CITY OF LIMA

SSO Abatement Master Plan
Addendum No. 2

DRAFT

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URS

Project No. 14573002

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CF	Cubic Feet
CFS	Flow rate: Cubic Feet Per Second
CSO	Combined Sewer Overflow
DWF	Dry Weather Flow
EPA	Environmental Protection Agency
EXTRAN	Extended Transport Module
FM	Flow Monitor
GPM	Flow rate: Gallons Per Minute
LF	Linear Feet
MH	Manhole
MG	Flow Volume: Million Gallon
MGD	Flow Rate: Million Gallon Per Day = 1.547 cfs
PS	Pump Station
SSO	Sanitary Sewer Overflow
SSOAP	Sanitary Sewer Overflow Abatement Master Plan
SWMM	EPA: Storm Water Management Model
WWF	Wet Weather Flow
UH	Unit Hydrograph
U.S.	United States
Y	Year

1 INTRODUCTION

The City of Lima initiated a Sewer System Overflow (SSO) study in the mid-1990s pursuant to an Administrative Order issued by the Ohio Environmental Protection Agency (EPA). The Administrative Order required the City of Lima to submit a Planning Document to abate pollution and eliminate separate sanitary sewer overflows. The "Sanitary Sewer Overflow Abatement Master Plan" (SSOAP) was finalized in September 1995, (URS, 1995). The SSOAP recommended a three-phased approach to achieve the abatement of the SSO's in the City's separate sanitary sewer system being:

Phase I:	Inflow Reduction
Phase II:	Monitor Effectiveness of Phase I Improvements
Phase III:	Implement Sanitary Sewer System Improvements

The "SSO Abatement Program Model Update and Recalibration" (URS, December 2005), provides a more accurate hydraulic model that reflects recent changes in the sanitary sewer system and utilizes recent flow monitoring data. The updated model provides schematics of the drainage areas in addition to daily pump station flow rates, peak flows at SSO's, tributary areas and sanitary sewer lengths and recalibration results.

On February 7, 2005, the United States (U.S.) EPA issued the City of Lima an Administrative Order, pursuant to which, the City of Lima conducted additional flow monitoring at active SSO locations. The flow monitoring program started on May 19th, 2005 and concluded on August 25th, 2005. Findings from the flow monitoring program were used in the model recalibration effort and are presented in the separate report "Sanitary Sewer Overflow (SSO) 2005 Flow Monitoring & Sampling" (URS, October 2005).

The 1995 SSOAP also recommended that prior to initiating the Phase III work, the sanitary sewer system hydraulic model should be updated and refined as a result of work

performed in Phases I and II. Accordingly, the hydraulic model (XP SWMM 2000, Storm Water Management Model-Version 7.51, EXTRAN Block) was updated using flow data previously collected, plus new flow data collected in 2005. The model update and Recalibration effort is documented in a separate report titled "SSO Abatement Program Model Update and Recalibration" dated December 19, 2005 by URS.

2 PURPOSE

The sanitary sewer system hydraulic model serves as the primary tool to evaluate alternatives and size facilities required to eliminate/control the SSO's. This Addendum No. 2 to the SSOAP provides an updated cost associated with required system improvements based on the recent update and recalibration of the hydraulic model and changes to the sanitary system. This update (Addendum No. 2) was necessary due to the following conditions:

1. The sanitary system hydraulic model was recently updated based on flow monitoring and sampling performed in 2005. The model also incorporated recent changes in the sanitary sewer system.
2. The sanitary system hydraulic model has been recalibrated utilizing the most updated EPA storm water management model to improve the modeling approach.
3. Construction costs have escalated since the last estimate in 2002.

The original SSOAP presented a table of sanitary sewer system deficiencies specific to each of the drainage basin areas. The City has an ongoing rehabilitation program to correct these deficiencies as outlined for Phase I of the SSOAP. This series of tables was updated in the "Sanitary Sewer Overflow Abatement Master Plan Addendum" (URS, May 2002). An additional rehabilitation update is not the intent of this report; therefore, these corrections will not be addressed in any further detail.

3 SANITARY SYSTEM OVERFLOW

An analysis of existing conditions was performed to identify the volume of sanitary system overflow in relation to the 5, 10, 25 and 100-year, 6-hour design storms. This analysis calculates manhole and pump station surcharges to produce a "real-time scenario" provided the City discontinued the sanitary system improvements. **Table 3.1** through **Table 3.4** present the overflow volumes for each SSO location associated with the four design storms.

The approximate total volumes of SSO (as predicted by the calibrated hydraulic model) associated with the 5, 10, 25 and 100 year design storms are 2.6, 3.3, 4.2 and 5.8 million gallons, respectively.

4 REQUIRED IMPROVEMENTS

The SSO abatement study continues as an ongoing process to eliminate/control SSO's and cost effectively make sewer system improvements to provide an adequate level of protection for the environment, as well as for properties being served by the City's sewer system. Currently, the U.S. EPA is finalizing an SSO control policy.

Since the City has both SSO's and Combined Sewer Overflows (CSO's), the degree of protection (i.e., size of design storm used as the basis for assigning system improvements) will largely depend on affordability. Therefore, this Addendum No. 2 presents costs for each of the 5, 10, 25 and 100-year, 6-hour design storms. This information will be used in conjunction with the CSO evaluations and other analyses performed at the wastewater treatment plant to develop the most cost effective overall system improvements.

Improvements required to convey each of the design storms evaluated consists of increasing the capacity in segments of the sewer system, pumping station upgrades, and

the addition of equalization basins at pumping stations with capacities exceeding 3,000 gallons per minute (gpm). A level of protection assigned to each specified design storm characterizes these proposed improvements.

The sewer system has been evaluated under dry and wet-weather flow conditions based on a series of design storms: 5-year, 10-year, 25-year and 100-year, 6-hour design storms. The hydraulic model was used to size improvements to eliminate SSO's and convey wastewater flows for each of the design storms mentioned above. The "SSO Abatement Program Model Update and Recalibration" (URS, 2005) incorporates recent changes in the sanitary sewer system and utilizes data results from the "Sanitary Sewer Overflow 2005 Flow Monitoring & Sampling" (URS, 2005). The Sanitary Sewer Overflow Master Plan Addendum No. 2 presents recommended sanitary sewer system improvements for each of the design storms utilizing the most recent hydraulic model. **Table 4.1** summarizes the total estimated project costs for Phase III improvements.

Table 4.1: Improvement Cost Summary

Basin	Design Storm			
	5-Year	10-Year	24-Year	100-Year
Lost Creek	$2,559,520	$3,807,169	$4,327,343	$6,444,341
West Street	$3,842,360	$4,628,474	$5,136,622	$6,174,801
Koop Road	$3,417,764	$3,926,369	$4,258,055	$5,108,161
Allentown Road	$3,440,391	$3,829,421	$4,191,478	$4,925,369
Cole Street	$333,392	$380,288	$520,899	$1,786,725
Findlay Road	$1,556,451	$1,642,744	$1,884,148	$1,816,240
15th Street	$156,000	$156,000	$520,730	$857,294
Total	**$15,305,878**	**$18,370,465**	**$20,839,275**	**$27,112,931**

Data for each of the SSO drainage basins are presented separately. The required improvements to capture and transport system flows generated for each of the 5, 10, 25

and 100-year, 6-hour design storm conditions are presented in tabular form in the following sections.

4.1 Lost Creek Area

The Lost Creek Area drainage basin is approximately 680 acres in area.

The Lost Creek Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.1.1**. Pump Station upgrades are provided in **Table 4.1.2**, which relate required flow rates with the four design storms. A detention basin for the Lost Creek Pump Station is sized to the design flows as shown in **Table 4.1.3**. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.1.4**. **Table 4.1.5** through **Table 4.1.8** outline costs associated with the system improvements to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.1.1 through **Figure 4.1.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system improvements for the 5, 10, 25 and 100-year, 6-hour design storms overlay the existing layout as shown.

4.2 West Street Area

The West Street Area drainage basin is approximately 429 acres in area.

The West Street Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.2.1**. Pump Station upgrades are provided in **Table 4.2.2**, which relate required flow rates with the four design storms. A detention basin for the West Street Pump Station is sized to the design flows as shown in **Table 4.2.3**. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.2.4**. **Table 4.2.5** through **Table 4.2.8** outline costs associated with the system improvements to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.2.1 through **Figure 4.2.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system improvements for the 5, 10, 25 and 100-year, 6-hour storms overlay the existing layout as shown.

4.3 Koop Road Area

The Koop Road Area drainage basin is approximately 600 acres in area.

The Koop Road Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.3.1**. Pump Station upgrades are provided in **Table 4.3.2**, which relate required flow rates with the four design storms. A detention basin for the Koop Road Pump Station is sized to the design flows as shown in Table 4.3.3. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.3.4**. **Table 4.3.5** through **Table 4.3.8** outline costs associated with the system improvements to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.3.1 through **Figure 4.3.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system improvements for the 5, 10, 25 and 100-year, 6-hour design storms overlay the existing layout as shown.

4.4 Allentown Road Area

The Allentown Road Area drainage basin is approximately 727 acres in area.

The Allentown Road Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on

the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.4.1**. Pump Station upgrades are provided in **Table 4.4.2**, which relate required flow rates with the four design storms. A detention basin for the Allentown Pump Station is sized to the design flows as shown in **Table 4.4.3**. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.4.4**. **Table 4.4.5** through **Table 4.4.8** outline costs associated with the system improvements to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.4.1 through **Figure 4.4.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system improvements for the 5, 10, 25 and 100-year, 6-hour design storms overlay the existing layout as shown.

4.5 Cole Street Area

The Cole Street Area drainage basin is approximately 240 acres in area.

The Cole Street Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.5.1**. Pump Station upgrades are provided in **Table 4.5.2**, which relate required flow rates with the four design storms. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.5.3**. **Table 4.5.4** through **Table 4.5.7** outline costs associated with the system improvements

to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.5.1 through **Figure 4.5.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system improvements for the 5, 10, 25 and 100-year, 6-hour design storms overlay the existing layout as shown.

4.6 Findlay Road Area

The Findlay Road Area drainage basin is approximately 393 acres in area.

The Findlay Road Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.6.1**. Pump Station upgrades are provided in **Table 4.6.2**, which relate required flow rates with the four design storms. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.6.3**. **Table 4.6.4** through **Table 4.6.7** outline costs associated with the system improvements to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.6.1 through **Figure 4.6.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system

improvements for the 5, 10, 25 and 100-year, 6-hour design storms overlay the existing layout as shown.

4.7 Fifteenth Street

The Fifteenth Street Area drainage basin is approximately 167 acres in area.

The Fifteenth Street Area sanitary system recommendations include corrections to public and private source locations. Several manhole locations require one or more of the following actions: disconnect of a surface water collection tap to the sanitary, sanitary main repairs, sealing of castings and joints, disconnect of downspouts, and point repair on laterals.

The sanitary sewer transport system has been tabulated to identify the length and diameter of sanitary sewer pipe between manholes. Sanitary sewer pipe diameters are adjusted to transport storm design flows and minimize surcharge of manholes based on the 5, 10, 25 and 100-year, 6-hour design storms, as shown in **Table 4.7.1**. Pump Station upgrades are provided in **Table 4.7.2**, which relate required flow rates with the four design storms. Totals for linear sanitary sewer pipe upgrades are outlined in **Table 4.7.3**. **Table 4.7.4** through **Table 4.7.7** outline costs associated with the system improvements to achieve 5, 10, 25 and 100-year, 6-hour design storms event level of protection, respectively.

Figure 4.7.1 through **Figure 4.7.4** provide a visual representation of the sanitary sewer system, including the pump stations and SSO locations. Required sanitary sewer system improvements for the 5, 10, 25 and 100-year, 6-hour design storms overlay the existing layout as shown.