

BETWEEN THE SINK & THE SEA: WASTEWATER TREATMENT FOR FINANCIAL TYPES

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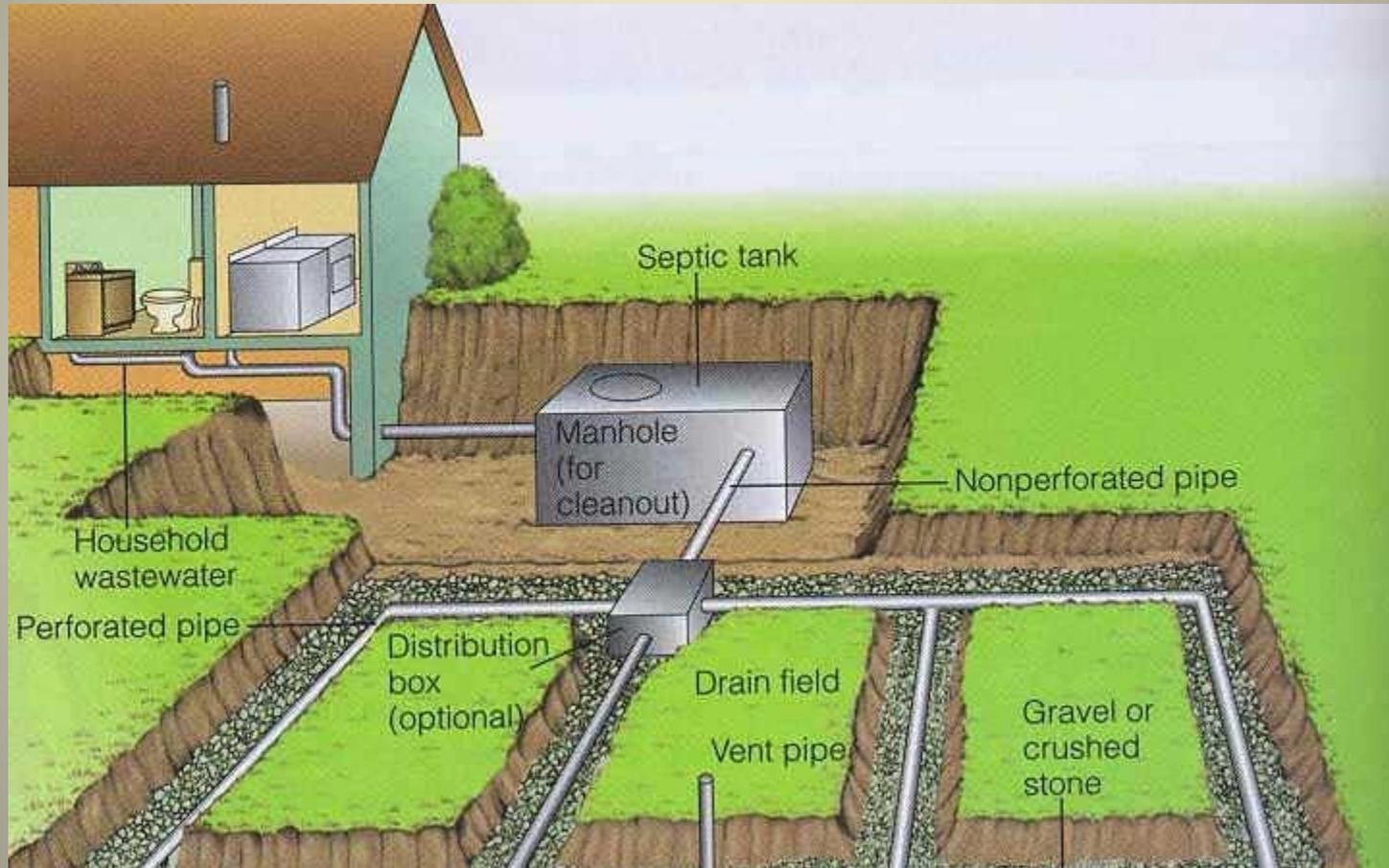
Topics Covered:

- Septic Systems
- Collection Systems
- Combined Sewer Overflows
- Wastewater Treatment Facilities

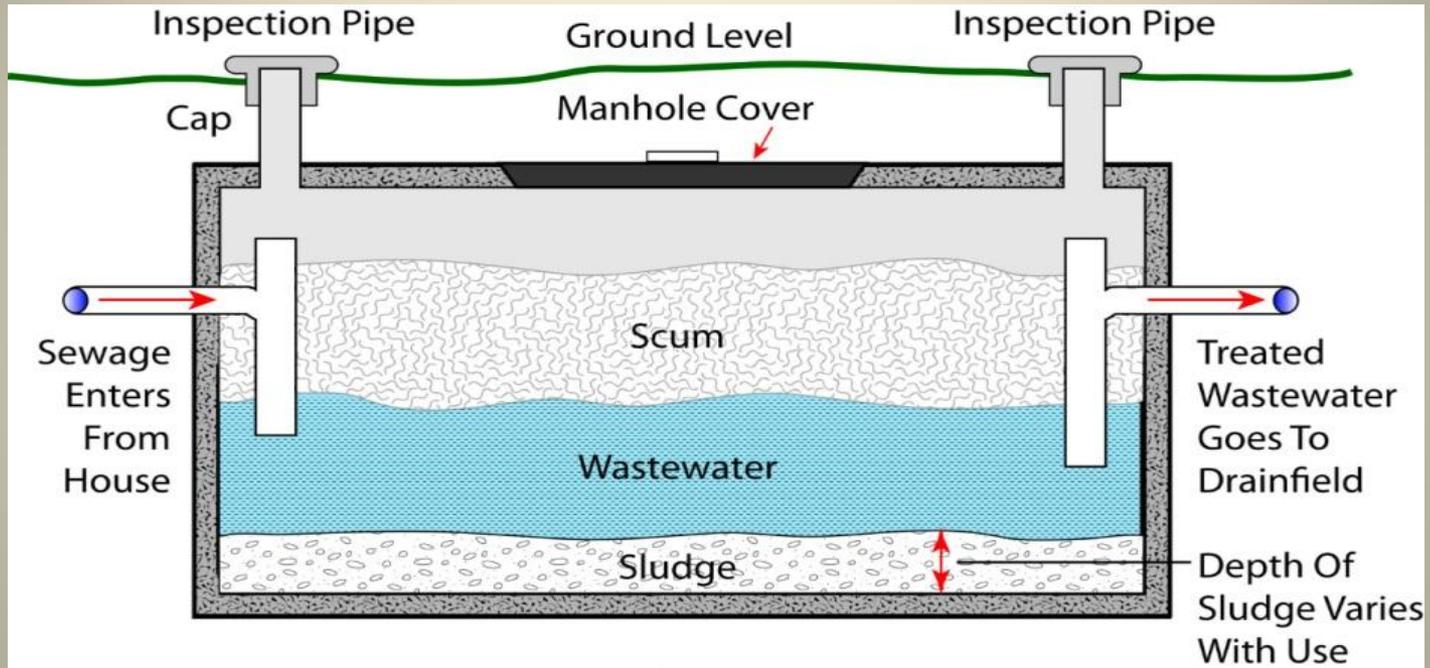
Remember: “The Bugs”

- Anaerobic Bacteria: Thrive in oxygen deprived/depleted environments; produce hydrogen sulfide and methane gas
- Aerobic Bacteria: Thrive in the presence of oxygen; produce carbon dioxide and water
- Facultative Bacteria: Can survive in both oxygen rich and oxygen depleted environments.

Septic Systems



Septic Systems

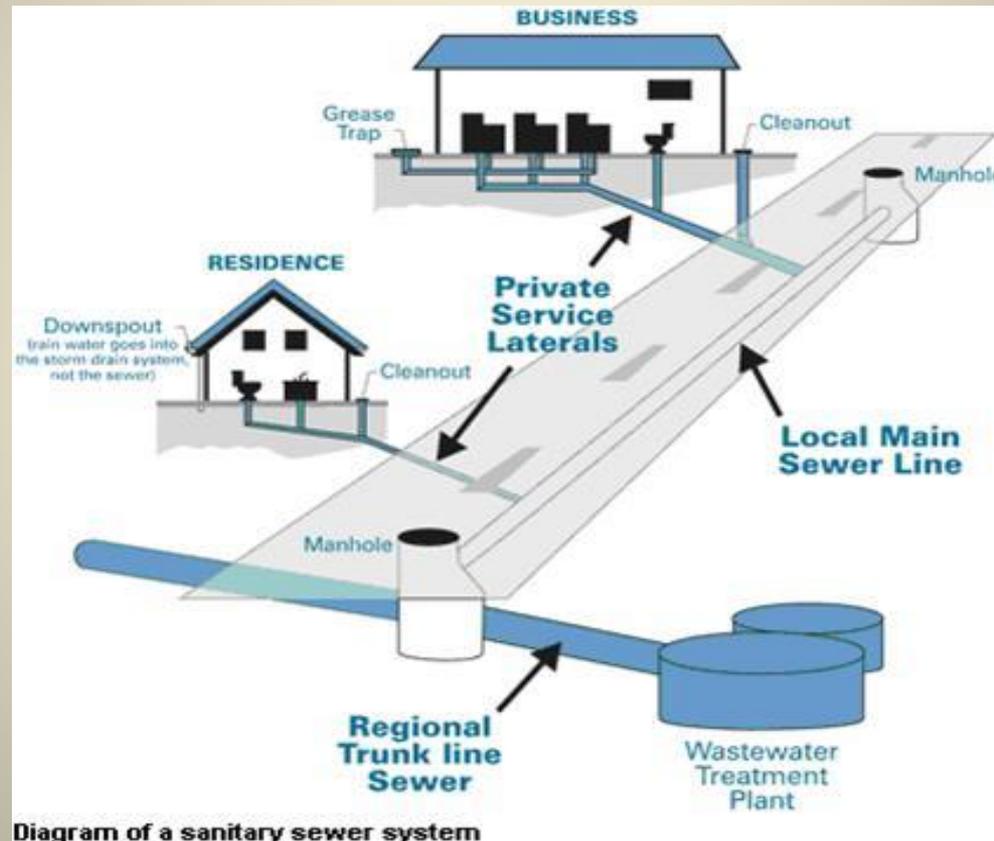


Schematic of a Septic Tank

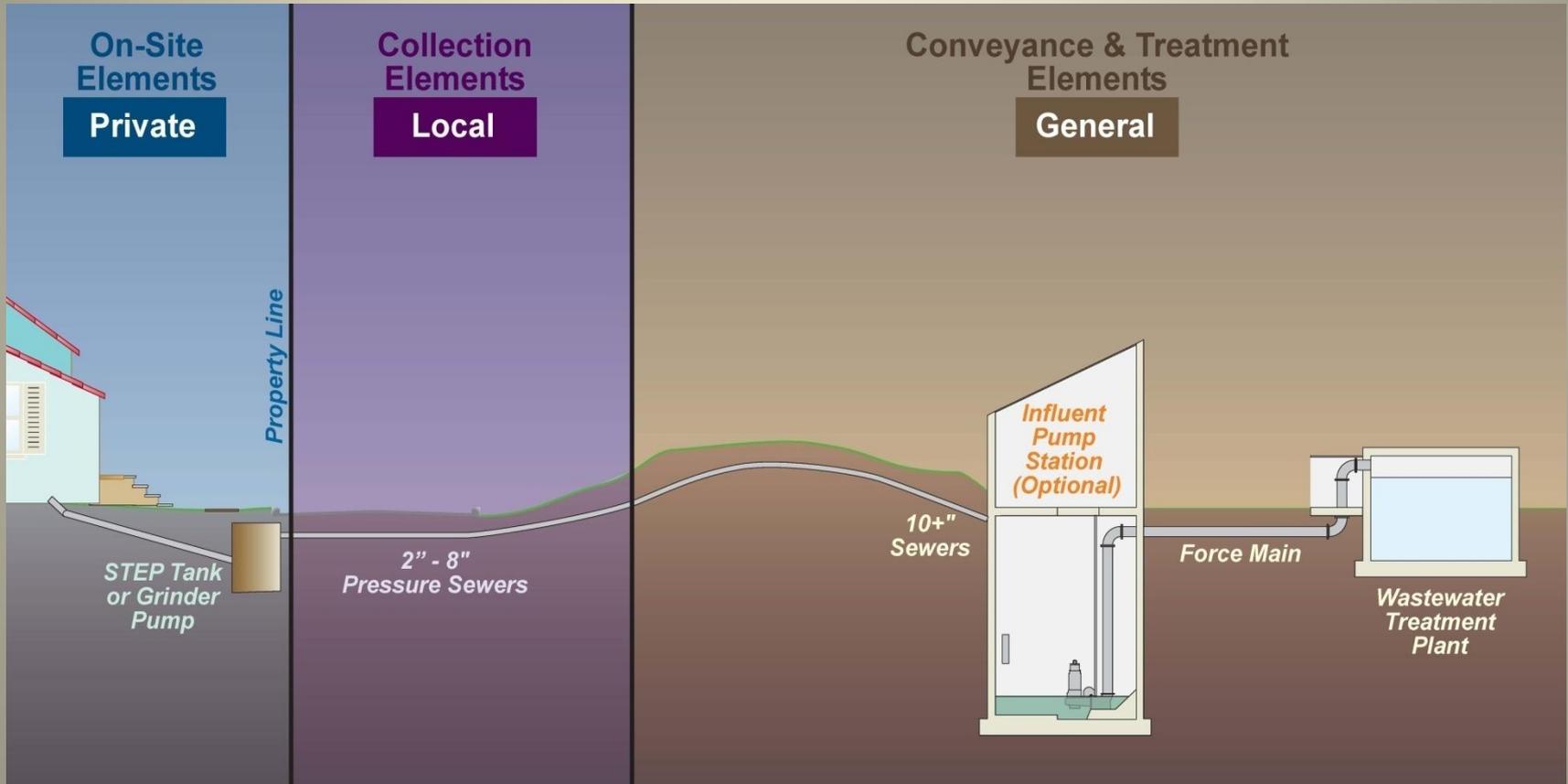
Collection Systems

- Transport sewage to WWTF
- Velocity must be sufficient to avoid deposition of solids (greater than 2 ft./sec) but avoid excessive scour (less than 12 ft./sec)
- Time of travel
- Infiltration/Inflow

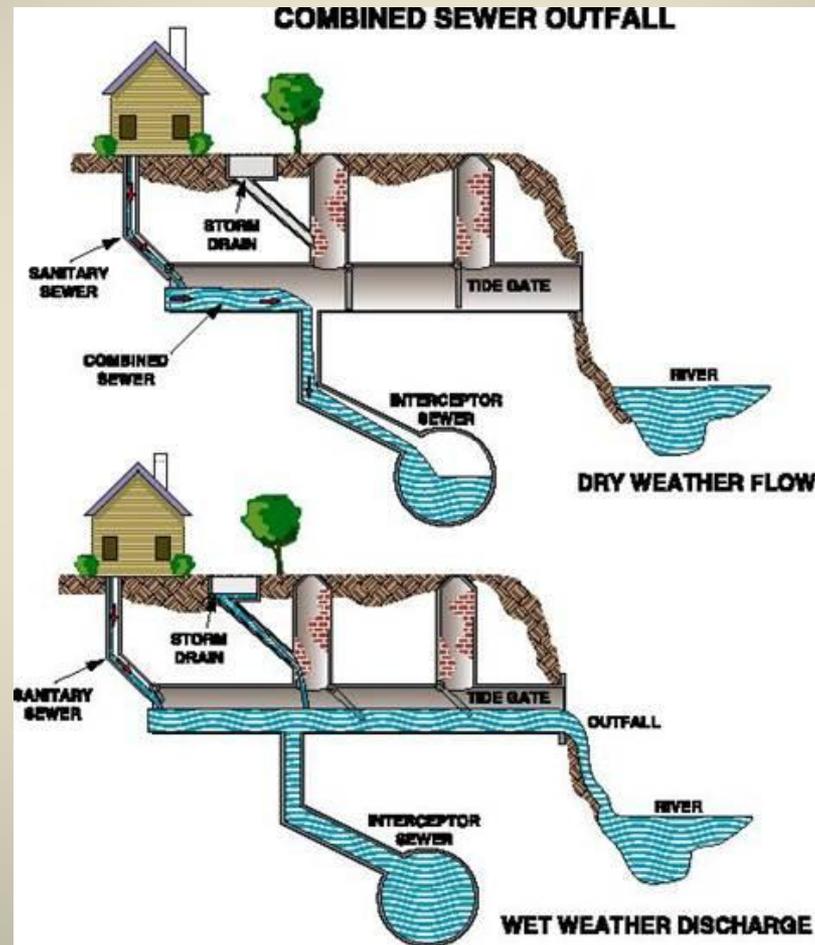
Collection Systems - Gravity



Collection Systems - Pressurized



Combined Sewer Overflows



At the Wastewater Treatment Facility



At the WWTF: Preliminary Treatment

Remove or reduce large items and grit that can damage downstream equipment:

bar racks and screens

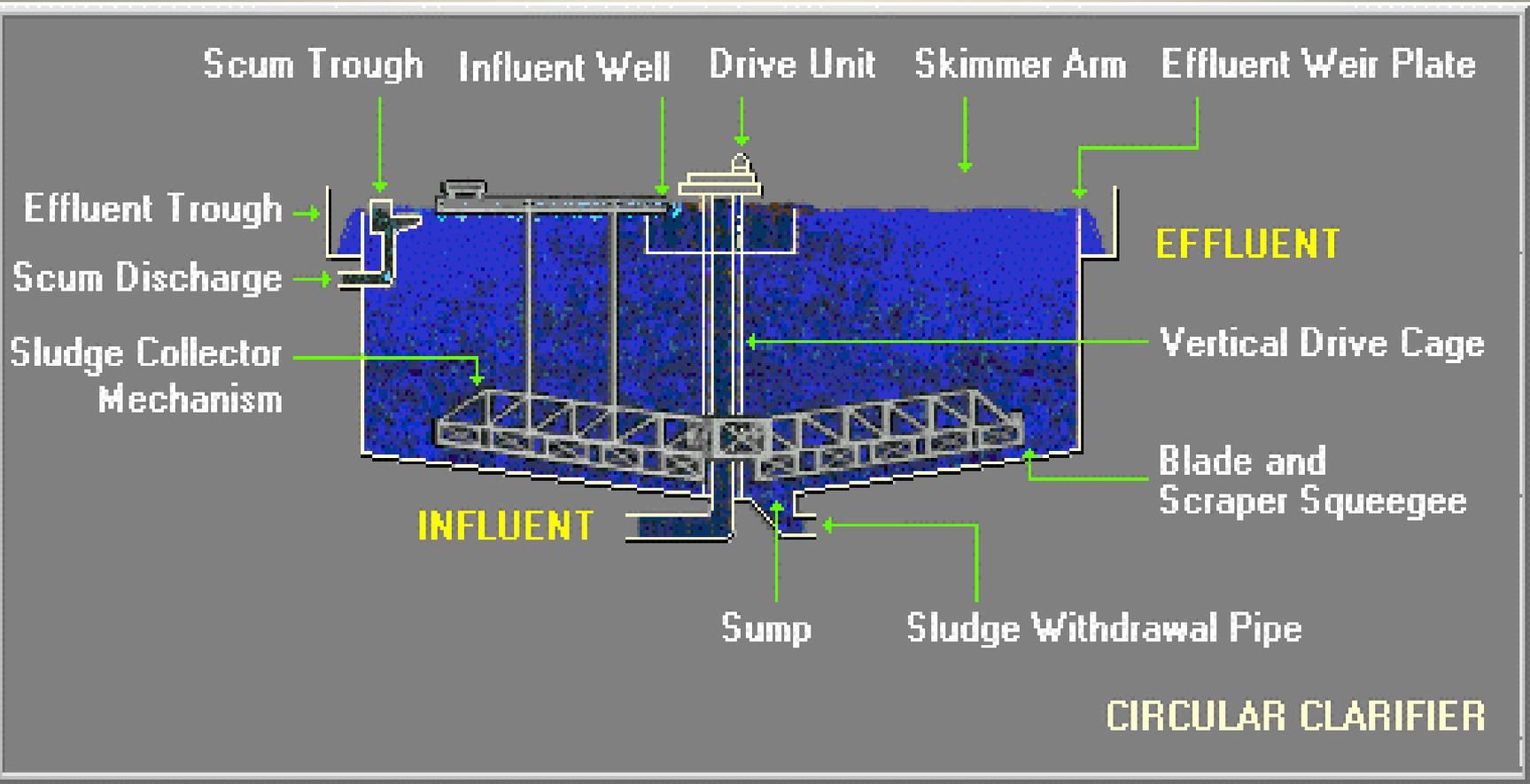
comminutors

grit chambers

At the WWTF: Primary Treatment

- Treatment via physical processes:
- Scum floats to surface and is collected by skimmers and troughs
- Heavier particles sink and are removed as sludge





At the WWTF: Secondary Treatment

- Treatment via the promotion of microbiological communities to breakdown and digest organic material:
- Lagoons
- Fixed Communities – rotating biological contactors (RBCs), trickling filters
- Suspended Communities – activated sludge

Heavier particles are removed via secondary settling/clarification







At the WWTF: Advanced Treatment

- The removal of targeted pollutants through additional physical, biological, or chemical processes, or a combination thereof:
 - nutrients
 - heavy metals
 - suspended solids

At the WWTF: Disinfection

- The destruction of pathogenic organisms:
 - Chlorination/de-chlorination
 - UV radiation
 - Ozone

At the WWTF: Supplemental Steps

- Effluent polishing
- Post-disinfection aeration

At the WWTF: Sludge Treatment

- Settled material from clarifiers is collected for thickening & de-watering (i.e. increase % solids content):
- Thickening – increase solids to approx. 7%:
gravity thickeners, rotary drum, belt thickeners
- De-watering – increase solids to 20 - 30+%:
centrifuges, belt filter or screw presses, drying beds

At the WWTF: Sludge Treatment

- Stabilization – treatment designed to address the pathogenic contents and odors in sludge (aka turning sludge into biosolids):
 - lime stabilization
 - pasteurization
 - composting
 - anaerobic/aerobic digesters

Disposal method determines level of stabilization

At the WWTF: Sludge Treatment

Disposal:

landfilling

incineration

land application

“bury it, burn it or use it”

At the Wastewater Treatment Facility



WAKE UP!!!

It's time for questions

Credits

- Narragansett Bay Commission
- Freeland (WA) Water and Sewer District
- Skyshots
- Linc Mann, Environmental Services, City of Portland
- Anyone unfortunate enough to have their photos found by Google and Bing