



Memorandum

To: Karl Hadler, Carollo Engineers

From: Chad Sanderson, AIA

Project/No: Oak Harbor Preliminary Design

Re: Oak Harbor Waste Water Treatment Plant, Preliminary Code Report

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The following information represents a preliminary code report for the new City of Oak Harbor Waste Water Treatment Plant. The building specific information herein is based on preliminary estimates of building size, height, and function provide to MWA by Carollo Engineers. The information in this report will be refined as the design of the facility progresses and should only be used as a rough guide for preliminary design activities.

The design of this new facility will be governed by several code authorities including but not limited to:

- City of Oak Harbor Regulations and Guidelines
 - City of Oak Harbor Municipal Code
 - Title 11 Streets and Sidewalks
 - Title 12 Stormwater
 - Title 14 Sewers (See Appendix F)
 - Title 17 Buildings
 - Title 18 Planning Ordinance
 - Title 19 Zoning Ordinance
 - Title 20 Environmental



- <http://www.codepublishing.com/WA/OakHarbor/>
- Shoreline Master Program (Nov, 2012)
 - <http://www.oakharbor.org/page.cfm?pageId=358>
- Design Regulations and Guidelines (2006)
 - http://www.oakharbor.org/uploads/documents/1233design_regulations_and_guidelines_approved_4_18_06.pdf
- 2012 International Building Code (IBC) with Washington Amendments
 - <http://publicecodes.cyberregs.com/icod/ibc/2009/>
- International Fire Code (IFC), current edition (most relevant sections re-appear in the IBC)
 - <http://publicecodes.cyberregs.com/icod/ifc/2012/index.htm>
- 2012 Washington State Energy Code (WSEC), current edition
 - <http://apps.leg.wa.gov/wac/default.aspx?cite=51-11>
- NFPA 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities, 2012 Edition
 - <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=820>
- OSHA regulations
 - <http://www.osha.gov/law-regs.html>

Many of the above regulations are available for review on the internet, and their corresponding web addresses are listed after each in blue text.

Further details regarding the requirements for some of the above regulations are listed below.

City of Oak Harbor Zoning Ordinance

Based on the current proposed location, the plant site will likely lie within the C-3 Commercial and/or PF Public Facilities zone. The city has declared this facility is consistent with an Essential Public Facility designation, permitting this use in both districts subsequent to a site approval process (attached in Section 5).

Six criteria must be met to qualify for a site approval use permit:

1. *All special conditions for that particular use are met;*
2. *It does not have significant, adverse environmental impact resulting in excessive*
2. *noise, light and glare or soil erosion on adjacent property;*



- 3. *It is provided with adequate parking;*
- 4. *It is served with adequate public streets, public utilities and facilities;*
- 5. *It otherwise meets the purpose of the district in which it is to be placed;*
- 6. *It meets the goals and policies of the Oak Harbor Comprehensive Plan.*

There are three steps to the site approval process. The first step is to meet with the City staff to discuss the project. The second step is to submit a conditional use application. The final step involves a public review. The public need to be notified at least 15 days prior to the public hearing through signage, letter communication with homeowners adjacent to the affected site and a published legal notice in the City’s official newspaper (City of Oak Harbor 2012). After review of all comments, city staff will issue a notification of decision.

Density provisions for both zones are as follows:

Zone	Lot Standards			Setbacks (in feet)			Bldg Ht (ft)*	Lot Coverage	Site/Design Review?
	Area	Width	Depth	Front	Side	Rear			
C-3	NL	NL	NL	35/15 ¹	NL/30 ²	NL ³	35	NL	Y
PF ⁶	NL	NL	NL	35	NL/12/35/20 ⁴	NL/35/12 ⁵	35	NL	Y

Notes:

NL = No Limitation

- 1: The building setback may be reduced to 15 feet if the entire setback area from property line to building is landscaped where reduction occurs
- 2: No limitation, except when abutting a residentially zoned property, then 30 feet each. For corner lots, the side yard abutting a public street shall be the same as the front setback.
- 3: no limitation, except when abutting a public street, then it shall be the same as the front setback.
- 4: no limitation, except when abutting a residentially zoned property, then 12 feet each side. For corner lots, a side yard abutting a public street shall be 35 feet except that the city council may approve a variable setback of not less than 20 feet or the established building line on adjoining property, whichever is greater, after consideration at a public meeting or public hearing.
- 5: No limitation except when abutting a public street, then 35 feet. If abutting a residential area, a 12’ setback is required.
- 6: Exemptions. Public parking lots are exempt from the density provisions of the PF zone; provided that other provisions of this title shall apply.

*Oak Harbor measures height from the overall site, and not the building base. It is the average property line corners that the building faces. **City of Oak Harbor Street Design Standards**

Section 11.17 of the Oak Harbor Municipal Code outlines the requirements for street design within the city. These requirements will apply to any realignment of Bayshore Drive or public access roads to the park and therefore should be considered when designing the new facility. That said, the code often notes that the City Engineer can approve alterations to these street design requirements.



The core street design requirements are summarized below.

Table 11.17-2 “Required Street Improvements” lists the criteria and dimensions for street improvements based on street function. That table is reproduced here.

Street Type	ROW Width*	Face of Curb to Face of Curb Width	Sidewalk Width Each Side	Landscape Strip Each Side	Bike Lane Width Each Side
Principal Arterial, 4-Lane	97-105 ft	52 ft without bike lanes, 60 ft with bike lanes. Landscaped median is 12 ft.	8 ft	12 ft	4 ft
Minor Arterial, 2-Lane	80 ft	47 ft, with 11 ft center turn lane	5 ft	10.5 ft	5 ft
Minor Arterial Industrial	60 ft	38 ft	None	6 ft (bioswale)	4 ft
Collector w/ Bike Lanes	66 ft	48 ft	5 ft	3 ft	5 ft
Collector, Industrial	50 ft	26 ft	None	6 ft (bioswale)	4 ft, one side
Local Residential Narrow	50 ft	28 ft with one parking lane. Or 28 ft including two 4 ft bike lanes and no parking	5 ft	5 ft	4 ft, optional
Local Residential Wide	60 ft	36 ft parking on both sides. Or 36 ft with parking on one side and 4 ft bike lanes on both sides	5 ft	5 ft	4 ft, optional
Local LID Street #1	50 ft	20 ft (two 10 ft travel lanes)	5 ft	8 ft planter strip on elevated side. 10 ft utility corridor on basin side. Bioretention outside of right-of-way.	None
Local LID Street #2	60 ft	28.5 ft with one 8.5 ft parking lane on basin side of street	5 ft	9.5 ft planter strip on elevated side. 10 ft utility strip on basin side. Bioretention outside of right-of-way.	None
Alley	20 ft	19 ft**	None	None	None

*All street types include a six-inch strip at the outside edge of the physical improvements, but within the right-of-way, with the exception of the “Minor Arterial, Industrial” which has a one-foot strip on the outside edge of right-of-way, the “Collector, Industrial” which has a four-foot strip on the outside edge of right-of-way, and the “Local LID Street #2” which has a one-foot strip on the outside edge of right-of-way.

**Sixteen-foot width pavement sections may be used as approved on alleys by the city engineer



Intersection Separation: Section 11.17.080-(2) states that intersection spacing of less than 125 feet is not allowed.

Section 11.17.100 lists the criteria for street geometry including curves, tangents, and grade change. That section is reproduced in full below.

11.17.100 Street Geometry

- (1) Horizontal Curves. Where a deflection angle of more than 10 degrees in the alignment of a street occurs, a curve of reasonably long radius shall be introduced. On streets 60 feet or more in width, the centerline radius of curvature shall be not less than 300 feet; on other streets, not less than 100 feet subject to review and approval by the engineering department.*
- (2) Vertical Curves. All changes in grade shall be connected by vertical curves of a minimum of 200 feet unless otherwise specified by the engineering department.*
- (3) Tangents. A tangent of at least 200 feet in length shall be provided between reverse curves for principal and minor arterials; 150 feet for collector streets; and 100 feet for residential access streets. The city engineer may authorize the modification of the above requirement when it can be shown that the minimum tangents would be impractical and where there would be no impact on traffic safety standards.*
- (4) The minimum grade on any street shall be one-half percent unless otherwise approved by the city engineer. Maximum grades shall not exceed the following grades unless otherwise approved by the city engineer:
 - (a) Residential streets: 10 percent.*
 - (b) Collectors: 10 percent.*
 - (c) Minor arterials: 10 percent.*
 - (d) Principal arterials: eight percent.**



(5) At street intersections, property line corners shall be rounded by an arc, the minimum radius of which shall be 20, except as provided for in OHMC 21.50.100. No rounding shall be required for the intersection of an alley with a street. (Ord. 1613 § 1, 2011).

City of Oak Harbor Design Criteria

Shoreline Master Program (SMP) – The proposed location of the plant is just north of the boundaries of the Shoreline Jurisdiction. Thus, the plant design would not need to meet any requirements of the program. If the plant were to move south however, further review of the SMP would be warranted.

Design Regulations and Guidelines – The City of Oak Harbor Design Guidelines are intended to

...direct the look and function of new development to meet the community's goals defined in the Comprehensive Plan. These goals describe design that is human scaled, people oriented, neighborhood appropriate, builds on our community's history and addresses the street and public areas.

Not all aspects of the Design Guidelines will be applicable to the new plant design.

Height Limit

The Design guidelines state that the height limit is 35'-0" and measured from the average of the highest and lowest corner of property line that the building faces. Elements more than 10'-0" from the property line, such as roof penthouses, elevator overruns, may extend another 10'-0", provided the additional height does not increase the sf of the building. Note that this applies to the Secondary clerestory – since any additional height needed is for the purpose of making room for the bridge crane.

Any mechanical equipment must be screened entirely – and the screens may not exceed more than 10'-0" above the height limit. There is an administrative review that will grant an additional 5% to the height limit that we intend to request to allow for design flexibility. That 5% results in an increase of 1'-9" over the limit – for a resulting height limit of 36'-9" (36.75)



Washington State Energy Code

Recently, energy codes have become much more stringent on requirements for building envelope design. The WSEC is one of the more strict energy codes in the country. The current direction is to follow the prescriptive path for wall assemblies on the non process facilities. This will set the insulation value required, as well as amount of fenestrations and their composition. This also includes electrical and mechanical compliance to more energy efficient equipment.

For the process facilities, the decision was that they are “semi-conditioned” spaces and thus not required to insulate the exterior walls. The definition is:

SEMI-HEATED SPACE. *An enclosed space within a building, including adjacent connected spaces separated by an uninsulated component (e.g., basements, utility rooms, garages, corridors), which:*

- 1. Is heated but not cooled, and has a maximum heating system output capacity of 3.4 Btu/(h-ft²) but not greater than 8 Btu/(h-ft²);*
- 2. Is not a cold storage space or frozen storage space.*

If the code officials do not accept the determination that the process buildings are “semi-conditioned” we recommend that the project team implement the “Total Building Performance” (WSEC Section C407) method of energy code compliance. In this method, the annual energy consumption of the design building is calculated and compared with that of a baseline building designed to code. The design building must prove to perform 7% more efficiently than the baseline building.

There will be isolated areas within the process facilities that have small offices and electrical rooms that are conditioned. To meet energy code we will require them to be insulated independently. The electrical building is the one process facility that will be conditioned, and it will follow the prescriptive path for wall assemblies.

International Building Code, International Fire Code

Much of the relevant information in the IFC appears in the IBC. The following information is a preliminary building code analysis of each proposed structure in the new plant. This information will be updated as the plant design evolves.



Occupancy Classification

The proposed design of the plant contains many different functions that could be separate buildings if the project site were large enough to allow adequate separation. Site space is limited so it is likely that multiple processes or functions will be housed under the same roof. This is ideal from a building envelope, screening, and site efficiency perspective but raises some issues related to occupancy classification.

In general, non-process functions will be considered B-Business occupancies and process functions will be considered F-1-Factory Moderate Hazard.

There is potential for there to be other occupancies within a larger building. For instance, a small storage room within a larger F Occupancy would be an S Occupancy. This smaller S Occupancy space may be consider “accessory” depending on its size, or, if large enough, may need to be considered a separated occupancy within a multi-occupancy building.

Depending on the amount of square footage classified as a particular occupancy, the building may need to be fire sprinkled in order to trigger the automatic fire sprinkler building area increase. This addition of fire sprinklers would be a significant increase to project costs.

F-1, S-1 and B occupancies can be adjacent to each other without fire separation. F-2 and S-2 must be fire separated from B, F-1 or S-1.

H-4 occupancies (secondary treatment) require a 2 hr separation between it and adjacent buildings that are non-sprinkled. This will be applied to the shared walls with Electrical/blower and Headworks.

The Administration and Maintenance area may be classified as B – Business occupancies and the Conference Facility will most likely be an A – Assembly occupancy. The occupant load for B occupancies is calculated at 100 SF/Occupant and the occupant load for A occupancies is calculated at 15 SF/Occupant. Thus these spaces will be rated for a much higher occupant load and therefore may need to be equipped with additional exits, fire sprinklers, etc.

In the end, occupancy classification will affect many aspects of the design including but not limited to fire sprinkler requirements, fire separation, allowable height and area, and fire resistance construction. It will be important to finalize this analysis as soon as building programming data is near completion. See below for a preliminary summary table of Building Occupancy information.



Other Building Code Information

Each building will need at least two exits, and maybe more depending on the size and function of the building.

Some rooms within buildings, such as an electrical room, may need 2 exits equipped with panic hardware.

For instance, NEC Article 110.C.3 states that in electrical rooms with “Large Equipment” rated 1200 amps or more and over 6 feet wide and containing overcurrent devices, switching devices or control devices, there shall be one entrance to and egress from the required working space at each end of the space unless the location permits a continuous and unobstructed way of egress or the depth of the working space around the equipment is twice what is required elsewhere in the NEC. Where there is equipment rated 800 amps or more and containing overcurrent devices, switching devices, or control devices that personnel doors into the space must open in the direction of egress travel and be equipped with panic hardware.

The maximum exit travel distance for each space is 200 ft. This may be increased if an automatic sprinkler system is installed.

The width of the exit egress path must be 36” minimum.

Other code requirements to take into consideration as the project moves forward include but are not limited to construction type, fire protection of structural members, hazardous materials, HVAC, and plumbing fixtures.

Area	Class	SF	SF/Occ	Occupants	# of Exits?	Fire Separation?	Sprinklers?	Notes
Admin	B	5805	100	59	4	1hr	Yes	Conf and Break areas are accessory occupancies
Assembly area	A-3	2946	15	196	2	1hr	Yes	1 hr between Assembly and rest of building
Maintenance	B	2248	100	23	2	no	No	
Headworks	F-1	15500	300	52	2	2 hr	Yes	Fire barrier required between H-4 and adjacent non sprinklered spaces
Solids Handling	F-1	9500	300	33	2	1hr	yes	Fire separation between main space and truck bay
Electrical/Blower	F-1	3340	300	12	2	2 hr	Yes	Fire separation required between H-4 and adjacent non sprinklered spaces
Secondary Treatment	H-4	30976	300	105	3	2 hr	Yes	Fire barrier required between H-4 and adjacent non sprinklered spaces



NFPA 820

NFPA 820 establishes minimum requirements for protection against fire and explosion hazards in waste water treatment plants and associated collection systems, including the hazard classification of specific areas and processes.

The following are the requirements for each structure per NFPA 820, 2012 edition.

Location and Function and NFPA 820 Table Section	Fire and Explosion Hazard	Ventilation	Extent of Classified Area	NEC Area Classification	Material of Construction	Fire Protection Measures
Admin/Training	NA					
Headworks 4.2.33.a	Buildup of vapors from flammable or combustible liquids	A	Enclosed space	Class I, Div 1	In accordance with Chapter 8	NR
Odor Control 4.2.20.a	Leakage and ignition of flammable gases	D	Entire area if enclosed	Class I, Div 2	NC, LC, or LFS	CGD and FDS
Solids Handling 6.2(b)	Accumulation of methane gas	NR	Entire room	Class I, Div 1	NC	H, FE, and FAS
Equalization 5.2.3.a	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed entire space	Class I, Div 1	NC	FE, H, and CGD if enclosed
Aeration Basin 5.2.8.a	Possible ignition of flammable gases and floating flammable liquids	A (interior of tank)	Enclosed entire space	Class I, Div 1	NC	NR
Aerobic Storage 6.2(a).25.a	Liberation of ammonia and toxic gas (composting materials can self-ignite)	As required by process	If enclosed, interior of reactor vessel plus a 10 ft envelope around reactor vessel	Class I, Div 2	NC	H and FDS
Chem Area	NA					
Blower Building	NA					
MBR tanks 5.2.8.a	Possible ignition of flammable gases or floating flammable liquids	A (interior of tank)	Enclosed entire space	Class I, Div 1	NC	NR
Effluent Storage 5.2.25	NA	NR	NA	Unclassified	NR	H
UV 5.2.24	NA	NR	NA	Unclassified	NR	H
Maintenance	NA					
Electrical	NA					

Key:

A: No ventilation or ventilated at less than 12 air changes per hour.

C: Continuously ventilated at six air changes per hour or in accordance with Chapter 9.

D: No ventilation or ventilated at less than six air changes per hour or in accordance with Chapter 9.



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NA: Not applicable
NC: Noncombustible material.
LC: Limited-combustible material.
LFS: Low flame spread material.
H: Hydrant protection in accordance with 7.2.4.
FE: Portable fire extinguisher.
CGD: Combustible gas detection system.
FAS: Fire alarm system.
FDS: Fire detection system.

OSHA Regulations

OSHA regulates workplace safety including but not limited to: confined space access, fall protection, ventilation, ladders and railings, etc. These issues will be handled on a case by case basis.