BY __________ DATE 1/1/2014
1-1/2" AND 2" WATER SERVICE CONNECTION

* (OR APPROVED EQUAL)

NOTES:
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL COMPRESSION FITTINGS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.
NOTES:
1. 3" METERS SHALL HAVE 3" PLUMBING AND 1½" BYPASS PLUMBING.
2. 4" METERS SHALL HAVE 4" PLUMBING AND 2" BYPASS PLUMBING.
3. A MINIMUM OF 10 PIPE DIAMETERS OF STRAIGHT UNOBSURED PIPE SHALL BE REQUIRED UPSTREAM OF THE INSTALLED METER.
4. THE METER BOX PIT SHALL BE BEDDED WITH 6" DEPTH OF CRUSHED ROCK.
5. USE CONCRETE UTILITY VAULT SIZED ACCORDINGLY WITH TRAFFIC-RATED HINGED ACCESS HATCHED(S) AND READER LID. VAULT SHALL HAVE CONCRETE BOTTOM WITH DRAIN TO DAYLIGHT OR PROVIDE MECHANICAL SUMP PUMP. INSIDE DEPTH SHALL NOT EXCEED 4'.
6. BYPASS AND GLOBE STYLE CHECK VALVE NOT REQUIRED FOR IRRIGATION ONLY INSTALLATION.
7. ALL PLUMBING SHALL BE SUPPORTED BY ADJUSTABLE JACK STANDS. THESE STANDS SHALL BE PLACED IN FOUR LOCATIONS TO PROVIDE THE INSTALLATION WITH A FIRM SUPPORT.
8. REMOTE READER ABOVE GROUND BOX SHALL BE INSTALLED. ALLIED MOULDED PRODUCTS #1056 W/ READER WINDOW.
9. REMOTE METER READER BOX SHALL BE MOUNTED A MIN. 3' ABOVE GROUND ON A 1½" GALVANIZED UNI-STRUT POST SET IN CONCRETE.
10. INSTALL ¾" PVC ELECTRICAL CONDUIT FROM METER VAULT TO REMOTE READER BOX.
11. METER VAULT SHALL HAVE GRAVITY DRAIN INSTALLED.
### Depth Requirements

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>6”–18”</td>
<td>42”</td>
</tr>
<tr>
<td>20” &amp; OVER</td>
<td>48”</td>
</tr>
</tbody>
</table>

**DITCH**

- Restore Ditch after Water Main Installation
- Depth Requirement: 18” MIN

**SLOPE**

- Restore Ditch after Water Main Installation
- Depth Requirement: 18” MIN
DUCTIL IRON WATER
MAIN TRENCH SECTION

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>6”</td>
<td>24”</td>
</tr>
<tr>
<td>8”</td>
<td>30”</td>
</tr>
<tr>
<td>10” &amp; 12”</td>
<td>36”</td>
</tr>
<tr>
<td>16” AND 18”</td>
<td>42”</td>
</tr>
</tbody>
</table>
EXISTING MAIN TO 4-07

NOTES:

1. 11 MIL. PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUAT BLOCK AND BACKFILL ARE Poured.
2. CONTROLLED DENSITY BACKFILL IS A PLANT MIX CONSISTING OF: 3100# SAND, 450# WATER, AND ONE SACK (94#) OF CEMENT.
3. SUPPORT VALVE AND SLEEVE CONTINUOUSLY THROUGH INSTALLATION.
4. MEGA LUG RESTRAINT JOIN REQUIRED ON ALL MECHANICAL JOINT FOLLOWERS.

CUT-IN-TEE
(ONLY BY APPROVAL OF CITY ENGINEER)

ASTM APPROVED TAPPING SLEEVE.
(12" DIAMETER AND UNDER SHALL BE STAINLESS STEEL).

GROUND
GATE VALVE
FL x MJ

CONCRETE THRUST BLOCK

CONTROLLED DENSITY BACKFILL
POURED WIDTH OF TRENCH, TWO FEET PAST VALVE FLANGE
UP TO 1/2 DIAMETER OF PIPE

FL x MJ x MJ
TEE

MJ X MJ X FL TEE
THRUST BLOCK (TYP)
MJ x MJ BARREL COUPLER

FL x MJ GATE VALVE
MJ

PIECE STUB

MJ

EXISTING MAIN

2' MIN.

2'

2' TYP.

TAPPING VALVE
FL x MJ

C Pipe

LIVE TAP

2' TYP.
BOX & ASSEMBLY

STANDARD VALVE

INLAND FOUNDRY #248
OR OLYMPIC FOUNDRY
VB-045 VALVE BOX

3' x 3' x 8'
COMMERCIAL
CONCRETE PAD

OUTSIDE PAVED AREA

BLUE COATED TRACER WIRE

SEAL WITH AR4000W

0.17' ACP

1.0'

0.17' CSTC

0.67' BALLAST

0.67' COMMERCIAL CONCRETE

INSIDE PAVED ROADWAY

12"

10"

5"

5"

6 3/4"

3 3/4"

1 1/4"

LOOP AT TOP MUST
BE ABLE TO EXTEND
A MIN. 3 FT. ABOVE
FINISHED GRADE.

FINISHED GRADE

FINISHED GRADE

2" SLOT OR HOLE FOR
TRACER WIRE CUT OR
DRILLED IN VALVE BOX
UPPER SECTION.

SLIP TYPE CAST IRON BASE
SECTION.

3/16"

24" MIN.
36" MAX

TRENCH DEPTH VARIES

3.5" MINIMUM COVER

TRENCH BOTTOM

GATE VALVE SHOWN — SIMILAR
INSTALLATION REQUIRED FOR
BUTTERFLY VALVES.

VALVE STEM EXTENSION LEGEND

1. VALVE OPERATING NUT OR 1¾"
   x 1¾" x 2" HIGH GRADE STEEL
   WELDED TO GUIDE PLATE.
2. ¾" THICK x 5¾" DIA STEEL GUIDE
   PLATE WELDED TO RISER SHAFT.
3. 2" x 2" x ¾" SQUARE STRUCTURAL
   STEEL TUBING TO FIT OPERATING
   NUT. LENGTH AS REQUIRED.

NOTES:
1. ALL WELDS TO SHAFT SHALL BE FILLET WELD
   ALL AROUND, AS SPECIFIED ABOVE.
2. ALL VALVES MUST HAVE 14 GAUGE BLUE COATED
   COPPER TRACER WIRE TIED OFF AT VALVE BODY,
   EXTENDED OUTSIDE CAST IRON RISER PIPE THEN
   EXTENDED ONE FOOT TOP OF VALVE BOX.

CITY OF GIG HARBOR
ENGINEERING DIVISION

STANDARD VALVE
BOX & ASSEMBLY

DETAIL NO. 4-08

APPROVED BY
CITY ENGINEER 
DATE 1/1/2014
NOTES:
1. FOR VALVE BOX REQUIREMENTS SEE DETAIL 4-09.
2. FILL THE AREA OUTSIDE OF THE BLOW-OFF RISER STAND PIPE WITH PEA GRAVEL.
3. FOR PIPING REQUIREMENTS SEE GENERAL NOTE #5.
4. ALL FITTINGS AND PIPING SHALL BE BRASS.
2" CORPORATION STOP
ADAPTER
2" BRASS PIPE

2" x 2-1/2" HOSE THREADS
BRASS INSERT WITH CUP
AND CHAIN (ELIMINATE HOSE
THREADS ON TEMPORARY ASSY).

PAINT YELLOW THAT
PORTION ABOVE GROUND

CAST IRON
VALVE BOX

2" GATE
VALVE WITH
HEX NUT

2" BRASS PIPE

2" BRASS PIPE

1/4 CUBIC YARD
WASHED GRAVEL POCKET
WRAPPED IN GEOTEXTILE
FABRIC

(2) 2" x 8" x 16"
CONC. BLOCKS

TAP BEND
WITH 1/8"
DIAMETER
WEEP HOLE

CITY OF GIG HARBOR
ENGINEERING DIVISION

IN-LINE BLOWOFF
ASSEMBLY

DETAIL NO. 4-10

APPROVED BY
CITY ENGINEER 1/1/2014
NOTES:
1. VALVE BOX, COVER AND PAD SHALL BE PER CITY OF GIG HARBOR VALVE BOX DETAIL 4-09.
2. ALL FITTING AND PIPING SHALL BE BRASS.
NOTE:
1. LOCATE BOLLARDS 3' FROM HYDRANT
   DO NOT BLOCK HYDRANT PORTS.
NOTES:
1. ALL PIPE EASEMENTS ARE TO BE 15 FEET WIDE WITH PIPE CENTERED IN EASEMENT.
2. WHEN THE DCVA IS IN A VAULT, OUTSIDE THE BUILDING, THE CITY EASEMENT SHALL END AT THE CITY VALVE.
3. WHEN THE DCVA IS LOCATED WITHIN THE BUILDING, THE CITY EASEMENT SHALL END AT THE CITY VALVE.
MATERIAL LIST:
1. OS & Y GATE VALVE W/HANDWHEEL FL x FL
2. D.S.H.S. APPROVED CHECK VALVE FL x FL
3. POST INDICATOR VALVE
4. TEST COCK - 4 REQUIRED
5. CLASS 52 DI WALL PIPE FL x FL
6. CLASS 52 DI 90° BEND FL x FL
7. CLASS 52 DI TEE FL x FL
8. SWING CHECK VALVE W/BALL DRAIN ASSEMBLY
9. FIRE DEPARTMENT CONNECTION
10. VALVE STANDS
11. LADDER

GENERAL NOTES:
1. THOROUGHLY FLUSH LINES PRIOR TO INSTALLING BACKFLOW ASSEMBLY.
2. PIPE FROM VAULT TO BUILDING SHALL BE CLASS 52 DI.
3. TAMPER SWITCHES SHALL BE INSTALLED ON 1 AND 3 CONNECTED TO BUILDING FIRE ALARM SYSTEM.
4. WHERE PIPING PASSES THROUGH CONCRETE WALL PROVIDE 2" CLEARANCE W/WATERPROOF MASTIC OR FLEXIBLE SEALANT.
5. DIAMETER OF PIPE AND FITTINGS TO BE DETERMINED BY CERTIFIED SPRINKLER DESIGNER.
7. ALL VAULTS SHALL BE EQUIPPED WITH A DRAIN TO DAYLIGHT OR BE INSTALLED ABOVE GROUND.
8. ALL FIRE SPRINKLER LINES UP TO THE FIRST VALVE ON THE DCFV SHALL BE DISINFECTED, PRESSURE TESTED, FLUSHED AND TESTED FOR PURITY PER THE CITY OF GIG HARBOR STANDARDS.
CONCRETE VALVE MARKER
POST 6” x 6” x 42”
PAIN IT YELLOW, PROVIDE STRAPS FOR A VENT PIPE

BROOK’S 37-T (12” x 20”)
METER BOX WITH 12” EXTENSION AND TRAFFIC LID (OR APPROVED EQUAL).

BRASS GATE VALVE

6” PVC PIPE FOR VALVE BOX

90° ELBOW

MUELLER NO. 110 COMPRESSION CONNECTOR (H-15428 CTSXMIP)

CORPORATION STOP
FORD 1101 OR EQUAL

TAP PIPE LINE AT HIGH POINT AT LOCATION DESIGNATED BY CITY

180° THREADED RETURN BEND WITH INSECT SCREEN. BAND TO POST, PAINT PIPE AND POST BLUE

1” BRASS PIPE AND FITTINGS FROM AIR VALVE

UNION

24” MIN. 12” MAX.

2 EA. 90° BRASS ELBOWS

VALMATIC 201-C OR CRISPIN UL-10 COMBINATION AIR-VACUUM RELIEF

BRASS AND/OR COPPER PIPE AND FITTINGS

1” SDR9 BLUE POLY PIPE

DUCTILE IRON PIPE

NOTES:
AIR VAC TO BE LOCATED OUTSIDE OF ROADWAY TRAVEL LANES
NOTES:
AIR VAC TO BE LOCATED OUTSIDE OF ROADWAY TRAVEL LANES
THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>90° BEND</th>
<th>45° BEND</th>
<th>22.5° BEND</th>
<th>11.25° BEND</th>
<th>DEAD END OR TEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4”</td>
<td>3600</td>
<td>2000</td>
<td>1000</td>
<td>500</td>
<td>2600</td>
</tr>
<tr>
<td>6”</td>
<td>8000</td>
<td>4400</td>
<td>2300</td>
<td>1200</td>
<td>5700</td>
</tr>
<tr>
<td>8”</td>
<td>14300</td>
<td>7700</td>
<td>4000</td>
<td>2000</td>
<td>10100</td>
</tr>
<tr>
<td>10”</td>
<td>22300</td>
<td>12100</td>
<td>6200</td>
<td>3100</td>
<td>15800</td>
</tr>
<tr>
<td>12”</td>
<td>32000</td>
<td>17400</td>
<td>8900</td>
<td>4500</td>
<td>22700</td>
</tr>
<tr>
<td>14”</td>
<td>43600</td>
<td>23600</td>
<td>12100</td>
<td>6100</td>
<td>30800</td>
</tr>
<tr>
<td>16”</td>
<td>57000</td>
<td>30800</td>
<td>15700</td>
<td>7900</td>
<td>40300</td>
</tr>
</tbody>
</table>

NOTES:
1. BLOCKING SHALL BE COMMERCIAL CONCRETE POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (SF):
   EXAMPLE: 12” – 90° BEND IN SAND AND GRAVEL
   32000 LBS/3000 LB/SF = 10.7 SF OF AREA
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES, AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

<table>
<thead>
<tr>
<th>SOIL</th>
<th>POUNDS PER SQUARE FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUCK, PEAT</td>
<td>0</td>
</tr>
<tr>
<td>SOFT CLAY</td>
<td>1,000</td>
</tr>
<tr>
<td>SAND</td>
<td>2,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL</td>
<td>3,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
<td>4,000</td>
</tr>
<tr>
<td>HARD SHALE</td>
<td>10,000</td>
</tr>
</tbody>
</table>

CITY OF GIG HARBOR
ENGINEERING DIVISION

THRUST LOADS

APPROVED BY
CITY ENGINEER
DATE

4-17
1/1/2014
NOTES:
1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS AND FITTINGS.
3. ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER.
NOTES:
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL PACK JOINTS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.
3. THE WATERLINE FOR THE SAMPLING STATION SHALL BE INSULATED FROM 1" BELOW GROUND LEVEL TO THE SAMPLING SPIGOT WITH 1" THICK FOAM PLUMBING INSULATION AND SECURED WITH NYLON TIES.
4. PAINT SAMPLE STATION WITH 2 COATS GREEN HI-GRADE EPOXY ENAMEL PAINT.
5. ALL PIPING AND FITTINGS SHALL BE BRASS.
FOR VEHICLE FILLING

BACKFLOW PREVENTION

APPROVED AIR GAP

PERMANENTLY ATTACHED PIPE

HOSE CONNECTION

AIR GAP – 2x PIPE I.D.

FOR NON-APPROVED AIR GAP
IS EQUIPPED WITH METER AND (RPBA)
REDUCED PRESSURE BACKFLOW ASSEMBLY

CITY OF GIG HARBOR
ENGINEERING DIVISION

BACKFLOW PREVENTION
FOR VEHICLE FILLING

DETAIL NO. 4-20

APPROVED BY

CITY ENGINEER DATE 1/1/2014
NOTES:
1. THE CITY WILL INSPECT AND TEST ALL MAINS AND HYDRANTS UP TO THE CITY VALVE.
2. ALL PIPE PAST CITY VALVE SHALL BE CLASS 52 D.I.
3. SEE PUBLIC WORKS STANDARDS SECTION 4.11 FOR MORE INFORMATION ON BACKFLOW PREVENTION.
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CHAPTER 5 SEWER

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Figure 5.2 Slope
CHAPTER 5

5.000 SANITARY SEWER

5A GENERAL CONSIDERATIONS

5A.010 General
Sanitary sewerage refers to waste water derived from domestic, commercial and industrial pretreated waste to which storm, surface, and ground water are not intentionally admitted.

Any extension of Gig Harbor’s sanitary sewer system shall be approved by the City Engineer and shall conform to the City of Gig Harbor’s Comprehensive Wastewater Plan, Tacoma - Pierce County Health Department, Department of Ecology (DOE), and Department of Health (DOH) requirements. Specific site conditions may require variance from the comprehensive plan and require approval from the Public Works Director and DOE.

The owners of all new houses, buildings, structures, or other uses of property used for human occupancy shall be required to connect the improvements on their properties to a public sanitary sewer, except as provided in sub-section E of GHMC 13.28.100.

Anyone who wishes to extend or connect to the City's sewer system should contact the Public Works Department for a sewer extension/connection fee estimate of the costs due the City for a sewer extension or connection.

Prior to the release of any water meters, or operation of any septic tank effluent pressure (STEP) systems, all Public Works improvements must be completed and approved and all applicable fees must be paid.

See Section 1.025 for definitions of specific sewers. Maintenance of the building or side sewer shall be the responsibility of the property owner. Maintenance of the lateral shall be the responsibility of the property owner.

5A.011 Grease Traps/Interceptors

A grease interceptor shall be installed in the waste line leading from sinks, drains, and other fixtures or equipment for all food service establishments such as restaurants, cafes, lunch counters, cafeterias, bars, and clubs, hotel, hospital, sanitarium, factory or school kitchens, or other establishments where grease may be introduced into the publicly owned treatment works (POTW) in quantities that can affect line stoppage or hinder sewage treatment or disposal.
The grease interceptor installation shall comply with the provisions of Chapter 10 of the Uniform Plumbing Code, and shall result in the discharge of no more than 100 mg/l fats, oils or grease

A grease interceptor is not required for individual dwelling units. Each food service establishment must be connected to an individual interceptor.

Car washing facilities and/or other businesses which handle liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances or other ingredients harmful to POTW, shall install industrial interceptors (clarifiers) and separators.

5A.012 Grinder Pump Specifications

Side sewer connections to the sewer main which originate from elevations lower than the sewer stub elevation shall require installation of a grinder pump, each one specific for single family units. Contact the Public Works Department for grinder pump specifications exceeding single family requirements.

5A.013 Building Sewers

Lots created by plats, re-plats, short plats, or binding site plans shall have a sewer service installed as required below. All building sewers are private and shall be installed in accordance with these standards and the Plumbing Code. Each dwelling shall require an individual connection to the sewer main.

In single family subdivisions, including mobile home and manufactured home subdivisions, a service shall be provided to each lot or pad. In cases where this is not practical, exceptions may be granted by the City in accordance with the Plumbing Code.

The City will no longer allow STEP systems unless circumstances require.

Duplexes on a gravity sewer, regardless of the number of units on a lot, may have a single or dual service provided to each building. In the case where a STEP system services a duplex, the duplex shall be served by one-3,000 gallon tank assembly. The tank servicing a duplex shall have a duplex electrical control box designed to operate if either side were to disconnect from the power source.

Services for multi-family and commercial complexes shall be as required in the Plumbing Code. Generally, this requires a minimum of one-side sewer to each separate building. See Section 5B.050 for more gravity side sewer requirements.

The location of all side sewers shall be marked on the face or top of the cement concrete curb with an "S" 1/4 in. into the concrete.

5A.020 Sanitary Sewer/Water Main Crossings

See Section 4.130 for requirements regarding sewer and water separation.
5A.030 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a professional engineer or a professional land surveyor by the State of Washington.

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

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

A. Stake location of mainline pipe and laterals every 50 ft. with cut or fill to invert of pipe.
B. Stake location of all manholes for alignment and grade with cut or fill to rim and invert of pipes.
C. Location of valves, fixtures and septic tank shall be staked for force mains and STEP systems.

5A.040 Trench Excavation

See Section 4.160 for requirements regarding trench excavation.

5A.050 Back filling

See Section 4.170 for requirements regarding back filling. No pea gravel is to be used as bedding or backfill of sewer piping or structures.

5A.060 Street Patching and Restoration

See Section 2B.170 and 2B.180 for requirements regarding street patching and trench restoration.

5A.070 Testing

Prior to acceptance and approval of construction, the following tests shall apply to each type of construction.

A. Gravity Sewer

1. Prior to acceptance of the project, the gravity sewer pipe shall be subject to a low pressure air test per WSDOT/APWA Standards. The contractor shall furnish all equipment and personnel for conducting the test under the observation of the City inspector. The testing equipment shall be subject to the approval of the City.

The contractor shall make an air test for his own purposes prior to notifying the City to witness the test. The acceptance air test shall
be made after the trench is back filled and compacted and the roadway Section is completed to sub grade.

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

2. Testing of the sewer main shall include a television inspection by the contractor. The camera must be equipped with a rotating head to allow televising of the side sewers as mainline inspection is occurring. The camera unit shall be equipped with a measuring device that is in plain view ahead of the camera. The device shall be 1" in diameter and on a flexible shaft. Television inspection shall be done after the WSDOT Low Pressure Air Test has passed, main cleaned with eductor truck equipped with pressure jetter, and before the roadway is paved. Immediately prior to a television inspection enough water shall be run down the line so it comes out the lower manhole. A copy of the video and written report shall be submitted to the City. The written report shall include the manhole number that the inspection originates at and show the ft., age and size of the line and the ft., age of all side sewers and any defects including debris that is encountered during the inspection. Any bellies encountered that exceed 3/8 in. or greater will need to be excavated and repaired. After repair has been made, the line will need to be videoed again to confirm repair. Acceptance of the line will be made after the video has been reviewed and approved by the Inspector. Any tap to an existing system needs to be televised as well.

3. A water or a negative air pressure “vacuum” test of all manholes is also required.

4. The water test shall be made by the contractor first by filling the manhole up with water and letting it sit for 24 hours to allow the water to saturate the concrete. After 24 hours the manhole shall be filled to the top of the cone. The water cannot drop more than 0.05 gallons in 15 minutes per ft. of head above invert to pass. Upon completion of the water test, the water shall be pumped out of the manhole and not allowed to be released to the system.

5. The negative air pressure “vacuum” test may be used for testing concrete manholes. The test shall be in accordance with ASTM C 1244-93 except that the duration shall be 5 seconds per ft. as measured from the bottom of the manhole channel to the ring regardless of manhole diameter. A vacuum of 10 in. of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head shall be closed, and the vacuum pump shall be shut off. The time shall be measured for the vacuum to drop to 9 in. of
mercury. The manhole shall pass if the time for the vacuum reading to drop from 10 in. to 9 in. of mercury meets or exceeds the time calculated.

6. A mandrel test in accordance with Section 5-17.3(4)H of the Standard Specifications shall be required on all sewers except laterals as defined in Section 1.025 of these standards.

B. Lift Station Pressure Main

1. Prior to acceptance of the project, the pressure line and service lines shall be subjected to a hydrostatic pressure test of 200 pounds for two hours and any leaks or imperfections developing under said pressure shall be remedied by the contractor. No air will be allowed in the line. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. The 200 psi pressure test shall be maintained while the entire installation is inspected. The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made. This is to include any and all connections as shown on the plan. The contractor shall perform all tests to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

2. A water or vacuum test for all wet wells in accordance with the manhole water test for gravity sewer shall be required.

3. A mandrel test in accordance with the Standard Specifications is required.

4. Pump operation, alarms, and electrical inspection of all lift stations is required.

C. STEP/Grinder Pressure Main System

1. Prior to acceptance of the project, the pressure mainline and service lines shall be subject to a hydrostatic pressure test of 75 pounds for 15 minutes and any leaks or imperfections developing under said pressure shall be remedied by the contractor. No air will be allowed in the line. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. The pressure test shall be maintained while the entire installation is inspected. The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made. The contractor shall
perform all tests to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

2. A water test of the septic, STEP or grinder tank at the factory and on site after installation is required in accordance with the criteria outlined in Section 5E.030.

3. Electrical inspection and testing of all electrical components of the system is required. All tested parts must pass before the City accepts the system. Additionally all electrical structures shall have a concrete base or floor.

5A.080 Effluent Spills

All discharges from the sewerage collection system and spills of any type that may affect human health or the environment must be immediately reported to the Tacoma - Pierce County Health Department and the Department of Ecology. As soon as the spill information is known, the persons responsible for the spill must notify the Department of Ecology of the spill, provide as much information as possible and be sure to give a detailed spill location description, including the estimated volume of discharge and the name of a person to contact for information. The Washington State Emergency Management Division 24-hour Spill telephone number is 1-800-258-5990.

A complete report on the nature, cause and extent of the spill and steps taken to clean up the spill and prevent future spills must be made to the Department of Ecology within 24 hours following the initial spill report call.

5B GRAVITY SEWER

5B.010 General

All sewers shall be designed as a gravity sewer whenever physically feasible or as outlined in the Comprehensive Sanitary Sewer Plan.

5B.020 Design Standards

The design of any sewer extension/connection shall conform to City Standards, Department of Ecology's Criteria of Sewage Works Design and any applicable standards as set forth herein and in Section 1.010 and 1.040.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. See Section 1.130 for utility extension information.

New gravity sewer systems shall be designed on the basis of an average daily per capita flow of sewage of not less than 150 gallons per day in accordance with Chapter 3 of the Wastewater Comprehensive Plan. This figure is assumed to cover normal infiltration, but an additional allowance shall be made where conditions are unfavorable. Generally, laterals and sub main sewers should be designed to carry, when running full, not less than 400 gallons daily per capita contributions of sewage. When deviations from the foregoing per capita rates are used, a description of the
procedure used for sewer design shall be submitted to the City Engineer for review and approval.

The General Notes on the following page shall be included on any plans dealing with sanitary sewer design.

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)

1. All workmanship and materials shall be in accordance with City of Gig Harbor standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction. In cases of conflict, the most stringent standard shall apply.

2. All safety standards and requirements shall be complied with as set forth by OSHA, WISHA and Washington State Department of Labor and Industries.

3. City of Gig Harbor datum shall be used for all vertical control. A list of benchmarks is available at the Engineering Department.

4. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction.

5. If construction is to take place in the County and/or Washington State Department of Transportation right-of-way, the contractor shall notify the City. The City will obtain the County and/or WSDOT permit(s) and provide a copy to the contractor. The contractor shall reimburse the City for associated permit fees.

6. A pre-construction meeting shall be held with the City of Gig Harbor Construction Inspector prior to the start of construction.

7. The City of Gig Harbor Construction Inspector shall be notified a minimum of 48 hours in advance of a tap connection to an existing main or lateral. The inspector shall be present at the time of the tap. Any material removed in the tap process must be given to the City Inspector at the time of the tap.

8. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate line at 811 a minimum of 48 hours prior to any excavation.

9. Gravity sewer main shall be PVC, ASTM D 3034 SDR 35 or ASTM F 589 with joints and rubber gaskets conforming to ASTM D 3212 and ASTM F 455, and shall be green in color.

10. Pre-cast manholes shall meet the requirements of ASTM C 458. Manholes shall be Type 1-48" manhole unless otherwise specified on the plans. Joints shall be rubber gasket conforming to ASTM C 443 and shall be grouted from the inside and outside. Lift holes shall be grouted from the outside and inside of the manhole. (See Note 1.) All manholes used in a STEP system, manholes where a force main terminates into, and gravity manholes as determined by the City, must be properly coated inside to prevent hydrogen sulfide corrosion.
11. Manhole frames and covers shall have a ductile iron casting marked "sewer" and shall be capable of withstanding a test load of 120,000 lbs. and meet AASHTO M 306 standards. Covers shall be one-man operable using standard tools. Covers shall be hinged and incorporate a 90 degree blocking system to prevent accidental closure and come complete with hinge infiltration plug. Frames shall be circular and shall incorporate a sealing ring and provide a 24 in. clear opening. The frame depth shall not exceed 4 in. and the flange shall incorporate bedding slots and bolt holes. All components shall be black coated with a total weight not to exceed 200lbs. The manufacturer shall be CertainTeed, or an approved equal. Lock-type covers shall be required in all multi-family complexes, on school grounds, on manholes containing odor control devices or as determined by the City.

12. Side sewer services shall be PVC, ASTM D 3034 SDR 35 and green in color with flexible gasket joints. Side sewer connections shall be made by a tap to an existing main or a wye branch from a new main connected above the spring line of the pipe.

13. All sewer mains shall be field staked for grades and alignment by a licensed engineering or surveying firm qualified to perform such work.

14. All plastic pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the proposed finished sub grade. The marker shall be plastic non-biodegradable, metal core or backing, marked "sewer" which can be detected by a standard metal detector. In addition, STEP systems and force mains shall be installed with 14 gauge coated copper wire wrapped around all plastic pipe, brought up and tied off at valve body. Tape shall be Terra Tape "D" or approved equal. The tape and wire shall be furnished by the contractor. All sewer pipe shall be green in color. If pipe used is not green in color a PVC sheathing or 'polywrap' shall be installed on pipe during construction.

15. All side sewers locations shall be marked on the face of the curb with an embossed "S" 3 in. high and ¼ in. into concrete and have the stub marked with treated 4 in. x 4 in. posts with wire.

16. Compaction of the backfill material shall be required in accordance with the above mentioned specification (See Note #1). Refer to the applicable Details 2-14 through 2-16. No pea gravel will be allowed as pipe bedding.

17. A 3-ft. square by 8 in. thick concrete pad with welded wire or #4 rebar shall be installed around all clean outs that are not in a pavement area.

18. Temporary street patching shall be allowed as approved by the City Engineer. Temporary street patching shall be provided by placement and compaction of 1 in. maximum asphalt concrete cold mix. Contractor shall be responsible for maintenance as required.

19. Erosion control measures shall be taken by the contractor during construction to prevent infiltration of existing and proposed storm drainage facilities and roadways.

20. The contractor shall be responsible for all traffic control in accordance with Section 2B.126 of the Gig Harbor Public Works Standards, the WSDOT Standard Plans for Road, Bridge and Municipal Construction (all applicable "K" plans) and/or the Manual on Uniform Traffic Control Devices (MUTCD). Prior to disruption of any traffic, a traffic control plan
shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

21. It shall be the responsibility of the contractor to have a copy of the approved plans on construction site whenever construction is in progress.

22. Any changes to the design shall first be reviewed and approved by the project engineer and the City of Gig Harbor.

23. All lines shall be high velocity cleaned, pressure tested, and video inspected prior to paving in conformance with the above referenced specifications. Hydrant flushing of lines is not an acceptable cleaning method. Testing of the sanitary sewer main shall include videotaping of the main by the contractor. Immediately prior to videotaping, enough water shall be run down the line so it comes out the lower manhole. The contractor shall install a screen at the lower manhole to catch all debris. A copy of the video shall be submitted to the City of Gig Harbor. Acceptance of the line will be made after the video has been reviewed and approved by the inspector. Any bellies in main greater than 3/8” shall be dug up and repaired prior to acceptance. A re-inspection video will be required after repair has been made. A water or vacuum test of all manholes in accordance with Gig Harbor standards is also required. Testing shall take place after all underground utilities are installed and compaction of the roadway sub grade is completed. After the paving and raising of manholes is complete, the developer shall clean the sewer conveyance system again at the developer’s expense. The method of cleaning shall be a high velocity water pressure cleaning. All rocks and debris shall be removed and be disposed of at the developer’s expense.

24. Contractors shall be responsible for cleanup of any debris in new or existing manholes and mains associated with the project after the new lines are cleaned as outlined above.

25. All STEP mains shall be hydrostatically tested in conformance with the above-referenced specification for testing water mains. In addition, all STEP mains shall be pigged in the presence of the City Inspector prior to placing STEP main in service.

26. Prior to backfill, all mains and appurtenances shall be inspected and approved by the City of Gig Harbor Construction Inspector. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor’s responsibility to notify the City of Gig Harbor for the required inspections.

27. When using steel plates over the trench, “Steel Plates Ahead” and “Motorcycles Users Extreme Caution” signs shall be required.
Figure 5.1 Process to Obtain Sewer Service

Applicant Requests Sewer Service Through Sewer Service CRC Application

NO

Inside City Limits?

YES

Apply For Utility Extension Agreement and Pay Fees

NO

City Council Approves Utility Extension Agreement?

YES

Submit Construction Plans To Connect To Lift Station and Pay Fees

Design and Construct Lift Station and Force Main, Dedicate to City

NO

existing Lift Station Available Per Wastewater Plan?

YES

Applicant Must Find Alternative Sewer Source

Revise and Resubmit

NO

Plans Approved?

YES

Pay Inspection Fees and Hold Pre-Construction Meeting

Construct and Inspect Facilities

Testing (Pressure and Bacteriological)

Record Drawings

Operational
5B.030 Main Line – Gravity

A main line is that portion of the City’s sewer system to which all connections to the City system are made.

A. Size: Sewer mains shall be sized for the ultimate development of the tributary area as described in the most current City of Gig Harbor Wastewater Comprehensive Plan. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet the requirements for future service.

The minimum size for mains shall be 8 in. inside in diameter. The minimum size for a lateral within right-of-way shall be 6”. See definitions in Section 1.025.

The design is subject to all other design requirements as noted in this chapter.

B. Material: Sewer main shall be PVC, ASTM D 3034, SDR 35 or ASTM F 589 with joints and rubber gaskets conforming to ASTM D 3212 and ASTM F 455 and shall be green in color.

C. Depth: Gravity sewer will typically have a minimum depth of 5 ft. to provide gravity service to adjoining parcels, adequate head room within manholes for maintenance personnel and vertical clearance between water and sewer lines. Actual depth will be determined by slope, flow, velocity and elevation of existing system.

D. Connections: All building sewer connections to the main shall be made with a wye connection. All new mains connecting to existing mains shall require the installation of a new manhole if not made at an existing manhole.

E. At no time shall a gravity sewer be installed with a reverse direction of flow. The maximum deflection angle through a manhole shall not exceed 90 degrees.

F. Pipe material requirements may change due to the depth of the sewer mainline. Sewers over 20’ in depth to invert shall be C900,C905 or ductile iron, green in color, or wrapped in green ‘polywrap’.

5B.040 Connection to Existing System

A. At connection to existing system, all new sewer connections shall be physically plugged until all tests have been completed and the City approves the removal of the plug.

B. Connection of new pipe lines to existing manholes shall be accomplished by using provided penetrations. Where penetrations are not available, the manhole shall be core-drilled for connection, and a link-seal connection will be used. The transition of connecting channels shall be constructed so as not to interrupt existing flow patterns.
C. Connection of a pipe line to a system where a manhole is not available shall be accomplished by pouring a concrete base and setting manhole Sections. The existing pipe shall not be cut into until approval is received from the City.

D. Connections to manholes requiring a drop shall follow the criteria as outlined in Section 5B.100.

E. All multi family, commercial and industrial sewer lateral connections shall be made at the manhole. A manhole shall be installed for lateral connections if one is not available. All new connections to existing manholes shall be channeled to meet existing flow line. If incoming slope of pipe is such that unusual turbulence is created, manhole shall be armored and coated to protect.

F. Taps shall not be allowed to protrude more than 1 in. into the existing main. A City inspector shall be notified 48 hours prior to any tap of a City sewer. A City Inspector shall be present to witness the tap and collect all material from the tap process. The mainline, at the tap location, shall be televised from the nearest manhole, a minimum of 10 ft. beyond the tap, after tapping and prior to approval to insure compliance. Taps shall be Romac’s style CB sewer saddle with Ductile plus saddle, stainless steel strap and rubber gasket meeting ASTM D-2000 3 BA515 or City approved equal. The manufactured bevel on the pipe to be inserted into the saddle shall be cut off to avoid pushing the pipe into the main.

5B.050 Building Sewer (lateral)

A. A building or side sewer refers to the extension from a building sewer beginning two ft. outside the outer foundation wall at the structure to the sanitary sewer main. Building sewers from the lateral to the right-of-way line shall be a minimum 4 in. diameter. Maintenance of the building sewer is the responsibility of the property owner. Prior to connection of a building sewer to the public sewer a connection permit must be obtained from the City (GHMC 13.12.010). Materials and design criteria for a building sewer are covered by the Uniform Plumbing Code (IPC) as adopted by GHMC Chapter 15. Inspection of the building sewer is the responsibility of the engineering/ construction inspector.

B. Each separate building shall have its own separate side sewer connection to the system, see 5A.015 for more information. Side sewers for single family residential properties shall not be connected to the system at the manhole. Manhole sizing, where side sewers are connected, shall be the same as designated in Section 5B.060 of this manual, unless approved by the City Engineer.

C. Location of clean out for building/plumbing sewer is governed by the plumbing code.

D. A 6" clean out shall be installed at the edge of the right of way per Public Works Standards.

5B.060 Manholes
Precast manholes shall meet the requirements of ASTM C 478 with either a precast base or a cast-in-place base made from 3000 psi structural concrete. Manholes shall be Type 1, 48 in. diameter minimum. The minimum clear opening in the manhole frame shall be 24-in.. Joints shall be of a rubber gasket conforming to ASTM C 443 and shall be grouted from the inside and out. Lift holes shall be grouted from the outside and inside of the manhole. Manholes constructed of other materials may be approved by the City Engineer, provided they meet the requirements of 2.318 of Department of Ecology's Criteria for Sewage Works Design. Material specifications need to be submitted for review before an alternate material will be considered. See drawing numbers 5-1 and 5-2 for details. All STEP system manholes and force main termination manholes must be coated for hydrogen sulfide protection with a high build modified polymer, as manufactured by Spectra Shield or approved equal.

An eccentric manhole cone shall be offset so as not to be located in the tire track of a traveled lane.

Manhole frames and covers shall be capable of withstanding test load of 120,000 lbs. Covers shall be one-man operable using standard tools. Covers shall be hinged and incorporate a 90 degree blocking system to prevent accidental closure and come complete with hinge infiltration plug. Frames shall be circular and shall incorporate a sealing ring and provide a 24-in., clear opening. The frame depth shall not exceed 4 in. and the flange shall incorporate bedding slots and bolt holes.

Manufacturer shall be CertainTeed Pam REX or approved equal.

Repairs of defects by welding or by the use of smooth-on or similar material will not be permitted. Manhole rings and covers shall be machine-finished or ground-on seating surfaces so as to assure a non-rocking, self-seating (easily removed and replaced without the use of a sledge hammer). Manholes located in areas subject to inflow shall be equipped with a Preco sewer guard watertight manhole insert or approved equal.

Where lock-type castings are called for, the casting device shall be such that the cover may be readily released from the ring and all movable parts shall be made of stainless steel materials and otherwise arranged to avoid possible binding. Lock-type covers shall be required in all multi-family complexes, on school grounds, on manholes containing odor control devices and as determined by the City.

All covers shall be coated with a bituminous coating prior to delivery to the job site.

All manhole steps must conform to State L&I requirements and shall be fabricated of polypropylene conforming to an ASTM D-4101 specification, injection molded around a 1/2 in. ASTM A-615 grade 60 steel reinforcing bar with non-slip drop-type steps, precast into the walls of the manhole. All steps shall project uniformity from the inside wall of the manhole. Steps shall be installed to form a continuous vertical ladder with rungs equally spaced on 12-in. centers. The top two safety steps (hand holds) shall not be installed in the manhole. If an eccentric cone is used on the manhole, all steps in both the cone and manhole must align in a straight vertical line. Generally, gravity sewers shall be designed with straight alignment between manholes. Curved alignment of the sewer shall not be permitted. When possible on straight thru
alignment on new manholes, run pipe thru manhole, pour channel, then remove top of pipe to provide smooth abrasion resistant channel.

Manholes shall be provided at a maximum of 400-ft. intervals for 8-in. to 15-in. sewers, 500-ft. intervals for 18-in. to 30-in. sewers, at intersections, and at changes in direction, grade or pipe size. (See also Section 5B.080.)

Minimum slope through the manhole shall be 1/10th of one ft. from invert in to invert out.

Manhole sizing shall be determined by the following criteria:

A. 48 in. Manhole
   1. 2 connecting pipes, 8 in. to 12 in. diameter.
   2. 3 connecting pipes, 8 in. to 10 in. diameter, perpendicular.
   3. 4 connecting pipes, 8 in. diameter, perpendicular.

B. 54 in. Manhole
   1. 2 connecting pipes, 8 in. to 12 in. with less than 45 degree deflection
   2. 3 connecting pipes, 10 in. to 12 in. diameter, perpendicular
   3. 4 connecting pipes, 10 in. to 12 in. diameter, perpendicular

C. 72 in. Manhole
   1. 2 connecting pipes, 15 in. to 18 in. diameter with less than 45 degree deflection
   2. 3 connecting pipes, 15 in. diameter, perpendicular
   3. 4 connecting pipes, 15 in. diameter, perpendicular

In the above criteria "deflection" refers to the angle between any 2 pipe channels in the manhole.

For other pipe configurations, the size of the manhole shall be approved by the City.

The above configurations will provide adequate shelves and room for maintenance and televising mains.

5B.070 Slope
All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 ft. per second based on Manning’s formula using an "n" valve of 0.013. Use of other practical "n" values may be permitted by the City if
deemed justifiable on the basis of research or field data submitted. The following minimum slopes, in Figure 5.2, should be provided; however, slopes greater than these are desirable.

**Figure 5.2 Slope**

<table>
<thead>
<tr>
<th>Sewer Size (In.)</th>
<th>Minimum % Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (Ft. per 100')</td>
</tr>
<tr>
<td>8</td>
<td>0.40 (0.0040 Ft/Ft)</td>
</tr>
<tr>
<td>10</td>
<td>0.28 (0.0028 Ft/Ft)</td>
</tr>
<tr>
<td>12</td>
<td>0.22 (0.0022 Ft/Ft)</td>
</tr>
<tr>
<td>14</td>
<td>0.15 (0.0015 Ft/Ft)</td>
</tr>
<tr>
<td>15</td>
<td>0.15 (0.0015 Ft/Ft)</td>
</tr>
<tr>
<td>16</td>
<td>0.14 (0.0014 Ft/Ft)</td>
</tr>
<tr>
<td>18</td>
<td>0.12 (0.0012 Ft/Ft)</td>
</tr>
<tr>
<td>21</td>
<td>0.10 (0.0010 Ft/Ft)</td>
</tr>
<tr>
<td>24</td>
<td>0.08 (0.0008 Ft/Ft)</td>
</tr>
<tr>
<td>25</td>
<td>0.05 (0.0005 Ft/Ft)</td>
</tr>
<tr>
<td>30</td>
<td>0.06 (0.0006 Ft/Ft)</td>
</tr>
<tr>
<td>36</td>
<td>0.05 (0.0005 Ft/Ft)</td>
</tr>
</tbody>
</table>

Under special conditions, slopes slightly less than those required for the 2.0 ft. per second velocity may be permitted by the City Engineer. Such decreased slopes will only be considered where the depth of flow will be 30 percent of the diameter or greater for design average flow. Whenever such decreased slopes are proposed, the design engineer shall furnish the plans with his/her computations of the depths of flow in such pipes at minimum, average, and daily or hourly rates of flow. Larger pipe size shall not be allowed to achieve lesser slopes.

Sewers shall be laid with uniform slope between manholes.

**5B.080 Increasing Size**

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

**5B.090 High Velocity Protection**

Where velocities greater than 15 ft. per second are expected, special provisions such as thrust-blocking and lining of manholes and piping materials shall be made to protect against decomposition of materials and displacement by erosion and shock.

**5B.100 Drops**

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

An inside drop connection shall be provided for a sewer entering a manhole at an elevation of 24-in. or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24-in., the invert shall be filleted and armored/coated to prevent solids deposition and corrosion of fillet.

If an inside drop is permitted, the corresponding manhole will need to be upgraded to at least a 60 in. manhole. See Detail 5-10 for inside drop pipe connections.

An outside drop connection will not be allowed by the City unless otherwise approved by the City Engineer or Waste Water Treatment Plant Supervisor.

5B.110 Clean outs

Clean outs are not an acceptable substitute for manholes, however, they may be used in lieu of manholes at the end of 8-in. diameter lines of not more than 150 ft. in length. This does not include a 6-in. building sewer to serve one or two single-family dwellings. Location of cleanout for building sewer is governed by the Uniform Plumbing Code as adopted by GHMC Chapter 15.

All clean outs in the City right-of-way or easements shall be extended to grade and a 3-ft. square by 8-in. thick concrete pad with welded wire or #4 rebar shall be installed around all clean outs that are not in a pavement area. See Detail 5-4.

5C LIFT STATIONS

5C.010 General

The need for a sewage lift station, as identified in the Wastewater Comprehensive Plan or necessary for a development as determined by the City, shall be presented by the developer in a design report. If the City determines the area cannot be served by gravity services, the developer shall provide information and design the lift station to comply with the following minimum standards in this chapter.

5C.020 Design Report Standards

If a lift station is determined to be necessary, the developer shall perform a study prepared and stamped by a professional engineer licensed in the State of Washington to determine that the lift station installation is sized to serve the overall sewage flows generated within the designated waste water basin. The waste water basin study shall include the developer’s plat boundary area and may include adjacent and future service areas as determined by the City. The final service area shall be the entire designated sewer basin as identified in the current Wastewater Comprehensive Plan which will be served by the installation of the lift station(s).

The design of any lift station shall conform to City of Gig Harbor standards, Department of Ecology’s Criteria for Sewage Works Design and applicable standards as set forth in herein and in Sections 3.020 and 3.040.
The station’s design flow capacity shall be based on an average daily per capita flow with related peaking factors and inflow/infiltration allowances.

Documentation of present and future service area flow rates for lift station size and capacity determination shall be included in the report.

The effects of the minimum flow conditions shall be estimated to be sure that retention of the sewage in the wet well will not create a nuisance and that pumping equipment operation will be optimized. The wet well shall be sized to provide full submergence on the pumps as recommended by the pump manufacturer and a minimum of six minutes between pump cycles at pump design capacity. The wet well shall be sized to provide reserve capacity as large as reasonable possible to allow adequate time for emergency responses during a failure.

The lift station shall be sized to meet the maximum rate of flow expected. The size of the receiving sewer shall also match the flow expected. At least two pumping units shall be provided at each lift station installation. The pumps shall have sufficient capacity and capability to efficiently handle the peak design flow with one pump out of service and to ensure a minimum velocity of 2-1/2 ft. per second velocity in the pressure main.

The pressure main shall be sized for a minimum velocity of 3-1/2 ft. per second and a maximum velocity of 8 ft. per second. The minimum inside diameter of the pressure main shall be 4 in.

Four copies of the design report shall be submitted to the City for review. As a minimum, the report shall include:

1. Project description
2. Projected flows
3. Connection point with downstream capacity
4. Wet well sizing
5. Run time calculation and cycle time
6. Pump station head calculation and system curve
7. Pump selection and wet well details
8. Pressure main size, length and material (see Section 5D Pressure Sewer)
9. Electrical requirements and Generator sizing if auxiliary pump is not used.
10. Odor and corrosion calculations

Information prepared by an engineering firm with experience in hydrogen sulfide formation and remediation shall be provided for the following:

A. Collection system to the lift station
B. Lift station wet well
C. Pressure main
D. Downstream gravity system
E. A statement that odors will not be detected at the lift station site or at the point of release, or the Developer will provide odor control and corrosion reduction at the appropriate locations in accordance with current City of Gig Harbor odor and corrosion control method. See also Section 5D.080 Pressure Main Termination.
11. Geotechnical analysis for wet well and lift station site
12. Backfill and compaction specifications
13. Preliminary site plan layout

5C.030 Design Drawings

The drawings shall be prepared by a professional engineer licensed in the State of Washington to an appropriate scale to show details of the site. See Section 1.040. The developer’s engineer shall revise the drawings and review all dimensions to ensure accuracy for the applicable site and pump selection.

The detailed engineering drawings shall accurately depict the equipment selected by the engineer. The drawings shall include an equipment list showing manufacturer, model number and size or capacity for all structures, mechanical and electrical components, and structural/building plans to house vital mechanical equipment.

The developer shall furnish a site layout for the lift station installation.

The lift station shall be located as far as practicable from present and/or proposed residential areas. Sites shall be of sufficient size for access, maintenance and future expansion or addition, if applicable.

Lift station sites together with access to the site shall be deeded to the City.

As a minimum, the following shall be provided on the plans for construction:

1. Complete lift station, to include but not limited to, wet well structure to house all vital components and vaults
2. Auxiliary power or auxiliary pump as determined by the City
3. All electrical
4. Telemetry compatible with existing system, including complete start up and revising existing screens at the Gig Harbor Wastewater Treatment Plant.
5. 2-in. water service with RPBA assembly and wash down hydrant.
6. Odor control, as applicable for location and capacity.
7. Site soil conditions. Excavation, select backfill and compaction requirements.
8. Cuts and fills to provide level site for maintenance.
10. Concrete within the maintenance area.
11. Landscaping per City of Gig Harbor criteria.
12. 6 or 7-ft. high fence enclosing the site and a 12-ft. wide lockable access gate
13. Address sign
14. Site lighting

5C.040 Submittals

At the time construction plans are submitted for approval, the following information shall be provided:
1. **Pump Data**
   - Size and type
   - Pump curves
   - Head capacity
   - Velocity
   - Manufacturer/distributor

2. **Motor Data**
   - Size and type
   - Horsepower
   - Service factor
   - Motor insulation
   - Cycle length
   - Full load amps
   - Voltage
   - Frame and type of mount
   - Manufacturer/distributor

3. **Controls**
   - Type
   - Timers and relay mounting
   - Motor starter size
   - Phase monitor
   - NEMA type enclosure
   - Thermal magnetic circuit breaker
   - GFI outlet
   - Indicating lights
   - Level controller
   - Telemetry failure points
   - Elapse time meters
   - Component manufacturer/distributor
   - Hand/Off/Auto (HOA) switch

4. **Telemetry**
   - Alarm system (must be compatible with City system by mission).

5. **Auxiliary Power/Auxiliary Pumping**
   - All lift stations must be furnished with auxiliary-powered generators by Onan.
   - Diesel generator
   - Fuel storage tank (24-hour reserve capacity)
   - Automatic transfer switch, dry contacts for Mission telemetry
   - Or as determined by the city auxiliary diesel powered dri-prime centrifugal screw pump
   - Self contained level control
   - Exercise timer
   - Dry contacts for Mission telemetry
   - Fuel storage tank (24 hour reserve capacity minimum)

6. **Maintenance**
   - Warranty for two years
   - Staff training upon completion
   - Tools and equipment required
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tr>
<td>7.</td>
<td><strong>Electrical Service</strong>&lt;br&gt;Specifications (service size, and voltage, motor size, enclosure type, etc.)&lt;br&gt;Source of power&lt;br&gt;Calculations&lt;br&gt;Single line diagram&lt;br&gt;Primary distribution equipment&lt;br&gt;Service entrance&lt;br&gt;Branch circuiting&lt;br&gt;Mechanical equipment power requirements&lt;br&gt;Control diagrams &amp; schematics&lt;br&gt;Schedules of fixtures, panel boards &amp; switch gear&lt;br&gt;Shop drawings</td>
</tr>
<tr>
<td>8.</td>
<td><strong>Lighting</strong>&lt;br&gt;Exterior/Interior lighting&lt;br&gt;AC and DC lighting circuits</td>
</tr>
<tr>
<td>9.</td>
<td><strong>Wet Well</strong>&lt;br&gt;Size&lt;br&gt;Storage capacity&lt;br&gt;Access hatch&lt;br&gt;Locking mechanism&lt;br&gt;Penetration seals&lt;br&gt;Safety entry equipment&lt;br&gt;Safety net&lt;br&gt;Manufacturer&lt;br&gt;Corrosion protection, material, application, warranty.</td>
</tr>
<tr>
<td>10.</td>
<td><strong>Valve Vault</strong>&lt;br&gt;Size&lt;br&gt;Access ladder&lt;br&gt;Access hatch&lt;br&gt;Penetration seals&lt;br&gt;Manufacturer</td>
</tr>
<tr>
<td>11.</td>
<td><strong>Piping and Valves</strong>&lt;br&gt;Size and material type&lt;br&gt;Valves&lt;br&gt;Flow meter&lt;br&gt;Bypass pumping fittings camlock&lt;br&gt;Pipe supports&lt;br&gt;Corrosion protection, material, application, warranty</td>
</tr>
<tr>
<td>12.</td>
<td><strong>Testing Plan</strong>&lt;br&gt;Factory test&lt;br&gt;Operational test &amp; start up&lt;br&gt;Pressure test&lt;br&gt;Start up &amp; training</td>
</tr>
<tr>
<td>13.</td>
<td><strong>Corrosion Protection</strong>&lt;br&gt;Type of materials&lt;br&gt;Coatings&lt;br&gt;Linings&lt;br&gt;Maintenance</td>
</tr>
<tr>
<td>14.</td>
<td><strong>Site layout</strong>&lt;br&gt;Location of lift station on property&lt;br&gt;Building renditions suitable for review by the City and Design Review Board, if applicable, including building materials (type and color)</td>
</tr>
</tbody>
</table>
See Section 5D “Pressure Sewer” for additional information regarding force mains.

The design drawings may be used to provide the information required in items 1 through 14 above. Design drawings shall be reviewed and verified for completeness and compliance by the design engineer prior to submittal to the City.

The City’s review does not relieve the engineer and/or developer of the responsibility for constructing a lift station that is trouble free and suitable for its purpose.

The general notes for gravity sewer and pressure sewer construction found in Section 5B and 5D of this chapter shall accompany the following lift station general notes on the plans.

**GENERAL NOTES (LIFT STATION INSTALLATION)**

1. All workmanship, materials and testing shall be in accordance with the most current WSDOT Standard Specifications for Road, Bridge and Municipal Construction, National Electrical Code and City of Gig Harbor Standards unless otherwise specified below. In cases of conflict, the most stringent standard shall apply. When the most stringent standard is not clear, the City Engineer will make the determination. The electrical contractor shall be familiar with all above stated publications and guidelines as they will be strictly enforced by the City.

2. Any changes to the station design shall first be reviewed and approved by the project engineer and the City of Gig Harbor.

3. Contractors shall be responsible for cleanup of any debris in the wet well, tanks, vaults and site associated with the project prior to start up.

4. Prior to backfill, all mains, tanks, wet wells and vaults shall be inspected and approved by the City of Gig Harbor Construction Inspector and/or special inspections by approved inspection firm. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor’s responsibility to notify the City of Gig Harbor for the required inspections.

5. All work shall be done per the National Electrical Code (N.E.C.) and The City of Gig Harbor Standards. The City of Gig Harbor Standards may exceed the N.E.C. The developer shall obtain all permits and arrange inspections.

6. The developer shall coordinate power service with serving utilities and make arrangements for power service connection. It shall be the developer’s responsibility to maintain power service for private lift stations serving commercial properties or developments.

7. Prior to testing and start-up of the lift station, three hard copies and two electronic copies of the Operation and Maintenance Manual, together with the number of approved copies required by the developer, shall be submitted to the City for review and approval. Equipment specific manuals shall be delivered with equipment or prior to delivery, but no later than delivery.

8. The Developer, at its own expense with the design engineer and all other parties involved in the lift station construction, shall arrange for an authorized factory-trained representative of the company or companies supplying the various items of equipment to check the installation, adjust and test the equipment furnished before the acceptance of the work by the City. The
factory representative shall be responsible to check and resolve any unacceptable vibration of the pump assemblies. Furthermore, the developer shall assist and instruct the City’s operating staff in adjusting and operating the equipment during the initial start-up period. They shall also provide a follow up training session after 6 months of operations. Said representative shall be experienced and knowledgeable of the equipment being tested.

9. The developer, at its own expense, shall conduct an instruction program for up to five personnel designated by the City. The developer shall furnish the services of qualified instructors from the various equipment manufacturers. Program shall include instruction covering basic system operation theory, routine maintenance and repair, and hands-on operation of equipment. Training shall not proceed until all operation maintenance manuals are complete and accepted by the City.

10. All equipment shall be tested and developer shall demonstrate to City personnel that proper operation and capacity have been fully obtained. The City will not accept any facility until successful full operation of all components has been demonstrated by the developer.

11. It is the developer’s responsibility to construct and start-up a complete and trouble-free system. The developer shall be responsible for correcting all design errors and/or construction defects that are discovered in the start-up or during the warranty period of the agreement with the City.

12. The developer shall give initial lubrication to all equipment as required by the part or component manufacturer.

13. Lift station and generator, site, driveway, access, concrete areas, lighting and water service shall all be completed prior to start-up request and inspection.

14. Generator/auxiliary pump and a 24-hour fuel storage tank shall be mounted on a concrete pad. The generator/auxiliary pump shall have weather proof sound dampening enclosure, block heater, battery charger, auto exerciser, radiator louvers or protection and shall comply with all requirements in Section 5C.070 of the City of Gig Harbor Standards.

15. Telemetry shall be set up completely and coordinated with the Mission including revising telemetry computer screens at Gig Harbor Wastewater Treatment Plant prior to start up request and acceptance.

16. Specific spare parts shall be provided for the station at time of startup acceptance:

- One set mechanical seals.
- One set of O-rings.
- One set of pump wear rings.

Additionally, any special tools specific to the pump manufacturer shall be provided to the City of Gig Harbor at start up.

5C.050 Lift Station

The Lift Station shall be of submersible style non-clog pumps mounted in the wet well, and shall meet all of the conditions outlined in Section 5C. Two styles of pumps are referenced in this section: They are a standard non-clog centrifugal pump with either an open channel
or a vortex impeller and clog free screw centrifugal pump. The City shall designate which style of pump to be used, depending on the waste being received at the lift station.

Requirements: Non-clog open channel or vortex pumps

Furnish and install submersible non-clog wastewater pumps. Each pump shall be equipped with submersible electric motor, connected for operation on 480 volts, 3 phase, 60 hertz, with submersible cable (SUBCAB) suitable for submersible pump application of adequate length to remove pump from wet well without disconnecting. The power cable shall be sized according to NEC and ICEA standards and also meet with U.L. and C.S.A. P MSHA approval. The pump shall be supplied with discharge connection capable of delivering flow as set forth in the Engineering/Hydraulic Report, Public Works Standards, Wastewater Comprehensive Plan.

Pump Design:
The pumps shall be automatically and firmly connected to the discharge connection, guided by no less than two stainless guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet well. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal-to-metal watertight contact with O-ring.

Pump Construction:
See Appendix for pump specifications

5C.060 Electrical

General

Definition of all terms shall be according to AIA and IEEE standard definitions. Shop drawings shall be submitted during design review on all special equipment and approval obtained before manufacture. Drawings are diagrammatic; locations of all outlets to be checked and verified on project site.

Where conflict occurs with other equipment, the developer shall consult City for final decision. The developer is responsible for obtaining rough-in dimensions from supplier for equipment.

All work shall be done per National Electrical Code as amended by WAC 296-46, and City of Gig Harbor Standards. The most stringent standard shall apply. The developer shall obtain all permits and arrange inspections.

The developer shall coordinate power service with serving utilities and make arrangements for power service connection.

The pump control and electrical equipment shall be factory manufactured and field installed. It shall be fabricated and assembled by an approved U.L. 508 listed manufacturer.

Pump Station Telemetry & Controls:
Duplex Pump Control Function: The two submersible pumps shall operate in a duplex mode. Each pump shall be provided with a “Hand Off Auto” (HOA) selector switch which shall control the pump as follows:

1. Hand Position: When the HOA switch is placed in the hand position, the pump shall immediately start and run until HOA switch is placed in the off position. Pumps shall not be controlled by level sensors when the HOA switch is in the hand position.

2. Off position: When the HOA switch is placed in the off position, the pumps shall immediately stop, regardless of the water level.

3. Auto position: When the HOA switch is placed in the auto position, the pumps shall start and stop automatically in response to the water level and in the sequence determined by the controller. One pump shall start as the lead pump when the water level rises above the lead pump-on level. The pump shall run continuously until the water level decreases to the pump-off level. When both pumps are called to run, the lag pump will be set to shut off at a point 10 percent or another set point as determined by the City before the lead pump shut off.

Pump running indication: Provide indicating lights (green) that shall indicate the pump running condition. The light shall glow steadily when pump is running and shall be turned off whenever the pump is not running. In addition, provide contacts for remote monitoring of pump operation. Provide red indicating lights when pump is not running.

Alarms: Alarms shall be reported locally at the control panel and dry contacts provided for remote alarms. In the event of an alarm, individual indicating alarm lights on the pump control panel shall be lit to pinpoint the specific trouble. The alarm contact wiring shall be complete to the telemetry box as per Mission Control instructions for landing.

The schematic and line diagrams shall show the following telemetry points if applicable and a common termination point shall be provided in the lift station to interface between the lift station and the remote telemetry unit (RTU). The telemetry points shall consist of the following:

Standard Lift Station

- High wet well
- Low wet well
- Phase loss
- Pump 1 run
- Pump 2 run
- Pump 1 fail
- Pump 1 seal fail
- Pump 1 high temperature
- Pump 2 fail
- Pump 2 seal fail
- Pump 2 high temperature
- Intrusion
- Wet well level
• Station overflow
• Operator in trouble
• Generator/Dri-prime run
• Generator/Dri-prime off
• Power failure

Control Panels: Circuit breakers, motor starters, control power transformers, control relays, interlocks, selector switches, elapsed time meters, contacts for remote mounted equipment and other type devices required to meet the functional equipment specified herein. The control panel, designed by the pump manufacturer, shall be UL listed and shall have the following minimum features:

1. Enclosure (cabinet) shall be stainless steel NEMA 4x construction.

2. Intrinsic-safe barrier relays for liquid-level sensor circuits.

3. Indicating light units shall be all-tight type. Units shall include a 120-6 volt transformer and 6-8 volt lamp and shall be of the illuminated push-button type with the push-button wired for push-to-test function. Lens caps for lights indicating alarms shall be red and for lights indicating motor running status, green. Six spare lamps shall be furnished.

4. Elapsed time meters shall have a 5-digit, non-reset register with the last digit indicating tenths of an hour.

5. Control relays shall be hermetically sealed, industrial grade rated for 600 Volts AC. Contacts shall be silver alloy. Parts shall be corrosion-resistant or treated in an approved manner to resist corrosion.

6. Selector switches shall be 3-position maintained type meeting NEMA type 13 requirements. Legend plate shall be marked “hand-off-auto”. Selector switches shall be provided with a padlock attachment (so that switch can be locked in the off position).

7. Provide for each starter a fused control circuit transformer with two fuses in the primary and one fuse in the secondary.

8. Panel wiring shall be stranded type XHHW or SIS rated 90 degrees Celsius with a minimum size of no. 14 AWG. Compression or ring tongue type lugs shall be used for transformers. Wires crossing hinges shall be installed in a manner to prevent chaffing. Plastic wire gutters and nylon cable wrap and wires shall be used to guide and train the wire as necessary.

9. Space shall be provided for Mission telemetry. This space shall be a minimum of 16 in. x 14 in. x 8 in. The telemetry unit shall be provided and installed per specification as required by the City. Telemetry shall be operational prior to station acceptance.

10. Main disconnect and transfer switches shall be mounted in the enclosure.
11. Cellular antenna and mounting installation shall be per Mission recommendation.

High Level Sensors: Level sensors shall be a float switch type utilizing a mercury switch mounted in a chemical resistant casing suspended on its own cable. If the sensor comes in contact with the rising-liquid level, the sensor shall tilt and cause the internal mercury switch to close its contact. The sensor shall stay tilted until the liquid level decreases below the sensor. The level sensor shall be designed for intrinsically-safe low power applications. Sensor shall be provided for high-level alarm.

The following list of approved materials shall be shown on the plans and include brand name, model and part numbers.

**APPROVED ELECTRICAL MATERIALS LIST:**

Wiring / Instrumentation / Controls:

A. Conduit and fittings - Underground or entering wet well, vaults and cabinets shall be PVC coated rigid steel RMC with polyethylene inner coat.

B. Supports and mounting brackets - Shall be stainless steel uni-strut, brackets and clamps with stainless steel mounting hardware.

C. Wire - #14 copper THWN minimum.


E. Control panel box – Hoffman or approved equal stainless steel enclosure. Orenco duplex community systems shall use standard Orenco fiberglass control panel box.

F. Intrusion switch – Cuttler Hammer or Square D.

G. Timers – Crouzet chronos or approved equal

H. Relays – Idec or approved equal

I. Phase Monitor – Diversified Electronics Model #SLA-440-ALE

J. Thermal magnetic circuit breakers – Square D or Cuttler Hammer

K. Indicator Lights – Cuttler Hammer or Square D

L. Fuses & Holder – Bussman

M. Starters – Sprecher Schuh, Cuttler Hammer or Square D
N. Overloads - Sprecher Schuh, Cuttler Hammer or Square D

O. Selector Switches – Square-D or Cuttler Hammer, Class 9001, Type TL3, or equal.

P. Float switch – Rotofloat

Q. Limit switches – GO Switch Model #11-11120-00 or approved equal

R. Control Breakers – Square D class 9080 GCB

S. Automatic Transfer switch – Onan

T. Manual Transfer switch – Cutler Hammer or Square D, knife style

U. Elapsed Time Meter – Yokogawa 240211AAAB

V. Amp Meters – Yokogawa

W. Receptacle – Leviton 20A – 120v GFCI with weatherproof cover.

X. Level Controller – Siemens pressure transducer, key pad 69900005. (no splice allowed in cable).

Y. UPS Back Up – Sola/Heavy Duty

Z. Transformers – Sola/Heavy Duty

AA. Power Supply – Power 1 International Power

BB. Terminal Blocks – Entrelec M 4/6 5116

CC. Radio Telemetry – Mission Cellular

All penetrations made to panels, breaker boxes, soft starts, etc. shall be made with water tight fittings such as a Myers hub.

5C.070 Auxiliary Power System/ Auxiliary Pumping System

General

Onan diesel emergency power generation equipment shall be provided at the lift station site which will operate the lift station in the event of a commercial power outage.

It is essential that the emergency system be designed with capacity and rating to carry safely the entire connected lift station load.

The auxiliary power unit shall be complete in every respect and shall include, but not be limited to, the following:
1. Generator, control panel and circuit breaker.

2. Engine, radiator and exhaust system.

3. Fuel tank (capacity for 24 hours full load, plus 25 percent).

4. Generator set enclosure, lockable to City standards.

5. Automatic transfer switch.

6. Radiator protection or automatic louvers.

7. Block heater.

8. Battery and rack.


10. Conduit, wire and piping.

The generator set and transfer switch shall be Cummins/Onan, complying with the latest edition of Onan Corporation Standard Specifications and with the City standards. The generator shall be 60 Hertz, 3-phase, 480 volt standby power.

The generator set/auxiliary pump shall include the following:

Engine:

- Single phase, 1500 watt coolant heater manufactured by KIM – hot shot 115 volt or 240 volt sized accordingly for the engine and climate conditions.

Generator set:

- Mainline circuit breaker
- Weather-protective/sound dampening enclosure with mounted silencer (maximum noise level of 68 dBA at 23 ft.).

Accessories:

- Batteries
- Battery Charger, 2 AMP, 12 VDC, 120 VAC Input
- Vibration Isolators, pad type

Control Panel:

- Annunciator relays (12)
- Run relay package (3)
- Low coolant level shutdown
- Anti-condensation space heater, 120 VAC
- Oil temperature gauge
- Wattmeter
- Emergency stop switch
- Low oil pressure shutdown

Fuel System:
- Diesel

Alternator:
- Anti-condensation heater, 120 VAC

Exhaust System:
- Exhaust silencer (68dBA AT 23 ft.)

Control Features:
- Run-stop-remote switch
- Remote starting, 12-volt, 2-wire
- Coolant temperature gauge
- Field circuit breaker
- DC voltmeter
- Running time meter
- Lamp test switch
- Oil pressure gauge
- Fault reset switch
- Cycle cranking
- 12-light engine monitor with individual 1/2 amp relay signals and a common alarm contact for each of the following conditions:
  - Run (green Light)
  - Pre-warning for low oil pressure (yellow Light)
  - Pre-warning for high coolant temp (yellow Light)
  - Low oil pressure shutdown (red Light)
  - High coolant temperature shutdown (red Light)
  - Over crank shutdown (red Light)
  - Over speed shutdown (red Light)
  - Switch off (flashing red Light - indicates generator set not in automatic start mode)
  - Low coolant temperature (yellow Light)
  - Low fuel (yellow Light)
  - Two customer selected faults (red Light)

AC Meter Package:
- Order with NFPA 110 monitor to meet code requirements.
- AC voltmeter (dual range)
The transfer switch shall include the following:
- AC ammeter (dual range)
- Voltmeter/ammeter phase selector switch with an off position
- Dual scale frequency meter/tachometer
- AC rheostat (panel mounted) for +5 percent voltage adjust

Pole Configuration:
- Poles - 3 (neutral)

Frequency:
- 60 hertz

Application:
- Application - Utility to Genset

System Operation:
- Three-phase, 3-wire or 4-wire

Enclosure:
- B002 type 3R; Intended for outdoor use also for interior application (dust proof and rainproof) shall have radiator grill protection or automatic louver system.

Listing:
- Listing - UL 1008

Programmed Transition:
- Program transition - 1-60 sec.

Exerciser Clock:
- 7-day Solid-State exerciser clock

Application Modules:
- Monitor - Phase sequence/balance

Suitable guards shall be provided on all electrical parts to minimize the personal shock hazard.
Generator shall be broken-in sufficiently to permit application of full load immediately upon installation.

Generator supplier shall provide all tools for the generator set as recommended and required by the manufacturer.

Generator installation shall be checked by the supplier after installation to determine that the installation is correct. Written confirmation shall be provided to the City. Generator supplier shall perform a full load test for 2 hours after installation is complete. Provide resistive load bank for this test.

Generator supplier shall provide a minimum of 4 hours of training for City personnel at the station site during start-up.

Generator manufacturer shall provide three hard and two electronic copies of the maintenance and operation manual. These manuals shall be complete and shall include all information necessary to all City personnel to maintain the generator. Manuals shall be delivered with or prior to delivery of equipment.

Generator and fuel tank mounting pad shall be reinforced concrete to carry the weight of the unit and shall extend a minimum of 6 in. beyond generator housing. Chamfer all edges 3/4 in.

Auxiliary Pump:

- Weather-protective/sound dampening enclosure with mounted silencer (maximum noise level of 68 dBA at 23 ft.). For interior application also.

Fuel System:

- Diesel

Accessories:

- Batteries
- Battery Charger, 2 AMP, 12 VDC, 120 VAC Input
- Vibration Isolators, pad type

Control Panel:

- Annunciator relays
- Run relay package (3)
- Low coolant level shutdown
- Oil - pressure gauge
- Emergency stop switch
- Low oil pressure shutdown

Exhaust System:

- Exhaust silencer (68 dBA AT 23 ft.)
Control Features:

- Run-stop-remote switch
- Remote starting, 12-volt, 2-wire
- Coolant temperature gauge
- DC voltmeter
- Running time meter
- Oil pressure gauge
- 8-light engine monitor with individual 1/2 amp relay signals and a common alarm contact for each of the following conditions:
  - Run (green light)
  - Low oil pressure shutdown (red light)
  - High coolant temperature shutdown (red light)
  - Over crank shutdown (red light)
  - Over speed shutdown (red light)
  - Low coolant temperature (yellow light)
  - Low fuel (yellow light)
  - Two customer selected faults (red light)

Exerciser Clock:

- 7-day Solid-State exerciser clock

Suitable guards shall be provided on all parts to minimize the personal shock and mechanical hazard.

Engine shall be broken-in sufficiently to permit application of full load immediately upon installation.

Supplier shall provide all tools for the generator set as recommended and required by the manufacturer.

Installation shall be checked by the supplier after installation to determine that the installation is correct. Written confirmation shall be provided to the City. Supplier shall perform a full load test after installation is complete.

Supplier shall provide a minimum of 4 hours of training for City personnel at the station site during start-up.

Manufacturer shall provide 5 copies of the maintenance and operation manual. These manuals shall be complete and shall include all information necessary to all City personnel to maintain the unit.

Mounting pad shall be reinforced concrete to carry the weight of the unit and shall extend a minimum of 6 in. beyond housing. Chamfer all edges 3/4 in.
5C.080  Odor Control

Odor control shall be provided at the lift station and/or at the pressure main discharge manhole as determined and required by the City.

Refer to Section 5D.080 for pressure main termination and odor control requirements.

5C.090  Lift Station Inspection Checklist

The checklist on the following pages will be used by the City when doing a final inspection of a lift station. Additional items may be added depending on the type and style of station constructed. The list on the following page is provided to help the developer prepare for the final inspection.
LIFT STATION INSPECTION CHECKLIST

Inspectors: _______________________________ Date: ________________

__________________________________ Date: ________________

Name of Lift Station:
____________________________________________________________________________________

Location:
____________________________________________________________________________________

Address:
____________________________________________________________________________________

Assigned Lift Station Number: __________

OPERATION OKAY
Yes No
Control Panel components:

Ultrasonic level instrument

Pump Run Lights: ________ ________
Hour Meters: ________ ________
H.O.A.: ________ ________
Limit Switches: ________ ________
Panel wiring ________ ________
Grounding ________ ________
UPS ________ ________
Power supplies ________ ________
Legend Plates ________ ________
Markings and Identifications ________ ________

Comments:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Alarm Functions:

Power Fail: ________ ________
High Wet Well: ________ ________
Low Wet Well: ________ ________
Control Overide ________ ________
Intrusion ________ ________
Pump run ________ ________
Pump fail ________ ________
Seal fail ________ ________
Overflow ________ ________
High temperature ________ ________
Generator failure ________ ________
Operator in trouble ________ ________
Intrusion ________ ________
### Pump Functions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump #1 Fail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #2 Fail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #1 Run</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #2 Run</td>
<td></td>
<td></td>
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<tr>
<td>Pump control override</td>
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Comments: __________________________________________

### Telemetry Function at Maintenance Shop:

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<tr>
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<tr>
<td>High Wet Well</td>
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<td></td>
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<tr>
<td>Pump #2 Fail</td>
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<tr>
<td>Intrusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #1 Run</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #2 Run</td>
<td></td>
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<td>Pump control override</td>
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Comments: __________________________________________

### Control Panel Enclosures Appropriate UL Labels:

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### Wiring Schematics for Correlation:

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Comments: __________________________________________

### Wire Gauge (usually 18):

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Comments: __________________________________________

### Raceways & Electrical Conduit for Defects:

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Comments: __________________________________________

### Terminal Block:

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Comments: __________________________________________

### Proper Sized Circuit Breakers & Fuses:

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Comments: __________________________________________

### Electrical Control Devices Sized for Motors:

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Comments: __________________________________________

### Overload Devices, Trip Test & Manual Reset:

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Comments: __________________________________________

### All Wires Connected & Grounding:

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Comments: __________________________________________

### Transformers:

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<th>Value 2</th>
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</thead>
</table>

Comments: __________________________________________
Comments: ______________________________________________________

Load Centers: 
Comments: ______________________________________________________

Electrical cabinet Heater Operation: 
Comments: ______________________________________________________

Disconnect Operation: 
Comments: ______________________________________________________

Auxiliary Generator Operation: 
Comments: ______________________________________________________

Transfer Switch Operation: 
Comments: ______________________________________________________

Isolation Valves Operation: 
Comments: ______________________________________________________

Check Valve Operation: 
Limit Switches: 
Comments: ______________________________________________________

Emergency Bypass Operation & Fittings: 
Comments: ______________________________________________________

All Nuts, Bolts and Anchors to spec., grade and in place: 
Comments: ______________________________________________________

All Mechanical Components Installed in Wet Well: 
Comments: ______________________________________________________

Wet Well Piping for Proper Size: 
Comments: ______________________________________________________

Corrosion Resistant (epoxy coating wet well pipes): 
Comments: ______________________________________________________

Calcium Aluminate Coating in Wet Well: 
Comments: ______________________________________________________

Flow Meter: 
Comments: ______________________________________________________

Note: Check that motors are not exceeding their nameplate amperage multiplied by the motor service factor, (i.e., with FLA = 10 and SF = 1.15, the amperage recorded should not exceed 11.5 amps). The motor will operate satisfactorily under the following conditions of voltage and frequency variation, but not necessarily in accordance with the standards established for operation under rated conditions.
The voltage variation may not exceed 10% above or below rating specified on the motor nameplate.

The frequency variation may not exceed 5% above or below motor nameplate.

The sum of the voltage and frequency variations may not exceed 10% above or below motor nameplate rating, provided the frequency variation does not exceed 5%.

Motor Nameplate Amps:                      #1        #2        #3
Motor Nameplate SF Amps:               #1        #2        #3
Voltage Taken @ Terminal Block:  L1 L2 L3

Unusual Noise #1 Pump or Motor:
Comments: ______________________________________
Unusual Noise #2 Pump or Motor:
Comments: ______________________________________
Unusual Noise #3 Pump or Motor:
Comments: ______________________________________
Proper Pump Rotation:
Comments: ______________________________________
Sealed Bearings:
Comments: ______________________________________
Pump Alternator Operation:
Comments: ______________________________________
AMP reading recorded at startup:  #1 #2 #3
Comments:__________________________________________________________________________
Motor Data:  HP RPM Phase Cycle Volt
Comments:__________________________________________________________________________
Pump Design in gallons per minute:  #1 #2 #3
# 1 #2 #3 TDH
Comments:__________________________________________________________________________
Pump performance during startup in gallons per minute: 
#1 _________ #2 _________ #3 _________ 

#1, #2 and 3 _________        TDH _________

Comments:__________________________________________________________________________  
____________________________________________________________________________________  
____________________________________________________________________________________

Hour Meter Readings: #1________________  #2 ________________  #3________________
Comments:__________________________________________________________________________  
____________________________________________________________________________________  
____________________________________________________________________________________

Pump #1 Running Amps:    L1 ____________    L2 ____________ L3 _______________
Pump #2 Running Amps:    L1 ____________    L2 ____________ L3 _______________
Pump #3 Running Amps:    L1 ____________    L2 ____________ L3 _______________

Actual Wet Well Pump down and fill levels:

High Water: ________________
Fill Level: ________________
Pump Down: ________________

OPERATION OKAY

Yes    No

Debris in Wet Well:
Comments: ____________________________________________________________

Wet Well Ladder:
Comments: ____________________________________________________________

Infiltration Points:
Comments: ____________________________________________________________

Operation of Wet Well Hatch & Latch:
Comments: ____________________________________________________________

Wet Well Safety Net:
Comments: ____________________________________________________________

Wet Well & Site Cleanliness:
Comments: ____________________________________________________________

Operation of Valve Vault Hatch & Latch:
Comments: ____________________________________________________________

Valve Vault Drain Sump / Cleanliness:
Comments: ____________________________________________________________

2" Wash Down Hydrant and DCVA:

____________  __________
Comments: __________________________________________
Locks: ___________________________  ______  ______
Comments: __________________________________________

Site Lighting: ___________________________  ______  ______
Comments: __________________________________________

Fence and Gate Area: ___________________________  ______  ______
Comments: __________________________________________

Driveway / Access: ___________________________  ______  ______
Comment: __________________________________________

O & M Manuals (3 hard, 2 electronic copies): ___________________________  ______  ______
Comments: __________________________________________

Warranty: ___________________________  ______  ______
Comments: __________________________________________

Other Comments:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Inspectors Signature of Acceptance:

Project Inspector: ___________________________  Date: ______

Shop Operations: ___________________________  Date: ______
5D PRESSURE SEWER (PRESSURE MAIN)

5D.010 General

Low pressure systems, such as STEP or grinder i.e., force mains, may be considered for situations where high ground water table or topography conditions make gravity sewer impractical. Lift station pressure mains will also fall under this design criteria. STEP systems are addressed separately in Section 5E, and are only allowed with approval of the City in extreme cases.

5D.020 Design Standards

The design of any sewer extension/connection shall conform to City standards, Department of Ecology's Criteria of Sewage Works Design, and any applicable standards as set forth herein and in Sections 1.010 and 1.040.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. In addition, main extensions shall be extended to and through the site of the affected property fronting the main.

The system shall be designed at full depth of flow on the basis of an average daily per capita flow as shown on the table in Section 5B.020. A friction factor of 0.013 shall be used for Manning’s “n” value.

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

Privately owned pressure mains shall have a control valve installed on the main at the right of way.

Grinder and/or STEP sewers may be allowed to connect to gravity sewer mains. STEP sewers shall not be allowed to connect to lift station pressure mains.

Pressure sewer pipe shall be even sizes only (ie. 2 in., 4 in., 6 in., etc.) Minimum pressure sewer pipe size for STEP shall be 2 in.- grinder shall be - 1 ¼ in diameter. Sdr 11 polyethelene

Minimum pressure sewer (pressure main) pipe size for lift stations shall be 4 in. diameter.

The applicable General Notes in Section 5B.020 shall be included on any plans dealing with pressure sanitary sewer design.
GENERAL NOTES (PRESSURE SEWER MAIN INSTALLATION)

1. All workmanship and materials shall be in accordance with City of Gig Harbor standards and the most current copy of the *State of Washington Standard Specifications for Road, Bridge and Municipal Construction* (WSDOT). In cases of conflict, the most stringent standard shall apply.

2. All safety standards and requirements shall be complied with as set forth by OSHA, WISHA and Washington State Department of Labor and Industries.

3. All approvals and permits required by the City of Gig Harbor shall be obtained by the contractor prior to the start of construction.

4. If construction is to take place in the County right-of-way, the contractor shall notify the City. The City will obtain all the required approvals and permits and provide a copy to the contractor. The contractor shall reimburse the City for associated permit fees.

5. A pre-construction meeting shall be held with the City of Gig Harbor Construction Inspector prior to the start of construction.

6. The City of Gig Harbor Construction Inspector shall be notified a minimum of 48 hours in advance of a tap connection to an existing main. The inspector shall be present at the time of the tap.

7. Any changes to the design shall first be reviewed and approved by the project engineer and the City of Gig Harbor.

8. The contractor shall be responsible for all traffic control in accordance with the *Manual on Uniform Traffic Control Devices* (MUTCD). Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

9. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate Line at 811 a minimum of 48 hours prior to any excavation.

10. All sewer mains shall be field staked for grades and alignment in accordance with Section 5A.030 of the Development Guidelines.

11. All side sewer locations shall be marked on the face of the curb with an embossed "S" 3 in. high and ¼ in. into concrete.

12. Pipe bedding material for sewer mains shall conform to Section 9-03.9(3) of the *WSDOT Standard Specifications for Road, Bridge, and Municipal Construction*. No “pea” gravel will be allowed.

13. A 3 ft. square x 8 in. thick concrete pad with #4 rebar shall be installed around all valves that are not in a pavement area.
14. Temporary street patching shall be allowed for as approved by the City Engineer. Temporary street patching shall be provided by placement and compaction of 1 in. maximum asphalt concrete cold mix. Contractor shall be responsible for maintenance as required.

15. Erosion control measures shall be taken by the contractor during construction to prevent infiltration of existing and proposed storm drainage facilities and roadways.

16. All buried power for STEP/Grinder systems shall be installed with continuous tracer tape installed 12 in. above the buried power. The marker shall be plastic non-biodegradable, metal core backing marked "power". Tape shall be furnished by contractor.

17. Pressure mains 2 in. diameter shall be Schedule 80 PVC, ASTM D2241, SDR 21 with rubber gasket joints. Gaskets shall comply with ASTM D 1869 (5E.030). Pressure mains over 2 in. diameter shall be PVC C-900. Welded poly (HDPE) pipe shall be high-density ASTM D 3350, SDR 11 socket welded or butt fusion welded. Fittings and valves shall comply with Section 5E.040 of the Development Guidelines.

18. STEP/Grinder service line from main connection to service ball valve shall be 1 ¼ in. or 2 in. diameter schedule 80 PVC. HDPE pipe shall be high-density ASTM D 3350, SDR 11 3408 socket or butt fusion welded.

19. All plastic pipe and services shall be installed with continuous tracer tape installed 12 in. to 18 in. under the proposed finished sub grade. The marker shall be plastic non-biodegradable, metal core or backing marked sewer which can be detected by a standard metal detector. In addition, STEP systems and pressure mains shall be installed with 14-gauge direct bury, USE green coated copper wire wrapped around all plastic pipe, brought up and tied off at valve body. Continuity testing of the wire will be done by the City. Tape shall be Terra Tape "D" or approved equal. The tape and wire shall be furnished by the contractor.

20. All pressure mains shall be hydrostatic tested in conformance with the above-referenced specification for testing water mains. (See note 1) In addition, all pressure mains shall be pigged in the presence of the City Inspector prior to placing the main in service.

21. Prior to backfill, all mains and appurtenances shall be inspected and approved by the City of Gig Harbor Construction Inspector. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor's responsibility to notify the City of Gig Harbor for the required inspections.

5D.030 STEP/Grinder/Lift Station Pressure - Main

A. Material: 2 in. diameter pressure mains shall be schedule 80 pipe with gasket couplings. Glued or solvent weld pipe and fittings will not be allowed. 1 ¼ in. SDR 11 PE pipe may be used for the grinder pump pressure main. Pressure main 4 in. to 12 in. shall be ductile iron AWWA C151 class 52 with ductile iron fittings, PVC C-900 or PVC C-905 with gasket joints. For 14 in. to 24 in. mains, pipe shall be ductile iron AWWA C151 Class 52 with ductile iron fittings and
gasket joints. All ductile iron pipe and fittings shall be epoxy coated on the inside of the pipe. The coating material shall be designed for use with corrosive materials. Pipe material & fittings for pressure mains larger than 24 in. shall be reviewed by the City of Gig Harbor. All pressure mains are to be green in color or wrapped with green sewer ‘polywrap’.

B. Depth: Pressure mains shall have a minimum 36 in. of cover to top of pipe. See Section 5A.020 for sanitary sewer/water main crossing requirements.

C. Lift Station Pressure Main Velocity: The minimum velocity allowed is 2 ft. per second (fps) at average dry weather flow. 2 fps is required to maintain solids in suspension, although 3 fps is desired to scour settled solids. Maximum velocity allowed shall be 8 fps.

5D.035 Connections to Pressure mains.

Connection to existing pressure main shall be done with stainless steel tapping saddle and epoxy coated resilient wedge gate valve. When connecting a STEP or grinder main or service lateral to a lift station pressure main, a check valve shall be installed up stream of the tapping valve at back of ROW. The check valve shall be made accessible for maintenance or replacement. Installation of a manhole/vault with bottom shall be required to facilitate access to the check valve.

5D.045 Valves

All valves up to 2 in. shall be red handle Philmac FIPT x FIPT ball valves with appropriate couplings. All valves 4 in. to 24 in. shall be M&H resilient seat gate valves or approved equal. Gate valves shall be ductile iron and epoxy coated on the inside and outside as specified in 5D.030. All plug valves shall have a 2 in. operating nut. Gate valves 10 in. and larger shall have gear reduction operation. Tapping valves shall be resilient wedge gate valves and be epoxy coated on the inside and outside. All pressure mains are to be green in color or wrapped with green sewer ‘polywrap’.

All valve types 3” and larger used in wastewater application shall be internally coated with a Fusion Bonded Epoxy Coating. The coating shall be a one part heat curable, thermosetting epoxy coating designed for the corrosion protection of metal in a wastewater application. The epoxy is applied to preheated steel as a dry powder which melts and cures to a uniform thickness. Manufacturers: Product shall be: 3M Scotchkote 134 Fusion Bonded Epoxy Coating or approved equal.

A. Pressure main valve spacing:
Valves shall be installed at all locations where the size of the pipe changes. (See also 5D.065 pig port requirements for pipe line size changes and spacing). Three valves shall be installed at each cross and two valves shall be installed at every tee. In no case shall valve spacing exceed 1000 ft. for mains up to 10 ft. Valve spacing shall not exceed 500 ft. for mains over 10 in. At every lift station, a pressure main isolation valve is required within ten ft. of the station.
B. **Air/vacuum release valves:**
Air release valves shall be Crispin Model PVC US10S with \( \frac{1}{4} \) in. operating orifice and operating range of 10 to 100 psi. Air release valves and air/vacuum valves shall be located at the high points of the line. This needs to stay. Air release valves shall be fitted with an activated carbon canister to absorb compounds with disagreeable odors prior to releasing the air to the surrounding area. Grades shall be designed to minimize the need for air/vacuum valves when practical. Vehicular access to valve is required for maintenance. See detail 5-5.

C. **Pressure sustaining valve assembly:**
Pressure sustaining valves are sometimes required in the design of STEP systems to keep the pipeline full during periods of low or no flow or when siphoning conditions exist. Pressure sustaining valve and assembly shall be reviewed by the City of Gig Harbor prior to approval.

### 5D.055 Fittings

All pipe fittings shall have a minimum working pressure rating equal to the pipe with which they are connected.

### 5D.060 Pressure Main Low Point Drain

Provisions to drain a pressure main to facilitate repairs or to temporarily remove pressure main from service shall be provided. This may be accomplished through the use of a valved tee connected to a drain line at the low point of the line. See detail 5-27.

### 5D.065 STEP/Grinder Pressure Main Pigging Ports

A pipeline pig is a projectile that is forced through the inside of a pipe to clean pressure pipelines. A pigging port is used as a point to send or retrieve the pig. Pigging ports shall be required:

1. At every change in pipeline size.
2. At the end of every dead end line.
3. At the connection point to the main when the main being constructed will be a secondary main.
4. Location and number of pigging ports required are subject to review and approval by the City of Gig Harbor. See details 5-18, 5-19.

### 5D.070 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class B poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.
See standard detail number 4-17 and 4-18 in water Section. Designed and approved restraining joint systems may be allowed in lieu of thrust blocking. Restraining joint brand, type and size shall be specified on the plans.

5D.080 Pressure Main Termination

Sewer odors and gases, hydrogen sulfide odors (H2S), and the buildup of sulfuric acid (H2SO4) occur in the operation of a pressure – main and/or STEP/grinder system. To mitigate these conditions, some type of control method(s) shall be used. This may include chemical addition at the pump station and/or the reaeration of the waste water at or near the terminus. Reaeration may include the following:

1. Construction of a vault housing and aspiration assembly.
2. The use of hydraulic fall (vertical siphon) within the terminal manhole.
3. High velocity discharge with smooth transition so as to not cause splashing of force main into the downstream gravity sewer.

These methods would all require an adequate source of fresh air at the vault or manhole. Odor and corrosion control measures shall be addressed on pressure sewer systems connecting to a gravity sewer system. All continued odor and corrosion costs shall be paid by the developer.

A determination of need for odor and corrosion prevention shall be prepared and stamped by a professional engineer licensed in the State of Washington. The report, along with said engineer’s history of odor control experience and references, shall be submitted during design phase for review by the City of Gig Harbor. As a minimum, the odor control system shall be designed and installed according to current method of City of Gig Harbor odor control treatment. If required, an odor control facility shall be installed in order to inject a treatment product into the system so that both odor and corrosion issues generated by the system are addressed. The pressure main shall be sized to provide adequate contact time for treatment to be effective. All manholes within 400 ft. downstream of the outfall manhole and including the outfall manhole shall be entirely coated from the top grade ring to the channel flow line with Spectra Shield. The coating shall be applied under direction of the product representative, by a factory trained/certified applicator of the product. If new gravity manholes are to be installed at the terminus, all of the new manholes shall be coated as well. The pressure main discharge shall be made with a smooth transition of flow into the existing flow so as to not cause splashing of the effluent at the discharge.

The developer shall provide the City with a signed maintenance contract showing continued odor control treatment will be provided.

5E STEP ONSITE SYSTEM:

5E.010 General

A Septic Tank Effluent Pump (STEP) system may only be installed in accordance with the existing sewer agreements outlined in Chapter 1 of the City of Gig Harbor Wastewater Comprehensive Plan.
A STEP system is a facility consisting of a tank or tanks for settling and digesting wastewater solids, and a pressure piping system for conveying the supernatant liquid into the sewer system.

STEP pump systems shall be designed and installed as a single family system.

Only sanitary wastewater shall be discharged into the tank. Roof drains and other storm water sources shall be strictly excluded.

Power for the single family system shall be provided by the customer.

All Grinder systems shall be owned and maintained by the customer.

5E.020 Design Standards

The design of any STEP sewer system shall conform to City standards and any applicable standards as set forth herein and in Sections 1.010 and 1.040.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. In addition, main extension shall be extended to and through the side of the affected property fronting the main. Individual STEP service boxes shall be located at the corner of the lot opposite the water meter. STEP service boxes shall not be installed in driveways. The location of these boxes should be coordinated with Peninsula Light Company so the STEP services can be located on the same corner of the lot as the power drops.

Odor control measures shall be addressed on STEP/Grinder sewer systems connecting to a gravity sewer. An odor control facility shall be installed in order to inject a treatment product into the system so that both odor and corrosion issues generated by the system are addressed. Odor control system shall be designed according to current method of City of Gig Harbor odor control treatment. The STEP/Grinder system main shall be sized to provide adequate contact time for treatment to be effective. An adequately sized space shall be provided and an easement granted to the City of Gig Harbor for the installation of the odor control facility.

The standards outlined in Section 5D “Pressure Sewer” of this manual shall be used for the design and construction of STEP/Grinder pressure mains.

Pump, pipeline, and appurtenant component sizing shall conform to the criteria as set forth in the Gig Harbor "Comprehensive Sanitary Sewer Plan". The applicable General Notes in Section 5B.020 shall be included on any plans dealing with pressure sanitary sewer design.

The standards outlined in Section 5D.080 “Pressure Main Termination” shall be used for STEP main termination.
5E.030 Concrete STEP / Septic Tanks

Tanks shall be rectangular, pre-cast concrete, dual chamber, and shall have been designed by a registered structural engineer. The chambers shall be divided in such a way that 1/3 of the tank capacity is designed as the pumping chamber and 2/3 of the tank capacity is designed as the settling chamber. All tanks shall be manufactured for acceptance of pump assemblies and effluent filters. Tanks shall use Orenco flanged tank adapters cast into the concrete for the 24 in. and 30 in. openings to allow positive attachment of the risers. The interior shall be coated after installation with an approved coating. The exterior shall be coated with a coal tar epoxy. The manufacturer shall provide the structural design and certification to the City for review. The design or analysis shall be in accordance with accepted engineering practice. Tanks 1.5 ft. to 4 ft. in depth shall be designed for the following loading conditions:

Loading Criteria

A. Top of tank 400 pounds per square ft.

B. Lateral load of 62.4 pounds per square ft. (62.4 pcf equivalent fluid).

C. The tank shall be designed to support a 2,500 pound wheel load with minimum allowable earth cover.

D. The tank shall be designed to withstand hydrostatic loading equal to the maximum depth of bury, in addition to the soil loading. Maximum depth of bury shall be measured from the ground elevation to the invert of the sewer line entering the tank.

Deeper installations, if required by local conditions, will require special consideration, as will tanks located where a vehicle might be driven over them. Tanks approved as traffic bearing tanks shall be designed to withstand an H-20 live load with a minimum soil cover of 18 in. Load rating of tank shall be clearly stamped in lid and side of tank. A specific design done by a structural engineer needs to be submitted to verify that the tank specified is designed for the depth and loading to be incurred.

All tanks shall be guaranteed in writing by the tank manufacturer for a period of five years from the date of delivery to the project. Manufacturer's signed guarantee shall accompany delivery.

Systems installed on a site where an existing septic tank exists may not use the existing tank. The existing tank must be removed or abandoned per DOH and/or county requirements.

Concrete material and construction shall meet the requirements of Section 6-02 of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, most current edition.

The concrete mix shall not be modified unless the mix design is reviewed and approved by the City.
Walls, bottom and top of reinforced-concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically-constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.

The walls and bottom slab shall be poured monolithically. Concrete shall achieve a minimum compressive strength of 4000 psi in 28 days. Date of manufacture shall be clearly stamped in lid and side of tank.

Reinforcing steel shall be ASTM A-615, Grade 60, fy = 60,000 psi. Details and placement shall be in accordance with ACI 315 and ACI 318.

Modification of completed or existing tanks will not be permitted for structural, warranty, and liability reasons. In order to demonstrate water tightness, tanks shall be tested prior to acceptance. Each tank shall be tested at the factory, by filling with water to the base of the riser and letting stand. After 24 hours, the tank shall be refilled to the soffit and the ex-filtration rate shall be determined by measuring the water loss during the next two hours. The two-hour water loss shall not exceed one gallon.

Tanks shall not be moved from the manufacturer’s site to the job site until the tank has cured for at least seven days and has reached two-thirds of the design strength.

Tanks shall be bedded on 6 5/8 in. crushed rock (CSTC). Backfill material shall be sand to within 12 in. of the finished grade. Sides shall be compacted in 2 ft. lifts to the same or greater density than the surrounding area.

After the tanks have been set in place and the riser installed, but prior to back filling, and after coatings have been applied, each tank shall be tested by filling the tank riser with water to the top or to a level that equals 3 psi against the tank to riser seal for a two-hour period. Water loss during the test shall not exceed 1 gallon. Electrical “J” box shall not be submerged during the test.

Tanks, installed where groundwater levels are above tank bottom, require precautions to prevent flotation. In general, tanks shall immediately be filled with water, after coating, and shall not be pumped down more than 3 ft. below top of tank.

Finish grading, cleanup, and restoration shall be completed prior to final acceptance by the City.

Fiberglass tanks will not be allowed.

5E.040 Service Lateral Pipe and Building Sewer

A. Service line: See City of Gig Harbor STEP System Requirement Chart for pipe size. Pipe shall be schedule 80 PVC water pipe, solvent weld joint located at 90 degrees to the mainline when possible. Solvent cements and primer for joining
PVC pipe and fittings shall comply with ASTM D 2564 and shall be used as recommended by the pipe and fitting manufacturers. Poly pipe shall be high-density ASTM D 3350, SDR 11 3408 socket or butt fusion welded. Services shall have a minimum 24 in. cover to top of pipe. Pressure services must cross under any water line. See Section 4.130 for water and sewer separation requirements.

B. Building Sewer: The gravity building sewer pipe between the building and the tank for a single family system shall be designed and installed in accordance with the Uniform Plumbing Code as adopted in GHMC Chapter 15. A clean out shall be installed on the gravity building sewer, located between the structure and the tank, raised to grade and installed per plumbing code.

C. All pipe shall be installed with continuous tracer tape installed 12 in. to 18 in. under the proposed finished grade. The marker tape shall be plastic, non-biodegradable, with a metal core or backing which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge, green coated copper wire, wrapped around the pipe, brought up and tied off at the valve boxes.

D. Bedding:

1. Bedding shall be crushed material meeting the requirements of Section 9-03 of the WSDOT Standard Specifications latest edition.

2. Bedding shall be installed as shown on the construction details. No pea gravel shall be used.

5E.050 Fittings

Solvent weld fittings for one inch through two inches of pipe shall be socket type Schedule 80 and shall comply with ASTM D 1584 and ASTM D 2466. Poly fittings shall be electro fusion welded high density ASTM D 3350 socket or butt fusion welded and of the same pressure rating and classification as the pipe.

5E.060 Service Lateral Valves

A. All service valves shall be 1 ¼ in. or 2 in. Philmac FIPT x FIPT ball valves. Valves shall be left "off" and have a threaded plug installed in the end until the lot is connected.

B. Check Valves: Check valves used on service lines shall be a tee or wye pattern swing check PVC. Valves shall have a working pressure of 150 psi. Valves shall be designed for use with corrosive fluids. A check valve shall be installed at the end of the service stub out at the property line to be installed in a valve box. Check valves shall be King Brothers, KSC or approved equal. The check valve shall be mounted horizontally and be visible in the valve box along with the ball valve. Check valve shall not be buried.

C. Service valve box lids. Valve box lids shall be specified to be marked "SEWER" so they can quickly be distinguished from valves in the water system.
D. Service Valve Boxes:

Earth Bury:
- Carson 1419E. For single service.
- Carson 1324E. For large or community type service.

Traffic Areas:
- Midstates Plastics BCF 1419SL. For single family service.
- Midstates Plastics BCF 1324SL for large or community type service.

5E.070 Tank Risers and Lids

A. Tank chamber risers shall be 8, 24, 30 or 48 in. diameter, fiberglass ribbed or PVC as manufactured by Orenco Systems, INC., 2826 Colonial Road, Roseburg, Oregon 95450 or approved equal. Solids compartment risers shall be 24 in. diameter. Clean out risers between compartments on 1,500 and 3,000 tanks shall be 8 in. diameter. Pump chamber risers shall be 30 in. diameter. 3,000 and 1,500 gallon tank riser height shall not exceed 48 in. from top of tank to finished grade. All tank riser lids shall be set to grade for maintenance access.

1. Primary tanks shall have 24 in. risers evenly spaced along tank length to facilitate pumping. Spacing of risers shall not exceed 10 ft. to center of risers. No shrubs, bushes, ground cover or trees shall be planted within a 3 ft. radius of the tank lids. All tank riser lids shall be set to grade for maintenance access.

   Pump chamber risers shall be factory equipped with the following:

B. Appropriately sized (IPS) neoprene grommets shall be installed no less than 8 in. from the top of the riser and no more than 12 in. from the top of the riser around the pump discharge pipe(s) and electrical splice box conduits where they exit the riser and create a seal to prevent the infiltration of ground water into the tank.

C. Single family tank splice box shall be Orenco Model SB4.

D. Motor leads shall exit riser and be housed in a standard concrete electrical junction box. There shall be a slack loop in the junction box along with Erickson union and seal off. Motor leads shall be continuous from motors to electrical cabinet without splices.

A lid shall be furnished with each riser. It shall be latching and constructed of fiberglass with an aggregate finish. Riser and lid combination shall be able to support a 2500 pound wheel load. This does not imply that PVC risers are intended for traffic areas.

Each riser shall be bonded to the top of the concrete tank with a two-part epoxy that shall be supplied with the riser by the manufacturer. The epoxy shall be applied in accordance with the manufacturer's recommendations. A generous bead of epoxy shall be laid completely around the bottom of the riser prior to
mounting the riser on the top of the tank. After the riser is in place, a generous fillet shall be run completely around the inside base. The epoxy shall be allowed 4-hours curing time at 64 degrees Fahrenheit; otherwise a greater time shall be allowed based on the manufacturer's recommendations before backfill is placed over tank. Care shall be exercised during the curing period to avoid dislodging the riser or disrupting the water-tight seal between the riser and tank.

5E.080 Pumping Tank Equipment

Pumps shall be UL listed for use in effluent. All pumping systems shall be Orenco Systems Model OSI S 4000 Series High Head Pumping Assemblies or approved equal. See City of Gig Harbor STEP System Requirement Chart and details. All pumping systems shall be installed in accordance with the manufacturer's recommendations.

5E.090 Control Panel Power

See Detail 5-17 for single family control panel and Section 5E.095.

All buried power shall be installed with continuous tracer tape installed 6 in. above the buried power. The marker tape(s) shall be plastic non-biodegradable and be labeled with the appropriate marking.

Wiring from the pump control panel to the splice box in the wet well riser shall be a minimum #14 stranded wire and colored insulation matching the manufacturer's diagram. Connections in the riser junction box shall be installed as per the manufacturer's specification. A good quality heat shrink shall be used on all leads. Splices shall be capable of lifting out of the junction box a minimum of 6 in. The motor and control circuits will be merged as part of the inspection procedure and shall be no less than 50 mega ohms before acceptance by the City.

5E.095 Control Panels

A. Control panels for single family dwellings shall be Orenco Systems Model #ORS1DS, City of Gig Harbor Control Panel or City approved equal. Control panel boxes shall not be painted. The control panel and riser junction box shall be dry and clean before acceptance. The control panel shall be furnished with the following features:

1. Rating: 1 HP/115 VAC, 2 HP/230 VAC, single phase, 60 Hz. Motor start contact shall be rated for 25 FLA (full load amps), single phase, 60 Hz

2. Audible alarm, panel mount with a minimum of 80 dB sound pressure at 24 in. continuous sound

3. Oil-tight visual alarm, red lens, with push-to-silence feature

4. Automatic audio-alarm reset
5. 15 amp motor rated toggle switch, single-pole, double-throw with three
positions: manual (MAN), automatic (AUTO) and center (OFF)

6. NEMA 4X-rated fiberglass enclosure with gasketed, hinged cover, and
locking latch. Padlock will be installed by City at time of City's acceptance
of the completed installation and shall signify final acceptance.

7. Alarm circuit shall be wired separately from the pump, so that if the
internal pump overload switch is tripped, the alarm will still function.

8. 20-amp power disconnect assembly toggle switch to de-energize entire
control panel, to permit servicing panel without access to the customer's
breaker switches.

9. All wiring systems shall be installed in accordance with the National
Electrical Code (NEC) and City of Gig Harbor specifications and the
manufacturer’s specifications. In cases of conflict the most stringent
standard shall apply.

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CHAPTER 5 SEWER

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Appendix A
Wastewater Pump Specifications

SUBMERSIBLE SEWAGE PUMP SPECIFICATIONS

1. Pump Case: Cast iron, ASTM A48, class 35B
2. Motor Housing: Cast iron, ASTM A48, class 35B
3. Impeller: Cast iron, ASTM A48, class 35B
4. Intermediate Housing (backplate): cast iron, ASTM A48, class 35B
5. Discharge Base Elbow: Cast iron, ASTM A48, class 35B
6. Pump/Motor Shaft: Entire shaft is to be ASTM A276 type 420 stainless steel
7. Wear Ring, case: Cast iron, ASTM A48, minimum 200 Brinell
8. Wear Ring, impeller (enclosed impellers only): Stainless steel, AISI329, 350 Brinnel
9. O-Rings: Nitrile rubber (NBR)
11. Lower Seal Faces: Silicon Carbide/Silicon Carbide
12. Upper Seal Faces: Silicon carbide stationary/carbon rotating
14. Lifting Chain or Cable: Stainless steel, ASTM A276 type 316
15. Oil-all uses ecologically safe, paraffin or mineral base
16. Power/Control Cable Jacket: Chloroprene with non-wicking fillers

Major pump components shall be of gray cast iron, ASTM A-48, class 35B with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be ANSI Type 316 stainless steel construction. All metal surfaces coming into contact with sewage, other than stainless steel, shall be protected by a factory applied spray coating of high solids two component thick coat paint with an epoxy resin base, free of any chips, cracks, voids or imperfections. This coating shall be non-toxic and be approved for water and wastewater applications.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with nitrile or Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

Motor

Provide a motor which is squirrel cage, induction in design, housed in a completely watertight and air filled chamber - with a min 1.15 service factor. Insulate the motor stator with, at minimum, Class F insulation rated for 311 degrees F. Provide temperature protection and seal leak detection as described in Section 2.3. Provide adequately rated motor with sufficient surface area for ambient only cooling without the need for oil circulation systems or submergence (cooling) jackets which circulate pumped media for motor cooling. If cooling jackets are provided, they must be designed to pass 3 in. wastewater solids (or to filter out all solids) while maintaining a minimum 2 ft. per second non-settling velocity of coolant at all anticipated pump operating speeds. Provide motors which are capable of operating for unlimited periods of time in a dry mode without damage to motor or seals (motors rated for “short duty in air” or “15 minutes in air” will not be acceptable). Provide motors which are designed, rated and warranted for continuous operation. Do not provide motors which contain in excess of two gallons of oil (combined total for cooling and seals) or which contain other than ecologically safe paraffin base or mineral base oil. Provide motors which are FM listed for use in Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code

A performance chart shall be provided showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.
Power Cable
Provide ample power/control cable with each pump to remove without disconnecting, suitable for submersible wastewater application, sized in accordance with NEC requirements. Provide cable terminal box on side of motor housing, with cable entry sealed to insure that no entry of moisture is possible into the high-voltage motor/terminal area even if the cable is damaged or severed below water level. The cable seal shall include a compressed rubber grommet to seal the cable exterior and epoxy fill to seal the interior passages. A strain relief device, in direct contact with both the cable and the cast iron entry housing, shall be provided. The cable entry shall be rated by Factory Mutual (or UL) for submerged operating depths to 85 ft.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

Bearings
Furnish upper and lower bearings, single row (preferred) or double row as needed to provide a B10 life of, at minimum, 100,000 hours at all anticipated axial and radial loadings. Provide sealed/shielded (permanently lubricated) bearings.

Mechanical
Shaft Seal
Provide two totally independent mechanical shaft seals, installed in tandem, each with its own independent single spring system acting in a common direction. Install the upper seal in an oil-filled chamber with drain and an inspection plug (with positive anti-leak seal) for easy external access to the pump. Provide seals requiring neither routine maintenance nor adjustment, but capable of being easily inspected and replaced. Provide seals which are non-proprietary in design, with replacements available from a source other than the pump manufacturer or its distributors.

Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; seals incorporating coolant circulating impellers, seals with face materials other than those specified.

Cartridge type systems shall be acceptable. No system requiring a pressure differential to offset pressure and to effect sealing shall be used. Proprietary seals shall not be allowed.

Pump Shaft
Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable.

Impeller
The impeller(s) shall be of gray cast iron, class 35B, dynamically balanced, semi-open, non-clogging design capable of handling soils, fibrous materials, heavy sludge and other matter found in wastewater. The impeller(s) shall have a back shroud only with back pump-out vanes to equalize axial thrust, and curved blades which protrude into the pump casing for maximum efficiency. The impeller will create a vortex which carries solids through the pump casing without passing through the blades. Impeller(s) shall be capable of passing a minimum 3 in. diameter solid. Specific impeller configuration may be required by the City depending on specific material within the pumped wastewater. Mass moment of inertia calculations shall be provided by the pump manufacturer upon request. The impellers shall be keyed to the shaft, retained with an allen head bolt.

Wear Rings
A wear ring system shall be used to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be equipped with a replaceable wear ring insert fitted to the volute inlet see “Materials” Section above for proper material and hardness.

MAJOR COMPONENTS
Furnish major components (pump case, impeller, intermediate housing, motor housing) of cast material as specified with smooth surfaces devoid of blow holes and other irregularities. Pump case design shall incorporate a centerline discharge for stability when mounted on the base elbow.

TEMPERATURE PROTECTION
Furnish temperature monitoring devices in motor windings for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Set temperature monitors at levels recommended by pump manufacturer

SEAL LEAK DETECTION
Provide a detector in the motor’s stator cavity which allows a control panel mounted relay to indicate leakage into the motor. In addition, on motors 80HP and larger provide a stainless steel float switch in a separate leakage collection chamber to indicate leakage past the inner mechanical seal prior to its entrance into either the motor stator cavity or the lower bearing. Electronic probes which depend on sensing resistance value changes in seal oil will not be acceptable as seal leak indicators.

**MOTOR SENSOR MONITORING RELAY**

The pump supplier shall furnish all relays required for monitoring all motor sensors. The relays shall be installed by others in the motor control panel and properly wired in accordance with pump manufacturer’s instructions. Relays shall mount in standard 12-pin socket bases (provided) and shall operate on available control voltage of 24-240 VAC. If relays require an input voltage that is not available in the motor control panel an adequate transformer (with fused input) shall be provided by the pump supplier. Relays shall have a power consumption of no more than 2.8 watt and shall be UL approved. Relays shall be modular in design, with each relay monitoring no more than two motor sensor functions. Each relay module shall include a dual color (red/green) LED to indicate the status of each monitored sensor. Green will indicate “status OK”; red will indicate a failure or an alarm condition. A self-corrected fault will allow the relay output contacts to reset, and cause the LED to change from a steady alarm indication to a flashing signal. The LED shall continue to flash until locally cleared, providing the operator an indication of a potential intermittent fault. Each relay shall also include a power-on LED and both “test” and “reset” push buttons.

An independent fail-safe (switch on power loss) form-C output contact shall be included for each monitored sensor to provide a normally-open and normally-closed dry contact to initiate a remote alarm device or shut down the motor. Contacts shall be rated for 5 amps at 120 volt.

**Miscellaneous**

The pump guide rails shall be 2-in. diameter minimum, 316 stainless steel pipe.
All brackets and mounting hardware shall be 316 stainless steel construction.
Each pump shall be fitted with a 316 stainless lifting bracket large enough to be easily attached to with a crane lifting hook without manned entry into the wet well. Attach stainless steel lifting chains.
The following spare parts shall be provided:
One set mechanical seals
One set O-rings
One set wear rings
SCREW CENTRIFUGAL PUMP SPECIFICATIONS

PART 1 GENERAL
There shall be supplied, as shown by the plans, dry or wet pit screw centrifugal pumps - specifically designed to pump raw, unscreened sewage, bio solids, or other media containing solids and/or rags and other fibrous materials without clogging.

QUALITY ASSURANCE
All pumping systems furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the owner that the quality is equal to systems made by that manufacturer specifically named herein. Manufacturers shall provide evidence of at least five installations in which similarly sized systems have provided satisfactory performance for a minimum of five years in a similar application.
To insure a consistent high standard of quality, the manufacturer of this pumping system shall comply with the requirements of the ISO 9001 Quality System and such compliance shall be verified by an independent certification agency approved by the International Organization for Standardization.
Documentation shall be submitted for approval showing compliance with this requirement, and the pumping system will not be released for shipment until approved.
Unit responsibility. Screw centrifugal pump, complete with immersible motor, fast-out and lifting cable or pump base and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
The screw centrifugal pumps specified in this Section shall be furnished by and be the product of one manufacturer.

SUBMITTALS
Submit shop drawings and product data.
Submit manufacturer’s installation instructions.
Submit data shall be prepared, in its entirety, by the equipment manufacturer. Shop drawings prepared by the manufacturer’s sales representative, fabrication shop, or other than the listed manufacturer shall not be acceptable. No additions or modifications to the manufacturer’s submittal shall be accepted, with the sole exception of a cover letter provided by the manufacturer’s local representative.

OPERATION AND MAINTENANCE DATA
Submit operation and maintenance data Include maintenance instructions, assembly views, lubrication instructions and replacement parts lists.

DELIVERY, STORAGE AND HANDLING
Deliver, store, handle and protect under provisions of section

SERVICES OF MANUFACTURER
Furnish the services of a representative of the manufacturer to assist in adjusting and testing the equipment furnished, to supervise in the initial operation, and to make any final adjustments as may be necessary to assure the owner that the pump(s) are in satisfactory operating condition.
Furnish sufficient supervision, data, and information from the manufacturer to train operators in the proper operation and maintenance of the pump(s) furnished.

PART 2 PRODUCTS

PERFORMANCE
The pumps shall be designed for continuous operation and will be operated continuously under normal service. To minimize operational power costs, the hydraulic efficiencies listed for each pump are the minimum acceptable and must be guaranteed by the manufacturer.

B. OPERATION CRITERIA

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</table>
C. PUMP CRITERIA
   1. Minimum suction diameter __________
   2. Minimum discharge diameter __________
   3. Minimum non-compressible solids passage __________
   4. Minimum B-10 bearing life __________

D. PRODUCT DESIGN
The basic design shall be a single-passage, clog-free pump, utilizing a screw-centrifugal impeller. The overall pump design shall combine high efficiency, low required NPSH, a large solid passage and the ability to handle rags or other fibrous material without plugging.

1. The hydraulic design of the impeller shall combine the action of a positive displacement screw with the action of a single-vane centrifugal impeller to provide a single, non-bifurcated flow stream with only gradual changes in flow direction.
   The leading edge of the impeller vane shall blend into the impeller body in such a way that any rag or other fibrous material caught on the leading edge and folded over both sides of the vane will be unfolded and released as the textile follows the flow stream through the pump.
   The impeller flange or impeller shall contain a spiral groove on the rear face so that any solids in the pumped media are discharged from the space between the backplate and the rear of the impeller.
2. In order to maintain optimum running clearances along the entire length of the impeller, to maintain design hydraulic efficiencies, the geometry of the impeller and suction piece shall be conical, so any axial adjustment of the impeller will cause the clearance between the impeller and suction piece to change uniformly along the entire length of the impeller. Designs incorporating curved, or combination curved/conical impeller and suction piece are not acceptable as in such designs, clearances cannot be adjusted uniformly over the full length of the impeller.
3. Suction and discharge flanges shall be drilled to meet ANSI 125 lb. bolting.

MATERIALS OF CONSTRUCTION
   Abrasion-Resistant Construction
The pump volute, backplate and suction piece housing shall be of close-grained cast iron, ASTM A 48-CL30.
The impeller shall be of 450 Brinell hardness hi-chrome Iron, ASTM A 532-CL.III Type A1.
Liner - The suction shall have an independently replaceable suction liner of minimum 450 Brinell hi-chrome Iron, ASTM A 532-CL.III type A1 and shall be externally adjustable by means of three stainless steel regulating screws (except D3K and D4K, which shall be adjustable by shims). Each adjusting screw shall incorporate a mechanism for positively advancing, positively retracting, and positively locking the position of the suction liner, so that the necessary running clearances between the liner and impeller can be maintained without disassembly of the pump and/or piping.

IMMERSIBLE MOTOR
   Design
Motors shall be of the explosion-proof design, approved by Factory Mutual for uses in class I, groups C&D and hazardous locations.
The motors shall be of the immersible type, suitable for full-load, continuous operation either completely dry or fully submerged in the pumped liquid of up to 65 ft. depths. Motors shall be of the "air-filled" type, to optimize efficiency, with stator and rotor housed in a watertight chamber containing only air. Motors of the "oil-filled" type with stator and rotor immersed in oil or motors which circulate the pumped media through internal cooling media channels, ports, or jackets are not acceptable.
Motors shall incorporate a separate heat-exchanger circuit, with a shaft-mounted cooling pump circulating oil from a jacket surrounding the stator housing to a heat-exchanger surface cast into the pump backplate. The circulating oil shall transfer excess motor heat directly to the pumped media inside the pump volute, without the need of submergence for adequate motor cooling at any continuous power output up to and including rated powers in ambient of 40 degrees Celsius. Alternately, motors shall dissipate heat directly (by convection) from the exposed stator housing to surrounding ambient air, without the need of submergence for adequate motor cooling at any continuous power output up to and including rated power in ambient of 40 degrees Celsius.
Motor stator windings and leads shall be Class H wire, insulated with moisture-resistant Class F insulation for operation at temperatures up to 155 degrees Celsius.

Motors shall have the stator varnish applied by the "vacuum-pressure impregnation" method to ensure thorough and complete varnish penetration. The stator shall be heat-shrink fitted into the stator housing. Motor cable-entry sealing assembly shall consist of the following five components to ensure a positive, redundantly watertight seal:

- The sealing components shall be mechanically isolated from cable strains by a two-piece restraining clamp, which will securely grip the cable above the moisture-sealing components and bear any mechanical forces applied to the cable.
- The cable moisture seal shall consist of an elastomer grommet, prevented from extruding past the cable by stainless-steel retaining washers on either side. The grommet shall be compressed tightly against the cable outside diameter (and the entry assembly inner diameter) by a screwed follower gland. Each individual conductor shall be interrupted by a solid-copper isolation dam to prevent wicking of moisture through the conductor strands.
- The cable insulation shall be sealed by an epoxy poured into the cable entry and totally encapsulating the stripped-back insulation and the individual copper dams. This poured epoxy seal shall also function as a redundant seal for the cable outside diameter.
- The cable-free end shall be sealed from moisture-entry during shipping, storage and prior to connection to the control panel by a plastic sleeve securely clamped over the cable end.
- Motors which use only a compress-grommet gland or only a poured epoxy seal, without benefit of redundancy of both types together, are not equal or acceptable.

Shaft sealing shall be by independently-mounted, tandem mechanical seals contained in an oil chamber that is formed as an intrinsic part of the motor frame and allows the seals to be completely submerged in and lubricated by the oil bath.

The mechanical seal nearest the bearing shall utilize carbon/ceramic faces, and shall isolate the seal cooling oil from the motor frame.

The mechanical seal nearest the impeller shall be a stainless steel or rubber bellows-type construction firmly attached to the rotating face and clamped to the shaft, to prevent contaminants from contacting the stainless-steel spring which loads the seal face. The seal faces shall be a solid tungsten-carbide rotating face running against a solid silicon-carbide stationary face. Seals with both faces of similar materials or seals with bonded, soldered, or converted face surfaces are not equal or acceptable.

The mechanical seal nearest the impeller shall be contained in a seal chamber formed by the impeller flange and a recess cast into the motor frame. To prevent debris from entering the chamber and to prolong the mechanical seal life, a flush port shall be provided so that an optional external water flush can be supplied directly into the seal channel.

The mechanical seal nearest the impeller shall be isolated from contaminants in the pumped media by a labyrinth-fit between the backside of the impeller and the backplate, as well as by pump-out grooves cast into the impeller back shroud and into the backplate, to minimize debris reaching the shaft seal.

Both inner and outer seals shall be dimensionally interchangeable with standard off-the-shelf, in.-size, john crane mechanical seals, or equal, to allow second-source availability of seals from local distributors for emergency repairs.

The thrust bearings shall be designed to take the full axial load of the impeller.

Motors shall be submersible, 3 phase, 60 cycle, with HP, RPM and volts to meet design criteria.

Protection devices. The motor shall be provided with the following protection devices:
- Two normally closed thermal sensors embedded in the stator windings, wired in series, will open a protective circuit if winding temperature exceeds rated operating temperature. These sensors automatically reset when winding temperature has cooled to a safe operating temperature.
- A conductivity probe to monitor the moisture content of the oil in the chamber between the outer and the inner mechanical seals. The probe shall be wired to a separate protective circuit, which, when connected to a conductivity-sensitive relay in the control panel, will trip an alarm if moisture content of the oil indicates a failure of the outer mechanical seal.

B. Mounting

Fast Out System. The manufacturer shall provide a cast fast-out fixture which shall be permanently mounted in the wet well as shown by the plans.

The fixture shall cantilever the entire pump and motor from the volute discharge flange, providing an unobstructed sump floor under the pump.
b) The fixtures shall include a 90 degree elbow to connect to vertical piping, and shall provide mounts for two-316 stainless steel rails of standard schedule pipe, which will guide the pump into position.

c) The pump shall be supported by a positive metal-to-metal interlocking flange, which is additionally sealed by a leak-proof nitrile rubber ring pressed against the fixture flange by the weight of the pump.

Wet Well, Valve Vault, Piping, Fittings and Valves:
The wet well shall be a pre-cast manhole meeting the requirements of ASTM C 458 with a flat top cover and aluminum access hatch designed for H-20 loading. Wet well shall be a minimum of six ft. in diameter. A larger diameter wet well may be required upon review by the City. If wet well is too large to be of pre-cast type, a cast in place or sunken cession may be required.
The wet well shall be designed for the soil conditions on the site including soil bearing conditions and ground water levels. Ladder rungs shall not extend below the high-water level line.
The valve vault shall be a pre-cast utility vault as manufactured by Utility Vault, Inc. Provide solid walls without knockouts, but with pre-cut holes for pipe penetrations. All pipes shall be grouted in place with non-shrink grout. Vault shall have a floor with drain sump and drain line back to wet well with an inline check valve and inline trap to prevent odors from entering the vault.
The access hatches shall be hinged, spring-assisted hatches designed for H-20 loading. The hatch for the pump station shall be the size recommended by the pump manufacturer but shall be no less than 2-36 in. x 36 in. minimum clear inside opening. The hatches for both the wet well and valve vault shall be by the same manufacturer and shall be Halliday products or approved equal. The access hatch shall include a written manufacturer’s guarantee to seal out all offensive odors completely.
The inside of the wet well shall be coated completely to prevent corrosion.

Wet Well Coating:
The wet well coating material shall be Spectra Shield or approved equal.
The product shall be installed in accordance with the manufacturer’s instructions by a factory certified applicator.
The wet well shall be thoroughly pressure washed using a minimum of 5,000 psi in preparation for the application to remove any dirt, debris or loose material.
The sprayed-on material shall be applied completely and uniformly to cover the wet well concrete floor, walls and underside of lid, a minimum of 0.40 in. in thickness. Finished surface shall be free of imperfections.
All manhole joints and pipe penetrations shall be watertight to prevent infiltration or exfiltration of the wet well prior to application of the product.
Any drilling, cutting or fabricating done in the wet well that breaks or disturbs the newly applied coating shall be repaired with the same Spectra Shield coating in accordance with the manufacturer’s instructions.
All piping and fittings in the wet well and valve pit and between the two units shall be ductile iron, class 52 and shall be 401 ceramic lined to a minimum of 40 mils. or be constructed of 316 stainless steel.
The isolation valves in the vault shall be epoxy coated M&H Series valves or approved equal, meeting the requirements of AWWA C 509. Valves larger than 6 in. shall have gear reduction operation with hand wheels. 4 in. and 6 in. valves shall have hand wheel operator.
The check valves shall be epoxy or P.E. lined and coated clow F 5381 equipped with outside spring and levers or approved equal.
The by-pass emergency pumping connections shall be equipped with 6-in. PT coupling aluminum, female, Cam lock fittings or approved equal. A 6 in/ Cam lock plug shall be installed in each fitting.
AUXILLARY SCREW PUMPING UNIT SPECIFICATIONS

EQUIPMENT AND COMPONENT NAME(S) AND NUMBER(S)

PART 1 GENERAL

1.1 WORK OF THIS SECTION

A. Work: The work necessary to furnish a complete portable pumping unit including screw centrifugal pump, diesel engine, vacuum assisted dry priming system, controls, noise enclosure and associated accessories and appurtenances.

B. Unit Responsibility: The work requires that the centrifugal screw portable pumping complete with all accessories and appurtenances (including, but not necessarily limited to, diesel engine, starter, control panel, hoses, priming system, trailer, and noise enclosure be the end product of the supplier. The supplier shall furnish all components and accessories of the system to enhance compatibility, ease of operation and maintenance and, as necessary, to place the equipment in operation conforming to the specified performance, features, and functions. The foregoing shall in no way alter or modify the contractor’s responsibilities under the contract documents. The contractor is responsible to the owner for providing the equipment systems as specified herein.

C. Like items of equipment provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance, operation, maintenance, spare parts and manufacturer’s service.

D. See Conditions of the Contract and Division 1, General Requirements, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. American Bearing Manufacturers’ Association (ABMA)
   3. Cast Iron Pipe and Flanges and Flanged Fittings
   5. Hydraulic Institute Standards (HIS)
   6. Occupational Safety and Health Administration (OSHA).

1.3 DEFINITIONS

Terminology pertaining to the pumping unit performance and construction shall conform to the ratings and nomenclature of the Hydraulic Institute Standards.

1.4 SUBMITTALS

A. Action submittals:

   1. Shop drawings:
      a. Make, model, weight, and horsepower of pump assembly.
      b. Complete pump, diesel engine, and vacuum pump catalog information, descriptive literature, specifications and identification of materials of construction.
      c. Performance data curves at nominal pump speed showing head, capacity, horsepower demand, NPSH required and pump efficiency over entire operation range of pump, from shutoff to maximum capacity. Indicate separately: head, capacity, and horsepower demand, NPSHR and overall efficiency require at rated conditions and at secondary conditions.
      d. Performance data curves for rated pump RPM.
      e. Certified detailed mechanical and electrical drawings showing equipment dimensions, arrangement, assembly, including locations and type of connections and weights of major equipment and components.
f. Complete diesel engine nameplate data, engine manufacturer, including any motor modifications.
g. Factory Finish System

B. Information submittals:
   1. Special shipping, storage and protections, and handling instructions.
   2. Manufacturer’s printed installation instructions.
   3. Suggested spare parts list to maintain equipment in service for period of 1 year and 5 years. Include a list of special tools required for checking, testing, parts replacement and maintenance with current price information.
   4. List special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
   5. Operation and maintenance Data: As specified in Section 01430 “Operation and Maintenance Data”.

1.6 OPERATIONS AND MAINTENANCE DATA
A. O&M Manuals: Content, format and schedule for providing as specified in Section 01430 “Operation and Maintenance Data”.
B. Maintenance Summary Forms: As specified in Section 01430, “Operation and Maintenance Data”.

1.7 EXTRA MATERIALS
A. Furnish for each set of pumps: One complete set of any special tools required to dismantle pump.

PART 2 PRODUCTS
GENERAL
A. Provide a complete, coordinated, and fully functional operating system.
B. Coordinate pump, diesel engine, and priming system as a system.
C. Pumps supplied under this section to be a standard product of manufacture and to have proven reliability.
D. Portable pump system to be capable of running dry or in snoring conditions.

MANUFACTURERS
A. “Screwsucker™” Pumping System, by APSCO, Inc. of Kirkland, WA. (Ph. 425-822-3335).

EQUIPMENT DESCRIPTION AND CONSTRUCTION DETAILS
A. Pump:
   1. Pump shall be a Hidrostal Pump. The basic design shall be a single passage, clog free pump utilizing a screw centrifugal impeller.
   2. Continuously rising head-capacity curve from run out to shutoff.
   3. Designed to operate continuously at any point in specified operating range of performance curve without cavitation, overheating, or excessive vibration.
   4. Engine nameplate horsepower rating not to be exceeded by pump brake horsepower required at any point on nominal pump performance curve.
   5. Pump shall be capable of continuous operation in dry condition.

B. Casing:
   2. Heavy wall, one-piece volute construction with integral flanged discharge flange and smooth fluid passages.
   3. Provide drilled and tapped volute vent and drain connections.
   4. The pump volute, backplate and suction piece housing shall be of close-grained cast iron, ASTM A48-CL30.
5. The impeller shall be ASTM A-536 72 iron, HB 270.
6. The suction shall have an independently replaceable suction liner minimum 270 Brinell Iron, ASTM A 536-72 and shall be externally adjustable by means of three stainless steel regulating screws. Each adjusting screw shall incorporate a mechanism for positively advancing, positively retracting and positively locking the position of the suction liner in so that the necessary running clearances between the liner and impeller can be maintained.

C. Bearing Housing:
1. The bearing housing shall be of cast iron, ASTM A48Cl-30 and shall be of the back pull out design.
2. The shaft shall be steel and provided with suitable bearings capable of taking all mechanical and hydraulic loads. Unless otherwise specified, bearings shall provide a minimum B10 bearing life of 50,000 hours without credit for hydraulic balancing by pump out vanes, grooves, or wear rings.
3. The shaft seals shall be isolated from contaminants in the pumped media by a labyrinth fit between the impeller backside and the volute back plate, as well as by pump-out grooves machined into the impeller back shroud and into the volute back plate, to prevent debris reach the shaft seal.

D. Mechanical Seal:
1. Tandem mechanical seal arrangement requiring no external flush. Shaft sealing shall be by independently-mounted, tandem mechanical seals contained in an oil chamber that is formed as an intrinsic part of the bearing frame and allows the seals to be completely submerged in and lubricated by the oil bath. Externally-mounted oil reservoirs are not acceptable.
2. The mechanical seal nearest the bearing shall utilize carbon/ceramic faces and shall isolate the seal cooling oil from the bearing frame.
3. The mechanical seal nearest the impeller shall be a stainless steel or rubber bellows type construction firmly attached to the rotating face and clamped to the shaft, to prevent contaminants from contacting the stainless-steel spring which loads the seal face. The seal faces shall be a solid tungsten-carbide rotating face running against a solid silicon-carbide stationary face. Seals with both faces of similar materials or seals with bonded, soldered or converted face surfaces are not equal or acceptable.

E. Diesel Engine
1. The diesel engine shall be a Deutz, John Deere or Caterpillar, four-stroke, water-cooled, high efficiency diesel engine.
2. The engine starting system shall be a 12 volt. Operation may be manual or with automatic level switching.
3. A 12-volt electric starter shall be an integral part of the engine.

F. Priming System and Control Panel
1. The priming system shall be a “dry prime” vacuum system which shall incorporate a priming chamber, priming probes, and controlled via an electronic control module.
2. A Busch Vacuum pump shall be supplied. The vacuum pump shall be oil lubricated and driven by a magnetic clutch from the diesel engine via a V-belt from the pump shaft. A solenoid valve will operate simultaneously with the vacuum pump clutch. The normally closed solenoid valve will only open when the magnetic clutch on the vacuum pump is engaged.
3. The priming chamber shall have a clear Plexiglas viewing window with electronic level probes mounted in the priming chamber.
4. An electronic control panel shall be furnished to control the dry prime vacuum system.

G. Control Panel
1. A control panel will be furnished in a NEMA 4X enclosure. The outside of the panel shall be furnished with an hour meter, run light, automatic start/stop and level control switch, low fuel light, and tachometer.

2. The control panel will be furnished with a connection for automatic start-stop of the unit with level control probes.

3. The control module must be supplied with functionality to automatically exercise the system weekly for a minimum of ten minutes.

4. A cell phone connection will be supplied in the electronic control module so that the unit can be monitored from a remote location.

5. The control panel shall operate and incorporate all the electrical features for the engine, pump, priming system, and automatic level control.

6. A magnetic clutch is to be provided that couples the primary pump, vacuum pump and diesel engine together. The magnetic clutch control is to be incorporated into the electronic control module.

7. Engine temperature and oil pressure shutdown protection shall be included.

H. Sound Attenuated Enclosure

1. The pump, diesel engine, control panel, and priming system shall be mounted in a sound enclosure. With the unit operating at full speed, Contractor must guarantee a noise level not to exceed 65 dBA at 23 ft.

2. A 125 gallon integrated fuel tank shall be part of the enclosure. Under the fuel tank shall be a containment vessel to prevent fuel, water or oil from spilling on the ground around the unit. A fuel gauge is to be supplied that will have a connection to the integrated cell phone in the electronic control module.

3. A lifting eye is to be integrated into the sound enclosure for lifting of unit.

4. The pumping unit is to be supplied with four sound proof doors that are all lockable.

5. Heavy duty 12-volt marine battery is to be furnished.

6. Flanged suction and discharge connections to be furnished.

I. Fuel Consumption - The pump system shall be capable of running continuously without re-fueling for 48 hours at 1,500 rpm on 125 gallons of diesel fuel.

3.5 MANUFACTURER’S SERVICES

A. Installation, Startup, and Testing Services:

1. Provide complete manufacturer’s installation, startup, and testing services in accordance with Section 01640 “Manufacturers’ Services” and Section 01810 “Equipment Testing and Facility Startup”.

2. Provide qualifications of manufacturer’s representative.

3. Provide 3 hard copies and 2 electronic O&M manuals on or prior to delivery of equipment.

B. Training Services

1. Provide training of owner’s personnel in accordance with Section 01640 “Manufacturers’ Services”.

2. Provide 1 person per day of pre-startup training, which shall be provided in one session.
SUBMERSIBLE CHOPPER PUMP SPECIFICATIONS

GENERAL

1.1 DESCRIPTION
The pump shall be specifically designed to pump waste solids at heavy consistencies without plugging or dewatering of the solids. Materials shall be chopped/macerated and conditioned by the pump as an integral part of the pumping action. The pump must have demonstrated the ability to chop through and pump high concentrations of solids such as plastics, heavy rags, grease and hair balls, wood, paper products and stringy materials without plugging, both in tests and field applications.

1.2 QUALITY ASSURANCE AND PERFORMANCE AFFIDAVIT
The pump shall meet City’s standard 2 (two) year warranty and a performance affidavit for equipment to be furnished in accordance with this section. The warranty for workmanship and materials shall be manufacturer's standard for 2 years from startup, not to exceed 30 months from factory shipment. In the performance affidavit, the manufacturer must certify to the Contractor and the Owner, that the Contract Documents have been examined, and that the equipment will meet in every way the performance requirements set forth in the Contract Documents for the application specified. Shop drawings will not be reviewed prior to the receipt by the Engineer of an acceptable performance affidavit. The performance affidavit must be signed by an officer of the company manufacturing the equipment, and witnessed by a notary public. The performance affidavit must include a statement that the equipment will not clog or bind on solids typically found in the application set forth.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURER
Pump shall be manufactured by Vaughan Co., Inc. or approved equal.

It is the express intent of these specifications to accurately describe equipment that is a regular production item of the specified manufacturer, and that has a proven record of performance in identical (not just similar) applications in other treatment facilities. The chopper pump manufacturer shall have a minimum of twenty (20) years of documented experience in the design and production of chopper pumps of all types, and not less than five (5) years of experience in the production of the exact equipment as specified herein.

Alternates shall be pre-approved no less than 15 days prior to the bid date, accompanied by a list of no less than twenty five (25) reference installations of chopper pumps in identical service applications. At least five (5) of the reference installations provided shall be of the exact model pump specified herein. References shall be pumps that have been used in continuous service for a period of no less than three (3) years. Only equipment that is in service at the time of referral shall be considered valid. Pumps that have been removed from service for any reason will not be considered as references. Telephone numbers and contact names shall be provided for any/all references upon request from the Engineer. Provision of performance bonds or other means of circumventing the above requirements for historical references and verification of past performance in identical applications are not considered an acceptable means of verifying the manufacturers experience.

2.2 SERVICE CONDITIONS
The pumps specified in this section will pump ______________ using the following design flow criteria:
GPM: _____ TDH: _____ HP: _____ RPM: _____

2.3 PUMP CONSTRUCTION
Casing and Back Pull-Out Plate: The pump casing shall be of volute design, spiraling outward to the 125 lb. flanged centerline discharge. Back pull-out design shall incorporate jacking bolts for accurate adjustment of impeller-to-cutter bar clearance. Casing & backplate shall be ductile cast iron with all water passages to be smooth, and free of blowholes and imperfections for good flow characteristics. A pressure tap shall be included on or near the discharge flange. Backplate shall include a replaceable Rockwell C 60 steel cutter adjustable for 0.005-0.015" clearance to cut against the rotating impeller pumpout vanes for removing fiber and debris.

Impeller: Shall be semi-open type with pump out vanes to reduce seal area pressure. Chopping/maceration of materials shall be accomplished by the action of the cupped and sharpened leading edges of the impeller blades moving across the cutter bar at the intake openings, with a maximum set clearance between the impeller and cutter bar of 0.015-0.025" cold. Impeller shall be cast alloy steel heat treated to minimum Rockwell C 60 and dynamically balanced. The impeller shall be keyed to the shaft and shall have no axial adjustments and no set screws.
Cutter Bar Plate: Shall be recessed into the pump bowl and shall contain at least 2 shear bars extending diametrically across the intake opening to within 0.010-0.020” of the rotating cutter nut tooth, for the purpose of preventing intake opening blockage and wrapping of debris at the shaft area. Chopper pumps utilizing individually mounted shear bars shall not be acceptable. Cutter bar shall be alloy steel heat-treated to minimum Rockwell C 60.

Cutter Nut: The impeller shall be secured to the shaft using a cutter nut, designed to cut stringy materials and prevent binding using a raised, rotating cutter tooth. The cutter nut shall be cast steel heat treated to minimum Rockwell C 60.

Upper Cutter: Shall be threaded into the back pull-out adapter plate behind the impeller, designed to cut against the pump-out vanes and the impeller hub, reducing and removing stringy materials from the mechanical seal area. Upper cutter shall be cast steel heat treated to minimum Rockwell C 60. The upper cutter teeth are positioned as closely as possible to the center of shaft rotation to minimize cutting torque and nuisance motor tripping. The ratio of upper cutter cutting diameter to shaft diameter in the upper cutter area of the pump shall be 3.0 or less.

Shafting: Pump shafting shall be heat-treated alloy steel. The pump shaft shall directly couple to the motor shaft, with a bolt and keyway.

Stainless Steel Nameplates: Shall be attached to the pump and drive motor giving the manufacturer’s model and serial number, rated capacity, head, speed and all pertinent data.

2.4. SUBMERSIBLE ELECTRIC MOTOR

Submersible Electric Motor: The submersible motor shall be U/L LISTED EXPLOSION PROOF for Class 1, Group D, Division 1 hazardous locations, rated at ___ HP,____ RPM, 480 Volts, 60 Hertz and 3 phase, with a 1.15 service factor (1.0 for Continuous In-Air) and Class F insulation. Motor shall be equipped with tandem independently mounted mechanical seals in oil bath and with dual moisture sensing probes. The inner and outer seals shall be separated by an oil-filled chamber. Double-seal (back to back) configurations are not acceptable due to the potential for failure of both seals as a result of lodged solids. The oil chamber shall act as a barrier to trap moisture and provide sufficient time for a planned shutdown. The oil shall also provide lubrication to the internal seal. The inner seal shall be a standard UL listed John Crane Type 21 or equal, with carbon rotating face and ceramic stationary face. The outer seal construction shall be designed for easy replacement. Outer mechanical seal shall be 316 stainless steel pusher type with silicon or tungsten carbide faces. Seal shall be positively driven by set screws. Elastomers shall be of Viton®. Motor shall include two normally closed automatic resetting thermostats connected in series and imbedded in adjoining phases. Motor frame shall be cast iron, and all hardware and shaft shall be stainless steel.

2.5 GUIDE RAIL SYSTEM

Provide a guide rail system consisting of two stainless steel guide rails, cast ductile iron pump guide bracket and discharge elbow with mounting feet and 125 lb. flanges, an upper stainless steel guide rail mounting bracket and intermediate guide brackets every 10 feet.

2.6 SURFACE PREPARATION

Solvent wash, coat with minimum 3 MDFT epoxy.
SERVICE LATERAL KIT WITH STAINLESS STEEL VALVES AND
ENGINEERED THERMOPLASTIC COMPRESSION FITTINGS SPECIFICATION

General

Description: The MANUFACTURER shall furnish service lateral kits (exclusive of piping); each consisting of three (3) compression fittings, one (1) combination curb stop/check valve assembly and one (1) curb box. The curb stop/check valve assembly shall be 304 stainless steel and have a two-piece cast 304 stainless steel housing. All plastic compression fittings are to be molded from polypropylene and shall be tested for resistance to aging, pressure rating, tensile strength, and flexural strength. All components shall incorporate compression fitting connections for easy, reliable installation of piping. The lateral kit shall be rated for 150 psi service. Lateral kits with pressure-tested combination curb stop/check valve assembly shall be provided by Environment One Corporation, Niskayuna, New York, or approved equal.

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

Warranty: All merchandise is warranted to be free from defects in materials and factory workmanship. Environment One shall provide, free of charge, new products in equal quantities for any that prove defective within two (2) years from date of shipment from our factory. MANUFACTURER shall not be liable for any loss, damage, or injury, direct or consequential, arising out of the use of or the inability to use the product. Before using, the user shall determine the suitability of the product for his intended use and user assumes all risk and liability whatever in connection therewith. No claims for labor or consequential damage will be allowed. The foregoing may not be changed except by agreement signed by an officer of the MANUFACTURER.

Product

Engineered Thermoplastic Fittings: All plastic fitting components are to be in compliance with applicable ASTM standards.

All pipe connections shall be made using compression fitting connections including a Buna-N o-ring for sealing to the outside diameter of the pipe. A split-collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

Stainless Steel Curb Stop/Check Valve Assembly: The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.

The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4” passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.

Curb Boxes: Shall be manufactured by Carson or approved equal of adequate size and depth to maintain valves.

Valves shall be at edge of ROW on owners side and shall remain owners responsibility to maintain.
High Density Polyethylene Pipe (Supplied by others)
Pipe shall be have a working pressure of 200 psi minimum and shall be classified SDR per ASTM D 3035.

**Deviations:** If a supplier chooses to submit a bid that does not meet all the requirements of this specification, the bid shall include a written description of the deviation with data that shows the magnitude of the deviation and the justification for the deviation from this specification. The decision to accept material deviating from this specification shall be the responsibility of the SPECIFYING ENGINEER.

**Certification:** The owner or the SPECIFYING ENGINEER may request certified lab data to verify the physical properties of the pipe materials supplied under this specification or may take random samples and have them tested by an independent laboratory.

**Rejection:** Polyethylene pipe may be rejected for failure to meet any of the requirements of this specification.

**Pipe Dimensions:** The SDR (Standard Dimension Ratio) of the pipe supplied shall be as specified by the SPECIFYING ENGINEER. SDR 7, 9 and 11 fittings are available from the MANUFACTURER. SIDR 7 fittings will not work with SDR pipe.

**Execution**

**Factory Test:** The stainless steel, combination curb stop/check valve component shall be 100 percent hydrostatically tested to 150 psi in the factory.

**Construction Practices**

Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking should be in accordance with the pipe manufacturer’s recommendations. The pipe should be handled in such a manner that it is not damaged by being dragged over sharp objects or cut by chokers or lifting equipment.

Segments of pipe having cuts or gouges in excess of 10 percent of the wall thickness of the pipe shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method. Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be the butt-fusion method and shall be performed in strict accordance with the pipe manufacturer’s recommendations. The butt-fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure.

Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lifting fused sections of pipe, chains or cable-type chokers should be avoided. Nylon slings are preferred. Spreader bars should be used when lifting long, fused sections. Care should be exercised to avoid cutting or gouging the pipe.

**Installation**

Assemble the compression fittings according to the fitting manufacturer’s recommendations.

The trench and trench bottom should be constructed in accordance with City of Gig Harbor Public Works Standards trench/backfill requirements.
SECTION: GRINDER PUMP STATIONS

1.0 General

1.01 GENERAL DESCRIPTION: The MANUFACTURER shall furnish complete factory-built and tested grinder pump unit(s), each consisting of a grinder pump core suitably mounted on an integral stand of stainless steel, special polyethylene tank, electrical quick disconnect (NEMA 6P), pump removal harness, discharge assembly/shut-off valve, anti-siphon valve/check valve assembly, electrical alarm assembly and all necessary internal wiring and controls. For ease of serviceability, all pump motor/grinder units shall be of like type and horsepower throughout the system.

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

1.03 MANUFACTURER: Grinder pump stations, complete with all appurtenances, form an integral system, and as such, shall be supplied by one grinder pump station manufacturer. The CONTRACTOR shall be responsible for the satisfactory operation of the entire system. The equipment specified shall be a product of a company experienced in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. The company shall submit detailed installation and user instructions for its product, submit evidence of an established service program including complete parts and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts. The MANUFACTURER shall provide, upon request, a reference and contact list from ten of its largest contiguous grinder pump installations of the type of grinder pumps described within this specification.

The MANUFACTURER of the grinder pump station shall be Environment One Corporation (or Proposed Alternate).

Attention is directed to the fact that the drawings and overall system design are based on a particular piece of equipment from a particular manufacturer. These specifications are intended to provide guidelines for standard equipment of a recognized manufacturer who already meets all the requirements of this specification.

1.03a ALTERNATE EQUIPMENT: In the event that the CONTRACTOR or another supplier proposes an Alternate to the specified MANUFACTURER, the ENGINEER recognizes that it will be difficult to conform to certain details of this Specification due to different manufacturing techniques or grinder pump station designs. If proposing an Alternate, the CONTRACTOR (supplier) must submit, no less than 15 business days in advance of the bid date, a complete description of any changes that will be necessary to the system design, a complete submittal package as outlined in Section 1.02 SUBMITTALS, a system hydraulic analysis based on the proposed pump (including pipe sizes, flows, velocities, retention times and number and location of recommended valves and cleanouts, if any), a list of exceptions to this specification, and demonstration of compliance to Section 1.04 EXPERIENCE CLAUSE of this specification. The CONTRACTOR (supplier) must also complete the Manufacturer Disclosure Statement found at the end of this specification. This information must be submitted to the ENGINEER for pre-approval of the alternate equipment being proposed and determination of compliance with these Contract Documents. If the equipment differs materially or differs from the dimensions given on the Drawings, the CONTRACTOR (supplier) shall submit complete drawings showing elevations, dimensions, or any necessary changes to the Contract Documents for the proposed equipment and its installation. Pre-approval, if granted, will be provided in writing by the ENGINEER to the CONTRACTOR (supplier) at least five business days in advance of the bid date. If the ENGINEER’S approval is obtained for Alternate Equipment, the CONTRACTOR (supplier) must make any needed changes in the structures, system design, piping...
or electrical systems necessary to accommodate the proposed equipment at the expense of the CONTRACTOR (supplier).

1.04 EXPERIENCE CLAUSE: The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically designed for use in low pressure systems. All manufacturers proposing equipment for this project shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units. All manufacturers proposing equipment for this project must also have not less than 500 successful installations of low pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein. An installation is defined as a minimum of 25 pumps discharging into a common force main which forms a low pressure sewer system. The CONTRACTOR (supplier) proposing alternate equipment shall also submit, as part of the bid schedule, an installation list with contact person(s), phone number(s) and date(s) of at least 10 installations of the type of pump specified herein that have been in operation for at least 10 years.

In lieu of this experience clause, the CONTRACTOR (supplier) of alternate equipment will be required to submit a 5-year performance bond for 100 percent of the stipulated cost of the equipment as bid and as shown in the Bid Schedule. This performance bond will be used to guarantee the replacement of the equipment in the event that it fails within the bond period.

1.05 OPERATING CONDITIONS: The pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

1.06 WARRANTY: The grinder pump MANUFACTURER shall provide a part(s) and labor warranty on the complete station and accessories, including, but not limited to, the panel for a period of 24 months after notice of OWNER’S acceptance, but no greater than 27 months after receipt of shipment. Any manufacturing defects found during the warranty period will be reported to the MANUFACTURER by the OWNER and will be corrected by the MANUFACTURER at no cost to the OWNER.

1.07 WARRANTY PERFORMANCE CERTIFICATION: As a bid certification requirement, each bidder shall provide with their bid schedule a Warranty Performance Certification statement executed by the most senior executive officer of the grinder pump MANUFACTURER, which certifies a minimum of a 24-month warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the MANUFACTURER will bear all costs to correct any original equipment deficiency for the effective period of the warranty. All preventive maintenance type requirements shall be included in this form as exclusions. These requirements include, but are not limited to, unjamming of grinder mechanism, periodic motor maintenance, and periodic cleaning of liquid level controls. Should the CONTRACTOR (supplier) elect to submit a performance bond in lieu of the experience clause outlined above, this Warranty Performance Certification shall also be used as a criterion to evaluate the CONTRACTOR’S (supplier’s) performance over the warranty period. A Warranty Performance Certification form is included with the bid schedule and must be completed and submitted as part of the bid package. Bids with incomplete forms or missing forms will be considered nonresponsive.

2.0 PRODUCT

2.01 PUMP: The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of
a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.02 GRINDER: The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties.

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

1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
2. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.
3. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.
4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

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

2.03 ELECTRIC MOTOR: As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.
2.04 MECHANICAL SEAL: The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

2.05 TANK: Polyethylene Construction. The tank shall be made of rotational molded polyethylene with high environmental stress cracking resistance. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

The overall basin capacity shall be 476 gallons. The basin shall incorporate a tapered bottom with an inside diameter of no greater than 46 inches, reducing to a diameter no greater than 42 inches, to minimize the retained volume. The largest diameter must be no less than 50 inches and no greater than 52 inches.

A station that is 77 inches tall shall have no greater than a 36 inch outside diameter flat fiberglass cover. The 77 inch tall station can be extended in 6 inch increments with normal cylindrical fiberglass extensions.

Taller stations shall have an accessway with a shroud and domed cover. The accessway shall be an integral extension of the wetwell assembly and shall include a lockable cover assembly with integral vent providing low profile mounting and watertight capability. The cover shall be high density polyethylene, green in color, with a load rating of 150 lbs per square foot. To minimize the station’s on-site footprint, the domed cover shall have an outside diameter of no greater than 30 inches. Accessway design and construction shall enable field adjustment of station height in 3-inch increments without the use of any adhesives or sealants requiring cure time before installation can be completed. Corrugated sections are to be made of a double-wall HDPE construction with the internal wall being generally smooth. Corrugations of the outside wall are to be of a minimum amplitude of 1-1/2 inch to provide necessary transverse stiffness. Any incidental sections of a single-wall construction are to be a minimum .250 inch thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The accessway wall must withstand the pressure exerted by saturated soil loading at maximum burial depth and must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

The tank and factory penetrations shall be factory tested and guaranteed to be watertight.

The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 pipe. Tank dimensions shall be as shown on the contract drawings.

2.06 DISCHARGE HOSE AND DISCONNECT/VALVE: All discharge fittings and piping shall be constructed of polypropylene, EPDM or PVC. The discharge hose assembly shall include a shut-off valve rated for 200 psi WOG and a quick disconnect feature to simplify installation and pump removal. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

2.07 ELECTRICAL QUICK DISCONNECT: The grinder pump core shall include a factory-installed NEMA 6P electrical quick disconnect (EQD) for all power and control functions. The EQD will be supplied with 32' total, 25’ of useable, electrical supply cable (ESC) to connect to the alarm panel. The EQD shall require no tools for assembly, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. Junction boxes are not acceptable due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required.
2.08 CHECK VALVE: The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

2.09 ANTI-SIPHON VALVE: The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.10 CORE UNIT: The grinder pump station shall have an easily removable core assembly containing pump, motor, grinder, all motor controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. The watertight integrity of the core unit shall be established by a 100% factory test at a minimum of 5 PSIG.

2.11 CONTROLS: All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating motor starting controls in a plastic enclosure is not acceptable. Wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. Level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. Level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. Level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermod plastic elastomer. The use of PVC for the level sensing housing is not acceptable.

Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.

All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or
temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.

2.12 ALARM PANEL(S):
SIMPLEX STATION:
Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D if certain options are included.

The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core’s power circuit and one 15-amp single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

2. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.

3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the “off” setting of the alarm pressure switch.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

(Optional) Alarm Contacts Package – Note: The Alarm Contacts Package is included with Sentry Simplex PreSTAT Panels

- **Alarm Activated Dry Contacts** – Normally open relay contact closes upon alarm activation.

- **Alarm Activated Contacts for Remote Indoor Alarm Module** – Will work with or without power to the alarm panel and is designed to work with E/One’s Remote Sentry.

- **Alarm Activated Remote (Powered) Contacts** – Normally open contacts that close on alarm, providing 120V on high level alarm.
(OPTIONAL) Generator Receptacle and Auto Transfer – The alarm panel shall include a 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. An automatic transfer switch shall be provided, which automatically switches from AC power to generator power. Power shall be provided to that alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. (No manual switching within the panel enclosure is necessary to switch from generator power back to AC Mains, so the mode cannot be inadvertently left in the generator position after pumping down the station in generator mode as is the case with a manual transfer switch).

(OPTIONAL) Service Equipment/Main Service Disconnect Breaker – A separate, internal breaker rated and approved for use as “service equipment” and acts as a main service disconnect of the grinder pump station shall be provided.

(OPTIONAL) Remote Sentry Indoor Alarm Module – A separate, remote indoor alarm module shall be provided to indicate a high level alarm with or without AC power to the grinder pump station. The Remote Sentry indoor alarm module shall have an internal power source enabling its continued operation without AC power. The Remote Sentry shall have an audible alarm and a visual alarm, both of which shall automatically reset if the high level alarm condition is eliminated. The Remote Sentry indoor alarm module shall include a Silence button for the audible alarm and a Test button.

(OPTIONAL) Run-time/Hour Meter – A run-time or hour meter to display the total run-time or operation time for the pump core shall be provided.

(OPTIONAL) Event/Cycle Counter – An event or cycle counter to display the number of operations of the pump core shall be provided.

(OPTIONAL) SENTRY SIMPLEX PROTECT

Provides protection from the following operating conditions:

- **Low Voltage (Brownout) Protection** – A lockout cycle will prevent the motor from operating and will illuminate an LED if:
  - the incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate (211 volts for a 240 volt system) for 2 to 3 seconds, regardless of whether the motor is running
  - the lockout cycle will end if the incoming AC Mains voltage returns to a predetermined value, typically 10% of nameplate (216 volts for a 240 volt system)

  The system continues to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The LED remains illuminated during a Brownout condition and remains latched until the pump breaker is turned off and then on again (reset). The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

- **Run Dry Protection** – A 20-minute lockout cycle will prevent the motor from operating and will illuminate an LED when the wastewater level in the tank is below the pump inlet level. The condition is rechecked every 20 minutes. If the lockout cycle has been initiated and the condition is satisfied, the pump is not allowed to cycle normally but the LED remains latched. The LED will remain latched until the pump breaker is turned off and then on again (reset). If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the pump breaker is turned off and on (reset) or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.
High System Pressure Protection – A 20-minute lockout cycle will prevent the motor from operating and will illuminate an LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). The condition is rechecked every 20 minutes. If the condition is satisfied, the pump is allowed to cycle normally but the LED remains latched. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until the condition is removed and power is reset. The LED will remain latched until the pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.

In all of the above cases, if more than one error condition is presented, the LED depicting the most recent error condition will be displayed.

Other included features:
- Alarm Activated Dry Contacts – Normally open relay contact closes upon alarm activation.
- Alarm Activated Contacts for Remote Indoor Alarm Module – Will work with or without power to the alarm panel and is designed to work with E/One’s Remote Sentry.
- Includes Inner Door Dead Front
- Separate LED’s for each condition

(OPTIONAL) SENTRY SIMPLEX PROTECT PLUS:
- All Sentry Protect features (as detailed above)
- High/Low Voltage monitoring with Trouble indication
- High/Low Wattage (wattage is used instead of current because it is a better indicator of pump performance) monitoring with Trouble indication
- Extended Run Time monitoring with Trouble indication
- Cycle/Event Counter
- Run Time Counter (Hour Meter)
- Run Time Limit (time adjustable, user selected options: 10 minutes (default) to 120 minutes in 1-minute intervals
- Power-up Delay (time adjustable, user selected options: None (default), to 300 minutes in 1-minute intervals
- Alarm Delay (time adjustable, user selected options: None (default) or adjustable in 1-minute intervals
- System self-test diagnostic
- User selectable Alarm latch
- User Selectable Protect Mode disable
- User selectable buzzer timer

Specific Protect PLUS indicators and programming features shall include:
- Ready LED to indicate AC power to the station is satisfactory
- Pump Run LED to indicate pump is operating
- Trouble LED indicator and predictive Visual Alarm notification (“blinking” alarm lamp; clears on Normal cycle)
- High Level Alarm LED indicator
- Manual Run switch to manually activate pump
- Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down)
- Normal Operation LED and Mode button for Mode status
- Pump Performance menu LED with LCD Display of the following pump performance statistics:
  - Real-time Voltage
  - Real-time Amperage
  - Real-time Wattage
DUPLEX STATIONS

MOD T260 DUPLEX:

Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The standard enclosure shall not exceed 12.5" W x 16" H x 7.5" D.

The panel shall contain one 15-amp single pole circuit breaker for the alarm circuit and one 15-amp double pole circuit breaker per core for the power circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The high-level alarm system shall operate as follows:

1. The panel will go into alarm mode if either pump’s alarm switch closes. During the initial alarm mode both pumps will run and the alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If the station is still in high-level alarm after the delay, the light and buzzer will be activated.
2. The audible alarm may be silenced by means of the externally mounted push-to-silence button.
3. The visual alarm remains illuminated until the sewage level in the wet well drops below the “off” setting of the alarm switch for both pumps.

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

(OPTIONAL) Generator Receptacle and Auto Transfer – The alarm panel shall include a 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. An automatic transfer switch shall be provided, which automatically switches from AC power to
generator power. Power shall be provided to the alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. (No manual switching within the panel enclosure is necessary to switch from generator power back to AC Mains, so the mode cannot be inadvertently left in the generator position after pumping down the station in generator mode as is the case with a manual transfer switch).

(OPTIONAL) Service Equipment/Main Service Disconnect Breaker – A separate, internal breaker rated and approved for use as “service equipment” and acts as a main service disconnect of the grinder pump station shall be provided.

(OPTIONAL) Remote Sentry Indoor Alarm Module – A separate, remote indoor alarm module shall be provided to indicate a high level alarm with or without AC power to the grinder pump station. The Remote Sentry indoor alarm module shall have an internal power source enabling its continued operation without AC power. The Remote Sentry shall have an audible alarm and a visual alarm, both of which shall automatically reset if the high level alarm condition is eliminated. The Remote Sentry indoor alarm module shall include a Silence button for the audible alarm and a Test button.

(OPTIONAL) Run-time/Hour Meter – A run-time or hour meter to display the total run-time or operation time for the pump core shall be provided.

(OPTIONAL) Event/Cycle Counter – An event or cycle counter to display the number of operations of the pump core shall be provided.

(OPTIONAL) External Autodialer –
- Four separate voice message alarm zones
- Calls up to 8 telephones, cell phones or pagers
- Built-in line seizure
- Remote Turn Off feature allows termination of activated channel
- EEPROM Memory retains program despite power loss
- Listen-in verification and communication
- Universal dial tone
- Built-in auxiliary output to drive external siren, strobe or relay
- Five optional settings for notifications of a power loss occurrence — instantaneous, 15 minutes, 2 hours, 12 hours or 24 hours
- One channel for power-loss sensing, three hardwired channels for additional input
- Dialer senses loss of power and based on setting; will notify parties of loss condition only when specified time has elapsed
- If power restores before set time has elapsed, no call will be made
- Package includes battery backup and transformer

DUPLEX PROTECT PLUS:

Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The standard enclosure shall not exceed 12.5" W x 16" H x 7.5" D.

The panel shall contain one 15-amp single pole circuit breaker for the alarm circuit and one 15-amp double pole circuit breaker per core for the power circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel
are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The high-level alarm system shall operate as follows:
1. The panel will go into alarm mode if either pump's alarm switch closes. During the initial alarm mode both pumps will run and the alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If the station is still in high-level alarm after the delay, the light and buzzer will be activated.
2. The audible alarm may be silenced by means of the externally mounted push-to-silence button.
3. The visual alarm remains illuminated until the sewage level in the wet well drops below the "off" setting of the alarm switch for both pumps.

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

Contains the following features:

- **Alarm Activated Dry Contacts** – Normally open relay contact closes upon alarm activation.
- **Alarm Activated Contacts for Remote Indoor Alarm Module** – Will work with or without power to the alarm panel and is designed to work with E/One’s Remote Sentry.
- **Includes Inner Door Dead Front**
- **Separate LED’s for each condition**

Provides protection from the following operating conditions:

- **Low Voltage (Brownout) Protection** – A lockout cycle will prevent the motor from operating and will illuminate the Trouble LED if:
  - the incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate (211 volts for a 240 volt system) for 2 to 3 seconds, regardless of whether the motor is running
  - the lockout cycle will end if the incoming AC Mains voltage returns to a predetermined value, typically 10% of nameplate (216 volts for a 240 volt system).

The system continues to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The Trouble LED remains illuminated during a Brownout condition and a corresponding Brownout message will be displayed on the LCD screen. The LED will turn off when the Brownout condition ends and the LCD message remains latched until the panel is reset. The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

- **Run Dry Protection** – A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the wastewater level in the tank is below the pump inlet shroud. A corresponding Run Dry message will be displayed on the LCD screen.
condition is rechecked every 20 minutes and the LCD message remains latched. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will go out, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the panel is reset or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.

- **High System Pressure Protection** – A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). A corresponding Overpressure message will be displayed on the LCD screen. The condition is rechecked every 20 minutes. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will turn off, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely and the audible and visual alarm will be activated. The LCD message and alarms will remain latched until the condition is removed and the panel is reset.

In all of the above cases, if more than one error condition is presented, the LCD message depicting the most recent error condition will be displayed.

**PROTECT PLUS FEATURES:**

- High/Low Voltage monitoring with Trouble indication
- High/Low Wattage (wattage is used instead of current because it is a better indicator of pump performance) monitoring with Trouble indication
- Extended Run Time monitoring with Trouble indication
- Cycle/Event Counter
- Run Time Counter (Hour Meter)
- Run Time Limit — time adjustable, user-selected options: 10 minutes (default) to 120 minutes in 1-minute intervals
- Power-up Delay — time adjustable, user-selected options: None (default), to 300 minutes in 1-minute intervals
- Alarm Delay — time adjustable, user-selected options: zero to 10 minutes in 30-second increments; 4 minutes is default
- System self-test diagnostic
- User-selectable Alarm latch
- User-selectable Protect Mode disable
- User-selectable buzzer timer

Specific Duplex Protect PLUS indicators and programming features shall include:

- Ready LED to indicate AC power to the station is satisfactory
- Pump Run LED to indicate pump is operating (LCD indicates which pump is running)
- Trouble LED indicator and predictive Visual Alarm notification (“blinking” alarm lamp; clears on Normal cycle)
- High Level Alarm LED indicator (LCD indicates which pump is in alarm)
- Manual Run switch to manually activate pumps
- Lead/Lag indication (LCD indicates which pump is lead)
- Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down)
- Normal Operation LED and Mode button for Mode status
- Pump Performance menu LED with LCD display of the following pump performance statistics:
  - Real-time Voltage
  - Real-time Amperage
Real-time Wattage
- Minimum/Maximum/Average Voltage
- Minimum/Maximum/Average Amperage
- Minimum/Maximum/Average Wattage
- Minimum/Maximum Run-time
- Average Run-time
- Last Run-time
- Cycle/Event Counter
- Run Time Counter (Hour Meter)
- Diagnostics Menu LED
- Initialize System Menu LED
- Run Limit Menu LED
- Alarm Delay Menu LED
- Power Delay Menu LED
- Pump alternating options (no alternation, adjustable time based and test)
- Pump alternating time options — 24 hours to 72 hours in 12-hour increments

(OPTIONAL) Generator Receptacle and Auto Transfer — The alarm panel shall include a 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. An automatic transfer switch shall be provided, which automatically switches from AC power to generator power. Power shall be provided to the alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. (No manual switching within the panel enclosure is necessary to switch from generator power back to AC Mains, so the mode cannot be inadvertently left in the generator position after pumping down the station in generator mode as is the case with a manual transfer switch).

(OPTIONAL) Service Equipment/Main Service Disconnect Breaker — A separate, internal breaker that is rated and approved for use as “service equipment” and acts as a main service disconnect of the grinder pump station shall be provided.

(OPTIONAL) Remote Sentry Indoor Alarm Module — A separate, remote indoor alarm module shall be provided to indicate a high level alarm with or without AC power to the grinder pump station. The Remote Sentry indoor alarm module shall have an internal power source enabling its continued operation without AC power. The Remote Sentry shall have an audible alarm and a visual alarm, both of which shall automatically reset if the high level alarm condition is eliminated. The Remote Sentry indoor alarm module shall include a Silence button for the audible alarm and a Test button.

(OPTIONAL) External Autodialer —
- Four separate voice message alarm zones
- Calls up to 8 telephones, cell phones or pagers
- Built-in line seizure
- Remote Turn Off feature allows termination of activated channel
- EEPROM Memory retains program despite power loss
- Listen-in verification and communication
- Universal dial tone
- Built-in auxiliary output to drive external siren, strobe or relay
- Five optional settings for notifications of a power loss occurrence — instantaneous, 15 minutes, 2 hours, 12 hours or 24 hours
- One channel for power-loss sensing, three hardwired channels for additional input
- Dialer senses loss of power and based on setting; will notify parties of loss condition only when specified time has elapsed
• If power restores before set time has elapsed, no call will be made
• Package includes battery backup and transformer

2.13 SERVICEABILITY: The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

2.14 OSHA CONFINED SPACE: All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station (as per OSHA 1910.146 Permit-required confined spaces). “Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant’s body breaks the plane of an opening into the space.”

2.15 SAFETY: The grinder pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station shall be listed by Underwriters Laboratories, Inc., to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

3.0 EXECUTION

3.01 FACTORY TEST: Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit’s dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.

The ENGINEER reserves the right to inspect such testing procedures with representatives of the OWNER, at the GRINDER PUMP MANUFACTURER’S facility.

All HDPE basins shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

3.02 CERTIFIED SERVICE PROGRAM: The grinder pump MANUFACTURER shall provide a program implemented by the MANUFACTURER’S personnel as described in this specification to certify the service company as an authorized serviced center. As evidence of this, the
MANUFACTURER shall provide, when requested, sufficient evidence that they have maintained their own service department for a minimum of 30 years and currently employ a minimum of five employees specifically in the service department.

As part of this program, the MANUFACTURER shall evaluate the service technicians as well as the service organization annually. The service company will be authorized by the MANUFACTURER to make independent warranty judgments. The areas covered by the program shall include, as a minimum:

1. Pump Population Information — The service company will maintain a detailed database for the grinder pumps in the territory that tracks serial numbers by address.

2. Inventory Management — The service company must maintain an appropriate level of inventory (pumps, tanks, panels, service parts, etc.) including regular inventory review and proper inventory labeling. Service technicians will also maintain appropriate parts inventory and spare core(s) on service vehicles.

3. Service Personnel Certification — Service technicians will maintain their level-specific certification annually. The certifications are given in field troubleshooting, repair, and training.

4. Service Documentation and Records — Start up sheets, service call records, and customer feedback will be recorded by the service company.

5. Shop Organization — The service company will keep its service shop organized and pumps will be tagged with site information at all times. The shop will have all required equipment, a test tank, and cleaning tools necessary to service pumps properly.

3.03 DELIVERY: All grinder pump core units, including level controls, will be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Grinder pump cores will be shipped separately from the tanks. Installing the cores and discharge piping/hose into the tanks is the only assembly step required and allowed due to the workmanship issues associated with other on-site assembly. Grinder pump cores must be boxed for ease of handling.

3.04 INSTALLATION: Earth excavation and backfill are specified under SITE WORK, but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

The CONTRACTOR shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the ENGINEER.

Remove packing material. User instructions MUST be given to the OWNER. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4” inlet grommet (4.50” OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.

Installation shall be accomplished so that 1” to 4” of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

A 6” inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8” or more than 3/4” shall be used as bedding material under each unit.

A concrete anti-flotation collar, as detailed on the drawings, and sized according to the manufacturer’s instructions, shall be required and shall be pre-cast to the grinder pump or poured in
place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.

If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.

The CONTRACTOR will provide and install a 4-foot piece of 4-inch SCH 40 PVC pipe with water tight cap, to stub-out the inlet for the property owners’ installation contractor, as depicted on the contract drawings.

The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the CONTRACTOR. An alarm device is required on every installation, there shall be NO EXCEPTIONS. It will be the responsibility of the CONTRACTOR and the ENGINEER to coordinate with the individual property owner(s) to determine the optimum location for the alarm panel.

The CONTRACTOR shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32’ total, 25’ of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a FACTORY INSTALLED EQD half to connect to the mating EQD half on the core.

3.05 BACKFILL REQUIREMENTS: Proper backfill is essential to the long-term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions. The most highly recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern; Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone, offers an added benefit in that it doesn’t need to be compacted.

Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactable soil, with less than 12% fines, free of ice, rocks, roots and organic material, it may be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85% and 90%. Heavy, non-compactable clays and silts are not suitable backfill for this or any underground structure such as inlet or discharge lines.

If you are unsure of the consistency of the native soil, it is recommended that a geotechnical evaluation of the material is obtained before specifying backfill.

Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped more than four feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.

Backfill of clean, native earth, free of rocks, roots, and foreign objects, shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 85%. Improper backfilling may result in damaged accessways. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.
All restoration will be the responsibility of the CONTRACTOR. Per unit costs for this item shall be included in the CONTRACTOR’S bid price for the individual grinder pump station. The properties shall be restored to their original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming and seeding, and restoration of the traveled ways, as directed by the ENGINEER.

3.06 START-UP AND FIELD TESTING: The MANUFACTURER shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the OWNER’S personnel in the operation and maintenance of the equipment before the stations are accepted by the OWNER.

All equipment and materials necessary to perform testing shall be the responsibility of the INSTALLING CONTRACTOR. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

The services of a trained, factory-authorized technician shall be provided at a rate of 40 hours for every 100 grinder pump stations supplied.

Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.
2. Turn ON the alarm power circuit and verify the alarm is functioning properly.
3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic “on/off” controls are operative. The pump should immediately turn ON.
4. Consult the Manufacturer’s Service Manual for detailed start-up procedures.

Upon completion of the start-up and testing, the MANUFACTURER shall submit to the ENGINEER the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

4.0 OPERATION AND MAINTENANCE

4.01 SPARE CORE: The MANUFACTURER will supply one spare grinder pump core for every 50 grinder pump stations installed or portion thereof, complete with all operational controls, level sensors, check valve, anti-siphon valve, pump/motor unit, and grinder.

4.02 MANUALS: The MANUFACTURER shall supply four copies of Operation and Maintenance Manuals to the OWNER, and one copy of the same to the ENGINEER.

END OF SECTION
WARRANTY PERFORMANCE CERTIFICATION

As a pre-bid certification requirement, each bidder shall provide a Warranty Performance Certification executed by the most senior executive officer, which certifies a minimum of a two (2) year warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the manufacturer will bear all costs to correct original equipment deficiency for the effective period of the warranty.

I, __________________________________________, by and through my duly authorized signature below as its most senior operating executive, certify that _______________ will provide a two (2) year warranty on grinder pump equipment manufactured and supplied by ______________________ for the ______________________ project. I further certify that, other than failure to install equipment in accordance with manufacturer’s instructions, no exclusions and/or cost items to maintain said equipment in warrantable condition, including labor, travel and shipping fees, exist except as detailed immediately below:

EXCLUSIONS: 1. _______________________________________________
2. _______________________________________________
3. _______________________________________________

COST ITEMS TO MAINTAIN EQUIPMENT IN WARRANTABLE CONDITION:

<table>
<thead>
<tr>
<th>Required</th>
<th>Avg. monthly cost ($)</th>
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<td>Frequency (mos)</td>
<td>times warranty period</td>
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Total labor/material cost to maintain equipment in warrantable condition for warranty period ($):

For any items not identified as exclusions or additional cost items above, OR for additional labor & material costs required to maintain equipment in warrantable condition that exceed the Avg. monthly cost ($) detailed above, _______________ will bear all costs to correct such original equipment deficiency for the effective period of the warranty including all applicable labor, travel and shipping fees.

___________________________________   _________________
Signature                                                                                             Date

___________________________________
Title
MANUFACTURER’S DISCLOSURE STATEMENT
Note: To be completed if proposing an alternate

1.0 GENERAL:
1.01 General Description
Describe all non-conforming aspects to the specification:

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

1.04 Experience
List 10 low pressure sewer system installations of the type of pump/station specified (progressive cavity type) that have been in operation for a period of no less than ten years with a minimum of 100 pumps pumping into a “common” low pressure sewer system. Provide Name and Location, Contact Name, Phone Number, Number of Pumps, and Install Date for each.

____________________________________________________________________________________
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1.05 Operating Conditions
Describe all non-conforming aspects to the specification:

____________________________________________________________________________________

1.06 Warranty
Fully state the manufacturer’s warranty:

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.0 PRODUCT:

2.01 Pump
Describe all non-conforming aspects to the specification:

____________________________________________________________________________________
____________________________________________________________________________________

2.02 Grinder
Describe all non-conforming aspects to the specification:

____________________________________________________________________________________
____________________________________________________________________________________
2.03 Motor
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.05 Tank
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.07 Electrical Quick Disconnect
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.08 Check Valve
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.09 Anti-Siphon Valve
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.11 Controls
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.15 Safety
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

3.0 EXECUTION:

3.01 Factory Test
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

I attest that all questions are answered truthfully and all non-conforming aspects to the specifications have been described where requested.

Manufacturer: ____________________________________________________
SECTION: GRINDER PUMP STATIONS

1.0 General

1.01 GENERAL DESCRIPTION: The MANUFACTURER shall furnish complete factory-built and tested grinder pump unit(s), each consisting of a grinder pump core suitably mounted on an integral stand of stainless steel, special polyethylene tank, electrical quick disconnect (NEMA 6P), pump removal harness, discharge assembly/shut-off valve, anti-siphon valve/check valve assembly, electrical alarm assembly and all necessary internal wiring and controls. For ease of serviceability, all pump motor/grinder units shall be of like type and horsepower throughout the system.

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

1.03 MANUFACTURER: Grinder pump stations, complete with all appurtenances, form an integral system, and as such, shall be supplied by one grinder pump station manufacturer. The CONTRACTOR shall be responsible for the satisfactory operation of the entire system. The equipment specified shall be a product of a company experienced in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. The company shall submit detailed installation and user instructions for its product, submit evidence of an established service program including complete parts and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts. The MANUFACTURER shall provide, upon request, a reference and contact list from ten of its largest contiguous grinder pump installations of the type of grinder pumps described within this specification.

The MANUFACTURER of the grinder pump station shall be Environment One Corporation (or Proposed Alternate).

Attention is directed to the fact that the drawings and overall system design are based on a particular piece of equipment from a particular manufacturer. These specifications are intended to provide guidelines for standard equipment of a recognized manufacturer who already meets all the requirements of this specification.

1.03a ALTERNATE EQUIPMENT: In the event that the CONTRACTOR or another supplier proposes an Alternate to the specified MANUFACTURER, the ENGINEER recognizes that it will be difficult to conform to certain details of this Specification due to different manufacturing techniques or grinder pump station designs. If proposing an Alternate, the CONTRACTOR (supplier) must submit, no less than 15 business days in advance of the bid date, a complete description of any changes that will be necessary to the system design, a complete submittal package as outlined in Section 1.02 SUBMITTALS, a system hydraulic analysis based on the proposed pump (including pipe sizes, flows, velocities, retention times and number and location of recommended valves and cleanouts, if any), a list of exceptions to this specification, and demonstration of compliance to Section 1.04 EXPERIENCE CLAUSE of this specification. The CONTRACTOR (supplier) must also complete the Manufacturer Disclosure Statement found at the end of this specification. This information must be submitted to the ENGINEER for pre-approval of the alternate equipment being proposed and determination of compliance with these Contract Documents. If the equipment differs materially or differs from the dimensions given on the Drawings, the CONTRACTOR (supplier) shall submit complete drawings showing elevations, dimensions, or any necessary changes to the Contract Documents for the proposed equipment and its installation. Pre-approval, if granted, will be provided in writing by the ENGINEER to the CONTRACTOR (supplier) at least five business days in advance of the bid date. If the ENGINEER’S approval is obtained for Alternate Equipment, the
CONTRACTOR (supplier) must make any needed changes in the structures, system design, piping or electrical systems necessary to accommodate the proposed equipment at the expense of the CONTRACTOR (supplier).

1.04 EXPERIENCE CLAUSE: The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically designed for use in low pressure systems. All manufacturers proposing equipment for this project shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units. All manufacturers proposing equipment for this project must also have not less than 500 successful installations of low pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein. An installation is defined as a minimum of 25 pumps discharging into a common force main which forms a low pressure sewer system. The CONTRACTOR (supplier) proposing alternate equipment shall also submit, as part of the bid schedule, an installation list with contact person(s), phone number(s) and date(s) of at least 10 installations of the type of pump specified herein that have been in operation for at least 10 years. In lieu of this experience clause, the CONTRACTOR (supplier) of alternate equipment will be required to submit a 5-year performance bond for 100 percent of the stipulated cost of the equipment as bid and as shown in the Bid Schedule. This performance bond will be used to guarantee the replacement of the equipment in the event that it fails within the bond period.

1.05 OPERATING CONDITIONS: The pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

1.06 WARRANTY: The grinder pump MANUFACTURER shall provide a part(s) and labor warranty on the complete station and accessories, including, but not limited to, the panel for a period of 24 months after notice of OWNER’S acceptance, but no greater than 27 months after receipt of shipment. Any manufacturing defects found during the warranty period will be reported to the MANUFACTURER by the OWNER and will be corrected by the MANUFACTURER at no cost to the OWNER.

1.07 WARRANTY PERFORMANCE CERTIFICATION: As a bid certification requirement, each bidder shall provide with their bid schedule a Warranty Performance Certification statement executed by the most senior executive officer of the grinder pump MANUFACTURER, which certifies a minimum of a 24-month warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the MANUFACTURER will bear all costs to correct any original equipment deficiency for the effective period of the warranty. All preventive maintenance type requirements shall be included in this form as exclusions. These requirements include, but are not limited to, unjamming of grinder mechanism, periodic motor maintenance, and periodic cleaning of liquid level controls. Should the CONTRACTOR (supplier) elect to submit a performance bond in lieu of the experience clause outlined above, this Warranty Performance Certification shall also be used as a criterion to evaluate the CONTRACTOR’S (supplier’s) performance over the warranty period. A Warranty Performance Certification form is included with the bid schedule and must be completed and submitted as part of the bid package. Bids with incomplete forms or missing forms will be considered nonresponsive.

2.0 PRODUCT

2.01 PUMP: The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. The rotor shall
be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.02 GRINDER: The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties.

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

1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.

2. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.

3. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.

4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

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

2.03 ELECTRIC MOTOR: As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.
2.04 **MECHANICAL SEAL:** The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

2.05 **TANK:** Polyethylene Construction. The tank shall be made of rotational molded polyethylene with high environmental stress cracking resistance. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

The overall basin capacity shall be 237 gallons. The basin shall incorporate a tapered bottom with an inside diameter of no greater than 28 inches to minimize the retained volume and shall be designed to fit into most septic tanks after removal of the septic tank cover. The largest diameter must be no less than 50 inches and no greater than 52 inches.

A station that is 55 inches tall shall have no greater than a 36 inch outside diameter flat fiberglass cover. The 55 inch tall station can be extended in 6 inch increments with normal cylindrical fiberglass extensions.

Taller stations shall have an accessway with a shroud and domed cover. The accessway shall be an integral extension of the wetwell assembly and shall include a lockable cover assembly with integral vent providing low profile mounting and watertight capability. The cover shall be high density polyethylene, green in color, with a load rating of 150 lbs per square foot. The domed cover shall have an outside diameter of no greater than 30 inches. Accessway design and construction shall enable field adjustment of station height in 3” increments without the use of any adhesives or sealants requiring cure time before installation can be completed. Corrugated sections are to be made of a double-wall HDPE construction with the internal wall being generally smooth. Corrugations of the outside wall are to be of a minimum amplitude of 1-1/2 inch to provide necessary transverse stiffness. Any incidental sections of a single-wall construction are to be a minimum .250 inch thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The accessway wall must withstand the pressure exerted by saturated soil loading at maximum burial depth and must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

The tank and factory penetrations shall be factory tested and guaranteed to be watertight.

The tank shall be furnished with one EPDM grommet fitting to accept a 4.50” OD DWV or Schedule 40 pipe. Tank dimensions shall be as shown on the contract drawings.

2.06 **DISCHARGE HOSE AND DISCONNECT/VALVE:** All discharge fittings and piping shall be constructed of polypropylene, EPDM or PVC. The discharge hose assembly shall include a shut-off valve rated for 200 psi WOG and a quick disconnect feature to simplify installation and pump removal. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

2.07 **ELECTRICAL QUICK DISCONNECT:** The grinder pump core shall include a factory-installed NEMA 6P electrical quick disconnect (EQD) for all power and control functions. The EQD will be supplied with 32’ total, 25’ of useable, electrical supply cable (ESC) to connect to the alarm panel. The EQD shall require no tools for assembly, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. Junction boxes are not acceptable due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required.
2.08 **CHECK VALVE**: The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

2.09 **ANTI-SIPHON VALVE**: The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.10 **CORE UNIT**: The grinder pump station shall have an easily removable core assembly containing pump, motor, grinder, all motor controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. The watertight integrity of the core unit shall be established by a 100% factory test at a minimum of 5 PSIG.

2.11 **CONTROLS**: All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating motor starting controls in a plastic enclosure is not acceptable. Wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. Level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. Level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. Level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable.

Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.

All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or
temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.

2.12 ALARM PANEL: Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D if certain options are included.

The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core’s power circuit and one 15-amp single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

2. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.

3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the “off” setting of the alarm pressure switch.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

(OPTIONAL) Alarm Contacts Package – Note: The Alarm Contacts Package is included with Sentry Simplex PreSTAT Panels

- **Alarm Activated Dry Contacts** – Normally open relay contact closes upon alarm activation.

- **Alarm Activated Contacts for Remote Indoor Alarm Module** – Will work with or without power to the alarm panel and is designed to work with E/One’s Remote Sentry.

- **Alarm Activated Remote (Powered) Contacts** – Normally open contacts that close on alarm, providing 120V on high level alarm.

(OPTIONAL) Generator Receptacle and Auto Transfer – The alarm panel shall include a 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to
provide access for connection of an external generator while maintaining a NEMA 4X rating. An automatic transfer switch shall be provided, which automatically switches from AC power to generator power. Power shall be provided to that alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. (No manual switching within the panel enclosure is necessary to switch from generator power back to AC Mains, so the mode cannot be inadvertently left in the generator position after pumping down the station in generator mode as is the case with a manual transfer switch).

**(OPTIONAL) Service Equipment/Main Service Disconnect Breaker** – A separate, internal breaker rated and approved for use as “service equipment” and acts as a main service disconnect of the grinder pump station shall be provided.

**(OPTIONAL) Remote Sentry Indoor Alarm Module** – A separate, remote indoor alarm module shall be provided to indicate a high level alarm with or without AC power to the grinder pump station. The Remote Sentry indoor alarm module shall have an internal power source enabling its continued operation without AC power. The Remote Sentry shall have an audible alarm and a visual alarm, both of which shall automatically reset if the high level alarm condition is eliminated. The Remote Sentry indoor alarm module shall include a Silence button for the audible alarm and a Test button.

**(OPTIONAL) Run-time/Hour Meter** – A run-time or hour meter to display the total run-time or operation time for the pump core shall be provided.

**(OPTIONAL) Event/Cycle Counter** – An event or cycle counter to display the number of operations of the pump core shall be provided.

**(OPTIONAL) SENTRY SIMPLEX PROTECT:**
Provides protection from the following operating conditions:

- **Low Voltage (Brownout) Protection** – A lockout cycle will prevent the motor from operating and will illuminate an LED if:
  - the incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate (211 volts for a 240 volt system) for 2 to 3 seconds, regardless of whether the motor is running or not
  - the lockout cycle will end if the incoming AC Mains voltage returns to a predetermined value, typically 10% of nameplate (216 volts for a 240 volt system)

  The system continues to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The LED remains illuminated during a Brownout condition and remains latched until the pump breaker is turned off and then on again (reset). The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

- **Run Dry Protection** – A 20-minute lockout cycle will prevent the motor from operating and will illuminate an LED when the wastewater level in the tank is below the pump inlet level. The condition is rechecked every 20 minutes. If the lockout cycle has been initiated and the condition is satisfied, the pump is not allowed to cycle normally but the LED remains latched. The LED will remain latched until the pump breaker is turned off and then on again (reset). If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the pump breaker is turned off and on (reset) or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.
• **High System Pressure Protection** – A 20-minute lockout cycle will prevent the motor from operating and will illuminate an LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). The condition is rechecked every 20 minutes. If the condition is satisfied, the pump is allowed to cycle normally but the LED remains latched. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until the condition is removed and power is reset. The LED will remain latched until the pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.

In all of the above cases, if more than one error condition is presented, the LED depicting the most recent error condition will be displayed.

Other included features:
- Alarm Activated Dry Contacts – Normally open relay contact closes upon alarm activation.
- Alarm Activated Contacts for Remote Indoor Alarm Module – Will work with or without power to the alarm panel and is designed to work with E/One’s Remote Sentry.
- Includes Inner Door Dead Front
- Separate LED’s for each condition

**(OPTIONAL) SENTRY SIMPLEX PROTECT PLUS:**
- All Sentry Protect features (as detailed above)
- High/Low Voltage monitoring with Trouble indication
- High/Low Wattage (wattage is used instead of current because it is a better indicator of pump performance) monitoring with Trouble indication
- Extended Run Time monitoring with Trouble indication
- Cycle/Event Counter
- Run Time Counter (Hour Meter)
- Run Time Limit (time adjustable, user selected options: 10 minutes (default) to 120 minutes in 1-minute intervals
- Power-up Delay (time adjustable, user selected options: None (default), to 300 minutes in 1-minute intervals
- Alarm Delay (time adjustable, user selected options: None (default) or adjustable in 1-minute intervals
- System self-test diagnostic
- User selectable Alarm latch
- User Selectable Protect Mode disable
- User selectable buzzer timer

Specific Protect PLUS indicators and programming features shall include:
- Ready LED to indicate AC power to the station is satisfactory
- Pump Run LED to indicate pump is operating
- Trouble LED indicator and predictive Visual Alarm notification (“blinking” alarm lamp; clears on Normal cycle)
- High Level Alarm LED indicator
- Manual Run switch to manually activate pump
- Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down)
- Normal Operation LED and Mode button for Mode status
- Pump Performance menu LED with LCD Display of the following pump performance statistics:
  - Real-time Voltage
  - Real-time Amperage
  - Real-time Wattage
  - Minimum/Maximum/Average Voltage
Minimum/Maximum/Average Amperage
Minimum/Maximum/Average Wattage
Minimum/Maximum Run-time
Average Run-time
Last Run-time
Cycle/Event Counter
Run Time Counter (Hour Meter)

- Diagnostics Menu LED
- Initialize System Menu LED
- Run Limit Menu LED
- Alarm Delay Menu LED
- Power Delay Menu LED

2.13 SERVICEABILITY: The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

2.14 OSHA CONFINED SPACE: All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station (as per OSHA 1910.146 Permit-required confined spaces). “Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant’s body breaks the plane of an opening into the space.”

2.15 SAFETY: The grinder pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station shall be listed by Underwriters Laboratories, Inc., to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

3.0 EXECUTION

3.01 FACTORY TEST: Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit’s dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.
The ENGINEER reserves the right to inspect such testing procedures with representatives of the OWNER, at the GRINDER PUMP MANUFACTURER’S facility.

All HDPE basins shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

3.02 CERTIFIED SERVICE PROGRAM: The grinder pump MANUFACTURER shall provide a program implemented by the MANUFACTURER’S personnel as described in this specification to certify the service company as an authorized serviced center. As evidence of this, the MANUFACTURER shall provide, when requested, sufficient evidence that they have maintained their own service department for a minimum of 30 years and currently employ a minimum of five employees specifically in the service department.

As part of this program, the MANUFACTURER shall evaluate the service technicians as well as the service organization annually. The service company will be authorized by the MANUFACTURER to make independent warranty judgments. The areas covered by the program shall include, as a minimum:

1. Pump Population Information — The service company will maintain a detailed database for the grinder pumps in the territory that tracks serial numbers by address.

2. Inventory Management — The service company must maintain an appropriate level of inventory (pumps, tanks, panels, service parts, etc.) including regular inventory review and proper inventory labeling. Service technicians will also maintain appropriate parts inventory and spare core(s) on service vehicles.

3. Service Personnel Certification — Service technicians will maintain their level-specific certification annually. The certifications are given in field troubleshooting, repair, and training.

4. Service Documentation and Records — Start up sheets, service call records, and customer feedback will be recorded by the service company.

5. Shop Organization — The service company will keep its service shop organized and pumps will be tagged with site information at all times. The shop will have all required equipment, a test tank, and cleaning tools necessary to service pumps properly.

3.03 DELIVERY: All grinder pump core units, including level controls, will be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Grinder pump cores will be shipped separately from the tanks. Installing the cores and discharge piping/hose into the tanks is the only assembly step required and allowed due to the workmanship issues associated with other on-site assembly. Grinder pump cores must be boxed for ease of handling.

3.04 INSTALLATION: Earth excavation and backfill are specified under SITE WORK, but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

The CONTRACTOR shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the ENGINEER.

Remove packing material. User instructions MUST be given to the OWNER. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4” inlet grommet (4.50” OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.
Installation shall be accomplished so that 1" to 4" of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

A 6" inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.

A concrete anti-flotation collar, as detailed on the drawings, and sized according to the manufacturer's instructions, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.

If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.

The CONTRACTOR will provide and install a 4-foot piece of 4-inch SCH 40 PVC pipe with water tight cap, to stub-out the inlet for the property owners' installation contractor, as depicted on the contract drawings.

The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the CONTRACTOR. An alarm device is required on every installation, there shall be NO EXCEPTIONS. It will be the responsibility of the CONTRACTOR and the ENGINEER to coordinate with the individual property owner(s) to determine the optimum location for the alarm panel.

The CONTRACTOR shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32' total, 25' of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a FACTORY INSTALLED EQD half to connect to the mating EQD half on the core.

3.05 BACKFILL REQUIREMENTS: Proper backfill is essential to the long-term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions. The most highly recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern; Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone, offers an added benefit in that it doesn’t need to be compacted.

Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactable soil, with less than 12% fines, free of ice, rocks, roots and organic material, it may be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85% and 90%. Heavy, non-compactable clays and silts are not suitable backfill for this or any underground structure such as inlet or discharge lines.

If you are unsure of the consistency of the native soil, it is recommended that a geotechnical evaluation of the material is obtained before specifying backfill.

Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augered holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped
more than four feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.

Backfill of clean, native earth, free of rocks, roots, and foreign objects, shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 85%. Improper backfilling may result in damaged accessways. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.

All restoration will be the responsibility of the CONTRACTOR. Per unit costs for this item shall be included in the CONTRACTOR’S bid price for the individual grinder pump station. The properties shall be restored to their original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming and seeding, and restoration of the traveled ways, as directed by the ENGINEER.

3.06 START-UP AND FIELD TESTING: The MANUFACTURER shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the OWNER’S personnel in the operation and maintenance of the equipment before the stations are accepted by the OWNER.

All equipment and materials necessary to perform testing shall be the responsibility of the INSTALLING CONTRACTOR. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

The services of a trained, factory-authorized technician shall be provided at a rate of 40 hours for every 100 grinder pump stations supplied.

Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.
2. Turn ON the alarm power circuit and verify the alarm is functioning properly.
4. Turn ON the pump power circuit. Initiate the pump operation to verify automatic “on/off” controls are operative. The pump should immediately turn ON.
4. Consult the Manufacturer’s Service Manual for detailed start-up procedures.

Upon completion of the start-up and testing, the MANUFACTURER shall submit to the ENGINEER the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

4.0 OPERATION AND MAINTENANCE

4.01 SPARE CORE: The MANUFACTURER will supply one spare grinder pump core for every 50 grinder pump stations installed or portion thereof, complete with all operational controls, level sensors, check valve, anti-siphon valve, pump/motor unit, and grinder.

4.02 MANUALS: The MANUFACTURER shall supply four copies of Operation and Maintenance Manuals to the OWNER, and one copy of the same to the ENGINEER.
WARRANTY PERFORMANCE CERTIFICATION

As a pre-bid certification requirement, each bidder shall provide a Warranty Performance Certification executed by the most senior executive officer, which certifies a minimum of a two (2) year warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the manufacturer will bear all costs to correct original equipment deficiency for the effective period of the warranty.

I, ____________________________________________________, by and through my duly authorized signature below as its most senior operating executive, certify that ______________ _____________________________________________________ will provide a two (2) year warranty on grinder pump equipment manufactured and supplied by ______________________ for the ______________________ project. I further certify that, other than failure to install equipment in accordance with manufacturer’s instructions, no exclusions and/or cost items to maintain said equipment in warrantable condition, including labor, travel and shipping fees, exist except as detailed immediately below:

EXCLUSIONS: 1. _________________________________________________
  2. _________________________________________________
  3. _________________________________________________

COST ITEMS TO MAINTAIN EQUIPMENT REQUIRED
IN WARRANTABLE CONDITION: Frequency (mos) times warranty period

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Total labor/material cost to maintain equipment in warrantable condition for warranty period ($):

For any items not identified as exclusions or additional cost items above, OR for additional labor & material costs required to maintain equipment in warrantable condition that exceed the Avg. monthly cost ($) detailed above, ______________________ will bear all costs to correct such original equipment deficiency for the effective period of the warranty including all applicable labor, travel and shipping fees.

_________________________ ______________________
Signature Date

_________________________
Title
MANUFACTURER’S DISCLOSURE STATEMENT

Note: To be completed if proposing an alternate

1.0 GENERAL:

1.01 General Description
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

1.04 Experience
List 10 low pressure sewer system installations of the type of pump/station specified (progressive cavity type) that have been in operation for a period of no less than ten years with a minimum of 100 pumps pumping into a “common” low pressure sewer system. Provide Name and Location, Contact Name, Phone Number, Number of Pumps, and Install Date for each.
____________________________________________________________________________________
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1.05 Operating Conditions
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________

1.06 Warranty
Fully state the manufacturer’s warranty:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.0 PRODUCT:

2.01 Pump
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________

2.02 Grinder
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
2.03 Motor
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
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2.05 Tank
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
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2.07 Electrical Quick Disconnect
Describe all non-conforming aspects to the specification:
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____________________________________________________________________________________

2.08 Check Valve
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.09 Anti-Siphon Valve
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.11 Controls
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.15 Safety
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

3.0 EXECUTION:

3.01 Factory Test
Describe all non-conforming aspects to the specification:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
I attest that all questions are answered truthfully and all non-conforming aspects to the specifications have been described where requested.

Manufacturer: ____________________________________________________________

By: ______________________    ______________________   Date: ________
   Name of Corporate Officer      Signature

   Title of Corporate Officer

Witness: __________________ ______________________   Date: ________
   Name                          Signature
NOTES:

1. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C478. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C443 AND SHALL BE GROUTED FROM THE INSIDE AND OUTSIDE. LIFT HOLES SHALL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE.

2. STEPS IN MANHOLE SHALL HAVE 6” MINIMUM CLEARANCE.

3. SEWER MANHOLE SHALL HAVE CONSISTANT WALL THICKNESS WITH NO KNOCKOUTS. MANHOLE SHALL BE MANUFACTURE CORED OR CORED ON SIGHT.

4. CONNECTION TO MANHOLE SHALL BE MADE BY KOR-N-SEAL BOOT OR LINK SEAL.

5. SEE DETAIL 5-3 FOR MANHOLE COLLAR INSTALLATION.

6. A SEWER GUARD SHALL BE INSTALLED IN ANY MANHOLE SUBJECT TO FLOODING.

7. WHEN POSSIBLE, RUN PIPE THROUGH MANHOLE, CHANNEL AND THEN REMOVE TOP OF PIPE TO PROVIDE A SMOOTH ABRASION RESISTANT CHANNEL.

8. MANHOLES SUBJECT TO HIGH LEVELS OF H2S OR AS DIRECTED BY CITY SHALL BE COATED ON THE INTERIOR WITH SPECTRA SHIELD OR APPROVED EQUAL. AREAS OF HIGH GROUND WATER SHALL HAVE EPOXY COATING APPLIED TO THE EXTERIOR.

9. SEWER LINES SHALL HAVE A MAXIMUM DEPTH OF 24’. A REQUEST FOR SEWER DEEPER THAT 24’ SHALL BE REVIEWED BY THE CITY. CITY’S DETERMINATION SHALL BE FINAL.
NOTES:

1. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C478. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C443 AND SHALL BE GROUTED OUTSIDE AND INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE.

2. STEPS IN MANHOLE SHALL HAVE 6" MINIMUM CLEARANCE.

3. THE RING AND COVER FOR MANHOLES LESS THAN 5' SHALL BE INSTALLED OVER THE OUTLET CHANNEL OR AS DIRECTED BY THE CITY.

4. CONNECTION TO MANHOLE SHALL BE MADE BY KOR-N-SEAL BOOT OR LINK SEAL.

5. SEE DETAIL 5-3 FOR MANHOLE COLLAR INSTALLATION.

6. A SEWER GUARD SHALL BE INSTALLED IN ANY MANHOLE SUBJECT TO FLOODING.

7. WHEN POSSIBLE, RUN PIPE THROUGH MANHOLE, CHANNEL AND THEN REMOVE TOP OF PIPE TO PROVIDE A SMOOTH ABRASION RESISTANT CHANNEL.

8. MANHOLES SUBJECT TO HIGH LEVELS OF H2S OR AS DIRECTED BY CITY SHALL BE COATED ON THE INTERIOR WITH SPECTRA SHIELD OR APPROVED EQUAL. AREAS OF HIGH GROUND WATER SHALL HAVE EPOXY COATING APPLIED TO THE EXTERIOR.
NOTES:
1. ON MANHOLE OUTSIDE ASPHALT ADD REINFORCING STEEL AS SHOWN ABOVE. DEFORMED BAR TO MEET ASTM A615 FY=60,000 P.S.I.
2. ALL SEWER MANHOLE LIDS SHALL BE ESIW OR PAMREX 24" GASKETED OR APPROVED EQUAL.
3. ALL SEAMS SHALL BE GROUTED INSIDE AND OUTSIDE.
4. IF COATING IS APPLIED, COATING SHALL RUN TO BOTTOM OF COVER GROVE.
NOTE:
1. ALL SEWER PIPE SHALL BE ASTM 3034 SDR 35.
2. LOCATED IN CENTER OF CUL-DE-SAC WHEN APPROPRIATE.
NOTES:
1. A RAIN GUARD SHALL BE REQUIRED.
CONSTRUCTION NOTES:

1. 4" DOUBLE SWEEP AT HOUSE.
2. WITHIN 24" OF FOUNDATION WALL.
3. MINIMUM COVER ON PRIVATE PROPERTY IS 24" OVER TOP OF PIPE.
4. 6" x 4" REDUCER WHERE REQUIRED.
5. SIDE SEWER PIPE SHALL BE 4" OR LARGER.
6. 6" SWEEPING CLEANOUT TEE BROUGHT TO THE SURFACE AT THE PROPERTY LINE. CLEANOUT CASTING STAMPED "SEWER" REQUIRED.
7. MINIMUM DEPTH AT PROPERTY LINE IS 48".
8. BUILDING SEWER SHOULD HAVE A MINIMUM 2% UNIFORM GRADE AND BE IN STRAIGHT ALIGNMENT INsofar AS POSSIBLE.
9. SWEEPING TEE AT MAIN.
10. 5/8" CSTC BEDDING AROUND PIPE.
11. LOCATE WIRE AND LOCATE TAPE REQUIRED IN TRENCH.
NOTE:
1. INSIDE DROP MANHOLE SHALL BE 60" MIN. DIAMETER FOR 4"-10" DROPS. 72" MANHOLE SHALL BE REQUIRED FOR 12"-16" INSIDE DROPS. ALL SIZES ARE SUBJECT TO CONDITIONS.
2. ALL HARDWARE FOR DUCTILE IRON FITTINGS AND PIPE BRACKETS SHALL BE STAINLESS STEEL.
3. PIPES SHALL BE SCH. 80 PVC, ALONG WITH 45° FITTING AT BOTTOM OF DROP.
4. ALL FITTINGS SHALL BE DUCTILE IRON.
5. MANHOLE ACCESS TO BE LOCATED NEXT TO DROP TO ALLOW ACCESS TO DUCTILE IRON CROSS.
6. VAN STONE FLANGE SHALL BE USED AT BOTTOM OF DROP PIPE TO ALLOW FLOW TO BE EASILY DIRECTED INTO EXISTING CHANNEL.
7. MANHOLE PENETRATION SHALL BE CORED AND CONNECTED USING LINK SEAL. PENETRATION SHALL BE GROUTED INSIDE AND OUT.
S.T.E.P SEPTIC TANK
1500 GALLON

CONSEAL CS102 CONCRETE SEALANT

END VIEW

SIDE VIEW

NOTES:
1. SEE SECTION 5E.030 AND 5E.035 FOR APPROVED TANKS.
2. REINFORCING STEEL:
   DEFORMED BAR ASTM A615
   GRADE 60 FY=60,000 P.S.I.
3. CONCRETE: F'c=4000 P.S.I.
4. LOADING:
   TOP SLAB:
   2500 L.B. WHEEL LOAD
   OVER 2½ SQ. FT.
   400 P.S.F. SOIL LOAD
   LATERAL LOAD:
   62.4 P.C.F. HYDROSTATIC
   SOIL BEARING:
   1000 P.S.F. ASSUMED
5. THIS TANK IS NOT DESIGNED TO WITHSTAND AN H-20 LIVE LOAD
6. CALL APPROVED TANK MANUFACTURER FOR DIMENSIONS. DIMENSIONS MAY VARY BETWEEN MANUFACTURERS.
7. INTERIOR SHALL BE COATED WITH SPRAY WALL, RAVEN 405 OR APPROVED EQUAL AS DETERMINED BY CITY.

CITY OF GIG HARBOR
ENGINEERING DIVISION

1500 GALLON
S.T.E.P SEPTIC TANK

OPENING 18" DIA. MIN.

24" DIA. FLANGED TANK ADAPTER OSI PRTA 24

30" DIA. FLANGED TANK ADAPTER OSI FRTA 30

PLAN

DETAIL NO. 5-08

APPROVED BY
CITY ENGINEER

1/1/2014
NOTES:

1. SEE SECTION 5E.030 AND 5E.035 FOR APPROVED TANKS.
2. REINFORCING STEEL:
   DEFORMED BAR ASTM 615
   GRADE 60 FY=60,000 P.S.I.
3. CONCRETE: FC=4000 P.S.I.
   COMPRESSIVE STRENGTH @ 28
   DAY TEST. MAX. AGGREGATE
   SIZE 3/8raith
4. LOADING:
   TOP SLAB:
   2500 LB. WHEEL LOAD
   OVER 2 1/2 SQ. FT.
   400 P.S.F. SOIL LOAD
   LATERAL LOAD:
   62.4 P.C.F. HYDROSTATIC
   SOIL BEARING:
   1000 P.S.F. ASSUMED
5. THIS TANK IS NOT DESIGNED
   TO WITHSTAND AN H-20
   LIVE LOAD
6. INTERIOR SHALL BE COATED WITH SPRAY
   WALL, RAVEN 405 OR APPROVED EQUAL
   AS DETERMINED BY CITY.

CITY OF GIG HARBOR
ENGINEERING DIVISION

3000 GALLON
S.T.E.P SEPTIC TANK

DETAIL NO.

5-09

APPROVED BY

CITY ENGINEER

DATE 1/1/2014
S.T.E.P. TANK
1500 GALLON

FIBERGLASS LID WITH STAINLESS STEEL BOLTS, NEOPRENE GASKET AND OPTIONAL STYROFOAM INSULATION
24" DIA. RIBBED PVC RISER INSTALLED AT FINISH GRADE.

ALL RISER LIDS SHALL BE RAISED TO FINISH GRADE.
THE BACKFILL MATERIAL SHALL BE PLACED UP THE SIDES OF THE TANK TO WITHIN 10" OF FINISH GRADE COVERING THE TOP OF THE TANK, INSTALLED AT FINISH GRADE.

FLANGED TANK ADAPTER
CONSEAL CS102 CONCRETE SEALANT
STANDARD PVC INLET TEE
4" NEOPRENE TY-SEAL
GASKET SEAL (ASTMC564)

THE INSIDE AND OUTSIDE SURFACES SHALL BE PROTECTED BY APPLYING A HEAVY CEMENT-BASE WATERPROOF COATING OF THOROSEAL OR AN APPROVED EQUAL.

FLANGED TANK ADAPTER

S.T.E.P.S.
(STEP TANK EFFLUENT PUMP SYSTEM)
SIDE VIEW TYPICAL 1,500 GALLON TANK

NOTES:
1. TANKS SHALL BE BEDDED ON 6 INCHES OF ¾" CRUSHED ROCK OR PEA GRAVEL. SIDES SHALL BE COMPACTED IN 2 FOOT LiftS TO THE SAME OR GREATER DENSITY THAN THE SURROUNDING AREA.
2. PIPING FROM PUMP TO THE MAINLINE CONNECTION SHALL BE 11 / 4" SCHEDULE 80 PVC.
3. ALL BACKFILL MATERIAL FOR THE TANK SHALL BE SAND OR GRAVEL BACKFILL FOR PIPE ZONE BEDDING PER WSDOT 9-03.12(3), PAGE 9-27.

FIBERGLASS LID WITH STAINLESS STEEL BOLTS, NEOPRENE GASKET
AND OPTIONAL STYROFOAM INSULATION MAXIMUM HEIGHT = 48 INCHES
30" DIA. x MIN. 18" HIGH RIBBED PVC RISER WITH 1 NEOPRENE GROMMET.
1" DIA. HIGH PRESSURE PVC HOSE AND BALL VALVE ASSEMBLY WITH FLO-CONTROL

FOR SERVICE BOX CONNECTION SEE DETAIL 5-18.

1" DIA. HIGH PRESSURE HOSE (12" LONG WITH FITTINGS).

PVU 57-1820 VAULT
BIO-TUBE (1/8" MESH).

1-1/4" 316 STAINLESS STEEL CHECK VALVE.
1-3/8" DIA. INLET HOLES AROUND PERIMETER OF VAULT (8 EACH).
DRAIN PORT WITH NEOPRENE FLAP CHECK.

MODEL P10 OSI 05 HHF HIGH HEAD SUBMERSIBLE EFFLUENT PUMP OR APPROVED EQUAL WITH S.O. POWER CABLE AND ¾" BY-PASS ORIFICE IN THE DISCHARGE HEAD.

SEE SECTION 5E FOR APPROVED TANKS.
S.T.E.P. TANK
3000 GALLON

FIBERGLASS LID WITH STAINLESS STEEL BOLTS, NEOPRENE GASKET AND OPTIONAL STYROFOAM INSULATION
24" DIA. RIBBED PVC RISER INSTALLED AT FINISH GRADE

ALL THE RISER LIDS SHALL BE RAISED TO FINISH GRADE. THE BACKFILL MATERIAL SHALL BE PLACED UP THE SIDES OF THE TANK TO WITHIN 10" OF FINISH GRADE COVERING THE TOP OF THE TANK. INSTALLED AT FINISH GRADE.

FLANGED TANK ADAPTER

CONSEAL CS102 CONCRETE SEALANT

STANDARD PVC INLET TEE
4" NEOPRENE TY-SEAL GASKET SEAL (ASTMC564)

THE INSIDE AND OUTSIDE SURFACES SHALL BE PROTECTED BY APPLYING A HEAVY CEMENT-BASED WATERPROOF COATING OR AN APPROVED EQUAL.

FIBERGLASS BOTTOM

6" SAND OR PEA GRAVEL

LEVEL CONTROL FLOAT ASSEMBLY MOD: "SI MF SR APPROVED EQUAL"

INTERNAL ELECTRICAL SPlice BOX W/CORD GRIPS ELECTRICAL CONDUIT TO POWER SOURCE

ANTI-SYPHON VALVE FILTER SUPPORT

RAISE GREEN 8" ORANGE CAP TO FINISH GRADE

9" 6" ALARM

ON-OFF 3-1/2" OFF

REDUNDANT OFF AND LOW LEVEL ALARM

10" MAX.

10" MAX.

FOR SERVICE BOX CONNECTION SEE DETAIL 5-18.

1" DIA. HIGH PRESSURE PVC RISER WITH 1 NEOPRENE GROMMET.

1" DIA. HIGH PRESSURE PVC HOSE AND BALL VALVE ASSEMBLY WITH FLO-CONTROL AT A

FLANGED TANK ADAPTER

S.T.E.P.S.
(STEP TANK EFFLUENT PUMP SYSTEM)
SIDE VIEW TYPICAL 3,000 GALLON TANK

NOTE:
1. TANKS SHALL BE BEDDED ON 6 INCHES OF 3/4" CRUSHED ROCK OR PEA GRAVEL. SIDES SHALL BE COMPACTED IN 2 FOOT LIFTS TO THE SAME OR GREATER DENSITY THAN THE SURROUNDING AREA.
2. PIPING FROM THE PUMP TO THE MAINLINE CONNECTION SHALL BE 11/4" SCHEDULE 80 PVC.
3. ALL BACKFILL MATERIAL FOR THE TANK SHALL BE SAND OR GRAVEL BACKFILL FOR PIPE ZONE BEDDING PER WSDOT 9-03.12(3), PAGE 9-27.

1-1/4" STAINLESS STEEL CHECK VALVE.

1-3/8" DIA. INLET HOLES AROUND PERIMETER OF VAULT (8 EACH).

DRAIN PORT WITH NEOPRENE FLAP CHECK.

MODEL P20 OSI 05 HHF HIGH HEAD SUBMERSIBLE EFFLUENT PUMP OR APPROVED EQUAL WITH S.O. POWER CABLE AND 3/4" BY-PASS ORIFICE IN THE DISCHARGE HEAD.

SEE SECTION 5E FOR APPROVED TANKS.
NOTE:
ALL VALVES MUST HAVE A 14 GAUGE COATED COPPER TRACER WIRE TIED OFF AT VALVE BODY, EXTENDED OUTSIDE PVC RISER PIPE THEN EXTENDED ONE FOOT TOP OF VALVE BOX.

VALVE STEM EXTENSION LEGEND
① VALVE OPERATING NUT OR 1-7/8" x 1-7/8" x 2" HIGH GRADE STEEL WELDED TO GUIDE PLATE.
② 3/16" THICK x 5-1/2" DIA. STEEL GUIDE PLATE WELDED TO RISER SHAFT.
③ 2" x 2" x 3/16" STRUCTURAL STEEL TUBING TO FIT OPERATING NUT. LENGTH AS REQUIRED.

NOTE:
ALL WELDS TO SHAFT SHALL BE FILLET WELD ALL AROUND, AS SPECIFIED ABOVE.

CITY OF GIG HARBOR ENGINEERING DIVISION

STANDARD VALVE BOX

APPROVED BY CITY ENGINEER DATE 1/1/2014
4" SCHEDULE 40 STEEL OR REINFORCED CONCRETE MARKER POST STAMPED WITH "S" AND DISTANCE TO VALVE POST TO RECEIVE ONE PRIME COAT AND TWO COATS OUTDOOR OIL BASE ENAMEL (GREEN)

LOCATE WIRE FROM SEWER STUD WRAPPED AROUND MARKER POST
NOTE:
1. CONTROL PANEL REQUIREMENT ARE IN 5E.095.
2. ELECTRICAL CONDUIT MUST BE BEDDED IN SAND OR PEA GRAVEL.
3. STEP LINES UNDER DRIVEWAYS SHALL BE CASED IN 2" CLASS 200 PVC EXTENDED 2 FEET BEYOND THE DRIVEWAY EDGES.
A SQUARE D 30A 240 VAC 3R SAFETY SWITCH NON-FUSED IS REQUIRED.
NOTES:
1. FILL SERVICE BOX WITH FIBERGLASS INSULATION AT TIME OF ON-SITE CONNECTION TO THE STUB.
2. AFTER THE HYDRO-STATIC TESTS HAVE BEEN APPROVED BY THE CITY INSPECTOR THE CHECK VALVE SHOULD BE INSTALLED.
3. FOR HDPE REQUIREMENTS SEE CHAPTER 50.
4. FUTURE LOT CONNECTION SHALL BE MADE AT THE 90° ELBOW WITH THE TRACER INCLUDED IN THE INSTALLATION.
5. ALL PIPING AND FITTINGS SHALL BE SCHEDULE 80.
6. THE 1¾" VALVE SHALL BE A PHILMAC THREADED.
7. THE CHECK VALVE SHALL BE KING BRO'S # KSC 1250 T THREADED.
8. SERVICE BOX—CARSON INDUSTRIES MODEL NO. 1419 WITH BOLTED, FLAT COVER AND NO. 1419 EXTENSION WHEN IN NON-Traffic AREAS, "VALVE BOX BOX LID SHALL BE MARKED SEWER".
30" OPENING W/ 30" CAST IRON MANHOLE FRAME AND COVER. NO BOLT-DOWN LIDS ALLOWED. RAIN GUARD REQUIRED.

72" DIA. MANHOLE

GRADE RING

POLYPROPYLENE STEPS
TOP SLAB

EPOXY COATED FLANGED RESILIENT PLUG VALVES

72" FLAT TOP MANHOLE W/ BASE AS REQUIRED BY THE CITY OF GIG HARBOR.

MEGALUG
FLANGE TEE

MEGALUG

FLOW

2" MIN. CLEARANCE (TYP.)

ADJUSTABLE PIPE SADDLE SUPPORTS

PIPE SIZE VARIES

TOP VIEW THROUGH MANHOLE OPENING

NOTES:
1. ALL APPURTENANCES INSTALLED SHALL BE THE SAME SIZE AS THE PIPE
2. THE SIZE OF THE MANHOLE SHALL BE DETERMINED BY THE SIZE OF THE PIPE.
30" OPENING W/30" CAST IRON MANHOLE FRAME AND COVER. NO BOLT DOWN LIDS ALLOWED. RAIN GUARD REQUIRED.

GRADE RING
72" DIA. MANHOLE

POLYPROPYLENE STEPS
TOP SLAB

EPOXY COATED FLANGED RESILIENT PLUG VALVES

--- FLAT TOP MANHOLE W/BASE AS REQUIRED BY THE CITY OF GIG HARBOR

GROUT GAPS WITH GROUT AROUND ALL PIPES

2” MIN. CLEARANCE (TYP.)

FLOW

TO TOP VIEW THROUGH MANHOLE OPENING

NOTES:
1. ALL APPURtenances INSTALLED SHALL BE THE SAME SIZE AS THE PIPE.
2. THE SIZE OF THE MANHOLE SHALL BE DETERMINED BY THE SIZE OF THE PIPE.
NOTE:
FOR LIVE TAP,
ROADWAY INSTALLATION

TOP SLAB OF THE
48" MANHOLE

GRADE RINGS
4" MIN
16" MAX

FRAME AND LID

APPROVED VALVE BOX
W/"GIG HARBOR SEWER"

6" PVC PIPE

THRUST BLOCK
W/FILTER FABRIC
OR PLASTIC
BARRIER

POLYPROPYLENE
STEPS 12" TYP

90 DEGREE ELL

PVC TEE
2 PHILMAC VALVES
PVC PIPING

14 GA.
TRACER WIRE
PVC UNION

PHILMAC VALVE

ADJUSTABLE PIPE
SADDLE SUPPORTS
TYP

6" OF 5/8" CRUSHED ROCK BEDDING

NOTES:
1. CONNECTION TO MANHOLE SHALL BE MADE
   BY KOR—N—SEAL BOOT.

2. SEE DETAIL 5–3 FOR MANHOLE COLLAR
   INSTALLATION.

3. A SEWER GUARD SHALL BE INSTALLED IN
   ANY MANHOLE SUBJECT TO FLOODING.

4. GROUT ALL JOINTS AND CONNECTION
   POINTS WITH NON—SHRINK CROUT.

5. THE PLACEMENT OF THE VALVE ASSEMBLY
   SHALL BE DIRECTLY BELOW THE MANHOLE
   FRAME AND LID.
NOTES:

1. CONNECTION TO MANHOLE SHALL BE MADE BY KOR-N-SEAL BOOT.
2. SEE DETAIL 5-3 FOR MANHOLE COLLAR INSTALLATION.
3. A SEWER GUARD SHALL BE INSTALLED IN ANY MANHOLE SUBJECT TO FLOODING.
4. GROUT ALL JOINTS AND CONNECTION POINTS WITH NON-SHRINK GROUT.
5. THE PLACEMENT OF THE VALVE ASSEMBLY SHALL BE DIRECTLY BELOW THE MANHOLE FRAME AND LID.
NOTE:
1. FOR VALVE STEM RISER REQUIREMENTS SEE DETAIL 5-15.
2. THE PIG LAUNCH SIZES SHALL BE THE SAME SIZE AS THE MAIN.
3. VALVE BOXES SHALL BE INLAND FOUNDRY #248 OR OLYMPIC FOUNDRY VB-950 VALVE BOX W/"CITY OF GIG HARBOR" CAST IN LID.
#4 REBAR TO MEET ASTM A615 GRADE 60 FY=60,000 PSI

COMMERCIAL CONCRETE PAD – 9’ x 4’ x .67” (IF OUTSIDE PAVED ROADWAY)

PAVEMENT

THREADED CAP
HAND TIGHT

MALE ADAPTOR

24” CONCRETE CULVERT PIPE, 2’ DEEP, WITH STANDARD SEWER FRAME AND COVER.

4” COMMERCIAL CONCRETE

2-45° ELBOWS

THRUST BLOCK W/BARRIER NEXT TO PIPE

UNDISTURBED EARTH

IFCO 248 OR OLYMPIC VB–950 VALVE BOX WITH COVER MARKED "GIG HARBOR SEWER"

6” PVC 3034 SEWER PIPE

NOTE:

1. FOR VALVE STEM RISER REQUIREMENTS SEE DETAIL 5–15. PHILMAC VALVES DO NOT REQUIRE EXTENSIONS.
2½" CLEAR FOR FRAME

3" x ¼" TYPE 316 SS FLAT BAR

½" TYPE 316 SS BARS (TYP.) WELD ALL BARS TO FRAME & EACH OTHER. OPENING SIZE = 1½"

2% SLOPE

TYPE 316 SS LAYERED FLAT BAR GATE FRAME W/ 2" DEEP ¾" WIDE OPENING ON SIDES ONLY.

NOTES:

1. THE DOWNSTREAM AREA BEHIND GATE MUST NOT ALLOW PIG TO CONTINUE TRAVEL DOWN PIPE.
NOTES:
1. FOR VALVE BOX REQUIREMENTS SEE DETAIL 5–15.
2. THIS IS A FUTURE EXTENSION DETAIL. THE TEST REQUIREMENTS SHALL BE PER SECTION 54.070 TESTING UNDER FORCE MAINS.
3. FOR PIPING REQUIREMENTS SEE SECTION 50.030 PRESSURE MAIN.
316 STAINLESS STEEL PIPE STRAP AND MOUNTING HARDWARE

1" PVC COATED RMC CONDUIT FROM CONTROL CABINET

USE SHRINKLESS GROUT AROUND CONDUIT

INSIDE WALL OF WET WELL

WET WELL ACCESS DOOR

CONDUIT MOUNTED MAXIMUM 18" BELOW UNDERSIDE OF LID

1" PVC SCHEDULE 80 UNION

LEVEL TRANSDUCER

MIN. 18"
NOTE:
1. INSERT-A-TEE SHALL NOT BE ALLOWED.
NOTE:

1. MANHOLE SHALL BE COATED ON THE INSIDE WITH TNEMIC 120 VINYL ESTER OR QUANTUM POLYMORPHIC RESIN.

2. INSTALL A CONCRETE PAD WHEN LOW POINT DRAIN MANHOLE IS INSTALLED OUTSIDE OF PAVED AREA. SEE DETAIL 5–3.
NOTES:

1. 11 MIL PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUST BLOCK AND BACKFILL ARE POURED.

2. CONTROLLED DENSITY BACKFILL IS A PLANT MIX CONSISTING OF: 3100# SAND, 450# WATER, AND ONE SACK (94#) OF CEMENT.

3. MJ CUT IN TEES SHALL NOT BE PERMITTED.

4. SUPPORT VALVE AND SLEEVE CONTINUOUSLY THROUGH INSTALLATION.
Design Criteria:

**Uniform Plumbing Code** - Appendix H

**Number of Meals x Waste Flow x Retention x Storage = Capacity in Gallons**

**Notes:**
1. Concrete: 28 Day Compressive Strength f'c = 7000 psi
2. Rebar: ASTM A-615 Grade 60
3. Mesh: ASTM A-185 Grade 65
5. Loads: H-20 Truck Wheel w/ 30% Impact Per AASHTO
6. Fill w/ Clean Water Prior To Start-Up Of System
7. Contractor To Supply & Install All Piping & Sampling Tees
8. Gray Water Only, Black Water Shall Be Carried By Separate Side Sewer
FLOAT CABLES*

1/2" COLLAR WIDTH

MOUNTING BRACKET* TO BE ATTACHED TO CONCRETE SURFACE

TRANSUDER CABLES*

LIFTING EYE 1/4" MIN. DIAMETER

1-1/2" CLEARANCE BETWEEN TOP OF COLLAR AND INSIDE OF LIFTING EYE

CABLES

3/8" STAINLESS WEDGE ANCHORS

2" STAINLESS WELDED FLAT BAR OR RECEIVER TUBE WITH ONE SIDE REMOVED

5/16" OFFSET HOLE FOR STAINLESS STEEL PIN IN FLOAT TREE

2" SQUARE TUBING (SS)

1" SCH 40 STAINLESS STEEL

PRESSURE TRANSDUCER

* NOTES
1. CABLES MUST BE LONG ENOUGH TO PULL FLOAT TREE VERTICALLY OUT OF WET WELL W/O DISCONNECTING
2. 3/8" x 4" x 6" STAINLESS STEEL MOUNTING BRACKET

CITY OF GIG HARBOR ENGINEERING DIVISION

TRANSUDER/ FLOAT TREE 5-30

APPROVED BY CITY ENGINEER  

DATE 1/1/2014