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# Meeting Agenda

## Barton, Murray, Magnolia, North Beach CSO Facilities Project

## E00022E06

### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

**Date of Meeting:** October 21, 2009 **Work Order No.:** 7562A.10

**Time:** 1 - 4 pm

**Location:** KSC 7045 North Wind

**Purpose:** Barton - Technical Criteria Review

**Meeting #** 100-55

**Anticipated Attendees**

| County | | Consultants |
|---|---|---|
| John Cameron | Shaun O'Neil | Ellen Blair |
| Betsy Cooper | Sekhar Palepu | Kevin Dour |
| Hien Dung | John Phillips | Karl Hadler |
| Pam Erstad | Kevin Sandquist | Jeff Lykken |
| Karen Huber | Mike Sand | Brian Matson |
| Ron Kohler | Kevin Schock | Allen de Steiguer |
| Kathy Mathena | Bob Swarner | Lloyd Skinner |
| Sue Meyer | Martha Tuttle | Jennifer Corrigan |
| Lee Miller | Jim Weber | |
| Shahrzad Namini Chris | Mary Wohleb | **SPU** |
| Okuda | Monica Van Der Vieren | Martha Burke |
| Ukwenga Oleru | Karl Zimmer | Sahba Mohandessi |

**Meeting Purpose:**

1. Overview of organization of October meetings.
2. Review/status update of Non-Technical information needs development
3. Review/status update of action items from last round of meetings
4. Presentation and discussion of Storage Alternatives CSO control approach.
5. Review of Storage Alternatives application in each of four basins.
6. Overview of Technical Information needs for Storage Alternatives

| Topic | Time | By |
|---|---|---|
| Introduction | TBD | S. Namini |
| Overview of October meetings | 10 min | B. Matson |
| Status update, questions, discussion, Non-Technical information | 20 min | B. Matson |
| Status update, action items last round of meetings, MAT actions | 20 min | B. Matson, S. Namini, J. Phillips |
| Storage Alternatives CSO control approach | 30 min | J. Lykken, K. Dour |
| Alternatives applications in each basin | 30 min | K. Dour K. Hadler A. de Steiguer |
| Technical information needs related to storage | 30 min | K. Dour |

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# Meeting Notes
## Barton, Murray, Magnolia, North Beach CSO Facilities Project
## E00022E06
### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

| | | | | | |
|---|---|---|---|---|---|
| **Date of Meeting:** | October 21, 2009 | **Date of Notes:** | November 3, 2009 | **Work Order No:** | 7562A.10 |
| **Time:** | 1:00 pm | | | | |
| **Location:** | King Street Center 7045 North Wind | | | | |

**Purpose:**
1. Overview of organization of October meetings.
2. Review/status update of Non-Technical information needs development.
3. Review/status update of action items from last round of meetings.
4. Presentation and discussion of Storage Alternatives CSO control approach.
5. Review of Storage Alternatives application in each of four basins.
6. Overview of Technical Information needs for Storage Alternatives.

**Meeting #** 100-55 - Technical Review Meeting #1 - Storage Schematics

**Attendees:**

| County | | Consultants |
|---|---|---|
| Shahrzad Namini | Sekhar Palepu | Brian Matson |
| Chris Okuda | Kevin Schock | Jeff Lykken |
| Ron Kohler | Bob Swarner | Kevin Dour |
| John Phillips | Monica Van Der Vieren | Karl Hadler |
| Sue Meyer | Kathy Mathena | |
| Jim Weber | Karl Zimmer | SPU |
| | | Sahba Mohandessi |

**Distribution:** Attendees, Betsy Cooper, John Cameron, Karen Huber, Mary Wohleb, Lee Miller, Hien Dung, Meredith Redmon, Kevin Sandquist, Ukwenga Oleru, Shaun O'Neil, Mike Sand, Martha Tuttle, Pam Erstad, Allen de Steiguer, Jennifer Corrigan, Lloyd Skinner, Bob Wheeler, Ellen Blair



## ACTION ITEMS

| Item # | Action | Action By | Due By |
|---|---|---|---|
| 1 | Schedule a separate meeting for briefing and to receive input from O&M staff. Provide handout materials electronically. | Ron Kohler | 11/3/09 |
| 2 | Check Orange Book requirements for odor control, backup power, redundancy requirements to make sure the schematic designs comply with the Ecology standards. | Jim Weber | 11/10/09 |

| | | | |
|---|---|---|---|
| 3 | Check space requirements of vertical versus horizontal activated carbon vessel. Use worst case footprint for planning. | Kevin Dour | 11/10/09 |
| 4 | Check air change requirements and use conservative value to develop the site footprint. | Jim Weber | 11/10/09 |
| 5 | Provide SDOT right of way use fee structure to team. | Hien Dung | 11/10/09 |
| 6 | Provide information on SPU use of odor control for CSO tanks. | Sabha Mohandessi | 11/10/09 |
| 7 | Determine need for H2S sampling. | John Phillips | 11/10/09 |



**DISCUSSION**

1. There is a meeting scheduled to discuss storage volumes required. Different models are producing different storage requirements. We are proceeding with the alternatives analysis based on the volumes developed by the County several months ago.
2. Schedule a separate meeting for briefing and to receive input from O&M staff. Provide handout materials electronically.
3. Check Orange Book requirements for odor control, backup power, redundancy requirements to make sure the schematic designs comply with the Ecology standards.
4. Check space requirements of vertical versus horizontal activated carbon vessel. Use worst case footprint for planning.
5. Right of way access for routine maintenance not acceptable.
6. Weirs are preferable to gates to keep solids in the sewer system.
7. Inline storage tanks are preferable with a flow-through design.
8. Check air change requirements and use conservative value to develop the site footprint. Changes during design can have a significant impact on the site footprint. Spaces are Class 1/Div 1.
9. Standby power is more important if it is a point of failure during the peak flow event such as a diversion gate. Pumps to drain the storage facility are not as critical because failure would simply delay return to the sewer system after the peak event.
10. A 12 hour draining period should be assumed for planning purposes.
11. Assume corrosion resistant materials for hatches and other pieces of equipment due to a humid, corrosive environment.
12. No special coatings are required for concrete.
13. Sand buildup is a concern in the storage tanks. Consider if a grit box is required.
14. Include washdown amenities in schematic design for cells likely to get most of flow.
15. Need to add SDOT right of way use fees to alternatives costs for evaluation.
16. The MAT wants to look at a range of storage volumes for alternatives.
17. County safety team to review operational aspects of alternatives.
18. Slope tunnel storage back towards sewer to facilitate solids removal.

END OF NOTES
Technical Review Meeting #1 - Storage Schematics
10/21/09

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# Meeting Agenda
## Barton, Murray, Magnolia, North Beach CSO Facilities Project
## E00022E06
### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

**Date of Meeting:** October 22, 2009 **Work Order No.:** 7562A.10

**Time:** 1 - 4 pm

**Location:** KSC 7045 North Wind

**Purpose:** Technical Review Meeting #2 - Pump Station Schematic

**Meeting #** 100-56

**Anticipated Attendees**

| County | | Consultants |
|---|---|---|
| John Cameron | Shaun O'Neil | Ellen Blair |
| Betsy Cooper | Sekhar Palepu | Kevin Dour |
| Hien Dung | John Phillips | Karl Hadler |
| Pam Erstad | Meredith Redmon | Jeff Lykken |
| Sue Hildreth | Kevin Sandquist | Brian Matson |
| Karen Huber | Mike Sand | Allen de Steiguer |
| Ron Kohler | Kevin Schock | Lloyd Skinner |
| Kathy Mathena | Bob Swarner | Jennifer Corrigan |
| Sue Meyer | Martha Tuttle | |
| Lee Miller | Jim Weber | **SPU** |
| Shahrzad Namini | Mary Wohleb | Martha Burke |
| Chris Okuda | Monica Van Der Vieren | Sahba Mohandessi |
| Ukwenga Oleru | Karl Zimmer | |

**Meeting Purpose:**
1. Overview of organization of October meetings.
2. Presentation and discussion of Pump Station approach for CSO control.
3. Review of Pump Station Alternatives application in each of four basins.
4. Review/status update of Non-Technical information needs development
5. Overview of Technical Information needs

| Topic | Time | By |
|---|---|---|
| Introduction | TBD | S. Namini |
| Overview of October meetings for new attendees | 10 min | B. Matson |
| Pump Station Alternatives CSO control details and application in each basin | 60 min | A. de Steiguer<br>K. Dour<br>K. Hadler |
| Technical information needs introduction (time permitting) | 30 min | K. Dour |
| Status update, questions, discussion, Non-Technical information | 10 min | B. Matson |

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# Meeting Notes

## Barton, Murray, Magnolia, North Beach CSO Facilities Project

## E00022E06

### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

| | | | | | |
|---|---|---|---|---|---|
| **Date of Meeting:** | October 22, 2009 | **Date of Notes:** | November 3, 2009 | **Work Order No:** | 7562A.10 |
| **Time:** | 1:00 pm | | | | |
| **Location:** | King Street Center 7045 North Wind | | | | |

**Purpose:**

1. Overview of organization of October meetings.
2. Presentation and discussion of Pump Station approach for CSO control.
3. Review of Pump Station Alternatives application in each of four basins.
4. Review/status update of Non-Technical information needs development
5. Overview of Technical Information needs.

**Meeting #** 100-56 - Technical Review Meeting #2 - Pump Station Schematic

**Attendees:**

| County | | Consultants |
|---|---|---|
| Shahrzad Namini | Sekhar Palepu | Allen de Steiguer |
| Chris Okuda | Kevin Schock | Kevin Dour |
| Ron Kohler | Bob Swarner | Karl Hadler |
| Lee Miller | Mary Wohleb | |
| Pam Erstad | Monica Van Der Vieren | |
| Sue Meyer | | SPU |
| Jim Weber | | Sahba Mohandessi |

**Distribution:** Attendees, Betsy Cooper, John Cameron, Karen Huber, John Phillips, Hien Dung, Meredith Redmon, Kathy Mathena, Kevin Sandquist, Ukwenga Oleru, Shaun O'Neil, Mike Sand, Martha Tuttle, Karl Zimmer, Brian Matson, Jeff Lykken, Jennifer Corrigan, Lloyd Skinner, Bob Wheeler, Ellen Blair



## ACTION ITEMS

| Item # | Action | Action By | Due By |
|---|---|---|---|
| 1 | Provide a summary of pump station capacity and head requirements for each alternative. | Allen de Steiguer | 11/3/09 |
| 2 | Provide County Design Standards. | Shahrzad Namini | 11/3/09 |
| 3 | Review the pump station design guidelines. Hold a separate meeting to review any deviations that may be appropriate for a CSO pump station. | Allen de Steiguer/ Kevin Dour/ Karl Hadler | 11/13/09 |

| | | | |
|---|---|---|---|
| 4 | Consider retrofit of SPU pump station for the South Magnolia alternatives that impact PS 77. | Allen de Steiguer | 11/17/09 |
| 5 | Look at gravity flow all the way to Interbay Pump Station to eliminate storage needs. | Allen de Steiguer | 11/17/09 |
| 6 | Provide Seattle Design Review Board requirements. | Hien Dung | 11/17/09 |

**DISCUSSION**



1. Pump Station Schematic:
   a. The cost of operation of a high head pump station will be significant. Provide a summary of capacity and head requirements for each alternative.
   b. The schematic does not cover pump stations downstream of storage to drain the storage basin.
   c. Submersible and VTSH pump stations are not typically employed in King County pump stations. Need to assess cost benefits of going with non-standard dry-pit pump station design.
   d. No access to the wet wells is assumed. Try to verify that 2 air changes per hour is acceptable.
   e. Prefer that generator fuel storage tanks are above ground for generators smaller than 500kW.
   f. Use one generator sized for peak flow in a separate room in lieu of multiple generators.
   g. Review the pump station design guidelines. Include standard requirements in schematic design and cost analysis. Hold a separate meeting to review any deviations that may be appropriate for a CSO pump station.
   h. Check City of Seattle requirements for height restrictions and view shed issues.
   i. Consider ancillary facilities in the site footprint such as access roads, restroom, HVAC, etc.
   j. Fencing and security to be provided for pump stations.
   k. Consider retrofit of SPU pump station for the South Magnolia alternatives that impact PS 77.
   l. Look at gravity flow all the way to Interbay Pump Station to eliminate storage needs.

2. Force Mains:
   a. The design maximum velocity in force mains is 10 feet per second.
   b. The most practical route is assumed for planning purposes. Non-technical issues may affect routing and final evaluation.

END OF NOTES
Technical Review Meeting #2 - Pump Station Schematic
10/22/09

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# Meeting Agenda

## Barton, Murray, Magnolia, North Beach CSO Facilities Project

## E00022E06

### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

**Date of Meeting:** October 28, 2009 **Work Order No.:** 7562A.10

**Time:** 1:00 - 3:00 pm

**Location:** 8th floor Conference Room

**Purpose:** Technical Review Meeting #3 - End of Pipe Treatment Schematic

**Meeting #** 100-57

**Anticipated Attendees**

| County | | Consultants |
|---|---|---|
| John Cameron | Shaun O'Neil | Ellen Blair |
| Betsy Cooper | Sekhar Palepu | Kevin Dour |
| Hien Dung | John Phillips | Karl Hadler |
| Pam Erstad | Meredith Redmon | Jeff Lykken |
| Sue Hildreth | Kevin Sandquist | Brian Matson |
| Karen Huber | Mike Sand | Allen de Steiguer |
| Ron Kohler | Kevin Schock | Lloyd Skinner |
| Kathy Mathena | Bob Swarner | Jennifer Corrigan |
| Sue Meyer | Martha Tuttle | |
| Lee Miller | Jim Weber | **SPU** |
| Shahrzad Namini | Mary Wohleb | Martha Burke |
| Chris Okuda | Monica Van Der Vieren | Sahba Mohandessi |
| Ukwenga Oleru | Karl Zimmer | |

**Meeting Purpose:**

1. Presentation and discussion of End of Pipe Treatment approach for CSO control.
2. Review of End of Pipe Treatment Alternatives in each of four basins.
3. Overview of technical information needs

| Topic | Time | By |
|---|---|---|
| Introduction | 5 min | S. Namini |
| Non-Technical Information Needs Status and Questions | 30 min | All |
| End of Pipe Treatment Details and Alternatives In Each Basin | 60 min | A. de Steiguer<br>K. Dour<br>K. Hadler |
| Technical Information Needs Introduction (time permitting) | 30 min | K. Dour |

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# Meeting Notes
## Barton, Murray, Magnolia, North Beach CSO Facilities Project
## E00022E06
### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

| | | | | | |
|---|---|---|---|---|---|
| **Date of Meeting:** | October ~~22~~28, 2009 | **Date of Notes:** | November 9, 2009 | **Work Order No:** | 7562A.10 |

**Time:** 1:00 pm

**Location:** King Street Center 8th Floor Conference Room

**Purpose:**
1. Presentation and discussion of End of Pipe Treatment approach for CSO control.
2. Review of End of Pipe Treatment Alternatives application in each of four basins.
3. Review/status update of Non-Technical information needs development.
4. Overview of Technical Information needs.

**Meeting #** 100-57 - Technical Review Meeting #3 - End of Pipe Treatment Schematic

**Attendees:**

| County | | Consultants |
|---|---|---|
| Chris Okuda | Sekhar Palepu | Brian Matson |
| Ron Kohler | John Phillips | Jeff Lykken |
| Karl Zimmer | Bob Swarner | Karl Hadler |
| Pam Erstad | Jim Weber | Lloyd Skinner |
| | Mary Wohleb | |

SPU
None

**Distribution:** Attendees, Shahrzad Namini, Betsy Cooper, John Cameron, Karen Huber, Hien Dung, Lee Miller, Meredith Redmon, Kathy Mathena, Kevin Sandquist, Sue Meyer, Ukwenga Oleru, Shaun O'Neil, Mike Sand, Martha Tuttle, Kevin Schock, Monica Van Der Vieren, Allen de Steiguer, Kevin Dour, Jennifer Corrigan, Bob Wheeler, Ellen Blair, Sahba Mohandessi



## ACTION ITEMS

| Item # | Action | Action By | Due By |
|---|---|---|---|
| 1 | Look at space requirements for sodium hypochlorite and dechlorination. | Karl Hadler | 12/1/09 |
| 2 | Include access for chemical truck and boom trucks in facility layout and costs. | Allen de Steiguer/ Kevin Dour/ Karl Hadler | 12/1/09 |
| 3 | Include an HVAC room. | Karl Hadler | 11/3/09 |

**DISCUSSION**

1. Overview of Non-Technical Issues:
   a. The Broadview Community may weigh in on the North Beach alternatives because they are interested in the impacts on Carkeek facilities.
   b. Need to start planning coordination effort with the City of Seattle Department of Planning and Development.
   c. The team is working on a definition and requirements for above grade and below grade facilities based on City of Seattle code.
   d. South Magnolia alternatives should look at discharge downstream of the Interbay Pump Station.
   e. The November 3 meeting with O&M staff will look at approaches and criteria information needs for storage, pump stations and end of pipe treatment.

2. End of Pipe Treatment Schematic:
   a. Fecal coliform limits mandate disinfection.
   b. The type of disinfection process has not been confirmed yet. UV has been assumed for comparison purposes and is a common technology for CSO facilities. A detailed comparison of UV versus sodium hypochlorite will likely need to be conducted if end of pipe treatment makes it to the next round of alternatives.
   c. Look at space requirements for sodium hypochlorite and dechlorination. The space requirements are expected to be large and may preclude certain sites.
   d. Sludge and screening are assumed to be recycled to the sewer. Consider the impact on sewers and conveyance facilities.
   e. Bremerton CSO Treatment Facility has met discharge requirements for a number of years. Salem has on been in operation for about a year. These facilities may be visited if end of pipe treatment makes it to the next round of alternatives.
   f. Need to determine if a pump station is required or flow through treatment facility is by gravity. This is basin specific and the costs of a pump station, if applicable, need to be included in the alternative.
   g. Include access for chemical truck and boom trucks in facility layout and costs.
   h. Include an HVAC room.
   i. The screenings area will require a cover.
   j. Consider how the facility will drain and the standard operating procedures for startup and shutdown. Alki is required to drain automatically. Alki requires approximately 15 to 20 minutes to start up.
   k. The sand used in high rate clarification stays in the tanks during standby periods. Makeup sand will be required for losses during operation. Routine maintenance may require disinfection of the sand.
   l. The convey and treat options in North Beach assume high rate clarification and disinfection at Carkeek combined with the existing facility. It is not feasible to retrofit the existing basins but a new facility would likely fit on the site.



END OF NOTES
Technical Review Meeting #3 - End of Pipe Treatment Schematic
10/28/09

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# Meeting Agenda

## Barton, Murray, Magnolia, North Beach CSO Facilities Project

## E00022E06

### King County Department of Natural Resources and Parks
### Wastewater Treatment Division

**Date of Meeting:** October 29, 2009 **Work Order No.:** 7562A.10

**Time:** 1:00 - 3:00 pm

**Location:** Chinook Building Room 121

**Purpose:** Technical Review Meeting #4 - Criteria Information Needs

**Meeting #** 100-58

**Anticipated Attendees**

| County | | Consultants |
|---|---|---|
| John Cameron | Shaun O'Neil | Ellen Blair |
| Betsy Cooper | Sekhar Palepu | Kevin Dour |
| Hien Dung | John Phillips | Karl Hadler |
| Pam Erstad | Meredith Redmon | Jeff Lykken |
| Sue Hildreth | Kevin Sandquist | Brian Matson |
| Karen Huber | Mike Sand | Allen de Steiguer |
| Ron Kohler | Kevin Schock | Lloyd Skinner |
| Kathy Mathena | Bob Swarner | Jennifer Corrigan |
| Sue Meyer | Martha Tuttle | |
| Lee Miller | Jim Weber | **SPU** |
| Shahrzad Namini | Mary Wohleb | Martha Burke |
| Chris Okuda | Monica Van Der Vieren | Sahba Mohandessi |
| Ukwenga Oleru | Karl Zimmer | |

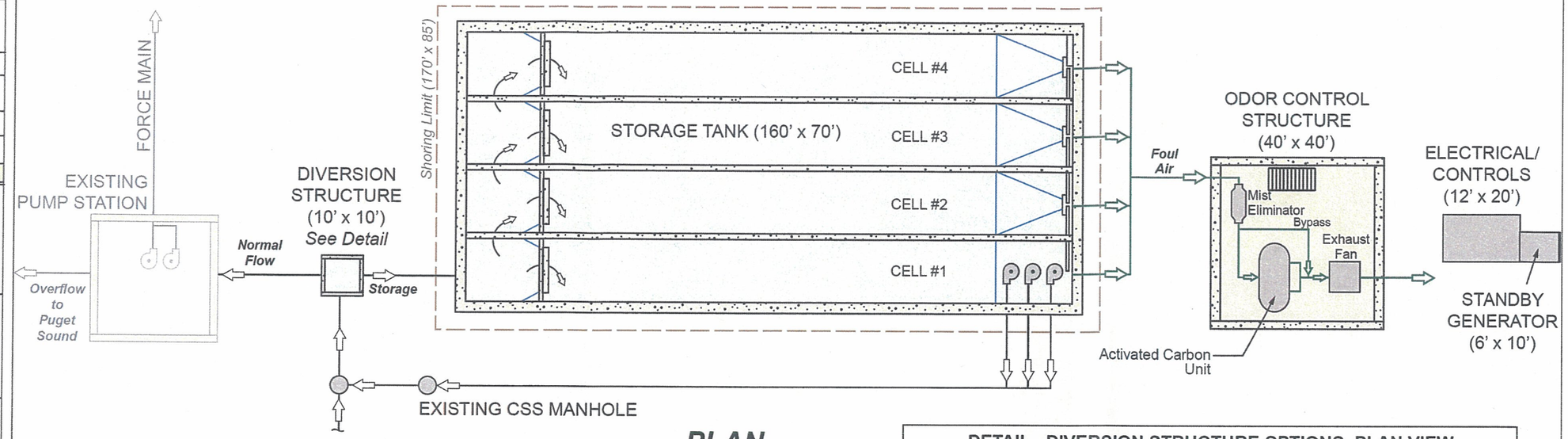
**Meeting Purpose:**

1. Review of Alternatives Analysis upcoming work.
2. Overview of technical information needs.
3. Discuss O&M coordination meeting format and agenda.

| Topic | Time | By |
|---|---|---|
| Introduction | 5 min | S. Namini |
| Alternatives Analysis Next Steps | 10 min | B. Matson |
| Technical & O&M Information Needs | 60 min | A. de Steiguer<br>K. Dour<br>K. Hadler |
| O&M Meeting Preparation | 20 min | B. Matson |

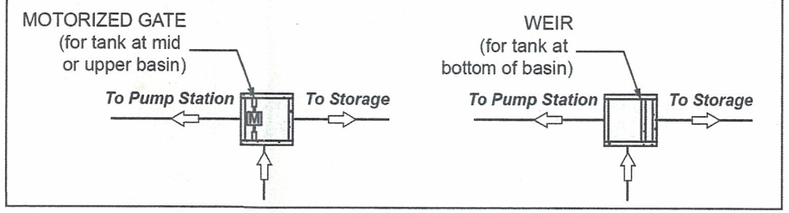
## 1.0-MG Rectangular Storage Tank Design Criteria & Assumptions

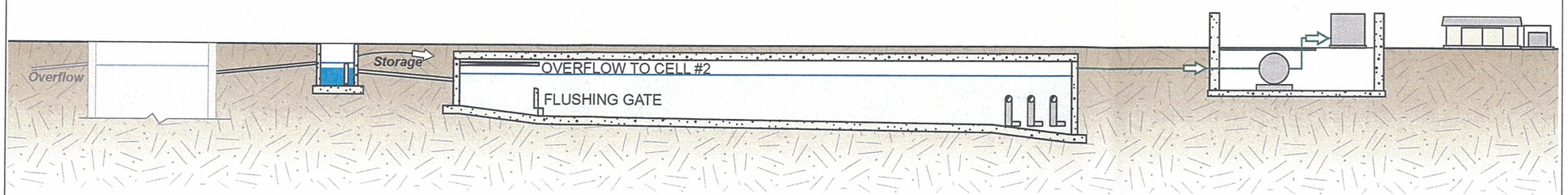
| | |
|---|---|
| **Structural** | |
| Maximum Excavation Depth | 30 feet |
| Outer Walls | 2-foot thickness |
| Internal/baffle Walls | 1.5-foot thickness |
| Floor Slope | 1.0% |
| Shoring | 5 feet beyond exterior walls |
| **Mechanical** | |
| Odor Control | Activated carbon unit and fan are sized for peak air displacement rate from the storage tank or 2 ACH/hr, whichever is greater. Air displacement rate is assumed to be equal to the peak flow discharge rate into the tank (12 mgd for Barton and 28.5 mgd for Murray) |
| Carbon Unit | Operate carbon unit during storage event<br>(2) 3' thick Vertical Bed Units, 1 Pass Air Flow, 50 FPM air velocity<br>Size: 8' Diameter x 12' Long<br>Capacity: 4,500 cfm<br>Dual $H_2S$ Sensors |
| Fan / Blower | Constant speed<br>Fan Size = 8' x 8'<br>Estimated footprint: 40' x 40' |
| Location | Fan unit would be located above ground and carbon scrubber unit below ground. |
| **Electrical** | |
| Electrical Space | Total Estimated Load = 50 hp (fan, flushing gates, sluice gates, drain and water booster pumps)<br>Estimated footprint: 20-foot x 12-foot x 12 feet high |
| Location | Inside a building |
| Standby Generator | Type of Fuel: Diesel<br>Estimated footprint: 6-foot x 10-foot x 8 feet high<br>Capacity: 60 kw |
| Location | Above grade, inside an acoustical enclosure |
| **Flow Control Strategy - Bottom of the Basin** | |
| Diversion Structure | Divert peak flows using overflow weir |
| Control Strategy | Peak flows are diverted over a weir when the water elevation within the pump station wet well rises. The diversion weir elevation is set below the elevation of the overflow weir in the existing CSO diversion structure. If the tank fills to capacity and the peak event has not subsided, the water elevation will continue to rise and a CSO will occur. |
| **Flow Control Strategy - Mid & Upper Basin** | |
| Diversion Structure | Divert peak flows using motorized gates and telemetry signals |
| Control Strategy | Peak flows are diverted by closing a motor-operated gate within the diversion structure when a signal is received. A signal will be sent when it is determined that a CSO event is likely or imminent. Indication that a CSO event may be imminent will be based on a combination of real-time control elements, including: water elevation in the pump station wet well; flow rate/water elevation in certain sewer pipelines; and pump/flow meter data within the pump station wet well. |




**PLAN**

### DETAIL - DIVERSION STRUCTURE OPTIONS, PLAN VIEW




**PROFILE**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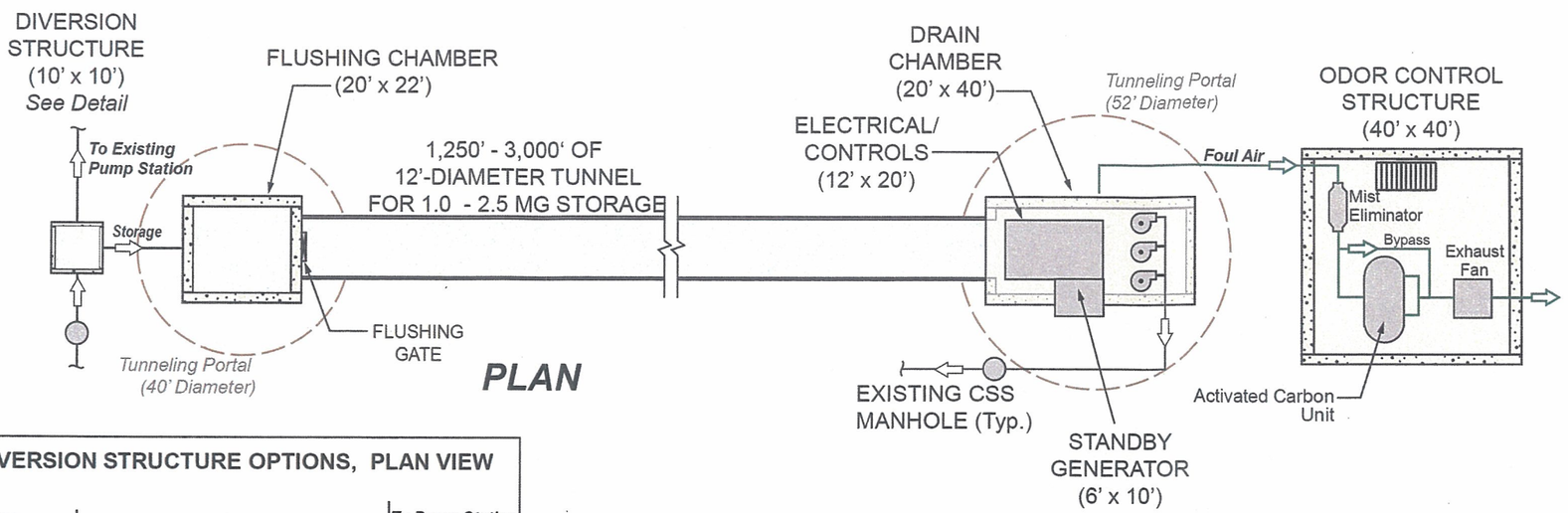
King County
Department of Natural Resources and Parks
Wastewater Treatment Division

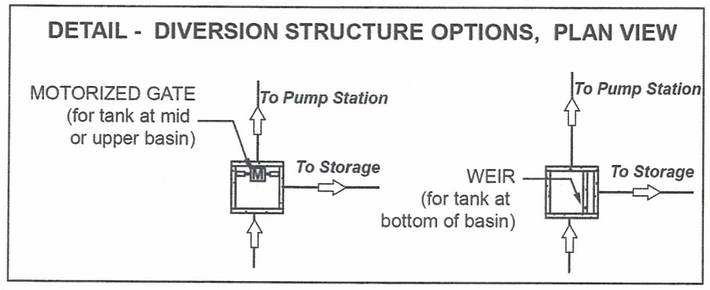
PRELIMINARY DRAFT

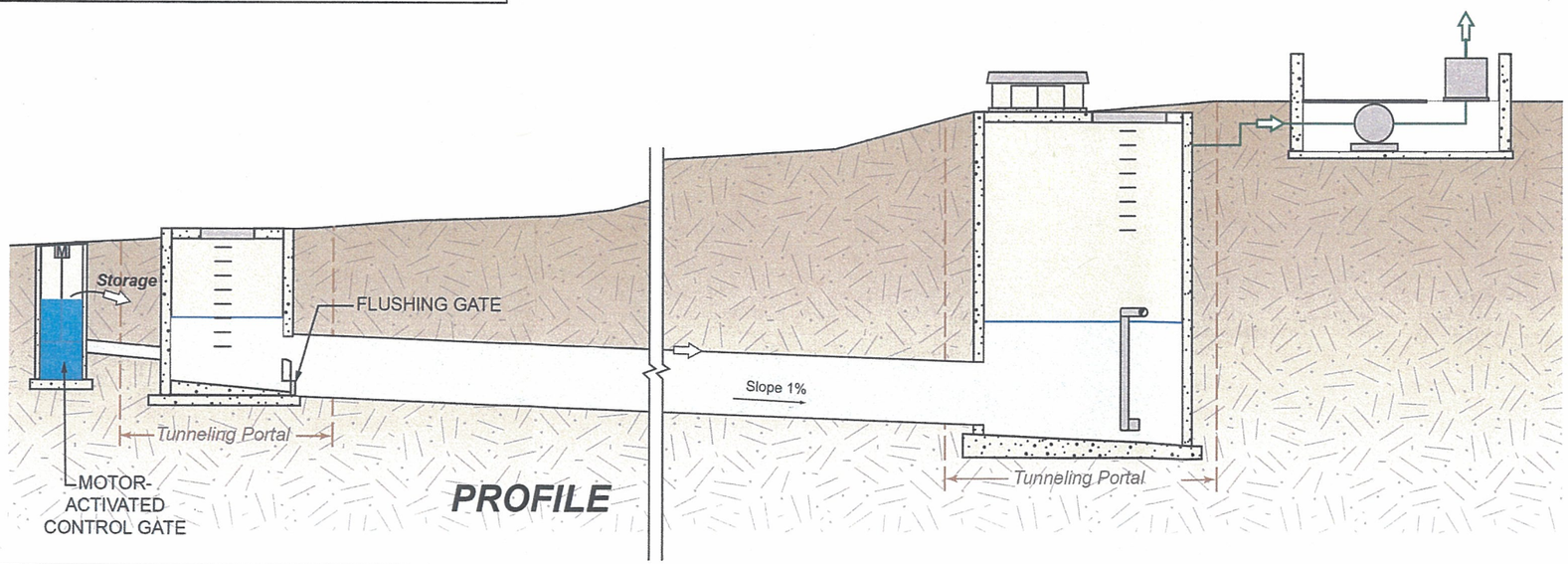
**1.0-MG Tank Storage Facility Schematic Design**

## 1.0-MG Tunnel Storage Design Criteria & Assumptions

| | |
|---|---|
| **General** | |
| Type of Excavation | Tunneling |
| Tunnel Diam | 144 inches |
| Slope | 1.0% |
| Flushing | One flushing gate for entire length of the tunnel, 1,250 feet. The flushing and drain chambers shown are for 1.0 MG storage tunnel. For longer tunnels, the size of the structures and the number of flushing gates required to be verified. |
| **Mechanical** | |
| Odor Control | Activated carbon unit and fan are sized for peak air displacement rate from the storage tank or 2 ACH/hr, whichever is greater. Air displacement rate is assumed to be equal to the peak flow discharge rate into the tank (12 mgd for Barton, 28.5 mgd for Murray, 11 mgd for North Beach, 8 mgd for South Magnolia) |
| Carbon Unit | Operate carbon unit during storage event<br>(2) 3' thick Vertical Bed Units, 1 Pass Air Flow, 50 FPM air velocity<br>Size: 8' Diameter x 12' Long<br>Capacity: 4,500 cfm (for 1.0 MG)<br>Dual $H_2S$ Sensors |
| Fan / Blower | Constant speed<br>Fan Size = 8' x 8' (for 1.0 MG)<br>Estimated footprint: 40' x 40' (for 1.0 MG) |
| Location | Fan unit would be located above ground and carbon scrubber unit below ground. |
| **Electrical** | |
| Electrical Space | Total Estimated Load = 50 hp (fan, flushing gates, sluice gates, drain and water booster pumps)<br>Estimated footprint: 20-foot x 12-foot x 12 feet high |
| Location | Inside a building |
| Standby Generator | Type of Fuel: Diesel<br>Estimated footprint: 6-foot x 10-foot x 8 feet high<br>Capacity: 60 kw |
| Location | Above grade, inside an acoustical enclosure |
| **Flow Control Strategy - Bottom of the Basin** | |
| Diversion Structure | Divert peak flows using overflow weir |
| Control Strategy | Peak flows are diverted over a weir when the water elevation within the pump station wet well rises. The diversion weir elevation is set below the elevation of the overflow weir in the existing CSO diversion structure. If the tunnel fills to capacity and the peak event has not subsided, the water elevation will continue to rise and a CSO will occur. |
| **Flow Control Strategy - Mid & Upper Basin** | |
| Diversion Structure | Divert peak flows using motorized gates and telemetry signals |
| Control Strategy | Peak flows are diverted by closing a motor-operated gate within the diversion structure when a signal is received. A signal will be sent when it is determined that a CSO event is likely or imminent. Indication that a CSO event may be imminent will be based on a combination of real-time control elements, including: water elevation in the pump station wet well; flow rate/water elevation in certain sewer pipelines; and pump/flow meter data within the pump station wet well. |

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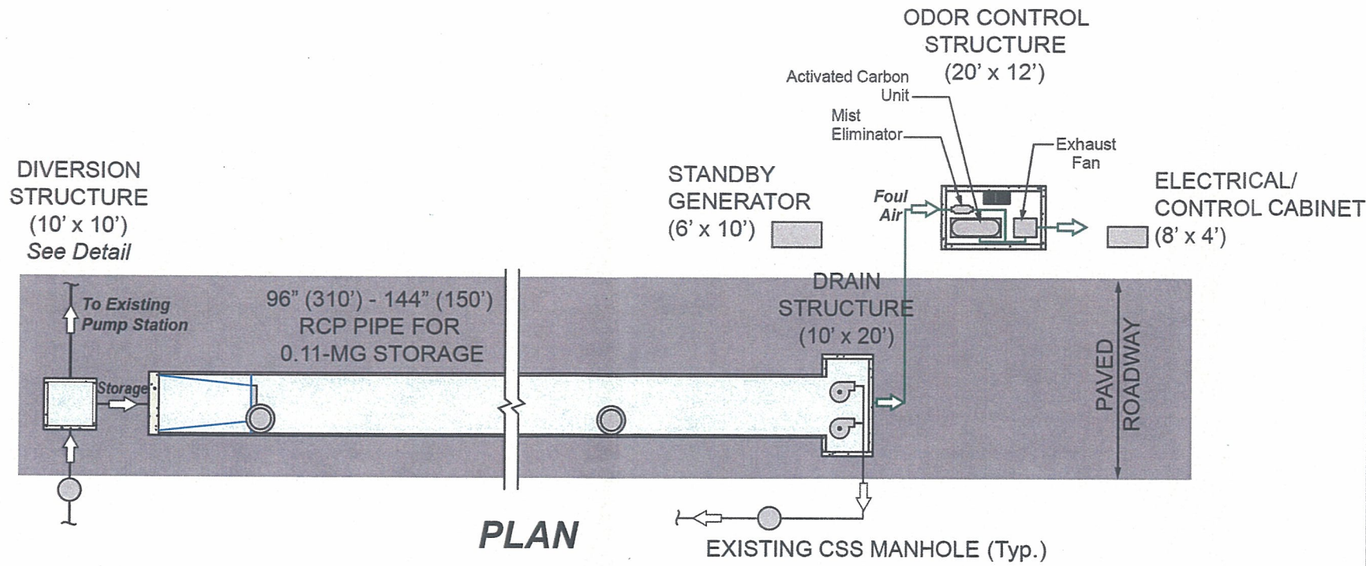
King County
Department of Natural Resources and Parks
Wastewater Treatment Division

PRELIMINARY DRAFT

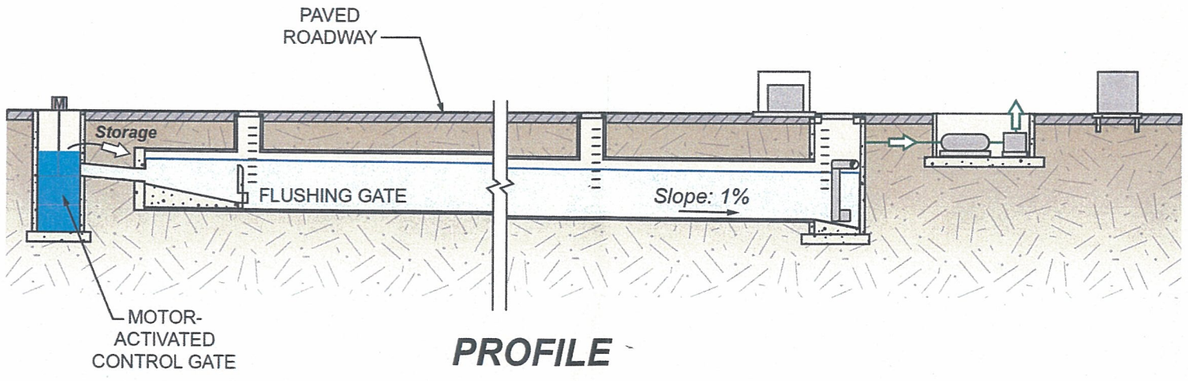
**1.0-MG Tunnel Storage Facility Schematic Design**

## 0.11-MG Pipe Storage Design Criteria & Assumptions

| | |
|---|---|
| **General** | |
| Type of Excavation | Cut and cover up to depths of 30 feet and possible trenchless methods for depths > 30 feet |
| Pipe Diameter | 96 inches to 144 inches |
| Slope | 1.0% |
| Flushing | One flushing gate for 0.11 MG of storage |
| Location | Road right-of-way. Width of pavement varies from 15' to 40' (15' on Upper Fauntleroy Ave. SW and 40' on Fauntleroy Ave. SW and Beach Drive SW) |
| **Mechanical** | |
| Odor Control | Activated carbon unit and fan are sized for peak air displacement rate from the storage tank or 2 ACH/hr, whichever is greater. Air displacement rate is assumed to be equal to the peak flow discharge rate into the tank (12 mgd for Barton) |
| Carbon Unit | Operate carbon unit during storage event<br>(2) 3' thick Vertical Bed Units, 1 Pass Air Flow, 50 FPM air velocity<br>Size: 4' Diameter x 10' Long<br>Capacity: 1,250 cfm |
| Fan / Blower | Constant speed<br>Fan Size = 3' x 3'<br>Estimated footprint: 12' x 20' |
| Location | Below grade structure located in or adjacent to the right-of-way |
| **Electrical** | |
| Electrical Space | Total Estimated Load = 20 hp (fan, flushing gates, drain and water booster pumps) |
| | Electrical cabinet mounted on a concrete pad at grade with weather-proof enclosure. |
| | Estimated footprint: 8-foot x 4-foot x 8 feet high |
| Standby Generator | Type of Fuel: Diesel<br>Estimated footprint: 6-foot x 10-foot x 8 feet high<br>Capacity: 35 kw |
| Location | Above grade, inside an acoustical enclosure |
| **Flow Control Strategy - Bottom of the Basin** | |
| Diversion Structure | Divert peak flows using overflow weir |
| Control Strategy | Peak flows are diverted over a weir when the water elevation within the pump station wet well rises. The diversion weir elevation is set below the elevation of the overflow weir in the existing CSO diversion structure. If the storage pipe fills to capacity and the peak event has not subsided, the water elevation will continue to rise and a CSO will occur. |
| **Flow Control Strategy - Mid & Upper Basin** | |
| Diversion Structure | Divert peak flows using motorized gates and telemetry signals |
| Control Strategy | Peak flows are diverted by closing a motor-operated gate within the diversion structure when a signal is received. A signal will be sent when it is determined that a CSO event is likely or imminent. Indication that a CSO event may be imminent will be based on a combination of real-time control elements, including: water elevation in the pump station wet well; flow rate/water elevation in certain sewer pipelines; and pump/flow meter data within the pump station wet well. |




**PLAN**




**PROFILE**

### DETAIL - DIVERSION STRUCTURE OPTIONS, PLAN VIEW

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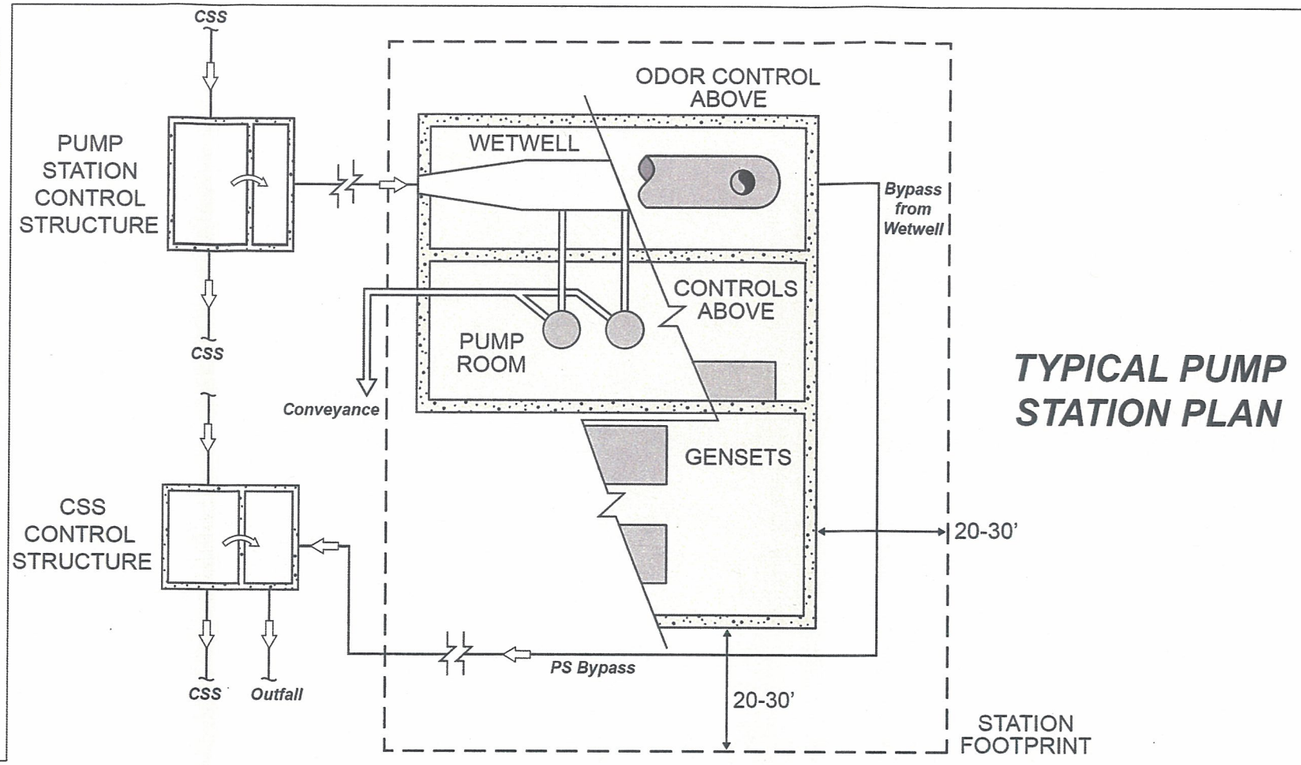
PRELIMINARY DRAFT

**0.11-MG Pipe Storage Facility Schematic Design**

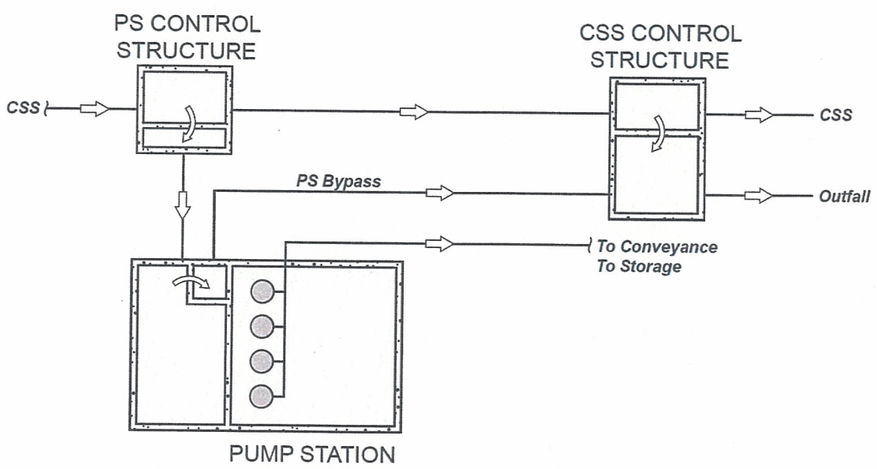
## 7 to 30 Mgd Pump Station Criteria and Assumptions

| | | | | |
|---|---|---|---|---|
| **General** | | | | |
| Firm Capacity mgd | | 7 | 20 | 30 |
| Hydraullic Conditions | | 70 - 200 ft head | 70 - 200 ft head | Over 200 ft Head |
| | | single stage | single stage | series, two stage |
| Number pumps installed | | 4 | 4 | 8 |
| Motor Size, Hp | | 50 - 125 at 7mgd | 125 - 325 at 20mgd | 200 - 700 at 30mgd |
| Standby power, kW | | 1@200 - 400 | 2@250 - 650 | 2@600-1250 |
| | | Station Footprint, with setbacks | | |
| Wetwell | | Circular, rectangular | Rectangular | Rectangular |
| Pump types, installation | Submersible wet pit | 90 x 90 | 110 x 105 | NA |
| | Centrifugal dry pit | 110 x 90 | 110 x 90 | 115 x 100 |
| | VTSH dry pit | 90 x 90 | NA | NA |
| Average depth, ft | | 25 | 25 | 25 |
| Outer Walls, ft | | 2 | 2 | 2 |
| Shoring | | 5ft beyond walls | | |
| **Mechanical** | | | | |
| Ventilation<br>Odor Control | 12 air changes per hour in occupied space when operational.<br>Carbon scrubber and fan, 2AC/hr for wetwell. Operates when pump station on line. | | | |
| Ancillary Eqpmt. | Typical service air, water, gates, valves for ww pump station | | | |
| **Electrical** | | | | |
| Pump drives | Close coupled motors, VFD | | | |
| Emergency Power | Permanent generator(s), diesel, sound attenuated. 36-hour fuel capacity in buried tank | | | |
| **Flow Control Strategy** | | | | |
| Diversion Structure | Divert peak flows using a weir and/or gate structure on the sewer upstream of the CSO control structure. | | | |
| Control Strategy | Peak flows are diverted over a weir when water elevation exceeds capacity of sewer or existing dry wet weather pump station. Flows exceeding pump station capacity overflow to outfall. | | | |




## TYPICAL PUMP STATION PLAN

## GENERAL ARRANGEMENT PLAN







## TYPICAL PUMP STATION SECTION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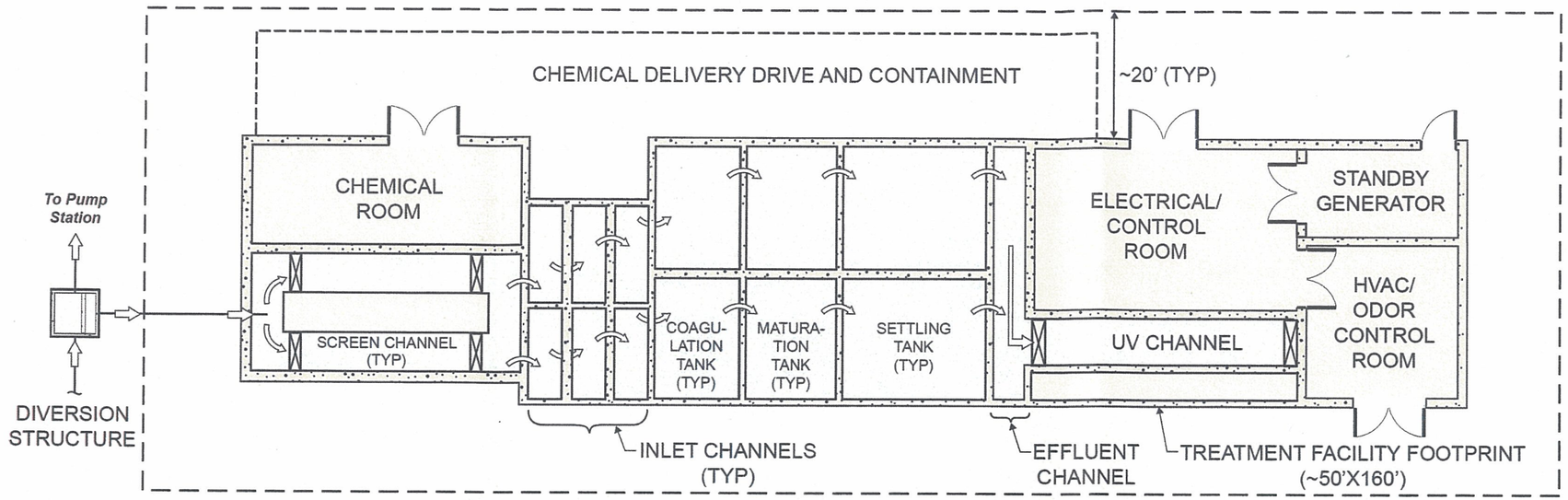
PRELIMINARY DRAFT

Pump Station

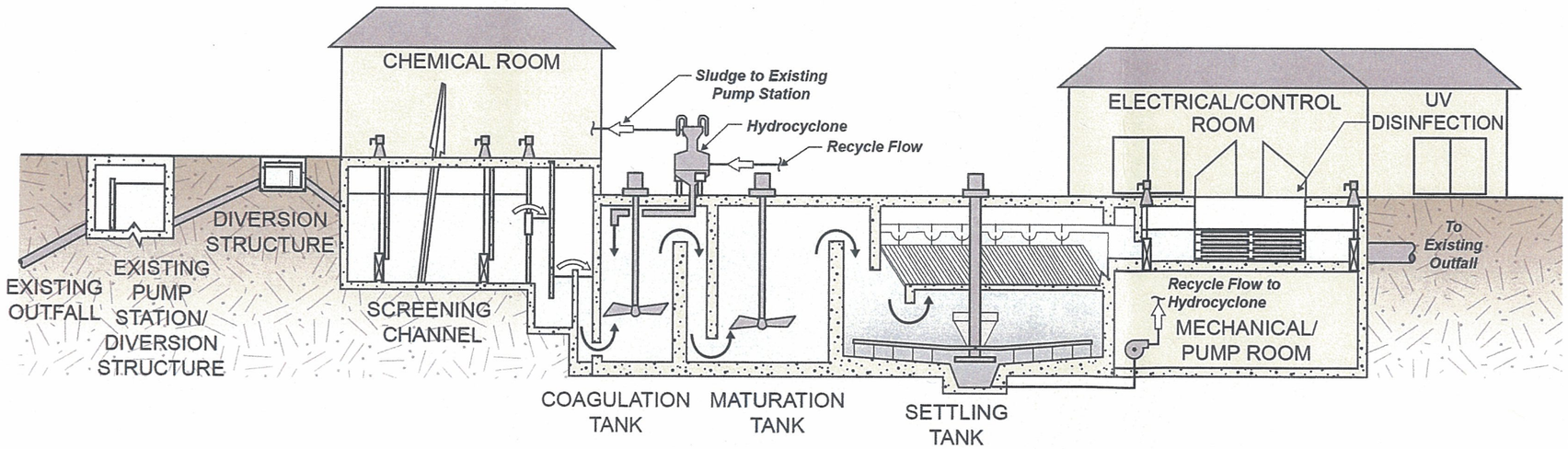
## 10 mgd High Rate Clarification Treatment Facility Design Criteria and Assumptions

| Description | Units | |
|---|---|---|
| **Plant Flow** | | |
| Minimum Flow Rate | mgd | 1 |
| Design Flow Rate | mgd | 10 |
| **Influent Screening** | | |
| Screen Type | type | Perforated Plate |
| Number of Screens | ea | 2 |
| Maximum Capacity per Screen | mgd | 5 |
| Maximum Head Loss | in | 12 |
| Screen Spacing | mm | 6 |
| **High Rate Clarification System** | | |
| Design Flow | | |
| Number of Trains | ea | 2 |
| Maximum Hydraulic Capacity per Train | mgd | 6 |
| Performance Requirements | | |
| Total Suspended Solids (TSS) | - | 85% or 10 MG/L |
| BOD | - | 50% or 10 MG/L |
| Injection/Coagulation/Maturation Tank | | |
| Hydraulic Retention Time | min | 5 |
| Tank Depth | ft | 20 |
| Number of Mixers per Train | ea | 3 |
| Settling Tank | | |
| Tank Depth | ft | 20 |
| Overflow Rate at Design Capacity | gpm/sqft | 60 |
| Microsand/Sludge Recirculation Circuit | | |
| Number of Pumps per Train | ea | 1 Lead, 1 Lag |
| Number of Hydrocyclones per Pump | ea | 1 |
| Sludge Discharge per Train at Design Flow | gpm | 200 |
| Estimated Sludge Concentration | % solids | 0.1 to 0.8 |
| **Chemical Feed Systems** | | |
| Coagulant | | |
| Number of Coagulant Pumps | ea | 1 Lead, 1 Lag |
| Coagulant Dosage Range | mg/L | 0-100 |
| Coagulant Storage Tank | | |
| Number of Tanks | ea | 1 |
| Tank Type | type | FRP, Vertical |
| Coagulant Tank Capacity | gal | 8,000 |
| Diameter | ft | 10 |
| Polymer | | |
| Number of Polymer Preparation Systems | ea | 1 Lead, 1 Lag |
| Number of Polymer Pumps | ea | 2 |
| Polymer Dosage Range | mg/L | 0-2 |
| Number of Polymer Totes | ea | 2 |
| Capacity of Each Polymer Tote | gal | 150 |
| **Ultraviolet Disinfection System** | | |
| Performance Requirements | | |
| Number of Channels | ea | 1 |
| Influent BOD/TSS | mg/L | 10 |
| Maximum Average Particle Size | microns | 30 |
| Maximum Influent (mpn/100 ml E. Coli) | MPN/100 | 400,000 |
| UV Transmittance at 254 nm/1cm | % | 70 |
| Minimum Dose | mJ/sqcm | 40 |
| **Electrical** | | |
| Estimated Load | Hp | 300 |
| Standby Power | kW | 250 |

| **Flow Control Strategy - Bottom of the Basin** | |
|---|---|
| Diversion Structure: | Divert Peak Flows Using Overflow Weir. |
| Control Strategy: | Peak flows are diverted over a weir when the water elevation within the pump station wet well rises. The diversion weir elevation is set below the elevation of the overflow weir in the existing CSO diversion structure. If the existing CSO diversion structure continues to fill and the peak event has not subsided, the water elevation will continue to rise and an uncontrolled CSO event will occur. |




***TYPICAL TREATMENT FACILITY PLAN***




***TYPICAL TREATMENT FACILITY SECTION***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**10 mgd High Rate Clarification Facility**
**Schematic Design**