

DSN028/029-WWT-1 (KC) or MEBI-Cons Kingdome-King-KC-WWTF Alternative DSN028/029-WWT-1 (KC) controls King County's King St and Kingdome CSOs by building an equalization basin and wet-weather treatment facility (WWTF) to store and treat CSOs prior to discharge into Elliott Bay. The WWTF would be located near the Kingdome 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.

Design Criteria

- Conveyance from King St and Kingdome Regulator Stations to WWTF (Common to Both CSO Treatment Processes)
 - CSO Peak Flow Rate for Sizing Conveyance from King St Regulator Station to Influent Pump Station, Equalization Basin, and WWTF: 29.6 MGD (King St CSOs)
 - CSO Peak Flow Rate for Sizing Conveyance from Kingdome Regulator Station to Influent Pump Station, Equalization Basin, and WWTF: 87.0 MGD (Kingdome CSOs)
- Ballasted Sedimentation
 - WWTF and Influent Pump Station Peak Design Flow Rate: 56.0 MGD
 - Equalization Basin Volume: 1.45 MG
 - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to Kingdome Regulator Station: 56.0 MGD
 - CSO Peak Flow Rate for Sizing New Outfall¹: 56.0 MGD
- Chemically Enhanced Primary Treatment with Lamella Plates
 - WWTF and Influent Pump Station Peak Design Flow Rate: 58.0 MGD
 - Equalization Basin Volume: 1.28 MG
 - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to Kingdome Regulator Station: 58.0 MGD
 - CSO Peak Flow Rate for Sizing New Outfall¹: 58.0 MGD

Description

Alternative DSN028/029-WWT-1 (KC) consists of a WWTF to treat King St and Kingdome CSOs, which discharge into Elliott Bay. The WWTF includes an influent pump station, equalization basin, screening facility, CSO treatment process, and disinfection. Modifications to the King St and Kingdome Regulator Stations would 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.

¹ Untreated CSOs will discharge to existing CSO outfalls (King St and Kingdome CSO Outfalls).

This alternative assumes that the WWTF would be located within or adjacent to the approximate solid boundary shown in Figure G.3.5-1. The WWTF could be located anywhere between the King St Regulator Station and Kingdome Regulator Station (indicated as dashed boundary in Figure G.3.5-1); 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 King St and Kingdome Regulator Stations to WWTF (Common to Both CSO Treatment Processes)
 - Modifications to the King St and Kingdome Regulator Stations.
 - Approximately 2,400 ft of 36-inch-diameter influent gravity sewer to convey King St CSOs from the King 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.3.5-1.
 - Up to approximately 1,570 ft of 54-inch-diameter influent gravity sewer to convey Kingdome CSOs from the Kingdome 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.3.5-1.
- CSO Treatment Process (One of the Following)
 - Ballasted Sedimentation
 - 56.0-MGD WWTF.
 - 1.45-MG equalization basin.
 - 56.0-MGD influent pump station.
 - Up to approximately 1,570 ft of 48-inch-diameter effluent gravity sewer from the WWTF to the Kingdome Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.3.5-1.
 - Approximately 3,000 ft of 48-inch-diameter pipe for the CSO outfall. The alternative assumes a new CSO outfall would convey treated CSOs from the Kingdome Regulator Station to Elliott Bay².
 - Chemically Enhanced Primary Treatment with Lamella Plates
 - 58.0-MGD WWTF.
 - 1.28-MG equalization basin.
 - 58.0-MGD influent pump station.

² 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*.

- Up to approximately 1,570 ft of 48-inch-diameter effluent gravity sewer from the WWTF to the Kingdome Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.3.5-1.
- Approximately 3,000 ft of 48-inch-diameter pipe for the CSO outfall. The alternative assumes a new CSO outfall would convey treated CSOs from the Kingdome Regulator Station to Elliott Bay³.

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

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

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 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.

³ 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*.

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 Kingdome Regulator Station and would store or treat King County CSOs diverted from the King St and Kingdome Regulator Stations.

One regulator station will be required to divert King County flows (Kingdome CSOs) from the Kingdome Regulator Station to the WWTF and equalization basin. For this planning phase, it is assumed that the diversion would occur at the Kingdome 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 facilities, which will be evaluated during preferred alternative development. The gravity sewer can be up to 1,570 feet long based on the criteria and assumptions listed in Section 6.1.

An additional regulator station will be required to divert King County flows (King St CSOs) from the King St Regulator Station to the WWTF. For this planning phase, it is assumed that the diversion would occur at the King St Regulator Station. Flows would be conveyed to the WWTF via approximately 2,400 ft of 36-inch-diameter influent gravity sewer. The total length of the gravity sewer will vary depending on the selected location of the facilities, which will be evaluated during preferred alternative development.

Treated CSOs would be conveyed to the Kingdome Regulator Station via a 48-inch-diameter effluent gravity sewer, up to approximately 1,570 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 3,000 feet of 48-inch-diameter pipe) from the Kingdome Regulator Station to Elliott Bay⁴. 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.

⁴ 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*.