

CITY OF PORTLAND
COMBINED SEWER OVERFLOW PROGRAM

ANNUAL CSO PROGRESS REPORT TO DEQ
FISCAL YEAR 2004-2005

As Required by the Amended Stipulated Final Order
(ASFO WQ-NWR-91-75)

CITY OF PORTLAND
BUREAU OF ENVIRONMENTAL SERVICES

JUNE 30, 2005



Annual CSO Progress Report to DEQ for FY 2004-2005

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I. Summary

Portland's Combined Sewer Overflow (CSO) Program has completed the 14th year of implementing the full array of projects that fulfill Portland's commitment to control all CSO discharges by December 2011. The City has completed all CSO projects for the Columbia Slough system resulting in several years of eliminating CSO to the Slough. For the Willamette System River, Portland is completing construction of the 14-foot West Side CSO Tunnel and is fully engaged in building the Swan Island Pump Station as part of the overall Westside CSO Program. The City has also completed 60% design of the Eastside CSO Tunnel. These efforts, along with the City's stream separation projects and local basin improvements, all control CSO across the combined system.

The Annual CSO Progress Report, required under the Amended Stipulated and Final Order (ASFO), presents the activities completed during fiscal year that ends June 30. The highlights and note-worthy accomplishments from fiscal year 2004-2005 include:

- Completed construction of over 10,000 lineal feet of West Side CSO Tunnel, 14-feet in diameter.
- Completed the north drive of the West Side CSO Tunnel to Swan Island Pump Station
- Completed internal structural walls of the Swan Island Pump Station and began building the lifts/floors in the structure. Also began building the control building.
- Completed micro-tunneling for the SW Parallel Interceptor Segment 3 that now connects into the Westside CSO Tunnel at the Clay Street Shaft
- Completed 90% construction to upgrade the Columbia Boulevard Influent Pump Station from 105 to 135 MGD.
- Completed 60% design for the East Side Willamette River CSO Tunnel and hired the construction contractor early to help incorporate contractor ideas into the final design.

The City of Portland has completed each of the 21 milestones required in the ASFO (see last page of Appendix A for full list) that have come due through June 30, 2005. Portland's CSO Program is on schedule and moving aggressively through the next phase of controlling the Willamette River CSO outfalls. This year, due to the massive facility construction program we have undertaken, we will expend approximately \$120 Million in CIP funds constructing the required CSO facilities.

The significant activities we expect to complete next fiscal year ending June 30, 2006 include:

- Complete the West Side CSO Tunnel South drive through Clay Street Shaft, effectively finishing all 14-foot diameter tunneling for the West Side Tunnel.
- Peninsular Forcemain: Complete construction to connect the Swan Island Pump Station to the Peninsular Tunnel
- Complete 100% design of the Eastside CSO Tunnel and initiate construction
- Complete design on Tanner Phase III and begin construction in the Highway 26 area

II. Introduction

Requirement for Annual Progress Report

This annual report to the Oregon Department of Environmental Quality (DEQ) is required under the Amended Stipulation and Final Order (ASFO) No. WQ-NWR-91-75 signed with the City of Portland (City) on August 11, 1994. During the period that the ASFO is in effect, the City is required to submit each year by September 1st an annual progress report summarizing the City's efforts to eliminate CSO discharges. The report is to contain information on CSO control activities performed during the past fiscal year and identify the CSO Program work planned for the current fiscal year. This report covers the CSO Program activities performed under the Capital Improvement Program (CIP) as well as the planning, operations, and maintenance activities performed by the Bureau of Environmental Services (BES) operating programs for the combined sewer and CSO systems during the past fiscal year.

Portland's Capital Improvement Program (CIP)

The City of Portland's Bureau of Environmental Services manages the planning, and implementation (pre-design, design, construction, & startup) of all capital projects. The CIP is divided into specific functional categories which include: CSO, Maintenance and Reliability, Sewage Treatment Systems, Surface Water Management, and Systems Development. The number of capital improvement projects, listed by program area, is shown in Table 1 below.

Table 1: Projects in Current Capital Improvement Program

Category	Projects Listed at End of FY 04-05	Projects Open During FY 04-05
Combined Sewer Overflow	299	6
Maintenance and Reliability	436	22
Mid-County Sewer	86	0
Sewage Treatment Systems	377	21
Surface Water Management	143	6
Systems Development	237	12
Total	1,578	67

At the end of fiscal year 2004-05, there were 1,578 individual projects listed in the CIP and 67 projects open during the year. For the CSO Program, there were 299 CSO projects listed in the CIP (see Appendix A for the CSO Capital Improvement Program Implementation Schedule).

The 299 CSO projects represent the CSO Management Plan, as it currently exists within the City of Portland in terms of CIP activities. This report focuses primarily on the accomplishments of those projects. It should be noted, however, that there are projects in other CIP categories that have or will have a positive impact on water quality and the control and/or handling of CSO such as basement flooding control projects and improvements at Columbia Boulevard Wastewater Treatment Plant (CBWTP). These projects are not extensively covered in this report but represent other work BES performs that results in improved control of CSO discharges.

III. CSO Program Background

In 1991, when the Stipulation and Final Order (SFO) was issued by DEQ, approximately 60% of Portland's population was served by the combined sewer system. When a storm event occurred in the City that exceeded 0.10 inches in a few hours, stormwater runoff into the combined system would cause overflows to both the Columbia Slough and the Willamette River through up to 55 individual outfalls. Model simulations showed that the 1990 combined sewer system would discharge approximately 6.0 billion gallons of CSO to the Columbia Slough and Willamette River for an average year. CSO discharges are estimated to contain approximately 20% untreated municipal wastewater and 80% stormwater.

Since 1991, the City has implemented stormwater reduction facilities across the city (these are referred to as the “Cornerstone Projects”), improved interceptor system performance, and completed large CSO conveyance, storage and treatment facilities in the Columbia Slough system. These activities have resulted in CSO discharges being reduced by more than half citywide. In the Columbia Slough, CSO events have been eliminated for storms less than 5-year winter or 10-year summer return frequency. CSO discharge volumes to the Willamette River have been reduced from 4.8 billion gallons per year (1990 estimate) to 2.7 billion gallons per year, based on average annual rainfall. This represents an annual system-wide reduction of 55% since 1990.

In 1994, the SFO was amended to allow a more cost-effective approach for obtaining appropriate water quality benefits for the Willamette River. The new agreement, the Amended Stipulated Final Order (ASFO), retained a similar schedule such that the CSO controls would be implemented across a 20-year period from 1991 through 2011. The City has met or exceeded each of the regulatory requirements for CSO control identified in the ASFO. The ASFO contains the following major milestones for controlling the CSO outfalls:

- By December 1, 2000, the City must eliminate all CSO discharges to the Columbia Slough for storms equal to or less than the 5-year winter storm and 10-year summer intensities. [Milestone completed.]
- By December 1, 2001, the City must eliminate CSO discharges at 7 Willamette River outfalls for storms less than or equal to a 3-year summer storm and limit winter overflows to four or less per winter on average. [Milestone completed.]

- By December 1, 2006, the City must eliminate CSO discharges at 16 additional Willamette River CSO outfalls for storms less than or equal to a 3-year summer storm and limit winter overflows four or less per winter on average. [Construction in progress.]
- By December 1, 2011, the City must eliminate CSO discharges at all remaining Willamette River outfalls for storms less than or equal to a 3-year summer storm and limit winter overflows to less than four per winter on average. [Design in progress.]

The ASFO has a number of intermediate milestones, including submission of this annual CSO progress report to DEQ by September 1 of each year that the ASFO is in effect.

IV. Past Fiscal Year Activities

The CSO abatement activities performed during the period beginning July 1, 2004 and ending June 30, 2005 are categorized in five subsections:

- ASFO Milestones Achieved
- Program Planning Accomplished
- CSO Control Projects Planned, Designed, and/or Constructed
- CSO Operation and Maintenance Activities
- Public Involvement Activities

A. ASFO Milestones Achieved

This past fiscal year contained one ASFO milestone for completing Portland's 20-year CSO program. In total, there are 38 milestones beginning with the first CSO Progress Report required in 1995 all the way through the final report in 2012 that will demonstrate the completed system's compliance with the ASFO performance criteria. The FY 04-05 milestone was #21, the Annual CSO Report. This milestone and the relevant ASFO section requiring the task are as follows:

Milestone #21 – Annual CSO Progress Report for FY03-04 as per ASFO Section 12.a (11):
 "By no later than September 1 of each year that this Amended Order is in effect, the City shall submit to the Department and to the Commission for review an annual progress report on efforts to eliminate untreated CSO discharges, subject to the storm return frequencies specified in Paragraph 12.a. of this Amended Order."

B. Accomplishments in Program Planning

The CSO Program continues to develop and execute planning projects for facilities and activities that will cost-effectively control CSO and assure that the Program meets our regulatory obligations. Planning activities performed during Fiscal Year 04-05 include the following:

Portland's Facilities/System Planning

The Bureau of Environmental Services formulated a new Division in Engineering Services to develop and execute Facilities or Infrastructure Systems Planning on an on-going, continual basis. The Bureau has allocated staff and resources dedicated to develop infrastructure system facilities plan for sanitary, combined, stormwater and surface water systems. A contract was developed to obtain consultant support of a BES-led 3-year effort to create a detailed Public Facilities Plan in a manner that is integral to the Portland Watershed Plan and incorporates asset management techniques including life cycle costing.

C. Accomplishments in Predesign, Design and Construction

As noted in Section II, 6 of the 299 projects in the City's CIP directly related to the CSO Program were active during the fiscal year. To be "active" a project must have been in at least one of the following project phases:

- Predesign
- Design
- Advertise/Bid
- Construction
- Startup / Close Out

Appendix A provides a graphical status check for all of the 299 CSO projects. The major active projects are described in narrative summaries below.

Downspout Disconnections FY 04/05

During FY 04-05, the City implemented the Downspout Disconnection Program in the East Willamette and Columbia Slough Watersheds. The Program focused on areas recommended by the 1994 CSO Facilities Plan (where sumps are installed) while also performing disconnections in neighboring combined sewer areas in addition to the original 1994 CSO Plan area.

Downspouts were disconnected at 1,286 homes. This activity is estimated to remove about 26 million additional gallons of stormwater per year from the combined sewer system. Of these homes, 670 were located in the original Cornerstone Project area defined in the 1994 CSO Plan. The other homes disconnected are in the new Program area outside of the original Cornerstone area. Finally, 583 homeowners (260 from sumped areas) signed up to disconnect downspouts but the work was not completed before the end of the fiscal year. Also, many homes were surveyed and found to have the roof area already disconnected from the combined sewer.

Since the beginning of the Downspout Disconnection Program through June 30, 2005, the Program has disconnected downspouts at over 22,219 homes removing about 445 million gallons of stormwater per year from the combined sewer system. Of these homes, 14,055 were located in the original Cornerstone area while the remaining are in the new Program area. Counting the

homes surveyed and those found to have the roof area already disconnected, a total of 46,320 homes have disconnected one or more of their downspouts from the combined sewer system.

In addition, a special survey of over 11,000 small MFR/COM properties was completed to determine suitability for disconnection. Based on the survey, information packets were sent to 7100 landlords encouraging participation.

Sustainable Stormwater Program

BES has organized several parallel efforts to implement green solutions and stormwater inflow controls into a single integrated program titled the “Sustainable Stormwater Program”. There are three primary program areas: (1) Pilot / Field Projects; (2) Policy and Technical Assistance; and (3) Education and Outreach related to sustainable stormwater strategies. Staff has also developed a monitoring program to document how much the different projects contribute to CSO reduction goals.

The Sustainable Stormwater Program includes three CIP projects included in previous CSO annual reports: the Willamette Stormwater Inflow Controls Project (completed in 2003); the Eastside Inflow Controls Predesign Project; and the Holladay, Stark, and Sullivan Inflow Controls Project. The program also includes the Innovative Wet Weather Program, which began implementation in FY 04-05 and is funded by the City’s operating budgeted and EPA grant funds.

Willamette Stormwater Inflow Controls – Demonstration Projects in CSO Area

In FY 02/03 BES provided \$350,000 in grants for commercial stormwater retrofit projects to reduce runoff from roofs and parking lots. The eleven projects manage runoff from more than five acres of impervious area. The grants helped defray costs for the property owners, who spent more than \$650,000 for the projects. Landscape infiltration systems were the most common technology; soakage trenches, a green roof, and a pervious pavement system were also constructed.

Innovative Wet Weather Program (IWWP)

The IWWP is funded through an EPA grant for innovative projects that demonstrate sustainable, low-impact stormwater management solutions at sites in the CSO area. Funds have been earmarked for twenty-three projects in three categories: Water-quality Friendly Streets & Parking Lots, Downspout Disconnections, Bioswales and Ecoroofs. Four projects were completed in FY 04-05, managing runoff from a total of four acres of hard surfaces:

Using Water-quality Friendly Streets & Parking Lots:

- Westmoreland Permeable Pavers

Using Downspout Disconnections/Bioswales/Planters

- Rebuilding Center
- Mississippi Commons
- SE Division New Seasons swale

Holladay, Stark, and Sullivan Inflow Controls Projects

In 2002 BES completed the engineering predesign to address capacity problems in the combined sewer serving the Holladay, Stark, and Sullivan basins. The predesign recommended a number of inflow control projects. In 2003 BES completed the first inflow control project, diverting runoff from 0.8 acres of paved surface into a landscape infiltration basin near Glencoe School. The project protects residents on SE 52nd from sewer backups. Predesign activities for a second project near Mt. Tabor Middle School began in 2003 and continued through FY 04/05. The project will divert runoff to stormwater infiltration systems from more than two acres of asphalt and roofs.

Eastside Inflow Controls Predesign Project

This project was initiated as a direct result of the Clean River Plan's Action #3: Reduce stormwater inflow to the Combined Sewer System. Explicit hydraulic models were constructed then coupled with an automated modeling tool to identify potential locations where stormwater inflow controls can be used to cost-effectively reduce basement flooding risk and CSO volumes. Stormwater inflow controls examined include downspout disconnection (including multi-family, commercial, and industrial roofs), landscape infiltration, and street runoff controls. Inflow controls for roofs, parking lots, and streets in the potential target areas were further evaluated with GIS, field, and hydraulic modeling analyses.

A reworking of future impervious area assumptions in 2004 forced a re-analysis of all sewer basins. This delay was essential to provide a consistent basis for cost comparison and compatibility with other Bureau efforts. Site re-evaluations were completed and cost-effective target areas were identified.

Tanner Creek Stream Diversion

The Tanner Creek Stream Diversion project continued with construction of the main separation conduit and final design of the remaining segments. This stream separation project is divided into 5 phases.

- Tanner Creek Phase 1 (from 17th & Johnson to 11th & Lovejoy): **Completed**
- Tanner Creek Phase 2 (from 18th & Jefferson/Light Rail to 17th & Johnson): **Completed**
- Tanner Creek Phase 3 (Sylvan/Canyon to Light Rail): Design is nearly completed for both stormwater/stream quantity and quality facilities along Highway 26 and under the Jefferson Ramp/Tunnel. Conflicts with utilities are being resolved and permits required to close one lane on Highway 26 are being obtained.
- Tanner Creek Phase 4 (North side of Washington Park along Burnside): This phase consists of 11,000 feet of new storm sewer pipe has been re-started after utility conflicts on the narrow Burnside Street corridor forced the cancellation of the original construction. The re-design is being completed and a new contract is about to be issued to finish the construction work required to direct the northside of Washington Park and surrounding stormwater areas into the new Tanner Creek stream pipe.

- Tanner Creek Phase 5 (From 11th & Lovejoy to the CSO Drop Shaft location at Upshur): *Completed.*

California Stormwater Separation & Sanitary Pump Station Upgrade

The sewer separation project in the collection system contributing to the pump station was substantially completed in April 2003, and a flow-monitoring network was established to evaluate the quantity of wet weather flow to the California pump station.

Flow monitoring to determine peak influent flows for design of the California PS Upgrade was completed in May 2004. The results of the monitoring effort are that the pump station needs to be upgraded from 500-gpm to a firm pumping capacity of approximately 1,320-gpm. The current project schedule calls for the following:

- Submitted 90% complete plans and specifications for ODEQ Approval to Construct about April 22, 2005; A DEQ Conditional Approval to Construct letter dated July 12, 2005 has been received.
- Complete all final modifications and corrections to the Contract Documents in response to permit review questions and issues on or about July 8, 2005;
- Advertise for Bids on or about August 22, 2005;
- Select a construction contractor, negotiate and complete a construction contract and issue a Notice to Proceed on or about December 20, 2005;
- Complete construction and initiate start-up and testing in September 2006;
- Achieve final Project Completion and start the 2-year warranty period on or about October 25, 2006.

The draft preliminary design report indicates that it is extremely likely that the upgrade project can be implemented within the existing structural shell, and if possible design work will be accelerated to shorten the schedule described above as much as practical.

West Side Willamette CSO Program Projects

The major set of large scale projects to control most of the outfalls along the west side of the Willamette River are managed and coordinated together within the West Side Willamette CSO Program. The specific projects contained in this program and the work accomplished include:

SW Parallel Interceptor

This critical CSO control facility for the Southwest Portland CSO area is divided into 3 distinct segments that generally parallel Macadam Boulevard. Segment 1 is aligned along SW Virginia from SW Taylors Ferry to SW Sweeney. Segment 2 stretches from Sweeney to Lowell primarily along the railroad right-of-way. Segment 3 will be installed from Lowell to the SW Clay Street drop shaft where it will connect into the Westside CSO Tunnel. The Segment 3 pipeline has a diameter ranging from 72-inch to 84-inch and is approximately 8,000 feet in length.

During previous fiscal years, Segment 1 and Segment 2 were completed. Micro-tunneling of Segment 3 pipeline is complete. All shafts have final structural linings installed with the exception of the Sheridan shaft (located adjacent to the Marquam Bridge), which is still being built out. Site restoration work at the shaft sites is ongoing and will be completed next fiscal year. Once completed, the Southwest Parallel Interceptor will discharge directly into the Westside CSO Tunnel at the Clay Street Dropshaft and will help control CSO from OF#01 through OF#07.

West Side CSO Tunnel, Shafts, Pump Station and Pipelines

The Westside tunnel will collect and intercept overflows from existing combined sewer outfalls that discharge to the Willamette River from the City of Portland's Central Business District and basins immediately north. The tunnel is approximately 18,000-feet long extending from the area near SW Clay Street, proceeding north paralleling the Willamette River to an area between NW Nicolai Street and NW 26th Street, then crossing underneath the Willamette River to a confluent structure and the Swan Island CSO Pump Station. The tunnel includes various shafts along the alignment with depths ranging between 100 to 150 feet. Specific shafts include:

- Swan Island Pump station shaft (135 feet diameter approximate)
- Confluent shaft for the West and future East CSO tunnels (45-ft diameter approximate)
- Four drop shafts along the alignment (outside diameter)
 - Clay Street 47-feet diameter
 - Ankeny 39- feet in diameter
 - Upshur 39-feet in diameter
 - Nicolai 60- feet in diameter

CSO Tunnel and Shafts

Slurry wall construction and shaft excavation are completed for all the shafts. The base slab for each shaft is completed and the internal concrete structures have begun on all shafts. The South Drive Tunnel Boring Machine has bored 14,144 feet (11,215 feet as of July 1, 2005). The North Drive Tunnel Boring Machine has completed 3,890 (1,668 feet between July 1, 2004 and October 26, 2005). Both tunnels are completed (as of August 1, 2005) and 18,034 lineal feet of CSO tunnel has been constructed.

Swan Island Pump Station

Located on Swan Island at the downstream end of the tunnel is a 220 Million Gallon per Day (MGD) dry-pit submersible pump station that transfers flow from the tunnel through a new force main system to the existing interceptors - Peninsular Tunnel and Portsmouth

Tunnel. The pump station is designed to accommodate low-flow dry-weather conditions as well as peak wet weather flows up to the design capacity. The pump station design includes surge control equipment and other site improvements.

The structural lining of the pump station is nearly complete with all but the top structural slab installed. Mechanical and electrical equipment build out of the station has begun on the lowest floor.

The separate operations and maintenance building for the pump station is nearing completion. The building is comprised of electrical and control rooms as well as a maintenance bay for servicing pump station equipment. The utility tunnel connecting the pump station and operations and maintenance building is nearly complete.

Tanner CSO Pipeline Extension

Micro-tunneling is complete. Final shaft buildout remains and will be completed next fiscal year. Once completed, the Tanner CSO Pipeline will connect the existing Tanner combined trunkline to the Westside CSO Tunnel at the Upshur Street Dropshaft and will help control CSO from Outfalls OF11, OF12 and OF13.

Peninsular Force Main

The Peninsular force main system is a dual force main consisting of a 30-inch and 48-inch pipelines up to 1,400 feet in length each that will connect the new Swan Island pump station to the existing Peninsular Tunnel interceptor. This force main system will be used for pumping dry weather flow as well wet weather flows up to 100 MGD.

Micro-tunneling of the force main casing is complete. The two force mains have been installed and casing backfilled with cellular concrete. Final connections to the Swan Island Pump Station and Peninsular Tunnel remain to be completed.

Portsmouth Force Main

The Portsmouth force main will connect the Swan Island Pump Station to the Portsmouth Tunnel interceptor and direct CSO to the CBWTP for treatment. The force main system will carry up to 120 MGD of CSO flow and will be complete in 2011. The preliminary design for this project was initiated in fiscal year 2003/2004. An alignment study was completed this past fiscal year 2004/2005. A consultant has been selected for the project with design to begin next fiscal year.

Influent Pump Station Capacity Improvements

Contractor James W Fowler continued construction of the Influent Pump Station Capacity Upgrade (to 135 MGD) and Wet Weather Hydraulic Improvements during the past fiscal year. Project construction was approximately 90% complete at the end of FY04/05. In addition to the construction work, BES Programmers started working on software

modifications to integrate the new facilities into the CBWTP automation and supervisory control systems.

CBWTP Wet Weather Headworks

No activities were performed on the previously shelved design to upgrade the existing CBWTP Screenhouse into a 150 MGD Wet Weather Screening Facility. Construction of the wet weather hydraulic capacity structures and pipelines that were combined with the Influent Pump Station Capacity Upgrade project were 90% complete at the end of FY04/05. The Wet Weather Headworks will be part of the work to be completed on the CBWTP-CBWWTF site for the 2011 deadline.

Eastside Willamette CSO Program

CSO Sizing & Flow Management Predesign Project

This project is charged with developing the sizing, configuration and operation recommendations for designing the Willamette Eastside CSO Tunnel by determining the best balance of stormwater separation, interceptor relief and flow equalization to meet the various Bureau objectives for CSO, stormwater quality, and systems operations. The project must provide design recommendations for the interceptor/basin relief, stream diversion and stormwater separation projects that impact CSO flows.

The project team submitted the recommended size of the Eastside CSO Tunnel diameter to the Tunnel Design Team along with recommended inflow reduction projects timed from 2006 through 2040. Examples of these projects include basin stream separation, stormwater separation, and sustainable storm water solutions. The Flow Management Project also completed the alternatives evaluation phase and is now drafting the Final Predesign Report to close-out the project. The Flow Management Project also completed a CSO System Operating Plan to provide guidance for BES staff to operating pump stations and control structures under various storm conditions.

Eastside CSO Tunnel Project

The purpose of the East Side CSO Tunnel is to control the overflows at 14 outfalls to the Willamette River by 2011. As the project has developed, the number of outfalls controlled by the tunnel was reduced to 12. Two outfalls are to be controlled through other mechanisms: OF 31 flows to be routed to existing interceptor system and OF 44A basin to be separated by December of 2011. The tunnel will be 29,530 linear feet (5.6 miles) long, 22 feet in diameter, and 85 to 165 feet deep.

The Design Project has completed the 60% documents and review as of June 30, 2005. The Design Project has examined the geology data, hydraulics, existing structures and drop shaft sites in order to establish the preferred horizontal and vertical alignment. At this time, it is expected that only 4 of the 14 outfalls will remain active after the tunnel is completed in 2011. All 4 of the remaining active outfalls will meet or exceed the ASFO

performance standard for controlling CSO to the 3-year summer storm and the 4-per-winter storm.

The contractor (joint venture team of Kiewit-Bilfinger-Berger) was selected in February 2005 and a Preconstruction Services Contract awarded in June 2005.

Columbia Slough CSO Program

Since the completion of the Columbia Slough CSO facilities, the primary work performed on the facilities consisted of operation, maintenance and monitoring. The large Columbia Slough Consolidation Conduit (CSCC) and the related pumping and conveyance system has performed above the required level in controlling storms equal to and exceeding the 5-year winter storm. There has not been an overflow from the CSCC system since it began operation in October 2000.

Combined Sewer Basin Relief & Reconstruction Projects

Basin relief and reconstruction projects in the combined sewer area are intended primarily to control basement and street flooding and address pipe condition and rehabilitation needs. A secondary purpose is to also provide projects that help reduce CSO flows to the river or to CSO facilities. This is typically done through stormwater management activities and/or inline storage projects that serve to reduce both flooding and CSO impacts. Although these projects are not considered “CSO Program” projects in the CIP, they nonetheless provide on-going reductions in CSO flows and help contribute to a higher level of CSO control.

Northwest Neighborhood Basin Relief & Reconstruction Predesign Project

This project will develop a recommended plan to alleviate current and potential basement flooding problems, identify repair or replacement requirements for structurally defective pipes, and provide a level of CSO control consistent with the Clean River Plan. The project area consists of Balch, Nicolai, Tanner B and Fremont combined sewer Basins. During FY04-05 the project team completed the following activities:

- Finalized the Northwest Neighborhoods CSO Flow Management Analysis Report (9/8/04) and Northwest Neighborhoods Status Report for Technical Review Committee Meeting (Balch Basin, 9/14/04). Received direction from the Technical Review Committee (TRC) on direction of the project based on outcome from the Flow Management Analysis and Balch Basin Status Report.
- Completed the pipe condition assessment, grading additional pipes that had been inspected prior to 2005.
- Amended the consultant contract (with HDR) to provide technical services to complete the predesign effort, including project management, alternative analysis, alternative refinement, and writing of the final predesign report. The new contract extends to May 16th, 2006.
- Began work on the Hydraulic Problem and Identification Criteria Technical Memorandum. This TM describes the system modeling methods to be used, the

base condition hydrology and hydraulics, the model boundary conditions, design storms, and data transfer methods between BES and HDR. It also defines the problems in regard to pipe capacity and flooding risk in detailed technical terms, and provides maps of at-risk properties.

- Ran the base condition model and transferred data to HDR to begin alternative analysis process.

D. CSO Operation and Maintenance Activities

During the year the City continued implementation of operation and maintenance practices that reduce the impact of CSOs and stormwater on the receiving streams. These activities capture and remove pollutants, floatables and debris from the stormwater before it is discharged to the receiving streams from the CSO outfalls. The following information provides the magnitude of the **citywide** effort.

- Sewer Cleaning: 189 miles
- Catch Basin / Inlet Cleaning: 16,500 units
- Drainage Sump/Sedimentation Manhole Cleaning: 981 units
- Street Sweeping: 52,320 curb miles

The maintenance activities described above that are performed and recorded specifically in the **CSO area** include the following:

- Sewer Cleaning: 124 miles
- Catch Basin / Inlet Cleaning: 9,900 units
- Drainage Sump/Sedimentation Manhole Cleaning: 376 units

Figure 1 provides a view of the locations of the sumps/sedimentation manholes cleaned in the past fiscal year and shows which facilities are in the CSO area.

The data to determine the Street Sweeping split between the curb miles swept on a citywide basis versus only in the CSO area was not available.

Diversions Structure Inspections and Modifications

The Diversion Structure Inspection Program is designed such that each active diversion structure that can overflow to a receiving water body (approximately 128) is inspected once a week.

Diversions that overflow to a downstream facility (approximately 30) and do not pose a risk of direct discharge to the receiving water body are inspected once every two months. Overall, the City performed approximately 6840 diversion inspections last fiscal year.

As a result of Diversion Structure Inspection Program and the flow monitoring system installed on many diversions, the City modified seven diversion structures during the past fiscal year to

improve performance or address maintenance issues specific to the structure. The diversion structures that were modified are summarized in Table 2 below.

Table 2: Diversion Structures Modified FY 04-05

Basin	Diversion Name	Hansen ID	Latest Status	Location	Date of Change	Comments	Old Dam Height (feet)	New Dam Height (feet)
Holladay	EC94A	ABG511	Abandoned	N Cherry & Winning Way	May, 2005	Sealed off overflow		
Oswego	NW20D	AAA797	Abandoned	8100 N. Columbia Blvd	May, 2005	Sealed off overflow		
St Johns B	SJ17	AAE648	Active	6824 N Philadelphia	Oct., 2004	Constructed beaverslide, Increased dam height, Installed bar screen	0.6	2.6
St Johns B	SJ22	AAE560	Active	6900 N Burlington	May - Oct., 2004	Constructed beaverslide, Installed new dam with bar screen	0.6	3.9
St Johns B	SJ9	AAC585	Active	6700 N Reno	June - Oct., 2004	Constructed beaverslide, Installed new dam with bar screen	1.0	3.8
Taggart D	SE137	ABY936	Active	14th & Gideon	July, 2004	Reconstructed diversion	2.4	3.6

Dry Weather Overflow & CSO Events and Alarms

During this past fiscal year, the Portland combined system experienced six dry weather overflow events at four locations. All incidents were reported to DEQ as required in the NPDES permit. Table 3 below lists the different events that occurred and includes the cause, resolution of the problem, and additional follow-up activities performed to better understand and prevent additional overflows.

Table 3: Dry Weather Overflow Incidents and Follow-Up Actions

Date	Basin	Outfall	Diversion Number	Street Location	Cause	Follow-Up Actions
2/14/2005	Oswego	OF55	NW20D	8100 N Columbia Blvd	Sewer liner installation failure blocked underflow pipe	Diversion Sealed
9/7/2004	Sellwood	OF27	SE199	8147 SE Grand Ave	Orifice blocked by concrete cylinder	Diversion Modified, Installed Monitor
7/23/2004	Beech-Essex	OF46	EC12	3749 N Melrose St	Debris blocking diversion orifice	Dam height raised, Installed Monitor
7/22/2004	Beech-Essex	OF46	EC12	3749 N Melrose St	Debris blocking diversion orifice	Underflow improvements in process
7/21/2004	Beech-Essex	OF46	EC12	3749 N Melrose St	Debris blocking diversion orifice	
7/9/2004	Taggart	OF30	SE137	1350 SE Gideon St	Seal in plug leaked during repair of diversion	Diversion reconstructed, Monitor installed

E. Public Involvement, Education and Information Activities

As the focus of the CSO construction program shifts from the west side of the Willamette River, CSO public involvement activities have changed to meet the needs of individual East Side CSO projects. The goals listed below are met through the public information and involvement activities:

- Goal 1:** Inform and involve residents and businesses in West Side CSO construction areas and the broader public about key issues such as noise issues, construction schedules and traffic plans.
- Goal 2:** Develop and maintain good working relationships between the public and project team members.
- Goal 3:** Meet construction timelines and minimize community impacts.
- Goal 4:** Respond to individual citizen or business concerns within 24 hours.
- Goal 5:** Help complete projects on time and within budget.

Public involvement plans have been or are being implemented for each West Side CSO project. Outreach activities for the West Side Willamette River CSO Projects continued during the past fiscal year. The projects included the West Side CSO Tunnel (West Side Big Pipe), the Swan Island Pump Station, tunnel access shaft construction for four west side locations and one eastside location, Peninsular Force Main, Southwest Parallel Interceptor and the Tanner Creek Stream Diversion.

East Side CSO Project outreach planning involves a plan for the East Side Big Pipe (tunnel route) and shafts, pipelines, and Portsmouth Force Main.

Outreach activities for the West Side Big Pipe Project continued into the construction phase. Outreach activities for the East Side Big Pipe Project are in full speed to provide for the latest project information and to gather information about business operations of each of the businesses along the tunnel and pipeline routes. Outreach provides businesses, residents and neighborhood groups with project information and opportunities to give input on project decisions, including construction mitigation measures and traffic plans. These activities are tailored to the needs of and impact to area communities. Site visits have been an invaluable tool to begin to develop the long-term relationships that will be needed for this project. In addition to involving impacted communities in CSO project decisions, the Bureau is committed to educating the public about environmental issues.

BES Clean Rivers educators and staff use the updated CSO video, "A River Renewed" for classrooms and various presentations to groups throughout Portland. In July 2004, the City made the video available to view online at <http://rs1.media.ci.portland.or.us:2259/ramgen/cso2.rm>. From July 16, 2004 to February 24, 2005 the video was viewed 898 times online. In October 2004 and November 2004, Portland Community Media broadcast the video nine times. On December 25, 2004, Portland television station KOIN broadcast the video during its 6:30 p.m. news to an estimated audience of 85,000.

Public Notification/River Alert Program In spring 2005, Environmental Services replaced identification signs at all 35 CSO outfalls on the Willamette River. The new signs identify each pipe as a CSO outfall and display individual outfall numbers. Nine CSO outfalls on the Columbia Slough will be marked this year with the new signs.

Willamette CSO Outfall Identification Sign



As of May 2005, the BES Spill Prevention/Citizen Response Section is on call to respond to a CSO discharge to the Columbia Slough by posting Extreme Rain Event signs. They will be posted at potentially impacted recreational access points along the Columbia Slough between NE 13th Avenue and Kelley Point Park.

Slough Extreme Rain Event Sign



The River Alert system also includes ten folding signs installed at public access points to the Willamette River. A contractor travels the river by boat and opens the warning signs each time there is a CSO from May 15 to October 15. Forty eight hours after each CSO event ends, the contractor closes the warning signs. The contractor is required to supply BES with written verification that the signs were opened or closed and a report of the times the work was completed. Between October 15 and May 15, the signs remain open with the message in view for boaters and other river users.

River Alert Warning Sign



folds

The River Alert Hotline number displayed on the warning signs, 503-823-2479, is a 24-hour recorded message the public can call to learn if a CSO advisory is in effect and to hear a message about the CSO program.

The River Alert program notifies the media by fax and email every time there is an overflow between May 15 and October 15. The Oregonian newspaper publishes an overflow icon on the top of the weather page when overflows occur. In addition, Internet users can visit the Environmental Services home page at www.portlandonline.com/bes to learn if a CSO advisory is in effect. Internet users can also subscribe to automatic email notification each time a CSO advisory is issued.

- **Media Events** draw attention to significant milestones in the CSO Program. BES held three CSO media events in the last year.

October 26, 2004 – The 16 foot diameter tunnel boring machine building the northbound segment of the West Side CSO tunnel holed out in the Swan Island pump station shaft. Television and newspaper photographers and reporters attended.

December 3, 2004 – Dignitaries, BES staff, reporters and photographers are invited to ride a train through the completed segment of the West Side CSO tunnel that runs beneath the Willamette River. The “Big Pipe Express” event is heavily covered by media.

June 29, 2005 – A 25-member delegation from the Chinese Ministry of Construction, in Portland for training on sustainable development, toured the West Side CSO project.

- **Media Coverage** of CSO projects that were not the result of news releases or BES events includes:

July 2004, Civil Engineering Magazine - Story on technical aspects on contracting procedures on the West Side CSO projects.

July 19, 2004, Oregonian newspaper - Photos and captions about using excavated soil from the West Side tunnel to reclaim a gravel-mining site in the Willamette.

August 11, 2004, Oregonian newspaper – CSO program update and report on new program cost estimates.

August 18, 2004, Oregonian newspaper – Report on the successful completion of the West Side CSO tunnel under the Willamette River.

November 26, 2004, Portland Tribune newspaper – Feature on culture of workers building the West Side CSO tunnel.

December 14, 2004, Oregonian newspaper – Update on the Tanner Creek Stream Diversion Project, one of the West Side CSO projects.

January 25, 2005, Oregonian newspaper – Two independent audits praise West Side CSO Program management.

June 2005, Daily Journal of Commerce Magazine – West Side CSO Swan Island pump station is featured as one of the top construction projects of 2005.

June 16, 2005, Oregonian newspaper – Preview of East Side CSO tunnel construction and a project public open house.

In addition to media events and media coverage, Environmental Services also made a public presentation to the Portland City Council in August 2004 to update the Council on the CSO abatement program. The briefing was covered by Portland media and broadcast on the community and government access channel of Portland Cable Access.

- **The Internet** provides current information about the City’s CSO programs. Environmental Services has a website dedicated entirely to CSO construction projects, schedules, and impacts at www.portlandonline.com/cso in addition to main BES website at www.portlandonline.com/bes.

V. Planned Efforts for Current Fiscal Year

Fiscal Year 2005-2006 activities to reduce CSO continue the implementation of the 20-year program to plan, design, construct, and operate Portland's CSO control system. The activities this fiscal year can be briefly summarized as follows:

- Continue large scale construction of the West Side Willamette CSO Tunnel and Swan Island Pump Station
- Complete 100% design of the East Side Willamette CSO Tunnel System
- Continue operating, maintaining and monitoring the Columbia Slough CSO System to assure compliance with the ASFO and the NPDES Permit
- Continue implementation of stormwater inflow reduction projects in the form of the Downspout Disconnection Program

The current work is divided into the same five subsections used for the previous year's efforts.

A. ASFO Milestones to be Achieved

Fiscal year 2006 contains one ASFO milestone – submitting the Annual CSO Progress Report:

- ASFO Section 12.a (11): “By no later than September 1 of each year that this Amended Order is in effect, the City shall submit to the Department and to the Commission for review an annual progress report on efforts to eliminate untreated CSO discharges, subject to the storm return frequencies specified in Paragraph 12.a. of this Amended Order.”

BES also intends to develop and submit an addendum to the December 2002 Compliance Report. In that previous report, BES showed that the Columbia Slough CSO Facilities fully contained the storms experienced during the 2001-2002 period. However, no storm occurred during that time that matched or exceeded (or even came close to) the ASFO design storms of 1-in-5 year winter storm or a 1-in-10 year summer storm. For that reason, the 2002 Compliance Report committed the Bureau to submit an addendum once two design-level storms occurred to test the system.

Since 2002, only one 5-year winter storm (1 to 3 days duration) has occurred, and a 2-year summer storm (1-hour duration) has occurred. The preferred two design-level events still have not occurred. Because it will have been three years since the original report was written, we believe it is prudent to develop the addendum with the storm data available through October 31, 2005 (end of the summer period) and submit it to DEQ by December 2005. This will complete the ASFO Requirement for Demonstrating Compliance for the Columbia Slough CSO Facilities.

(Note: A Compliance Report will be required December 1, 2007 for the new Westside Willamette CSO Facilities).

B. Program Planning to be Accomplished

CSO program-level planning will continue during the current fiscal year as the City finalizes the CSO Sizing Predesign Report, which will be the basis for an Updated CSO Facilities Plan due to DEQ in December 2006.

In addition, the new Systems Planning effort will be examining the capacity and rehabilitation needs in the combined and sanitary systems. The end result will be a public facilities plan with recommended projects to address basement backups, SSOs and potential structural condition problems. BES expects to complete the combined and sanitary system plans in fiscal year 2008.

C. CSO Projects to be Predesigned, Designed and/or Constructed

The CSO control projects that will be in the predesign, design and/or construction phases during the current fiscal year include:

- During FY 05-06, the **Downspout Disconnection Program** will continue to disconnect downspouts at homes as well as small multifamily properties in the East Willamette Watershed served by the combined sewer.
- **Tanner Creek Stream Diversion:** Complete construction of Phase 4 (Nicolai basin / Burnside); complete design and begin construction of Phase 3 (Sylvan /Canyon) segments of the Tanner Creek Stream Diversion Project.
- **California Pump Station Upgrade:** The California Wastewater Pump Station Improvements project has been designed to provide a 1,325-gpm firm pumping capacity, and for the installation of an on-site standby diesel engine-generator set. The plans were submitted for building permit review on 6/30/2005. The project will be advertised for construction bids on 8/22/2005, with bid due on 9/29/2005. We anticipate that a contractor will be selected, and a construction notice to proceed (NTP) issued on or about 12/29/2005. That schedule will allow for substantial completion of construction on or about 10/5/2006, and completion of startup testing on or about 11/2/2006. The project should achieve final completion on or about 11/3/2006, and start the 2-year warranty period.
- **Influent Pump Station Capacity Improvements:** Construction of the CBWTP Influent Pump Station (IPS) capacity upgrade from 105 MGD to 135 MGD and wet weather hydraulic improvements designed under the CBWTP Wet Weather Headworks project will be completed during FY05/06. Final completion of the project, including Operator Training and integration of the newly constructed facilities into the CBWTP automation and supervisory control system software, will also be completed this fiscal year.
- **Eastside Inflow Controls Predesign Project:** Finalization of the Predesign Report in early 2006. This document will include the analysis procedure and highlight the most cost effective areas for the implementation of inflow controls, including a recommendation for implementation phasing. Primary results include the amount of basement flooding relief,

total CSO volume reduction, and overall cost savings over traditional pipe upsize projects. Results will be summarized for local areas and individual sewer basins.

- **Innovative Wet Weather Program:** Nineteen of the grant projects will be completed by Summer 2006.
- **Holladay, Stark, and Sullivan Inflow Controls Project:** BES will construct infiltration systems at Mt. Tabor Middle School in Summer 2006.
- **Southwest Parallel Interceptor:** Continue construction of the third and final component - Segment 3. Complete shaft construction and site restoration. Once completed, the Southwest Parallel Interceptor will discharge directly into the Westside CSO Tunnel at the Clay Street Dropshaft and will help control CSO from OF#01 through OF#07.
- **West Side Willamette CSO Program:** Complete structural build-outs of the shafts. Tunneling is complete. The contractor will be removing utilities and rail track from the tunnel and cleaning debris within the tunnel.
- **Swan Island Pump Station:** The structural elements of the pump station will be completed this fiscal year. Mechanical, and electrical build out will continue and be nearly complete at the end of the fiscal year. Commissioning and start-up activities will begin on the pump station toward the end of next fiscal year. Construction of the Operations and Maintenance Building in support of the pump station will be completed toward the middle of the next fiscal year.
- **Peninsular Forcemain:** Connections to the existing Peninsular tunnel and the Swan Island Pump Station (under construction) will be completed. Final structural buildout of the Greeley Shaft (connection to Peninsular Tunnel) will be completed next fiscal year.
- **Portsmouth Forcemain Project:** This new force main system will connect the Swan Island Pump Station to the existing Portsmouth Tunnel to direct up to 120 of CSO to CBWTP for treatment by December 2011. A consultant design team will begin design work this fiscal year and will focus on selecting an alignment for the force main pipe system and initiating final design.
- Design of the **East Side Willamette CSO System** will be continued this fiscal year through two parallel activities.
 - **CSO Sizing and Flow Management Predesign Project:** Develop, review and finalize the Systems Operations Plan and the Final Predesign Report for 2006, 2011 and 2040 configurations. Project closeout is expected by end of 2005 calendar year.
 - **East Side CSO Tunnel Design Project:** Final design will completed January 2006. The contractor (joint venture team of Kiewit-Bilfinger-Berger) was selected February 2005 and a Preconstruction Services Contract awarded in June 2005. The design team composed of owner, designer, and contractor is currently reviewing the 90% design documentation for development of the 100% design. During this collaborative final design phase, the following work shall occur: design of shaft support, sizing, and configuration, design of the tunnel lining system, detailed design of the pipe connections from the existing sewer system to the tunnel, stipulation and procurement

procedures for the tunnel boring machine, verification of the long-term system performance, acquisition of properties and easements to be acquired, continued development of construction drawings, and evaluation of means and methods of the project construction. Construction is expected to begin in March 2006.

- **Basin Relief & Reconstruction in the CSO Area:**

- **Northwest Neighborhoods:** The Northwest Neighborhoods Predesign Project will be completed in June 2006. The following major tasks will be performed in FY05-06:
 - The Hydraulic/ Problem Identification Criteria (TM 510.0), Project Evaluation Criteria (TM 510.1), Project Prioritization Criteria (TM 510.2), and Green Solutions/ Inflow Controls technical memorandums will be completed.
 - Two alternatives will be developed to solve hydraulic capacity, basement flooding, and pipe condition problems in the NW Neighborhoods project area. The Conveyance Alternative will focus on the upsizing of pipes to meet the project goals, while the Separation Alternative will look at the separation of stormwater from the combined system to meet project goals.
 - Green Solutions and Inflow Controls will be incorporated into the Preferred Alternative where cost effective.
 - The final Preferred Alternative will be split up into constructable projects and prioritized according to the criteria presented in TM 510.2.
 - The Final Design Report will be written to present the Preferred Alternative and to document the predesign process.

D. CSO Operation and Maintenance Activities Planned

During the current fiscal year the City will continue the implementation of operation and maintenance practices that reduce the impact of CSOs on receiving streams. This Citywide effort is expected to complete the following estimated project work:

- Sewer Cleaning: 200 miles
- Catch Basin/inlet Cleaning: 15,000 catch basin/inlets
- Drainage Sump Cleaning: 800 sumps/sedimentation manholes
- Street Sweeping: 60,100 curb miles
- Diversion Structure Inspections: Perform weekly inspections on all active diversion structures that directly overflow to the receiving stream and do not have automatic monitors/alarms; perform routine inspections on all other active diversions on a bi-monthly (once per two months) basis or as needed for maintenance and proper performance

E. Public Involvement Activities Planned

BES will continue to educate and identify opportunities for Portland residents, businesses and neighborhood groups to participate in CSO and watersheds enhancement projects. The City will expand efforts to increase citizen participation in project decisions, raise awareness about watershed issues and encourage citizens to become stewards for the Portland watershed. The Bureau will work closely with Neighborhood Coalition Offices and Associations to raise awareness about the CSO program, gain active public input on project decisions, and involve more citizens, businesses and neighborhood groups in watershed protection and restoration efforts. This year's activities include:

- Work with citizen committees and work groups to address issues regarding CSO project designs and construction plans. This will include continued community involvement and outreach for the East Side CSO Tunnel design now underway.
- Continue support of the Businesses for Clean Rivers Advisory Committee.
- Continue to conduct site visits to areas within the East Side CSO Tunnel alignment.
- Continue to give presentations to organized community groups and trade groups.
- Provide opportunities to provide face-to-face discussions such as open house activities.
- Develop informational materials that explain CSO projects, time lines, construction mitigation plans and opportunities to enhance impacted communities.
- Provide public involvement support for Willamette Stormwater Inflow Control Projects to encourage and assist commercial and industrial property owners in the combined area to remove stormwater from the combined system by creating on-site stormwater infiltration facilities. These facilities use more natural systems like swales, wetlands and native vegetation to detain and treat stormwater.
- Provide educational CSO classroom presentations and assembly program; develop a new CSO classroom activity that focuses on the history of sewers and implementation of the CSO solutions in Portland.
- Provide information to the public about the CSO program through special displays and computer kiosks in high traffic areas such as OMSI and businesses affected by construction.
- Provide guided tours of project sites and jet boat tours.
- Continue CSO River Alert signage and notification program.
- Distribute Citywide newsletters and quarterly bill inserts that inform citizens about the CSO program, watershed restoration activities and how citizens help protect Portland watersheds.
- Develop a speakers bureau / watershed workshop to highlight City of Portland water quality issues and projects such as the CSO Program to improve the Willamette River.

VI. Conclusions

This past fiscal year, the City continued its aggressive construction effort to complete the large-scale facilities for the West Side CSO Program. The City has finished the West Side CSO Tunnel's northern drive to the Swan Island Pump Station and the southern drive to the Clay Street Shaft. The Westside Tunnel is essentially complete. Construction is fully under way at the Swan Island Pump Station and the upstream SW Parallel Interceptor is nearly complete. These activities are in addition to the design and contracting efforts for the East Side CSO Tunnel, as well as the smaller system improvement projects completed to bring the system to a high level of CSO control. Due to these efforts, the capital expenditure for the CSO Program was about \$120 million this past fiscal year, and is expected to be similar over the next few years. These costs are in addition to the approximate \$600 million in capital costs already expended over the past years for the Westside, Cornerstone Projects and the Columbia Slough CSO systems.

With the completion of the CSO Sizing & Predesign Projects, the Bureau's focus is being extended to plan for the projects that will need to occur after 2011 in order to maintain and increase the level of CSO control beyond the minimum requirements stated in the ASFO. These future, post-2011 projects are almost entirely "sustainable stormwater management" projects that are designed to infiltrate and treat additional stormwater off of difficult impervious surfaces while providing vegetation and green spaces for habitat and public amenities. To prepare for this post-2011 effort, BES is implementing many pilot and grant projects to develop a full base of experience and proven projects that will serve the Bureau in achieving the post-2011 goals for continued stormwater reduction and increased CSO control.

APPENDIX A

CITY OF PORTLAND - BES

CSO Capital Improvement Program Implementation Schedule

(Appendix A contains 37 pages including this title page)