United States and State of Ohio v. Northeast Ohio Regional Sewer District

Consent Decree
Appendix 1

Control Measures and Performance Criteria

Appendix 1

	Control Measure	Description	CSOs Controlled	Design Criteria	Performance Criteria in a Typical Year[1]	Critical Milestones
	Easterly Plant					
1	Increase Secondary Treatment Capacity	Increase secondary capacity from 300 MGD to a sustained capacity of 400 MGD	Elimination of the Primary Effluent Bypass (PEB)	Provide secondary sustained treatment capacity of 400 MGD	Eliminate the primary effluent bypass; provide secondary treatment to meet NPDES effluent limits	1. Bid Year: 2014 2. Achievement of Full Operation: 2016
2	Treatment and Disinfection of CSO 001 using CEHRT	1. Pilot testing of CEHRT and disinfection to assess performance 2. If pilot testing of CEHRT does meet performance criteria, construction of 400 MGD CEHRT and disinfection system	Outfall 001	Provide treatment and high rate disinfection of CSO 001 flows up to 400 mgd peak inflow to 25 fully treated OF and 2 partially treated OF in a typical year. Design to control 30 mg/l of TSS.	Achieve 40.0 mg/l TSS averaged across 7 consecutive activations; 126/100 ml E. coli (rec. season geomean) 284/100 ml E. coli (rolling 7 days of activation geomean); and 0.038 mg/l residual chlorine. If 40 mg/l TSS is not achieved, default to ballasted flocculation[6] treatment system in Item 2A.	1. Work Plan: Submitted by January 1, 2011 2. Pilot Testing Report: Within 42 months of Work Plan Approval 3. Design Commencement: Within 6 months of Pilot Testing Report Approval 4. Construction Award: Within 18 months of Design Commencement 5. Construction Completion: Within 30 months of construction award
2A	Treatment and Disinfection of CSO 001 using Ballasted Flocculation[6]	If pilot testing of CEHRT under Control Measure 2 does not meet performance criteria, construction of 400 MGD ballasted flocculation[6] and disinfection system.	Outfall 001	Provide ballasted flocculation[6] treatment and high rate disinfection of CSO 001 flows up to 400 mgd peak inflow to 25 fully treated OF and 2 partially treated OF in a typical year. Design to control 30 mg/l of TSS.	Achieve 30 mg/l TSS averaged across 7 consecutive activations; 126/100 ml E. coli (rec. season geomean) 284/100 ml E. coli (rolling 7 days of activation geomean) ; and 0.038 mg/l residual chlorine.	1. Work Plan: Submit work plan for ballasted flocculation[6] pilots within 6 months after submission of pilot report for CEHRT that indicates failure to achieve performance criteria in Control Measure 2. 2. Pilot Testing Report: Within 12 months of Work Plan Approval 3. Design Commencement: Within 6 months of Pilot Testing Report Approval 4. Construction Award: Within 18 months of Design Commencement 5. Construction Completion: Within 30 months of construction award
	Westerly Plant					
3	Treatment and Disinfection of CSO 002 using CEHRT in all 6 Quadrants (quads).	1. Demonstration and testing of CEHRT within the existing four CSOTF quads to assess performance 2. If demonstration testing of the existing four quads using CEHRT meets performance criteria, construction of 2 additional quads to provide 411 MGD wet weather capacity 3. If demonstration testing of the existing four quads using CEHRT does not meet performance criteria, implement Control Measure 3A	Outfall 002	Provide CEHRT treatment in 4 existing and 2 new quads and high rate disinfection of CSO 002 flows up to 411 mgd peak inflow to 11 fully treated OF and 3 partially treated OF in a typical year. Design to control to 30 mg/l of TSS.	Achieve 40.0 mg/l TSS averaged across 7 consecutive activations; 126/100 ml E. coli (rec. season geomean) 284/100 ml E. coli (rolling 7 days of activation geomean); and 0.038 mg/l residual chlorine NTE. If 40 mg/l TSS is not achieved, default to ballasted flocculation[6] treatment system in Item 3A.	1. Work Plan: Submitted by January 1, 2011. 2. Demonstration Testing Report: Within 54 months of Work Plan Approval 3. Design Commencement of 2 additional quads : Within 6 months of Demonstration Testing Report Approval 4. Construction Award: Within 18 months of Design Commencement 5. Construction Completion: Within 30 months of construction award

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	Control Measure	Description	CSOs Controlled	Design Criteria	Performance Criteria in a Typical Year[1]	Critical Milestones
3A	Treatment and Disinfection of CSO 002 using CEHRT in Existing 4 Quads and Ballasted Flocculation[6]	If demonstration testing of the existing four quads using CEHRT under Control Measure 3 does not meet performance criteria, construction of 150 MGD ballasted flocculation[6] treatment system to provide 450 MGD wet weather capacity.	Outfall 002	Provide CEHRT (4 existing quads) and 150 MGD ballasted flocculation[6] treatment and high rate disinfection of CSO 002 flows up to 450 mgd peak inflow to 12 fully treated OF and 2 partially treated OF in a typical year. Design to control to 30 mg/l of TSS. The facility will be integrated into the upgraded existing CSOTF such that wet weather operation will prioritize (1) storage in upgraded CSOTF tankage, (2) treatment of flows exceeding storage capacity through the 150 MGD ballasted flocculation[6] treatment system, and (3) treatment of flows in excess of the 150 MGD ballasted flocculation[6] facility capacity through the upgraded 4 quads CEHRT system.	Achieve maximum performance of TSS removal; 126/100 ml E. coli (rec season geomean), 284/100 ml E. coli (rolling 7 days of activation geomean) and 0.038 mg/l residual chlorine NTE.	1. Work Plan: Submit work plan for ballasted flocculation[6] pilots for 2 additional quads within 6 months after submission of pilot report for CEHRT that indicates failure to achieve performance criteria in Control Measure 3. 2. Pilot Testing Report: Within 12 months of Work Plan Approval 3. Design Commencement: Within 6 months of Pilot Testing Report Approval 4. Construction Award: Within 18 months of Design Commencement 5. Construction Completion: Within 30 months of construction award
	Southerly Plant					
4	Treatment of Primary Effluent Bypass Demonstration/Pilot Project	Demonstration or pilot testing of chemical addition within primaries bank 11 - 18 and high rate disinfection of the primary effluent bypass to assess performance.	PEB	Demonstrate or pilot performance of treatment and high rate disinfection of primary effluent bypass flows for up to 125 MGD peak flow designed to control to 30 mg/l TSS.	Achieve 40.0 mg/l TSS averaged across 7 consecutive activations; 126/100 ml E. coli (rec. season geomean) 284/100 ml E. coli (rolling 7 days of activation geomean); and 0.038 mg/l residual chlorine NTE. If 40 mg/l TSS is not achieved, default to ballasted flocculation[6] treatment system for PEB in Item 5A.	1. Work Plan: Submitted by January 1, 2011 2. Pilot Testing Report: Within 42 months of Work Plan Approval
5	Increase Secondary Treatment Capacity and Treat Primary Effluent Bypass with CEHRT	1. Increase secondary capacity from 400 MGD to 615 MGD during wet weather by adding an additional 1st stage settling tank, operating the 1st and 2nd stage secondary systems in parallel, and creating a second effluent outfall off of 1st stage. 2. If demonstration testing of chemical addition under Control Measure 4 does meet performance criteria, construct chemical addition within primaries and high rate disinfection of the remaining primary effluent bypass flows up to 125 MGD peak flows.	PEB	1. Provide secondary treatment capacity of 615 MGD during wet weather and reduce bypass events to 1 treated/0 untreated in a typical year. 2. Provide treatment and high rate disinfection for primary effluent bypass flows up to 125 MGD peak flow designed to control to 30 mg/l TSS.	1. For 1st and 2nd Stage outfalls, achieve NPDES Permit limits[2] . 2. For PEB flow occurring beyond capacity of the 615 MGD 1st and 2nd stage parallel treatment capacity, achieve 40 mg/l TSS averaged acrossed 7 consecutive activations, 126/100 ml E. coli (rec. season geomean), 284/100 ml E. coli (rolling 7 days of activation geomean) and 0.038 mg/l residual chlorine NTE.	1. Commencement of design of plant improvements and PEB CEHRT system within 6 months of approval of pilot report. 2. Construction award for plant improvements and PEB CEHRT system within 24 months of design commencement. 3. Construction Completion of plant improvements and PEB CEHRT system within 30 months of construction award.

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	Control Measure	Description	CSOs Controlled	Design Criteria	Performance Criteria in a Typical Year[1]	Critical Milestones
5A	Treat Primary Effluent Bypass with Ballasted Flocculation[6]	If demonstration testing of chemical addition within the primaries under Control Measure 4 does not meet performance criteria, construction of ballasted flocculation[6] treatment facility and high rate disinfection system for remaining PEB flows up to 125 MGD peak flows.	PEB	Provide ballasted flocculation6 treatment and high rate disinfection for primary effluent bypass flows up to 125 MGD peak flow designed to control to 30 mg/l TSS.	For PEB flow occurring beyond capacity of the 615 MGD 1st and 2nd stage parallel treatment capacity, achieve 30 mg/l TSS averaged acrossed 7 consecutive activations, 126/100 ml E. coli (rec. season geomean), 284/100 ml E. coli (rolling 7 days of activation geomean) and 0.038 mg/l residual chlorine NTE.	1. Work Plan: Submit work plan for ballasted flocculation[6] pilots within 6 months after submission of pilot report for CEHRT in PEB that indicates failure to achieve performance criteria in Control Measure 4. 2. Pilot Testing Report: Within 12 months of Work Plan Approval 3. Design Commencement of plant improvements and PEB ballasted flocculation[6] system: Within 6 months of Pilot Testing Report Approval 4. Construction Award for plant improvements and PEB 150 MGD ballasted flocculation[6] system: Within 18 months of Design Commencement 5. Construction Completion of plant improvements and PEB ballasted flocculation[6] system: Within 30 months of construction award
	Easterly CSO Projects [3]					
6	Euclid Creek Tunnel/Dugway Storage System	24 ft diameter storage tunnel, dewatering pump station, and consolidation/relief sewers that capture and store the CSO within Euclid and Dugway tributary sewersheds.	Outfalls 206, 208, 209, 210, 211, 212, 214, 230, 231, 232, 239, 242	Provide a minimum of 117 MG of effective storage volume[7] to capture flow from CSO outfalls 206, 208, 209, 210, 211, 212, 214, 230, 231, 232, 239, and 242.	When incorporated with all of the Euclid Creek and Dugway Brook tunnel components improvements, reduce overflow events to 2 or less in a typical year	1. Bid Year: 2010 2. Achievement of Full Operation: 2020
7	Shoreline Tunnel System	21 ft diameter storage tunnel and consolidation sewers that capture and store CSO from the outfalls leading to Lake Erie from the area near East 12th Street to the connection of the Dugway/Doan Storage Tunnel system in Forest Hill Park. Includes multiple drop structures near existing outfalls to capture CSO.	Outfalls 093, 094, 095, 096, 097, 098, 200, 201, 202, 203, 204, and 205	Provide a minimum of 43 MG of effective storage volume[7] to capture flow from CSO outfalls 093, 094, 095, 096, 097, 098, 200, 201, 202, 203, 204, and 205. Dewater into the ECT/ECT tunnel system.	When completed with all of the Shoreline Area tunnel components improvements, reduce overflow events to 2 or less at Priority outfalls, and 3 or less at other outfalls in a typical year	1. Bid Year: 2021 2. Achievement of Full Operation: 2027
8	Doan Valley Tunnel System	17 ft diameter storage tunnel and consolidation/relief sewers that capture and store CSO from Doan Brook Area to the Dugway West Interceptor relief sewer. This includes a 8.5 ft consolidation sewer (MLK/Chester Conveyance Tunnel) to convey captured flow from the western CSO regulator locations along Doan Brook and 6 ft consolidation sewer (Woodhill Conveyance Tunnel) to convey combined sewer flow, a portion of relief flow, and some dry weather flow.	Outfalls 073, 217, 218, 219, 220, 221, 222, 223/224, 226, and 234	Provide a minimum of 16 MG of effective storage volume[7] to capture flow from CSO outfalls 073, 217, 218, 219, 220, 221, 222, 223/224, 226, and 234.	When completed with all of the Doan Valley tunnel components improvements, reduce overflow events to 2 or less at Priority outfalls, and 3 or less at other outfalls in a typical year	1. Bid Year: 2017 2. Achievement of Full Operation: 2021
9	Superior Avenue Pump Station Upgrade	Upgrade of existing pump station to increase pumping capacity and wet well storage for purposes of providing sufficient conveyance and storage capacity for tributary regulators E-26, E-27, E-28, and the Stones Levee Pump Station	Outfalls 090, W. 11th/Superior Pump Station CSO	Upgrade the SAPS firm pumping capacity to 10.5 mgd and provide wet weather storage within the wet well.	Reduce overflow events to 2 or less in a typical year	1. Bid Year: 2016 2. Achievement of Full Operation: 2018

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	Control Measure	Description	CSOs Controlled	Design Criteria	Performance Criteria in a Typical Year[1]	Critical Milestones
10	Stones Levee Pump Station Upgrade	Project includes an upgrade to the pump station and a new near-surface storage tank and consolidation sewer from tributary regulator E-25. The additional pumping capacity will also assist in alleviating surcharging in the combined sewer along West 3rd Street. Regulator modifications to regulator E-25 which is tributary to CSO-235.	Outfalls 235, Stones Levee Pump Station CSO; surcharging relief	Upgrade the SLPS firm pumping capacity to 1.5 mgd and provide wet weather storage adjacent to the wet well.	Reduce overflow events to 3 or less in a typical year	1. Bid Year: 2016 2. Achievement of Full Operation: 2017
11	Canal Road In-Line Storage	Replace regulators E-25, E-26, and E-27 with a two-stage static control system to utilize the available storage in the existing combined sewer upstream of the control structure.	Outfalls 090, 235; Additional storage capacity and flow attenuation	Provide in-line storage along Canal Road.	Reduce overflow events to 3 or less in a typical year	1. Bid Year: 2017 2. Achievement of Full Operation: 2018
12	Flood Control & System Enhancement	District and intercommunity relief sewers that solely provide flooding relief for the 5-year, 6-hour design storm	Flooding relief for 5-year, 6-hour design storm	Provide capacity to carry the 5-year 6-hour design storm	Capacity to carry the 5-year 6-hour design storm	1. Bid Year: 2032 2. Achievement of Full Operation: 2034
13	East 55th Relief Sewer	Parallel relief sewer to provide wet weather flood relief for the existing E. 55th Street Interceptor.	Flooding relief for 5-year, 6-hour design storm	Provide capacity to carry the 5-year 6-hour design storm	Capacity to carry the 5-year 6-hour design storm	1. Bid Year: 2031 2. Achievement of Full Operation: 2032
	Westerly CSO Projects [4]					
14	Westerly Tunnel System	24 ft and 10ft diameter storage/conveyance tunnel system with dewatering pump station and consolidation sewers that capture and store the CSO within Westerly tributary sewersheds	Outfalls 074, 075, 080, 087	Provide a minimum of 36 MG of effective storage volume[7] to capture flow from CSO outfalls 074, 075, 080 and 087.	When completed with all of the Westerly Tunnel area tunnel components improvements, reduce overflow events to 2 or less at Priority outfalls, and 3 or less at other outfalls in a typical year	1. Bid Year: 2020 2. Achievement of Full Operation: 2024
15	Columbus Road Storage Tank	Storage tank to capture overflow from regulator WR-18 and store flows until capacity is available in the LLI.	Outfall 078	Storage facility sized to capture effective volume of 0.33 MG CSO from CSO 078 outfall.	Reduce overflow events to 0 in a typical year	1. Bid Year: 2018 2. Achievement of Full Operation: 2019
16	Center Street Storage Tank	Replace regulator WR-9 with a small, gravity draining storage tank to control overflows to 076. WR-9 acts as a relief point for the Low Level Interceptor (LLI) and the storage tank will allow for the overflows to stored until capacity is available in the LLI.	Outfall 076	Storage facility sized to capture effective volume of 0.16 MG CSO from CSO 076 outfall.	Reduce overflow events to 0 in a typical year	1. Bid Year: 2023 2. Achievement of Full Operation: 2024
17	West Third Street Storage Tank	Storage tank to capture overflow from regulator WR-8 and store flows until capacity is available in the combined system.	Outfall 082	Storage facility sized to capture effective volume of 0.055 MG CSO from CSO 082 outfall.	Reduce overflow events to 4 or less in a typical year	1. Bid Year: 2024 2. Achievement of Full Operation: 2025
18	Mary Street Pump Station Upgrade	Upgrade existing pump station from 8 mgd t0 10 mgd, upgrade of influent combined sewer from 18-in to 27-in, and modifications to the several upstream tributary regulators to maximize in-line storage.	Outfall 086	Upgrade facility to pump flows tributary to the Mary Street PS up to a firm capacity of 10 mgd.	Reduce overflow events to 4 or less in a typical year	1. Bid Year: 2015 2. Achievement of Full Operation: 2017
19	Jefferson Avenue Separation	Construct a sanitary sewer along Jefferson Avenue parallel to the combined sewer tributary to regulator WR-7A. New sanitary sewer would tie in downstream of regulator and the dry weather outlet from WR-7A bulkheaded. CSO-240 would become a stormwater only outlet.	Outfall 240	Parallel sanitary sewer to provide separate conveyance from combined system.	Reduce overflow events to 0 in a typical year	1. Bid Year: 2027 2. Achievement of Full Operation: 2028
20	West 3rd St/Quigley Parallel Storage System	Replace systems upstream of regulator WR-1 and regulator WR-2 with orifice/weir control systems and larger sewer pipes to control overflows to CSO-089	Outfall 089	Provide outlet restrictions and parallel pipe storage for captured CSO.	Reduce overflow events to 2 or less in a typical year	1. Bid Year: 2021 2. Achievement of Full Operation: 2021
	Southerly CSO Projects [5]					

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	Control Measure	Description	CSOs Controlled	Design Criteria	Performance Criteria in a Typical Year[1]	Critical Milestones
21	Southerly Tunnel System	23 ft diameter tunnel storage system with dewatering pump station and consolidation relief sewers that capture CSO from outfalls leading to the Cuyahoga River replacing the existing Southerly Interceptor by conveying dry and wet weather flows to the Southerly Plant.	Outfalls 033, 035, 036, 039, 040, and 072	Provide a minimum of 54 MG of effective storage volume[7] to capture flow from CSO outfalls 033, 035, 036, 039, 040, and 072.	When completed with all of the Southerly Interceptor Area tunnel components improvements, reduce overflow events to 3 or less in a typical year	1. Bid Year: 2024 2. Achievement of Full Operation: 2030
22	Big Creek Tunnel System	20 ft diameter tunnel system with 6 ft diameter dewatering sewer and consolidation/relief sewers that captures CSOs from outfalls leading to Big Creek, Spring Creek, and Rocky River and conveys the flows to the Southerly Plant through existing Big Creek Interceptor.	Outfalls 043, 044, 049, 050, 051, 053, 054, 055, 056, 057, 058, 059, 233, 238, & Cooley Avenue	Provide a minimum of 46 MG of effective storage volume[7] to capture flow from CSO outfalls 043, 044, 049, 050, 051, 053, 054, 055, 056, 057, 058, 059, 233, 238, & Cooley Avenue.	When completed with all of the Big Creek Interceptor Area tunnel components improvements, reduce overflow events to 3 or less in a typical year	1. Bid Year: 2026 2. Achievement of Full Operation: 2035
23	CSO-045 Storage Tank	Storage tank to capture flows tributary to Jennings Road Pump Station (CSO-045)	Outfalls 045, 088	Storage facility sized to capture effective volume of 1.1 MG CSO from CSO 045 and 088 outfalls.	Achieve 4 overflows or less in a typical year	1. Bid Year: 2021 2. Achievement of Full Operation: 2023
24	CSO-063 Relief / Consolidation Sewer	Interbasin diversion of combined flows to the Southwest Interceptor via 4' diameter pipe and new SWI drop structure	Outfall 063	Convey controlled wet weather flows to SWI up to prescribed control level.	Achieve 1 overflows or less in a typical year	1. Bid Year: 2013 2. Achievement of Full Operation: 2014
25	Stickney Creek Intercommunity Sewer	Intercommunity relief sewer along the existing Stickney Creek Sanitary System to relieve flooding problems. Tributary to Stickney Creek Area Consolidation Sewer.	surcharging and flooding relief	Provide capacity to carry the 5-year 6-hour design storm	Capacity to carry the 5-year 6-hour design storm	1. Bid Year: 2033 2. Achievement of Full Operation: 2034

1 - Typical year of storm events as defined in the CSO Phase II Facilities Plans for the Westerly, Doan Valley, Easterly and Southerly Districts.

2 - Discharge from 1st Stage outfall does not receive nitrification and is expected to meet plant-wide ammonia limits when averaged with discharge from 2nd Stage outfall.

3 - Easterly priority CSOs are 001, 073, 200, 202, 204, 206, 209, 210, 211, 221, 222, 230, 232 and 242. Easterly non-priority CSOs are 208, 212, 214, 231, 239, 090, 093, 094, 095, 096, 097, 098, 201, 203, 205, 217, 218, 219, 220, 223/224, 226, 234, 235, Superior Ave Pump Station (PS), and Stones Levee PS.

4 - Westerly priority CSOs are 002 and 080. Westerly non-priority CSOs are 074, 075, 076, 078, 082, 086, 087, 088, 089 and 240.

5 - Southerly priority CSOs are 057, 058 and 063. Southerly non-priority CSOs are 043, 044, 045, 049, 050, 051, 053, 054, 055, 056, 059, 233, 238, and Cooley Avenue.

6 - Ballasted flocculation: A physical-chemical treatment process that uses continuously recycled media and a variety of additives to improve the settling properties of suspended solids through improved floc bridging (USEPA Wastewater Fact Sheet)

7 - Effective storage volume is defined as the volume of combined sewage that can reliably enter and be stored by the specified tunnel during wet weather events and is the volume required to store CSO volumes during wet weather events to meet identified Performance Criteria plus a 10% contingency. Effective storage volume is storage tunnel volume; such volume may include usable volumes in tunnel adits and tunnel drop shafts. Effective storage volume does not include volume that may be stored in consolidation, conveyance or dewatering tunnels/sewers or in near-surface tunnel-related structures.