

## DSN039/041-WWT-1 (KC) or SEBI-Cons Brandon-S Michigan-KC-WWTF (New Conveyance)

Alternative DSN039/041-WWT-1 (KC) controls King County's S Michigan St and Brandon St CSOs by building an equalization basin and wet-weather treatment facility (WWTF) to store and treat CSOs prior to discharge into the Lower Duwamish Waterway. The WWTF would be located near the S Michigan St Regulator Station and designed to meet NPDES effluent water quality limits. This alternative is an independent alternative which would store or treat King County CSOs.

This alternative includes new conveyance to convey flows from the Brandon St and S Michigan St Regulator Stations to the WWTF.

### Design Criteria

- Conveyance from S Michigan St Regulator Station to WWTF (Common to Both CSO Treatment Processes)
  - CSO Peak Flow Rate for Sizing Conveyance from Brandon St Regulator Station to Influent Pump Station, Equalization Basin and WWTF: 35.2 MGD (Brandon St CSOs)
  - CSO Peak Flow Rate for Sizing Conveyance from S Michigan St Regulator Station to Influent Pump Station, Equalization Basin, and WWTF: 66.1 MGD (S Michigan St CSOs)
- Ballasted Sedimentation
  - WWTF and Influent Pump Station Peak Design Flow Rate: 66.0 MGD
  - Equalization Basin Volume: 0.89 MG
  - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to S Michigan St Regulator Station: 66.0 MGD
  - CSO Peak Flow Rate for Sizing New Outfall<sup>1</sup>: 66.0 MGD
- Chemically Enhanced Primary Treatment with Lamella Plates
  - WWTF and Influent Pump Station Peak Design Flow Rate: 68.0 MGD
  - Equalization Basin Volume: 0.72 MG
  - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to CSO Outfall: 68.0 MGD
  - CSO Peak Flow Rate for Sizing New Outfall<sup>1</sup>: 68.0 MGD

### Description

Alternative DSN039/041-WWT-1 (KC) consists of a WWTF to treat S Michigan St and Brandon St CSOs, which discharge into the Lower Duwamish Waterway. The WWTF includes an influent pump station, equalization basin, screening facility, CSO treatment process, and disinfection. Modifications to both the Brandon St and S Michigan St Regulator Stations would

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<sup>1</sup> Untreated CSOs will discharge to existing CSO outfalls (Brandon St and S Michigan St CSO Outfalls).

be required for diversion of flows to the WWTF. Ancillary facilities include an odor control facility, electrical/controls building, and emergency generator. The CSO treatment process could be either a) Ballasted Sedimentation or b) Chemically Enhanced Primary Treatment (CEPT) with Lamella Plates. See Section 6.1 and Appendix F.3 for more details about the treatment facilities and CSO treatment processes.

This alternative assumes that the WWTF would be located within or adjacent to the approximate solid boundary shown in Figure G.5.3-1. The WWTF could be located anywhere between the Brandon St Regulator Station and S Michigan St Regulator Station (indicated as dashed boundary in Figure G.5.3-1); however, conveyance would need to be re-evaluated if WWTF moves from the assumed location (solid boundary). See Section 6.1 Planning-Level Sizing Assumptions for criteria and assumptions used in establishing the approximate boundaries. The main components of this alternative would include:

- Conveyance from Brandon St and S Michigan St Regulator Stations to WWTF (Common to Both CSO Treatment Processes)
  - Modifications to the Brandon St and S Michigan St Regulator Stations.
  - Approximately 4,000 ft of 42-inch-diameter influent gravity sewer from the Brandon St Regulator Station to the WWTF. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.5.3-1.
  - Up to approximately 2,320 ft of 54-inch-diameter influent gravity sewer from the S Michigan St Regulator Station to the WWTF. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.5.3-1.
- CSO Treatment Process (One of the Following)
  - Ballasted Sedimentation
    - 66.0-MGD WWTF.
    - 0.89-MG equalization basin.
    - 66.0-MGD influent pump station.
    - Up to approximately 2,320 ft of 54-inch-diameter effluent gravity sewer from the WWTF to the S Michigan St Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.5.3-1.
    - Approximately 1,150 ft of 54-inch-diameter pipe for the CSO outfall. The alternative assumes a new CSO outfall would convey treated CSOs from the S Michigan St Regulator Station to the center of the Lower Duwamish Waterway<sup>2</sup>.
  - Chemically Enhanced Primary Treatment with Lamella Plates

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<sup>2</sup> Preliminary outfall assumptions (see Appendix F.3 for WWTF design criteria) were used during the alternatives development and evaluation process. Refined outfall design concepts and cost estimates were prepared separately from this technical memorandum and are included in *Technical Memorandum 954.03, Preliminary CSO Outfall Concepts Analysis*.

- 68.0-MGD WWTF.
- 0.72-MG equalization basin.
- 68.0-MGD influent pump station.
- Up to approximately 2,320 ft of 54-inch-diameter effluent gravity sewer from the WWTF to the S Michigan St Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.5.3-1.
- Approximately 1,150 ft of 54-inch-diameter pipe for the CSO outfall. The alternative assumes a new CSO outfall would convey treated CSOs from the S Michigan St Regulator Station to the center of the Lower Duwamish Waterway<sup>3</sup>.

### Wet-Weather Treatment Facility

Two treatment technologies have been developed for use in the CSO treatment processes for this alternative based on the findings of the *Technical Memorandum 700, Treatment Technology Selection*. Table 1 summarizes the unit processes of the WWTF that are included for each CSO treatment process evaluated. See Section 6.1 and Appendix F.3 for more details about the treatment facilities and CSO treatment processes.

**Table 1. Unit Process for CSO Treatment Processes**

<b>Ballasted Sedimentation</b>	<b>CEPT with Lamella Plates</b>
<ul style="list-style-type: none"> <li>• Influent Pump Station,</li> <li>• Fine Screening,</li> <li>• Grit Removal,</li> <li>• Ballasted Sedimentation System (including Chemical Feed System),</li> <li>• Solids Handling Facility,</li> <li>• Disinfection System, and</li> <li>• Facilities Building (odor control, electrical controls, standby generator).</li> </ul>	<ul style="list-style-type: none"> <li>• Influent Pump Station,</li> <li>• Coarse Screening,</li> <li>• CEPT System (including Chemical Feed System and Additional Depth for Solids Handling),</li> <li>• Solids Handling Facility,</li> <li>• Disinfection System, and</li> <li>• Facilities Building (odor control, electrical controls, standby generator).</li> </ul>

### Equalization Basin

The equalization basin allows for shaving peak flows to the WWTF. The shaving of peak flows results in a reduced design capacity requirement for the WWTF. In this alternative, CSOs would be pumped to the WWTF, and flows in excess of the hydraulic capacity of the WWTF would be diverted to the equalization basin prior to the WWTF. This operational mode ensures that CSOs

<sup>3</sup> Preliminary outfall assumptions (see Appendix F.3 for WWTF design criteria) were used during the alternatives development and evaluation process. Refined outfall design concepts and cost estimates were prepared separately from this technical memorandum and are included in *Technical Memorandum 954.03, Preliminary CSO Outfall Concepts Analysis*.

are being treated, and the equalization basin is used only during peak wet-weather events that exceed the WWTF design capacity.

An alternate operational mode includes routing all flows to the equalization basin prior to sending flows to the WWTF to minimize operational costs associated with the WWTF. However, the capacity of the WWTF would need to increase to handle higher peak wet-weather events.

#### Flow Diversion and Discharge

The WWTF and equalization basin is located near the S Michigan St Regulator Station and would store or treat King County CSOs diverted from the S Michigan St and Brandon St Regulator Stations.

One regulator station will be required to divert King County flows (S Michigan St CSOs) from the S Michigan St Regulator Station to the WWTF and equalization basin. For this planning phase, it is assumed that the diversion would occur at the S Michigan St Regulator Station. Evaluation of whether flows can be diverted upstream of the regulator will be completed during preferred alternative development. Diverted King County flow would discharge to the location of the WWTF and equalization basin via a 54-inch-diameter influent gravity sewer. The length of the gravity sewer will vary depending on the selected location of the WWTF, which will be evaluated during preferred alternative development. The gravity sewer can be up to 2,320 feet long based on the criteria and assumptions listed in Section 6.1.

Another regulator station will be required to divert King County flows (Brandon St CSOs) from the Brandon St Regulator Station to the WWTF. For this planning phase, it is assumed that the diversion would occur at the Brandon St Regulator Station, and flows would be conveyed to the WWTF via a 42-inch-diameter gravity sewer. The length of the gravity sewer will vary depending on the selected location of the WWTF, which will be evaluated during preferred alternative development. The gravity sewer is approximately 4,000 feet long based on the criteria and assumptions listed in Section 6.1.

Treated CSOs would be conveyed to the S Michigan St Regulator via a 54-inch-diameter effluent gravity sewer<sup>4</sup>, up to approximately 2,320 feet in length. The length of the gravity sewer will vary depending on the selected location of the WWTF, which will be evaluated during preferred alternative development. The treated CSOs would then be conveyed by the new CSO outfall (approximately 1,150 feet of 54-inch-diameter pipe) from the S Michigan St Regulator Station to the center of the Lower Duwamish Waterway<sup>5</sup>. The length of the CSO outfall will be modified depending on the selected location of the discharge, which will be evaluated during preferred alternative development.

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<sup>4</sup> The 54-inch-diameter effluent pipe would operate as a gravity sewer for the Ballasted Sedimentation alternative, but it would operate as a pressure sewer for the CEPT with Lamella Plates alternative at peak flow rates.

<sup>5</sup> Preliminary outfall assumptions (see Appendix F.3 for WWTF design criteria) were used during the alternatives development and evaluation process. Refined outfall design concepts and cost estimates were prepared separately from this technical memorandum and are included in *Technical Memorandum 954.03, Preliminary CSO Outfall Concepts Analysis*.