2.0 MAXIMIZATION OF STORAGE IN THE COLLECTION SYSTEM

2.1 OVERVIEW

The 2nd NMC is titled "Maximization of Storage in the Collection system". EPA's NMC Guidance explains that this NMC means "making relatively simple modifications to the CSS to enable the system itself to store wet weather flows." .

CSOs can be reduced by eliminating bottlenecks and obstructions in the collection system that cause upstream overflows before the WPCP is at capacity. CSOs can also be reduced by maximizing storage in the collection system. The City's WPCP was designed to treat sewage at a peak maximum rate of approximately 60 million gallons per day (MGD). Were it possible (it is not) for the WPCP to treat at a constant rate of 60 MGD for 24 hours a day, 365 days a year, the WPCP could theoretically treat approximately 21,900 million gallons (MG) of flow per year.

The City's collection system has delivered as average of approximately 43 MGD of sewage to the WPCP. Given the WPCP's design peak capacity of 60 MGD, the WPCP would, theoretically, treat up to an average of 17 MGD (60 MGD – 43 MGD) of wet weather runoff each day, or 6,205 MG of wet weather runoff each year.

Unfortunately, neither sewage nor wet weather runoff are produced at a constant rate. The City's challenge during wet weather events is to utilize as much of the WPCP capacity as possible. One important means to help the City meet this challenge is the storage of flows when flow to the WPCP is greater than its capacity and by releasing stored flow to the WPCP when flow to the WPCP is less than its capacity.

This Chapter will describe how the major components of the collection system operate, provide information on bottlenecks and obstructions, and analyze the feasibility of utilizing storage in the collection system to store peak wet weather flows. Other measures associated with NMC No. 2, including collection system inspection, tide gate maintenance and repair and removal of obstructions to flow are addressed in Chapter 1.

2.2 OPERATION OF THE COLLECTION SYSTEM

Originally trunk sewers, highlighted in orange in Exhibit B-1, were built to transport the combined sewage from combined sewer subbasins directly to receiving waters. The boundaries of the combined sewer subbasins are outlined in yellow on Exhibit B-1.

When the WPCP was constructed a series of interceptors was built to transport dry weather flow. Exhibit B-1 shows the major interceptor sewers. The interceptors (or section of interceptors) that transport combined sewage to the WPCP are highlighted in green.

Regulators were constructed to convey combined sewage from subbasin trunk sewers to the interceptor sewers. The regulators were also constructed to control the volume of combined sewage that flows to the interceptor system. This was done to protect the biological processes at the WPCP. Regulators are shown on the Exhibit B-1 as yellow dots. They are labeled with the City's 6-digit structure identification number.

During some wet weather events, interceptor capacity can be exceeded. Flows of combined sewage that does not get into an interceptor are routed to a receiving water through a permitted CSO outfall. The City's CSO outfalls are indicated by a large black dot on Exhibit B-1 and labeled with the City's NPDES Permit number for that location.

Exhibit B-1 shows the City's sewer system as it was in 1940. Exhibit B-2 shows the same system in 2005. Note that the 2005 system remains comprised of combined sewer subbasins, subbasin trunk sewers, regulators, interceptor sewers and the WPCP.

2.3 ELIMINATION OF BOTTLENECKS AND OBSTRUCTIONS

Perhaps the City's foremost means to identify and eliminate bottlenecks within its CSS are its inspection and maintenance programs (see Chapter 1). CSO outfalls and regulators are inspected daily and also on weekends in connection with any wet weather events. These inspections, in addition to other scheduled inspections, proactive preventative maintenance, and other activities enable to City to identify system constraints (e.g. flow obstructions) and promptly effect solutions.

Ineffective pump stations are a common collection system bottleneck in many systems. All of the City's interceptors that carry combined sewage flow by gravity to the WPCP - there are no pump stations in the interceptor system. All of the combined sewer subbasins are served by gravity trunk sewers. No combined sewage is pumped to the regulators.

Combined sewage is pumped from a regulator to an interceptor in only one subbasin (O10-101). The pumps in this subbasin are sized to pump the maximum amount of combined sewage (more than peak dry weather flows) that the downstream interceptor can handle. These pumps have been provided with an alternate power supply (2^{nd} electrical feed) to mitigate against an overflow being caused by a power failure. In addition, comminutors have been installed to improve reliability and prevent damage to the pumps from debris.

Another common collection system bottlenecks are undersized pipes – pipes which flow to smaller downstream pipes. Pipe capacities for both the interceptor sewers and trunk sewers were analyzed during the development of the City's electronic sewer model. All trunk sewers increase in size and capacity as they approach regulators or interceptors. All interceptor sewers increase in size and capacity as they approach the WPCP.

Finally, regulators are engineered bottlenecks in many collection systems. Regulators are designed to impose a maximum limit on the flow to the WPCP. The maximum limitation is created by the size of the opening to the interceptor and by gates that reduce the opening size. All but five of the City's mechanical regulator gates are chained fully open to allow maximum flow to the interceptor (in allowing the maximum flow, the potential for CSOs is not significantly increased.) Those that are not chained fully open are set to operate at maximum capacity. This maximizes the flow that can get into the interceptors without rebuilding the regulator. The City recognizes that maximizing flow to the interceptor reduces the potential for inline storage in the subbasins but at the same time (as described in Section 2.4.2 below) acknowledges that many trunk sewers are too shallow to present additional storage capacity without creating a greater risk of basement backups and flooding. A CSS modeling study was performed as part of Section 2.4 to evaluate the potential of partially closing some of regulator gates. Results are located in Exhibit B-3.

2.4 UTILIZATION OF COLLECTION SYSTEM STORAGE

The first step in maximizing collection system storage capacity is identifying the locations of potential storage. Storage can be found on the ground above the collection system, in collection pipes, and in collection system tanks or ponds.

The second step in maximizing collection system storage capacity is identifying and analyzing possible modifications that increase the utilization of in-system storage. The analysis considers the amount of storage available, the risk of upstream (street, basement) flooding, and the increase in O&M requirements should be analyzed.

2.4.1 Ground Above the Collection System

One of the steps in developing projects for the City's Combined Sewer System Capacity Improvement Program (CSSCIP) has been to identify potential solutions to capacity problems through public brainstorming workshops and the City's Sewer Advisory Group. One option evaluated at these workshops for solutions to capacity issues in each basin is utilizing public streets and/or parking areas for temporary wet weather storage. More than half of the entire combined sewer subbasin area has been through this process. To date, no locations have been identified where street storage has presented an acceptable community solution. Each subbasin studied has a final report summarizing the findings of the evaluation.

2.4.2 Collection Pipes

The City's interceptor sewers have the capacity to deliver more than 120 million gallons of flow per day to its WPCP. Average daily flow to the WPCP is in the range of 40 to 48 MGD. This suggests that there is ample available storage in the interceptor sewers. This storage is currently used automatically.

The combined sewer subbasin trunk sewers are another potential location for storage of peak flows. The trunk sewers in the 2005 version of the City's sewer system are highlighted on Exhibit B-2 in orange. Trunk sewers, however, are often not as deep as interceptor sewers. In-line storage in truck sewers, consequently, represents a greater potential to cause flooding in basements, yards, and streets. Nonetheless, the City conducted a study done to assess the potential of using trunk sewers for in-system storage. A copy of the study can be found at Exhibit B-3. Several potential locations for in-system storage were identified in the study. In several instances, the study recommended weir adjustments which have since been implemented as noted in Exhibit B-6. Many other recommendations of the study, however, entail significant engineering and high costs well exceeding the scope of an NMC. .

2.4.3 Collection System Tanks and CSO Ponds

Pumps are used at 5 of the City's CSO discharge points to pump the overflow into the receiving waters. General information on these pump stations can be found at Exhibit A-2. If the wet wells associated with these pumps are kept dewatered during dry weather, the wet wells could be used to capture and store small overflows. The volume of each of the five pump station wet wells that could potentially be dewatered back to the interceptor is approximately:

Griswold Pump Station	0.016 MG
Nebraska Pump Station	0.018 MG,
Brown Street Pump Station	0.057 MG
Morton Street CSO Pump Station	0.062 MG
Third Street Pump Station	0.097 MG

The City is working to rehabilitate and replace dewatering pumps in these wet wells to allow use of the wet wells for storage. The dewatering pumps are also being re-routed to pump to interceptor sewers rather that the receiving water. By the end of 2007, four of these five CSO discharge stations will have dewatering pumping systems installed in their wet wells.

Due to the low frequency of discharges at the Griswold station, it will not be effective to install a dewatering pump system in its wet well. Instead, access improvements to the wet well have been performed so that the wet well can be vacuumed out. The installation of these dewatering systems is expected to lower the number of CSO events at these locations, as well as reduce the overflow volume of some of the CSO events. Following completion of this work and observation of the results, the CSS model will be updated to incorporate these dewatering capabilities.

The City's collection system contains 2 large ponds that are currently used to detain combined sewage flows from the Glasglow regulator and Wayne Street Interceptor overflow in excess of WPCP capacity. The ponds are currently without operating facilities to return their combined sewage flows to the WPCP. The City studied how much combined sewage could be returned to the WPCP if appropriate facilities existed in the future. A copy of this study can be found at Exhibit B-4. Conceptual designs for return structures were developed by Donohue & Associates Inc. in 2004. A section of their report showing the design and calculations of the associated costs are shown at Exhibit B-5. The study makes it clear that significant engineering and costs would be required to construct the requisite return facilities. Return facilities, therefore, will not be implemented as an NMC. Through its LTCP, however, the City will be constructing initial improvements in 2008 which will then allow the limited dewatering of flows captured by the ponds to the WPCP. Improvements allowing a higher volume of dewatering will be scheduled as LTCP improvements in connecting with improvements to the WPCP itself.

2.5 TIDE GATE INSPECTIONS

Tide gates that do not seal or operate properly can admit significant volumes of water back into the collection system. The City has a tide gate inspection and maintenance program as described in Exhibit A-1 WPCM O&M Plan. In addition to the maintenance activities at Exhibit A-1, the City works to inspect tide gates in connection with the daily monitoring of the City's CSO monitoring program.

2.6 RETARDING INFLOWS - INFILTRATION & INFLOW REDUCTION

Sewer systems can experience significant impacts from inflow and infiltration (I&I) of rain water and ground water. The 1995 Wastewater Master Plan identified areas where high priority and cost effective inflow removal was recommended. The City has hired a sewer program manager with responsibilities that include I&I reduction in the sewer collection system. This program manager helps monitor the City's goal of performing wet weather inspections on 450 manholes each year, as well as coordinating flow monitoring in areas where I&I impacts are suspected. Manhole rehabilitation and sewer pipe CIPP lining projects are developed by the program manager and used to reduce sources of I&I in the public portion of the sewer collection system. The City also has developed a video and pamphlet on downspout disconnection for property owners to reduce private I&I and has conducted a pilot downspout disconnection project.

2.7 RECORDKEEPING

A project list of weir adjustment activities to date is shown at Exhibit B-6. At the end of each calendar year this list will be updated with a status report describing the progress of the various projects. The progress reports will be kept in Exhibit B-7.

DIRECTORY FOR APPENDIX B
(Items Presented in Order of Appearance in Appendix B)

EXHIBIT B-1

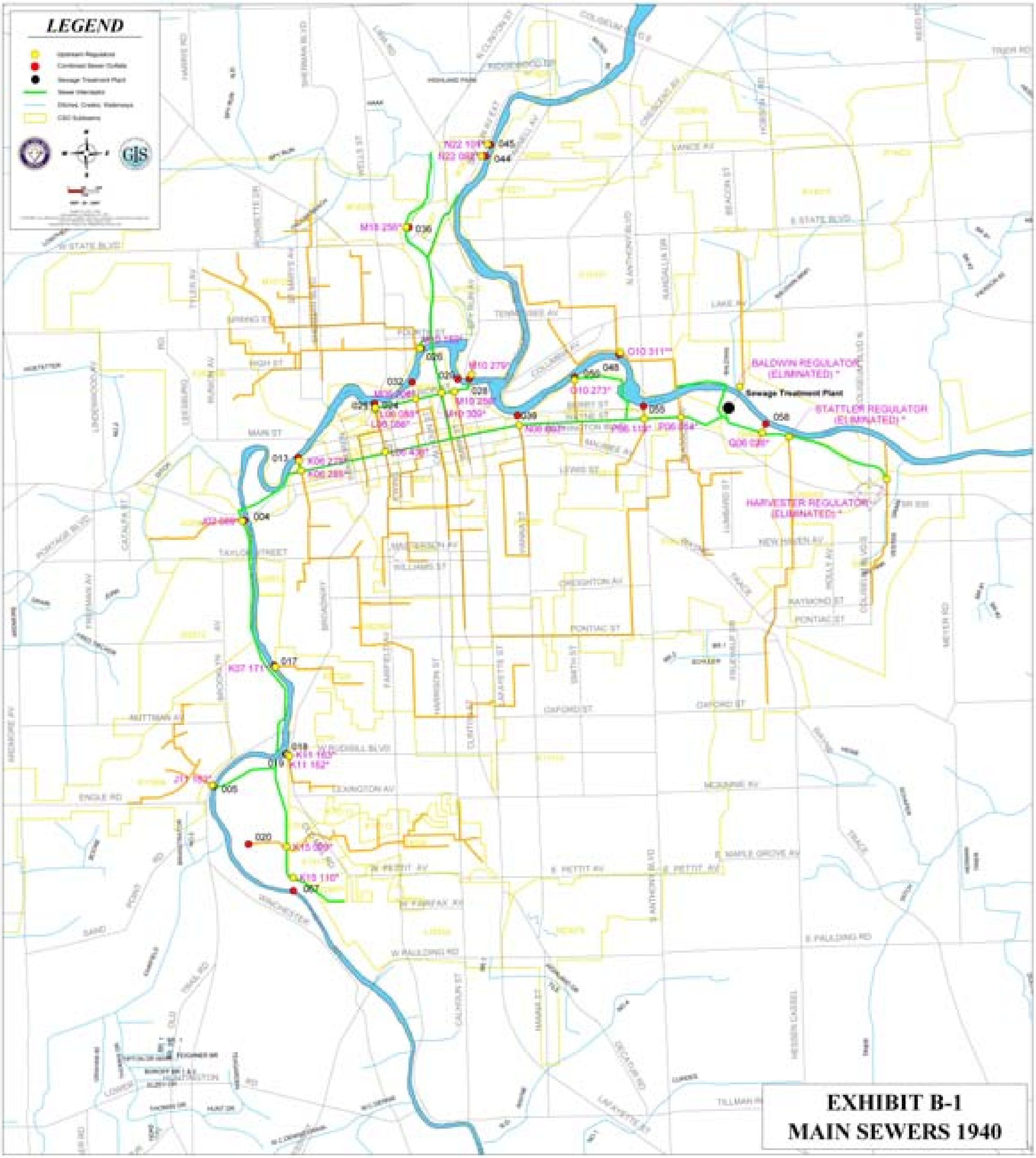


EXHIBIT B-1
MAIN SEWERS 1940

EXHIBIT B-2

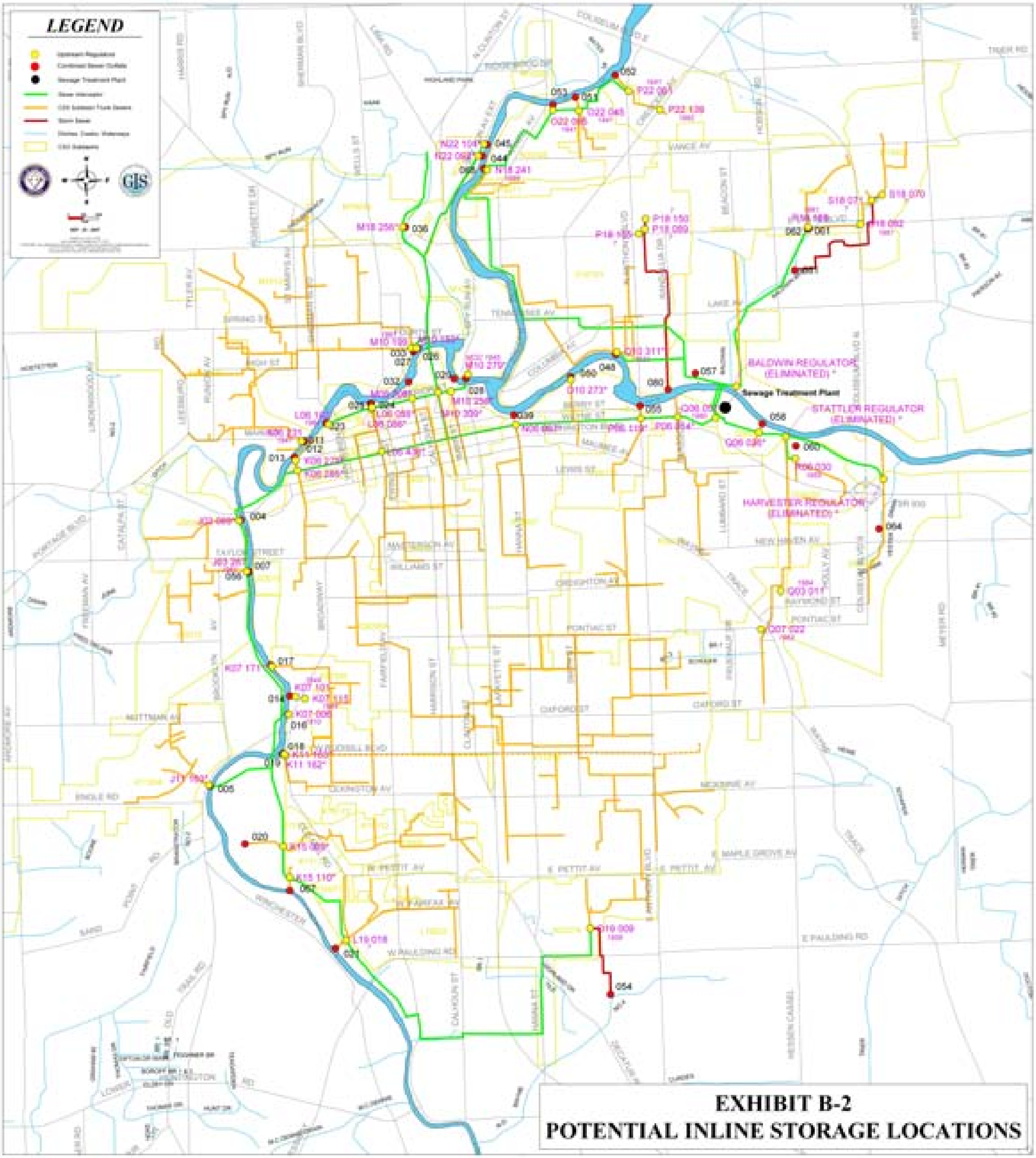


EXHIBIT B-2
POTENTIAL INLINE STORAGE LOCATIONS

EXHIBIT B-3

COMBINED SEWER SYSTEM INLINE STORAGE ASSESSMENT STUDY

TECHNICAL MEMORANDUM NO. 1.2

CITY OF FORT WAYNE, INDIANA

NOVEMBER 2004 (Technical Memorandum No. 1)
Revised: MARCH 2005 (Technical Memorandum No. 1.1)
Revised: AUGUST 2005 (Technical Memorandum No. 1.2)
Revised: SEPTEMBER 2007

1.0 STUDY OBJECTIVES

The Environmental Protection Agency (EPA) and the Indiana Department of Environmental Management (IDEM) have established Nine Minimum Controls (NMCs) that Combined Sewer Overflow (CSO) communities should employ to optimize operation of the collection system and reduce overflows. The Nine Minimum Controls form the basis for the City of Fort Wayne's Combined Sewer System Operational Plan (CSSOP). Maximum use of collection system storage is one of the NMCs. Under NMC requirements, maximizing use of the collection system for storage can include incorporating relatively simple modifications to the collection system to store wet weather flows to reduce CSO discharges, if those modifications do not create hydraulic or system flooding concerns.

The overall goal of this project is to perform an assessment of the inline storage capacity of the trunk sewers that serve the combined sewer subbasins in Fort Wayne. The assessment will identify the subbasins whose combined trunk sewers have the ability to store ample wet weather flows without causing any detrimental surcharges or basement flooding, and the resulting benefit in terms of reduction in overflow volume. The first phase of this effort is to assess the potential for inline storage using simple screening methodologies, and identify critical locations in the subbasins that control the allowable surcharge. The second phase of this study investigates the operation of the inline storage, and the impact of the filling/dewatering process, through annual model simulations. These simulations provide estimates of reductions in annual overflow volumes with assumed inline storage. The third and final phase predicts the reductions in number of annual overflow events and overflow volumes with increase in weir heights at regulators of selected subbasins. This technical memorandum presents the methodology used to perform these three phases, the details of the evaluation using XP SWMM modeling, and results of the evaluation.

2.0 METHODOLOGY USED TO ASSESS POTENTIAL FOR INLINE STORAGE

The following method was used to evaluate the storage potential for the combined trunk sewers in subbasins:

Step 1. Identify subbasins with trunk sewer sizes larger than 36 inches in diameter. The subbasins with smaller trunk sewer sizes (i.e. less than or equal to 36-inch diameter) were eliminated from further evaluation. It was assumed that subbasins that have trunk sewer size less than 36-inch diameter are not likely to have viable inline storage volume to store adequate wet weather flows.

Step 2. For the subbasins that have trunk sewer sizes greater than 36-inch diameter, the full volume of trunk sewers greater than 36-inch diameter was calculated.

Step 3. Using results from completed annual continuous model simulations (performed as part of the LTCP development by Malcolm Pirnie in 2001 using XP SWMM), the maximum total annual volume that could be stored in the trunk sewers was estimated. Using the model-predicted overflow hydrographs, the volume of each overflow event was calculated and compared to the available in-line storage. If the overflow volume was less than the available storage, then the event was assumed to be captured in its entirety. If the overflow volume was more than the available storage, then the portion in excess of the available storage was assumed to overflow. It was also assumed that the full storage volume was available for each storm event, i.e., dewatering of the storage was not accounted for.

This methodology intentionally provides an estimate of the maximum total annual volume that could be stored. A maximum estimate was desired because the estimated stored volumes were subsequently used in Step 4 to eliminate basins that were clearly not candidates for inline storage. Two assumptions cause the estimate to represent the maximum total annual volume that could be stored:

- First, as noted above, dewatering of storage was not accounted for. Therefore, in a situation with back-to-back overflow events, it was assumed that the full inline storage volume was available for both events. In reality, the full volume may not be available for the second event, if the overflow from the first event is still being dewatered from storage.
- Second, it was assumed that the full inline storage volume could be used. In reality, the surcharge necessary to fill the full inline storage volume may be unacceptable, i.e., cause basement flooding conditions in the subbasin.

Step 4. If the estimated maximum total annual stored volume is less than 20 percent of the total annual overflow volume, then the associated subbasin was eliminated from further evaluation. This 20 percent cut off point was based on engineering judgment; given that the estimate of benefit in the screening step is conservatively maximized (see above), a 20 percent threshold is considered appropriate

Step 5. The subbasins identified above (trunk sewers greater than 36 inches in diameter [Step 1] and meeting the 20 percent criteria [Steps 2, 3 & 4]) are considered viable candidates for inline storage. However, fully assessing the estimated benefit (in terms of reduction in annual overflow volume) from inline storage must also account for the maximum allowable hydraulic grade lines in each subbasin, and the impact from the filling/dewatering process on the capture of sequential overflow events. Step 5 used a design storm analysis to provide a first indication of the wet-weather conditions that trigger an unacceptable hydraulic grade line condition in the trunk sewers under existing conditions.

Step 6. The previous step studied the effect of a single rain event on the combined sewer system of the above identified subbasins. As part of Step 6, annual model simulations were performed on these subbasins, incorporating dynamic controls to induce inline storage while maintaining HGL set points.

Step 7. The changes to the annual overflow volumes and the number of annual overflow events from existing conditions were documented.

Step 8. Subbasins with the ability to pass large rainfall events, and hence the potential ability to store relatively significant volumes were selected as part of Step 8. Annual model simulations were again performed, incorporating increased weir heights as a simpler method of inducing inline storage while maintaining HGL set points.

Step 9. The changes to the annual overflow volumes and the number of annual overflow events from existing conditions were again documented.

3.0 ASSESSMENT OF INLINE STORAGE POTENTIAL

The City of Fort Wayne has a total of 40 combined sewer subbasins. Out of the 40, 38 subbasins were analyzed for inline storage potential in their respective combined trunk sewers. Subbasins M10120 and Q14025A were not included in the inline storage assessment study because the subbasin models were not calibrated and construction of sewer separation projects has been completed.

3.1 SUBBASINS ELIMINATED BASED ON TRUNK SEWER DIAMETER SIZE (STEP 1)

From the total of 38 subbasins, 13 subbasins were eliminated based on the criteria set by Step 1 (Section 2). Table 3-1 lists the subbasins that were eliminated and the largest trunk sewer diameter for the corresponding subbasin.

TABLE 3-1

SUBBASINS ELIMINATED BASED ON TRUNK SEWER DIAMETER SIZE

Subbasin	Largest Diameter of Trunk Sewer
J02089	30-inch
K15112	24-inch
K19071	18-inch
L06079	18-inch
M14007	12-inch
M18256	24-inch
M18261	21-inch
N22005	24-inch
O06017	36-inch
O22061B	24-inch
Q06002	24-inch
Q06049	24-inch
S02008	24-inch

3.2 SUBBASINS ELIMINATED BASED ON ANNUAL STORED OVERFLOW VOLUME (STEPS 2 TO 4)

Table 3-2 lists the subbasins that were eliminated based on the criteria set by Steps 2 through 4 (Section 2) and the total assumed annual stored overflow volume for these subbasins as percent of the total annual overflow volume.

TABLE 3-2

SUBASINS ELIMINATED FOR LACK OF STORAGE CAPACITY

Subbasin	Total Assumed Annual Stored Overflow Volume as Percent of the Total Annual Overflow Volume
M10237	13%
O22092	12%
M18271	15%
R14075	15%
N23078	14%

3.3 CANDIDATE SUBBASINS FOR INLINE STORAGE ASSESSMENT STUDY

Twenty subbasins remained after the two screening steps described above and so were identified as "candidate" subbasins for a full assessment of inline storage. Table 3-3 lists the candidate subbasins and their corresponding trunk sewer diameter sizes.

TABLE 3-3

CANDIDATE SUBBASINS AND ASSOCIATED TRUNK SEWER DIAMETERS

Subbasin	**Trunk Sewer Diameters**
J03012	42-inch to 60-inch
K06290A	72-inch
K06290B	60-inch to 72-inch
K07026	42-inch
K11004	54-inch to 66-inch
K11010	72-inch to 126-inch
K15009	42-inch to 72-inch
L06078	42-inch to 48-inch
L06086	48-inch
L06087/L06438	42-inch to 72-inch
L19252	48-inch to 66-inch
M06044	42-inch
M06711	42-inch to 60-inch
M10250	42-inch to 48-inch
N06007	60-inch
O10101	42-inch to 66-inch
P06014	48-inch to 96-inch
P06119	48-inch
R14033	42-inch to 48-inch

3.4 ESTABLISHING HGL SET POINTS FOR CANDIDATE SUBBASINS

As noted above, assessing the benefit of inline storage requires definition of the HGL set points necessary to protect the subbasin from unacceptable surcharge. Knowledge of the local system combined with XP SWMM model results were used to identify the HGL set points. The set points are made up of two measures:

- First, the locations where the set points are applied. These are manholes that are predicted to exhibit the worst surcharging during simulated design storms.
- Second, the depth set point that must be maintained. This depth set point was defined based on:

  1). For sewers where the depth of pipe crown is greater than 8 feet from grade: Maintain 8 feet of freeboard.

  2). For sewers where the depth of pipe crown is less than 8 feet from grade: Maintain non-surcharged conditions.

For the remainder of this Technical Memorandum, any discussion of HGL set points refers to the HGL set points identified through the above procedure.

3.5 DESIGN STORM ANALYSIS

As an initial indicator of the benefit from inline storage, Malcolm Pirnie performed design storm simulations for the candidate subbasins under existing conditions. The synthetic design storms used for this analysis were defined during the City's LTCP development. The design storms return periods, durations, and rainfall depths are as follows:

1) 3-month, 6-hour storm (1.04 inches)
2) 6-month, 6-hour storm (1.31 inches)
3) 9-month, 6-hour storm (1.49 inches)
4) 1-year, 6-hour storm (1.62 inches)

5) 2-year, 6-hour storm (1.89 inches)
6) 5-year, 6-hour storm (2.28 inches)
7) 10-year, 6-hour storm (2.64 inches)
8) 25-year, 6-hour storm (3.22 inches)

For each subbasin, the smallest design storm that violated the HGL set points described in Section 3.4 was identified. This design storm is referred to as the critical, or threshold, design storm. It is important to recognize that these simulations were performed assuming existing conditions, i.e., no inline storage. Therefore, they identify the largest design storm for which some level of inline storage can be used. They do not identify the largest design storm that can be fully captured using inline storage.

3.6 RESULTS OF DESIGN STORM ANALYSIS

As presented in Sections 3.4 and 3.5, the HGL set points and the threshold design storm that violated the set points were determined for each candidate subbasin. The XP SWMM model simulation results for these subbasins are presented in Table 3-4 under two scenarios:

1) For Sewers with Diameter ≥ 42-inch Only (Trunk Sewers) – This section of the table presents the results based on the critical HGL set point identified in the 42-inch or greater diameter trunk sewers in the subbasin. Under this scenario, the critical HGL set point may still be violated in smaller-diameter tributary systems within the subbasins.
2) For Entire Subbasin (Trunk Sewers and Sewers with Diameter < 42-inch) – This section of the table presents the results based on the critical HGL set point identified for any sewer in the subbasin (including the sewers that are less than 42-inch diameter in size). There could be possible local bottleneck points in the

smaller diameter sewers which would surcharge or flood for a smaller storm even though the trunk sewers have the capacity to handle a much larger storm.

The model results presented in Table 3-4 indicate the following assuming an HGL set point in the 42-inch or greater diameter sewers:

- Five subbasins (Subbasins K11004, L06078, L06086, N06007 and L19252) do not violate the critical HGL set points under existing conditions even during a 25-year, 6-hour design storm.
- Eight subbasins (Subbasins K07026, K15009, L06087/L06438, K06290B, M06711, M10250 and P06014) do not violate the critical HGL set points under existing conditions during a 10-year, 6-hour design storm.
- Subbasin M06044 does not violate the critical HGL set points under existing conditions during a 5-year, 6-hour design storm.

The 25-year and 10-year design storms indicate the varying degree of risk (basement backups & flooding) associated with them. It should be noted while interpreting the above results, that the subbasins that are predicted to have storage potential for a 25-year storm would provide storage for a 10-year storm at a lesser risk level.

TABLE 3-4

FORT WAYNE CSSOP INLINE STORAGE ASSESSMENT STUDY

THRESHOLD DESIGN STORMS

SUBBASIN[1]	FOR SEWERS WITH DIAMETER ≥42-INCH ONLY (TRUNK SEWERS)			FOR ENTIRE SUBBASIN (TRUNK SEWERS AND SEWERS WITH DIAMETERS <42-INCH ONLY)		
	Set Point Node	Set Point HGL Elevation[2]	Threshold Design Storm	Set Point Node	Set Point HGL Elevation[2]	Threshold Design Storm
J03012	J03113	746.39	6-Month, 6-Hour	J03113	746.39	6-Month, 6-Hour
K07026	K07171.2	746.57	25-Year, 6-Hour	K07006	758.87	9-Month, 6-Hour
K11004	--	--	>25-Year, 6-Hour	--	--	>25-Year, 6-Hour
K15009	L15302	767.18	25-Year, 6-Hour	L15256	768.90	2-Year, 6-Hour
L06078	--	--	>25-Year, 6-Hour	--	--	>25-Year, 6-Hour
L06086	--	--	>25-Year, 6-Hour	--	--	>25-Year, 6-Hour
L06087/L06438	L02415	761.70	25-Year, 6-Hour	L02415	761.70	25-Year, 6-Hour
L19252	--	--	>25-Year, 6-Hour	--	--	>25-Year, 6-Hour
M06044	M10309	748.19	10-Year, 6-Hour	M10309	748.19	10-Year, 6-Hour
M06711	M06673	755.90	25-Year, 6-Hour	M06673	755.90	25-Year, 6-Hour
M10250	M10256.2	752.01	25-Year, 6-Hour	M10256.2	752.01	25-Year, 6-Hour
O10101	N14106	742.77	5-Year, 6-Hour	O18246	753.32	< 3-Month, 6-Hour

TABLE 3-4 (Continued)

FORT WAYNE CSSOP INLINE STORAGE ASSESSMENT STUDY

THRESHOLD DESIGN STORMS

SUBBASIN[1]	FOR SEWERS WITH DIAMETERS ≥42-INCH ONLY (TRUNK SEWERS)			FOR ENTIRE SUBBASIN (TRUNK SEWERS AND SEWERS WITH DIAMETERS <42-INCH ONLY)		
	Set Point Node	Set Point HGL Elevation[2]	Threshold Design Storm	Set Point Node	Set Point HGL Elevation[2]	Threshold Design Storm
P06014	P06073	760.00	25-Year, 6-Hour	P06073	760.00	25-Year, 6-Hour
P06119	P06124	759.40	5-Year, 6-Hour	P06124	759.40	5-Year, 6-Hour
R14033	S18071	783.36	5-Year, 6-Hour	S18071	783.36	5-Year, 6-Hour
K06290A	K03101	751.11	5-Year, 6-Hour	K03101	751.11	5-Year, 6-Hour
K06290B	K10389	750.96	25-Year, 6-Hour	K10381	758.00	25-Year, 6-Hour
N06007	N02071	--	>25-Year, 6-Hour	N02206	780.00	5-Year, 6-Hour
K11010	K11099	774.00	NA[3]	K11099	774.00	NA[3]

1) Subbasins with trunk sewer diameter greater than 36-inch and storage volume greater than 20 % of annual overflow storage volume

2) Set point HGL equal the larger of the ground elevation minus 8’ or the pipe crown elevation

3) Subbasin K11010 contains several manholes at the down stream end of the basin with little to no cover. Therefore, under any design storm the minimum 8’ freeboard rule is violated. Due to the flooding that occurs at the downstream end, the set point HGL cannot be reached

- Four subbasins (Subbasins K06290A, R14033, P06119 and O10101) do not violate the critical HGL set points under existing conditions during a 2-year, 6-hour design storm.
- Subbasin J03012 does not violate the critical HGL set points under existing conditions during events smaller than a 6-month, 6-hour storm.
- Subbasin K11010 contains several manholes at the downstream end of the basin with little or no cover. Therefore, under any design storm the minimum 8-feet freeboard is violated as the sewer experiences surcharged conditions.

The overall conclusions derived from the model results are that 13 subbasins are predicted to have the inline capacity to store some of the overflows from virtually all storms, even storms equivalent to 25-year and 10-year design storms. The model also predicts that certain sections of sewers with diameter less than 42-inch in Subbasins K07026, K15009, O10101 and N06007 experience unacceptable surcharge conditions for smaller design storms. This indicates that even though the larger diameter trunk sewers in these subbasins could have the capacity to store some of the overflows from events smaller than or equal to the threshold storms, certain sections of the sewers that are less than 42-inch diameter in size experience capacity issues (surcharged or flooding conditions) for such storms.

As noted earlier, it is important to recognize that these results identify the threshold events that violate the HGL set points under existing conditions, i.e., with no inline storage. Therefore, they identify the largest design storm for which some level of inline storage can be used; they do not identify the largest design storm that can be fully captured using inline storage. Since available inline storage volume will depend on the actual flow conditions in the sewer, the sequence of storm events through the year, and the need to dewater the stored flow after events, a continuous annual simulation incorporating inline storage is necessary to fully assess the benefit in terms of reduction in overflow volume.

3.7 ANNUAL MODEL SIMULATION DESCRIPTION – INLINE STORAGE

In order to further evaluate the impact of inline storage, Malcolm Pirnie performed a typical annual continuous simulation for each of the subbasins shown in Table 3-4. The annual continuous rainfall event for this analysis was defined during the City's LTCP development. The goals of the simulation included the following:

- Run continuous simulations incorporating dynamic control to maintain HGL set points.
- Document changes in *annual overflow volumes* from continuous simulation results for existing conditions.
- Document changes in the *number of annual overflow events* from continuous simulation results for existing conditions.
- Document the *maximum 6-hour design storm* that can successfully be stored without producing an overflow event.

3.8 ANNUAL CONTINUOUS SIMULATION MODEL RESULTS – INLINE STORAGE

The results from the annual continuous simulation were analyzed for several key comparisons as noted in Section 3.7. The model results presented in Table 3-5 compare the total overflow volume under existing conditions (no inline storage) and with inline storage controls. As expected, when storage controls are in place, the total overflow volume decreases. It should be noted that subbasin J03012 was removed from this portion of the analysis as this subbasin reported no overflow under existing conditions.

Table 3-6 presents the annual number of overflow events under existing conditions and with inline storage controls. In most subbasins the presence of inline storage controls reduces the number of annual overflow events, as expected. But, in two subbasins (Subbasins K07026 and O10101) the number actually increases, although as shown in Table 3-5, the total volumes decrease.

TABLE 3-5 FORT WAYNE CSSOP - INLINE STORAGE ASSESSMENT STUDY OVERFLOW VOLUME COMPARISON				
Subbasin	**Under Existing Conditions**		**With Storage Controls**	
	Overflow Link	**Total Overflow Volume (MG)**	**Overflow Link**	**Total Overflow Volume (MG)**
K07026	LK07171.0	13.50	LK07171.0	9.75
K11004	LJ11163.0	20.98	LJ11163.0	16.40
K15009	LK15009.0	26.96	LK15009.0	18.33
L06078	LL06102.0	2.31	LL06102.0	1.74
L06086	LL06086.1	0.06	LL06086.1	0.00
L06087/L06438	LL06087.2	15.57	LL06087.2	1.20
L06087/L06438	LL06203	31.93	LL06203	11.13
L19252	LL19018.0	17.07	LL19018.0	6.91
M06044	LM10309.0	1.10	LM10309.0	0.94
M06711	LM06706.1	2.52	LM06706.1	0.39
M10250	LM10256.0	0.85	LM10256.0	0.76
O10101	L010311.0	30.01	L010311	20.25
O10101	L010312.0	56.24	L010312	40.29
P06014	LP06014.0	57.22	LP06014.0	33.13
P06119	LP06119.0	34.05	LP06119.0	24.01
R14033	LS18082.0	11.76	LS18082.0	10.23
K06290A	LK06285.0	62.92	LK06285.0	35.01
K06290B	LK06231.0	22.92	LK06231	14.67
N06007	LN06007.2	21.41	LN06022d	9.64

TABLE 3-6
FORT WAYNE CSSOP - INLINE STORAGE ASSESSMENT STUDY
ANNUAL NUMBER OF OVERFLOW EVENTS COMPARISON

Subbasin	Under Existing Conditions		With Storage Controls	
	Overflow Link	Annual Number of Overflow Events	Overflow Link	Annual Number of Overflow Events
K07026	LK07171.0	41	LK07171.0	54
K11004	LJ11163.0	58	LJ11163.0	56
K15009	LK15009.0	65	LK15009.0	23
L06078	LL06102.0	20	LL06102.0	13
L06086	LL06086.1	1	LL06086.1	0
L06087/L06438	LL06087.2	27	LL06087.2	3
L19252	LL19018.0	72	LL19018.0	15
M06044	LM10309.0	7	LM10309.0	4
M06711	LM06706.1	10	LM06706.1	3
M10250	LM10256.0	11	LM10256.0	3
O10101	L010311.0	43	L010311	23
O10101	L010312.0	46	L010312	47
P06014	LP06014.0	38	LP06014.0	12
P06119	LP06119.0	53	LP06119.0	38
R14033	LS18082.0	18	LS18082.0	12
K06290A	LK06285.0	40	LK06285.0	16
K06290B	LK06231.0	34	LK06231	19
N06007	LN06007.2	34	LN06022d	7

These increases in events are due to the simplified configuration of the storage controls in the model, and the dewatering methodology utilized by the model. In implementation, it is expected that more sophisticated control mechanisms and logic could eliminate these increases in activation.

It is important to note that the annual results for existing conditions (no inline storage) shown in Tables 3-5 and 3-6 are based on new simulations performed as part of the current effort. Because of this, these existing condition results are not identical to the existing condition results presented in the City's 2001 LTCP. The existing condition simulations were re-run as part of the current effort for two reasons:

- First, the XP-SWMM model has improved since 2001. Because the current XP-SWWM version is required to simulate the dynamic controls for the inline storage scenario, the existing condition baseline had to be re-run with this same model version for a consistent comparison.
- Second, several of the subbasin models have been improved since 1999 (the period of the original LTCP modeling) through the City's CSCIP program. These improvements were incorporated in the current analysis, and so required re-running of the existing condition baseline.

Table 3-7 documents the maximum design storm that each subbasin can store completely (i.e., eliminate overflow) using inline storage, with dynamic controls in place and operated to maintain the defined HGL set points. This scenario is much different than the one summarized in Table 3-4; Table 3-4 presents the maximum 6-hour design storm that can be passed through the existing system without violating the HGL set point, while Table 3-7 presents the maximum 6-hour design storm that can be stored completely with dynamic controls in place without violating the HGL set point. Note the largest design storm that can be stored is a 3-month, 6-hour event in subbasins L06087/L06438 and M06711. Five subbasins (Subbasins L06086, M06044, M10250, N06007 and R14033) can store a 1-month, 6-hour design storm. The remaining subbasins can not store even a 1-month, 6-hour design storm. These results are not surprising; note that even a 1-month event will be equaled or exceeded only 12 times per year, meaning that there are approximately 110 smaller events per year in Fort Wayne. The decrease in annual overflow volume through inline

TABLE 3-7

FORT WAYNE CSSOP - INLINE STORAGE ASSESSMENT STUDY

MAXIMUM DESIGN STORM STORED WITH STORAGE CONTROLS

Sub-basin	Overflow Link	Maximum Design Storm
K06290A	LK06285.0	<1-month, 6-hour
K06290B	LK06231	<1-month, 6-hour
K07026	LK07171.0	<1-month, 6-hour
K11004	LJ11163.0	<1-month, 6-hour
K15009	LK15009.0	<1-month, 6-hour
L06078	LL06102.0	<1-month, 6-hour
L06086	LL06086.1	1-month, 6-hour
L06087/L06438	LL06087.2	3-month, 6-hour
L19252	LL19018.0	<1-month, 6-hour
M06044	LM10309.0	1-month, 6-hour
M06711	LM06706.1	3-month, 6-hour
M10250	LM10256.0	1-month, 6-hour
N06007	LN06022d	1-month, 6-hour
O10101	L010311	<1-month, 6-hour
O10101	L010312	<1-month, 6-hour
P06014	LP06014.0	<1-month, 6-hour
P06119	LP06119.0	<1-month, 6-hour
R14033	LS18082.0	1-month, 6-hour

storage is achieved through capture of many small events, rather than capture of any significant portion of larger events.

3.9 ANNUAL MODEL SIMULATION DESCRIPTION – RAISED WEIRS

In order to evaluate an alternative method of inducing inline storage, overflow weir heights were increased for select subbasins. This analysis assessed the potential benefit of simple passive storage controls implemented by raising fixed weir crests. Subbasins were selected based on the results presented in Table 3-4, as these results are strong indicators of the potential for inline storage using passive controls. Only those subbasins with 10-year, 6-hour and 25-year, 6-hour threshold design storms were included in this analysis, as the ability to pass these large events through the existing system without violating the established HGL set points suggests that there may be inline storage capacity for the multitude of small events that occur in a typical year. Subbasins in Table 3-4 with a smaller threshold design storm would likely have very limited benefits and therefore were not included in this portion of the study.

Each overflow weir was evaluated to calculate the maximum potential increase in weir height that did not compromise the regulators ability to pass the identified threshold design storm, i.e., did not result in a violation of the established upstream HGL set point during the design storm. The maximum increase in weir height is presented in Table 3-8. Then, a typical annual continuous simulation with the increased weirs for each of the subbasins was performed. As mentioned in Section 3.7, the typical annual rainfall record for this analysis was defined during the City's LTCP development. The goals of the simulation included the following:

- Run continuous simulations incorporating increased weir heights while maintaining HGL set points.
- Document changes in *annual overflow volumes* from continuous simulation results for existing conditions.

- Document changes in the *number of annual overflow events* from continuous simulation results for existing conditions.

TABLE 3-8
FORT WAYNE CSSOP – INLINE STORAGE ASSESSMENT STUDY
MAXIMUM POTENTIAL INCREASE IN WEIR HEIGHTS

Subbasin	Overflow Link	Weir Link	Existing Weir Height (ft) (Above Manhole Invert)	Maximum Proposed Increase In Weir Height (ft)
K07026	LK07171.0	LK07171.W	1.60	0.10
K11004	LJ11163.0	LJ11163.1	0.83	1.50
K15009	LK15009.0	LK15009.W	0.66	2.04
L06078	LL06102.0	LL06102.W [1]	1.08	1.54
L06086	LL06086.1	LL06086.W	1.16	1.00
L06087/L06438	LL06087.2	LL06087.W	1.00	1.19
L19252	LL19018.0	LL19018.W	0.77	0.70
M06711	LM06706.1	LM06706.W	1.33	0.86
M10250	LM10256.0	LM10256.W	1.00	0.38
P06014	LP06014.0	LP06014.W	1.06	5.34
K06290B	LK06231.0	LK06231.W	2.50	0.50
N06007	LN06007.2	LN06007.W	2.00	3.98

1 - Regulator L06102 has a sliding aluminum plate mechanism to direct the wet weather flows.

3.10 ANNUAL CONTINUOUS SIMULATION MODEL RESULTS – RAISED WEIRS

The results from the annual continuous simulation were analyzed for several key comparisons as noted in Section 3.9. The model results presented in Table 3-9 compare the total overflow volume under existing conditions (no raised weirs) and with weir raised. As expected, when the weirs are raised, the total overflow volume decreases.

Table 3-10 presents the annual number of overflow events under existing conditions and with raised weirs. In most subbasins the presence of passive weir storage controls reduces the number of annual overflow events, as expected. But, in four subbasins (Subbasins K07026, L06086, M06711 and K06290B) the number remains the same, although as shown in Table 3-9, the total overflow volumes decrease.

In addition, the HGL set point goals identified in Table 3-4 were maintained in all subbasins. The increased weir heights did not negatively impact upstream HGL conditions.

TABLE 3-9
FORT WAYNE CSSOP – INLINE STORAGE ASSESSMENT STUDY
TOTAL ANNUAL OVERFLOW VOLUME COMPARISON

	Under Existing Conditions		With Weirs Raised		
Subbasin	**Overflow Link**	**Total Annual Overflow Volume (MG)**	**Overflow Link**	**Total Annual Overflow Volume (MG)**	**% Reduction in Total Annual Overflow Volume**
K07026	LK07171.0	13.50	LK07171.0	No Change	0
K11004	LJ11163.0	20.98	LJ11163.0	18.64	11
K15009	LK15009.0	26.96	LK15009.0	19.51	28
L06078	LL06102.0	2.31	LL06102.0	1.21	47
L06086	LL06086.1	0.06	LL06086.1	0.03	54
L06087/L06438	LL06087.2	15.57	LL06087.2	12.84	18
L19252	LL19018.0	17.07	LL19018.0	14.51	15
M06711	LM06706.1	2.52	LM06706.1	2.00	21
M10250	LM10256.0	0.98	LM10256.0	0.85	13
P06014	LP06014.0	57.22	LP06014.0	42.93	25
K06290B	LK06231.0	22.92	LK06231	19.86	13
N06007	LN06007.2	21.41	LN06022d	11.93	44

TABLE 3-10
FORT WAYNE CSSOP – INLINE STORAGE ASSESSMENT STUDY
ANNUAL NUMBER OF OVERFLOW EVENTS COMPARISON

Subbasin	Under Existing Conditions		With Weirs Raised		
	Overflow Link	Annual No of Overflow Events	Overflow Link	Annual No of Overflow Events	% Reduction in Annual No of Overflow Events
K07026	LK07171.0	42	LK07171.0	No Change	0
K11004	LJ11163.0	58	LJ11163.0	48	17
K15009	LK15009.0	65	LK15009.0	34	48
L06078	LL06102.0	20	LL06102.0	17	15
L06086	LL06086.1	1	LL06086.1	No Change	0
L06087/L06438	LL06087.2	27	LL06087.2	18	33
L19252	LL19018.0	72	LL19018.0	47	35
M06711	LM06706.1	10	LM06706.1	No Change	0
M10250	LM10256.0	11	LM10256.0	6	45
P06014	LP06014.0	38	LP06014.0	31	18
K06290B	LK06231.0	34	LK06231	No Change	0
N06007	LN06007.2	34	LN06022d	9	74

4.0 COMBINED SEWER INLINE STORAGE TECHNOLOGIES

Inline storage uses the excess volume in the combined trunk sewer to store peak flows resulting from storm runoff. The stored flows will be gradually released as the trunk sewer regains adequate capacity.

The degree to which the existing trunk sewer system can be used for storage is a function of: pipe size; pipe or channel gradient (relatively flat sewers provide the most storage capacity without susceptibility to flooding low areas); suitable locations for installation of control devices; and the reliability of installation control.

4.1 INLINE STORAGE SYSTEMS

The following sections describe some of the available technologies that could provide inline storage in Fort Wayne's combined trunk sewers

A) Inline Storage Devices

Various devices have been used for storage in sewers, including throttle valves, inflatable dams, gates and weirs. The following devices may be apt for Fort Wayne's inline storage efforts:

1. **Inflatable Dams**

   Inflatable dams are popular storage control measures whereby a rubberized fabric device is inflated and deflated to control flows and maximize storage in designated points in the combined sewer system. Inflatable dams are usually activated by automatic sensors that measure flow levels at specified points in the system. Generally very little maintenance is required for inflatable dams but periodic maintenance of the air and water supply connection to the inflatable dam is necessary.

2. **Gates**

Motor or hydraulically operated sluice gates can be used to store flows inside the sewer. These gates could be installed at potential storage locations in the trunk sewer. The installed gates can be activated by automatic flow sensors that measure flow levels at specified points in the system. Generally very little maintenance is required for gates but periodic cleaning and lubrication is essential for trouble free performance.

B) Control Concepts

There are two types of concepts that have been used for controlling the mechanical storage devices. They are:

1. **Reactive Control**

Reactive control is a concept where a dynamic control (gate or inflatable dam) reacts to a defined set point. For example, gates or inflatable dams could be attached to flow sensors that could provide the trigger to shut a gate or inflate a dam once the flow rises to a particular level in the trunk sewer and open the gate or deflate a dam as a controlling upstream HGL set point is reached.

Implementing a Reactive Control system can be relatively simple and cost effective. The operation and maintenance is also relatively easy, but would require additional resources in Fort Wayne's maintenance division. Hence, Reactive Control system is a viable inline storage concept that may be considered for implementation in Fort Wayne.

2. **Predictive Control**

Predictive control is a concept where a computer system with predictive models adjusts set points and flows within the sewer systems (which in our case is the trunk sewer). This control system operates the gates or inflatable dams at optimal variable set points prior to actual rainfall conditions, based on predictions a few hours in advance from collection system models. Because it can constantly readjust its control set points according to updated field information, this control system is the most sophisticated and potentially the most efficient to control and minimize overflow and surcharges in the existing system.

Implementing a Predictive Control system can be relatively complex and costly compared to Reactive Control. The operation and maintenance is also complex. If a Predictive Control system were to be implemented, new modeling staff with adequate technical expertise, in addition to new maintenance staff, will be needed to operate this complex system.

The sophistication of a "Predictive Control" system is unlikely to offer a cost effective solution unless there is a. large in-line storage capacity. Hence the concept of "Predictive Control," though more efficient, may not be viable for implementation in Fort Wayne.

C) Other Measures to Maximize Inline Storage Potential – Raising Weir Heights at Regulators

Other measures such as raising existing weir heights when implemented alongside or in lieu of the above described storage devices and controls would augment inline storage in trunk sewers of Fort Wayne's Combined Sewer System**.** Raising weir heights at existing CSO regulators provides a passive means to induce storage in the combined sewer system. The modeling study (explained in sections 3.9 and 3.10) indicates that increasing weir heights results in inline storage for select subbasins.

4.2 TECHNICAL CONCLUSIONS

Increasing weir heights at CSO regulators has the potential to be a feasible, cost effective solution to reduce overflows, but provides desirable benefits only in select subbasins. Inflatable Dams and Sluice Gates are two mechanical devices that have been used widely for inline storage in many cities. These two devices would be viable for Fort Wayne's inline storage efforts. The Capital and O&M costs are comparable for both devices. The decision to choose either one of these needs to be made based on the conditions at the proposed location of installation and any local factors that impact operation and maintenance requirements.

A Reactive Control system may be viable for Fort Wayne. This would be cost effective compared to the sophisticated Predictive Control system. Periodic sewer maintenance through flushing and storage at pump station wet wells could serve as effective secondary measures that could augment the primary inline storage efforts

5.0 OVERALL CONCLUSIONS

The analysis presented above provides valuable information related to the potential for inline storage in Fort Wayne's combined sewer subbasins. With this comprehensive technical evaluation completed, it is appropriate to re-visit the decision process completed by the City during development of the CSO LTCP in 1998. During this decision process, the project team considered the possibility of storing wet-weather flow in major trunk sewers. Assessing this possibility in terms of the components required for in-line storage proceeded as follows:

- It was recognized in 1998 that many trunk sewers do have the physical capacity for storage, e.g., the Rudisill Avenue Trunk Sewer. The current analysis confirms this.
- No trunk sewers had the type of flow control required to induce dynamic storage in 1998, nor do they today. Viable technologies for these controls have been identified as part of the current analysis and are described above. While the City could install these controls, the capital cost associated with the installations is arguably enough on its own to push potential trunk sewer storage beyond NMC

implementation. However, it could be considered as part of LTCP implementation.

- The model study (sections 3.9 & 3.10) indicates that there may be value in a pilot study to demonstrate the effect of increased weir heights on the inline storage potential in select subbasins. In 2005, the City acted on this potential benefit and implemented a pilot program by raising the fixed weir heights at six regulators. The six pilot regulators control flows discharged at CSOs 5, 17, 36, 39, 62, and 68. The City continues to monitor these locations to establish quantitative trends in overflow reduction. However, even before quantification, it is self-evident that a benefit in terms of overflow reduction has been realized.
- At the time of LTCP development, the City did not have the staff available to operate in-system flow controls to induce storage in trunk sewers. Furthermore, the City was hesitant at that time to commit to developing those resources. Since then, the City has shown the desire and ability to add wet-weather program staff, although it still must be done judiciously.

The most important factor in the City's 1998 decision process was that political and community leaders were (and continue to be) very sensitive to basement flooding concerns in the combined sewer subbasins. Therefore, while technically feasible (although likely beyond NMC implementation), using trunk sewers for storage of wet-weather flows was considered likely to be unacceptable to the community in 1998. Whether or not this controlling political factor has changed is a judgment that must be made by the City as part of deciding on implementation of inline storage.

EXHIBIT B-4

TECHNICAL MEMORANDUM

SUBJECT: CSO Ponds Nos. 1 & 2 Recycle Study

PREPARED BY: Patrick W. Callahan, P.E.

DATE PREPARED: 6/2004

1. PURPOSE AND SCOPE

This technical memorandum presents information addressing the releases of combined sewage from Ponds Nos. 1 & 2 and the capacity of the Water Pollution Control Plant (WPCP) during these releases. The purpose of this memorandum is to identify the potential benefits of returning the combined sewage stored in the ponds to the WPCP for treatment.

2. EXISTING CONDITIONS

The Wayne Street Interceptor conveys combined sewage to the City of Fort Wayne's WPCP through an 84-inch pipe. The flow from the Wayne Street Interceptor passes a Diversion Chamber before entering the WPCP. When the WPCP cannot take the entire flow from the Wayne Street Interceptor the flow backs up and surcharges the interceptor. When this interceptor surcharge exceeds 3 feet the flow is diverted to a pump station that can pump it into Ponds Nos. 1 & 2. The combined sewer overflows (CSOs) from the Glasgow regulator also enter this pump station and mix with the Wayne Street Interceptor flows. Thus, CSO flow is pumped into the Ponds after flow is maximized to the WPCP, storage in the Wayne Street Interceptor is maximized and the CSOs from the Wayne Street Interceptor and Glasgow Regulator begin to discharge to the pump station. One exception to this situation would where there is significant local rainfall in the Glasgow regulator subbasin, without rainfall in the remainder of the system. While physically possible, this rainfall pattern would be highly unusual.

The combined sewer overflows flow can be pumped into Pond 1, which can hold 152 million gallons. Pond 1 is connected to Pond 2, which can hold 138 million gallons, by a channel to the south and a 58" x 91" elliptical pipe to the north. A minimum of 5 ft of water is kept in the ponds to control odor and prevent fish kills in the ponds. This reduces the available capacity in each pond to 87.5 million gallons in Pond 1 and 90.6 million gallons in Pond 2. This loss in capacity is significant and of concern to the City, but operational experience has proven the necessity for a 5' minimum depth. The City has used Solar Bees that circulate the water at depth between the aerobic and anaerobic zone to help keep the D.O. levels high, therefore reducing odor in Ponds 1& 2. Even with these preventative measures in place, Pond 2 often experiences algae blooms that cause odor issues. The City also maintains a spray system for deodorizing the air. This is system is utilized when odor is bad in an effort to mask the odor. It is assumed that the majority of the fish enter the collection system through the outfalls and are pumped into the ponds during wet weather, or through the CSO pump station gates when the river level is high. The D.O levels in Pond 2 are such that a fish could survive. As part of the LTCP, the City proposes to construct improvements to Ponds that will allow the Ponds to be more effectively used. The overall intent of these improvements will be to reduce the amount of grit and debris getting into the ponds as well as improve the City's ability to clean and maintain the Ponds. It is believed that with these improvements the ponds that the current 5' minimum depth may be reduced.

Currently, before combined sewage overflows are pumped into Pond 1, the gates between Pond 1 and Pond 2 are closed. Pond 1 is filled before any new overflows are put into Pond 2. If the volume of new overflows is small enough, all new overflows are stored in Pond 1. If the volume of new overflows is too large to store in Pond 1, overflows are released to Pond 2 after Pond 1 is full.

Overflows are held in Pond 1 as long as possible to allow the larger solids to settle. Overflows are then distributed equally between Ponds 1 & 2 and held as long as possible to allow bacteria to die off. When the solids and bacteria reach permit limits the flow is discharged into the Maumee River. If a wet weather even, that requires overflows to be pumped into Pond 1, occurs before the above process is completed, partially treated overflows may have to be discharged to the Maumee River to make room for new overflows.

3. <u>PLANNING PARAMETERS</u>

This study addresses short term operations of and modifications to the ponds. Long term operations of and modifications to the ponds is addressed in the City's CSO LTCP. Because of this the WPCP will be assumed to have a capacity of 60 million gallons per day (MGD) and the recorded discharges from the ponds during 2002 and 2003 will be assumed to be representative of the future short term operation of the ponds.

4. <u>POND NOS. 1 & 2 DISCHARGE DATA RESULTS</u>

The dates and volumes of discharges from the ponds were obtained from the MRO reports. The volume of WPCP influent for the same dates was also obtained from the MRO reports. The influents were subtracted from 60 to determine the remaining capacity in the WPCP. The potential for recycling is the smaller of the remaining WPCP capacity or the amount discharged from the ponds. These calculations made for both 2002 and 2003. See Attachments 1 and 2.

The benefits of recycling were expressed as reduction in discharge volume per year and reduction in discharge days. See Attachment 3.

Table 4.1

2002 - 60MGD CAPACITY							
	Pond #1	Pond #2	Total Pond	WPCP Plant	Remaining	Potential for	Potential
	Discharges	Discharges	Discharges	Influent Flow	Capacity	Recycling	Discharge
Date	MG	MG	MG	MG	MG	MG	MG
1/29/2002	37.2		37.2	49.86	10.14	10.14	27.06
2/1/2002	110.5		110.5	48.22	11.78	11.78	98.72
2/2/2002	38.8		38.8	55.89	4.11	4.11	34.69
2/3/2002	48		48	58.62	1.38	1.38	46.62
2/4/2002	46.2		46.2	43.28	16.72	16.72	29.48
2/5/2002	24.1		24.1	40.90	19.10	19.4	4.7
2/6/2002	20.3		20.3	40.51	19.49	19.48	0.82
2/7/2002	4.4		4.4	46.79	13.21	4.4	0
3/3/2002	4.24		4.24	67.54	-7.54	0	4.24
3/4/2002	10		10	67.55	-7.55	0	10
3/5/2002	6.55		6.55	60.22	-0.22	0	6.55
3/6/2002	6.55		6.55	59.47	0.53	0.53	6.02
3/7/2002	6.55		6.55	57.92	2.08	2.08	4.47
3/8/2002	3.82		3.82	56.20	3.80	3.8	0.02
3/30/2002		28.53	28.53	59.92	0.08	0.08	28.45
3/31/2002		32.39	32.39	53.21	6.79	6.79	25.6
4/1/2002		22.34	22.34	59.38	0.62	0.62	21.72
4/2/2002		39.58	39.58	58.99	1.01	1.01	38.57
4/3/2002		49.43	49.43	59.20	0.80	0.8	48.63
4/4/2002		23.98	23.98	61.40	-1.40	0	23.98
4/10/2002		88.81	88.81	66.20	-6.20	0	88.81
5/12/2002		41.6	41.6	66.52	-6.52	0	41.6
5/13/2002		38.3	38.3	66.48	-6.48	0	38.3
5/18/2002		11.1	11.1	68.87	-8.87	0	11.1
6/11/2002		66.9	66.9	48.99	11.01	11.01	55.89
6/12/2002		30.2	30.2	45.45	14.55	14.55	15.65
7/15/2002		12.4	12.4	42.14	17.86	12.4	0
7/16/2002		13.3	13.3	40.92	19.08	13.3	0
9/10/2002		5.34	5.34	40.83	19.17	5.34	0
9/11/2002		8.88	8.88	40.23	19.77	8.88	0
9/12/2002		8.88	8.88	40.74	19.26	8.88	0
9/13/2002		7.99	7.99	41.59	18.41	7.99	0
9/14/2002		15.1	15.1	42.37	17.63	15.1	0
9/15/2002		6.22	6.22	40.60	19.40	6.22	0

9/16/2002		4.97	4.97	40.82	19.18	4.97	0
9/17/2002		7.75	7.75	39.17	20.83	7.75	0
9/18/2002		8.18	8.18	39.04	20.96	8.18	0
9/19/2002		6.46	6.46	39.42	20.58	6.46	0
9/20/2002		9.81	9.81	54.15	5.85	5.85	3.96
9/21/2002		7.69	7.69	53.69	6.31	6.31	1.38
9/22/2002		7.69	7.69	40.81	19.19	7.69	0
9/23/2002		8.82	8.82	41.35	18.65	8.82	0
9/24/2002		6.67	6.67	42.40	17.60	6.67	0
9/25/2002		21.83	21.83	40.32	19.68	19.68	2.15
9/26/2002		5.17	5.17	40.98	19.02	5.17	0
10/2/2002		7.88	7.88	41.74	18.26	7.88	0
11/12/2002		29.73	29.73	51.92	8.08	8.08	21.65
11/13/2002		8.13	8.13	46.68	13.32	8.13	0
			1,059.26	2,409.49	470.51	318.43	740.83
			22.07	50.20	9.80	6.63	

Table 4.2

2003 - 60 MGD CAPACITY							
	Pond #1	Pond #2	Total Pond	WPCP Plant	Remaining	Potential for	Potential
	Discharges	Disgharges	Discharges	Influent Flow	Capacity	Recycling	Discharge
Date	MG	MG	MG	MG	MG	MG	MG
3/13/2003		63.60	63.60	60.36	-0.36	0.00	63.60
3/19/2003		16.45	16.45	59.10	0.90	0.90	15.55
3/20/2003		73.97	73.97	59.42	0.58	0.58	73.39
3/24/2003		86.62	86.62	59.05	0.95	0.95	85.67
3/25/2003		4.49	4.49	59.88	0.12	0.12	4.37
3/26/2003		23.92	23.92	57.79	2.21	2.21	21.71
3/27/2003		8.33	8.33	57.25	2.75	2.75	5.58
3/28/2003		30.42	30.42	55.37	4.63	4.63	25.79
3/29/2003		24.00	24.00	59.06	0.94	0.94	23.06
3/30/2003		4.11	4.11	58.38	1.62	1.62	2.49
3/31/2003		15.56	15.56	56.68	3.32	3.32	12.24
4/5/2003	1.00		1.00	62.87	-2.87	0.00	1.00
4/8/2003		135.90	135.90	64.75	-4.75	0.00	135.90
4/30/2003		13.88	13.88	47.77	12.23	12.23	1.65
5/6/2003		11.16	11.16	62.75	-2.75	0.00	11.16
5/7/2003		136.93	136.93	64.79	-4.79	0.00	136.93
5/10/2003		106.06	106.06	62.81	-2.81	0.00	106.06
5/11/2003		63.20	63.20	60.30	-0.30	0.00	63.20
5/12/2003		59.18	59.18	61.14	-1.14	0.00	59.18
5/13/2003		101.31	101.31	60.26	-0.26	0.00	101.31
5/16/2003		106.19	106.19	63.08	-3.08	0.00	106.19
5/17/2003		5.19	5.19	64.65	-4.65	0.00	5.19
5/28/2003		18.38	18.38	49.69	10.31	10.31	8.07
5/29/2003		15.56	15.56	48.66	11.34	11.34	4.22
5/30/2003		6.69	6.69	49.49	10.51	6.69	0.00
6/23/2003		24.50	24.50	42.52	17.48	17.48	7.02
6/25/2003		18.43	18.43	40.45	19.55	18.43	0.00
7/7/2003		67.13	67.13	59.76	0.24	0.24	66.89
7/8/2003		83.10	83.10	58.44	1.56	1.56	81.54
7/9/2003		90.89	90.89	58.45	1.55	1.55	89.34
7/10/2003		109.13	109.13	56.04	3.96	3.96	105.17
7/11/2003		117.46	117.46	55.40	4.60	4.60	112.86
7/12/2003		101.08	101.08	56.33	3.67	3.67	97.41
7/13/2003		74.29	74.29	57.30	2.70	2.70	71.59
7/14/2003		35.41	35.41	53.92	6.08	6.08	29.33
7/29/2003		57.99	57.99	62.66	-2.66	0.00	57.99
7/30/2003		45.83	45.83	58.11	1.89	1.89	43.94

7/31/2003		17.63	17.63	58.27	1.73	1.73	15.90
8/8/2003		61.99	61.99	60.44	-0.44	0.00	61.99
8/9/2003		29.53	29.53	62.35	-2.35	0.00	29.53
8/10/2003		22.12	22.12	57.44	2.56	2.56	19.56
8/19/2003		21.88	21.88	46.66	13.34	13.34	8.54
8/20/2003		18.21	18.21	48.36	11.64	11.64	6.57
9/2/2003		120.15	120.15	61.21	-1.21	0.00	120.15
9/16/2003		17.45	17.45	54.96	5.04	5.04	12.41
9/17/2003		12.14	12.14	48.80	11.20	11.20	0.94
9/18/2003		10.54	10.54	47.75	12.25	10.54	0.00
10/9/2003		19.28	19.28	46.80	13.20	13.20	6.08
10/10/2003		18.70	18.70	46.64	13.36	13.36	5.34
10/13/2003		43.24	43.24	44.53	15.47	15.47	27.77
12/23/2003		107.50	107.50	60.21	-0.21	0.00	107.50
12/26/2003		39.10	39.10	60.92	-0.92	0.00	39.10
			2,516.80	2,930.07	189.93	218.83	2,297.97
			48.40	56.35	3.65	4.21	44.19

Table 4.3

	60 MGD Plant	
	2002	**2003**
Discharge Days	48	52
Potential Reduction		
Days	19	3
%	40%	6%
Pond Discharges (MG)	1,059	2,517
Potential Reduction		
Volume (MG)	318	219
%	30%	9%

EXHIBIT B-5

TECHNICAL MEMORANDUM

TO: Mark Gensic, City of Fort Wayne

FROM: Ken Sedmak, Project Manager, Donohue & Associates, Inc.

SUBJECT: WPCP CSO Terminal Ponds Nos. 1 & 2 Recycle Study
Donohue Project Number 10725.000

PREPARED BY: Stacy Jones, Donohue & Associates, Inc.
Amber Smith, Donohue & Associates, Inc.

DATE PREPARED: September 17, 2007

1.0 PURPOSE AND SCOPE

This technical memorandum presents information addressing the pumping facilities associated with combined sewer overflow (CSO) and the terminal ponds north of the Water Pollution Control Plant (WPCP).

As a part of discharge permit negotiations, the City of Fort Wayne (City) as well as the Indiana Department of Environmental Management (IDEM) requested an evaluation to estimate the amount of flow and cost of returning terminal pond water to the WPCP after a CSO event. By constructing a CSO Bleedback Facility, the WPCP will be able to return CSO pond water back to the WPCP for further wastewater treatment when there is available plant capacity. This facility will also lower the water elevations in the terminal ponds which will allow for additional storage of CSO water during a wet-weather event. This facility is one of the key components of the City's long term control plan.

Workshop No. 1 was held on June 25, 2004 with City and Donohue personnel to discuss issues and requirements for the WPCP CSO Terminal Ponds Nos. 1 & 2 Recycle Study. A copy of the notes from Workshop No. 1 is included with this memorandum as Attachment 3.

The purpose of this technical memorandum (TM) is to summarize the results from the City of Fort Wayne's Monthly Report of Operation (MRO) data analysis and provide conceptual layouts and costs for three conveyance alternates to return terminal pond water back to the WPCP. It is important to note that all calculations and analysis were based on limited MRO data provided by the City.

2.0 EXISTING CONDITIONS

The City of Fort Wayne has a combined sewer system that has a Combined Sewer Overflow (CSO) Treatment Facility located on the north side of the Maumee River across from the Water Pollution Control Plant (WPCP). Raw wastewater flows to the plant through two 84-inch interceptors, the Wayne Street Interceptor and the North Maumee Interceptor. The Wayne Street Interceptor is a combined sewer and the North Maumee Interceptor is a sanitary sewer. The flow from the Wayne Street Interceptor passes a Diversion Chamber before connecting with the North Maumee Interceptor prior to entering the WPCP. When flow into the WPCP exceeds plant capacity, flow is diverted from the Wayne Street Interceptor to the Diversion Chamber and flows to the CSO Treatment Facility. The CSO Treatment Facility consists of a CSO Pump Station and two large terminal ponds. Terminal Ponds Nos. 1 and 2 were constructed in the 1970's. CSO is pumped from the CSO pump station into Terminal Pond No. 1, which holds 87.5 million gallons, and flows through an interconnection channel into Terminal Pond No. 2, which holds 90.6 million gallons.

Chlorine solution from the WPCP may be added to the CSO for odor control (This is not used because it is not effective in controlling odors). The CSO is pumped to Pond No. 1, overflows to Pond No. 2, and is ultimately discharged from Pond No. 2 to the Maumee River. Effluent disinfection at Pond No. 2 discharge does not exist. The flow is not metered, therefore, volumes are determined based upon fill and draw and not flow through. There is no facility to return stored CSO in the ponds to the interceptor sewer system for treatment at the plant. Although conveyance facilities are in place to direct CSO to Pond No. 3, the pond is not used for CSO treatment. Pond No. 3 is used as a final polishing step for plant effluent.

Pond Nos. 1 and 2 are intended to be a primary treatment system (for CSO treatment) and discharge to the river. The ponds are designed as flow through facilities with no wastewater return control structures. Flow through Pond No. 1 and Pond No. 2 are controlled by steel sheet baffles in each pond. These baffles direct flow in a serpentine pattern to prevent short-circuiting in the ponds.

Pond Nos. 1, 2 and 3 all have outfalls to the Maumee River. These outfalls allow for individual ponds to be drained independent of the remaining two ponds. Pond No. 1 has a special open channel interconnect structure utilizing three sluice gates to control flow from Pond No. 1 to Pond No. 2. The open channel structure maintains a minimum water level at elevation 745.50 feet in Pond No. 1. This minimum water level condition is critical to maintain in avoiding major fish kills within the ponds. This structure is normally used to allow CSO flow from Pond No. 1 to Pond No. 2. There is also a northern interconnect structure between Pond Nos. 1 and 2. This interconnect is a concrete structure using a sluice gate to control flow into a pipe which drains Pond No. 1 into Pond No. 2. This northern interconnect is not normally used. The CSO Pump Station also has a permitted overflow to the Maumee River, CSO No. 019, through a number of flap gates along the wetwell wall.

3.0 PLANNING PARAMETERS

Preliminary engineering was performed to evaluate facilities necessary to return stored, partially treated CSO flow from the terminal ponds to the interceptor sewer system for conveyance to the treatment plant. The flow that is returned to the treatment plant will be measured and controlled. Discharge from the ponds to the river will occur only if the ponds are full and the treatment plant is operating at its maximum capacity.

The surface area, storage depth and effective storage volume for Terminal Ponds Nos. 1 and 2 are as follows:

Terminal Pond No. 1:	35.9 acres	7.5 ft deep	87.5 million gallons
Terminal Pond No. 2:	32.9 acres	8.5 ft deep	90.6 million gallons

Analysis is to be based on three plant capacities:

Current Plant Capacity:	60 MGD
Planned Plant Capacity:	85 MGD Total (78 MGD Firm)
Future Plant Capacity:	100 MGD Total (92 MGD Firm)

4.0 POND NOS. 1 & 2 DISCHARGE DATA RESULTS

Data received within the MRO reports are for the outfalls to Terminal Pond No. 1 and Terminal Pond No. 2, including variables such as total flow of raw sewage, precipitation, flow from CSO ponds and duration of outfall to the river from the ponds. The MRO reports do not include data from the other CSO's throughout the City nor from CSO No. 019 at the CSO Pump Station. Based on the limited information provided by the City, an analysis of this data was performed to estimate the quantity of CSO that could be recycled back to the WPCP for treatment. Four major assumptions were made prior to the analysis of the CSO Terminal Ponds.

- The first assumption is that an increase in plant capacity will not affect the influent volume to the terminal ponds. Although the WPCP will be able to treat more wastewater as its capacity increases, the terminal ponds will see the same amount of water being diverted from the sewer system with fewer discharges at the other CSO outfalls throughout the City.
- The second assumption is that the potential amount of CSO recycled to the plant is based on the remaining capacity of the plant or the volume of discharge, whichever case is the limiting factor.
- The third assumption is that flow to the WPCP is equal to the maximum capacity of the WPCP before flow is diverted to the CSO Treatment Facilities.
- The last assumption is that the average yearly WPCP plant effluent flowrate will not change with respect to an increase in plant capacity at the WPCP. The average yearly plant effluent flow rate is the amount of water that the plant receives on an average day for that year (in this case 2002 or 2003). This number was held constant for each capacity alternate for two reasons. First, the plant effluent flow data includes days of wet-weather events where the flowrates were higher than normal. Second, increasing or decreasing the size of the collection system was not

calculated or predicted in this study. See Attachment 4 for the MRO data that was used to determine the values in Tables 1 through 3. The tables in Attachment 5 are for days when the Terminal Ponds received a discharge.

Analysis was based on the WPCP current plant capacity of 60 MGD, planned plant capacity of 85 MGD and future plant capacity of 100 MGD. Tables 1, 2, and 3 show the potential CSO recycled to WPCP.

TABLE 1: 60 MGD - CURRENT PLANT CAPACITY

Year	(1) WPCP Plant Effluent Flow Yearly Average (MG) *	(2) Pond Influent Flow Yearly Average (MG) ***	(3) Pond Discharge to River Yearly Average *	(4) Potential Recycled to Plant Yearly Average (MG) **	(5) Yearly Amount Recycled
2002	48.90	28.70	22.07	6.63	30.04%
2003	53.07	52.61	48.40	4.21	8.70%

* Based on MRO data obtained from WPCP personnel
** Calculated value obtained from plant effluent flow and ability to recycle CSO from the ponds
*** Potential amount recycled plus pond discharge to river

TABLE 2: 85 MGD - PLANNED PLANT CAPACITY

Year	(1) WPCP Plant Effluent Flow Yearly Average (MG) *	(2) Pond Influent Flow Yearly Average (MG) ***	(3) Pond Discharge to River Yearly Average *	(4) Potential Recycled to Plant Yearly Average (MG) **	(5) Yearly Amount Recycled
2002	48.90	37.95	22.07	15.88	71.96%
2003	53.07	68.92	48.40	20.52	42.40%

* Based on MRO data obtained from WPCP personnel
** Calculated value obtained from plant effluent flow and ability to recycle CSO from the ponds
*** Potential amount recycled plus pond discharge to river

TABLE 3: 100 MGD - FUTURE PLANT CAPACITY					
Year	**(1)** **WPCP Plant Effluent Flow Yearly Average (MG) ***	**(2)** **Pond Influent Flow Yearly Average (MG) *****	**(3)** **Pond Discharge to River Yearly Average ***	**(4)** **Potential Recycled to Plant Yearly Average (MG) ****	**(5)** **Yearly Amount Recycled**
2002	48.90	40.85	22.07	18.78	85.11%
2003	53.07	75.84	48.40	27.44	56.70%

* Based on MRO data obtained from WPCP personnel
** Calculated value obtained from plant effluent flow and ability to recycle CSO from the ponds
*** Potential amount recycled plus pond discharge to river

For ease of discussion, the columns in Tables 1 through 3 have been numbered (1) through (5).

- Column 1, WPCP Plant Effluent Flow Yearly Average, indicates the average daily plant effluent flow over all 365 days in 2002 or 2003. This is important to note since the remaining columns are based solely on days where the Terminal Ponds recorded a discharge.
- Column 3, Pond Discharge to River Yearly Average, is the average of the summation of discharge from Terminal Pond No. 1 and Terminal Pond No. 2 throughout their respective years. The breakdown of this column can be seen in the Total Pond Discharge column in the tables in Attachment 5.
- Column 4, Potential Recycle to Plant Yearly Average, shows the average amount that could have been recycled back to the plant. This volume is based on the remaining capacity of the plant at the time of discharge, which can be seen in the Potential Amount Recycled column in Attachment 5. For example, on January 29, 2002, the total volume discharge from the Terminal Ponds was 37.2 million gallons (MG) and the flow into the plant was 49.86 MG, leaving 10.14 MG of potential recycle capacity. Only 10.14 MG of recycle would be possible for that particular day. On July 15, 2002, the total volume discharged from the Terminal Ponds was 12.40 MG and the flow into the plant was 42.12 MG, leaving 17.86 MG of potential recycle capacity. However, because only 12.40 MG was discharge from the ponds on that day, 12.40 MG is the value recorded in the potential amount recycled column in Attachment 5.
- Column 2, Pond Influent Flow Yearly Average, is the sum of columns 3 and 4.
- Column 5, Yearly Amount Recycled, is a percentage of CSO that could have been returned to the WPCP for further treatment. This value is calculated by taking Column 4 divided by Column 3.

More CSO was discharged and not measured by the plant staff through CSO No. 019. This CSO did not go to the ponds for measurement in this data. Therefore, the "Yearly Amount Recycled" percentages are high.

Over the two-year period analyzed in the study, 37,220 million gallons (MG) of wastewater was treated at the WPCP. If the plant were running at full capacity (60 MG) every day for those two years, the WPCP could have treated 43,800 MG of wastewater. The difference between running at full capacity and actual treated capacity is 6,581 MG. From the tables in Attachment 5, the sum of "Total Pond Discharge" of CSO for 2002 and 2003 was 3,576 MG. These calculations illustrate that 100% of the discharged CSO had the potential to be recycled to the WPCP for further treatment rather than being discharged to the river. However, when some of the CSO discharges occurred, the plant was already running either at capacity or close to its maximum capacity of 60 MGD.

The CSO Bleedback Facility should be designed to handle CSO return flows for the current and future capacities of the WPCP. Design the new facility with the following minimum parameters:

- CSO Bleedback flow to be recycled for study:
  - Minimum Flow: 3.0 MGD
  - Average Flow: 10 MGD
  - Maximum Flow: 30 MGD

- Magmeter sizing:
  - At Minimum Flow: 1.5 ft/sec
  - At Average Flow: 4.8 ft/sec
  - At Maximum Flow: 14.5 ft/sec

- Parshall Flume sizing:
  - Minimum Flow: 1.70 MGD
  - Maximum Flow: 66.9 MGD

The CSO Bleedback Facility should include options to return water from either Terminal Pond. Each terminal pond has different waste characteristics that can be used at the WPCP following a wet-weather event. Fresh CSO water pumped into Terminal Pond No. 1 will have a stronger waste than the partially treated CSO water in Terminal Pond No. 2. The current operation of the CSO Treatment Facilities will not change with this proposed facility during a wet-weather event.

5.0 ALTERNATES

Three alternate layouts for the conveyance of CSO from the terminal ponds back to the WPCP for treatment were considered. Each alternate includes devices to control and measure the recycled flow. Figure 1, in Attachment 1, presents the existing site plan highlighting the proposed project area. Each of the following alternates have an inlet structure for Terminal Pond Nos. 1 & 2 leading to a 6-foot by 12-foot manhole that connects to the existing 54-inch Baldwin Drain Area Sanitary Relief Sewer, herein after called the 54-inch sanitary sewer.

The 54-inch sanitary sewer was constructed as a combined sewer in 1971 and is still in service. It flows to the south to a junction structure upstream of its connection to the

84-inch Maumee Interceptor. At this structure, flow is regulated through a 48-inch pipe into Maumee Interceptor. This connection is located a few hundred feet upstream of the interceptor's river crossing. In the past few years, storm inlets have been removed from this portion of the sewer system and this sewer receives less combined sewer flow than previously designed. In 2006, the City viewed this sewer from a manhole located between Terminal Ponds No. 1 and 2 and it appears that it is in good condition.

Two diversion structures, the plant influent diversion structure and the Glasgow diversion structure, are located just upstream of the WPCP and downstream of the 54-inch sanitary sewer connection to the Maumee Interceptor. Both of these diversion structures divert flow from entering the WPCP to the CSO Pump Station which pumps the CSO to Terminal Pond No. 1.

Each alternate will have similar control strategies. See the proposed control strategy in Attachment 6.

CSO Bleedback from the Terminal Ponds will not occur unless these conditions are met:

- Wayne St. Interceptor will be below a certain level for a certain amount of time.
- Plant Influent flowmeter flow rate (bleedback shall not create plant to become overloaded).
- High level in 54-inch Sanitary Sewer Manhole

If any one of these conditions are not met, CSO will not be returned to the WPCP for further treatment. The upstream regulators on the 54-inch sanitary sewer will not cause any CSO's because the level is being monitored.

5.1 24" Magmeter with Electrically Actuated Plug Valves

Figure 2, in Attachment 1, shows a 36-inch diameter pipe leading from Terminal Pond No. 1 to an inlet structure containing a 24-inch magmeter to measure flow and a 24-inch electrically actuated plug valve to control flow. The CSO would then travel through a 36-inch diameter pipe where it would drop into a 6-foot by 12-foot manhole and connect to an existing 54-inch sanitary sewer. The 54-inch sanitary sewer connects to the Maumee Interceptor where the CSO would be directed to the WPCP for further treatment. An identical set-up leading from Terminal Pond No. 2 will flow into the same 6-foot by 12-foot manhole.

Figure 3, in Attachment 1, presents section cuts of the manhole structure and inlet structures. This drawing includes invert elevations with respect to high and low water levels in the terminal ponds.

The initial cost for the 24-inch Magmeter with Electrically Actuated Plug Valves alternate is estimated at about $1.09 million. See Attachment 2.

5.2 24" Magmeter with 54" by 54" Electrically Actuated Sluice Gate

Figure 4, in Attachment 1, shows a 36-inch diameter pipe leading from Terminal Pond No. 1 to an inlet structure containing a 24-inch magmeter to measure flow and a 54-inch by 54-inch electrically actuated sluice gate to control flow into the structure. The CSO would then travel through a 36-inch diameter pipe where it would drop into a 6-foot by 12-foot manhole and connect to an existing 54-inch sanitary sewer. The 54-inch sanitary sewer connects to the Maumee Interceptor where the CSO would be transferred to the WPCP for further treatment. An identical set-up leading from Terminal Pond No. 2 will flow into the same 6-foot by 12-foot manhole.

Figure 5, in Attachment 1, presents section cuts of the manhole structure and inlet structures. This drawing includes invert elevations with respect to high and low water levels in the terminal ponds.

The initial cost for the 24-inch Magmeter with 54-inch by 54-inch Electrically Actuated Sluice Gate alternate is estimated at about $1 million. See Attachment 2.

5.3 6’-0” Parshall Flume with 54” by 54” Electrically Actuated Sluice Gate

Figure 6, in Attachment 1, shows a 36-inch diameter pipe leading from Terminal Pond No. 1 to an inlet structure containing a 54-inch by 54-inch electrically actuated sluice gate to control flow into the structure. The CSO would then travel through a 36-inch diameter pipe where it would enter a 90-foot long concrete channel leading to a 6-foot Parshall Flume to measure the flow. The CSO would then drop into a 6-foot by 12-foot manhole and enter a 48-inch diameter pipe leading to another 6-foot by 12-foot manhole which connects to an existing 54-inch sanitary sewer. The 54-inch sanitary sewer connects to the Maumee Interceptor where the CSO would be transferred to the WPCP for further treatment. An identical set-up leading from Terminal Pond No. 2 flows into the 90-foot concrete channel leading into the 6-foot by 12-foot manhole.

Figure 7, in Attachment 1, presents section cuts of the manhole structure, concrete channel with flume, and inlet structures. This drawing includes invert elevations with respect to high and low water levels in the terminal ponds.

The initial cost for the 6-foot Parshall Flume with 54-inch by 54-inch Electrically Actuated Sluice Gate alternate is estimated at about $1.1 million. See Attachment 2.

6.0 RECOMMENDATIONS

The study shows that Alternate No. 2 “24-inch Magmeter with 54-inch by 54-inch Electrically Actuated Sluice Gate” will provide the desired operation at the least cost. Based on cost effectiveness, minimal maintenance, ease of flow control and effectiveness in isolating the pond from the recycle area, Alternate No. 2 is recommended.

Based on discussions with WPCP personnel, it is recommended that further implementation of the WPCP CSO Terminal Ponds Nos. 1 & 2 Recycle Study be delayed until the Primary Clarifier Project has been completed. Also, if this study reaches the design phase, the uses of the northern interconnect between Terminal Pond Nos. 1 and 2 will be explored. The northern interconnect currently has a sluice gate to isolate Terminal

Pond No. 1 from Terminal Pond No. 2. With an additional sluice gate to isolate Terminal Pond No. 2 from this structure, a less expensive facility can be constructed to accomplish the City's goals by returning, sampling, and metering flow from either pond.

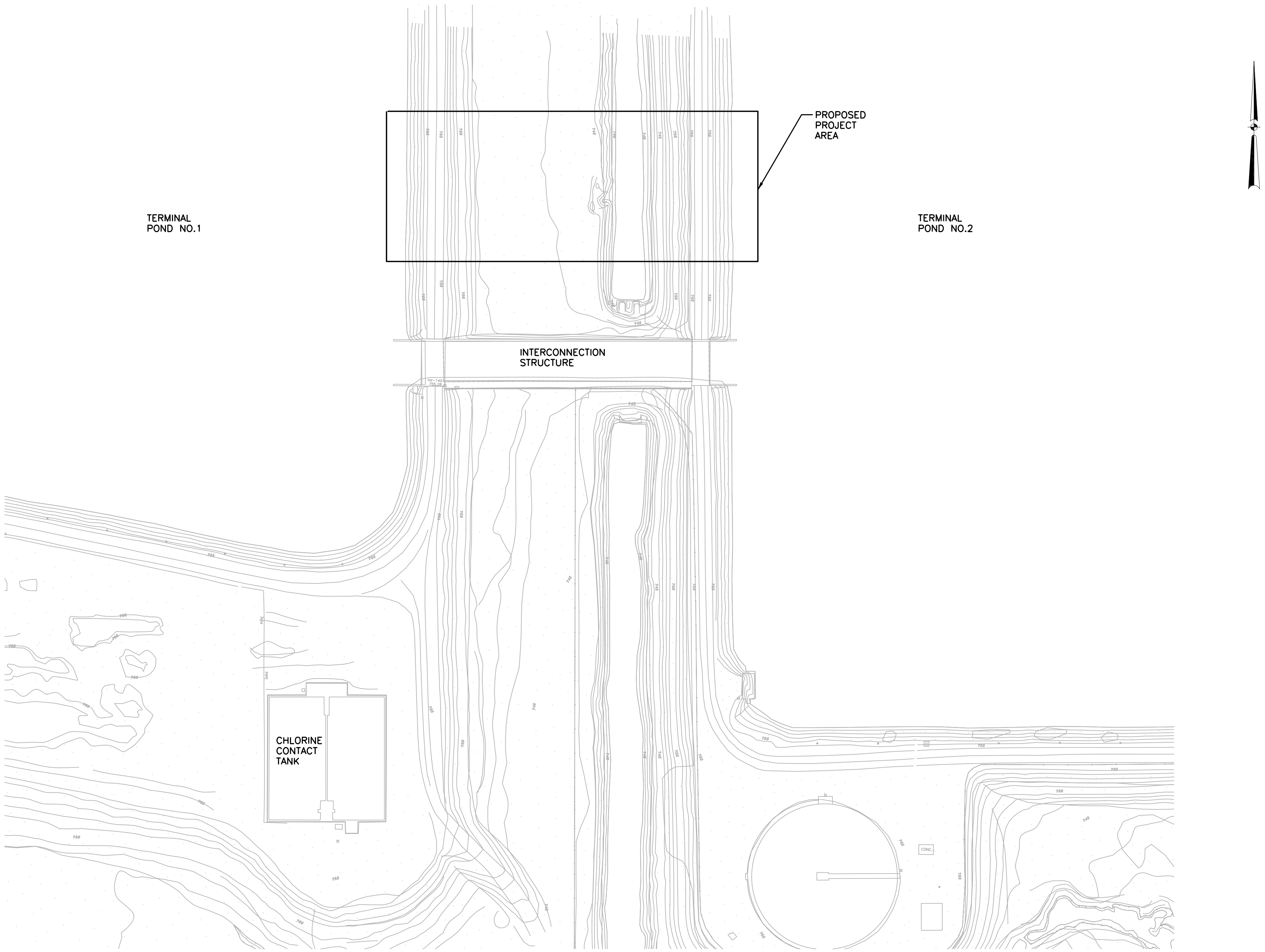
WPCP personnel brought up an additional concern with recycling CSO from the Terminal Ponds. If either terminal pond is drained to low pool level, there is a possibility of a large fish kill due to decreased levels of dissolved oxygen in the water. This will create odor problems.

Another option for the City to consider is a flow-through treatment system with post disinfection from Pond No. 2. The permit would need to be modified for bacteria levels rather than BOD and suspended solids. This option would be more controllable, provide CSO treatment to at least a primary treatment level and decrease the bacteria level in the river during a CSO event.

ATTACHMENT 1

Conceptual Layout Alternates

- **24-inch Magmeter with Electrically Actuated Plug Valves**
- **24-inch Magmeter with 54-inch by 54-inch Electrically Actuated Sluice Gate**
- **6-foot Parshall Flume with 54-inch by 54-inch Electrically Actuated Sluice Gate**



EXISTING SITE PLAN

0 100'

FIGURE 1

EXISTING SITE-NORTH

CITY OF FORT WAYNE

WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY

FORT WAYNE, INDIANA

SEPTEMBER 2007

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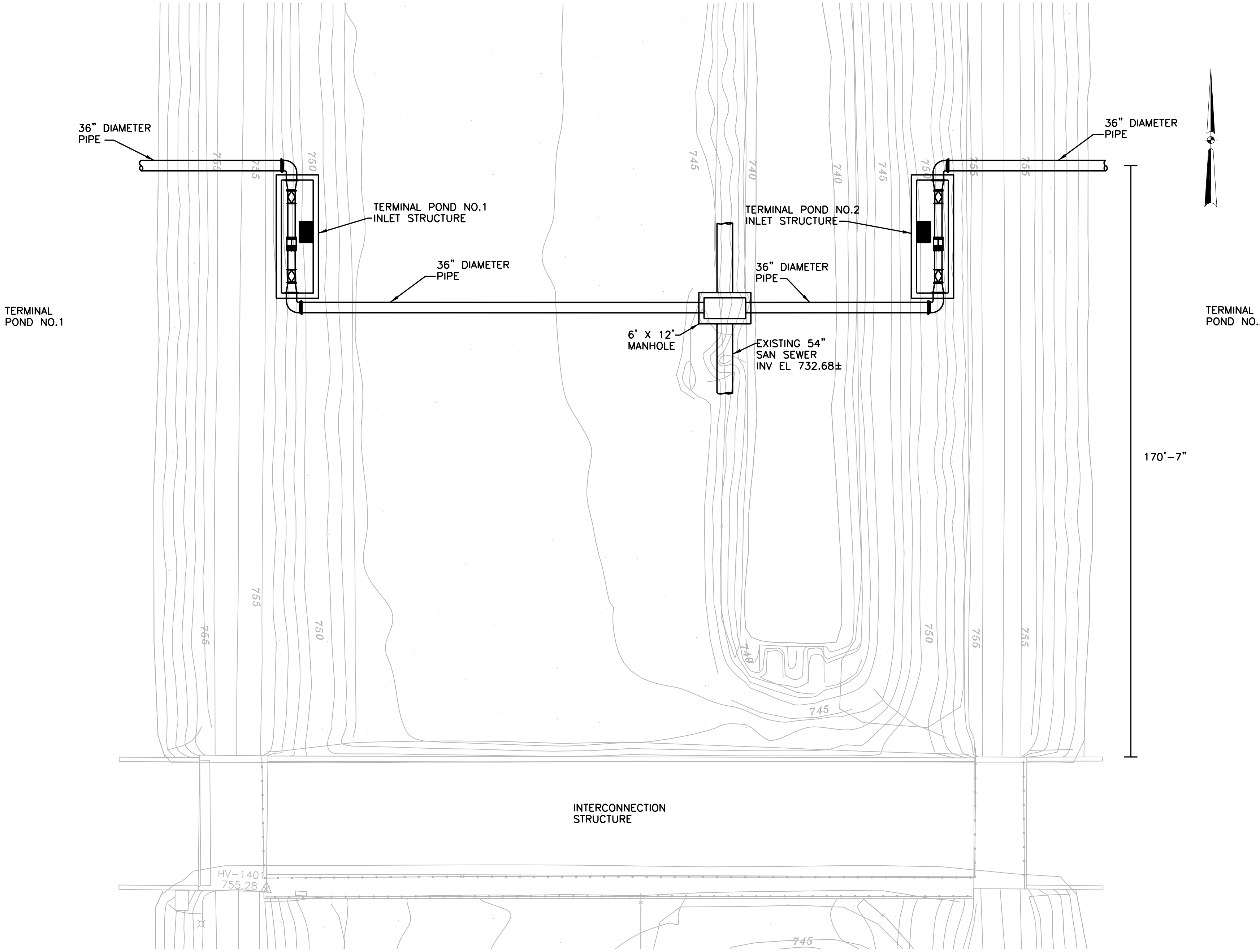

ALTERNATE NO. 1 SITE PLAN

0 40'

FIGURE 2

ALTERNATE NO. 1 PLAN: 24" MAGMETER WITH ELECTRICALLY ACTUATED PLUG VALVE

CITY OF FORT WAYNE

WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY

FORT WAYNE, INDIANA

SEPTEMBER 2007

DONOHUE & ASSOCIATES

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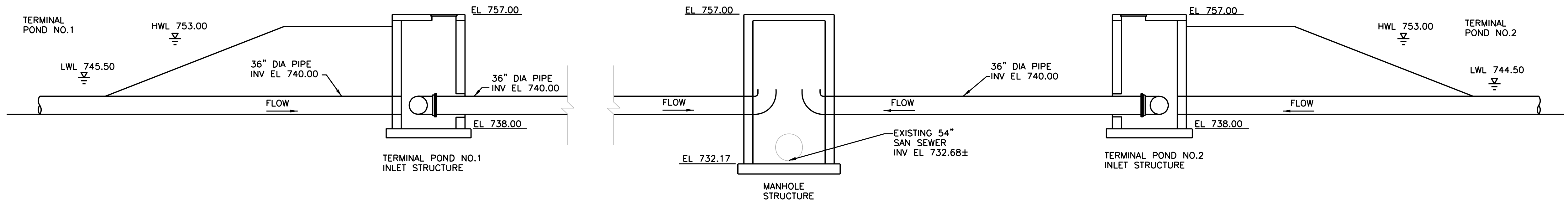
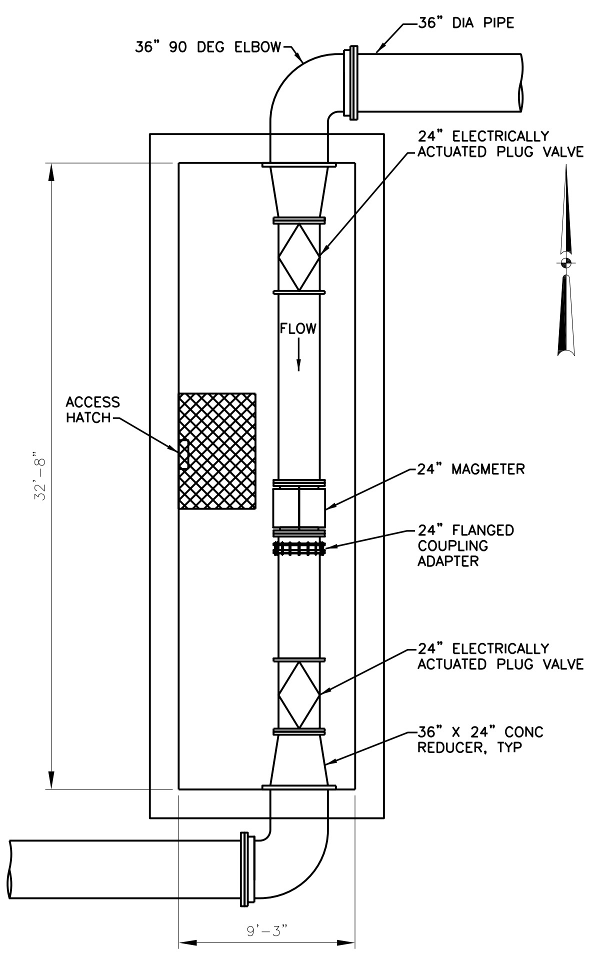


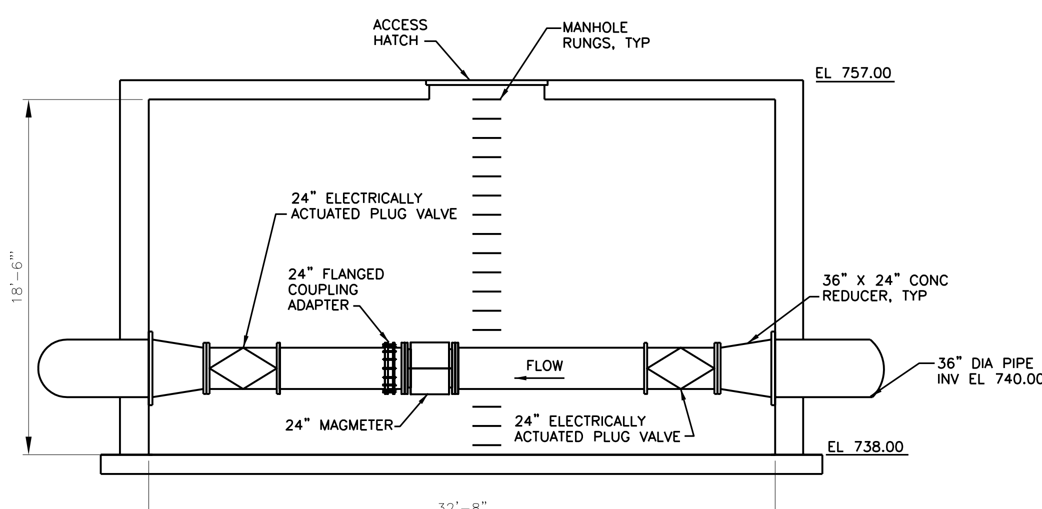
ALTERNATE NO. 1 SECTION A

0 20'



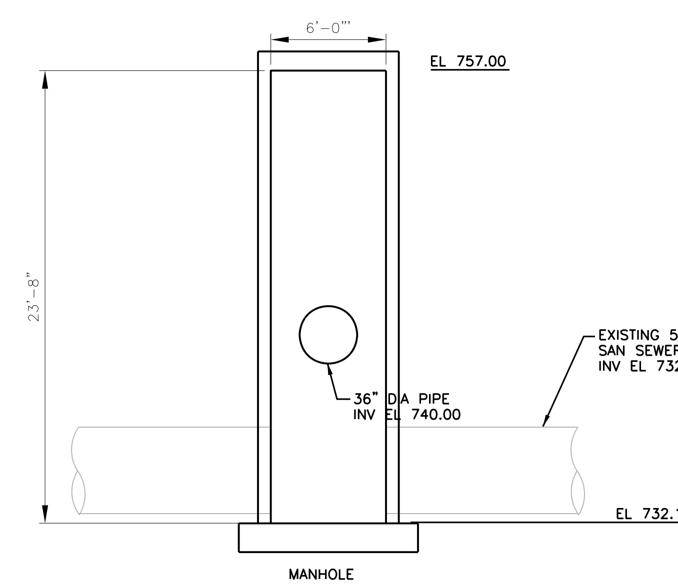
ALTERNATE NO. 1 PLAN

0 10'



ALTERNATE NO. 1 SECTION B

0 10'



ALTERNATE NO. 1 SECTION C

0 10'

FIGURE 3

ALTERNATE NO. 1 SECTION: 24" MAGMETER WITH ELECTRICALLY ACTUATED PLUG VALVE

CITY OF FORT WAYNE

WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY

FORT WAYNE, INDIANA

SEPTEMBER 2007

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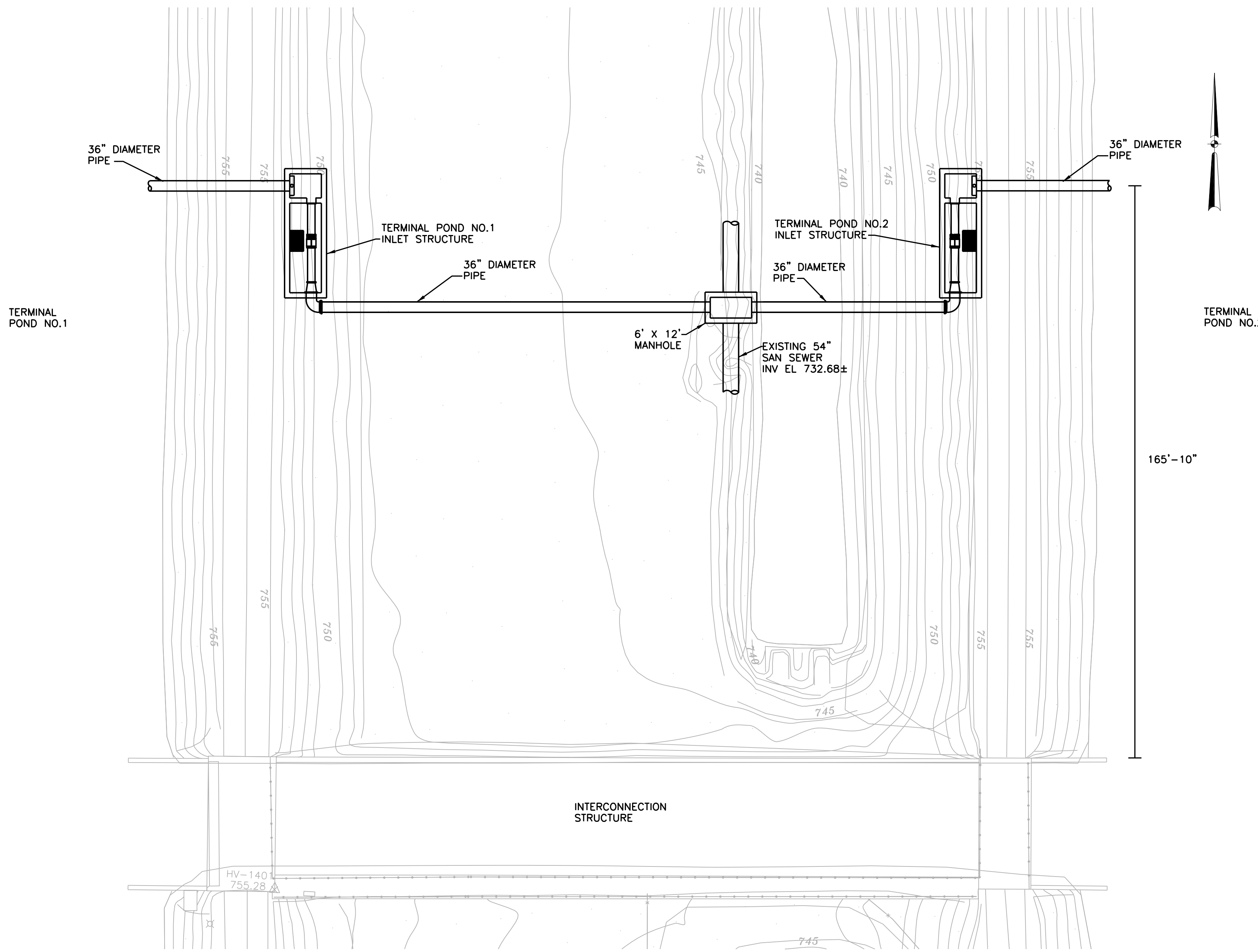

ALTERNATE NO. 2 SITE PLAN

0 40'

FIGURE 4

ALTERNATE NO. 2 PLAN: 24" MAGMETER WITH 54" X 54" ELECTRICALLY ACTUATED SLUICE GATE

CITY OF FORT WAYNE

WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY

FORT WAYNE, INDIANA

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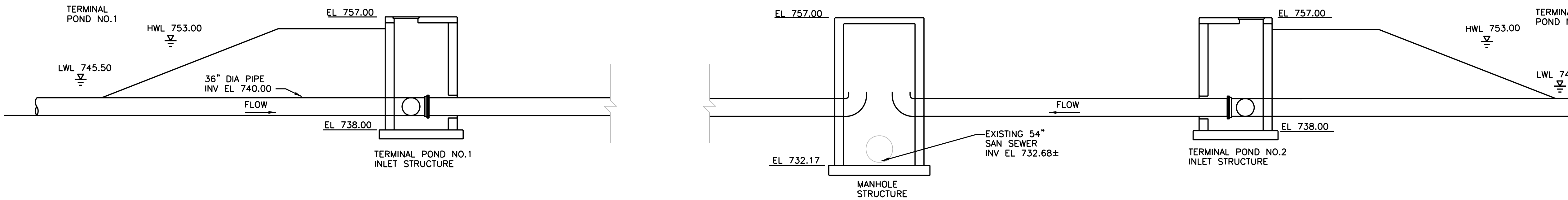
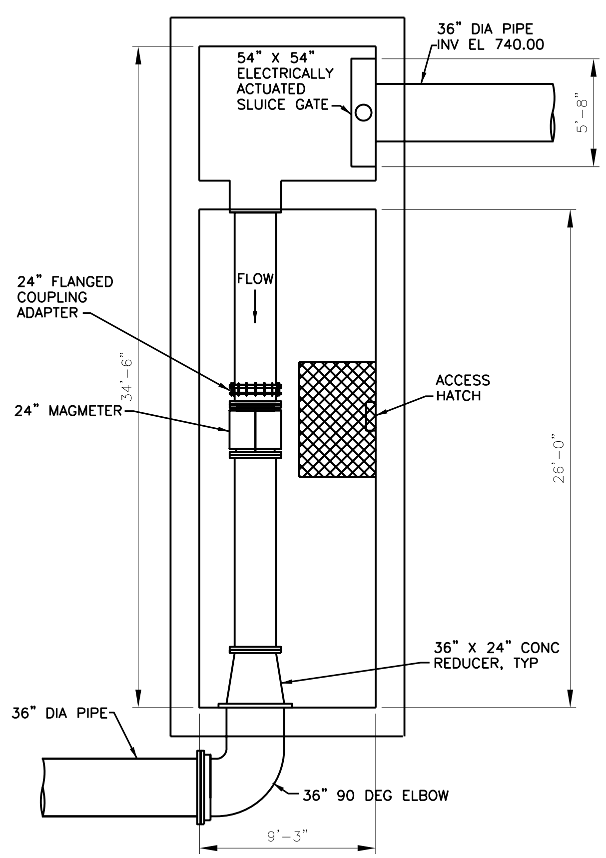


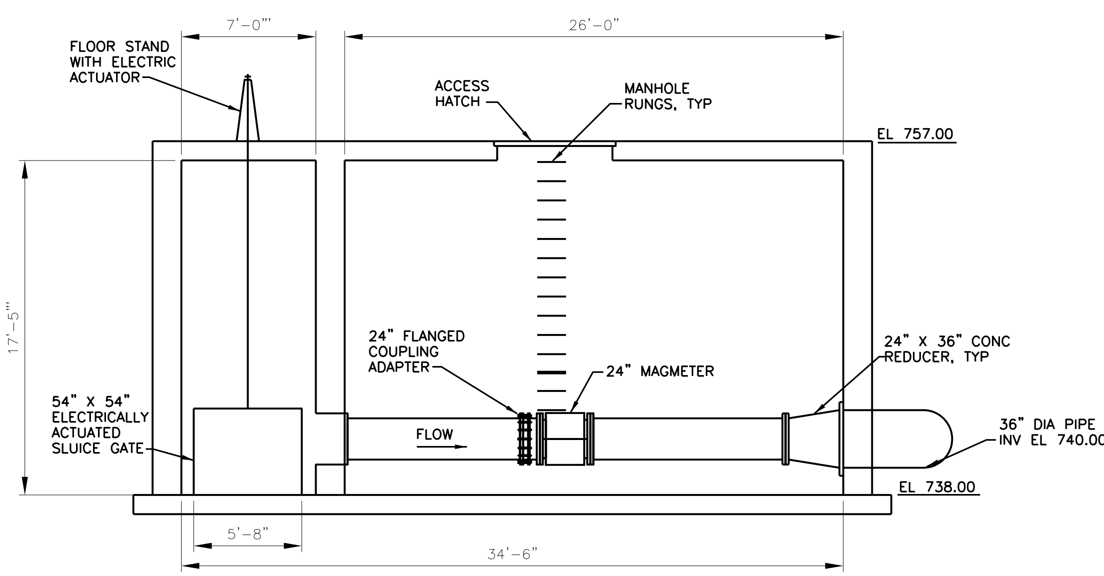
ALTERNATE NO. 2 SECTION A

0 20'



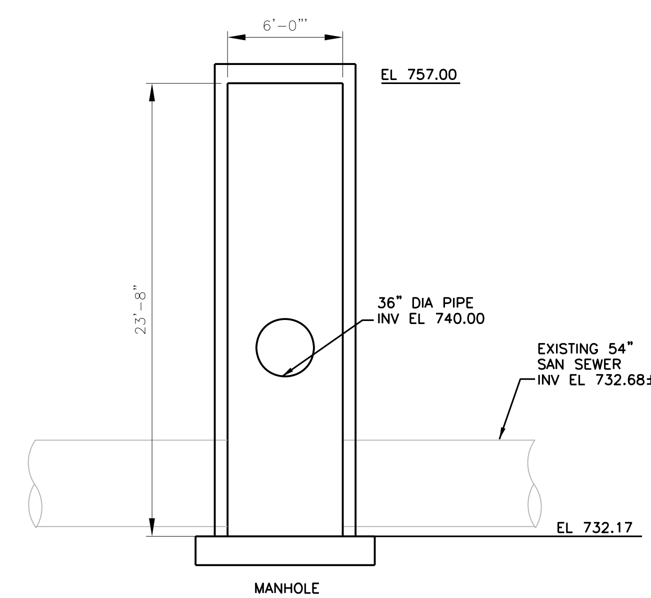
ALTERNATE NO. 2 PLAN

0 10'



ALTERNATE NO. 2 SECTION B

0 10'



ALTERNATE NO. 2 SECTION C

0 10'

FIGURE 5
ALTERNATE NO. 2 SECTION: 24" MAGMETER WITH 54" X 54" ELECTRICALLY ACTUATED SLUICE GATE
CITY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY
FORT WAYNE, INDIANA

DONOHUE & ASSOCIATES

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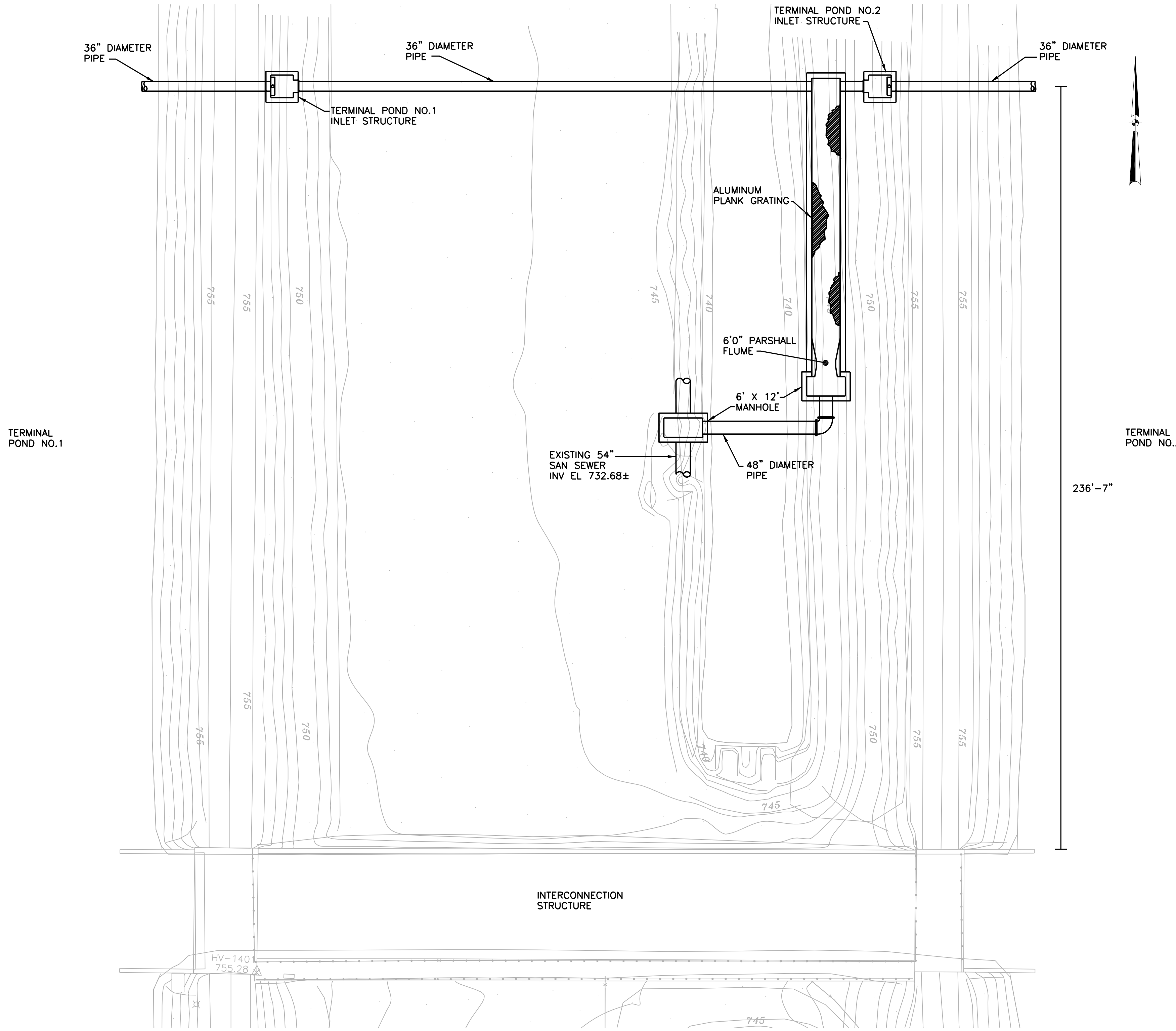

ALTERNATE NO. 3 SITE PLAN

0 40'

FIGURE 6
ALTERNATE NO. 3 PLAN: 6'0" PARSHALL FLUME W/ 54" X 54" ELECTRICALLY ACTUATED SLUICE GATE

CITY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY

FORT WAYNE, INDIANA

DONOHUE & ASSOCIATES

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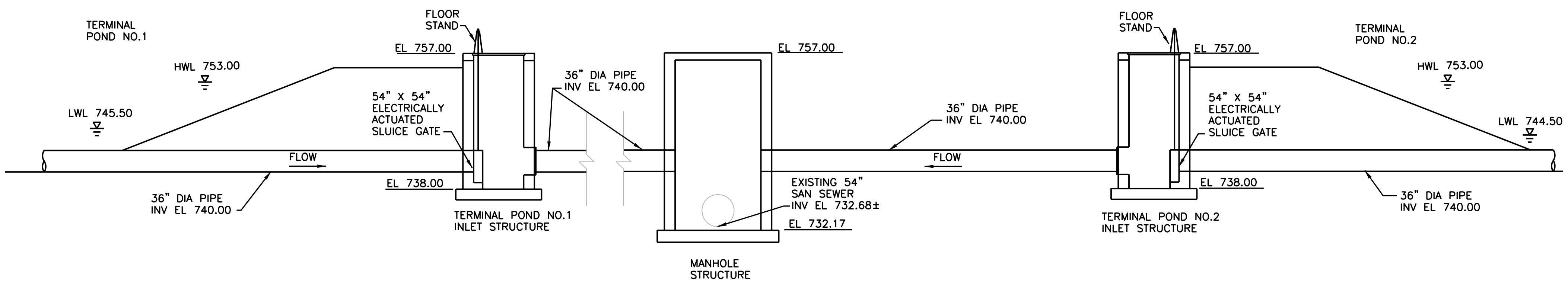
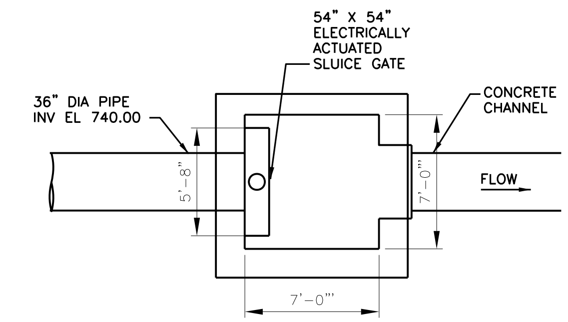


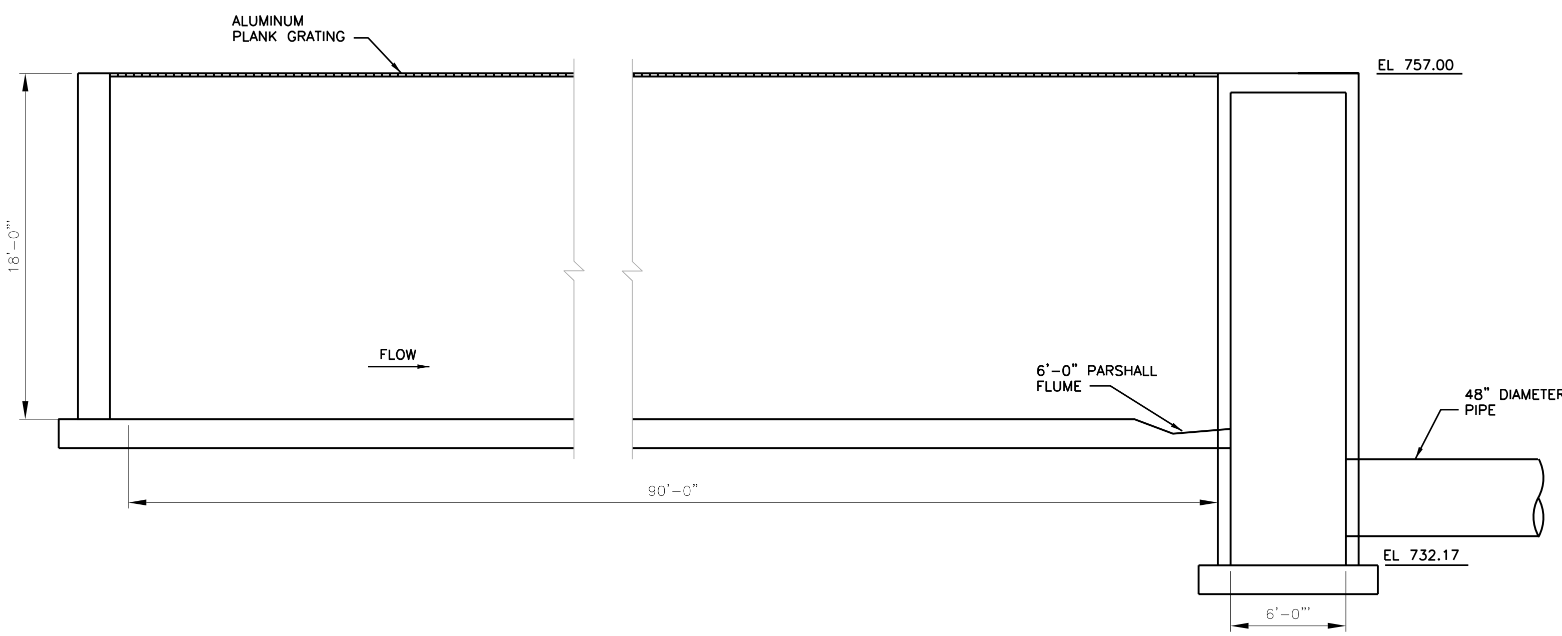
ALTERNATE NO. 3 SECTION A

0 20'



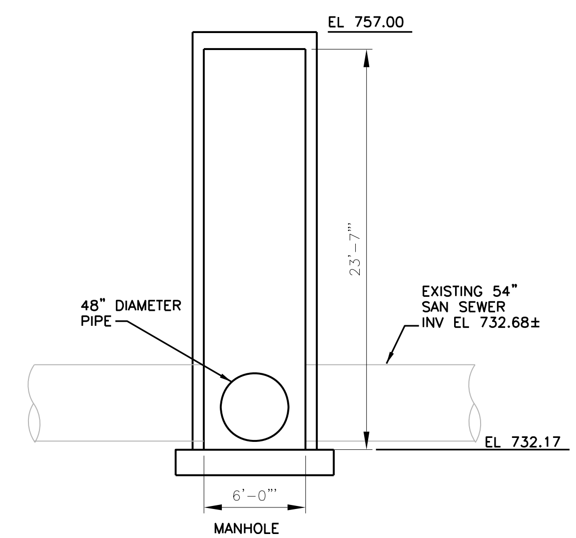
ALTERNATE NO. 3 PLAN

0 10'



ALTERNATE NO. 3 SECTION B

0 10'



ALTERNATE NO. 3 SECTION C

0 10'

FIGURE 7
ALTERNATE NO. 3 SECTION: 6'0" PARSHALL FLUME W/ 54" X 54" ELECTRICALLY ACTUATED SLUICE GATE
CITY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYLCE STUDY
FORT WAYNE, INDIANA

DONOHUE & ASSOCIATES
SEPTEMBER 2007

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ATTACHMENT 2

Initial Cost Estimate

- **24-inch Magmeter with Electrically Actuated Plug Valves**
- **24-inch Magmeter with 54-inch by 54-inch Electrically Actuated Sluice Gate**
- **6-foot Parshall Flume with 54-inch by 54-inch Electrically Actuated Sluice Gate**

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

SUMMARY

INITIAL COST ESTIMATE

General Description
To evaluate facilities necessary to return stored CSO flow from the terminal ponds to the interceptor sewer system for conveyance to the Water Pollution Control Plant (WPCP)

ITEM	Initial Cost ($)
ALTERNATE NO. 1: 24" Magmeter with Electrically Actuated Plug Valve	1,089,659
ALTERNATE NO. 2: 24" Magmeter with 54"x54" Electrically Actuated Sluice Gate	1,002,173
ALTERNATE NO. 3: 6'-0" Parshall Flume with 54"x54" Electrically Actuated Sluice Gate	1,100,986

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

ALTERNATE NO. 1: 24" Magmeter with Electrically Actuated Plug Valve

INITIAL COST ESTIMATE

General Description
One inlet structure will be built for both Terminal Pond No. 1 and Terminal Pond No. 2. Within these structures, there will be a 24" magmeter and an electrically actuated plug valve. The plug valve will control the amount of CSO that will be recycled to the WPCP and the magmeter will measure the flow and return the signal to a PLC. The recycled CSO will then combine with the 54" sanitary sewer that runs under the Baldwin Ditch through a new manhole.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Architectural/Structural				
Earthwork	See Worksheet for Detailed Cost Breakdown			125,300
Concrete	See Worksheet for Detailed Cost Breakdown			165,550
Metals	See Worksheet for Detailed Cost Breakdown			7,500
Buildings	See Worksheet for Detailed Cost Breakdown			0
Demoltion	See Worksheet for Detailed Cost Breakdown			5,000
Process				
Piping	LS	**1**	**109,950**	109,950
Plug Valves w/ electric actuator	Each	**2**	**34,708**	69,415
Plug Valves w/ handwheel	Each	**2**	**17,500**	35,000
Instrumentation & Control				
Equipment	LS	**1**	**24,900**	24,900
Programming	LS	**1**	**4,940**	4,940
Field Wiring	LS	**1**	**440**	440
Electrical				
Distribution Equipment	LS	**1**	**1,100**	1,100
Conduit, Wire, Handholes, and Site Work	LS	**1**	**34,000**	34,000
Subtotal				583,095
Contingency			**30%**	174,929
Subtotal				758,024
Contractor Overhead & Profit			**25%**	189,506
Total Construction Cost				**947,529**
Engineering			**15%**	142,129
Total Initial Cost				**1,089,659**

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

ALTERNATE NO. 1: 24" Magmeter with Electrically Actuated Plug Valve

ARCHITECTURAL/STRUCTURAL WORKSHEET

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Earthwork: Excavation for Meter Vaults	cu yds	1,500	10	15,000
Earthwork: Excavation for Manhole	cu yds	150	10	1,500
Earthwork: Sheeting for Meter Vaults	sq ft	2,400	32	76,800
Earthwork: Sheeting for Manhole	sq ft	1,000	32	32,000
Earthwork: Flood Protection Levee	cu yds			
Earthwork: Flood Protection Gravel Road	sq yds			
Earthwork:				
Earthwork				**125,300**
Concrete: Base Slab for Meter Vaults	cu yds	70	270	18,900
Concrete: Base Slab for Manhole	cu yds	15	270	4,050
Concrete: Walls for Meter Vaults	cu yds	190	460	87,400
Concrete: Walls for Manhole	cu yds	60	460	27,600
Concrete: Structural Slab for Meter Vaults	cu yds	35	690	24,150
Concrete: Structural Slab for Manhole	cu yds	5	690	3,450
Concrete: Channels	cu yds			
Concrete: Precast Roof	ft			
Concrete				**165,550**
Metals: Aluminum Grating	sq ft			
Metals: Aluminum Handrail	ft			
Metals: Aluminum Stairway	risers			
Metals: Manhole Rungs	ea	52	75	3,900
Metals: Hatches	ea	3	1,200	3,600
Metals				**7,500**
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Buildings				**0**
Demolition: 54 inch Pipe in Manhole	lump sum	1	5,000	5,000
Demolition:	cu ft			
Demolition:	lump sum			
Demolition:	lump sum			
Demoltion				**5,000**

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

ALTERNATE NO. 2: 24" Magmeter with 54"x54" Electrically Actuated Sluice Gate

INITIAL COST ESTIMATE

General Description
One inlet structure will be built for both Terminal Pond No. 1 and Terminal Pond No. 2. Within these structures, there will be a 24" magmeter and an electrically actuated sluice gate. The sluice gate will control the amount of CSO that will be recycled to the WPCP and the magmeter will measure the flow and return the signal to a PLC. The recycled CSO will then combine with the 54" sanitary sewer that runs under the Baldwin Ditch through a new manhole.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Architectural/Structural				
Earthwork	See Worksheet for Detailed Cost Breakdown			125,300
Concrete	See Worksheet for Detailed Cost Breakdown			176,100
Metals	See Worksheet for Detailed Cost Breakdown			9,900
Buildings	See Worksheet for Detailed Cost Breakdown			0
Demoltion	See Worksheet for Detailed Cost Breakdown			5,000
Process				
Piping	LS	1	99,600	99,600
Sluice Gates	Each	2	27,500	55,000
Instrumentation & Control				
Equipment	LS	1	24,900	24,900
Programming	LS	1	4,940	4,940
Field Wiring	LS	1	440	440
Electrical				
Distribution Equipment	LS	1	1,100	1,100
Conduit, Wire, Handholes, and Site Work	LS	1	34,000	34,000
Subtotal				536,280
Contingency			30%	160,884
Subtotal				697,164
Contractor Overhead & Profit			25%	174,291
Total Construction Cost				**871,455**
Engineering			15%	130,718
Total Initial Cost				**1,002,173**

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

ALTERNATE NO. 2: 24" Magmeter with 54"x54" Electrically Actuated Sluice Gate

ARCHITECTURAL/STRUCTURAL WORKSHEET

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Earthwork: Excavation for Meter Vaults	cu yds	1,500	10	15,000
Earthwork: Excavation for Manhole	cu yds	150	10	1,500
Earthwork: Sheeting for Meter Vaults	sq ft	2,400	32	76,800
Earthwork: Sheeting for Manhole	sq ft	1,000	32	32,000
Earthwork: Flood Protection Levee	cu yds			
Earthwork: Flood Protection Gravel Road	sq yds			
Earthwork:				
Earthwork				**125,300**
Concrete: Base Slab For Meter vaults	cu yds	75	270	20,250
Concrete: Base Slab for Manhole	cu yds	15	270	4,050
Concrete: Walls For Meter Vaults	cu yds	210	460	96,600
Concrete: Walls for Manhole	cu yds	60	460	27,600
Concrete: Structural Slabs For Meter Vaults	cu yds	35	690	24,150
Concrete: Structural Slab for Manhole	cu yds	5	690	3,450
Concrete: Channels	cu yds			
Concrete: Precast Roof	ft			
Concrete				**176,100**
Metals: Aluminum Grating	sq ft			
Metals: Aluminum Handrail	ft			
Metals: Aluminum Stairway	risers			
Metals: Manhole Rungs	ea	52	75	3,900
Metals: Hatches	ea	5	1,200	6,000
Metals				**9,900**
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Buildings				**0**
Demolition: 54 inch Pipe in Manhole	lump sum	1	5,000	5,000
Demolition:	lump sum			
Demolition:	lump sum			
Demolition:	lump sum			
Demoltion				**5,000**

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

ALTERNATE NO. 3: 6'-0" Parshall Flume with 54"x54" Electrically Actuated Sluice Gate

INITIAL COST ESTIMATE

General Description

One inlet structure will be built for both Terminal Pond No. 1 and Terminal Pond No. 2. Within these structures, there will be an electrically actuated sluice gate which will control the amount of CSO that will be recycled to the WPCP. The recycled CSO will flow through a pipe into a concrete channel that contains a parshall flume that will measure the flow and send it to a PLC. The recycled CSO will then combine with the 54" sanitary sewer that runs under the Baldwin Ditch through a new manhole.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Architectural/Structural				
Earthwork	See Worksheet for Detailed Cost Breakdown			140,200
Concrete: Structural Slab for Manhole	See Worksheet for Detailed Cost Breakdown			206,650
Metals	See Worksheet for Detailed Cost Breakdown			30,000
Buildings	See Worksheet for Detailed Cost Breakdown			0
Demoltion	See Worksheet for Detailed Cost Breakdown			5,000
Process				
Piping	LS	1	101,526	101,526
Sluice Gates	Each	2	27,500	55,000
Instrumentation & Control				
Equipment	LS	1	10,300	10,300
Programming	LS	1	4,940	4,940
Field Wiring	LS	1	440	440
Electrical				
Distribution Equipment	LS	1	1,100	1,100
Conduit, Wire, Handholes, and Site Work	LS	1	34,000	34,000
Subtotal				589,156
Contingency			30%	176,747
Subtotal				765,903
Contractor Overhead & Profit			25%	191,476
Total Construction Cost				**957,379**
Engineering			15%	143,607
Total Initial Cost				**1,100,986**

CITTY OF FORT WAYNE
WPCP CSO TERMINAL POND NOS. 1 & 2 RECYCLE STUDY
FT. WAYNE, INDIANA

ALTERNATE NO. 3: 6'-0" Parshall Flume with 54"x54" Electrically Actuated Sluice Gate

ARCHITECTURAL/STRUCTURAL WORKSHEET

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Earthwork: Excavation For Gate Vaults	cu yds	750	10	7,500
Earthwork: Excavation for Parshall Flume	cu yds	800	10	8,000
Earthwork: Excavation for Manhole	cu yds	150	10	1,500
Earthwork: Sheeting for Gate Vaults	sq ft	1,600	32	51,200
Earthwork: Sheeting for Parshall Flume	sq ft	1,250	32	40,000
Earthwork: Sheeting for Manhole	sq ft	1,000	32	32,000
Earthwork:				
Earthwork				**140,200**
Concrete: Base Slab for Gate Vaults	cu yds	20	270	5,400
Concrete: Base Slab for Parshall Flume	cu yds	100	270	27,000
Concrete: Base Slab for Manhole	cu yds	15	270	4,050
Concrete: Walls for Gate Vaults	cu yds	70	460	32,200
Concrete: Walls for Parshall Flume	cu yds	240	460	110,400
Concrete: Walls for Manhole	cu yds	30	460	13,800
Concrete: Structural Slabs for Gate Vaults	cu yds	10	690	6,900
Concrete: Structural Slabs for Parshall Flume	cu yds	5	690	3,450
Concrete: Structural Slab for Manhole	cu yds	5	690	3,450
Concrete: Precast Roof				**206,650**
Metals: Aluminum Grating	sq ft	850	30	25,500
Metals: Aluminum Handrail	ft			
Metals: Aluminum Stairway	risers			
Metals: Manhole Rungs	ea	12	75	900
Metals: Hatches	ea	3	1,200	3,600
Metals				**30,000**
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Building:	sq ft			
Buildings				**0**
Demolition: 54 inch Pipe at end of Parshall Flume	lump sum	1	5,000	5,000
Demolition:	lump sum			
Demolition:	lump sum			
Demolition:	lump sum			
Demoltion				**5,000**

ATTACHMENT 3

June 25, 2004 Workshop

Meeting Notes & Handouts

Date: Tuesday June 29, 2004

To: Mark Gensic — City of Fort Wayne

From: Ken Sedmak — Donohue

Attendees:		
	Cheryl Cronin	City of Fort Wayne
	Brian Panzer	City of Fort Wayne
	Chris Gach	City of Fort Wayne
	Mark Gensic	City of Fort Wayne
	Andrew Schipper	City of Fort Wayne
	Stacy Jones	Donohue
	Ken Sedmak	Donohue
	Amber Smith	Donohue

Re: City of Fort Wayne
WPCP CSO Terminal Ponds Nos. 1 & 2 Recycle Study Workshop
Donohue Project No. 10725.100

We met for a workshop to discuss the project on Friday June 25, 2004 at 9:30 a.m. at the Water Pollution Control Plant (WPCP) Conference Room. The purpose of the meeting was to discuss analysis results and alternatives to reach the project objective. An agenda was distributed with handouts. The handouts are not a part of these meeting notes.

Significant information and discussion is documented as a part of these notes.

Note No.	Action By	Note
		INTRODUCTIONS
1	Information	The design team introduced themselves and discussed their intentions.
		PURPOSE OF THE MEETING
2	Information	Ken Sedmak introduced the purpose of the meeting, which is to discuss the data analysis results and alternatives to reach the project objective. The project is to consider recycling CSO from the terminal ponds to the plant for treatment.
		PROJECT DESCRIPTION
3	Information	Ken Sedmak discussed the overall project elements for further discussion.
		POND NO. 1 AND POND NO. 2 DISCHARGE DATA RESULTS
4	Information	Stacy Jones discussed the discharge data results with respect to potential amounts of CSO recycled back to WPCP at 60 mgd, 85 mgd and 100 mgd. It is important to note that all calculations and analysis were based on limited data provided by MRO sheets.

Note No.	Action By	Note
		POND RECYCLE CONCEPTUAL LAYOUTS
5	Information	Stacy Jones discussed three alternate layouts for the conveyance of CSO from the terminal ponds back to the WPCP for treatment. Each alternate includes devices to control and measure the recycled flow. Alternate No. 1 consists of a 24" Magmeter with Electrically Actuated Plug Valves. Alternate No. 2 consists of a 24" Magmeter with 54" x 54" Electrically Actuated Sluice Gate. Alternate No. 3 consists of a 6'-0" Parshall Flume with 54" x 54" Electrically Actuated Sluice Gate. All three alternates have an inlet structure for Terminal Pond Nos. 1 & 2 leading to a 6’-0” x 12’-0” manhole. This manhole will be constructed of the existing 54” Baldwin Interceptor.
6	Information	Chris Gach recommended using the Northern Interconnect for inlet structures due to an existing sluice gate and MCC. Chris says that they do not use this structure anymore. This recommendation will be considered if this study progresses to a design phase.
7	Information	Cheryl Cronin brought up a concern about the 54” sewer. We may run into regulation violations if we use the 54” to transport CSO if it is classified strictly as a sanitary sewer.
8	Andrew Schipper	Andrew Schipper will provide Northern Intercept information to Donohue.
9	Information	Brian Panzer mentioned that the Terminal Ponds house many fish. We would not want to take the ponds to low pool as this would cause a dramatic decrease in dissolved oxygen which would cause a large fish kill.
10	Information	Ken Sedmak suggested that Terminal Ponds Nos. 1 & 2 be disinfected in a flow-through scenario rather than recycling CSO back to WPCP. The permit would then be based on coliform levels rather than BOD and suspended solids.
		PROBABLE CONSTRUCTION COST ESTIMATES
12	Information	Stacy Jones presented the initial cost estimate for each alternate.
		OTHER INFORMATION
13	Mark Gensic	Mark Gensic suggested delaying this project until the primary project is complete.

Please review these Final notes. Any comments please send to Ken Sedmak.

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POND NO. 1 AND POND NO. 2 DISCHARGE DATA RESULTS

Varying Discharge

TABLE 1: 60 MGD - CURRENT PLANT CAPACITY

Year	WPCP Plant Effluent Flow (MG)	Pond Influent Flow (MG)	Pond Discharge to River	Potential Recycled to Plant (MG)	Yearly Amount Recycled
2002	48.90	28.70	22.07	6.63	30.04%
2003	53.07	52.61	48.40	4.21	8.70%

TABLE 2: 85 MGD - PLANNED PLANT CAPACITY

Year	WPCP Plant Effluent Flow (MG)	Pond Influent Flow (MG)	Pond Discharge to River	Potential Recycled to Plant (MG)	Yearly Amount Recycled
2002	48.90	40.18	23.41	16.77	71.63%
2003	53.07	76.62	54.53	22.09	40.51%

TABLE 3: 100 MGD - FUTURE PLANT CAPACITY

Year	WPCP Plant Effluent Flow (MG)	Pond Influent Flow (MG)	Pond Discharge to River	Potential Recycled to Plant (MG)	Yearly Amount Recycled
2002	48.90	44.16	24.49	19.67	80.33%
2003	53.07	79.23	47.51	31.72	66.77%

Assumptions:

- For planned and future plant capacity, increased plant capacity would cause less influent to terminal ponds.
- Potential amount recycled to plant is based on remaining capacity or volume of discharge.
- Assumed amounts to be recycled for study:
  - Minimum Flow: 3.0 MGD
  - Average Flow: 10 MGD
  - Maximum Flow: 60 MGD
- Magmeter sizing:
  - At Minimum Flow: 1.5 ft/sec
  - At Average Flow: 4.8 ft/sec
  - At Maximum Flow: 14.5 ft/sec
- Parshall Flume:
  - Minimum Flow: 1.70 MGD
  - Maximum Flow: 66.9 MGD

POND NO. 1 AND POND NO. 2 DISCHARGE DATA RESULTS (cont'd)

Same Discharge

TABLE 4: 60 MGD - CURRENT PLANT CAPACITY					
Year	**WPCP Plant Effluent Flow (MG)**	**Pond Influent Flow (MG)**	**Pond Discharge to River**	**Potential Recycled to Plant (MG)**	**Yearly Amount Recycled**
2002	48.90	28.70	22.07	6.63	30.04%
2003	53.07	52.61	48.40	4.21	8.70%

TABLE 5: 85 MGD - PLANNED PLANT CAPACITY					
Year	**WPCP Plant Effluent Flow (MG)**	**Pond Influent Flow (MG)**	**Pond Discharge to River**	**Potential Recycled to Plant (MG)**	**Yearly Amount Recycled**
2002	48.90	37.95	22.07	15.88	71.96%
2003	53.07	68.92	48.40	20.52	42.40%

TABLE 6: 100 MGD - FUTURE PLANT CAPACITY					
Year	**WPCP Plant Effluent Flow (MG)**	**Pond Influent Flow (MG)**	**Pond Discharge to River**	**Potential Recycled to Plant (MG)**	**Yearly Amount Recycled**
2002	48.90	40.85	22.07	18.78	85.11%
2003	53.07	75.84	48.40	27.44	56.70%

Assumptions:

- For planned and future plant capacity, increased plant capacity would not affect influent to terminal ponds.
- Potential amount recycled to plant is based on remaining capacity or volume of discharge.
- Assumed amounts to be recycled for study:
  - Minimum Flow: 3.0 MGD
  - Average Flow: 10 MGD
  - Maximum Flow: 60 MGD
- Magmeter sizing:
  - At Minimum Flow: 1.5 ft/sec
  - At Average Flow: 4.8 ft/sec
  - At Maximum Flow: 14.5 ft/sec
- Parshall Flume:
  - Minimum Flow: 1.70 MGD
  - Maximum Flow: 66.9 MGD

ATTACHMENT 4

MRO Data

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Plant Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Jan-02	1-Jan-2002	1	0	45.78						
	2-Jan-2002	2	t	46.94						
	3-Jan-2002	3	t	46.41						
	4-Jan-2002	4	0	45.06						
	5-Jan-2002	5	t	44.93						
	6-Jan-2002	6	0.09	44.97						
	7-Jan-2002	7	t	45.18						
	8-Jan-2002	8	0	44.52						
	9-Jan-2002	9	0	44.94						
	10-Jan-2002	10	0	42.86						
	11-Jan-2002	11	0	43.33						
	12-Jan-2002	12	t	42.88						
	13-Jan-2002	13	0	42.58						
	14-Jan-2002	14	0.01	44.03						
	15-Jan-2002	15	t	43.92						
	16-Jan-2002	16	t	43.53						
	17-Jan-2002	17	t	42.99						
	18-Jan-2002	18	0	43.40						
	19-Jan-2002	19	0	41.14						
	20-Jan-2002	20	0	39.97						
	21-Jan-2002	21	t	40.49						
	22-Jan-2002	22	0	42.45						
	23-Jan-2002	23	0.01	41.22						
	24-Jan-2002	24	0.05	43.09						
	25-Jan-2002	25	0	42.03						
	26-Jan-2002	26	0	42.31						
	27-Jan-2002	27	0	39.22						
	28-Jan-2002	28	0	43.01						
	29-Jan-2002	29	0.93	49.86	37.2		24			
	30-Jan-2002	30	0.44	61.52						
	31-Jan-2002	31	1.03	54.92						
Feb-02	1-Feb-2002	1	0.06	48.22	110.5		24			
	2-Feb-2002	2	0.00	55.89	38.8	47.4	24			
	3-Feb-2002	3	T	58.62	48		24			
	4-Feb-2002	4	T	43.28	46.2		24			
	5-Feb-2002	5	0.00	40.90	24.1		24			
	6-Feb-2002	6	0.00	40.51	20.3		24			
	7-Feb-2002	7	0.00	46.79	4.4		18.5			
	8-Feb-2002	8	0.00	55.20						
	9-Feb-2002	9	0.00	54.81		28.6				
	10-Feb-2002	10	0.13	52.38						
	11-Feb-2002	11	T	52.06						
	12-Feb-2002	12	0.01	52.18						
	13-Feb-2002	13	T	50.64						
	14-Feb-2002	14	0.00	48.73						
	15-Feb-2002	15	T	47.95						
	16-Feb-2002	16	0.03	46.83						
	17-Feb-2002	17	T	45.18						
	18-Feb-2002	18	0.00	46.29						
	19-Feb-2002	19	0.58	55.08			4.8			
	20-Feb-2002	20	0 0.31	66.78			5.5			
	21-Feb-2002	21	0 0.02	65.06						
	22-Feb-2002	22	0 T	61.80						
	23-Feb-2002	23	0 0.00	53.03						
	24-Feb-2002	24	0 0.00	50.83						
	25-Feb-2002	25	0 0.32	49.65						
	26-Feb-2002	26	0 0.34	66.06						
	27-Feb-2002	27	0 T	57.71						
	28-Feb-2002	28	0 0.00	46.69						
Mar-02	1-Mar-2002	1	0.00	53.24						
	2-Mar-2002	2	0.51	57.79						
	3-Mar-2002	3	0.02	67.54	4.2		4			
	4-Mar-2002	4	T	67.55	10.0		24			
	5-Mar-2002	5	T	60.22	6.6		24			
	6-Mar-2002	6	0.00	59.47	6.6		24			
	7-Mar-2002	7	0.02	57.92	6.6		24			
	8-Mar-2002	8	0.02	56.20	3.8		14			
	9-Mar-2002	9	0.65	68.99						
	10-Mar-2002	10	T	68.66		6.7				
	11-Mar-2002	11	0.00	68.26						
	12-Mar-2002	12	0.00	54.19						
	13-Mar-2002	13	0.00	58.25						
	14-Mar-2002	14	0.00	58.60						
	15-Mar-2002	15	0.11	54.51						
	16-Mar-2002	16	0.00	53.98						
	17-Mar-2002	17	0.01	50.07						
	18-Mar-2002	18	T	48.32						
	19-Mar-2002	19	T	47.70						
	20-Mar-2002	20	0.06	52.22						
	21-Mar-2002	21	T	48.19						
	22-Mar-2002	22	0.00	46.78						
	23-Mar-2002	23	0.00	45.94						
	24-Mar-2002	24	0.10	45.71						
	25-Mar-2002	25	0.17	47.66						
	26-Mar-2002	26	0.55	46.54						
	27-Mar-2002	27	0.00	53.68						
	28-Mar-2002	28	T	62.27						
	29-Mar-2002	29	0.31	61.28						
	30-Mar-2002	30	0.00	59.92				28.5		14.0
	31-Mar-2002	31	0.03	55.21				32.4		24.0

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Apr-02	1-Apr-2002	1	0.03	59.38				22.3		24
	2-Apr-2002	2	0.36	58.99				39.6		24
	3-Apr-2002	3	T	59.20				49.4		24
	4-Apr-2002	4	T	61.40				24.0		13
	5-Apr-2002	5	T	61.70						
	6-Apr-2002	6	0.00	60.36					34	
	7-Apr-2002	7	T	56.61						
	8-Apr-2002	8	0.78	57.97						
	9-Apr-2002	9	0.17	62.94						
	10-Apr-2002	10	0.00	66.20				88.8		8
	11-Apr-2002	11	0.00	70.59						
	12-Apr-2002	12	0.51	64.99						
	13-Apr-2002	13	T	71.32					89	
	14-Apr-2002	14	0.02	71.95						
	15-Apr-2002	15	0.00	71.24						
	16-Apr-2002	16	0.00	62.56						
	17-Apr-2002	17	0.00	61.30						
	18-Apr-2002	18	0.00	57.63						
	19-Apr-2002	19	0.58	56.36						
	20-Apr-2002	20	0.03	61.34						
	21-Apr-2002	21	0.19	62.83						
	22-Apr-2002	22	T	60.28						
	23-Apr-2002	23	0.00	52.44						
	24-Apr-2002	24	0.07	51.69						
	25-Apr-2002	25	0.01	49.33						
	26-Apr-2002	26	0.00	47.55						
	27-Apr-2002	27	0.93	54.22						
	28-Apr-2002	28	0.02	71.98						
	29-Apr-2002	29	T	63.38						
	30-Apr-2002	30	T	54.63						
May-02	1-May-2002	1	0.63	53.46						
	2-May-2002	2	T	70.73						
	3-May-2002	3	0.00	68.87						
	4-May-2002	4	0.00	57.32						
	5-May-2002	5	0.00	53.67						
	6-May-2002	6	0.14	56.68						
	7-May-2002	7	0.04	53.67						
	8-May-2002	8	0.44	55.70						
	9-May-2002	9	0.16	70.45						
	10-May-2002	10	0.00	63.64						
	11-May-2002	11	0.78	56.13						
	12-May-2002	12	0.63	66.52				41.6		18
	13-May-2002	13	0.13	66.48				38.3		24
	14-May-2002	14	0.00	66.64						
	15-May-2002	15	0.00	71.83						
	16-May-2002	16	0.24	67.39						
	17-May-2002	17	0.17	69.72						
	18-May-2002	18	0.00	68.87				11.1	30.3	5
	19-May-2002	19	T	65.81						
	20-May-2002	20	T	58.50						
	21-May-2002	21	0.00	55.85						
	22-May-2002	22	0.00	53.24						
	23-May-2002	23	0.00	51.10						
	24-May-2002	24	0.02	48.49						
	25-May-2002	25	1.84	52.68						
	26-May-2002	26	0.00	63.70						
	27-May-2002	27	0.00	52.70						
	28-May-2002	28	0.90	62.02						
	29-May-2002	29	0.17	63.71						
	30-May-2002	30	T	63.36						
	31-May-2002	31	T	53.45						
Jun-02	1-Jun-2002	1	0	50.25						
	2-Jun-2002	2	T	46.99						
	3-Jun-2002	3	T	50.03						
	4-Jun-2002	4	0.29	49.86						
	5-Jun-2002	5	0.79	62.50						
	6-Jun-2002	6	0.02	58.80						
	7-Jun-2002	7	0	48.96						
	8-Jun-2002	8	0	46.41						
	9-Jun-2002	9	0	45.32						
	10-Jun-2002	10	0	44.88						
	11-Jun-2002	11	0.2	48.99				66.9		24
	12-Jun-2002	12	T	46.18						
	13-Jun-2002	13	0.05	45.45				30.2		23
	14-Jun-2002	14	0.2	48.94						
	15-Jun-2002	15	0.29	45.17					48.6	
	16-Jun-2002	16	0.00	42.39						
	17-Jun-2002	17	0.09	42.29						
	18-Jun-2002	18	0.16	50.17						
	19-Jun-2002	19	0.00	45.50						
	20-Jun-2002	20	0.00	43.27						
	21-Jun-2002	21	0.00	43.71						
	22-Jun-2002	22	0.00	42.62						
	23-Jun-2002	23	0	41.75						
	24-Jun-2002	24	0	44.28						
	25-Jun-2002	25	0.59	50.12						
	26-Jun-2002	26	0.45	52.43						
	27-Jun-2002	27	0	69.83						
	28-Jun-2002	28	0	67.47						
	29-Jun-2002	29	0	67.74						
	30-Jun-2002	30	0	59.21						

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Jul-02	1-Jul-2002	1	0.00	53.83						
	2-Jul-2002	2	0.00	51.85						
	3-Jul-2002	3	0.00	48.51						
	4-Jul-2002	4	0.00	45.69						
	5-Jul-2002	5	0.00	44.14						
	6-Jul-2002	6	0.00	43.71						
	7-Jul-2002	7	0.00	42.83						
	8-Jul-2002	8	0.00	45.54						
	9-Jul-2002	9	0.18	46.79						
	10-Jul-2002	10	0.00	44.37						
	11-Jul-2002	11	0.00	42.76						
	12-Jul-2002	12	0.00	42.43						
	13-Jul-2002	13	0.00	41.85						
	14-Jul-2002	14	0.00	40.51						
	15-Jul-2002	15	0.00	42.14				12.4		24
	16-Jul-2002	16	0.00	40.92				13.3		24
	17-Jul-2002	17	0.00	40.66						
	18-Jul-2002	18	0.35	43.17						
	19-Jul-2002	19	T	47.03						
	20-Jul-2002	20	0.00	47.45						
	21-Jul-2002	21	0.00	39.36					12.9	
	22-Jul-2002	22	0.31	50.29						
	23-Jul-2002	23	0.11	51.00						
	24-Jul-2002	24	0.00	44.57						
	25-Jul-2002	25	0.00	43.44						
	26-Jul-2002	26	T	41.77						
	27-Jul-2002	27	0.01	40.10						
	28-Jul-2002	28	T	39.82						
	29-Jul-2002	29	1.44	49.45						
	30-Jul-2002	30	0.00	55.13						
	31-Jul-2002	31	0.00	53.86						
Aug-02	1-Aug-2002	1	0.00	43.43						
	2-Aug-2002	2	0.03	43.33						
	3-Aug-2002	3	0.00	40.52						
	4-Aug-2002	4	0.00	38.74						
	5-Aug-2002	5	0.05	40.53						
	6-Aug-2002	6	0.00	39.04						
	7-Aug-2002	7	0.00	39.40						
	8-Aug-2002	8	0.00	38.57						
	9-Aug-2002	9	0.00	39.56						
	10-Aug-2002	10	0.00	37.64						
	11-Aug-2002	11	0.00	36.53						
	12-Aug-2002	12	0.11	41.56						
	13-Aug-2002	13	0.12	42.85						
	14-Aug-2002	14	0.34	45.66						
	15-Aug-2002	15	T	40.67						
	16-Aug-2002	16	T	40.69						
	17-Aug-2002	17	0.00	38.35						
	18-Aug-2002	18	0.00	36.75						
	19-Aug-2002	19	0.92	54.83						
	20-Aug-2002	20	0.00	43.79						
	21-Aug-2002	21	0.00	39.57						
	22-Aug-2002	22	0.78	43.69						
	23-Aug-2002	23	0.44	61.97						
	24-Aug-2002	24	0.00	55.57						
	25-Aug-2002	25	0.00	43.58						
	26-Aug-2002	26	0.00	42.42						
	27-Aug-2002	27	0.00	41.15						
	28-Aug-2002	28	0.00	40.42						
	29-Aug-2002	29	0.00	41.65						
	30-Aug-2002	30	0.00	41.51						
	31-Aug-2002	31	0.00	43.46						
Sep-02	1-Sep-2002	1	0.00	39.98						
	2-Sep-2002	2	t	40.13						
	3-Sep-2002	3	0.00	39.09						
	4-Sep-2002	4	0.00	40.91						
	5-Sep-2002	5	0.00	41.29						
	6-Sep-2002	6	0.00	41.26						
	7-Sep-2002	7	0.00	40.60						
	8-Sep-2002	8	0.00	40.03						
	9-Sep-2002	9	t	40.55						
	10-Sep-2002	10	0.00	40.83				5.34		24
	11-Sep-2002	11	0.00	40.23				8.88		24
	12-Sep-2002	12	0.00	40.74				8.88		24
	13-Sep-2002	13	0.35	41.59				7.99		24
	14-Sep-2002	14	t	42.37				15.10	9.2	24
	15-Sep-2002	15	0.00	40.60				6.22		24
	16-Sep-2002	16	0.00	40.82				4.97		7
	17-Sep-2002	17	0.02	39.17				7.75		24
	18-Sep-2002	18	0.12	39.03				8.18		24
	19-Sep-2002	19	1.31	39.42				6.46		24
	20-Sep-2002	20	0.00	54.15				9.81		24
	21-Sep-2002	21	0.01	53.69				7.69	7.3	24
	22-Sep-2002	22	0.00	40.81				7.69		24
	23-Sep-2002	23	0.00	41.35				8.82		24
	24-Sep-2002	24	0.00	42.40				6.67		24
	25-Sep-2002	25	0.00	40.32	8.5		24.0	13.33		24
	26-Sep-2002	26	0.73	40.98				5.17		24
	27-Sep-2002	27	0.00	58.77						
	28-Sep-2002	28	0.00	46.79		8.5			8.3	
	29-Sep-2002	29	0.00	40.84						
	30-Sep-2002	30	0.00	41.91						

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Oct-02	1-Oct-2002	1	0.00	41.54						
	2-Oct-2002	2	0.00	41.74				7.9		24
	3-Oct-2002	3	T	42.38						
	4-Oct-2002	4	0.47	50.51						
	5-Oct-2002	5	0.00	45.93					7.9	
	6-Oct-2002	6	0.01	40.64						
	7-Oct-2002	7	0.00	40.79						
	8-Oct-2002	8	0.00	39.78						
	9-Oct-2002	9	0.00	36.44						
	10-Oct-2002	10	0.00	38.11						
	11-Oct-2002	11	0.00	40.27						
	12-Oct-2002	12	0.03	39.67						
	13-Oct-2002	13	0.02	40.35						
	14-Oct-2002	14	0.00	41.52						
	15-Oct-2002	15	0.00	49.99						
	16-Oct-2002	16	0.00	43.80						
	17-Oct-2002	17	T	34.87						
	18-Oct-2002	18	0.23	40.00						
	19-Oct-2002	19	0.13	49.95						
	20-Oct-2002	20	0.00	40.10						
	21-Oct-2002	21	0.00	40.18						
	22-Oct-2002	22	0.00	40.43						
	23-Oct-2002	23	0.00	40.74						
	24-Oct-2002	24	T	40.87						
	25-Oct-2002	25	0.55	49.49						
	26-Oct-2002	26	T	46.30						
	27-Oct-2002	27	0.00	39.76						
	28-Oct-2002	28	0.00	39.32						
	29-Oct-2002	29	0.14	41.17						
	30-Oct-2002	30	T	40.00						
	31-Oct-2002	31	0.00	41.43						
Nov-02	1-Nov-2002	1	0.00	38.26						
	2-Nov-2002	2	0.00	38.72						
	3-Nov-2002	3	t	37.56						
	4-Nov-2002	4	0.01	40.04						
	5-Nov-2002	5	0.31	43.79						
	6-Nov-2002	6	t	43.81						
	7-Nov-2002	7	0.00	38.98						
	8-Nov-2002	8	0.00	40.21						
	9-Nov-2002	9	0.07	35.54						
	10-Nov-2002	10	1.18	57.72						
	11-Nov-2002	11	0.00	58.18						
	12-Nov-2002	12	0.00	51.92				29.7		24
	13-Nov-2002	13	0.00	46.68				8.1		24
	14-Nov-2002	14	t	45.03						
	15-Nov-2002	15	0.13	48.30						
	16-Nov-2002	16	0.02	47.28					18.9	
	17-Nov-2002	17	t	42.82						
	18-Nov-2002	18	0.03	43.71						
	19-Nov-2002	19	0.11	46.91						
	20-Nov-2002	20	0.00	42.69						
	21-Nov-2002	21	0.19	45.24						
	22-Nov-2002	22	0.11	56.47						
	23-Nov-2002	23	0.00	51.14						
	24-Nov-2002	24	t	45.15						
	25-Nov-2002	25	0.03	46.81						
	26-Nov-2002	26	0.04	45.94						
	27-Nov-2002	27	0.00	47.16						
	28-Nov-2002	28	0.00	44.14						
	29-Nov-2002	29	0.00	42.95						
	30-Nov-2002	30	0.04	42.94						
Dec-02	1-Dec-2002	1	0.00	43.43						
	2-Dec-2002	2	0.04	43.79						
	3-Dec-2002	3	0.00	45.40						
	4-Dec-2002	4	0.00	45.18						
	5-Dec-2002	5	t	43.87						
	6-Dec-2002	6	t	43.33						
	7-Dec-2002	7	0.00	42.43						
	8-Dec-2002	8	0.00	43.17						
	9-Dec-2002	9	0.00	43.90						
	10-Dec-2002	10	0.00	43.37						
	11-Dec-2002	11	0.00	42.12						
	12-Dec-2002	12	0.00	44.07						
	13-Dec-2002	13	0.05	42.57						
	14-Dec-2002	14	t	42.68						
	15-Dec-2002	15	t	41.02						
	16-Dec-2002	16	0.00	42.75						
	17-Dec-2002	17	0.20	43.20						
	18-Dec-2002	18	0.10	48.73						
	19-Dec-2002	19	0.34	60.21						
	20-Dec-2002	20	0.02	58.93						
	21-Dec-2002	21	t	56.36						
	22-Dec-2002	22	t	46.92						
	23-Dec-2002	23	0.00	47.80						
	24-Dec-2002	24	0.23	46.28						
	25-Dec-2002	25	0.31	42.58						
	26-Dec-2002	26	t	45.68						
	27-Dec-2002	27	0.00	46.04						
	28-Dec-2002	28	0.00	45.06						
	29-Dec-2002	29	0.00	44.84						
	30-Dec-2002	30	t	51.80						
	31-Dec-2002	31	0.32	43.44						

				48.90	Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Jan-03	1-Jan-2003	1	0.00	63.16						
	2-Jan-2003	2	0.00	57.66						
	3-Jan-2003	3	0.00	53.38						
	4-Jan-2003	4	0.00	48.71						
	5-Jan-2003	5	0.00	51.38						
	6-Jan-2003	6	0.00	51.62						
	7-Jan-2003	7	0.00	50.13						
	8-Jan-2003	8	0.00	48.48						
	9-Jan-2003	9	0.00	57.71						
	10-Jan-2003	10	0.00	58.53						
	11-Jan-2003	11	0.00	53.89						
	12-Jan-2003	12	0.00	48.93						
	13-Jan-2003	13	0.00	48.35						
	14-Jan-2003	14	0.00	46.36						
	15-Jan-2003	15	0.00	44.97						
	16-Jan-2003	16	0.00	46.22						
	17-Jan-2003	17	0.00	44.55						
	18-Jan-2003	18	0.00	44.64						
	19-Jan-2003	19	0.00	41.92						
	20-Jan-2003	20	0.00	43.17						
	21-Jan-2003	21	0.00	41.88						
	22-Jan-2003	22	0.00	40.45						
	23-Jan-2003	23	0.00	42.65						
	24-Jan-2003	24	0.00	41.83						
	25-Jan-2003	25	0.00	41.79						
	26-Jan-2003	26	0.00	39.54						
	27-Jan-2003	27	0.00	40.55						
	28-Jan-2003	28	0.00	34.22						
	29-Jan-2003	29	0.00	39.89						
	30-Jan-2003	30	0.00	38.43						
	31-Jan-2003	31	0.00	41.51						
Feb-03	1-Feb-2003	1	0.01	44.44						
	2-Feb-2003	2	0.01	49.91						
	3-Feb-2003	3	0.21	53.35						
	4-Feb-2003	4	0.03	63.21						
	5-Feb-2003	5	t	56.10						
	6-Feb-2003	6	0.04	46.54						
	7-Feb-2003	7	t	43.26						
	8-Feb-2003	8	t	43.26						
	9-Feb-2003	9	t	41.73						
	10-Feb-2003	10	0.06	41.32						
	11-Feb-2003	11	0.07	47.32						
	12-Feb-2003	12	t	40.44						
	13-Feb-2003	13	0.00	39.50						
	14-Feb-2003	14	0.04	39.96						
	15-Feb-2003	15	0.11	40.51						
	16-Feb-2003	16	t	38.42						
	17-Feb-2003	17	0.04	39.09						
	18-Feb-2003	18	t	39.07						
	19-Feb-2003	19	0.00	50.90						
	20-Feb-2003	20	0.00	47.48						
	21-Feb-2003	21	0.00	43.42						
	22-Feb-2003	22	0.71	49.53						
	23-Feb-2003	23	0.01	55.35						
	24-Feb-2003	24	0.05	46.20						
	25-Feb-2003	25	0.00	43.86						
	26-Feb-2003	26	0.00	44.64						
	27-Feb-2003	27	0.00	44.14						
	28-Feb-2003	28	0.00	45.36						
Mar-03	1-Mar-2003	1	0.03	44.02						
	2-Mar-2003	2	T	46.03						
	3-Mar-2003	3	T	42.93						
	4-Mar-2003	4	T	48.64						
	5-Mar-2003	5	0.09	57.74						
	6-Mar-2003	6	0.06	58.62						
	7-Mar-2003	7	0.00	55.31						
	8-Mar-2003	8	0.05	54.56						
	9-Mar-2003	9	0.02	62.46						
	10-Mar-2003	10	0.00	61.18						
	11-Mar-2003	11	0.00	47.46						
	12-Mar-2003	12	0.00	62.38						
	13-Mar-2003	13	0.24	60.36				63.600		21
	14-Mar-2003	14	0.00	56.90						
	15-Mar-2003	15	0.00	56.67					63.600	
	16-Mar-2003	16	0.00	56.94						
	17-Mar-2003	17	0.00	58.24						
	18-Mar-2003	18	0.00	58.16						
	19-Mar-2003	19	0.09	59.10				16.450		8
	20-Mar-2003	20	0.27	59.42				73.970		6
	21-Mar-2003	21	0.07	58.08						
	22-Mar-2003	22	T	58.27					45.210	
	23-Mar-2003	23	0.00	60.04						
	24-Mar-2003	24	0.00	59.05				86.620		24
	25-Mar-2003	25	0.03	59.88				4.490		24
	26-Mar-2003	26	0.00	57.79				23.920		24
	27-Mar-2003	27	0.00	57.25				8.330		24
	28-Mar-2003	28	1.42	55.37				30.420		24
	29-Mar-2003	29	0.01	59.06				24.000	29.630	24
	30-Mar-2003	30	0.00	58.38				4.110		24
	31-Mar-2003	31	T	56.68				15.560		23

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Apr-03	1-Apr-2003	1	0.03	54.96						
	2-Apr-2003	2	0.00	57.45						
	3-Apr-2003	3	0.00	55.51						
	4-Apr-2003	4	1.60	58.47						
	5-Apr-2003	5	t	62.87	1.000		1			
	6-Apr-2003	6	0.00	63.05						
	7-Apr-2003	7	0.33	63.61						
	8-Apr-2003	8	t	64.75				135.9		19
	9-Apr-2003	9	0.00	59.57						
	10-Apr-2003	10	0.00	58.39						
	11-Apr-2003	11	0.00	61.56						
	12-Apr-2003	12	0.00	63.12					135.9	
	13-Apr-2003	13	0.00	58.78						
	14-Apr-2003	14	0.00	50.94						
	15-Apr-2003	15	0.00	57.18						
	16-Apr-2003	16	0.00	50.60						
	17-Apr-2003	17	t	49.79						
	18-Apr-2003	18	t	48.36						
	19-Apr-2003	19	0.00	47.16						
	20-Apr-2003	20	t	44.19						
	21-Apr-2003	21	0.00	46.77						
	22-Apr-2003	22	0.00	48.75						
	23-Apr-2003	23	0.00	47.13						
	24-Apr-2003	24	0.00	45.48						
	25-Apr-2003	25	0.00	49.93						
	26-Apr-2003	26	0.00	46.52						
	27-Apr-2003	27	0.00	44.07						
	28-Apr-2003	28	0.00	44.33						
	29-Apr-2003	29	0.00	45.20						
	30-Apr-2003	30	0.00	47.77				13.9		24
May-03	1-May-2003	1	0.77	58.02						
	2-May-2003	2	0.01	61.93						
	3-May-2003	3	0.00	47.73						
	4-May-2003	4	0.41	46.24						
	5-May-2003	5	1.82	62.60						
	6-May-2003	6	0.00	62.75				11.2		20
	7-May-2003	7	0.34	64.79				136.9		24
	8-May-2003	8	T	62.47						
	9-May-2003	9	1.51	63.30						
	10-May-2003	10	0.17	62.81				106.1	84.7	24
	11-May-2003	11	0.20	60.30				63.2		24
	12-May-2003	12	0.06	61.14				59.2		24
	13-May-2003	13	0.00	60.26				101.3		24
	14-May-2003	14	0.68	59.76						
	15-May-2003	15	0.15	62.17						
	16-May-2003	16	0.00	63.08				106.2		24
	17-May-2003	17	0.00	64.65				5.2	67.0	24
	18-May-2003	18	T	65.43						
	19-May-2003	19	T	62.98						
	20-May-2003	20	0.46	64.76						
	21-May-2003	21	0.00	67.08						
	22-May-2003	22	0.00	61.99						
	23-May-2003	23	0.00	55.44						
	24-May-2003	24	0.00	52.98						
	25-May-2003	25	0.00	51.66						
	26-May-2003	26	0.00	55.46						
	27-May-2003	27	0.00	50.42						
	28-May-2003	28	0.00	49.69				18.38		24
	29-May-2003	29	0.00	48.66				15.6		24
	30-May-2003	30	0.00	49.49				6.7		6
	31-May-2003	31	0.00	61.98					13.5	
Jun-03	1-Jun-2003	1	0.00	46.43						
	2-Jun-2003	2	0.09	48.73						
	3-Jun-2003	3	0.34	61.00						
	4-Jun-2003	4	T	48.45						
	5-Jun-2003	5	0.00	47.53						
	6-Jun-2003	6	0.10	49.99						
	7-Jun-2003	7	0.00	46.81						
	8-Jun-2003	8	0.16	51.78						
	9-Jun-2003	9	0.00	47.44						
	10-Jun-2003	10	0.02	48.73						
	11-Jun-2003	11	0.10	46.96						
	12-Jun-2003	12	0.01	61.57						
	13-Jun-2003	13	0.16	62.69						
	14-Jun-2003	14	T	61.37						
	15-Jun-2003	15	0.00	61.75						
	16-Jun-2003	16	0.00	61.51						
	17-Jun-2003	17	0.18	59.26						
	18-Jun-2003	18	0.00	61.88						
	19-Jun-2003	19	T	61.91						
	20-Jun-2003	20	0.00	62.25						
	21-Jun-2003	21	0.00	47.01						
	22-Jun-2003	22	0.00	39.52						
	23-Jun-2003	23	0.00	42.52				24.5		9
	24-Jun-2003	24	0.00	42.09						
	25-Jun-2003	25	0.00	40.45				18.4		24
	26-Jun-2003	26	0.14	45.42						
	27-Jun-2003	27	0.00	45.46						
	28-Jun-2003	28	0.17	38.69					21.5	
	29-Jun-2003	29	0.09	40.00						
	30-Jun-2003	30	0.10	43.58						

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Jul-03	1-Jul-2003	1	0.00	38.42						
	2-Jul-2003	2	0.12	40.30						
	3-Jul-2003	3	0.00	40.33						
	4-Jul-2003	4	1.77	44.33						
	5-Jul-2003	5	0.66	59.63						
	6-Jul-2003	6	2.67	61.07						
	7-Jul-2003	7	1.10	59.76				67.1		24
	8-Jul-2003	8	0.66	58.44				83.1		24
	9-Jul-2003	9	0.08	58.45				90.9		24
	10-Jul-2003	10	0.27	56.04				109.1		24
	11-Jul-2003	11	T	55.40				117.5		24
	12-Jul-2003	12	0.00	56.33				101.1	94.8	24
	13-Jul-2003	13	0.00	57.30				74.3		24
	14-Jul-2003	14	0.00	53.92				35.4		24
	15-Jul-2003	15	0.08	63.43						
	16-Jul-2003	16	0.00	63.10						
	17-Jul-2003	17	0.00	58.44						
	18-Jul-2003	18	T	55.78						
	19-Jul-2003	19	0.00	52.40					54.9	
	20-Jul-2003	20	T	48.76						
	21-Jul-2003	21	1.48	55.66						
	22-Jul-2003	22	0.51	60.09						
	23-Jul-2003	23	0.00	61.53						
	24-Jul-2003	24	0.00	61.15						
	25-Jul-2003	25	0.00	60.74						
	26-Jul-2003	26	0.00	61.44						
	27-Jul-2003	27	0.40	61.64						
	28-Jul-2003	28	T	60.91						
	29-Jul-2003	29	0.00	62.66				58.0	58.0	24
	30-Jul-2003	30	0.00	58.11				45.8	51.9	24
	31-Jul-2003	31	0.00	58.27				17.6	40.5	24
Aug-03	1-Aug-2003	1	0.83	56.98						
	2-Aug-2003	2	0.21	61.54						
	3-Aug-2003	3	T	62.93						
	4-Aug-2003	4	0.07	62.58						
	5-Aug-2003	5	0.00	61.94						
	6-Aug-2003	6	0.00	62.58						
	7-Aug-2003	7	0.00	60.68						
	8-Aug-2003	8	0.07	60.44				62.0		24
	9-Aug-2003	9	T	62.35				29.5	45.8	24
	10-Aug-2003	10	0.00	57.44				22.1		24
	11-Aug-2003	11	0.00	51.02						
	12-Aug-2003	12	0.07	54.26						
	13-Aug-2003	13	0.00	55.21						
	14-Aug-2003	14	0.00	49.71						
	15-Aug-2003	15	0.00	50.72						
	16-Aug-2003	16	T	50.06						
	17-Aug-2003	17	0.00	48.12						
	18-Aug-2003	18	0.00	47.03						
	19-Aug-2003	19	0.00	46.66				21.9		24
	20-Aug-2003	20	0.00	48.36				18.2		24
	21-Aug-2003	21	0.05	48.30						
	22-Aug-2003	22	0.33	51.72						
	23-Aug-2003	23	0.00	46.92					20.0	
	24-Aug-2003	24	0.00	44.38						
	25-Aug-2003	25	0.00	45.90						
	26-Aug-2003	26	1.25	55.66						
	27-Aug-2003	27	0.00	62.69						
	28-Aug-2003	28	0.00	55.51						
	29-Aug-2003	29	0.68	57.86						
	30-Aug-2003	30	0.00	57.61						
	31-Aug-2003	31	0.52	47.33						
Sep-03	1-Sep-2003	1	1.36	62.41						
	2-Sep-2003	2	0.01	61.21				120.2		24
	3-Sep-2003	3	0.00	61.79						
	4-Sep-2003	4	0.00	62.77						
	5-Sep-2003	5	0.00	63.36						
	6-Sep-2003	6	0.00	62.55					120.2	
	7-Sep-2003	7	0.00	58.75						
	8-Sep-2003	8	0.00	52.38						
	9-Sep-2003	9	0.00	52.90						
	10-Sep-2003	10	0.00	56.96						
	11-Sep-2003	11	0.00	51.12						
	12-Sep-2003	12	0.00	48.74						
	13-Sep-2003	13	0.00	48.10						
	14-Sep-2003	14	0.65	50.35						
	15-Sep-2003	15	0.17	66.84						
	16-Sep-2003	16	0.00	54.96				17.5		24
	17-Sep-2003	17	0.00	48.80				12.1		24
	18-Sep-2003	18	0.00	47.75				10.5		24
	19-Sep-2003	19	0.00	47.33						
	20-Sep-2003	20	0.00	45.38					13.4	
	21-Sep-2003	21	0.01	43.87						
	22-Sep-2003	22	1.24	59.18						
	23-Sep-2003	23	0.00	62.07						
	24-Sep-2003	24	0.76	63.07						
	25-Sep-2003	25	0.00	63.46						
	26-Sep-2003	26	1.04	62.76						
	27-Sep-2003	27	T	61.23						
	28-Sep-2003	28	0.20	62.55						
	29-Sep-2003	29	T	62.68						
	30-Sep-2003	30	0.00	62.12						

					Pond #1			Pond #2		
		Day of Month	Precipitaion (in.)	Total Flow (MGD)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)	Flow from CSO (MG)	CSO Weekly Average	Duration of Outfall (hrs.)
Oct-03	1-Oct-2003	1	0.00	60.14						
	2-Oct-2003	2	0.00	54.25						
	3-Oct-2003	3	0.24	52.41						
	4-Oct-2003	4	T	58.63						
	5-Oct-2003	5	0.00	50.81						
	6-Oct-2003	6	0.00	49.36						
	7-Oct-2003	7	0.00	48.09						
	8-Oct-2003	8	0.00	48.66						
	9-Oct-2003	9	0.00	46.80				19.3		24
	10-Oct-2003	10	0.00	46.64				18.7		6
	11-Oct-2003	11	0.00	45.27						
	12-Oct-2003	12	T	46.22						
	13-Oct-2003	13	0.00	44.53				43.2	27.1	24
	14-Oct-2003	14	0.84	55.71						
	15-Oct-2003	15	0.00	62.05						
	16-Oct-2003	16	0.21	57.18						
	17-Oct-2003	17	0.00	52.78						
	18-Oct-2003	18	0.00	50.10						
	19-Oct-2003	19	0.00	48.84						
	20-Oct-2003	20	0.00	48.01						
	21-Oct-2003	21	0.00	46.55						
	22-Oct-2003	22	T	44.92						
	23-Oct-2003	23	T	45.27						
	24-Oct-2003	24	0.00	43.68						
	25-Oct-2003	25	0.48	50.53						
	26-Oct-2003	26	0.01	52.64						
	27-Oct-2003	27	T	46.01						
	28-Oct-2003	28	0.13	46.79						
	29-Oct-2003	29	T	48.30						
	30-Oct-2003	30	0.00	45.92						
	31-Oct-2003	31	0.00	48.23						
Nov-03	1-Nov-2003	1	T	48.29						
	2-Nov-2003	2	T	45.66						
	3-Nov-2003	3	0.00	45.09						
	4-Nov-2003	4	0.00	44.03						
	5-Nov-2003	5	T	45.52						
	6-Nov-2003	6	T	43.67						
	7-Nov-2003	7	0.00	43.32						
	8-Nov-2003	8	0.00	42.86						
	9-Nov-2003	9	0.00	43.01						
	10-Nov-2003	10	T	43.17						
	11-Nov-2003	11	0.38	46.89						
	12-Nov-2003	12	0.11	47.80						
	13-Nov-2003	13	T	45.92						
	14-Nov-2003	14	T	44.66						
	15-Nov-2003	15	0.00	45.06						
	16-Nov-2003	16	0.00	43.69						
	17-Nov-2003	17	0.00	43.23						
	18-Nov-2003	18	0.66	55.47						
	19-Nov-2003	19	0.03	62.52						
	20-Nov-2003	20	0.00	60.41						
	21-Nov-2003	21	0.00	51.45						
	22-Nov-2003	22	0.00	49.42						
	23-Nov-2003	23	0.10	49.67						
	24-Nov-2003	24	0.36	60.71						
	25-Nov-2003	25	0.00	59.43						
	26-Nov-2003	26	T	54.47						
	27-Nov-2003	27	0.10	57.12						
	28-Nov-2003	28	0.37	57.91						
	29-Nov-2003	29	T	59.91						
	30-Nov-2003	30	0.00	59.78						
Dec-03	1-Dec-2003	1	0.00	59.14						
	2-Dec-2003	2	0.00	58.03						
	3-Dec-2003	3	0.00	53.43						
	4-Dec-2003	4	0.07	51.24						
	5-Dec-2003	5	0.36	54.53						
	6-Dec-2003	6	0.00	61.73						
	7-Dec-2003	7	0.00	60.97						
	8-Dec-2003	8	T	55.91						
	9-Dec-2003	9	0.06	60.62						
	10-Dec-2003	10	0.41	60.44						
	11-Dec-2003	11	T	60.80						
	12-Dec-2003	12	0.00	61.47						
	13-Dec-2003	13	0.01	61.29						
	14-Dec-2003	14	0.04	56.53						
	15-Dec-2003	15	T	56.61						
	16-Dec-2003	16	0.14	57.52						
	17-Dec-2003	17	T	61.00						
	18-Dec-2003	18	T	52.33						
	19-Dec-2003	19	0.14	50.12						
	20-Dec-2003	20	0.02	49.01						
	21-Dec-2003	21	0.00	49.71						
	22-Dec-2003	22	0.17	49.64						
	23-Dec-2003	23	0.85	60.21				107.5		24
	24-Dec-2003	24	0.01	59.08						
	25-Dec-2003	25	0.00	59.44						
	26-Dec-2003	26	0.00	60.92				39.1		8
	27-Dec-2003	27	0.00	61.89					73.3	
	28-Dec-2003	28	0.00	56.24						
	29-Dec-2003	29	0.34	57.61						
	30-Dec-2003	30	T	59.40						
	31-Dec-2003	31	0.00	60.61						

ATTACHMENT 5

Donohue & Associates, Inc.

Working Spreadsheets & Tables

Month	Date	WPCP Plant Influent Flow (MG)	Remaining Capacity (@ 60 MG)	Remaining Capacity (@ 85 MG)	Remaining Capacity (@ 100 MG)	Pond #1 Flow from CSO (MG)	Pond #2 Flow from CSO (MG)	Total Pond Discharge (@ 60MG)	Potential Amount Recycled (@ 60 MG)	Potential % Recycled to Plant (@ 60MG)	Monthly Amount Recycled (@ 60MG)	Total Pond Discharge (@ 85MG)	Potential Amount Recycled (@ 85 MG)	Potential % Recycled to Plant (@ 85MG)	Monthly Amount Recycled (@ 85MG)	Total Pond Discharge (@ 100MG)	Potential Amount Recycled (@ 100 MG)	Potential % Recycled to Plant (@ 100MG)	Monthly Amount Recycled (@ 100MG)
Jan-02	29-Jan-2002	49.86	10.14	35.14	50.14	37.2		37.2	10.14	27.27%	27.27%	37.20	35.14	94.47%	94%	37.20	37.20	100%	100%
Feb-02	1-Feb-2002	48.22	11.78	36.78	51.78	110.5		110.5	11.78	10.66%		110.50	36.78	33.29%		110.50	51.78	46.86%	
	2-Feb-2002	55.89	4.11	29.11	44.11	38.8		38.8	4.11	10.60%		38.80	29.11	75.03%		38.80	38.80	100%	
	3-Feb-2002	58.62	1.38	26.38	41.38	48		48	1.38	2.88%		48.00	26.38	54.97%		48.00	41.38	86.22%	
	4-Feb-2002	43.28	16.72	41.72	56.72	46.2		46.2	16.72	36.19%		46.20	41.72	90.30%		46.20	46.20	100%	
	5-Feb-2002	40.90	19.10	44.10	59.10	24.1		24.1	19.10	79.25%		24.10	24.10	100%		24.10	24.10	100%	
	6-Feb-2002	40.51	19.49	44.49	59.49	20.3		20.3	19.49	96.00%		20.30	20.30	100%		20.30	20.30	100%	
	7-Feb-2002	46.79	13.21	38.21	53.21	4.4		4.4	4.40	100%	26.34%	4.40	4.40	100%	62.54%	4.40	4.40	100%	77.65%
Mar-02	3-Mar-2002	67.54	-7.54	17.46	32.46	4.2		4.24	0.00	0%		4.24	4.24	100%		4.24	4.24	100%	
	4-Mar-2002	67.55	-7.55	17.45	32.45	10.0		10	0.00	0%		10.00	10.00	100%		10.00	10.00	100%	
	5-Mar-2002	60.22	-0.22	24.78	39.78	6.6		6.55	0.00	0%		6.55	6.55	100%		6.55	6.55	100%	
	6-Mar-2002	59.47	0.53	25.53	40.53	6.6		6.55	0.53	8.14%		6.55	6.55	100%		6.55	6.55	100%	
	7-Mar-2002	57.92	2.08	27.08	42.08	6.6		6.55	2.08	31.77%		6.55	6.55	100%		6.55	6.55	100%	
	8-Mar-2002	56.20	3.80	28.80	43.80	3.8		3.82	3.80	99.46%		3.82	3.82	100%		3.82	3.82	100%	
	30-Mar-2002	59.92	0.08	25.08	40.08		28.5	28.53	0.08	0.27%		28.53	25.08	87.90%		28.53	28.53	100%	
	31-Mar-2002	53.21	6.79	31.79	46.79		32.4	32.39	6.79	20.96%	13.47%	32.39	31.79	98.15%	96%	32.39	32.39	100%	100%
Apr-02	1-Apr-2002	59.38	0.62	25.62	40.62		22.3	22.34	0.62	2.78%		22.34	22.34	100%		22.34	22.34	100%	
	2-Apr-2002	58.99	1.01	26.01	41.01		39.6	39.58	1.01	2.55%		39.58	26.01	65.71%		39.58	39.58	100%	
	3-Apr-2002	59.20	0.80	25.80	40.80		49.4	49.43	0.80	1.61%		49.43	25.80	52.19%		49.43	40.80	82.53%	
	4-Apr-2002	61.40	-1.40	23.60	38.60		24.0	23.98	0.00	0%		23.98	23.60	98.41%		23.98	23.98	100%	
	10-Apr-2002	66.20	-6.20	18.80	33.80		88.8	88.81	0.00	0%	1.08%	88.81	18.80	21.17%	52.00%	88.81	33.80	38.06%	71.61%
May-02	12-May-2002	66.52	-6.52	18.48	33.48		41.6	41.6	0.00	0%		41.60	18.48	44.42%		41.60	33.48	80.47%	
	13-May-2002	66.48	-6.48	18.52	33.52		38.3	38.3	0.00	0%		38.30	18.52	48.36%		38.30	33.52	87.52%	
	18-May-2002	68.87	-8.87	16.13	31.13		11.1	11.1	0.00	0%	0%	11.10	11.10	100%	53%	11.10	11.10	100%	86%
Jun-02	11-Jun-2002	48.99	11.01	36.01	51.01		66.9	66.9	11.01	16.46%		66.90	36.01	53.83%		66.90	51.01	76.25%	
	13-Jun-2002	45.45	14.55	39.55	54.55		30.2	30.2	14.55	48.19%	26.33%	30.20	30.20	100%	68.19%	30.20	30.20	100%	84%
Jul-02	15-Jul-2002	42.14	17.86	42.86	57.86		12.4	12.4	12.40	100%		12.40	12.40	100%		12.40	12.40	100%	
	16-Jul-2002	40.92	19.08	44.08	59.08		13.3	13.3	13.30	100%	100%	13.30	13.30	100%	100%	13.30	13.30	100%	100%
Sep-02	10-Sep-2002	40.83	19.17	44.17	59.17		5.34	5.34	5.34	100%		5.34	5.34	100%		5.34	5.34	100%	
	11-Sep-2002	40.23	19.77	44.77	59.77		8.88	8.88	8.88	100%		8.88	8.88	100%		8.88	8.88	100%	
	12-Sep-2002	40.74	19.26	44.26	59.26		8.88	8.88	8.88	100%		8.88	8.88	100%		8.88	8.88	100%	
	13-Sep-2002	41.59	18.41	43.41	58.41		7.99	7.99	7.99	100%		7.99	7.99	100%		7.99	7.99	100%	
	14-Sep-2002	42.37	17.64	42.64	57.64		15.10	15.1	15.10	100%		15.10	15.10	100%		15.10	15.10	100%	
	15-Sep-2002	40.60	19.40	44.40	59.40		6.22	6.22	6.22	100%		6.22	6.22	100%		6.22	6.22	100%	
	16-Sep-2002	40.82	19.18	44.18	59.18		4.97	4.97	4.97	100%		4.97	4.97	100%		4.97	4.97	100%	
	17-Sep-2002	39.17	20.83	45.83	60.83		7.75	7.75	7.75	100%		7.75	7.75	100%		7.75	7.75	100%	
	18-Sep-2002	39.03	20.97	45.97	60.97		8.18	8.18	8.18	100%		8.18	8.18	100%		8.18	8.18	100%	
	19-Sep-2002	39.42	20.58	45.58	60.58		6.46	6.46	6.46	100%		6.46	6.46	100%		6.46	6.46	100%	
	20-Sep-2002	54.15	5.85	30.85	45.85		9.81	9.81	5.85	59.64%		9.81	9.81	100%		9.81	9.81	100%	
	21-Sep-2002	53.69	6.31	31.31	46.31		7.69	7.69	6.31	82.01%		7.69	7.69	100%		7.69	7.69	100%	
	22-Sep-2002	40.81	19.19	44.19	59.19		7.69	7.69	7.69	100%		7.69	7.69	100%		7.69	7.69	100%	
	23-Sep-2002	41.35	18.65	43.65	58.65		8.82	8.82	8.82	100%		8.82	8.82	100%		8.82	8.82	100%	
	24-Sep-2002	42.40	17.60	42.60	57.60		6.67	6.67	6.67	100%		6.67	6.67	100%		6.67	6.67	100%	
	25-Sep-2002	40.32	19.68	44.68	59.68	8.5	13.33	21.83	19.68	90.16%		21.83	21.83	100%		21.83	21.83	100%	
	26-Sep-2002	40.98	19.02	44.02	59.02		5.17	5.17	5.17	100%	94.92%	5.17	5.17	100%	100%	5.17	5.17	100%	100%
Oct-02	2-Oct-2002	41.74	18.26	43.26	58.26		7.9	7.88	7.88	100%	100%	7.88	7.88	100%	100%	7.88	7.88	100%	100%
Nov-02	12-Nov-2002	51.92	8.08	33.08	48.08		29.7	29.73	8.08	27.17%		29.73	29.73	100%		29.73	29.73	100%	
	13-Nov-2002	46.68	13.32	38.32	53.32		8.1	8.13	8.13	100%	42.81%	8.13	8.13	100%	100%	8.13	8.13	100%	100%
	Average:	**50.20**						**22.07**	**6.63**			**22.07**	**15.88**			**22.07**	**18.78**		
	2002 Sum:							**1059.26**											
									2002 Average =		**30.04%**				**71.96%**				**85.11%**

Month	Date	WPCP Plant Influent Flow (MG)	Remaining Capacity (@ 60 MG)	Remaining Capacity (@ 85 MG)	Remaining Capacity (@ 100 MG)	Pond #1 Flow from CSO (MG)	Pond #2 Flow from CSO (MG)	Total Pond Discharge (@ 60MG)	Potential Amount Recycled (@ 60 MG)	Potential % Recycled to Plant (@ 60MG)	Monthly Amount Recycled (@ 60MG)	Total Pond Discharge (@ 85MG)	Potential Amount Recycled (@ 85 MG)	Potential % Recycled to Plant (@ 85MG)	Monthly Amount Recycled (@ 85MG)	Total Pond Discharge (@ 100MG)	Potential Amount Recycled (@ 100 MG)	Potential % Recycled to Plant (@ 100MG)	Monthly Amount Recycled (@ 100MG)
Mar-03	13-Mar-2003	60.36	-0.36	24.64	39.64		63.60	63.6	0.00	0.00%		63.60	24.64	38.74%		63.60	39.64	62.33%	
	19-Mar-2003	59.10	0.90	25.90	40.90		16.450	16.45	0.90	5.49%		16.45	16.45	100.00%		16.45	16.45	100%	
	20-Mar-2003	59.42	0.58	25.58	40.58		73.970	73.97	0.58	0.79%		73.97	25.58	34.59%		73.97	40.58	54.87%	
	24-Mar-2003	59.05	0.95	25.95	40.95		86.620	86.62	0.95	1.10%		86.62	25.95	29.96%		86.62	40.95	47.28%	
	25-Mar-2003	59.88	0.12	25.12	40.12		4.490	4.49	0.12	2.58%		4.49	4.49	100.00%		4.49	4.49	100%	
	26-Mar-2003	57.79	2.21	27.21	42.21		23.920	23.92	2.21	9.22%		23.92	23.92	100.00%		23.92	23.92	100%	
	27-Mar-2003	57.25	2.75	27.75	42.75		8.330	8.33	2.75	33.06%		8.33	8.33	100.00%		8.33	8.33	100%	
	28-Mar-2003	55.37	4.63	29.63	44.63		30.420	30.42	4.63	15.21%		30.42	29.63	97.39%		30.42	30.42	100%	
	29-Mar-2003	59.06	0.94	25.94	40.94		24.000	24	0.94	3.93%		24.00	24.00	100.00%		24.00	24.00	100%	
	30-Mar-2003	58.38	1.62	26.62	41.62		4.110	4.11	1.62	39.41%		4.11	4.11	100.00%		4.11	4.11	100%	
	31-Mar-2003	56.68	3.32	28.32	43.32		15.560	15.56	3.32	21.36%	**5.13%**	15.56	15.56	100.00%	**57.66%**	15.56	15.56	100%	**54.05%**
Apr-03	5-Apr-2003	62.87	-2.87	22.13	37.13	1.000		1	0.00	0.00%		1.00	1.00	100.00%		1.00	1.00	100%	
	8-Apr-2003	64.75	-4.75	20.25	35.25		135.9	135.9	0.00	0.00%		135.90	20.25	14.90%		135.90	35.25	25.94%	
	30-Apr-2003	47.77	12.23	37.23	52.23		13.9	13.88	12.23	88.09%	**8.11%**	13.88	13.88	100.00%	**23.30%**	13.88	13.88	100%	**25.94%**
May-03	6-May-2003	62.75	-2.75	22.25	37.25		11.2	11.16	0.00	0.00%		11.16	11.16	100.00%		11.16	11.16	100%	
	7-May-2003	64.79	-4.79	20.21	35.21		136.9	136.93	0.00	0.00%		136.93	20.21	14.76%		136.93	35.21	25.71%	
	10-May-2003	62.81	-2.81	22.19	37.19		106.1	106.06	0.00	0.00%		106.06	22.19	20.92%		106.06	37.19	35.07%	
	11-May-2003	60.30	-0.30	24.70	39.70		63.2	63.2	0.00	0.00%		63.20	24.70	39.08%		63.20	39.70	62.82%	
	12-May-2003	61.14	-1.14	23.86	38.86		59.2	59.18	0.00	0.00%		59.18	23.86	40.31%		59.18	38.86	65.66%	
	13-May-2003	60.26	-0.26	24.74	39.74		101.3	101.31	0.00	0.00%		101.31	24.74	24.42%		101.31	39.74	39.23%	
	16-May-2003	63.08	-3.08	21.92	36.92		106.2	106.19	0.00	0.00%		106.19	21.92	20.64%		106.19	36.92	34.76%	
	17-May-2003	64.65	-4.65	20.35	35.35		5.2	5.19	0.00	0.00%		5.19	5.19	100.00%		5.19	5.19	100%	
	28-May-2003	49.69	10.31	35.31	50.31		18.38	18.38	10.31	56.08%		18.38	18.38	100.00%		18.38	18.38	100%	
	29-May-2003	48.66	11.34	36.34	51.34		15.6	15.56	11.34	72.87%		15.56	15.56	100.00%		15.56	15.56	100%	
	30-May-2003	49.49	10.51	35.51	50.51		6.7	6.69	6.69	100%	**4.50%**	6.69	6.69	100.00%	**30.90%**	6.69	6.69	100%	**39.73%**
Jun-03	23-Jun-2003	42.52	17.48	42.48	57.48		24.5	24.5	17.48	71.35%		24.50	24.50	100.00%		24.50	24.50	100%	
	25-Jun-2003	40.45	19.55	44.55	59.55		18.4	18.43	18.43	100%	**83.65%**	18.43	18.43	100.00%	**100.00%**	18.43	18.43	100%	**-**
Jul-03	7-Jul-2003	59.76	0.24	25.24	40.24		67.1	67.13	0.24	0.36%		67.13	25.24	37.60%		67.13	40.24	59.95%	
	8-Jul-2003	58.44	1.56	26.56	41.56		83.1	83.1	1.56	1.87%		83.10	26.56	31.96%		83.10	41.56	50.01%	
	9-Jul-2003	58.45	1.55	26.55	41.55		90.9	90.89	1.55	1.71%		90.89	26.55	29.22%		90.89	41.55	45.72%	
	10-Jul-2003	56.04	3.96	28.96	43.96		109.1	109.13	3.96	3.63%		109.13	28.96	26.54%		109.13	43.96	40.28%	
	11-Jul-2003	55.40	4.60	29.60	44.60		117.5	117.46	4.60	3.92%		117.46	29.60	25.20%		117.46	44.60	37.97%	
	12-Jul-2003	56.33	3.67	28.67	43.67		101.1	101.08	3.67	3.64%		101.08	28.67	28.37%		101.08	43.67	43.21%	
	13-Jul-2003	57.30	2.70	27.70	42.70		74.3	74.29	2.70	3.63%		74.29	27.70	37.28%		74.29	42.70	57.47%	
	14-Jul-2003	53.92	6.08	31.08	46.08		35.4	35.41	6.08	17.18%		35.41	31.08	87.78%		35.41	35.41	100%	
	29-Jul-2003	62.66	-2.66	22.34	37.34		58.0	57.99	0.00	0.00%		57.99	22.34	38.52%		57.99	37.34	64.38%	
	30-Jul-2003	58.11	1.89	26.89	41.89		45.8	45.83	1.89	4.12%		45.83	26.89	58.67%		45.83	41.89	91.40%	
	31-Jul-2003	58.27	1.73	26.73	41.73		17.6	17.63	1.73	9.82%	**3.50%**	17.63	17.63	100.00%	**36.41%**	17.63	17.63	100%	**50.54%**
Aug-03	8-Aug-2003	60.44	-0.44	24.56	39.56		62.0	61.99	0.00	0.00%		61.99	24.56	39.62%		61.99	39.56	63.82%	
	9-Aug-2003	62.35	-2.35	22.65	37.65		29.5	29.53	0.00	0.00%		29.53	22.65	76.70%		29.53	29.53	100%	
	10-Aug-2003	57.44	2.56	27.56	42.56		22.1	22.12	2.56	11.58%		22.12	22.12	100.00%		22.12	22.12	100%	
	19-Aug-2003	46.66	13.34	38.34	53.34		21.9	21.88	13.34	60.96%		21.88	21.88	100.00%		21.88	21.88	100%	
	20-Aug-2003	48.36	11.64	36.64	51.64		18.2	18.21	11.64	63.95%	**17.92%**	18.21	18.21	100.00%	**71.18%**	18.21	18.21	100%	**64%**
Sep-03	2-Sep-2003	61.21	-1.21	23.79	38.79		120.2	120.15	0.00	0.00%		120.15	23.79	19.80%		120.15	38.79	32.28%	
	16-Sep-2003	54.96	5.04	30.04	45.04		17.5	17.45	5.04	28.88%		17.45	17.45	100.00%		17.45	17.45	100%	
	17-Sep-2003	48.80	11.20	36.20	51.20		12.1	12.14	11.20	92.29%		12.14	12.14	100.00%		12.14	12.14	100%	
	18-Sep-2003	47.75	12.25	37.25	52.25		10.5	10.54	10.54	100%	**16.71%**	10.54	10.54	100.00%	**39.88%**	10.54	10.54	100%	**32.28%**
Oct-03	9-Oct-2003	46.80	13.20	38.20	53.20		19.3	19.28	13.20	68.49%		19.28	19.28	100.00%		19.28	19.28	100%	
	10-Oct-2003	46.64	13.36	38.36	53.36		18.7	18.7	13.36	71.45%		18.70	18.70	100.00%		18.70	18.70	100%	
	13-Oct-2003	44.53	15.47	40.47	55.47		43.2	43.24	15.47	35.77%	**51.75%**	43.24	40.47	93.59%	**97%**	43.24	43.24	100%	**100%**
Dec-03	23-Dec-2003	60.21	-0.21	24.79	39.79		107.5	107.5	0.00	0.00%		107.50	24.79	23.06%		107.50	39.79	37.01%	
	26-Dec-2003	60.92	-0.92	24.08	39.08		39.1	39.1	0.00	0.00%	**-**	39.10	24.08	61.59%	**33.34%**	39.10	39.08	100%	**37.01%**
	Average:	**56.35**						**48.40**	**4.21**			**48.40**	**20.52**			**48.40**	**27.44**		
	2003 Sum:							**2516.80**											
										2003 Average =	**8.70%**				**42.40%**				**56.70%**

ATTACHMENT 6

CSO Bleedback Facility Control Strategy

Description

The purpose of the CSO Pond Bleedback is to send the CSO back to the WWTP for treatment.

Control

Remote – With both CSO Pond No. 1 and No.2 Bleedback sluice gate actuator Local/Off/Remote Handswitches in Remote, the following control options are available from the Control Station.

Auto Start Cycle – Initiation of the cycle would be based on the Wayne St. Interceptor level. When the Wayne St. Interceptor level lowers to a certain level for a certain amount of time, then the process of CSO bleedback would initiate. CSO Pond No. 1 Bleedback Gate would slowly open. The amount of flow to be bledback would be based on the Wayne St. Interceptor level; the lower the level the more flow would be bledback. Then when the flow from Pond No. 1 slows, the gate closes and the CSO Pond No. 2 Bleedback Gate would open. Flow continues to be based on the Wayne St. Interceptor level. When the flow of Pond No. 2 slows, the CSO Pond No. 1 Bleedback Gate opens. The gates would remain open until the flow slows, then both gates would close. The action is complete.

Manual Start Cycle – In Manual Start Cycle, two options are available at the HMI. The initiation of the process would be by the operator.

Flow Based on Wayne St. Interceptor Level – The CSO Pond No. 1 Bleedback Gate would slowly open. The amount of flow to be Bledback would be based on the interceptor level; the lower the interceptor level the more flow would be Bledback. Then when the flow from Pond No. 1 slows, the gate shuts and the CSO Pond No. 2 Bleedback Gate would open. Flow continues to be based on the Wayne St. Interceptor Level. When the flow of Pond No. 2 slows, the CSO Pond No. 1 Bleedback Gate opens. The gates would remain open until the flow slows, then both gates would close. The action is complete.

Flow Based on Operator Set Point – The CSO Pond No. 1 Bleedback Gate would slowly open. The amount of flow to be Bledback would be based on the operator-set point. Then when the flow from Pond No. 1 slows, the gate shuts and the CSO Pond No. 2 Bleedback Gate would open. Flow continues to be based on the Wayne St. Interceptor Level. When the flow of Pond No. 2 slows, the CSO Pond No. 1 Bleedback Gate opens. The gates would remain open until the flow slows, then both gates would close. The action is complete.

Interlocks

- Wayne St. Interceptor shall be below a certain level for a certain amount of time.
- Influent flowmeter flow rate (bleedback shall not create plant to become overloaded).
- High level in 54-inch Sanitary Sewer Manhole.

Manual – With the Manual/Auto selector (one per sluice gate) in Manual, the following control options are available from the HMI.

Open – This selection will open the respective gate.
Close – This selection will close the respective gate.

Monitoring

- High level in 54-inch Sanitary Sewer Manhole.
- Flow rate for calculation purposes.
- CSO Pond sample for calculation purposes.
- Fail

EXHIBIT B-6

Project List
Sites Where Weirs Were Raised By WPC Maintenance
9/07

As Recommended by CSO OP Plan Inline Storage Assessment Study

Permit #	Location	Dated Raised	Data	# Overflows	
62	**State & Laverne**	2/23/05	3/04 – 3/05	54	Before
			4/05 – 4/06	38	After
			5/06 – 5/07	47	After
17	**Wildmere**	6/29/05	6/04 – 6/05	69	Before
			7/05 – 7/06	64	After
			8/06 – 8/07	63	After
68	**Glazier**	6/05	6/04 – 6/05	17	Before
			7/05 – 7/06	12	After
			8/06 – 8/07	13	After
36	**Westbrook**	6/29/05	6/04 – 6/05	10	Before
			7/05 – 7/06	11	After
			8/06 – 8/07	16	After
05	**Foster Park**	6/05	6/04 – 6/05	97	Before
			7/05 – 7/06	77	After
			8/06 – 8/07	63	After
39	**Hanna & Wayne**	2/22/05	No Overflows		

EXHIBIT B-7