King County
Department of Natural Resources and Parks
Wastewater Treatment Division

West Point Influent Screenings Improvement Project Criteria

Council Conditional Use (Type IV) Sewage Treatment Plants (SMC 23.51A.002.D) Reconfiguration of a Sewage Treatment Plant

Project # 3012604

October 25, 2011

Background

The West Point Treatment Plant (the Plant) is located about four miles northwest of downtown Seattle on the shores of Puget Sound at 4215 36th Avenue SW. It is part of King County's regional system that treats wastewater for about 1.5 million people and covers 420 square miles in the Puget Sound region. Every day, the West Point Plant cost-effectively treats wastewater and stormwater from homes, offices, schools, agencies, businesses and industries in Seattle, north King County, south Snohomish County, and some areas of Lake Washington.

In 1991, to comply with the 1972 federal Clean Water Act, Metro began an expansion of the Plant to provide secondary treatment. Expansion and upgrading to secondary treatment was completed in 1996. The average capacity for wet weather flow is 133 million gallons per day. The maximum capacity is 440 million gallons per day during peak storms.

Purpose and Need

This project is required under recent Washington State Department of Ecology biosolids management regulations as outlined under Washington Administrative Code (WAC) 173-308-205. The regulations require all treatment plants in Washington State to install 3/8-inch (or finer) bar screens somewhere in the treatment process to "significantly remove manufactured inerts" such as plastics, metals, ceramics and other manufactured items from the biosolids.

In order to accomplish this, the existing 5/8-inch bar screens need to be replaced. This project will upgrade the screening and screening handling facilities at the West Point Treatment Plant located in Discovery Park, Seattle. The project will replace six 5/8-inch travelling rake bar screens in the existing Raw Sewage Pump Building (Screenings Room) with four new 3/8-inch multi-rake bar screens and two new ¼-inch multi-rake bar screens.

The project will also construct a new Screenings Handling building located south of, and directly adjacent to the existing Screenings Room. The new building will house the screenings handling facilities as needed to accommodate the expected 5-times increase in screened material, including equipment and facilities necessary to grind, wash, dry, compact, load and haul the additional screened material. The footprint of the new two-story building will be approximate 4,174 square feet and up to 38 feet in height; the overall square footage of the building itself is 5597 square feet. The building will function as a process facility only, not an occupied space, and there will be no office space, restrooms, or break facilities.

Conditions for Approval of Proposal (as per SMC 23.052.D3)

The project shall be located so that adverse impacts on residential areas shall be minimized.

Because the closest residential home to the proposed new screenings building is approximately 3,000 feet away, long-term impacts to residents will be negligible. The site is located in an area that should not be visible from the exterior of the Plant. The elevation change, vegetation, and retaining wall along the east perimeter of the site will help screen out short-term disruptions to park users from noise due to construction activities.

Visual impacts will be minor and the site will be partially screened from the south by the administration building. Views into the Plant are obscured by a berm planted with native vegetation. The height of the Proposed Screening Handling Building will be consistent with the height of existing buildings within the vicinity of the project area so views will not be impeded.

The Screenings Handling building will add approximately 12 wall-mounted exterior luminaire lights including 100-watt wall-mounted exterior luminaire lights over the building entrances and along the outside walls, as well as 250-watt metal halide lights below the canopies on the front (south) site of the building. Lighting will be directed downward and otherwise mitigated so as not to increase glare from the Plant.

The expansion of a facility shall not result in a concentration of institutions or facilities that would create or appreciably aggravate impacts that are incompatible with single-family residences.

The proposed new screenings building will not create or aggravate impacts that are incompatible with single-family residences for the following reasons:

Footprint

The proposed new screenings building will be contained within the existing footprint/perimeter of the West Point Treatment Plant (Plant) and will be located within the interior of the Plant surrounded by existing buildings.

Traffic Impacts

Long-Term/Post-Construction

There will be no increase in operational or commuting traffic at the Plant as a result of this project. In fact, the County expects to reduce trips to and from the Plant (total truck trips) by up to 280 biosolids and screenings truck trips per year, described as follows.

Currently, solids entering West Point are removed from the liquid stream in two ways. Some of the larger inert material such as cans, sticks, plastics, and hygiene products are separated out by the bar screens in the Plant's headworks. This screened material is then collected, dewatered, compacted, and loaded into 20-yard containers that are hauled to the landfill about once per week. Solids not captured by the bar screens end up in the Plant's solids handling facilities and are hauled from the Plant as biosolids. Table 1 shows that under existing conditions, approximately 550 wet tons of screened material are hauled from the Plant each year. The material consists of approximately 24percent solids and 76 percent water. The biosolids also leave the plant at about 24 percent solids. Note that biosolids make up about 99 percent of the total solids being hauled from the Plant.

Table 1. Existing and Proposed Annual Screening and Biosolids Amounts [a]

Existing Situation 2010	**Wet Tons**	**% Solids**	**Dry Tons[b]**
Screenings from 5/8-inch Screens	550[c]	24	130
Biosolids	54,000[c]	24	13,000
Total Residuals (rounded)	55,000		13,000
Proposed (2015)	**Wet Tons**	**% Solids**	**Dry Tons**
Screenings from 1/4-inch Screens	2,900[d]	59	1,700
Biosolids	46,000[f]	24	11,000[e]
Total Residuals (rounded)	49,000[g]		13,000

[a] Values are rounded
[b] Dry tons = wet tons * percent solids
[c] From plant records
[d] The new screens are expected to generate about 5 times more screened material (Consultant Basis of Design)
[e] No change in total solids through the plant, so 13,000 total dry tons minus 1,700 screenings dry tons = 11,000 biosolids dry tons
[f] 11,000 biosolids dry tons divided by 24 percent solids
[g] Less residuals equates to less water leaving the plant since total solids dry tons remains the same.

After the new 3/8-inch & ¼-inch bar screens are installed, they will generate up to five times more screened material than is collected by the existing 5/8-inch screens—about 2,900 wet tons overall. However, the new screenings handling facilities will process the screened material so that it is more than twice as dry as the existing screenings or biosolids (59% solids vs. 24% solids), meaning it will be much more efficient to haul the inert material in the screenings trucks than it is to haul it in the biosolids trucks. Table 1 also shows that there will be about 46,000 wet tons of biosolids being hauled from the Plant after the project is completed, which is a reduction of about 8,000 wet tons from the existing situation. This reduction in biosolids wet tons is essentially a reduction in

the amount of water being hauled from the Plant since the total amount of dry solids hauled from the Plant (13,000 dry tons) is constant.

Table 2 shows the expected change in total truck trips as a result of this project. In terms of screenings truck trips, we expect an increase of about 200 trips per year. As mentioned, there is five times more screenings material being generated by the new project, but the material will be loaded in containers that are twice as large as the existing containers (40 cubic yards vs. 20 cubic yards). This results in about 2.5 times more screenings loads leaving the plant each year. The Plant currently hauls 70 screenings loads per year and is expected to haul about 170 loads once the project is implemented. This represents an increase of about 100 screenings loads per year, or 200 more total trips per year (to and from the Plant). However, this increase in screenings trips is more than offset by an expected reduction in total biosolids trips. As explained above, there will be about 46,000 wet tons of biosolids to haul each year after the new project is implemented. Each biosolids truck hauls 33 wet tons, so there will be about 1,400 loads per year. The Plant currently hauls about 1,640 loads per year (3,280 total trips including empty trucks returning to Plant), so there would be about 240 fewer annual biosolids loads, or 480 fewer total truck trips annually. The net result is an overall reduction of approximately 280 total truck trips per year.

Table 2. Existing and Proposed Total Truck Trips per Year

	Existing Truck Trips	Proposed Truck Trips	Difference
Screenings	140[a]	340[c]	200
Biosolids	3,280[b]	2,800[d]	(480)
Total Trips	3,420	3140	(280)

[a] From plant records.
[b] The existing biosolids truck trips are the total wet tons divided by 33 wet tons per load (54,000/33 = 1,640 loads * 2 trips per load = 3,280 trips).
[c] The proposed screenings trips is 2,900 Wet Tons per year divided by 17 set tons per load (2,900/17 = 170 loads * 2 trips per load = 340 trips)
[d] The proposed biosolids truck trips is 46,000 Wet Tons per year divided by 33 Wet Tons per load (46,000/33 = 1,400 loads * 2 trips per load = 2,800 trips).

In addition to the truck trip reductions described above, it is important to note that the new screenings trailers will be about half the length of the existing trailers. This is because the existing screenings trucks use a double trailer to haul the 20-yard screenings container, and the new screenings trucks will use a single trailer to haul a 40-yard screenings container. A comparison of the trailers is shown in Figure 1.

Figure 1. Existing and Proposed Screenings Hauling Containers

Existing Double Trailer loading a 20-yard container	**Proposed Single Trailer hauling a 40-yard container**

The existing screenings trucks use a double trailer because of operational considerations; namely, the existing 20-yard screenings containers must be slid from the floor onto the trailer and vice versa, which requires a long trailer to prevent the front of the truck from being lifted off the ground. The proposed screenings containers will remain on the trailer while the screenings are being loaded. In terms of trailer height, the proposed 40-yard containers are about four feet taller than the existing 20-yard containers.

As mentioned, there will be no increase in employee commuter traffic because the new screenings building will not be occupied. The building is strictly for operations and will contain no bathrooms or offices; no additional staff will be employed to operate the new facility.

<u>Short-Term Construction Impacts</u>

Construction of the proposed project would generate approximately 800 total truck trips (to and from the Plant) during the approximately 20 month construction period. In addition approximately 40 vehicular trips per day would be generated by construction workers travelling to the treatment plant (Table 3).

Table 3. Construction Traffic Summary[a]

Activity	Total Round Trips	Type of Vehicle	Mitigation
Construction Equipment			
Demolition	5	Quad axle dump truck	
Excavation spoils	140	Quad axle dump truck	Use as much excavated, stockpiled material as possible in backfill
Building forms and steel	4	40-foot flat bed	
Concrete	110	In-transit mix truck	
Steel decking, misc metals, stairs, etc	10	40-foot flat bed	
Major equipment deliveries	10	40-foot flat bed	Consider storing equipment off-site and consolidating equipment shipments to reduce the number of truck trips.
HVAC equipment	4	40-foot flat bed	
All other equip and materials	80	Various flat beds and trucks	
Total	363		
Personnel			
Contractor employees and services	4,000 (13/day average)	Car or light truck	80% of these trips take place between January 2013 and November 2013. Carpooling and vanpooling will be encouraged.
Resident engineer staff	1,600 (4/day average)	Car or light truck	
Total	17/day		

[a] The number of trips can vary plus or minus 15 percent based on the contractor's means, methods, and scheduling. Based on the schedule proposed in this section, the largest concentration of truck traffic will occur in the spring of 2013.

Noise Impacts

Long-term noise above the current levels at the boundary will be negligible after construction is complete due to the enclosed nature of the screenings facilities and relatively low-noise style equipment to be installed; specifically:

- The existing Screenings Room will have less equipment, no sluice way, ram press or recycle pumps;
- The new bar screens and belt conveyors will generate the same or less noise;
- The existing Screenings Room remains totally enclosed, (except for the incline conveyors which will be mostly enclosed but ventilated);

- The proposed Screenings Handling building is totally enclosed;
- The proposed Screenings Handling building equipment, e.g., grinders, conveyors, washer/compactor, are not inherently noisy pieces of equipment ;
- Auxiliary equipment such as fans and pumps will be located inside or will be partially selected on their quietness;
- The closest residential home is approximately 3000 feet away making long-term noise impacts negligible.

Short-term construction related noise is anticipated to occur during the project. The main source of noise would be construction equipment performing activities such as pavement sawcutting, excavation, removal of spoils, etc. These types of equipment typically generate noise in the range of 70 to 85 dBA at a distance of 50 feet. Because the closest residence to the Plant is approximately 3000 feet away, noise impacts to the local residents should be negligible. Finally, construction will be limited to construction hours set by the City of Seattle and in compliance with its noise ordinance.

Visual Impacts

There will be no visual impacts to single-family residences within the vicinity of the project site. The height of the proposed Screenings Handling building will be consistent with existing buildings within the vicinity (Figure 2), and lower than many existing structures at the Plant (Figure 3). In addition, the hillside retaining wall will provide screening of the new facility. Also, an informal photo survey by the County's design consultant showed that the new building couldn't be seen from Discovery Park trails (Appendix A).

Figure 2. Relative Height of Proposed Screenings Handling Building as Viewed from Puget Sound

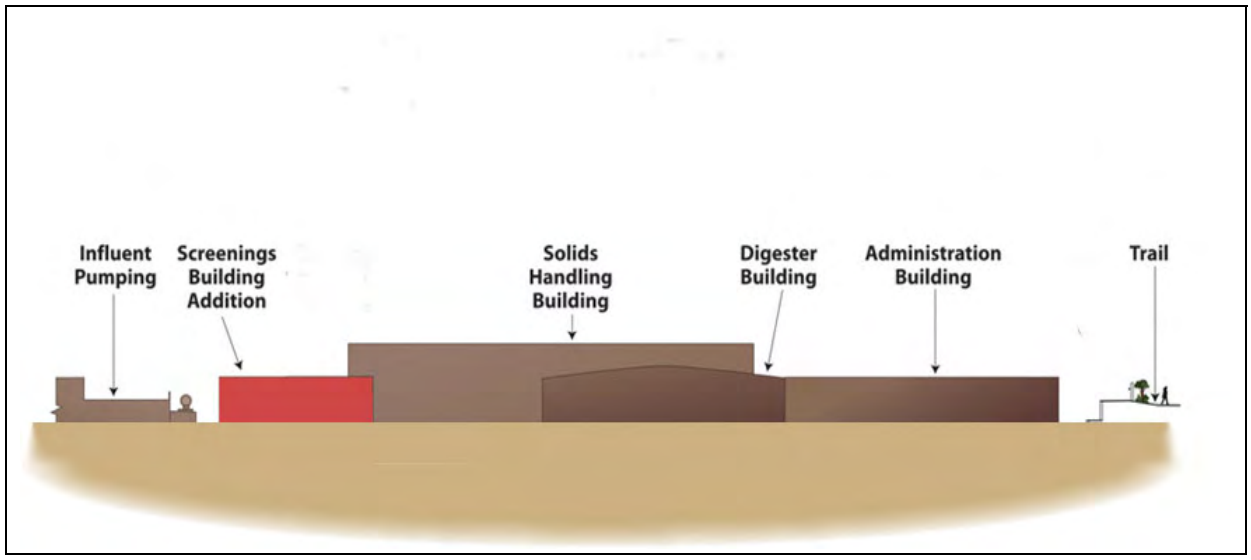
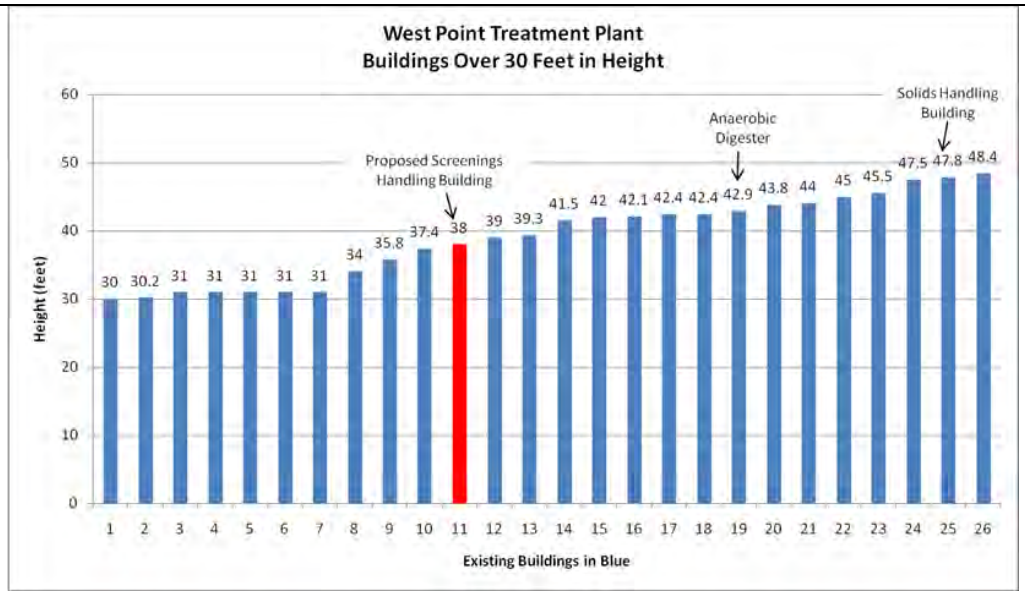


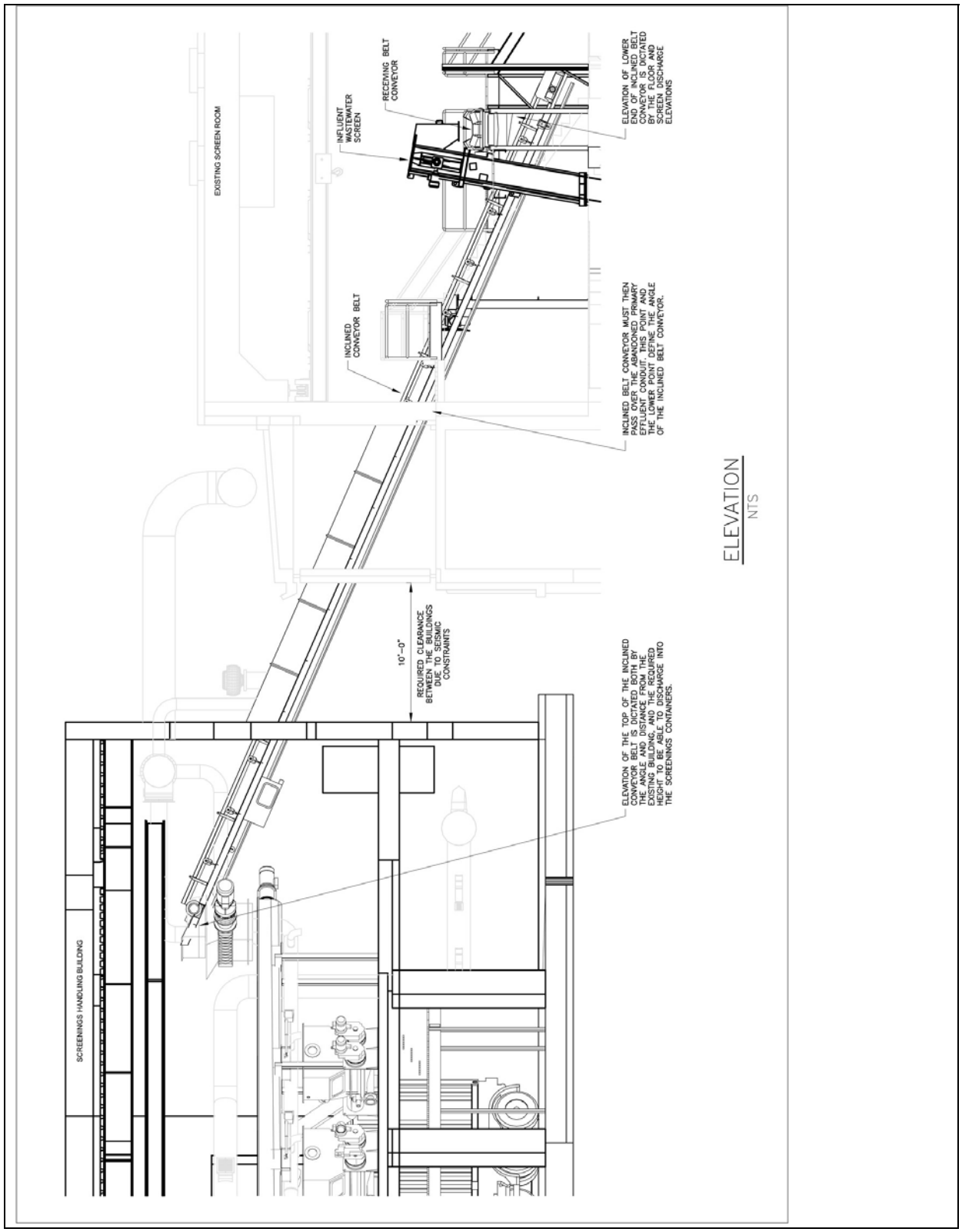
Figure 3.



As mentioned, the proposed Screenings Handing Building will be up to 38 feet tall. As of the completion of predesign, the building height is approximately 35 feet, but additional height is being requested to allow for potential variations during final design. The design team was directed to minimize the height of the proposed Screenings Handling building to the extent possible, but certain factors had to be accounted for in the design. In particular, the cross-building inclined belt conveyor imposed the largest constraints on minimizing building height. These factors are listed below and shown in Figure 4.

1. The conveyor's lowest point is established by the floor of the existing Screenings Room and screen discharge elevations.
2. The inclined conveyor must clear the abandoned Primary Effluent Channel that runs between the existing and proposed buildings.
3. Items 1 and 2 above established the minimum angle of the inclined conveyor
4. The length of the conveyor is based on:
    a. The distance between the existing and proposed buildings. Note that a 10-foot separation is required between the buildings to meet seismic requirements
    b. The height needed to discharge into the grinders, washer compactors, and ultimately the screenings containers.
5. Additional height is needed above the inclined conveyor for crane rails and structural members.

Figure 4. Factors affecting the Height of the Proposed Screenings Handling Building



Parking Impacts

The County expects that 21 parking spots will need to be removed to make room for the new Screenings Handling building; however, parking at the plant still exceeds what is required by code. Table 4 shows the gross occupiable building floor areas at the Plant, which total about 139,633 square feet for the purpose of parking calculations. Table 5 shows that 70 spaces are required for this floor area, and the Plant has space available for 210 spaces on site. The net result is there will still be approximately 189 parking spaces available at the Plant after the project is implemented.

Table 4. Gross Building Floor Areas at West Point

BUILDING DESCRIPTION	GROSS FLOOR AREA SQUARE FEET	GROSS FLOOR AREA LESS 2500 SQ FT WAIVER
PROPOSED SCREENING HANDLING BUILDING	5,600	3,100
ADMINISTRATION BUILDING	18,500	16,000
ADMINISTRATION ANNEX	4,078	1,578
MAINTENANCE	28,417	25,917
INFLUENT CONTROL STRUCTURE	503	0
INFLUENT PUMP STATION	23,703	21,203
SCREENINGS AND GRIT REMOVAL	3,943	1,443
EFFLUENT PUMPING	13,076	10,576
DIGESTER CONTROL BUILDINGS	7,095	4,595
OXYGEN PRODUCTION	13,625	11,125
CHLORINE HANDLING	7,688	5,188
SOLIDS HANDLING	29,700	27,200
FACILITY SERVICES	4,768	2,268
INTERMEDIATE PUMP STATION	11,940	9,440
TOTAL	172,636	139,633

Table 5. Parking Requirement

1 SPACE PER 2000 SQ FT GROSS FLOOR AREA PER BUILDING WITH WAIVER FOR 1ST 2500 SQ FT PER BUILDING (REF: SMC 23.54.015)	
PARKING REQUIRED BY CODE:	139,633 SQ FT/2000 SQ FT = 70 SPACES
PARKING TO BE REMOVED:	21 SPACES
EXISTING PARKING:	210 SPACES
PROPOSED PARKING:	189 SPACES
BUILDING LOT COVERAGE FOR ENTIRE SITE: SINGLE FAMILY ZONE: 826,352 SQ FT / 3,150,018 SQ FT = 26.0%	

A facility management and transportation plan shall be required. The level and kind of detail to be disclosed in the plan shall be based on the probable impacts and/or scale of the proposed facility, and shall at a minimum include discussion of sludge transportation, noise control, and hours of operation. Increased traffic and parking expected to occur with use of the facility shall not create a serious safety problem or a blighting influence on the neighborhood.

The West Point Treatment Plant has a Facility Plan[1] registered with the Department of Ecology and a Transportation Plan developed as part of the secondary upgrade. Project-specific information such as the scale of the proposed Screenings Handling building, sludge transportation, noise control, traffic and parking, are discussed in detail above.

Transportation patterns will remain the same once construction is complete. The proposed Screenings Handling building will be for operations only and not occupied (i.e., no offices or restrooms) and existing staff will operate and maintain the facility once construction is complete. As mentioned above, there will be no increase in truck traffic (biosolids and solids) and existing routes will be used after the new building is built.

There will be a temporary short-term increase in traffic during construction as described previously.

Measures to minimize potential odor emissions and airborne pollutants including methane shall meet standards of and be consistent with best available technology as determined in consultation with the Puget Sound Clean Air Agency (PSCAA), and shall be incorporated into the design and operation of the facility.

Regulated odor emissions will not increase as a result of the proposed Screenings Handling building, and the potential for nuisance odors at the Plant will likely be decreased because of building design and implementation of Best Management Practices (BMPs).

Regulated Emissions

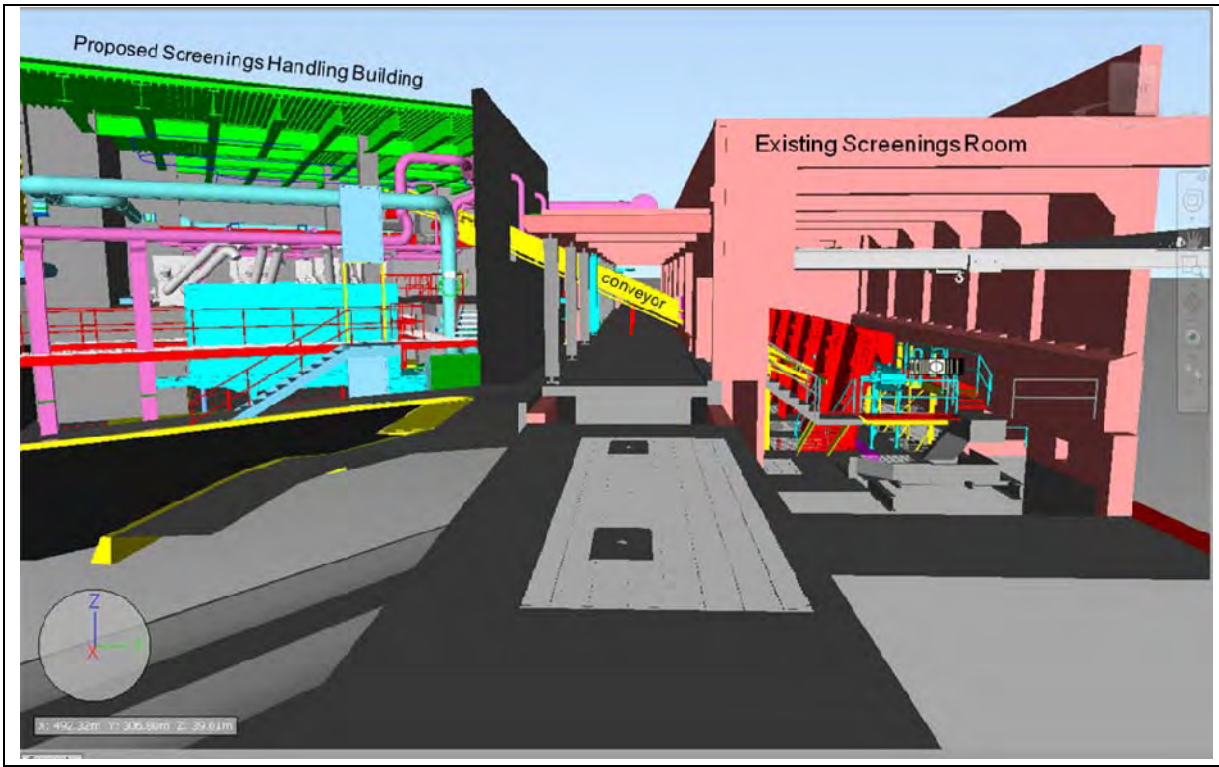
Once construction is complete, the ventilation system in the proposed Screenings Handling building will increase airflow through the existing odor control system by approximately 8,500 cubic feet per minute. Wastewater Treatment Division staff modeled

[1] West Point Secondary Treatment Facilities Project. Addendum to the March 1989 West Point Facilities Plan. Municipality of Metropolitan Seattle. Publication 408. October 1990.

this increased flow using an EPA air dispersion model called SCREEN3. Based upon the modeling results (Appendix B), the proposed project will increase downwind impacts by only 0.36 percent due to the additional flow rates compared to existing conditions. Given the accuracy of the model, the results are essentially identical and therefore we conclude that there will be no effective change in odor impacts as a result of the screenings project. In addition, even with the increased airflow, the existing odor control system is only handling about 80 percent of the airflow upper limit. Based on this information and discussions with a representative from the Puget Sound Clean Air Agency, the County has determined that a Notice of Construction is not required for the project.

Regarding the building design, there will be two enclosed inclined conveyor belts to convey raw screenings from the multi-rake screens in the Existing Screenings Room to the proposed Screenings Handling building (Figure 5). The inclined conveyor belts will be approximately 30 inches wide to convey 1,600 cubic feet per hour of raw screenings. The building penetration from the existing Screen Room will be an opening approximately 4 feet by 4 feet in size.

Figure 5. Inclined Conveyor Connecting Existing Screenings Room With Proposed Screenings Handling Building.



During normal screening operation, raw screenings would be transported via the inclined belt conveyor for processing. The ventilation system will induce negative pressure in both the existing Screenings Room and the proposed Screenings Handling building, which will prevent transfer of relatively odorous air from the Screenings Room into the inclined belt conveyor and on to the Screenings Handling building.

Because the National Fire Protection Association Standard (NAFP) 820 does not allow any transfer of air between a classified space (the existing Screenings Room) and an unclassified space (the proposed Screenings Handling building), the conveyors between the buildings incorporate passive, louvered openings along their length. This will allow any flammable vapors to escape should a power failure occur. However, during normal operating conditions, no odors will escape through the louvered openings because the existing Screenings Room and proposed Screenings Handling building will be under negative pressure, drawing outside air into the buildings for treatment by the odor control system.

Nuisance Odors

The potential for nuisance odors associated with the screenings facilities at the Plant should also be decreased once the project is operational. As discussed above, the screened materials will be much drier (59% solids vs. the current 24% solids) and much cleaner, which will significantly reduce the potential for odors emanating from vehicles hauling screened material compared to the existing situation. Further, the raw screenings entering the proposed Screenings Handling building will remain untreated for only a short amount of time before being ground and washed, which will re-entrain most of the organic material back into the Plant's influent. After dewatering and compaction, the screenings material will be substantially less odorous than the existing screened material.

Operational improvements resulting from the proposed project will also reduce the potential for nuisance odors. Currently, the screenings containers in the existing Screenings Room are changed out weekly. This is a complex and labor intensive process that involves sliding containers in and out of the Screenings Room and can take from one to two hours. During this time the roll-up door on the existing Screenings Room remains open, allowing the potential for nuisance odors to escape. These odors result from the raw influent as well as from the relatively unprocessed screening material that is deposited in an open 20-yard container. After the new screenings building is built, , the roll-up door on the existing screenings room will be opened only occasionally as needed to maintain or replace equipment, greatly reducing the potential for nuisance odors. In addition, the screened material stored in the containers in the proposed Screenings

Handling building will be significantly dryer, cleaner, and less odorous. Also, the change-out of the containers will be much less time consuming because the containers will be mounted on wheeled trailer chasses that can be installed and removed quickly.

In both existing and proposed situations, the screenings containers are/will be tarped before the roll-up doors are opened. Tarping the container is done either from side to side, or front to back within the building. On the proposed project, the container bay design was modified to provide platforms on both sides and back of the screenings container for easy access in tarping the container. Once the tarp has been placed over the trailer, the operator will go down to the ground floor level from the intermediate platforms to attach bungee cords to secure the cover. Stairs have been provided at the south end of these platforms to facilitate easy access to the intermediate platforms.

Construction Emissions

During construction there would temporarily be an increase in exhaust emissions and fugitive dust from construction vehicles and equipment operating at the site.

Methods of storing and transporting chlorine and other hazardous and potentially hazardous chemicals shall be determined in consultation with the Seattle Fire Department and incorporated into the design and operation of the facility.

The Plant no longer uses chlorine for disinfection due to safety issues and has changed its disinfection processes to use Sodium Hypochlorite. The proposed Screenings Handling building will not negatively impact or delay these disinfection upgrades.

Vehicular access suitable for trucks is available or provided from the plant to a designated arterial improved to City standards;

Current access is by W. Government Way. This project will not alter the existing access route.

The bulk of facilities shall be compatible with the surrounding community. Public facilities that do not meet bulk requirements may be located in single-family residential areas if there is a public necessity for their location there.

The proposed Screenings Handling building is located within the Plant. The size of the proposed footprint, 5597 square feet in gross floor area, is compatible with other buildings within the vicinity of the project site (Appendix C) and will be up to 38 feet from grade at its highest point. The new Screenings building will not be visible from the

Discovery Park trail and will located within the interior footprint of the existing Plant. The existing wall surrounding the Plant will provide screening of the new facility.

Landscaping and screening, separation from less intensive zones, noise, light and glare controls and other measures to ensure the compatibility of the use with the surrounding area and to mitigate adverse impacts shall be incorporated into the design and operation of the facility.

The existing site is 100% impervious surface. It is not feasible to install landscaping where construction will occur because operational facilities are located in, and around the vicinity of the project site which is located within the interior of the Plant. There is existing landscaping surrounding the Plant that serves to screen noise and light.

As mentioned above, the Screenings Handling building will add approximately 12 exterior lights including 100-watt wall-mounted luminaire lights over the building entrances and along the outside walls as well as 250-watt metal halide lights below the canopies on the front (south) site of the building. Lighting will be directed downward and otherwise mitigated so as not to increase glare from the Plant.

Residential structures, including those modified for nonresidential use, shall not be demolished for facility expansion unless a need has been demonstrated for the services of the institution or facility in the surrounding community.

No residential structures shall be demolished or modified for nonresidential use.

Substantial Conformance (as per SMC 23.052.D4)

If the application for a project specific proposal is submitted after an early determination that location of the sewage treatment plant is not feasible in a zone where establishment of the use is permitted, the proposed project must be in substantial conformance with the feasibility determination.

Substantial conformance shall include, but not be limited to, a determination that:

a. ***There is no net substantial increase in the environmental impacts of the project-specific proposal as compared to the impacts of the proposal as approved in the feasibility determination.***
b. ***Conditions included in the feasibility determination are met.***

The feasibility determination and the application for a project specific proposal are combined for the Influent Screenings Building project.

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Appendix A

Informal Photo Survey of Views Toward the Plant from Locations In Discover Park

10/25/2011

Lighthouse and Sewer Plant Parking
Utah Ave
Utah Ave
Utah Ave
Utah Ave
Loop Trail
Loop Trail
Hawaii Cir
1
2
3
4
5
6
7
8

1

2

3

4

6

Appendix B

SCREEN 3 Modeling Results

10/25/2011

07/07/11
16:36:29

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Base Case

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE            =        POINT
   EMISSION RATE (G/S)    =      1.00000
   STACK HEIGHT (M)       =      13.4100
   STK INSIDE DIAM (M)    =       1.3700
   STK EXIT VELOCITY (M/S)=      13.6067
   STK GAS EXIT TEMP (K)  =     273.0000
   AMBIENT AIR TEMP (K)   =     273.0000
   RECEPTOR HEIGHT (M)    =       1.5000
   URBAN/RURAL OPTION     =        RURAL
   BUILDING HEIGHT (M)    =        .0000
   MIN HORIZ BLDG DIM (M) =        .0000
   MAX HORIZ BLDG DIM (M) =        .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   STACK EXIT VELOCITY WAS CALCULATED FROM
   VOLUME FLOW RATE =   42500.000     (ACFM)

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =   86.873 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
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DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	68.20	3.30	3.28	NO
100.	27.05	1	3.0	3.1	960.0	31.67	27.36	14.89	NO
200.	44.23	2	3.5	3.6	1120.0	29.06	36.44	20.72	NO
300.	46.81	3	3.5	3.6	1120.0	28.93	34.58	20.81	NO
400.	43.80	3	2.5	2.6	800.0	35.13	45.08	27.16	NO
500.	40.27	4	4.0	4.2	1280.0	26.79	36.35	18.69	NO
600.	51.34	5	1.0	1.1	10000.0	34.86	32.51	15.92	NO
700.	62.35	5	1.0	1.1	10000.0	34.86	37.28	17.61	NO
800.	69.56	5	1.0	1.1	10000.0	34.86	42.00	19.27	NO
900.	73.54	5	1.0	1.1	10000.0	34.86	46.67	20.89	NO
1000.	75.06	5	1.0	1.1	10000.0	34.86	51.31	22.48	NO
1100.	73.92	5	1.0	1.1	10000.0	34.86	55.90	23.77	NO
1200.	72.07	5	1.0	1.1	10000.0	34.86	60.46	25.03	NO
1300.	69.79	5	1.0	1.1	10000.0	34.86	64.99	26.25	NO
1400.	67.27	5	1.0	1.1	10000.0	34.86	69.48	27.44	NO
1500.	65.81	6	1.0	1.2	10000.0	32.57	49.34	18.84	NO
1600.	66.57	6	1.0	1.2	10000.0	32.57	52.28	19.56	NO
1700.	66.83	6	1.0	1.2	10000.0	32.57	55.21	20.27	NO
1800.	66.71	6	1.0	1.2	10000.0	32.57	58.13	20.96	NO
1900.	66.28	6	1.0	1.2	10000.0	32.57	61.03	21.64	NO
2000.	65.60	6	1.0	1.2	10000.0	32.57	63.91	22.31	NO
2100.	64.48	6	1.0	1.2	10000.0	32.57	66.78	22.88	NO
2200.	63.28	6	1.0	1.2	10000.0	32.57	69.64	23.43	NO

```
                                        SCREEN
  2300.   62.03        6     1.0    1.2 10000.0   32.57   72.48   23.97    NO
  2400.   60.76        6     1.0    1.2 10000.0   32.57   75.32   24.51    NO
  2500.   59.46        6     1.0    1.2 10000.0   32.57   78.14   25.03    NO
  2600.   58.16        6     1.0    1.2 10000.0   32.57   80.95   25.55    NO
  2700.   56.87        6     1.0    1.2 10000.0   32.57   83.75   26.05    NO
  2800.   55.59        6     1.0    1.2 10000.0   32.57   86.54   26.55    NO
  2900.   54.33        6     1.0    1.2 10000.0   32.57   89.32   27.04    NO
  3000.   53.09        6     1.0    1.2 10000.0   32.57   92.09   27.53    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
  1000.   75.06        5     1.0    1.1 10000.0   34.86   51.31   22.48    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC     DIST TO    TERRAIN
  PROCEDURE         (UG/M**3)     MAX (M)     HT (M)
---------------    -----------    -------    -------
SIMPLE TERRAIN       75.06          1000.        0.

*****************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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07/07/11
16:46:23

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

High Flow Case

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.06700
   STACK HEIGHT (M)         =      13.4100
   STK INSIDE DIAM (M)      =       1.3700
   STK EXIT VELOCITY (M/S)=       14.5137
   STK GAS EXIT TEMP (K)    =     273.0000
   AMBIENT AIR TEMP (K)     =     273.0000
   RECEPTOR HEIGHT (M)      =       1.5000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =        .0000
   MIN HORIZ BLDG DIM (M) =          .0000
   MAX HORIZ BLDG DIM (M) =          .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   STACK EXIT VELOCITY WAS CALCULATED FROM
   VOLUME FLOW RATE =   45333.000     (ACFM)

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =   98.841 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	71.85	3.47	3.45	NO
100.	24.93	1	3.0	3.1	960.0	32.89	27.42	15.02	NO
200.	44.18	2	4.0	4.1	1280.0	28.02	36.41	20.66	NO
300.	46.70	3	4.0	4.1	1280.0	27.89	34.54	20.74	NO
400.	43.63	3	2.5	2.6	800.0	36.58	45.14	27.26	NO
500.	40.21	4	4.0	4.2	1280.0	27.68	36.38	18.75	NO
600.	49.28	5	1.0	1.1	10000.0	35.80	32.57	16.03	NO
700.	60.73	5	1.0	1.1	10000.0	35.80	37.32	17.71	NO
800.	68.57	5	1.0	1.1	10000.0	35.80	42.04	19.36	NO
900.	73.20	5	1.0	1.1	10000.0	35.80	46.71	20.97	NO
1000.	75.33	5	1.0	1.1	10000.0	35.80	51.34	22.55	NO
1100.	74.61	5	1.0	1.1	10000.0	35.80	55.93	23.84	NO
1200.	73.09	5	1.0	1.1	10000.0	35.80	60.49	25.09	NO
1300.	71.08	5	1.0	1.1	10000.0	35.80	65.01	26.31	NO
1400.	68.76	5	1.0	1.1	10000.0	35.80	69.51	27.50	NO
1500.	66.29	5	1.0	1.1	10000.0	35.80	73.97	28.65	NO
1600.	66.48	6	1.0	1.2	10000.0	33.42	52.31	19.63	NO
1700.	67.01	6	1.0	1.2	10000.0	33.42	55.24	20.34	NO
1800.	67.12	6	1.0	1.2	10000.0	33.42	58.15	21.03	NO
1900.	66.90	6	1.0	1.2	10000.0	33.42	61.05	21.70	NO
2000.	66.41	6	1.0	1.2	10000.0	33.42	63.93	22.37	NO
2100.	65.42	6	1.0	1.2	10000.0	33.42	66.80	22.93	NO
2200.	64.34	6	1.0	1.2	10000.0	33.42	69.66	23.49	NO

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                                        SCREEN
  2300.   63.20        6     1.0    1.2 10000.0   33.42   72.50   24.03    NO
  2400.   62.01        6     1.0    1.2 10000.0   33.42   75.34   24.56    NO
  2500.   60.79        6     1.0    1.2 10000.0   33.42   78.16   25.08    NO
  2600.   59.56        6     1.0    1.2 10000.0   33.42   80.97   25.60    NO
  2700.   58.32        6     1.0    1.2 10000.0   33.42   83.77   26.10    NO
  2800.   57.08        6     1.0    1.2 10000.0   33.42   86.55   26.60    NO
  2900.   55.86        6     1.0    1.2 10000.0   33.42   89.33   27.09    NO
  3000.   54.65        6     1.0    1.2 10000.0   33.42   92.10   27.58    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
  1000.   75.33        5     1.0    1.1 10000.0   35.80   51.34   22.55    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------     -----------   -------   -------
SIMPLE TERRAIN       75.33         1000.        0.

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** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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Appendix C

Bulk Facilities Information

10/25/2011

Facility No.	Name	Height (feet)	SQ FT
731	Administration Annex	20	4078
701	Administration	30	12472
702	Maintenance	44	21726
702	Lube Store/Auto Shop	26	1901
703	Influent Control Structure	16.8	2193
704	Influent Pump Station (Raw Sewage Pump Building)	31	12421
705	Screening System/Grit Removal	39.3	3943
706	West Primary Clarifiers	28.6	78265
706	East Primary Clarifiers	30.2	78327
707	Effluent Pumping	39	5432
708	Anaerobic Digester	42.4	7854
708	Anaerobic Digester	42	7854
708	Anaerobic Digester	42.1	7854
708	Anaerobic Digester	42.4	7854
708	Anaerobic Digester	42.9	7854
708	Anaerobic Digester	47.5	7854
708	Anaerobic Digester (not built)	0	0
708	Digester Control Building	21.6	3735
708	Motor Control Center	16	674
708	Motor Control Center	14.2	490
708	Digester Control Building	23.6	2158
708	Digester Control Building	18	1128
708	Storage Tanks	26	1274
	Odor Control Unit	31	76
	Gallery Vent Shaft	8	68
708	Electrical Substation	9.3	1000
	Supply Fan	7	95
	Supply Fan	7	674
	Louver House	5	45
	Odor Control Unit	31	52
	Odor Control Unit	31	20
709	Galleries (Height varies)	25	88264
710	HPO Aeration Basins	43.8	117322
711	Oxygen Production	35.8	13625
711	Oxygen Production LOX Area	31	3921
712	Secondary Clarifier	26.9	16477
712	Secondary Clarifier	21	16477
712	Secondary Clarifier	24.9	16477
712	Secondary Clarifier	23	16477
712	Secondary Clarifier	24	16477
712	Secondary Clarifier	22	16477
712	Secondary Clarifier	23.5	16477
712	Secondary Clarifier	18.5	16477
712	Secondary Clarifier	24.2	16477
712	Secondary Clarifier	20.1	16477
712	Secondary Clarifier	21.4	16477

Facility No.	Name	Height (feet)	SQ FT
712	Secondary Clarifier	23.1	16477
712	Secondary Clarifier	24.3	16477
712	RAS Pump Station Stairwell	23.6	180
712	RAS Pump Station Stairwell	21.7	180
712	RAS Pump Station Stairwell	26.2	180
712	RAS Pump Station Stairwell	21.3	180
712	RAS Pump Station Stairwell	26.5	180
712	RAS Pump Station Stairwell	26.3	180
712	RAS Pump Station Stairwell	29.6	180
	Gallery Ventilation Exhaust Fan	23.9	264
713	Chlorine Handling	19.3	7688
714	Chlorine Contact	0	0
714	Chlorine Mixing	22.2	761
714	Chlorine Mixing	23	761
715	Solids Handling	47.8	30485
715	Odor Control	48.4	13951
718	Facility Services	23.7	4830
720	Bypass and Influent Channels	0	0
721	Flow Diversion Structure	21	1888
722	Main Electrical Substation	16.4	6325
723	Retaining Wall	45.5	0
724	Intermediate Pump Station	34	8720
	Privatized Sludge Management	45	25864
708	Waste Gas Incinerator	37.4	841
	Gallery Stairwell	14.8	205
	Gallery Stairwell	14.8	205
725	Perimeter Berm Wall	24	0
700	Raw Sewage Transition Structure	16.8	0
716	**Proposed Screening Handling Building**	**35**	**5600**
	Total		**826352**