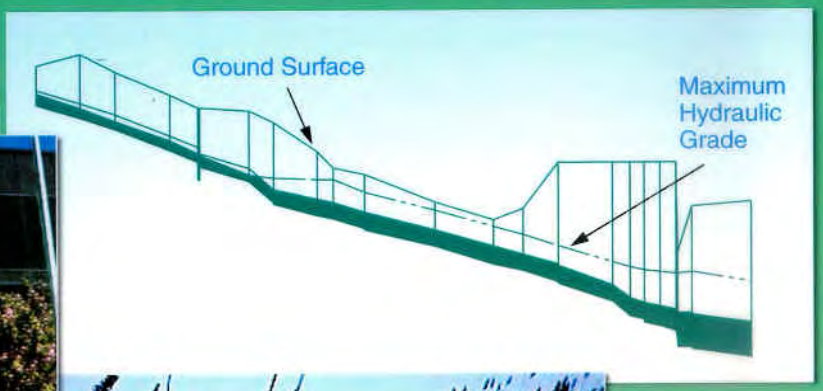
FINAL REPORT

City of New Haven Long-Term Combined Sewer Overflow Control Plan



The City of New Haven
and the
Water Pollution Control Authority

CH2MHILL

APRIL 2001

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April 30, 2001
135807.BA.08

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345 East Shore Parkway
New Haven, CT 06512

Subject: City of New Haven Long-Term CSO Control Plan

Dear Sirs:

Enclosed please find the final *City of New Haven Long-Term CSO Control Plan*. This unique CSO control plan documents a dynamic and flexible program that has come together with the continued support of your departments, the Connecticut Department of Environmental Protection, a wide variety of watershed stakeholders, and the citizens of New Haven.

The plan includes implementation of short-term CSO controls, detailed sewer system evaluations, and conveyance corrections to optimize the final design of specific long-term CSO controls described in this report. This document provides the plan details, costs, schedule, and the resultant reductions in CSO volumes and pollutant loads. This final plan proves to meet the following initial project goals:

- *Identifying financially responsible structural and non-structural CSO controls by maximizing the use of existing collection and treatment system investments*
- *Meeting regulatory requirements as identified in your National Pollutant Elimination System Permit and the United States Environmental Protection Agency's CSO Control Policy*
- *Incorporating a collaborative project delivery process with endorsement from a wide variety of stakeholders throughout the project*

We are pleased to have contributed to this effort. Please do not hesitate to contact us should you have any questions.

Sincerely,
CH2M HILL

Clifford W. Bowers, P.E.
Vice President

CITY OF NEW HAVEN
LONG-TERM CSO CONTROL PLAN

Prepared for

The City of New Haven
The New Haven Water Pollution Control Authority

Prepared by

CH2MHILL

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April 2001

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Acronyms

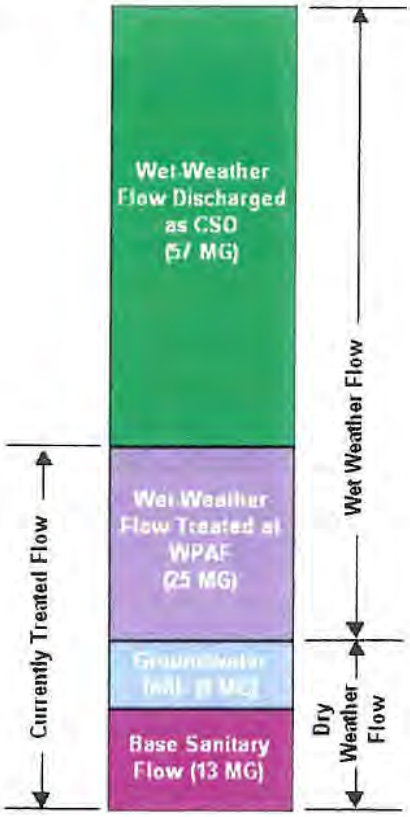
BOD	biochemical oxygen demand
CEA	cost-effectiveness analysis
CSO	combined sewer overflow
CONNDOT	Connecticut Department of Transportation
CTDEP	Connecticut Department of Environmental Protection
FC	fecal coliform
GIS	Geographic Information System
gpm	gallons per minute
I/I	infiltration and inflow
LF	linear feet
LTCP	long-term control plan
MG	million gallons
mgd	million gallons per day
NMCs	USEPA's Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
RII	rainfall-induced infiltration
STCP	short-term control plan
TM	Technical Memorandum
TN	total nitrogen
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
WPAF	East Shore Water Pollution Abatement Facility
WPCA	Water Pollution Control Authority

Executive Summary

Introduction

The City of New Haven (City) and the New Haven Water Pollution Control Authority (WPCA) operate a wastewater collection and treatment system that serves more than 100,000 residents of New Haven, and through interlocal agreements, the Towns of Woodbridge, Hamden, and East Haven (East Haven accepts some wastewater flow from North Branford). The wastewater collection system includes both combined and separate sewers.

During a two-year rain event, the design storm utilized for this study, approximately 104 million gallons (MG) of combined sewage enters the combined sewer system. As a result, capacity is exceeded in parts of the sewer system, and approximately 57 MG of combined sewage overflows to receiving waters through 24 permitted combined sewer overflows (CSOs). During that same rain event, approximately 47 MG of wastewater are conveyed to and treated at the East Shore Water Pollution Abatement Facility (CH2M HILL February 2000). Therefore, approximately 45% of the total combined sewage entering the sewer collection system is currently conveyed to the East Shore plant and treated during a 2-year storm while the balance of approximately 55% overflows untreated to receiving waters.



In 1981, a facility plan that evaluated alternative methods for controlling CSOs was completed and recommended sewer separation as the most cost-effective method of meeting evaluation criteria; the plan was updated in 1988. Because of significant changes in regulatory requirements and advances in control technologies, the City reevaluated this approach. In 1997, the City of New Haven entered into an agreement with CH2M HILL to prepare a Long-Term CSO Control Plan with the following objectives:

- Reduce the overall cost of constructing CSO controls
- Produce documents required for CSO-related issues described in the WPCA's National Pollutant Discharge Elimination System (NPDES) Permit, administered and enforced through the Water Management Bureau of the State of Connecticut Department of Environmental Protection's (CTDEP) Permitting, Enforcement, and Remediation Division (CTDEP 1995)
- Produce a long-term CSO control plan that is generally consistent with guidance provided in the United States Environmental Protection Agency's (USEPA) CSO Control Policy of April 1994

Plan Development

The City of New Haven Long-Term Control Plan Project included of the following tasks:

1. Establish project goals and approach
2. Map the combined sewers and develop a computer model of the system
3. Monitor rainfall and sewer flows for calibration and verification of the computer model
4. Determine and analyze pollutant loads from New Haven CSOs and other sources
5. Compare New Haven's operation and maintenance with EPA's Nine Minimum Controls
6. Evaluate CSO control alternatives with input and oversight from stakeholders

7. Develop selected CSO control alternatives to compare costs and benefits
8. Develop the components of the selected long-term CSO control plan

The City of New Haven worked closely with the CTDEP and a broad group of stakeholders to meet the project objectives through the series of tasks above. As a result, a CSO Control Plan was selected that allows flexibility within the plan to reduce/eliminate sewer backups and flooding problems and eliminate CSOs during wet weather for storms up to a 2-year size. The general approach for implementation of the plan follows this flow chart:

Plan Components

The plan has two parts: 1) the Short-Term Control Plan (STCP) and 2) Long-Term Control Plan (LTCP) with the difference being the commitment and ability of the City to implement the Short-Term Control Plan within the first 3 years of the overall program schedule of 15 years.

The STCP is summarized in Table ES-1, and the LTCP is summarized in Table ES-2, both tables have been inserted at the end of this executive summary. The costs of the program are summarized in Table ES-1.

TABLE ES-1
Summary Costs of the CSO Control Program

Components	Construction Cost (CC in $M)	Operation & Maintenance Costs ($)	Capital Costs = 1.35 x CC in $M
STCP	$ 30.8	$ 797,000	$41.6
LTCP	$188.9	$238,000	$255.0
TOTAL PROGRAM	**$219.7**	**$1,035,000**	**$296.6**

These program costs result in a projected total wastewater charge to City of New Haven customers averaging $470 annually over the 15-year program and representing 1.8% of median household income (which is within USEPA's 2% affordability guidelines for wastewater programs). The water quality benefits of the program include 100% CSO reduction citywide for up to and during a 2-year storm event as shown in Figure ES-1.

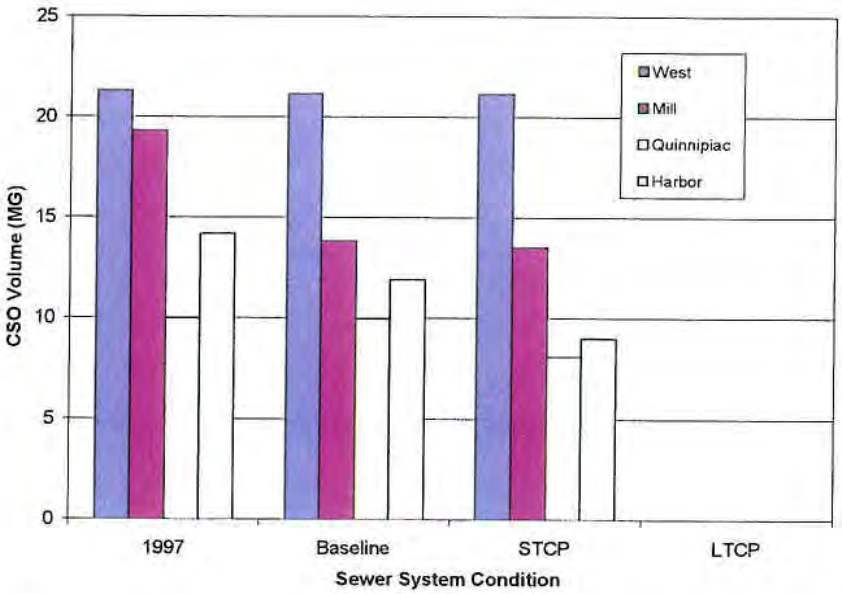


FIGURE ES-1. Projected CSO volumes by watershed for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

Additional benefits of the program include the following:

- Elimination of dry weather overflows
- Elimination of wet weather overflows for up to and including a 2-year storm
- Reduction of backups and street flooding for up to and including a 2-year storm
- Protection of critical areas (schedule promotes implementation in areas of greatest public use and environmental sensitivity)

- Maximization of conveyance
- Maximization of treatment of wet weather flows at the existing treatment plant

In summary, the present Long-Term CSO Control Plan not only meets the objectives of the program and the stakeholders but also provides a more cost-effective program with greater benefits.

SECTION 1

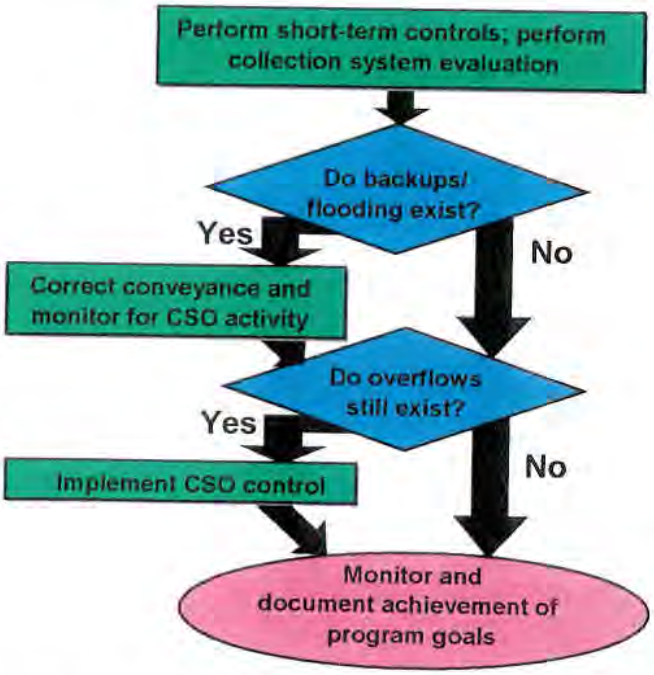
Introduction to the Plan

Objectives

In 1997, the City of New Haven entered into an agreement with CH2M HILL to prepare a Long-Term CSO Control Plan with the following objectives:

- Reduce the overall cost of constructing CSO controls
- Produce documents required for CSO-related issues described in the Water Pollution Control Authority's (WPCA's) NPDES Permit, administered and enforced through the Water Management Bureau of the State of CTDEP's Permitting, Enforcement, and Remediation Division (CTDEP 1995)
- Produce a long-term CSO control plan that is generally consistent with guidance provided in the United States USEPA's CSO Control Policy of April 1994

The City of New Haven worked closely with the CTDEP and a broad group of stakeholders to meet these objectives. As a result, a CSO Control Plan was selected that allows flexibility within the plan to reduce/eliminate sewer backups and flooding problems and eliminate CSOs during wet weather for storms up to a 2-year size. The general approach follows this flow chart:



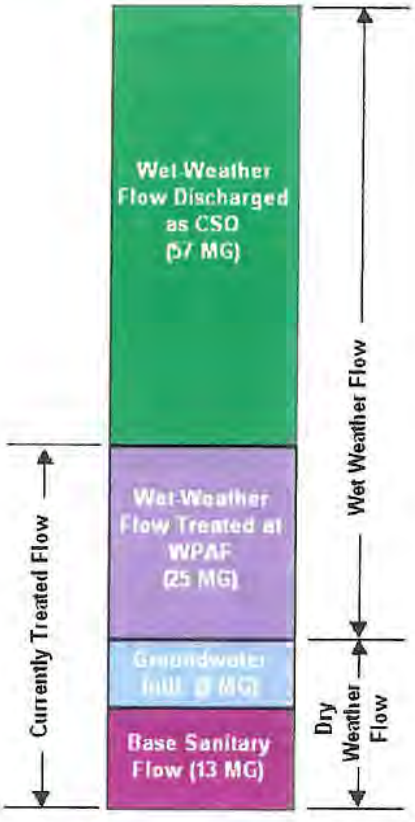
This approach was applied to each CSO sewershed to focus on specific sewershed issues and resolutions.

Project Background

The City of New Haven (City) and the WPCA operate a wastewater collection and treatment system that serves more than 100,000 residents of New Haven, and through interlocal agreements, the Towns of Woodbridge, Hamden, and East Haven (East Haven accepts some wastewater flow from North Branford.) The wastewater collection system includes both combined and separate sewers. A combined sewer is one that collects both sanitary sewage and stormwater runoff. In a separated sewer system, one sewer collects sewage and another sewer collects stormwater runoff. There are roughly 244 miles of sanitary/combined sewers and 24 permitted CSO regulators that divert high flows from the interceptor sewers to 20 CSO outfalls (CH2M HILL June 1998).

During dry weather, New Haven's sewer system conveys a combination of sanitary flow and groundwater infiltration to the 40-million-gallon-per-day (mgd) East Shore Water Pollution Abatement Facility (WPAF). All dry weather flows receive primary and secondary treatment and disinfection at the WPAF before discharge to New Haven Harbor.

During a two-year rain event, the design storm utilized for this study, approximately 104 MG of combined sewage enters the combined sewer system. As a result, capacity is exceeded in parts of the sewer system, and approximately 57 MG of combined sewage overflows to receiving waters through 24 permitted CSOs. During that same rain event, approximately 47 MG of wastewater are conveyed to and treated at the East Shore Water Pollution Abatement Facility (CH2M HILL February 2000). Therefore, approximately 45% of the total combined sewage entering the sewer collection system is currently conveyed to the East Shore plant and treated during a 2-year storm while the balance of approximately 55% overflows untreated to receiving waters.



A facility plan that evaluated alternative methods for controlling CSOs was completed in 1981 and updated in 1988 (Cardinal Engineering Associates 1981, 1988). The plan evaluated controls required to convey, treat, or store overflows associated with a 10-year storm. The plan concluded that

sewer separation was the most cost-effective method of meeting the evaluation criteria. Because of significant changes in regulatory requirements and advances in control technologies, the City is reevaluating this approach.

As of 1997, when the Long Term CSO Project began, approximately 35 percent of the planned sewer separation had been completed (see Figure 1-1). It should be noted that the current plan calls for all areas where sewer separation has taken place to date to have roof leaders disconnected from the now partially separated sewers to complete their full separation. Additionally, the plan calls for all current and future separation projects to include disconnection of roof leaders. Modeling results are based on the assumption that such disconnections are effected.

Task Summary

The following briefly summarizes the various project tasks.

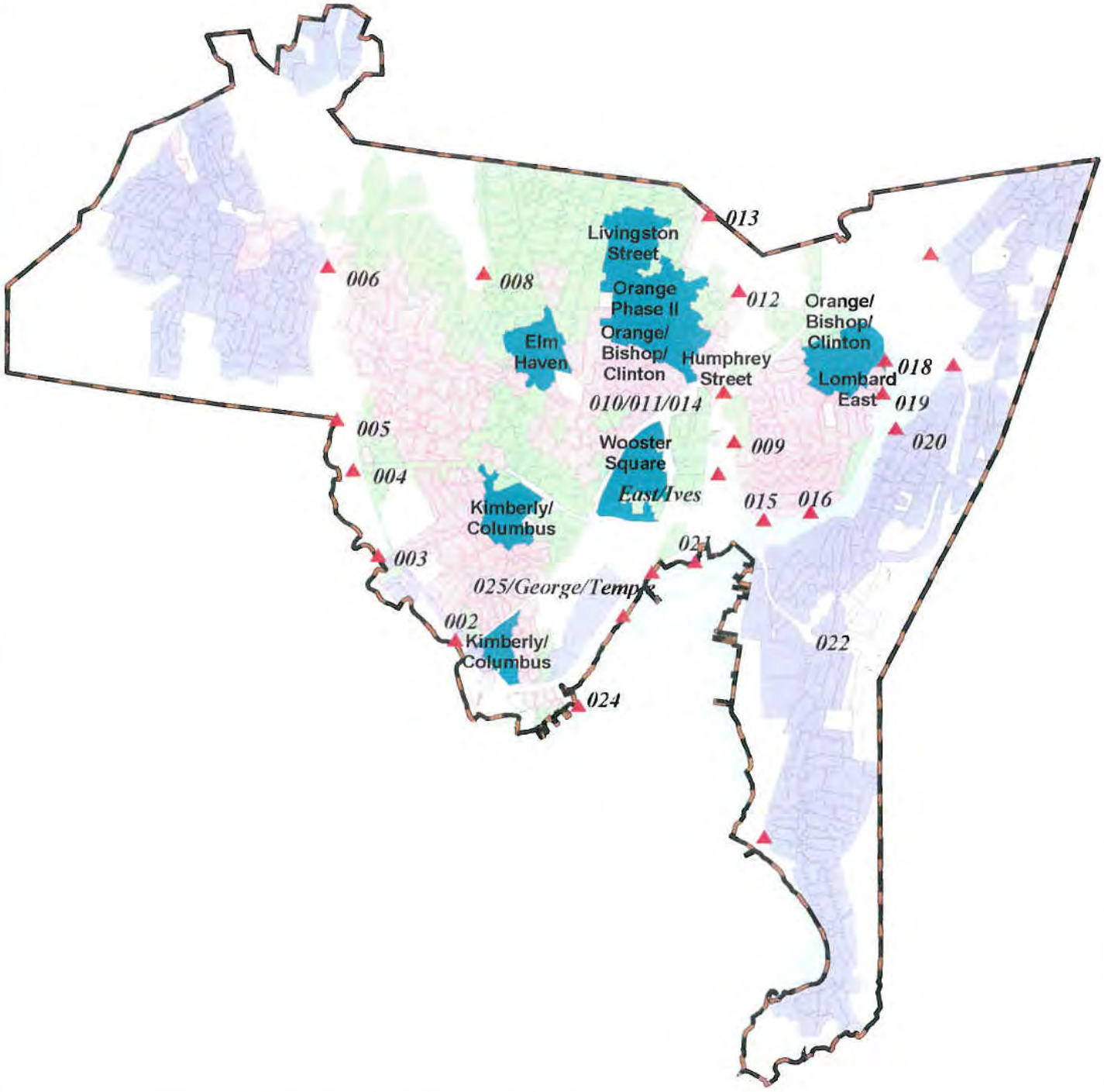
1. **Establish Project Goals and Approach** – Task 1 was comprised of a series of workshops with City, WPCA, and regulatory agency staff to define objectives, goals, procedures, etc, for the project. Results are documented in Technical Memorandum (TM) #1, *Project Goals and Approach*, (CH2M HILL June 1997).

2. **Model Development** - Task 2 comprised approximately half of the total project scope and included developing electronic maps of the existing sanitary and combined sewer system and development, calibration, and verification of a sewer system computer model for use in hydrologic and hydraulic analyses. Results are documented in TM #3, *System Inventory and Model Results* (CH2M HILL December 1998).

3. **Monitoring Program** – Task 3 was comprised of rainfall and sewer system flow monitoring throughout the City over a 3-month period. The results, used in analyses and for calibrating and verifying the computer model, are documented in TM #5, *Monitoring Program Results* (CH2M HILL March 1998).

4. **Hydraulic Characterization** – Task 4 was comprised of developing a database of available water quality data to determine, predict, and analyze pollutant loadings from key regional and local sources and to compare them with local CSO volumes and loads. Results are provided in TM#6, *Hydraulic Characterization Report* (CH2M HILL February 2000).

5. **Nine Minimum Controls (NMCs)** – Task 5 comprised a review of the City's combined sewer system operation and maintenance and best management practices as compared to USEPA's CSO Control Policy's Nine Minimum Control guidelines. Results are provided in TMs #7 and #8, *NMCs, Parts 1 and 2*, respectively (CH2M HILL June 1998 and CH2M HILL April 2000, respectively).



New Haven City Boundary

CSO Outfall

Combined Catchment

Partially Separated Catchment

Separated Catchment

Non-Sewered Catchment

Active/Recent Sewer Separation Project

2000 0 2000 4000 Feet

CH2MHILL

Figure 1-1

Status of Sewer Separation

New Haven Long Term CSO Control Plan

6. **Evaluation of CSO Control Alternatives** – Task 6 included development of a broad stakeholder group in August 1998 followed by a series of six stakeholder workshops over the next two years to discuss project progress and solicit input. A stakeholder notebook and five newsletters were also prepared. In addition to the minutes from the stakeholder meetings, TM #12, *Preliminary Evaluation of CSO Control Alternatives,* (CH2M HILL January 1999) documents stakeholder input to the decision-making process. The top evaluation criteria identified by the Stakeholders include the following:

   - Meet State water quality standards
   - Protect critical areas (i.e., areas with significant public health and environmental sensitivity)
   - Eliminate dry and wet weather overflows
   - Maximize aquatic habitat
   - Maximize conveyance
   - Maximize treatment plant capacity

An interactive approach promotes stakeholder support.

7. **Design Development** – Task 7 comprised an evaluation of city-wide CSO control alternatives with respect to CSO volume reduction, receiving water pollutant load reduction, costs, and ranking based on stakeholder criteria. Results are provided in TM #13, *Design Development Report* (CH2M HILL July 2000).

8. **Long-Term CSO Control Plan** – Task 8 is comprised of development of a dynamic and flexible long-term CSO control plan for the City of New Haven which addresses the top evaluation criteria identified by the Stakeholders in addition to relief of sewer system backups and flooding concerns being experienced throughout the City. The plan serves as an instruction manual for implementation of 100% CSO control of the 2-year storm in New Haven. The plan identifies strategies, controls, costs, schedules, and impacts and is presented in this document, TM #14, *Long-Term CSO Control Plan.*

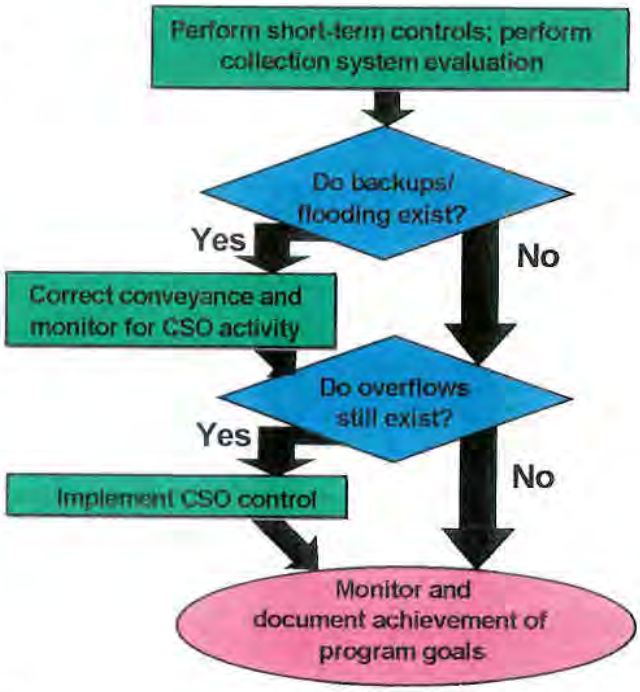
This document presents the components of both the short and long-term CSO control plans and the final conclusions and recommendations of the project. Section 2 presents an overview of the CSO Control Plan components including details of the both short and long-term CSO controls, costs, and an overview of the proposed implementation schedule. Section 3 presents the resultant CSO reductions and water quality impacts of the program. Locations of CSO regulators are provided in Appendix A. Cost details and site plans of the short-term CSO control plan components are provided in Appendix B. Cost details and site plans of the long-term CSO control plan components are provided in Appendix C. Details of the financial analysis are included in Appendix D.

SECTION 2

Short-Term CSO Control Plan

Basis of the Short-Term Control Plan

The City of New Haven Short-Term CSO Control Plan is a subset of the Long-Term CSO Control Plan and was developed using the same methodology. During the review of guidelines provided by the USEPA in their 1994 CSO Control Policy's Nine Minimum Controls in addition to NPDES Permit requirements, it was noted that the City of New Haven in cooperation with other City agencies and watershed groups were already implementing many of USEPA's nine minimum controls which provides the basis for the short-term control plan. Therefore, the short-term control plan, summarized in Table 2-1, presents plans to enhance programs already in place. Previous reports (TMs #7 and #8) provide information on programs already in place. Construction and O&M cost estimates are also provided in Table 2-1.



Costs

Construction and operation and maintenance cost estimates were developed for the Short-Term Control Plan and are also presented in Table 2-1. Cost assumptions and detailed backup are provided in Appendix B. Capital costs are estimated using the financial model developed for the project to allow for consistent changes in assumptions. Using an assumption of engineering and contingency being equal to 35% of construction costs results in a capital cost of the Short-Term Control Plan of $41.6-million.

Schedule

The schedule for the short-term control plan is to have the tasks complete within the first 3 years after plan approval.

TABLE 2-1

NEW HAVEN SHORT-TERM CONTROL PLAN

Action To Be Taken	Construction Cost ($/yr)	O&M Cost ($/yr)
1 - Operations and Maintenance		
NPDES Permit - Update of Appendix A of the NPDES permit & the designated O&M manager is (**see Appendix A of this report**)	n/a	n/a
Combined Sewer Flushing - The current sewer flushing program involves flushing every combined or sanitary sewer approximately every three to five years; upgrade to try to clean every sewer every 3 years.	$ 255,000	$ 145,000
GIS Database - Implement program set-up to enhance to ioncorporate O&M records to GIS database; perform pipe risk assessment to prioritize inspections and to plan for potential future rehabilitation projects	$ 7,000	$ 2,000
Cross-Connections - Identify, inspect, and document known system locations with cross-connections between storm and sanitary sewers: Carlisle/Liberty; Grove/Whitney; Greene/1 block east of Chestnut; University Place; Elm/University Place (2 locations); Chapel/Hamilton (added to list by WPCA)	$ 64,000	n/a
Overflow Structures - Determine exact discharge location and operation of NPDES #002; provide access to regulators #003, #004, #009; fix bottleneck at #003	$ 190,000	n/a
Combined Sewer System Tide Gates - Perform monthly inspection of tide gates and backwater check valves on overflow pipes and pump station emergency bypasses; replace Poplar Street tide gate (NPDES #016) and Boulevard pump station tide gates (NPDES #024)	$ 377,000	$ 106,000
Tidal Inflow Check - Continue to measure the salinity and flow fluctuations at the treatment plant as a means of determining significant inflow and salt water intrusion into the system; use regular intervals such as hourly measurements for 1 day per week	n/a	$ 81,000
Pump Station Operations - Install run-time recorders or SCADA equipment at all pump stations to track operations and to operate stations as designed (project in progress)	n/a	n/a
2 - Maximization of Use of Collection System		
Sewer Separation - Orange Street PH II	$ 3,798,000	n/a
Sewer Separation - Orange/Clinton/B/M	$ 5,249,000	n/a
Sewer Separation - Lombard Street East	$ 3,727,000	n/a
Sewer Separation - Wooster Square	$ 4,440,000	n/a
Sewer Separation - Kimberly/Columbus	$ 5,648,000	n/a
Sewer Separation - Humphrey Street	$ 1,194,000	n/a
Sewer Separation - Elm Haven PH I	$ 1,250,000	n/a
Sewer Separation - Elm Haven PH II	$ 850,000	n/a
Reduce CSO - Create weir at NPDES #008 constricting overflow by 50%	$ 5,000	n/a
Reduce CSO - Seal CSO at NPDES #010 (downstream weir)	$ 5,000	n/a
Eliminate CSO - Seal CSO at Portsea/Liberty	$ 5,000	n/a

TABLE 2-1 Continued NEW HAVEN SHORT-TERM CONTROL PLAN		
Action To Be Taken	**Construction Cost ($/yr)**	**O&M Cost ($/yr)**
3 - Pretreatment Program		
Industrial Pretreatment Program - program in place; loads monitored quarterly; local program more extensive than state program	n/a	n/a
4 - Maximization of Flow to Treatment Plant		
Modify WPAF Operations to accept 140 to 160 mgd - Modify wet weather operations for primary clarifiers; construct wet-weather diversion structures; add chlorination and dechlorination	$ 1,114,000	nominal above current conditions
Pump Station Screens - Upgrade bar screens at East Street and Boulevard Pump Stations, James Street siphon, and the WPAF headworks to reduce head loss and improve conveyance	$ 2,352,000	n/a
Reduce CSO - Remove stop logs at NPDES #015 when capacity at WPAF is sufficient to handle extra wet-weather flows	$ 5,000	n/a
5 - Prohibition of Dry-Weather Overflows		
Dry-Weather Overflows - New Haven currently has no dry-weather overflows	n/a	n/a
6 - Solids and Floatables Control		
Street Sweeping - Increase frequency of programs in areas where sediment deposition is problematic (i.e, E.T. Grasso Boulevard) and where sewer separation is being performed. Monthly coordination meetings between the WPCA/OMI and the Department of Public Works, which is responsible for street cleaning, have been started, although the coordination of programs has not yet been addressed.	$ 142,000	$ 341,000
Floatables/Debris Removal - Implement program to remove floatables and any other visible debris from CSOs		$ 20,000
7 - Pollution Prevention		
Source Control - Extensive programs already in place including control of hazardous waste, solid waste, recycling, construction debris, erosion control, catch basin stenciling	n/a	n/a
NPDES Permit - Modify the Sewer Use Ordinance to reflect the language and intent required by the NPDES permit	n/a	n/a
8 - Public Notification		
Public Education - 6 stakeholders meetings held and 5 newsletters distributed during project; pertinent parties are notified during overflow and bypass events	n/a	n/a
9 - Compliance Monitoring		
Compliance Monitoring - Implement flow monitoring program to confirm effectiveness of CSO controls and provide feedback to refine the LTCP as progress is made	$ 124,000	$ 102,000
TOTAL:	**$ 30,801,000**	**$ 797,000**

Water Quality Results

Figure 2-1 shows that the Short-Term CSO Control Plan results in a 20% reduction in CSO volumes citywide. Baseline projects include the sewer separation projects outlined in the STCP in addition to computer model modifications explained in detail in Appendix B.

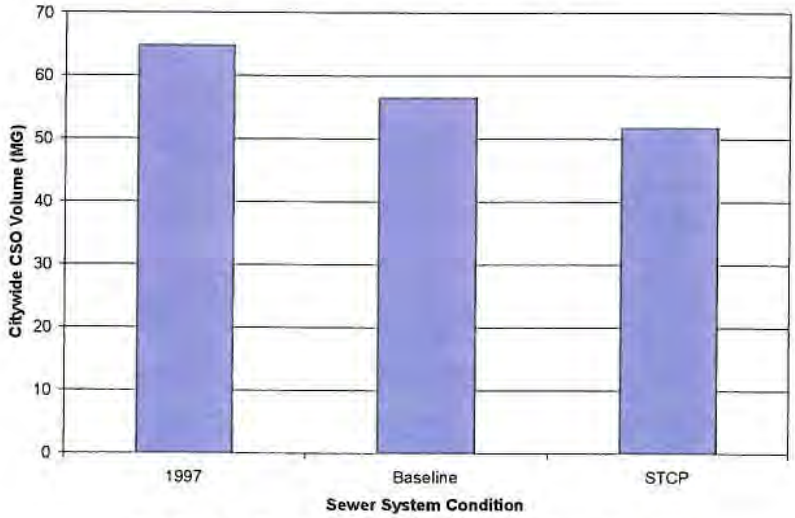


FIGURE 2-1. Projected citywide CSO volumes under 1997, baseline, and short-term control plan conditions.

Figure 2-2 shows the same information distributed into watersheds.

The largest CSO reductions are evident in the Mill River, Quinnipiac River, and New Haven Harbor as the sewer separation projects included under baseline conditions impact these watersheds and maximization of flow to the treatment plant help downstream sewer system conditions more than upstream sewer system conditions. While some of the short-term controls will affect the West River watershed, they are not the types of controls that cause significant CSO reductions. The West River watershed has large-volume CSOs that require significant controls and will therefore be addressed under the long-term control plan. However, because of the sensitivity of the West River to CSO impacts, controls in that watershed are planned early in the implementation of the long-term control plan.

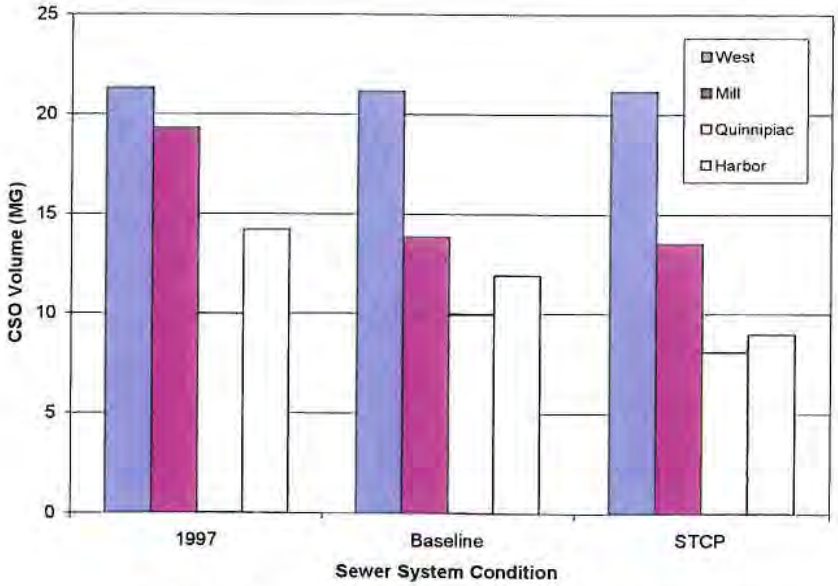


FIGURE 2-2. Projected CSO volumes by watershed under 1997, baseline, and short-term control plan conditions.

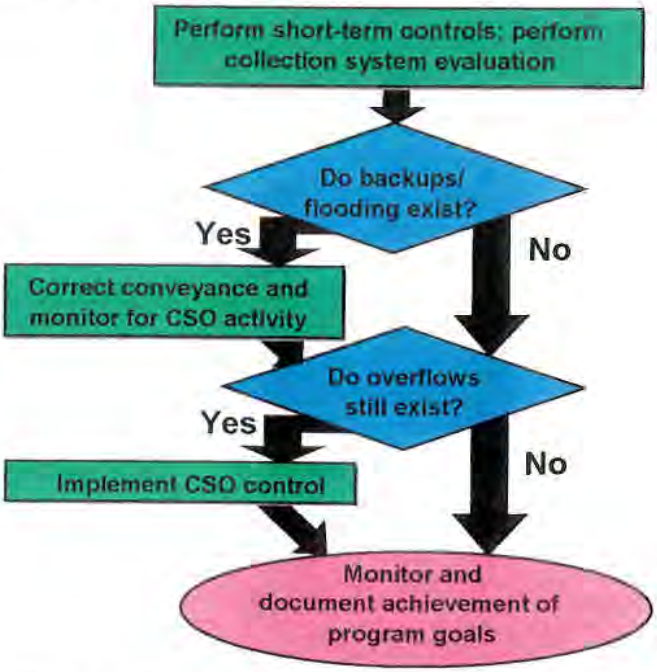
SECTION 3

Long-Term CSO Control Plan

Basis of the Long-Term Control Plan

In the conduct of the Long Term CSO Control Plan Study, a computer model was developed, calibrated, and verified by monitoring results to simulate the hydrology and hydraulics of the City's surface drainage and combined sewer system for pipes greater than 18-inches in diameter. The model was then used to determine:

- Sewer system surcharging,
- Street flooding,
- CSO discharges, and
- Recommendations for improvements



The resulting Long-Term CSO Control Plan developed with continuous stakeholder input is a flexible and dynamic plan that allows for adjustments in the program components as the individual projects are further evaluated. The plan reflects stakeholder and regulatory priorities of

- Performing short-term controls including maximizing use of existing facilities
- Eliminating sewer backups and street flooding through conveyance corrections under wet weather conditions up to and including a 2-year storm
- Eliminating CSOs through long-term controls which have been optimized by conveyance corrections under wet weather conditions up to and including a 2-year storm

Due to the dynamic and flexible approach being undertaken as part of the CSO control program, it should be noted that the recommendations listed are possible resolutions to very complex hydraulic issues and that these recommendations may change as this approach is implemented city-wide and additional information becomes available as a result of the collection system evaluation. It should also be noted that this is a CSO control plan and that recommendations may change during future design and construction phases where

thorough analyses of field conditions are made. These recommendations are made utilizing planning level tools.

Components of the Long-Term Control Plan

This section briefly describes the primary components of the long-term plan:

- Collection system evaluation
- Boulevard sewershed issues and recommendations
- East Street sewershed issues and recommendations
- East Shore sewershed issues and recommendations

Figure 3-1 shows the CSO locations and individual sewersheds discussed in this section. Table 3-1, at the end of this section, summarizes the issues, recommendations, and construction and operation and maintenance costs for each of the plan components presently proposed. Cost details are provided in Appendix C.

Collection System Evaluation

Within New Haven

The objective of the collection system investigation is to specifically locate and quantify significant inflow and infiltration sources to determine the cost-effectiveness of removal. The major program steps are as follows:

1. **Collect/review existing data and perform field investigations** - The program will be initiated with collection and review of relevant data on the collection system, coupled with field investigations to identify control points, possible monitoring locations in each catchment, and other characteristics.

2. **Perform flow monitoring** - The program continues by performing flow metering within each catchment and analyzing the data to quantify the inflow, infiltration and rain-induced-infiltration (RII) components of wet weather flows. For planning purposes 31 discrete catchments were identified within the combined sewer area of New Haven. The number of flow meters estimated to be used in each catchment is based on the catchment area, using an allocation of roughly one flow meter per 100 acres with a minimum of two flow meters for any catchment. A twelve-week time period for installation of each flow meter has been conservatively budgeted as it is often weather-dependent.

3. **Perform smoke testing where necessary** - The actual subsequent field investigations to be performed in each catchment will be defined based on the analysis of the flow metering data. The principal inflow investigative technique budgeted at this time is smoke testing, which is an excellent tool for locating inflow sources such as connected roof leaders and catch basins. The budget allocates 225 crew-days for this task that represents near saturation testing of each catchment.

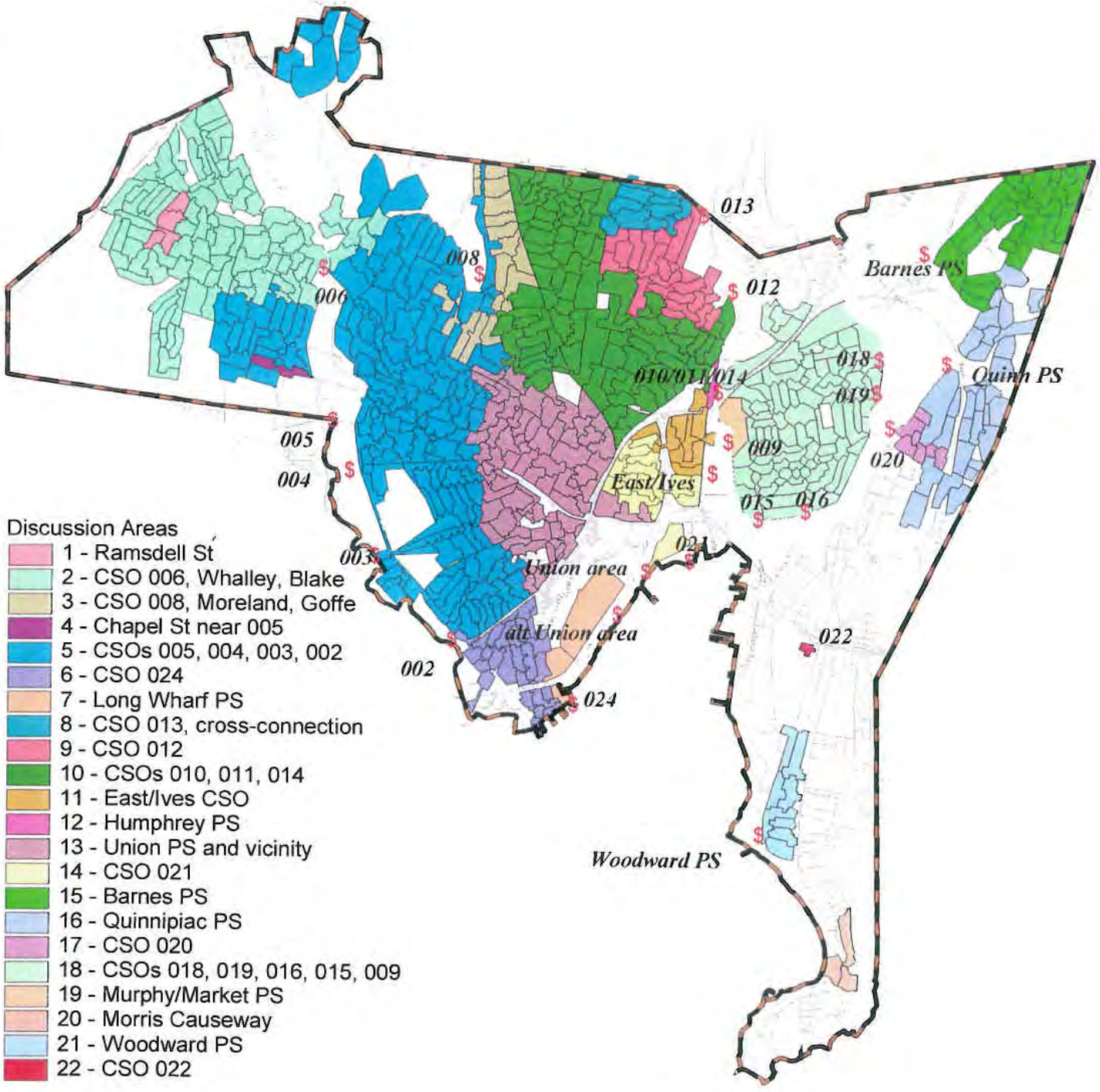


Figure 3-1
Discussion Areas

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New Haven Long Term CSO Control Plan

4. **Perform closed circuit television inspection where necessary** - The extent of RII and infiltration source investigations that will be required will be more accurately estimated upon completion of the flow monitoring data analysis. For budgeting purposes a closed circuit television inspection program has been included which targets 30% of the sewers for inspection. It is expected that this quantity will be modified after analysis of the flow monitoring data, and that this budget will be re-evaluated and possibly re-allocated, with the potential inclusion of other inflow investigative techniques such as dyed water testing or water flooding tests.

5. **Analyze data and prepare recommendations** - Upon completion of the field investigations, the identified inflow, infiltration, and RII sources will be tabulated. The volume of each extraneous flow component will be quantified, and a cost-effectiveness analysis (CEA) will be performed. The CEA will provide the data to evaluate the impact of disconnection of extraneous flow sources on the proposed CSO facilities.

External to New Haven

New Haven has agreements with the neighboring towns of Woodbridge, Hamden, and East Haven to accept and treat some sanitary flows. The locations where flow meters have been installed to determine the amount of flow entering New Haven's boundaries are listed below. There are two metering points for Woodbridge, seven for Hamden, and four for East Haven.

- NH01 – Fountain Street (Woodbridge)
- NH02 – Litchfield Turnpike (Woodbridge)
- NH03 – Dixwell Avenue (Hamden)
- NH04 – Winchester Avenue (Hamden)
- NH05 – Whitney Avenue (Hamden)
- NH06 – Foxon Road (East Haven)
- NH07 – Foxon Park South/Eastern Street (East Haven)
- NH09 – Dodge Avenue/Dean Street (East Haven)
- NH10 – Ora Avenue/Dean Street (East Haven)
- NH11 – East Rock Road/Park Drive (Hamden)
- NH12 – Thorpe Drive/Brookside Drive (Hamden)
- NH13 – Welton Street (Hamden)
- NH14 – Arch Street (Hamden)

The locations are shown in Figure 3-2, which plots each point with a magnitude for its peaking factor during a 2-year storm. The peaking factor was calculated based on modeled hydrographs as the peak wet weather flow divided by the peak dry weather flow. Many of these locations have relatively small flow rates, so a large peaking factor does not necessarily connote a large flow rate. However, all these communities have separated sewer systems, and a large peaking factor would not be expected to occur in a separated system unless it is experiencing a lot of infiltration and inflow.

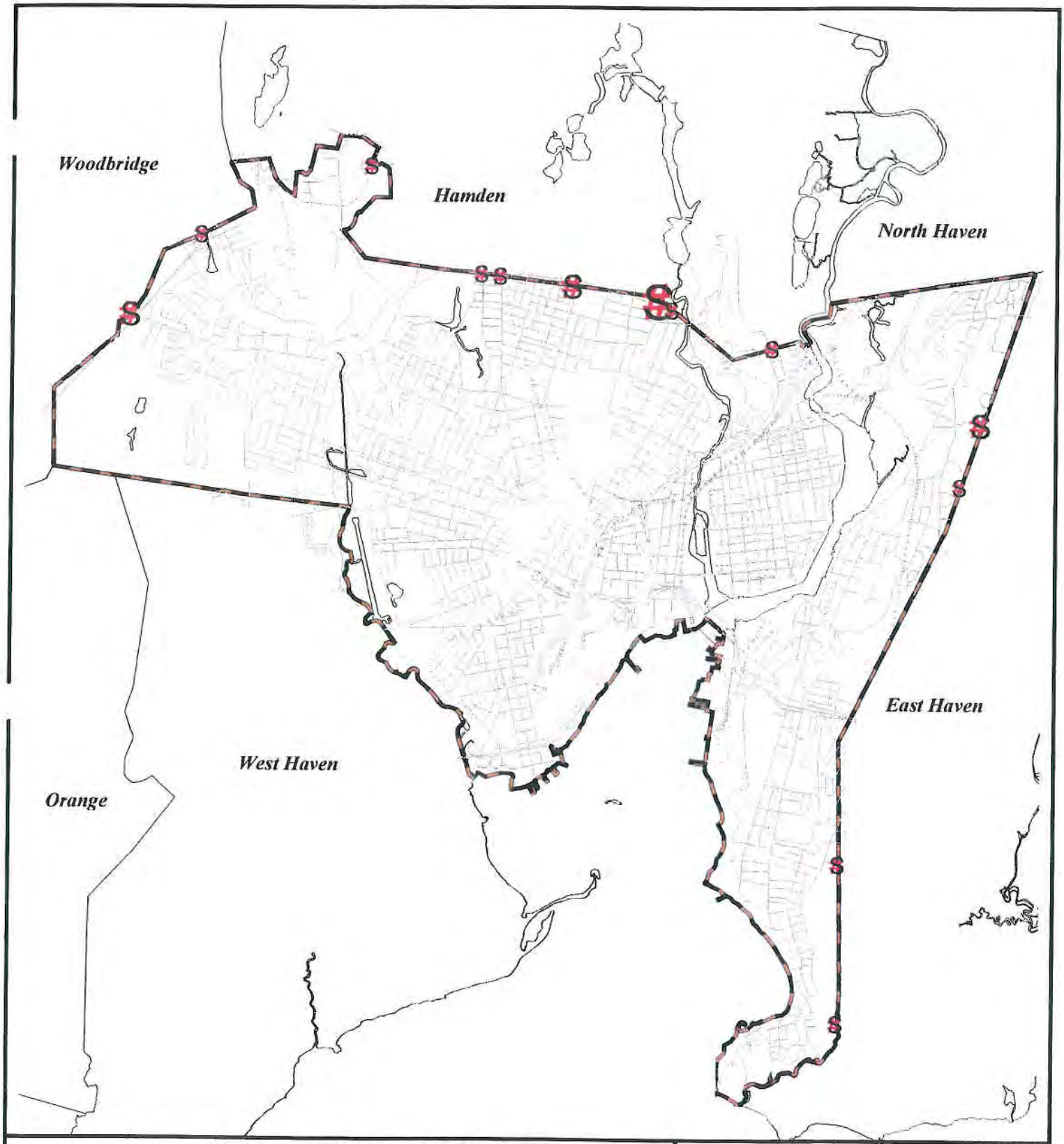

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Figure 3-2

Wet-Weather Peaking Factors for Flow from External Communities

New Haven Long Term CSO Control Plan

The interlocal agreements between New Haven and the other communities specify the control of infiltration and inflow (I/I) in two ways: via a maximum peak hourly flow and through specification of a permitted rate of infiltration of groundwater per inch diameter-mile-day. Some computer model tests based on available data suggested that some of the inflow sites can exceed the I/I allowed under their agreements during wet weather.

The following recommendations are made based on modeling results that included disconnection of roof leaders in all areas where separation was already performed or is to be performed in a future project. Variations in sewer system modifications could affect sizing, design, and construction of storage tanks or other infrastructure recommendations.

Boulevard Sewershed Issues and Recommendations

Ramsdell Street

Definition of the problem: The sewers in this area are separated; however, the impacts of wet-weather flows are still evident in the separated sewers. The computer model indicates significant sewer system surcharging and street flooding in this area; the 1999 WPCA Complaint Database also indicates some basement backups and flooding. There may also be a hydraulic constriction in the sewer along Ramsdell Street, just north of Fairfield Street, as noted in TM #8, *Nine Minimum Controls Report (Part 2 of 2)*. A 250 linear-foot (LF) section of 10-inch diameter pipe between two sections of 15-inch diameter pipe is indicated in the Geographic Information System (GIS) and included in the model but is not confirmed by City staff. Surcharging, backups, and flooding result from excess wet weather flow in the sewers with inadequate capacity in the sewer system downstream, and would be exacerbated by the hydraulic bottleneck.

Recommendation: Perform collection system evaluation (including confirmation of the existence or non-existence of the bottleneck) to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

CSO 006, Whalley Avenue from City Limits to Fitch Street, and Blake Street

Definition of the problem: CSO 006 - Whalley/Fitch discharges to the West River in Edgewood Park just south of the intersection of Whalley Avenue and Fitch Street. In addition the computer model indicates significant sewer system surcharging and street flooding in this area; the 1999 WPCA Complaint Database also indicates sewer backups and street flooding. This area of the system consists predominantly of separated sewers. The CSO and flooding are a result of excess wet weather flow in the sewers and inadequate capacity in the sewer system downstream. This CSO is strongly affected by backwater from the downstream interceptor.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications. It is anticipated that storage will be necessary to address the CSO.

CSO 008 (Munson/Orchard), Moreland Road and Goffe Street

Definition of the problem: CSO 008 - Munson/Orchard discharges to Beaver Ponds. The drainage area associated with CSO 008 - Munson/Orchard is partially separated. Discharges from CSO 008 - Munson/Orchard result from excess wet weather flow in the sewers and inadequate capacity in the sewer system downstream (the downstream sewer connects to the regulator chamber for CSO 005 at Derby Avenue and E.T. Grasso Boulevard). The computer model has indicated significant street flooding and surcharging along Moreland Road and Goffe Street; the 1999 WPCA Complaint Database also indicated some street flooding and sewer backups in this area.

Recommendation: Separating the roof leaders in the already partially separated area in the computer model appears to eliminate the CSO and flooding in this area. It is recommended to perform a collection system evaluation to identify significant inflow sources, perform necessary sewer system modifications, and monitor to confirm abatement of CSO activity and flooding.

Chapel Street Upstream of CSO 005

Definition of the problem: The sewers along Chapel Street area are separated; however, flooding to ground surface was indicated by the computer model during the simulated 2-year storm. The flooding is a result of excess wet weather flow in the sewers and inadequate capacity in the sewer system downstream.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

CSOs 005 (Boulevard/Derby), 004 (Boulevard /Legion), 003 (Boulevard /Orange), and 002 (Boulevard /Lamberton)

Definition of the problem: These overflows are located along the Boulevard interceptor and discharge to the West River. The Boulevard interceptor receives flow from several tributary sewers, which makes the reduction of surcharging and CSO along this interceptor difficult. Controls will be required in the tributary areas upstream. The interceptor has a very flat gradient, resulting in sediment being deposited at the bottom of the pipes over time to a hardened depth of up to 1 foot. There is persistent surcharging in the interceptor, but flooding at the ground surface is not widespread or critical because of relief provided by the four overflow regulators.

Recommendation: Perform collection system evaluation and necessary sewer system modifications. Separate storage tanks are proposed to contain the overflows at CSOs 005 - Blvd/Derby, 004 - Blvd/Legion, 003 - Blvd/Orange, and 002 - Blvd/Lamberton.

Regulator 005 – Blvd/Derby has complex hydraulics that may contribute to the accumulation of sediment in the Boulevard interceptor. It is recommended that the existing sediment near the regulator chamber be removed and the site be monitored to determine how long the site will remain sediment-free under typical conditions. A possible solution to promote better hydraulics in the regulator chamber was proposed in TM #8, *Nine Minimum Controls Report (Part 2 of 2)*. It is anticipated that streamlining the hydraulics of this regulator chamber will decrease the CSO volume at 005 – Blvd/Derby but increase the CSO

volume at 004 – Blvd/Legion. Since storage tanks are proposed as the controls at both of these sites, the regulator fix is not expected to aid in CSO control. Therefore, the cost of changing the regulator chamber must be weighed against the need to streamline the hydraulics and minimize the propensity for sediment accumulation in this area.

The source of sediment should be identified and controlled to the extent feasible. Once the sources are identified, increased best management practices (surface pollutant controls include street sweeping and catch basin cleaning and sewer deposition pollutant controls include the installation of sedimentation chambers on trunk sewers) can be considered which would allow the sediment to be eliminated to gain back lost capacity. A pilot program could be begun of source identification, source control, and sewer cleaning during the monitoring phase to observe the program's effectiveness. The flexibility of the proposed long-term plan allows for changes to be made to the plan if new information supports other recommendations.

CSO 024 (Boulevard Pump Station)

Definition of the problem: CSO 024 - Boulevard Pump Station discharges to New Haven Harbor. The Boulevard interceptor ends at CSO 024 - Boulevard Pump Station just upstream of the Boulevard Pump Station. The Boulevard Pump Station is a major pump station that handles approximately one-third of the total system wastewater flow. The City indicates that there is significant wet-weather inflow to this pump station from I-95 drainage that can increase the amount of flow this pump station needs to convey, and that I-95 experiences periodic flooding problems in this area due to the pump station not conveying wet-weather flow fast enough. A motorized sluice gate at the Boulevard Pump Station is intended to control the opening of the 48-inch diameter influent pipe to the pump station to prevent the water level in the wet well from exceeding the floor elevation of the pump station. Due to the inability of this arrangement to reliably control the wet well level during wet weather events, this sluice gate has been fixed at approximately 40% open. The computer model confirms that during wet weather the pump station is not able to use its full pumping capacity (three 8,000-gallon-per-minute (gpm) pumps) to convey flow to the East Shore treatment plant because of this upstream constriction in the flow to the station. Excess wet weather flow in the sewers backs up and discharges through overflow 024 - Boulevard Pump Station.

Recommendation: There is currently a project underway to improve the controls at the pump station. As part of this project, the instrumentation that provides real-time control of the influent sluice gate is being reviewed and improved. Fully opening the sluice gate was tested in the computer model to determine the impacts. The results showed that surcharging in the Boulevard interceptor and tributary sewers was reduced, the full pumping capacity of the station was able to be utilized, and the volume of CSO 024 - Boulevard Pump Station was reduced. The pump station was able to achieve an increase of approximately 8 mgd in flow to the treatment plant (although new controls will probably prevent the sluice gate from being fully opened in a storm as large as the 2-year event in order to prevent flooding the wet well, so the increase in conveyance for such a storm may be less). It is recommended that existing equipment (controls, motors, drives) be evaluated with regard to the need to replace old equipment and gain better control over the pump station. A storage tank may be required to address the CSO, and its volume is highly dependent on the maximum achievable sluice gate opening, resultant maximum flow

through the Boulevard Pump Station, and the conveyance capacity of the force main. Also, since the Boulevard flow combines with the flow from the East Street Pump Station into a common force main that flows directly to the East Shore Water Pollution Abatement Facility, any modification to its capacity and/or operation will have impact on the treatment facility, which must be considered and addressed. It is recommended that as the current controls project continues, wet-weather monitoring of the surcharging in the interceptor and the CSO be conducted. It is also recommended to work with the Connecticut Department of Transportation (CONNDOT) to eliminate significant wet-weather inflow from I-95.

Long Wharf Pump Station

Definition of the problem: This is a small pumping station that collects flow from a small drainage area along Sargent Drive and discharges to Boulevard Pump Station. There are no overflows in this tributary area but surcharging in the sewer downstream of the pump station, which is the influent pipe to the Boulevard Pump Station, can affect its discharge. The flow levels in the sewer upstream of Long Wharf Pump Station have exceeded the ground surface elevation in the computer model.

Recommendation: The model indicates that increasing the pump capacity of the Long Wharf Pump Station will resolve flooding.

East Street Sewershed Issues and Recommendations

CSO 013 (East Rock Road) and Nearby Cross-Connection

Definition of the problem: CSO 013 - East Rock Road discharges to the Upper Mill River. The CSO 013 - East Rock Road outfall pipe has a connection to a storm sewer (i.e. cross-connection) which also discharges to the Mill River. This cross-connection enables CSO to be discharged at two locations, one of which is unpermitted.

Recommendation: Separating the roof leaders in this already partially separated area appears to significantly reduce (nearly eliminate) the CSO in the computer model. It is recommended to perform a collection system evaluation to identify significant inflow sources, perform necessary sewer system modifications, and monitor to confirm significant reduction or abatement of CSO activity. It is also recommended to work with neighboring communities to reduce their wet weather inflow into New Haven's collection system. Based on model results, it is anticipated that the CSO could be sealed after the significant inflow is removed to eliminate the CSO completely. It is recommended to confirm with monitoring that sealing the overflow will cause no adverse impacts. Sealing this overflow would eliminate the need to address the cross-connection.

CSO 012 (Mitchell/Nicoll), 010 (East/I-91), 011 (Humphrey/I-91), 014 (Trumbull/Orange), and East/Ives CSO

Definition of the problem: CSOs 012 - Mitchell/Nicoll, 010 - East/I-91, 011 - Humphrey/I-91, 014 - Trumbull/Orange, and the East/Ives CSO discharge to the Mill River. The drainage areas tributary to these CSO regulators are either combined or partially separated. The wet-weather inflow to the sewer system is therefore substantial. Although there is persistent surcharging in the sewers, flooding at ground surface is not widespread or critical.

Recommendation: Perform collection system evaluation and necessary sewer system modifications. The computer model indicates that inflow reduction will eliminate CSO 010 - East/I-91 and the East/Ives CSO. Perform follow up monitoring to confirm removal of significant inflow sources and abatement of CSO activity. It is also recommended to work with neighboring communities to reduce their wet weather inflow into New Haven's collection system. Storage is proposed to contain the overflows at CSOs 012 - Mitchell/Nicoll, 011 - Humphrey/I-91, and 014 - Trumbull/Orange. A common storage tank is proposed for CSOs 011 - Humphrey/I-91 and 014 - Trumbull/Orange; a separate storage tank is proposed for CSO 012 - Mitchell/Nicoll.

Humphrey Pump Station

Definition of the problem: This is a small pumping station that receives flow from a small drainage area from the north. There is a wet-weather bypass at the pump station that the model indicates is active during the 2-year storm. Surcharging in the sewer upstream of the pump station has exceeded the ground surface elevation in the computer model.

Recommendation: Perform collection system evaluation, including confirming wet-weather bypass activity and determining extent of wet-weather surcharging and flooding. Perform necessary sewer system modifications. The model methodology causes small areas like this one to be modeled conservatively[1]. Further modeling of this area at a finer scale that includes small neighborhood pipes and more spatial distribution of stormwater runoff may be worthwhile. If necessary, perform further sewer and pump station modifications to address surcharging and flooding problems. The model indicates that the bypass may still be active during a 2-year storm after the proposed sewer and pump station modifications are implemented; however, the discharge is very small. Additional monitoring is necessary to confirm whether the bypass is active for storms of up to 2-year return frequency. If it is active, then it is recommended that the overflow be addressed by the proposed storage tank that also addresses CSOs 011 - Humphrey/I-91 and 014 - Trumbull/Orange.

CSO 025 (Union Pump Station), George/Temple Street CSO, South Frontage/Davenport CSO, Union and Columbus Avenues, Water Street

Definition of the problem: CSO 025 - Union Pump Station, the George/Temple CSO, and the South Frontage/Davenport CSO discharge to New Haven Harbor. The sewers in the George Street/Temple Street and Union Avenue/Columbus Avenue areas upstream of the Union Pump Station have constrictions; these areas, along with Water Street downstream of the pump station have excessive wet-weather flow, resulting in surcharging and flooding to the ground surface in the computer model; the 1999 WPCA Complaints Database also indicates street flooding.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications. It is anticipated that storage will be necessary to address the CSOs.

[1] For example, the hydrograph may be less attenuated due to the exclusion of pipes with diameters less than 18" from the model. The hydrograph may also exhibit a sharp peak due to the introduction of stormwater runoff into the model at a limited number of locations.

CSO 021 (East Street Pump Station)

Definition of the problem: CSO 021 - East Street Pump Station discharges to New Haven Harbor and is located just upstream of the East Street Pump Station. The East Street Pump Station is a major pump station that controls about a third of the total system wastewater flow. It receives flows from the Union Pump Station and other areas via the East Street interceptor. However, the East Street Pump Station does not have sufficient capacity to convey the peak flows during a 2-year storm, thus limiting conveyance in the East Street interceptor and restricting the flow that can be pumped by the Union Pump Station. Since its discharge combines with the flow from the Boulevard Pump Station into a common force main that flows directly to the East Shore Water Pollution Abatement Facility, any modification to its capacity and/or operation will have an impact on the treatment facility which must be considered and addressed.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications. It is recommended that existing equipment (controls, motors, drives) be evaluated with regard to the need to replace old equipment and gain better control over the pump station. It is anticipated that a storage tank will be required to control the overflow from CSO 021 - East Street Pump Station.

East Shore Sewershed Issues and Recommendations

Barnes Pump Station

Definition of the problem: In this separated area of New Haven's sewer system the computer model indicates significant sewer system surcharging along the interceptor in Middletown Avenue; the 1999 WPCA Complaint Database indicates some sewer backups along Middletown Avenue and street flooding further to the northeast. In addition, the Barnes Pump Station has provision for wet weather overflow.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

Quinnipiac Pump Station

Definition of the problem: This area has a separated sewer system. The computer model indicates significant sewer system surcharging and some street flooding along the Quinnipiac Interceptor; the 1999 WPCA Complaint Database also indicates some street flooding in the area near the pump station. In addition, the Quinnipiac Pump Station has provision for wet weather overflow.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

CSO 020 (Quinnipiac/Clifton)

Definition of the problem: CSO 020 - Quinnipiac/Clifton is located at the intersection of Quinnipiac Avenue and Clifton Street and discharges to the Quinnipiac River, directly adjacent to a proposed public boat launch. This area has a separated sewer system. The

computer model indicates significant sewer system surcharging in the interceptor along Quinnipiac Avenue to the point of its connection with the discharge from the James Street Siphon; the 1999 WPCA Complaint Database indicates at least one sewer backup complaint during 1999 along the Quinnipiac Interceptor.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

CSOs 018 (N. Front/Lombard), 019 (N. Front/Pine), 016 (Poplar/River), 015 (James St. Siphon), 009 (James/Grand)

Definition of the problem: There are five CSOs in the Fair Haven area of New Haven: 018 - N. Front/Lombard, 019 - N. Front/Pine, 016 - Poplar/River, 015 - James St. Siphon, and 009 - James/Grand. CSOs 018 - N. Front/Lombard, 019 - N. Front/Pine, 016 - Poplar/River, and 015 - James St. Siphon discharge to the Quinnipiac River. CSO 009 - James/Grand discharges to the Mill River. The computer model indicates that significant sewer system surcharging and some street flooding occur along Front Street, River Street, James Street, and Poplar Street in this primarily combined sewer area of Fair Haven; the 1999 WPCA Complaint Database indicates complaints of sewer backups and street flooding in Fair Haven. The sewer along River and Front Streets has a wide but shallow cross-section with a particularly flat slope, which contribute to sediment deposition and flooding problems.

Recommendation: Perform collection system evaluation. Perform complete sewer separation and seal CSOs 018 - N. Front/Lombard and 019 - N. Front/Pine. It is anticipated that new sanitary and new storm sewers will need to be constructed to perform the separation and address the significant sedimentation problem in this area. The possibility of installing a low-lift pump station at the downstream end of the James Street Interceptor to allow a steeper gradient in the new upstream sewer should be considered. The model indicates that small overflows may remain at CSOs 016 - Poplar/River, 015 - James St. Siphon, and 009 - James/Grand. It is possible that monitoring will show these CSOs to be inactive during a 2-year rain event after complete sewer separation has taken place. If not, additional alternatives would need to be evaluated including construction of small storage tanks.

Murphy/Market Pump Station

Definition of the problem: The computer model indicates that sewer surcharging and possibly some street flooding may occur upstream of the Murphy/Market Pump Station, even after sewer separation has been performed in Fair Haven. It has been noted by the City that the road elevation in this area is below the elevation of the Mill River at its higher stages. Though it would not be confirmed by the model developed for this project (which does not address surface water flooding), some street flooding may be due to river water.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

Morris Causeway

Definition of the problem: The computer model indicates that sewer surcharging occurs upstream of the Morris Cove Pump Station during wet weather. The 1999 WPCA Complaints Database includes complaints of street flooding in this area. This part of New Haven's sewer system is separated.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the extent of surcharging and flooding and the need for sewer modifications. Perform necessary sewer modifications.

Woodward Pump Station

Definition of the problem: The computer model indicates that sewer surcharging occurs in the vicinity of the Woodward Pump Station during wet weather. In addition, this pump station has provision for wet weather overflow. Modeling indicates that the wet well for this pump station is not large enough to accommodate peak flow during a 2-year rain event, and the pumps do not have the capacity to convey those peak flows during this event. This area of New Haven's sewer system is already fully separated.

Recommendation: Perform monitoring to evaluate the need for storage to control the overflow. If necessary, construct a storage tank to control the CSO.

CSO 022 (Allen Place)

Definition of the problem: CSO 022 - Allen Place discharges to a drainage ditch which ultimately leads to New Haven Harbor. A large storm sewer which conveys I-95 highway drainage to CSO 022 - Allen Place has a small sanitary sewer connected to it that conveys flow from five buildings south of Forbes Avenue between Townsend Avenue and Woodward Avenue. The CSO regulator chamber diverts dry weather flows to the treatment facility; however, during wet weather the stormwater and sanitary flows are combined and overtop the regulator weir, sending combined sewage to CSO 022 - Allen Place. Since CSO 022 - Allen Place receives a high volume of stormwater during wet weather, and since the weir is relatively low, this site appears to overflow frequently, but only a very small portion of the discharge is sanitary wastewater. This area of the sewer system is fully separated except for this cross-connection.

Recommendation: Perform collection system evaluation to identify significant inflow sources and determine the need for sewer modifications. Perform necessary sewer modifications. It is recommended to disconnect the laterals for these five buildings from the storm sewer, reconnect them to the sewer below Forbes Avenue, and seal the cross-connection at Allen Place, thereby eliminating the CSO.

TABLE 3-1 New Haven Long-Term CSO Control Plan Recommendations

Location	2-Year Storm Impact	Recommendation	Year 2000 $	
			Coll. Syst. Eval. & Const. Cost	O&M Cost
BOULEVARD SEWERSHED				
Ramsdell	Street flooding & sewer backups	1) Perform collection system evaluation and confirm if a 10" diameter, 250 LF bottleneck exists on Ramsdell Street 2) Perform rehabilitation focusing on the Brooklawn Circle area[1] and, if follow-up monitoring verifies that problems continue after the collection system evaluation and rehabilitation is complete, consider increasing 1,700 LF of 15" pipe (or 1,450 LF of 15" pipe and 250 LF of 10" pipe if bottleneck was confirmed) to 30" along Ramsdell Street from Fountain Street to Whalley Avenue, 225 LF of 8" pipe to 15" along Fountain Street from Cooper Place to Ramsdell Street, and 450 LF of 12" pipe to 24" along Lowin Avenue midway between Judwin Avenue and Fountain Street plus along Fountain Street between Lowin Avenue and Ramsdell Street (new sewer inverts should also be lowered to match pipe crowns)	$800,000	n/a
CSO 006 (Whalley/Fitch), Whalley/Blake	CSO = 4.6 MG, street flooding, & sewer backups	1) Perform collection system evaluation 2a) Using additional monitoring information from the system evaluation, model the following scenario: a) completing sewer separation in this catchment, b) constructing new sewer to reroute Whalley Avenue flows around the upper Boulevard interceptor, connecting to the interceptor at Chapel Street, c) increasing capacity of the West Rock Pump Station, d) abandoning existing connection between upper and lower Whalley Avenue at Fitch Street, and e) constructing storage tank to address remaining CSO 2b) Compare the above modeling scenario to the following sewer system modification: a) adding 8,600 LF of parallel sewer along Whalley Avenue from the City limits to Fitch Street (includes 6,565 LF of 30" diameter, 2,036 LF of 36" diameter, and 8 LF of 42" diameter pipe - new sewer inverts should be lowered to match pipe crowns), b) reconstructing regulator, and c) constructing 5.5 MG CSO storage tank (storage tank may be downsized by approximately 20% if sewer modifications discussed in Item 3a are not performed) 3) Select and construct preferred sewer system modification	$15,800,000	$14,000
CSO 008 (Munson/Orchard), Moreland/Goffe	CSO = 0.2 MG, street flooding, & sewer backups	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation	$3,100,000	n/a
Chapel Street upstream of 005	Street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation and consider increasing 1,800 LF of 12" pipe to 24" along Chapel Street from Alden Avenue to Yale Avenue (new sewer inverts should be lowered to match pipe crowns)	$600,000	n/a
CSO 005 (Boulevard/Derby)	CSO = 5.2 MG	1) Perform collection system evaluation 2) Identify sediment source, implement sedimentation controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 4.2 MG storage tank	$39,800,000	$27,000
CSO 004 (Boulevard/Legion)	CSO = 6.0 MG	1) Perform collection system evaluation 2) Identify sources of sedimentation, consider implementation of controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 4.9 MG storage tank		$25,000
CSO 003 (Boulevard/Orange)	CSO = 4.3 MG	1) Perform collection system evaluation 2) Identify sources of sedimentation, consider implementation of controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 3.9 MG storage tank		$16,000
CSO 002 (Blvd/Lamberton)	CSO = 1.0 MG	1) Perform collection system evaluation 2) Identify sources of sedimentation, consider implementation of controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 0.9 MG storage tank	$4,300,000	$5,000
CSO 024 (Blvd Pump Station)	CSO = 3.3 MG	1) Perform collection system and pump station evaluation and monitor impacts of current controls project that will provide more reliable control over influent sluice gate 2) Work with ConnDOT to eliminate significant wet-weather inflow from I-95[1] 3) Perform sewer system and pump station modifications or rehabilitation 4) Construct approximately 3.2 MG storage tank	$11,200,000	$5,000
Long Wharf Pump Station	Street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation 3) If problems continue after rehabilitation, consider increasing pump station maximum pumping rate from 700 to 2240 gpm in conjunction with increasing the force main diameter from 6" to 10"	$300,000	n/a

TABLE 3-1 New Haven Long-Term CSO Control Plan Recommendations

Location	2-Year Storm Impact	Recommendation	Year 2000 $	
			Coll. Syst. Eval. & Const. Cost	O&M Cost
EAST STREET SEWERSHED				
CSO 013 and nearby cross-connection (East Rock Road)	CSO = 0.1 MG & cross connection to storm sewer	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's collection system 2) Perform sewer system modifications or rehabilitation	$1,200,000	n/a
CSO 012 (Mitchell/Nicoll)	CSO = 1.5 MG	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's collection system 2) Perform sewer system modifications or rehabilitation 3) If necessary, construct approximately 0.7 MG storage tank	$6,800,000	$7,000
CSO 010 (East/I-91)	CSO = 0.8 MG	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation; if monitoring confirms conveyance problems, consider increasing 850 LF of 18" pipe to 30" along State Street from Grove Street to Trumbull Street 3) Construct approximately 6.0 MG storage tank for 011, 014, and Humphrey Pump Station	$28,000,000	n/a
CSO 011 (Humphrey/I-91)	CSO = 7.9 MG			$18,000
CSO 014 (Trumbull/Orange)	CSO = 0.8 MG			
East/Ives CSO	CSO = 0.3 MG	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation	$800,000	n/a
Humphrey Pump Station	CSO = 0.1 MG & street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation 3) Using additional monitoring data, assess whether more detailed hydraulic modeling of this catchment should be performed (i.e. including smaller diameter neighborhood pipes). If so, model and compare with previous model results. If results are similar and surcharge persists, consider increasing the maximum pump capacity from 350 to 1,050 gpm in conjunction with increasing the force main diameter from 6" to 10" and increasing 530 LF of 18" pipe to 30" along Mill River Street from just south of the northbound I-91 lane (just north of the end of Mill River Street) to approximately Humphrey Street in conjunction with an additional 20 LF of 10" pipe to 30" connecting this pipe to the pump station 4) Monitor to confirm CSO control. If storage is still needed, combine storage requirement with storage tank for CSOs 011/014	$600,000	n/a
S. Frontage/Davenport CSO	CSO = 0.7 MG	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation and consider a) moving Union Pump Station one city block north and adding 6000 LF of 36" force main from the Union PS to the East Street PS to maximize conveyance through the Union PS, b) increasing 75 LF of parallel pipe from 8" and 15" to 24" parallel pipes upstream of the Union PS near the intersection of Union and Columbus Avenues 3) Construct an approximately 1.2 MG storage tank for CSO 025 and George/Temple CSO and, if still necessary, an approximately 0.2 MG storage tank for South Frontage/Davenport	$17,400,000	$5,000
CSO 025 (Union Pump Station)	CSO = 2.7 MG			$5,000
George/Temple CSO	CSO = 0.9 MG			
Union/Columbus Avenues & Water Street	Street flooding			n/a
CSO 021 (East St Pump Station)	CSO = 4.2 MG	1) Perform collection system and pump station evaluation 2) Perform sewer system modifications or rehabilitation 3) Construct approximately 0.6 MG storage tank for CSO 021 4) Perform pump station modifications and consider increasing the max pump capacity from 29,700 gpm to 43,540 gpm which the model suggests will increase conveyance to the plant by about 17 mgd	$5,500,000	$12,000

TABLE 3-1 New Haven Long-Term CSO Control Plan Recommendations

Location	2-Year Storm Impact	Recommendation	Year 2000 $	
			Coll. Syst. Eval. & Const. Cost	O&M Cost
EAST SHORE SEWERSHED				
Barnes Pump Station	CSO = 0.3 MG, street flooding, & basement backups	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's system 2) Perform extensive sewer system rehabilitation[2]	$2,200,000	n/a
Quinnipiac Pump Station	CSO = 0.5 MG & street flooding	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's system 2) Perform extensive sewer system rehabilitation[2]	$1,400,000	n/a
CSO 020 (Quinnipiac/Clifton)	CSO = 0.4 MG & street flooding	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's system 2) Perform extensive sewer system rehabilitation[1]	$100,000	n/a
CSO 018 (N. Front/Lombard)	CSO = 0.6 MG, street flooding, & basement backups	1) Perform collection system evaluation 2) Perform sewer system rehabilitation and sewer separation; consider installing a new sanitary interceptor along Front, River, and James Streets and a low lift pump station near the James Street siphon to provide sanitary sewers with steeper slopes 3) Seal 018 and 019 and construct 0.1, 0.2, and 0.2 MG storage tanks for 016, 015 and 009, respectively, as necessary.	$45,100,000	n/a
CSO 019 (N. Front/Pine)	CSO = 0.9 MG, street flooding, & basement backups			n/a
CSO 016 (Poplar/River)	CSO = 3.7 MG & street flooding			$16,000
CSO 015 (James St. Siphon)	CSO = 3.6 MG & street flooding			$56,000
CSO 009 (James/Grand)	CSO = 2.4 MG & street flooding			$12,000
Murphy/Market Pump Station	Street flooding	1) Street built below flood elevation, no recommendations to alter road included here[1]; perform collection system evaluation 2) Perform sewer system modifications modifications if necessary	$200,000	n/a
Morris Cove	Street flooding	1) Perform collection system evaluation 2) Perform sewer system rehabilitation focusing on excessive I/I in the Dean, Concord, and Townsend Street areas and work with surrounding communities on reducing wet weather flow into New Haven's system[2]. If necessary, consider increasing 1,500 LF of 18" pipe to 36" along Lighthouse Road and Morris Causeway between Cove Street and the Morris Cove PS and increasing the max pump capacity from 10,025 gpm to 11,350 gpm	$2,800,000	n/a
Woodward Pump Station	CSO = 0.1 MG & street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation 3) If necessary, construct 0.1 MG storage tank	$800,000	$15,000
CSO 022 (Allen Place)	CSO active but volume not quantified	1) Perform collection system evaluation 2a) Connect laterals of buildings on the south side of Forbes Ave between Townsend Ave and Woodward Ave to sanitary sewer along Forbes Ave to eliminate sanitary flow from the highway drainage pipes and thus eliminate CSO 2b) Bulkhead connection to 8" sanitary pipe in chamber at Allen Place to eliminate cross-connection	$100,000	n/a
		TOTALS	$188,900,000	$238,000

[1] Recommendation or comment provided by City and/or WPCA

[2] Recommendation and part of cost estimate provided by City and/or WPCA

SECTION 4

CSO Reductions and Water Quality Improvements

Based on the CSO program components outlined in the previous section, hydrologic and hydraulic computer modeling estimates presented in Figure 4-1 show the citywide decreases in projected CSO volumes from a 2-year storm event. Specific CSO volume reductions under each program phase at individual CSO locations are presented in Table 4-1.

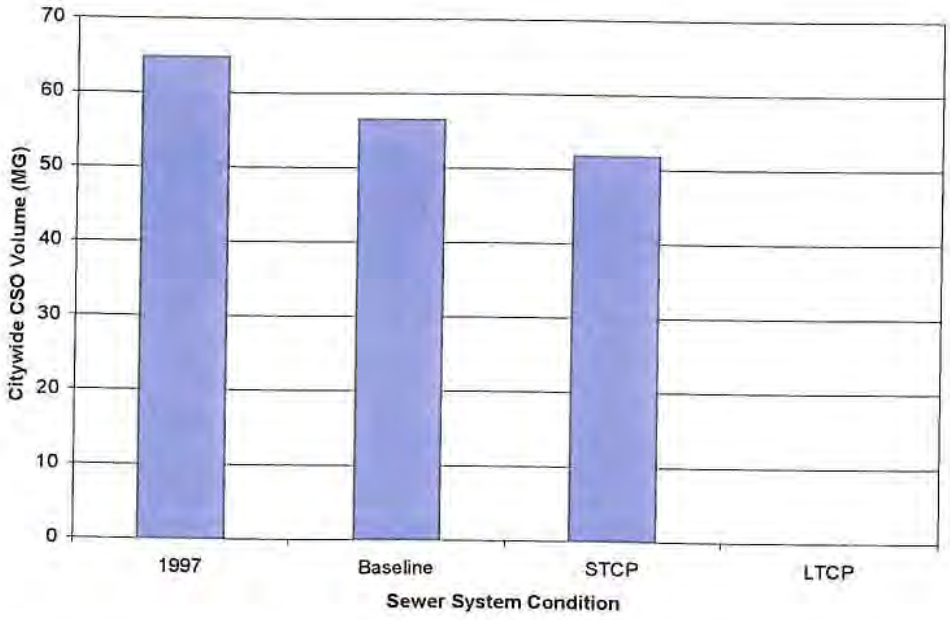


FIGURE 4-1 Projected citywide CSO volumes for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

As shown in the graphic, there are approximately 13% and 20% reductions in CSO discharges citywide (compared to 1997 conditions) after implementation of the baseline controls and short-term controls, respectively. Implementation of the long-term controls brings about a 100% reduction in CSO discharges citywide.

Figure 4-2 shows the reduction in CSO volumes as a result of implementation of the various control plans by watershed.

TABLE 4-1. CSO Volumes (MG) Under Differing Sewer System Conditions

CSO #	Location	1997 Conditions	Baseline Conditions	Short-Term Control Plan	Long-Term Control Plan
WEST RIVER					
006	Whalley/Fitch	4.6	4.6	4.6	0.0
005	Blvd/Derby	5.0	5.2	5.2	0.0
004	Blvd/Legion	6.1	6.0	6.0	0.0
003	Blvd/Orange	4.3	4.3	4.3	0.0
002	Blvd/Lamberton	1.1	1.0	1.0	0.0
	TOTAL	**21.1**	**21.0**	**21.0**	**0.0**
BEAVER PONDS					
008	Munson/Orchard	0.2	0.2	0.2	0.0
	TOTAL	**0.2**	**0.2**	**0.2**	**0.0**
MILL RIVER					
013	East Rock Rd	0.8	0.1	0.1	0.0
n/a	Cross connection at 013	0.0	0.0	0.0	0.0
012	Mitchell/Nicoll	2.7	1.5	1.5	0.0
n/a	Mitchell Pump Station	0.0	0.0	0.0	0.0
010	East/I-91 (upstream)	0.7	0.3	0.5	0.0
010	East/I-91 (downstream)	0.7	0.5	0.0	0.0
011	Humphrey/I-91	9.9	7.9	7.9	0.0
014	Trumbull/Orange	0.9	0.8	0.8	0.0
n/a	Humphrey Pump Station	0.1	0.1	0.1	0.0
009	James/Grand	2.8	2.4	2.4	0.0
n/a	East/Ives	0.7	0.3	0.2	0.0
	TOTAL	**19.3**	**13.9**	**13.5**	**0.0**
QUINNIPIAC RIVER					
n/a	Barnes Pump Station	0.3	0.3	0.3	0.0
n/a	Quinnipiac Pump Station	*	0.5	0.5	0.0
018	N.Front/Lombard	1.7	0.6	0.6	0.0
019	N.Front/Pine	1.5	0.9	0.9	0.0
020	Quinnipiac/Clifton	0.2	0.4	0.4	0.0
016	Poplar/River	1.7	3.7	3.6	0.0
015	James St Siphon	4.6	3.6	1.9	0.0
	TOTAL	**10.0**	**10.0**	**8.1**	**0.0**
NEW HAVEN HARBOR					
n/a	S. Frontage/Davenport	*	0.7	0.7	0.0
n/a	Portsea/Liberty	*	0.0	0.0	0.0
n/a	Carlisle/Liberty	*	*	*	*
021	East St PS	5.4	4.2	1.3	0.0
025	Union PS	4.2	2.7	2.7	0.0
n/a	George/Temple	1.0	0.9	0.9	0.0
022	Allen Place	*	*	*	*
024	Blvd PS	3.5	3.4	3.3	0.0
n/a	Woodward Pump Station	0.1	0.1	0.1	0.0
	TOTAL	**14.2**	**11.9**	**9.0**	**0.0**
	GRAND TOTAL (MG)	**64.8**	**56.5**	**51.8**	**0.0**
	INCREMENTAL CSO REMOVED (MG)	**n/a**	**8.3**	**4.8**	**51.8**
	CONSTRUCTION COST ($ MILLIONS)	**n/a**	**$ 30.2**	**$ 5.5**	**$ 188.9**

n/a = not applicable; no NPDES number assigned

* = overflow not modeled; volume not known

Baseline Conditions include all Short-Term Control Plan (STCP) sewer separation (except Elm Haven Phase II) + Livingston Phases 1 & 2 + repair of the CSO 016 (Poplar Street @ River Street) tide gate + weir raises at CSOs 004, 009, and 013.

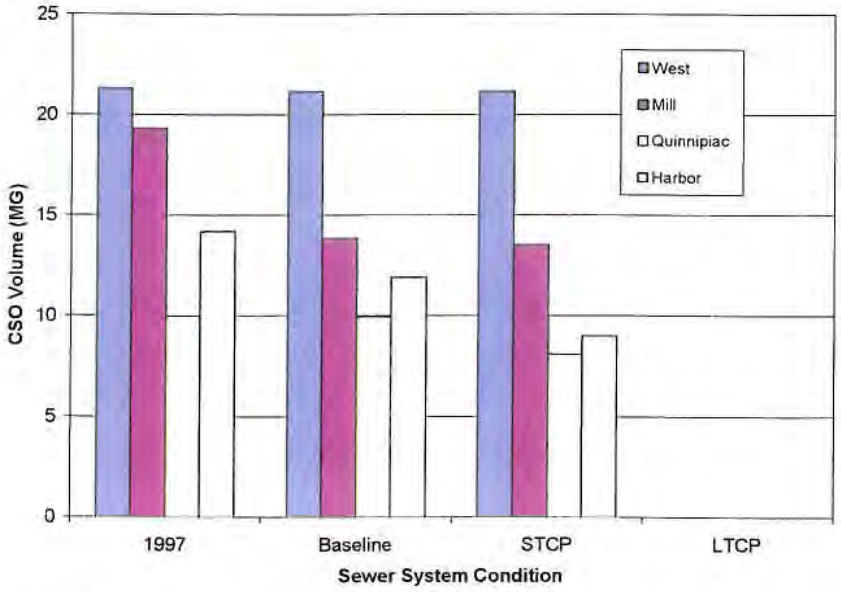


FIGURE 4-2 Projected CSO volumes by watershed for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

Projected water quality improvements for biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform (FC), and total nitrogen (TN) follow.

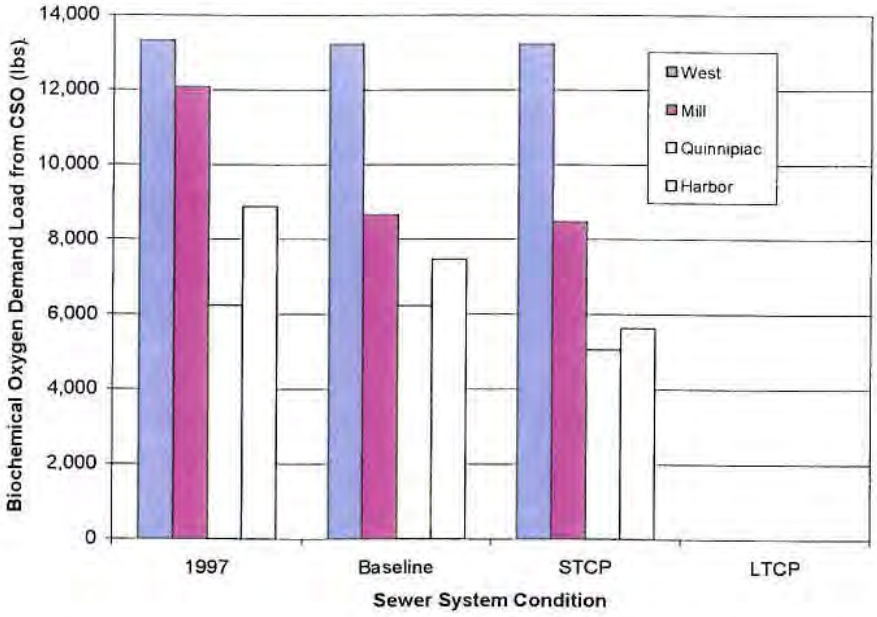


FIGURE 4-3 Projected improvement in biochemical oxygen demand load by watershed for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

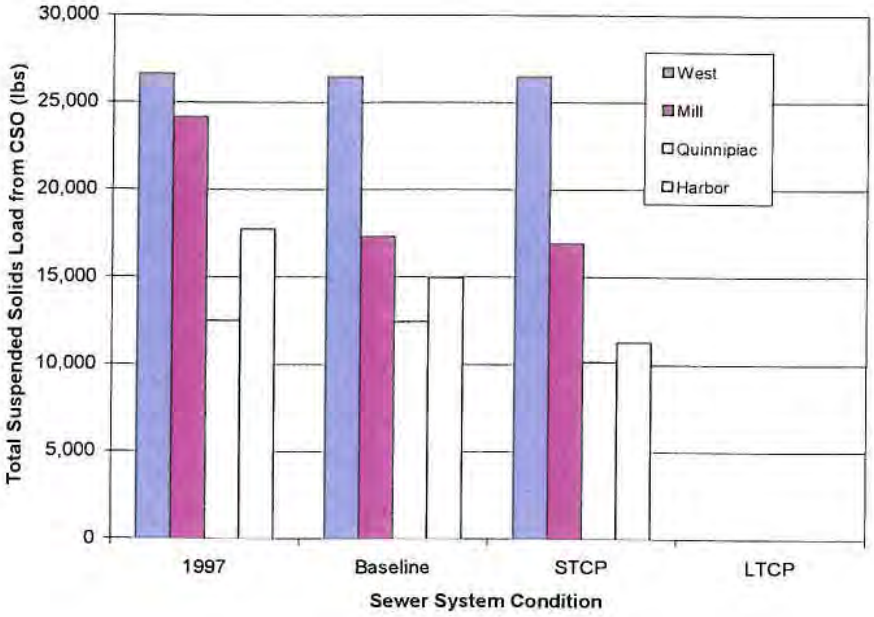


FIGURE 4-4 Projected improvement in total suspended solids load by watershed for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

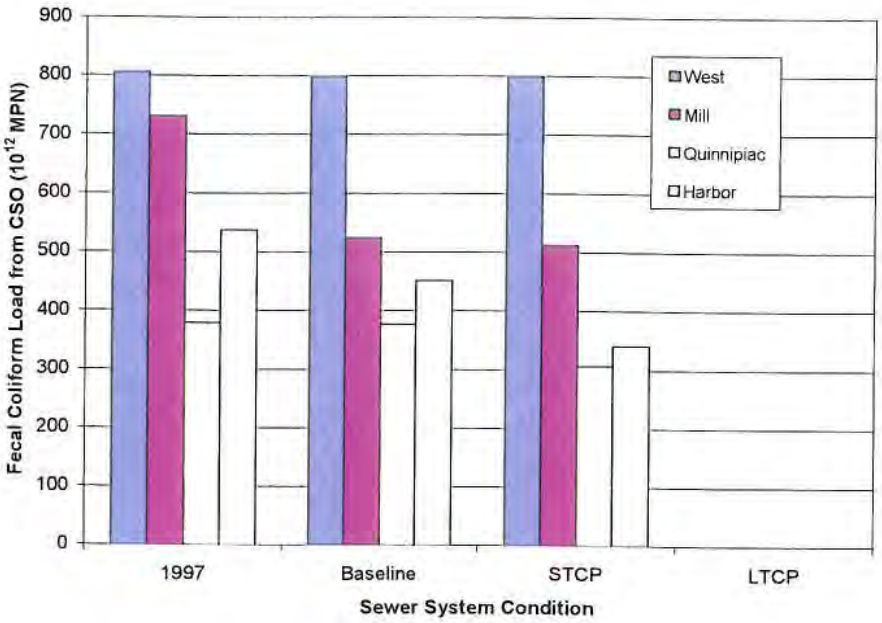


FIGURE 4-5 Projected improvement in fecal coliform load by watershed for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

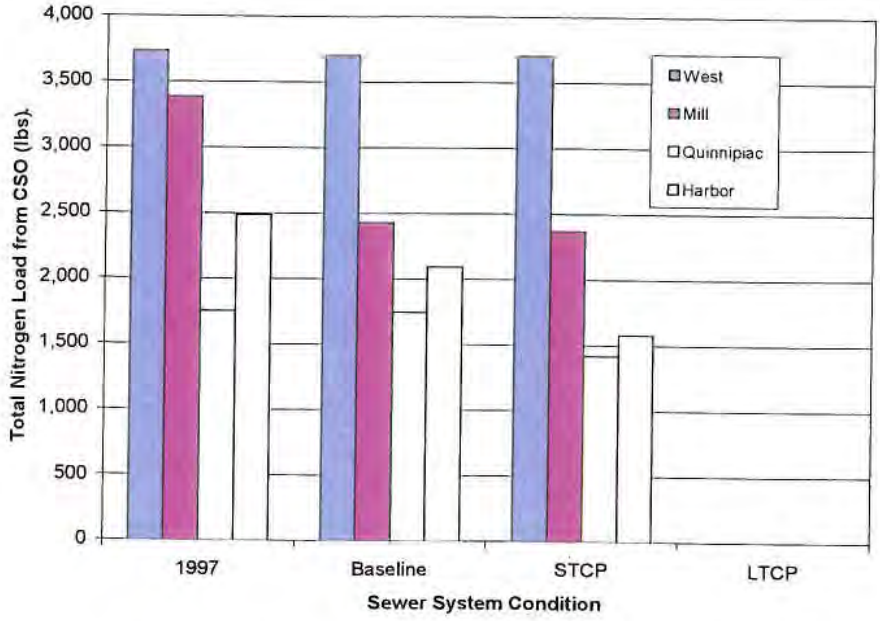


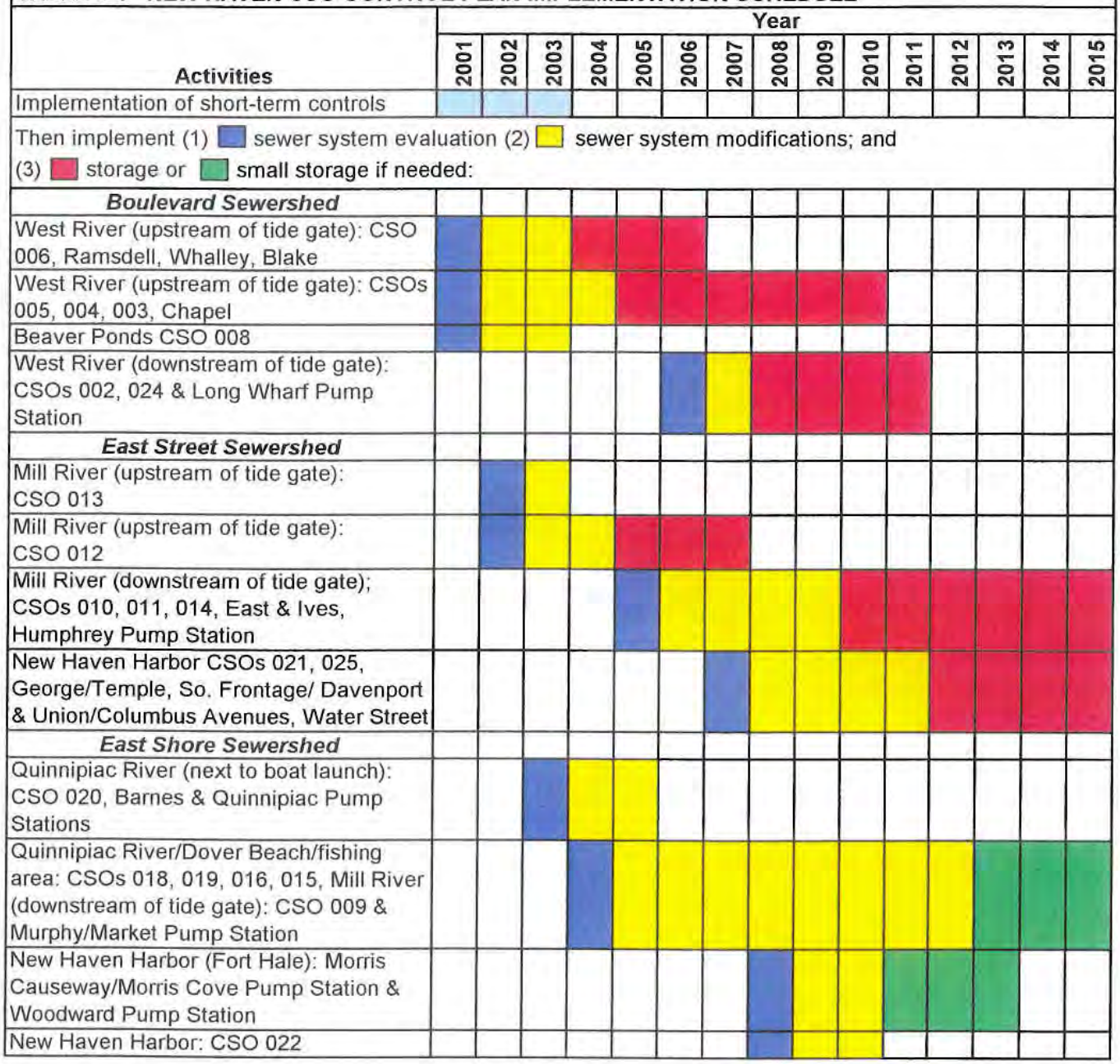
FIGURE 4-6 Projected improvement in total nitrogen load by watershed for sewer system under 1997, baseline, short-term control plan, and long-term control plan conditions.

SECTION 5

Implementation Schedule

A goal of financial planning for the implementation of a program and developing a financial model is to plan a program with achievable and fairly even funding and expenditures over the implementation period. This is demonstrated by the timing of projects identified in the implementation schedule in Table 5-1. The selection of the projects incorporates water quality concerns by focusing on areas of greatest public health contact earlier in the schedule.

TABLE 5-1 NEW HAVEN CSO CONTROL PLAN IMPLEMENTATION SCHEDULE



SECTION 6

Financial Analysis of CSO Control Plan Costs

As described in TM #13, *Design Development Report*, a financial model has been developed to incorporate how the City receives and expends money to fund wastewater projects. Details of the financial model are provided in Appendix D.

A principal goal of financial planning is to demonstrate to the regulatory authorities the impact of financing the program as compared with the median household income. The USEPA uses 2% of median household income as a guide for the affordable impact of a program on City tax and rate payers. The following graphics, Figures 6-1 and 6-2 present the projected cost impacts of the CSO control program on the tax and rate payers of New Haven and the cost impacts relative to percent of median household income, respectively.

FIGURE 6-1

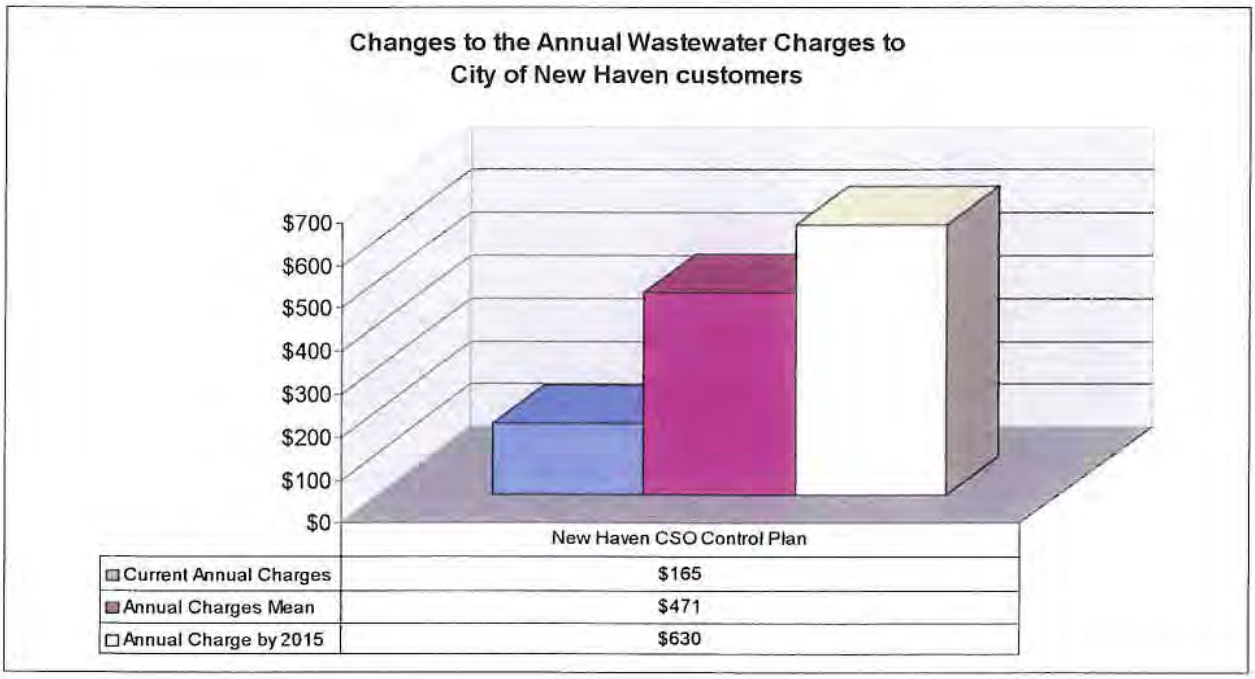
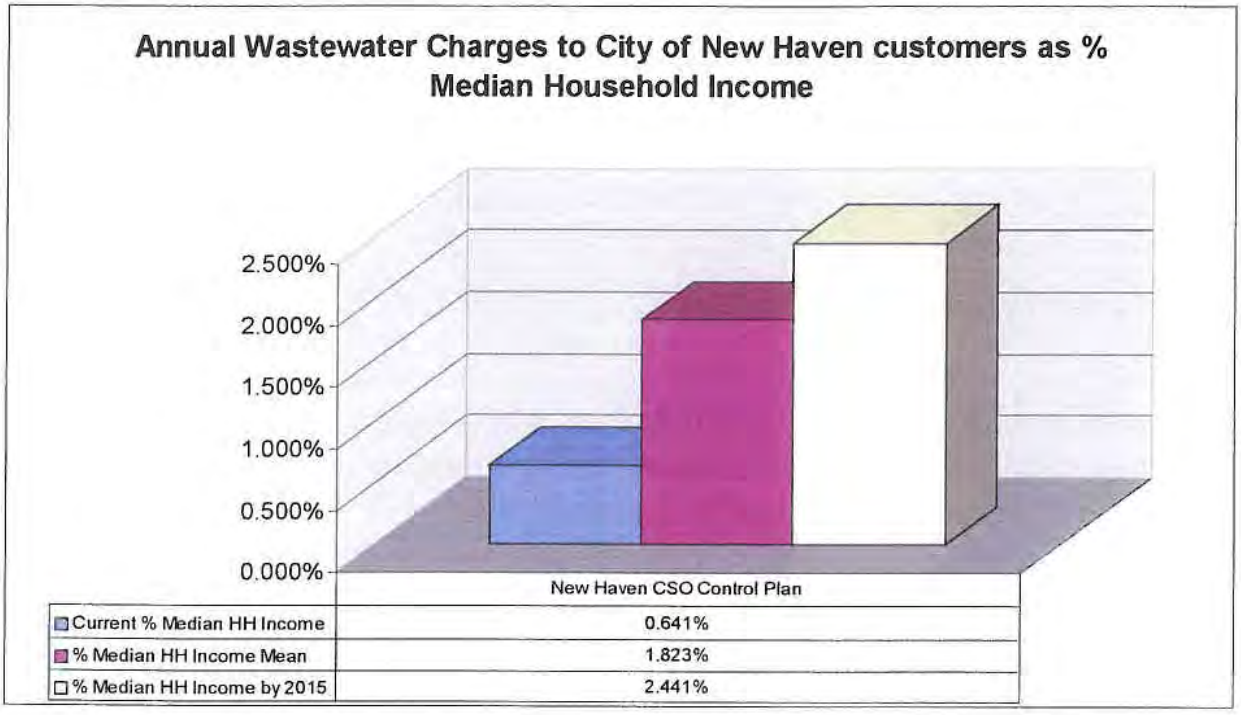


FIGURE 6-2


Annual Wastewater Charges to City of New Haven customers as % Median Household Income
2.500%
2.000%
1.500%
1.000%
0.500%
0.000%
New Haven CSO Control Plan
Current % Median HH Income
0.641%
% Median HH Income Mean
1.823%
% Median HH Income by 2015
2.441%

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 024
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	515	$450	$231,750	$34,763	$46,350	$312,863
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	40	$90	$3,600	$540	$720	$4,860
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	1380	$20	$27,600	$4,140	$5,520	$37,260
Item 2c	For Excavation of Structures	CY	31200	$45	$1,404,000	$210,600	$280,800	$1,895,400
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	160	$20	$3,200	$480	$640	$4,320
Item 3b	For 3/4" Broken Stone	CY	2150	$18	$38,700	$5,805	$7,740	$52,245
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	2320	$50	$116,000	$17,400	$23,200	$156,600
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	6550	$400	$2,620,000	$393,000	$524,000	$3,537,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	1.32691	$100,000	$132,691	$0	$26,538	$159,229
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$320,480	$320,480	$48,072	$64,096	$432,648
ITEM 10	MOBILIZATION	LS	1	$640,960	$640,960	$96,144	$128,192	$865,296
							TOTAL:	**$7,707,470**

Tank Info (ft)	
Length	170
Width	170
Depth	15
Cover	9

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	515	Sewer
Length	40	Force
Manholes	0	
Acreage	1.327	

Storage	3,242,580	3,200,000 G
Cost/Gal.	$2.41	$7,707,470
Lookup	$2.41	$7,810,028

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 009
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	1620	$450	$729,000	$109,350	$145,800	$984,150
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	650	$90	$58,500	$8,775	$11,700	$78,975
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	4800	$20	$96,000	$14,400	$19,200	$129,600
Item 2c	For Excavation of Structures	CY	2800	$45	$126,000	$18,900	$25,200	$170,100
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	590	$20	$11,800	$1,770	$2,360	$15,930
Item 3b	For 3/4" Broken Stone	CY	140	$18	$2,520	$378	$504	$3,402
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	700	$50	$35,000	$5,250	$7,000	$47,250
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	600	$400	$240,000	$36,000	$48,000	$324,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.08264	$100,000	$8,264	$0	$1,653	$9,917
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$100,660	$100,660	$15,099	$20,132	$135,891
ITEM 10	MOBILIZATION	LS	1	$201,310	$201,310	$30,197	$40,262	$271,769
							TOTAL:	**$2,420,734**

Tank Info (ft)	
Length	45
Width	40
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	1620	Sewer
Length	650	Force
Manholes	2	
Acreage	0.083	

Storage	201,960	200,000 G
Cost/Gal.	$12.10	$2,420,734
Lookup	$12.10	$2,444,457

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 011/014
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 54" RCP Sewer Pipe	LF	3870	$450	$1,741,500	$261,225	$348,300	$2,351,025
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	30	$90	$2,700	$405	$540	$3,645
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	21930	$20	$438,600	$65,790	$87,720	$592,110
Item 2c	For Excavation of Structures	CY	76300	$45	$3,433,500	$515,025	$686,700	$4,635,225
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	1230	$20	$24,600	$3,690	$4,920	$33,210
Item 3b	For 3/4" Broken Stone	CY	4010	$18	$72,180	$10,827	$14,436	$97,443
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	4100	$50	$205,000	$30,750	$41,000	$276,750
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	11760	$400	$4,704,000	$705,600	$940,800	$6,350,400
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	3.33333	$100,000	$333,333	$0	$66,667	$400,000
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$749,480	$749,480	$112,422	$149,896	$1,011,798
ITEM 10	MOBILIZATION	LS	1	$1,498,960	$1,498,960	$224,844	$299,792	$2,023,596
							TOTAL:	**$18,024,952**

Tank Info (ft)

Length	230
Width	235
Depth	15
Cover	18

Pipe Info (ft)

Diameter	4.5	
Depth	10	
Length	3870	Sewer
Length	30	Force
Manholes	10	
Acreage	3.333	

Storage	6,064,410	6,000,000 G
Cost/Gal.	$3.00	$18,024,952
Lookup	$3.00	$18,218,450

Project:
Facility:
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 012
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	364	$450	$163,800	$24,570	$32,760	$221,130
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	73	$90	$6,570	$986	$1,314	$8,870
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	1410	$20	$28,200	$4,230	$5,640	$38,070
Item 2c	For Excavation of Structures	CY	9000	$45	$405,000	$60,750	$81,000	$546,750
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	130	$20	$2,600	$390	$520	$3,510
Item 3b	For 3/4" Broken Stone	CY	480	$18	$8,640	$1,296	$1,728	$11,664
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1320	$50	$66,000	$9,900	$13,200	$89,100
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	1700	$400	$680,000	$102,000	$136,000	$918,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.29385	$100,000	$29,385	$0	$5,877	$35,262
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$106,110	$106,110	$15,917	$21,222	$143,249
ITEM 10	MOBILIZATION	LS	1	$212,220	$212,220	$31,833	$42,444	$286,497
							TOTAL:	**$2,551,851**

Tank Info (ft)	
Length	80
Width	80
Depth	15
Cover	13

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	364	Sewer
Length	73	Force
Manholes	1	
Acreage	0.294	

Storage	718,080	700,000 G
Cost/Gal.	$3.65	$2,551,851
Lookup	$3.65	$2,617,761

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 015
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	55	$450	$24,750	$3,713	$4,950	$33,413
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	32	$90	$2,880	$432	$576	$3,888
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	140	$20	$2,800	$420	$560	$3,780
Item 2c	For Excavation of Structures	CY	2600	$45	$117,000	$17,550	$23,400	$157,950
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	30	$20	$600	$90	$120	$810
Item 3b	For 3/4" Broken Stone	CY	140	$18	$2,520	$378	$504	$3,402
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	660	$50	$33,000	$4,950	$6,600	$44,550
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	600	$400	$240,000	$36,000	$48,000	$324,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.08264	$100,000	$8,264	$0	$1,653	$9,917
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$41,580	$41,580	$6,237	$8,316	$56,133
ITEM 10	MOBILIZATION	LS	1	$83,150	$83,150	$12,473	$16,630	$112,253
							TOTAL:	**$999,845**

Tank Info (ft)	
Length	45
Width	40
Depth	15
Cover	8

Pipe Info (ft)		
Diameter	4	
Depth	30	
Length	55	Sewer
Length	32	Force
Manholes	0	
Acreage	0.083	

Storage	201,960	200,000 G
Cost/Gal.	$5.00	$999,845
Lookup	$5.00	$1,009,644

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 016
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 54" RCP Sewer Pipe	LF	0	$450	$0	$0	$0	$0
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	30	$90	$2,700	$405	$540	$3,645
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	0	$20	$0	$0	$0	$0
Item 2c	For Excavation of Structures	CY	1600	$45	$72,000	$10,800	$14,400	$97,200
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	10	$20	$200	$30	$40	$270
Item 3b	For 3/4" Broken Stone	CY	70	$18	$1,260	$189	$252	$1,701
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	540	$50	$27,000	$4,050	$5,400	$36,450
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	350	$400	$140,000	$21,000	$28,000	$189,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.04132	$100,000	$4,132	$0	$826	$4,959
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$29,150	$29,150	$4,373	$5,830	$39,353
ITEM 10	MOBILIZATION	LS	1	$58,300	$58,300	$8,745	$11,660	$78,705
							TOTAL:	**$701,032**

Tank Info (ft)	
Length	30
Width	30
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	4.5	
Depth	10	
Length	0	Sewer
Length	30	Force
Manholes	0	
Acreage	0.041	

Storage	100,980	100,000 G
Cost/Gal.	$7.01	$701,032
Lookup	$7.01	$707,902

Project:
Facility:
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 021
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 66" RCP Sewer Pipe	LF	60	$500	$30,000	$4,500	$6,000	$40,500
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	50	$90	$4,500	$675	$900	$6,075
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	260	$20	$5,200	$780	$1,040	$7,020
Item 2c	For Excavation of Structures	CY	7800	$45	$351,000	$52,650	$70,200	$473,850
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	30	$20	$600	$90	$120	$810
Item 3b	For 3/4" Broken Stone	CY	420	$18	$7,560	$1,134	$1,512	$10,206
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1210	$50	$60,500	$9,075	$12,100	$81,675
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	1520	$400	$608,000	$91,200	$121,600	$820,800
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.25826	$100,000	$25,826	$0	$5,165	$30,992
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$86,090	$86,090	$12,914	$17,218	$116,222
ITEM 10	MOBILIZATION	LS	1	$172,170	$172,170	$25,826	$34,434	$232,430
							TOTAL:	**$2,070,329**

Tank Info (ft)	
Length	75
Width	75
Depth	15
Cover	12

Pipe Info (ft)		
Diameter	5.5	
Depth	10	
Length	60	Sewer
Length	50	Force
Manholes	0	
Acreage	0.258	

Storage	631,125	600,000 G
Cost/Gal.	$3.45	$2,070,329
Lookup	$3.45	$2,177,727

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
George/Temple & CSO 025
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 30" RCP Sewer Pipe	LF	2700	$350	$945,000	$141,750	$189,000	$1,275,750
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	32	$90	$2,880	$432	$576	$3,888
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	6500	$20	$130,000	$19,500	$26,000	$175,500
Item 2c	For Excavation of Structures	CY	13300	$45	$598,500	$89,775	$119,700	$807,975
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	660	$20	$13,200	$1,980	$2,640	$17,820
Item 3b	For 3/4" Broken Stone	CY	820	$18	$14,760	$2,214	$2,952	$19,926
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1540	$50	$77,000	$11,550	$15,400	$103,950
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	2730	$400	$1,092,000	$163,800	$218,400	$1,474,200
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.88441	$100,000	$88,441	$0	$17,688	$106,129
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$211,750	$211,750	$31,763	$42,350	$285,863
ITEM 10	MOBILIZATION	LS	1	$423,490	$423,490	$63,524	$84,698	$571,712
							TOTAL:	**$5,092,462**

Tank Info (ft)	
Length	105
Width	105
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	2.5	
Depth	10	
Length	2700	Sewer
Length	32	Force
Manholes	5	
Acreage	0.884	

Storage	1,237,005	1,200,000 G
Cost/Gal.	$4.24	$5,092,462
Lookup	$4.24	$5,249,501

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
Woodward Pump Station CSO
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 24" RCP Sewer Pipe	LF	60	$250	$15,000	$2,250	$3,000	$20,250
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	30	$90	$2,700	$405	$540	$3,645
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	100	$20	$2,000	$300	$400	$2,700
Item 2c	For Excavation of Structures	CY	1500	$45	$67,500	$10,125	$13,500	$91,125
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	20	$20	$400	$60	$80	$540
Item 3b	For 3/4" Broken Stone	CY	70	$18	$1,260	$189	$252	$1,701
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	480	$50	$24,000	$3,600	$4,800	$32,400
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	350	$400	$140,000	$21,000	$28,000	$189,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.04132	$100,000	$4,132	$0	$826	$4,959
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$29,810	$29,810	$4,472	$5,962	$40,244
ITEM 10	MOBILIZATION	LS	1	$59,610	$59,610	$8,942	$11,922	$80,474
							TOTAL:	**$716,787**

Tank Info (ft)	
Length	30
Width	30
Depth	15
Cover	7

Pipe Info (ft)		
Diameter	2	
Depth	10	
Length	60	Sewer
Length	30	Force
Manholes	0	
Acreage	0.041	

Storage	100,980	100,000 G
Cost/Gal.	$7.17	$716,787
Lookup	$7.17	$723,811

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
South Frontage/Davenport CSO
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 36" RCP Sewer Pipe	LF	1082	$350	$378,700	$56,805	$75,740	$511,245
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	67	$90	$6,030	$905	$1,206	$8,141
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	2410	$20	$48,200	$7,230	$9,640	$65,070
Item 2c	For Excavation of Structures	CY	2800	$45	$126,000	$18,900	$25,200	$170,100
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	260	$20	$5,200	$780	$1,040	$7,020
Item 3b	For 3/4" Broken Stone	CY	140	$18	$2,520	$378	$504	$3,402
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	700	$50	$35,000	$5,250	$7,000	$47,250
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	600	$400	$240,000	$36,000	$48,000	$324,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.08264	$100,000	$8,264	$0	$1,653	$9,917
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$69,800	$69,800	$10,470	$13,960	$94,230
ITEM 10	MOBILIZATION	LS	1	$139,590	$139,590	$20,939	$27,918	$188,447
							TOTAL:	**$1,678,571**

Tank Info (ft)	
Length	45
Width	40
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	2	
Depth	10	
Length	1082	Sewer
Length	67	Force
Manholes	1	
Acreage	0.083	

Storage	201,960	200,000 G
Cost/Gal.	$8.39	$1,678,571
Lookup	$8.39	$1,695,021

O&M costs.xls

CITY OF NEW HAVEN
Operations & Maintenance Plan for CSO Tanks
COST ESTIMATE
SUMMARY

Location	Estimated Cost
CSO 006	$14,000
CSO 005	$27,000
CSO 004	$25,000
CSO 003	$16,000
CSO 002	$5,000
CSO 012	$7,000
CSO 011/014	$18,000
CSO 009	$12,000
CSO 016	$16,000
CSO 015	$18,000
new James Street Pump Station	$38,000
S. Frontage/Davenport	$5,000
CSO 021/East Street Pump Station	$12,000
CSO G/T & 025/Union Pump Station	$5,000
CSO 024/Boulevard Pump Station	$15,000
Woodward Pump Station	$5,000
TOTALS:	**$238,000**

CITY OF NEW HAVEN
Operations & Maintenance Plan for CSO Tanks
COST ESTIMATE
SUMMARY

O&M (Average year Storm Event Data)					
Overflow Site		Storage Volume	Frequency	Volume	Duration
006	Whalley/Fitch	5.5	19	0.4	2
005	Blvd/Derby	4.2	44	0.4	6
004	Blvd/Legion	4.9	39	1.0	5
003	Blvd/Orange	3.9	26	0.6	3
002	Blvd/Lamberton	0.9	7	0.1	1
012	Mitchell/Nicoll	0.7	14	0.1	2
011/014	011/014	6.0	25	1.3	3
009	James/Grand	0.2	28	0.2	3
016	Foote/River				
018	James/Fairmont				
SFD	S. Frontage/Davenport	0.2	8	0.3	3
021	East St PS	0.6	26	2.0	4
025	UPS and G/T	1.2	7	1.2	2
024	Blvd PS	3.2	26	1.2	4
WPS	Woodward Pump Station	0.1	8	0.3	3

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 002
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	35	hr/yr	$1,400	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	17.5	hr/yr	$928	1 Supervisor per crew (2.5 man hrs/event)	
							$4,560
Electric Costs							
Motors	$45	event	7	event/yr	$315	30 HP motors @ 1 kW/HP	
							$315
Expendables							
Disposal of solids	$110	ton	0.035	ton/yr	$4	Based on West New York, NJ report	
							$4
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	70	miles/yr	$53	Includes gas	
							$53
TOTAL ANNUAL O&M Cost					**$4,931**	Excluding Truck and Maintenance	$4,931

Cost Assumptions

Storage Volume	0.9	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	7		Input Value
Average volume per overflow	0.1	MG	Input value
Average overflow duration	1	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 003
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	130	hr/yr	$5,200	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	65	hr/yr	$3,445	1 Supervisor per crew (2.5 man hrs/event)	
							$10,877
Electric Costs							
Motors	$195	event	26	event/yr	$5,070	30 HP motors @ 1 kW/HP	
							$5,070
Expendables							
Disposal of solids	$110	ton	0.78	ton/yr	$86	Based on West New York, NJ report	
							$86
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	260	miles/yr	$195	Includes gas	
							$195
TOTAL ANNUAL O&M Cost					**$16,228**	Excluding Truck and Maintenance	$16,228

Cost Assumptions

Storage Volume	3.9	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	26		Input Value
Average volume per overflow	0.6	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 004
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	195	hr/yr	$7,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	97.5	hr/yr	$5,168	1 Supervisor per crew (2.5 man hrs/event)	
							$15,200
Electric Costs							
Motors	$245	event	39	event/yr	$9,555	30 HP motors @ 1 kW/HP	
							$9,555
Expendables							
Disposal of solids	$110	ton	1.95	ton/yr	$215	Based on West New York, NJ report	
							$215
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	390	miles/yr	$293	Includes gas	
							$293
TOTAL ANNUAL O&M Cost					**$25,262**	Excluding Truck and Maintenance	$25,262

Cost Assumptions

Storage Volume	4.9	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	39		Input Value
Average volume per overflow	1	MG	Input value
Average overflow duration	5	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 005
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	220	hr/yr	$8,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	110	hr/yr	$5,830	1 Supervisor per crew (2.5 man hrs/event)	
							$16,862
Electric Costs							
Motors	$210	event	44	event/yr	$9,240	30 HP motors @ 1 kW/HP	
							$9,240
Expendables							
Disposal of solids	$110	ton	0.88	ton/yr	$97	Based on West New York, NJ report	
							$97
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	440	miles/yr	$330	Includes gas	
							$330
TOTAL ANNUAL O&M Cost					**$26,529**	Excluding Truck and Maintenance	$26,529

Cost Assumptions

Storage Volume	4.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	44		Input Value
Average volume per overflow	0.4	MG	Input value
Average overflow duration	6	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 006
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	95	hr/yr	$3,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	47.5	hr/yr	$2,518	1 Supervisor per crew (2.5 man hrs/event)	
							$8,550
Electric Costs							
Motors	$275	event	19	event/yr	$5,225	30 HP motors @ 1 kW/HP	
							$5,225
Expendables							
Disposal of solids	$110	ton	0.38	ton/yr	$42	Based on West New York, NJ report	
							$42
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	190	miles/yr	$143	Includes gas	
							$143
TOTAL ANNUAL O&M Cost					**$13,959**	Excluding Truck and Maintenance	$13,959

Cost Assumptions

Storage Volume	5.5	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	19		Input Value
Average volume per overflow	0.4	MG	Input value
Average overflow duration	2	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 012
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	70	hr/yr	$2,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	35	hr/yr	$1,855	1 Supervisor per crew (2.5 man hrs/event)	
							$6,887
Electric Costs							
Motors	$35	event	14	event/yr	$490	30 HP motors @ 1 kW/HP	
							$490
Expendables							
Disposal of solids	$110	ton	0.07	ton/yr	$8	Based on West New York, NJ report	
							$8
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	140	miles/yr	$105	Includes gas	
							$105
TOTAL ANNUAL O&M Cost					**$7,490**	Excluding Truck and Maintenance	$7,490

Cost Assumptions

Storage Volume	0.7	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	14		Input Value
Average volume per overflow	0.1	MG	Input value
Average overflow duration	2	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 011/014
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	125	hr/yr	$5,000	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	62.5	hr/yr	$3,313	1 Supervisor per crew (2.5 man hrs/event)	
							$10,545
Electric Costs							
Motors	$300	event	25	event/yr	$7,500	30 HP motors @ 1 kW/HP	
							$7,500
Expendables							
Disposal of solids	$110	ton	1.625	ton/yr	$179	Based on West New York, NJ report	
							$179
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	250	miles/yr	$188	Includes gas	
							$188
TOTAL ANNUAL O&M Cost					**$18,411**	Excluding Truck and Maintenance	$18,411

Cost Assumptions

Storage Volume	6.0	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	25		Input Value
Average volume per overflow	1.3	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 009
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	140	hr/yr	$5,600	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	70	hr/yr	$3,710	1 Supervisor per crew (2.5 man hrs/event)	
							$11,542
Electric Costs							
Motors	$10	event	28	event/yr	$280	30 HP motors @ 1 kW/HP	
							$280
Expendables							
Disposal of solids	$110	ton	0.28	ton/yr	$31	Based on West New York, NJ report	
							$31
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	280	miles/yr	$210	Includes gas	
							$210
TOTAL ANNUAL O&M Cost					**$12,063**	Excluding Truck and Maintenance	$12,063

Cost Assumptions

Storage Volume	0.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	28		Input Value
Average volume per overflow	0.2	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 016
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	195	hr/yr	$7,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	97.5	hr/yr	$5,168	1 Supervisor per crew (2.5 man hrs/event)	
							$15,200
Electric Costs							
Motors	$5	event	39	event/yr	$195	30 HP motors @ 1 kW/HP	
							$195
Expendables							
Disposal of solids	$110	ton	0.78	ton/yr	$86	Based on West New York, NJ report	
							$86
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	390	miles/yr	$293	includes gas	
							$293
TOTAL ANNUAL O&M Cost					**$15,773**	Excluding Truck and Maintenance	$15,773

Cost Assumptions

Storage Volume	0.1	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	39		Input Value
Average volume per overflow	0.4	MG	Input value
Average overflow duration	5	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 015
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	225	hr/yr	$9,000	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	112.5	hr/yr	$5,963	1 Supervisor per crew (2.5 man hrs/event)	
							$17,195
Electric Costs							
Motors	$10	event	45	event/yr	$450	30 HP motors @ 1 kW/HP	
							$450
Expendables							
Disposal of solids	$110	ton	2.25	ton/yr	$248	Based on West New York, NJ report	
							$248
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	450	miles/yr	$338	Includes gas	
							$338
TOTAL ANNUAL O&M Cost					**$18,230**	Excluding Truck and Maintenance	$18,230

Cost Assumptions

Storage Volume	0.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	45		Input Value
Average volume per overflow	1	MG	Input value
Average overflow duration	5	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
S. Frontage/Davenport
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	40	hr/yr	$1,600	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	20	hr/yr	$1,060	1 Supervisor per crew (2.5 man hrs/event)	
							$4,892
Electric Costs							
Motors	$10	event	8	event/yr	$80	30 HP motors @ 1 kW/HP	
							$80
Expendables							
Disposal of solids	$110	ton	0.12	ton/yr	$13	Based on West New York, NJ report	
							$13
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	80	miles/yr	$60	Includes gas	
							$60
TOTAL ANNUAL O&M Cost					**$5,045**	Excluding Truck and Maintenance	$5,045

Cost Assumptions			
Storage Volume	0.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	8		Input Value
Average volume per overflow	0.3	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 021/East Street Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	130	hr/yr	$5,200	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	65	hr/yr	$3,445	1 Supervisor per crew (2.5 man hrs/event)	
							$10,877
Electric Costs							
Motors	$30	event	26	event/yr	$780	30 HP motors @ 1 kW/HP	
							$780
Expendables							
Disposal of solids	$110	ton	2.6	ton/yr	$286	Based on West New York, NJ report	
							$286
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	260	miles/yr	$195	Includes gas	
							$195
TOTAL ANNUAL O&M Cost					**$12,138**	Excluding Truck and Maintenance	$12,138

Cost Assumptions

Storage Volume	0.6	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	26		Input Value
Average volume per overflow	2	MG	Input value
Average overflow duration	4	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO George/Temple & 025/Union Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	35	hr/yr	$1,400	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	17.5	hr/yr	$928	1 Supervisor per crew (2.5 man hrs/event)	
							$4,560
Electric Costs							
Motors	$60	event	7	event/yr	$420	30 HP motors @ 1 kW/HP	
							$420
Expendables							
Disposal of solids	$110	ton	0.42	ton/yr	$46	Based on West New York, NJ report	
							$46
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	70	miles/yr	$53	Includes gas	
							$53
TOTAL ANNUAL O&M Cost					**$5,078**	Excluding Truck and Maintenance	$5,078

Cost Assumptions

Storage Volume	1.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	7		Input Value
Average volume per overflow	1.2	MG	Input value
Average overflow duration	2	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 024/Boulevard Pump Station
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	130	hr/yr	$5,200	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	65	hr/yr	$3,445	1 Supervisor per crew (2.5 man hrs/event)	
							$10,877
Electric Costs							
Motors	$160	event	26	event/yr	$4,160	30 HP motors @ 1 kW/HP	
							$4,160
Expendables							
Disposal of solids	$110	ton	1.56	ton/yr	$172	Based on West New York, NJ report	
							$172
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	260	miles/yr	$195	Includes gas	
							$195
TOTAL ANNUAL O&M Cost					**$15,404**	Excluding Truck and Maintenance	$15,404

Cost Assumptions

Storage Volume	3.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	26		Input Value
Average volume per overflow	1.2	MG	Input value
Average overflow duration	4	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
Woodward Pump Station
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	40	hr/yr	$1,600	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	20	hr/yr	$1,060	1 Supervisor per crew (2.5 man hrs/event)	
							$4,892
Electric Costs							
Motors	$5	event	8	event/yr	$40	30 HP motors @ 1 kW/HP	
							$40
Expendables							
Disposal of solids	$110	ton	0.12	ton/yr	$13	Based on West New York, NJ report	
							$13
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	80	miles/yr	$60	Includes gas	
							$60
TOTAL ANNUAL O&M Cost					**$5,005**	Excluding Truck and Maintenance	$5,005

Cost Assumptions

Storage Volume	0.1	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	8		Input Value
Average volume per overflow	0.3	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project: CITY OF NEW HA
Facility: LONG TERM CSO CON
File Name: O&M Costs.xls CSO STORAGE TANK COS
New James Street Pur
East Shore Sewer

Work Division		Unit Cost		No.	Units	Annual Cost
O&M Crew						
	Operator	$40	hr	130	hr/yr	$5,200
	Mechanic	$40	hr	130	hr/yr	$5,200
	Electrician	$53	hr	24	hr/yr	$1,272
	Supervisor	$53	hr	24	hr/yr	$1,272
Utilities						
	Electric/Heating/Communications		LS			$10,000
Expendables						
	Disposal of solids	$110	ton	130	ton/yr	$14,300
Equipment Costs						
	Utility Truck	$50,000	truck	0.1424	CRF	$7,119
	Truck Maintenance	25%	of truck annual cost			$1,780
	Mileage	$0.75	mile	1300	miles/yr	$975
TOTAL ANNUAL O&M Cost						**$38,219**

Cost Assumptions

Screenings per volume	100	lbs/MG
Mileage per visit	10	miles
Interest rate on vehicle purchase	7%	
Capital recovery factor	0.1424	

AVEN
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np Station
rshed

BY: UIC
April 27, 2001

Comments/Assumptions	
2 workers per crew @ 2.5 visits/week (more or less depending on dry or wet weather) Electrician or Lead Mechanic/Supervisor only required for periodic maintenance of equipment	$12,944
Allowance	$10,000
Based on West New York, NJ report	$14,300
ten year service life @ 7% interest yearly maintenance cost of truck Includes gas	$975
Excluding Truck and Maintenance	$38,219

New Haven Long-Term CSO Control Plan Storage Tank Volumes				
NPDES #	Location	Volume (MG)		Volume (MG)
WEST RIVER				
006	Whalley/Fitch	5.5		**5.5**
005	Blvd/Derby	4.2		**4.2**
004	Blvd/Legion	4.9		**4.9**
003	Blvd/Orange	3.9		**3.9**
002	Blvd/Lamberton	0.9		**0.9**
	TOTAL	19.3		**19.3**
BEAVER PONDS				
008	Munson/Orchard			**no tank**
	TOTAL	0.0		**0.0**
MILL RIVER				
013	East Rock Rd			**no tank**
n/a	Cross connection at 013			**n/a**
012	Mitchell/Nicoll	0.7		**0.7**
n/a	Mitchell Pump Station			**no tank**
010	East/I-91 (upstream)			**no tank**
010	East/I-91 (downstream)			**no tank**
011	Humphrey/I-91	5.7	build 1 tank for these 3 OF pipes	**6.0**
014	Trumbull/Orange	0.3		
n/a	Humphrey Pump Station	0.04		
009	James/Grand	0.2		**0.2**
n/a	East/Ives			**no tank**
	TOTAL	7.0		**7.0**
QUINNIPIAC RIVER				
n/a	Barnes Pump Station			**no tank**
n/a	Quinnipiac Pump Station			**no tank**
018	N.Front/Lombard			**no tank**
019	N.Front/Pine			**no tank**
020	Quinnipiac/Clifton			**no tank**
016	Poplar/River	0.1		**0.1**
015	James St Siphon	0.2		**0.2**
	TOTAL	0.3		**0.3**
NEW HAVEN HARBOR				
n/a	S. Frontage/Davenport	0.2		**0.2**
n/a	Portsea/Liberty			**no tank**
021	East St PS	0.6		**0.6**
025	Union PS	0.9	build 1 tank for these 2 OF pipes	**1.2**
n/a	George/Temple	0.3		
022	Allen Place			**no tank**
024	Blvd PS	3.2		**3.2**
n/a	Woodward Pump Station	0.1		**0.1**
	TOTAL	5.3		**5.3**
	GRAND TOTAL	31.9		**31.9**

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Cardinal Engineering Associates, Inc. 1988. *Update and Supplement to Facility Plan for Elimination of Combined Sewer Overflows.* March, 1988.

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CH2M HILL. 1991. *CSO Control Technologies Assessment.* Technology Transfer Seminar, Gainesville, Florida. May 21-23, 1991.

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CTDEP. 1995. NPDES Permit Modification for City of New Haven WPAF. October 24, 1995.

APPENDIX A

Inventory of Regulator Locations

TABLE A-1
Updated List of Regulator Locations for WPCA's NPDES Permit

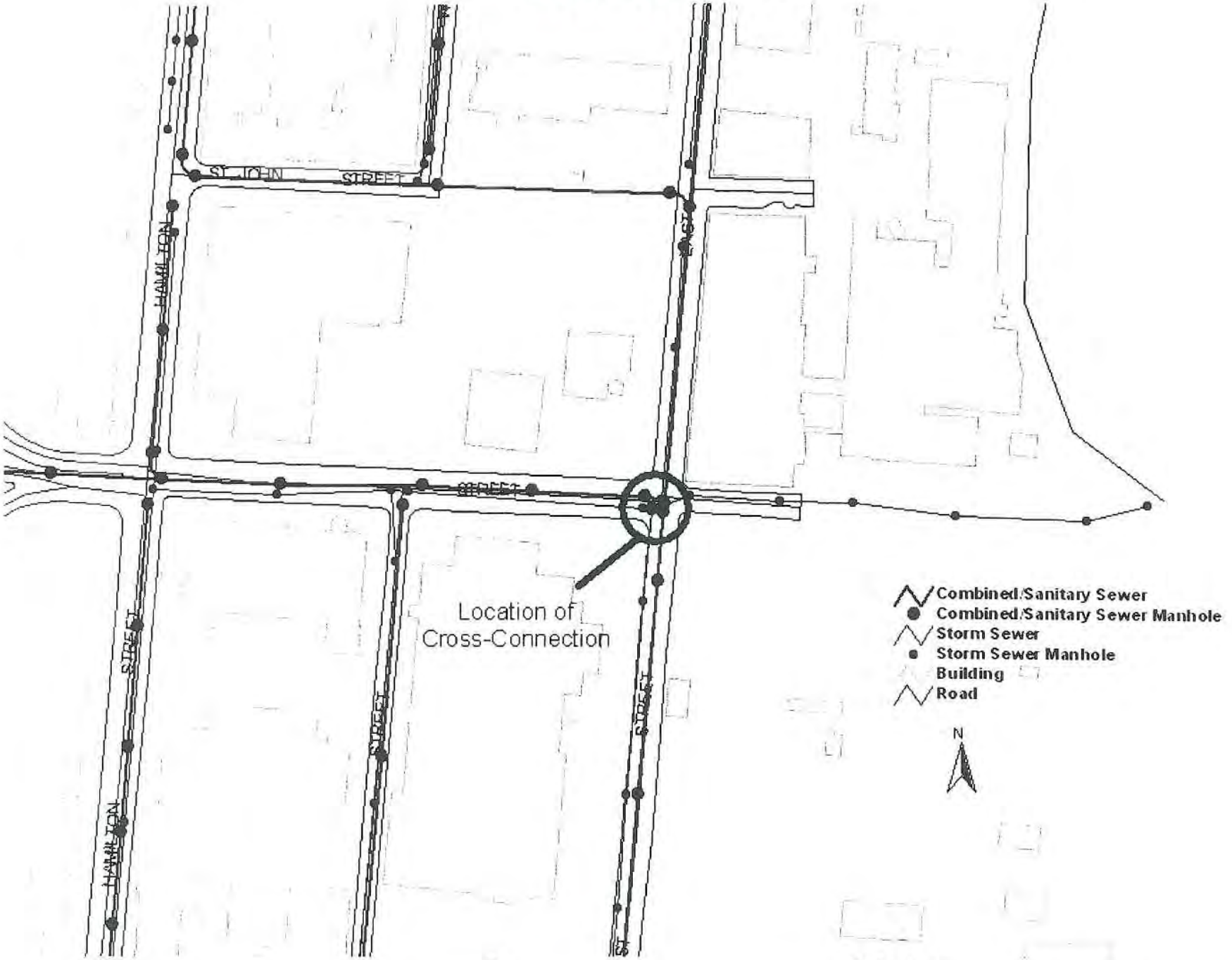
NPDES #	Regulator Location	Receiving Water	Status as of January 2001
002	E.T. Grasso Blvd. @ Lamberton St.	West River	Active
003	E.T. Grasso Blvd. @ Orange Ave.	West River	Active
004	E.T. Grasso Blvd. @ Legion Ave.	West River	Active
005	E.T. Grasso Blvd. @ Derby Ave.	West River	Active
006	Whalley Ave. @ Fitch St.	West River	Active
007	Munson St. @ Canal St.	Bowen Field Lagoon (lower Beaver Pond)	Closed
008	Munson St. @ Orchard St.	Bowen Field Lagoon (lower Beaver Pond)	Active
009	Grand Ave. @ James St.	Mill River	Active
010	East St. @ I-91 (2 weirs)	Mill River	Active
011	Humphrey St. @ I-91	Mill River	Active
012	Mitchell Dr., east of Nicoll St.	Mill River	Active
013	Everit St. @ East Rock Rd.	Mill River	Active
014	Trumbull St. @ Orange St.	Mill River	Active
015	James St. Siphon	Quinnipiac River	Active
016	Poplar St. @ River St.	Quinnipiac River	Active
017	Grand Ave. @ Front St.	Quinnipiac River	Closed
018	Lombard St. @ North Front St.	Quinnipiac River	Active
019	Pine St. @ North Front St.	Quinnipiac River	Active
020	Quinnipiac Ave. @ Clifton St.	Quinnipiac River	Active
021	East St. Pump Station	New Haven Harbor	Active
022	Allen Place	Drainage swale to New Haven Harbor	Active
023	Franklin St. @ Water St.	New Haven Harbor	Closed
024	Boulevard Pump Station	New Haven Harbor	Active
025	Union Pump Station	New Haven Harbor	Active

TABLE A-1 (CONT)
Updated List of Regulator Locations for WPCA's NPDES Permit

NPDES #	Regulator Location	Receiving Water	Status as of January 2001
	Locations not previously listed in NPDES Permit		
NA	Humphrey Pump Station	Mill River	Active
NA	East/Ives*	Mill River	Active
NA	Mitchell Pump Station	Mill River	Active
NA	Barnes Pump Station	Quinnipiac River	Active
NA	Quinnipiac Pump Station	Quinnipiac River	Active
NA	S. Frontage/Davenport*	New Haven Harbor	Active
NA	Portsea/Liberty*	New Haven Harbor	Active
NA	Carlisle/Liberty*	New Haven Harbor	Active
NA	George/Temple*	New Haven Harbor	Active
NA	Woodward Pump Station	New Haven Harbor	Active

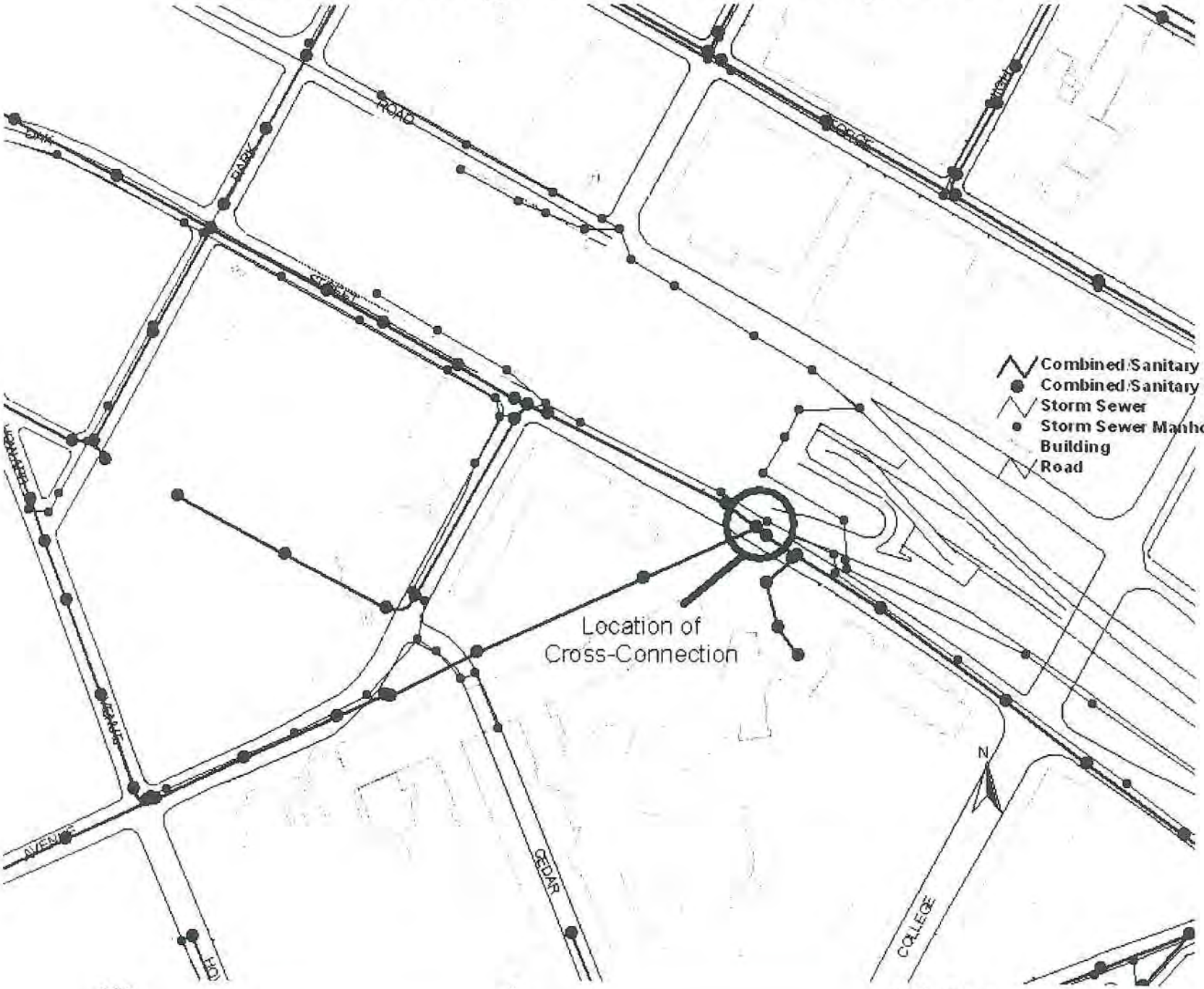
NOTES:
NA = Not Applicable
Active = Regulator has potential to allow overflows during storm events
Regulator 010's upstream weir, 011, and 014 discharge CSO through a common outfall pipe. Regulator 010's downstream weir has a separate outfall pipe to the Mill River.
* Site plans follow for these noted locations

East St/Ives Pl



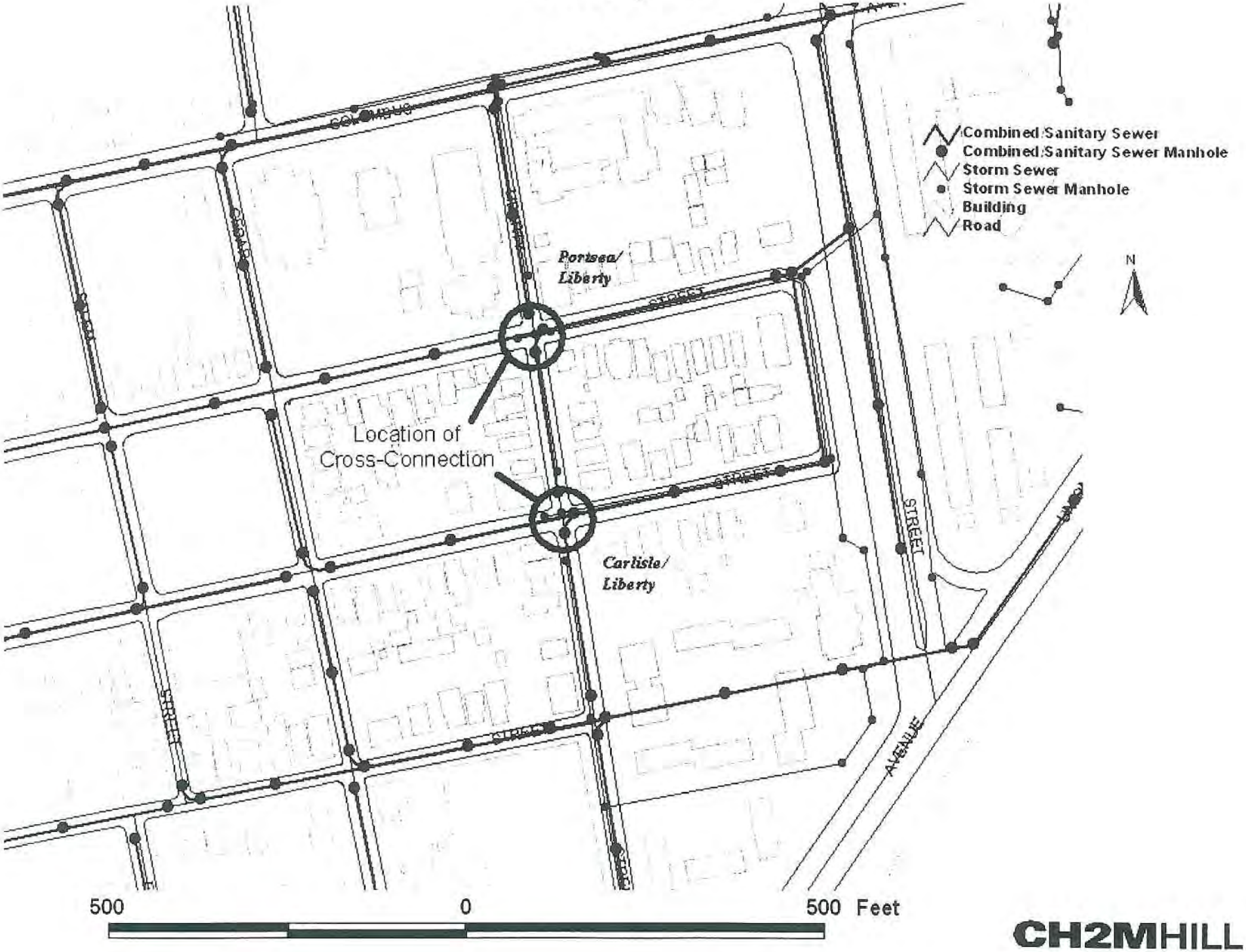
CH2MHILL

S. Frontage Rd near Davenport Ave



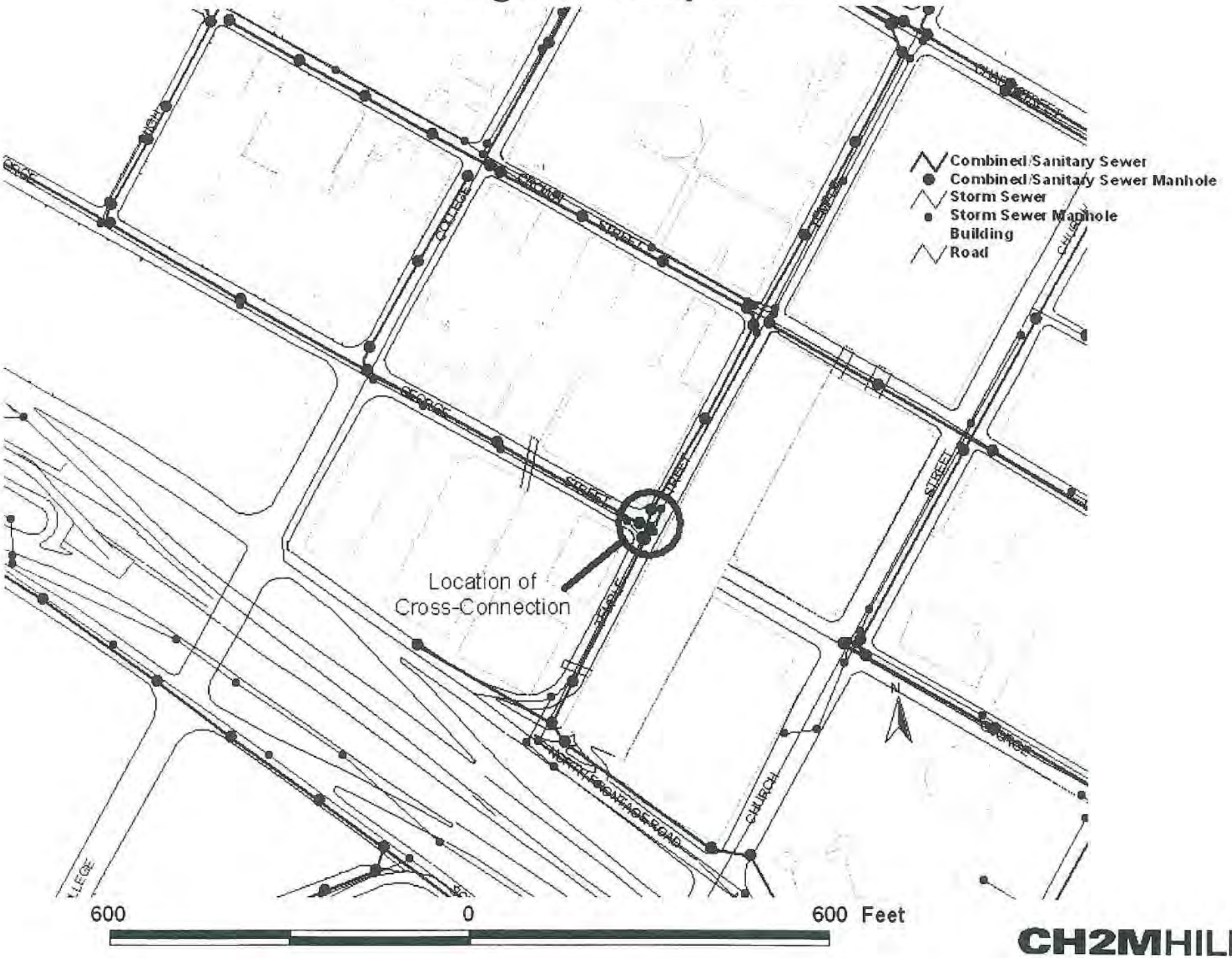
CH2MHILL

Liberty St



CH2MHILL

George St/Temple St



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APPENDIX B

Short-Term Control Plan Cost and Site Details

Cost Development Basis

The cost estimates contained in this report are considered "order-of-magnitude." According to the American Association of Cost Engineers, an order-of-magnitude estimate is an approximate estimate made without detailed engineering data. The costs were estimated based on vendor quotes for major pieces of equipment and percentage allowances for mechanical, yard piping, electrical, instrumentation and control, and site work. An order of magnitude estimate is normally expected to be accurate within +50 percent or –30 percent.

The cost estimates shown, along with any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time the cost estimate was prepared. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, firm selected for final engineering design, and other variable factors. As a result, the final project costs will vary from the cost estimates presented herein.

The following assumptions were used in preparing these cost estimates:

- All costs are in year 2000 dollars and are based on average U.S. labor and material rates for urban areas in the Northeast.
- The construction cost estimates represent the cost for facility construction. The construction cost estimates do not include costs for design engineering, legal and other administrative fees, environmental studies and reports, or regulatory negotiation.

Appendix B Contents

This appendix includes the following:

- Table 2-1 is repeated here as Table B-1 for ease in following backup
- Cost details for all costs presented in Table B-1 (nmcs01_10_01.xls)
- Graphics for the Cross-Connections
- Graphics of modifications to CSO 008, 010, 015, Portsea/Liberty, and the WPAF

TABLE B-1

NEW HAVEN SHORT-TERM CONTROL PLAN

Action To Be Taken	Construction Cost ($/yr)	O&M Cost ($/yr)
1 - Operations and Maintenance		
NPDES Permit - Update of Appendix A of the NPDES permit & the designated O&M manager is **(see Appendix A of this report)**	n/a	n/a
Combined Sewer Flushing - The current sewer flushing program involves flushing every combined or sanitary sewer approximately every three to five years; upgrade to try to clean every sewer every 3 years.	$ 255,000	$ 145,000
GIS Database - Implement program set-up to enhance to ioncorporate O&M records to GIS database; perform pipe risk assessment to prioritize inspections and to plan for potential future rehabilitation projects	$ 7,000	$ 2,000
Cross-Connections - Identify, inspect, and document known system locations with cross-connections between storm and sanitary sewers: Carlisle/Liberty; Grove/Whitney; Greene/1 block east of Chestnut; University Place; Elm/University Place (2 locations); Chapel/Hamilton (added to list by WPCA)	$ 64,000	n/a
Overflow Structures - Determine exact discharge location and operation of NPDES #002; provide access to regulators #003, #004, #009; fix bottleneck at #003	$ 190,000	n/a
Combined Sewer System Tide Gates - Perform monthly inspection of tide gates and backwater check valves on overflow pipes and pump station emergency bypasses; replace Poplar Street tide gate (NPDES #016) and Boulevard pump station tide gates (NPDES #024)	$ 377,000	$ 106,000
Tidal Inflow Check - Continue to measure the salinity and flow fluctuations at the treatment plant as a means of determining significant inflow and salt water intrusion into the system; use regular intervals such as hourly measurements for 1 day per week	n/a	$ 81,000
Pump Station Operations - Install run-time recorders or SCADA equipment at all pump stations to track operations and to operate stations as designed (project in progress)	n/a	n/a
2 - Maximization of Use of Collection System		
Sewer Separation - Orange Street PH II	$ 3,798,000	n/a
Sewer Separation - Orange/Clinton/B/M	$ 5,249,000	n/a
Sewer Separation - Lombard Street East	$ 3,727,000	n/a
Sewer Separation - Wooster Square	$ 4,440,000	n/a
Sewer Separation - Kimberly/Columbus	$ 5,648,000	n/a
Sewer Separation - Humphrey Street	$ 1,194,000	n/a
Sewer Separation - Elm Haven PH I	$ 1,250,000	n/a
Sewer Separation - Elm Haven PH II	$ 850,000	n/a
Reduce CSO - Create weir at NPDES #008 constricting overflow by 50%	$ 5,000	n/a
Reduce CSO - Seal CSO at NPDES #010 (downstream weir)	$ 5,000	n/a
Eliminate CSO - Seal CSO at Portsea/Liberty	$ 5,000	n/a

TABLE B-1 Continued

NEW HAVEN SHORT-TERM CONTROL PLAN

Action To Be Taken	Construction Cost ($/yr)	O&M Cost ($/yr)
3 - Pretreatment Program		
Industrial Pretreatment Program - program in place; loads monitored quarterly; local program more extensive than state program	n/a	n/a
4 - Maximization of Flow to Treatment Plant		
Modify WPAF Operations to accept 140 to 160 mgd - Modify wet weather operations for primary clarifiers; construct wet-weather diversion structures; add chlorination and dechlorination	$ 1,114,000	nominal above current conditions
Pump Station Screens - Upgrade bar screens at East Street and Boulevard Pump Stations, James Street siphon, and the WPAF headworks to reduce head loss and improve conveyance	$ 2,352,000	n/a
Reduce CSO - Remove stop logs at NPDES #015 when capacity at WPAF is sufficient to handle extra wet-weather flows	$ 5,000	n/a
5 - Prohibition of Dry-Weather Overflows		
Dry-Weather Overflows - New Haven currently has no dry-weather overflows	n/a	n/a
6 - Solids and Floatables Control		
Street Sweeping - Increase frequency of programs in areas where sediment deposition is problematic (i.e, E.T. Grasso Boulevard) and where sewer separation is being performed. Monthly coordination meetings between the WPCA/OMI and the Department of Public Works, which is responsible for street cleaning, have been started, although the coordination of programs has not yet been addressed.	$ 142,000	$ 341,000
Floatables/Debris Removal - Implement program to remove floatables and any other visible debris from CSOs		$ 20,000
7 - Pollution Prevention		
Source Control - Extensive programs already in place including control of hazardous waste, solid waste, recycling, construction debris, erosion control, catch basin stenciling	n/a	n/a
NPDES Permit - Modify the Sewer Use Ordinance to reflect the language and intent required by the NPDES permit	n/a	n/a
8 - Public Notification		
Public Education - 6 stakeholders meetings held and 5 newsletters distributed during project; pertinent parties are notified during overflow and bypass events	n/a	n/a
9 - Compliance Monitoring		
Compliance Monitoring - Implement flow monitoring program to confirm effectiveness of CSO controls and provide feedback to refine the LTCP as progress is made	$ 124,000	$ 102,000
TOTAL:	**$ 30,801,000**	**$ 797,000**

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: CML
06-Dec-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	Combined Sewer Flushing								
Item 1a	New Vactor	EA	1	$175,000.00	$175,000	$17,500	$28,875	$33,206	$254,581
Item 1b	Operator for Year	LS	2	$50,000.00	$100,000	$10,000	$16,500	$18,975	$145,475
								TOTAL:	$400,056
								TOTAL:	$400,056

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: CML
06-Dec-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	GIS DATABASE								
Item 1a	Cityworks Software w/ Customer Service Module	EA	1	$5,000.00	$5,000	$500	$825	$949	$7,274
Item 1b	Yearly Maintenance	EA	1	$1,400.00	$1,400	$140	$231	$266	$2,037
								TOTAL:	$9,310
								TOTAL:	$9,310

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: BRG
18-Oct-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	For Inspection of Potential Cross Connection Carlisle and Liberty								
Item 1a	Identify (Survey), Inspect/Design Repairs (Engineer), Document (As Built) Location	MH	40	$100.00	$4,000	$400	$660	$759	$5,819
Item 1b	Labor for Repairs and Confined Space (6 Man Crew)	MH	48	$42.00	$2,016	$202	$333	$383	$2,933
Item 1c	Confined Space Entry Equipment	DAY	1	$300.00	$300	$30	$50	$57	$436
								TOTAL:	$9,188
ITEM 2	Grove and Whitney	LOC	1	$9,188.00					$9,188
ITEM 3	Greene (one block east of Chestnut)	LOC	1	$9,188.00					$9,188
ITEM 4	University Place	LOC	1	$9,188.00					$9,188
ITEM 5	Elm/Univ. Place (2 Locations)	LOC	2	$9,188.00					$18,376
ITEM 6	Chapel/Hamilton*	LOC	1	$9,188.00					$9,188
								TOTAL:	$64,316

* Added to list by WPCA

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP
BY:
18-Oct-2000

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	For Closed Circuit TV Inspection 002	LF	335	$10	$3,350	$335	$553	$636	$4,873
ITEM 2	Excavation and Disposal of Debris at Outfall 002	CY	20	$150	$3,000	$300	$495	$569	$4,364
ITEM 3	Construction of Manhole for Access at 003 and Removal of Bottleneck								
Item 3a	Demolish Existing Base Surface	SY	100	$3	$300	$30	$50	$57	$436
Item 3b	Excavate	CY	444	$10	$4,444	$444	$733	$843	$6,466
Item 3c	Dewatering	LS	1	$1,800	$1,800	$180	$297	$342	$2,619
Item 3d	Utility Relocation (remove bottleneck)	LS	1	$15,000	$15,000	$1,500	$2,475	$2,846	$21,821
Item 3e	Demolish Existing Manhole/Structure	LS	1	$1,500	$1,500	$150	$248	$285	$2,182
Item 3f	Cast-in-place Footer and Walls	CY	24	$510	$12,240	$1,224	$2,020	$2,323	$17,806
Item 3g	Cast-in-place Suspended Slab	CY	2.5	$570	$1,407	$141	$232	$267	$2,047
Item 3h	Manhole Cover Rated for Heavy Traffic	EA	1	$615	$615	$62	$101	$117	$895
Item 3i	Grout Pipe Penetration	HR	18	$40	$720	$72	$119	$137	$1,047
Item 3j	Materials for Grouting	LS	1	$200	$200	$20	$33	$38	$291
Item 3k	Backfill	CY	444	$8	$3,556	$356	$587	$675	$5,172
Item 3l	Patch Asphalt and Existing Base Surface	SY	100	$40	$4,000	$400	$660	$759	$5,819
Item 3m	For Reinforcement	LB	0	$10	$0	$0	$0	$0	$0
Item 3n	Excavation	CY	10	$25	$250	$25	$41	$47	$364
Item 3o	Traffic Control (includes 2 police men)	HR	112	$45	$5,040	$504	$832	$956	$7,332
Item 3p	Confined Space Entry	DAY	1	$750	$750	$75	$124	$142	$1,091
								Subtotal	$74,952
ITEM 4	Construction of Manhole for Access at 004								
Item 4a	Demolish Existing Base Surface	SY	100	$3	$300	$30	$50	$57	$436
Item 4b	Excavate	CY	444	$10	$4,444	$444	$733	$843	$6,466
Item 4c	Dewatering	LS	1	$1,800	$1,800	$180	$297	$342	$2,619
Item 4d	Demolish Existing Manhole/Structure	LS	1	$1,500	$1,500	$150	$248	$285	$2,182
Item 4e	Cast-in-place Footer and Walls	CY	24	$510	$12,240	$1,224	$2,020	$2,323	$17,806
Item 4f	Cast-in-place Suspended Slab	CY	2.5	$570	$1,407	$141	$232	$267	$2,047
Item 4g	Manhole Cover Rated for Heavy Traffic	EA	1	$615	$615	$62	$101	$117	$895
Item 4h	Grout Pipe Penetration	HR	18	$40	$720	$72	$119	$137	$1,047
Item 4i	Materials for Grouting	LS	1	$200	$200	$20	$33	$38	$291
Item 4j	Backfill	CY	444	$8	$3,556	$356	$587	$675	$5,172
Item 4k	Patch Asphalt and Existing Base Surface	SY	100	$40	$4,000	$400	$660	$759	$5,819
Item 4l	For Reinforcement	LB	0	$10	$0	$0	$0	$0	$0
Item 4m	Excavation	CY	10	$25	$250	$25	$41	$47	$364
Item 4n	Traffic Control (includes 2 police men)	HR	112	$45	$5,040	$504	$832	$956	$7,332
Item 4o	Confined Space Entry	DAY	1	$750	$750	$75	$124	$142	$1,091
								Subtotal	$53,131
ITEM 5	Construction of Manhole for Access at 009								$53,131
								TOTAL:	$190,452

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: BRG
18-Oct-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	M/B/I 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	For Preparation of Inspection Form								
	Supervisor	HR	8	$53	$424			$64	$488
ITEM 2	For Permit Preparation and Tracking								
	Engineer	HR	90	$100	$9,000			$1,350	$10,350
ITEM 3	For Replacement of Tide Gate at 016								
	Demolition of Existing	EA	1	$4,000	$4,000	$400	$660	$759	$5,819
	Furnish and Install Duckbill	EA	1	$80,000	$80,000	$8,000	$13,200	$15,180	$116,380
ITEM 4	For Replacement of Tide Gate at 024								
	Demolition of Existing	EA	2	$4,000	$8,000	$800	$1,320	$1,518	$11,638
	Furnish and Install Duckbill	EA	2	$80,000	$160,000	$16,000	$26,400	$30,360	$232,760
								TOTAL:	$377,435
O&M	For Inspection of Tide Gates								
	2 Operators	HR	192	$40	$7,680			$1,152	$8,832
								ANNUAL COST:	$105,984

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: BRG
18-Oct-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	Labor For Grab Samples	HR	48	$ 42	$ 2,016			$ 302	$ 2,318
ITEM 2	For Lab Analysis	EA	96	$ 40	$ 3,840			$ 576	$ 4,416
								MONTHLY TOTAL:	$ 6,734
								ANNUAL TOTAL:	$80,813

Sewer Separation

Completed Projects

Project Name	Project No.	Final Construction Costs	Total Engineering Services (Design & Construction)	Other Costs	
Orange Street PH I	74-049-01	$ 3,106,809.00	$ 336,882.00	$ -	
Ninth Square	88-141-01	$ 207,910.89	$ 102,535.00	$ -	
Foster Street	88-142-01	$ 716,251.95	$ 199,725.00	$ -	
Henry Street PH I	88-143-01	$ 5,049,267.11	$ 587,686.00	$ -	
Division/Newhall PH I	88-144-01	$ 1,637,471.00	$ 453,779.00	$ -	
Sherman Parkway PH I	88-176-01	$ 1,138,723.71	$ 245,471.00	$ -	
State Street	88-177-01	$ 1,544,518.70	$ 407,527.00	$ -	
Henry Street PH II	88-190-01	$ 887,229.36	$ 297,244.00	$ -	
Division/Newhall	88-191-01	$ 2,831,417.60	$ 679,699.00	$ -	
Mod Morris Creek PS	90-062-01	***$ 499,400.00***	$ 150,932.00	$ -	
Church/Grove Sts	91-097-01	$ 836,454.09	$ 165,684.00	$ -	
Livingston PH II	90-132-1R	$ 2,774,168.28	$ 199,605.00	$ -	
Sherman Pkwy PH II	90-133-01	$ 839,098.23	$ 207,284.00	$ -	
Sherman Pkwy PH III	90-134-01	$ 1,364,653.70	$ 259,451.00	$ -	
Broadway-Tower Pkwy	93-088-01	$ 650,541.07	$ 109,470.00	$ -	
Wooster Street	94-128-01	$ 496,570.14	$ 331,402.00 *	$ -	
Livingston PH I	90-131-01	$ 2,015,643.00	$ 73,333.00 *	$ -	
East Rock Road**	90-130-01	$ -	$ 72,054.00	$ -	
CSO Coordinator	90-160-01	$ -	$ -	$ 63,464.00	
Total	-	$ 26,596,127.83	$ 4,879,763.00	$ 63,464.00	**$31,539,354.83**

Project Commitments

Project Name	Project No.	Bid Costs	Engineering Design Cost	Engineering Construction Cost	
Orange Street PH II	94-070-01	$ 3,798,390.00	$ 303,122.00	***$ 341,900.00***	
Orange/Clinton/B/M	94-071-01	$ 5,249,320.00	$ 325,438.86	***$ 369,300.00***	
Lombard Street East	94-072-01	$ 3,727,075.00	$ 311,502.00	***$ 401,403.00***	
Wooster Square	94-128-01	$ 4,439,871.00	$ 331,402.00	***$ 546,586.00***	
Kimberly/Columbus	95-099-01	$ 5,647,905.00	$ 350,145.00	***$ 472,300.00***	
Humphrey Street	95-125-01	$ 1,193,635.00	$ 34,200.00	***$ 119,000.00***	
ElmHaven PH I	97-176-01	$ 1,250,000.00	$ 60,000.00	***$ 188,000.00***	
Elm Haven PH II***	98-113-01	$ 850,000.00	$ 30,017.08	***$ 80,000.00***	
Long-Term CSO Study	96-055-41	$ -	$ 2,100,000.00	$ -	
Total	-	$ 26,156,196.00	$ 3,845,826.94	$ 2,518,489.00	**$32,520,511.94**
			15%	10%	

Notes

Bold italics indicates estimated cost

* Construction associated engineering costs not available

** Project construction not cost effective

*** Project design not complete and therefore not modeled

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP
CSO # 008

BY: BRG
26-Apr-2000
PN: 135807.BA.05

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	FOR REHABILITATION OF MANHOLES AND WEIRS							
Item 1a	2 Man Crew	HR	16	$ 42	$ 672	$ 101	$ 116	$ 889
Item 1b	Construction or Reconstruction with Brick Masonry	SF	3	$ 40	$ 120	$ 18	$ 21	$ 159
Item 1c	Plastering Walls of Manholes and Weirs	SF	7	$ 12	$ 84	$ 13	$ 14	$ 111
ITEM 2	FOR FLOW BYPASS AND DEWATERING							
Item 2a	For 4" Pump	HR	8	$ 80	$ 640	$ 96	$ 110	$ 846
ITEM 3	FOR TRAFFIC CONTROL (includes 2 police men)	HR	8	$ 100	$ 800	$ 120	$ 138	$ 1,058
ITEM 4	FOR CONFINED SPACE ENTRY							
Item 4a	2 Man Crew plus Entry Equipment	DAY	1	$ 750	$ 750	$ 113	$ 129	$ 992
ITEM 5	MOBILIZATION	LS	1	$ 500	$ 500	$ 75	$ 86	$ 661
							TOTAL:	$ 4,716

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP
CSO # 010 (DOWNSTREAM)

BY: BRG
22-Mar-2000
PN: 135807.BA.05

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	FOR REHABILITATION OF MANHOLES AND WEIRS							
Item 1a	2 Man Crew	HR	16	$ 42	$ 672	$ 101	$ 116	$ 889
Item 1b	Construction or Reconstruction with Brick Masonry	SF	2	$ 40	$ 80	$ 12	$ 14	$ 106
Item 1c	Plastering Walls of Manholes and Weirs	SF	4	$ 12	$ 48	$ 7	$ 8	$ 63
ITEM 2	FOR FLOW BYPASS AND DEWATERING							
Item 2a	For 4" Pump	HR	8	$ 80	$ 640	$ 96	$ 110	$ 846
ITEM 3	FOR TRAFFIC CONTROL (includes 2 police men)	HR	8	$ 100	$ 800	$ 120	$ 138	$ 1,058
ITEM 4	FOR CONFINED SPACE ENTRY							
Item 4a	2 Man Crew plus Entry Equipment	DAY	1	$ 750	$ 750	$ 113	$ 129	$ 992
ITEM 5	MOBILIZATION	LS	1	$ 500	$ 500	$ 75	$ 86	$ 661
							TOTAL:	$ 4,616

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP
CSO # Portsea - Liberty

BY: BRG
26-Apr-2000
PN: 135807.BA.05

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	FOR REHABILITATION OF MANHOLES AND WEIRS							
Item 1a	2 Man Crew	HR	16	$ 42	$ 672	$ 101	$ 116	$ 889
Item 1b	Construction or Reconstruction with Brick Masonry	SF	2	$ 40	$ 80	$ 12	$ 14	$ 106
Item 1c	Plastering Walls of Manholes and Weirs	SF	4	$ 12	$ 48	$ 7	$ 8	$ 63
Item 1d	Raising or Removing Stop Log Weir	LF	0	$ 25	$ -	$ -	$ -	$ -
ITEM 2	FOR FLOW BYPASS AND DEWATERING							
Item 2a	For 4" Pump	HR	8	$ 80	$ 640	$ 96	$ 110	$ 846
ITEM 3	FOR TRAFFIC CONTROL (includes 2 police men)	HR	8	$ 100	$ 800	$ 120	$ 138	$ 1,058
ITEM 4	FOR CONFINED SPACE ENTRY							
Item 4a	2 Man Crew plus Entry Equipment	DAY	1	$ 750	$ 750	$ 113	$ 129	$ 992
ITEM 5	MOBILIZATION	LS	1	$ 500	$ 500	$ 75	$ 86	$ 661
							TOTAL:	$ 4,616

Estimate Summary

Project:
Facility:

CITY OF NEW HAVEN
SHORT TERM CSO CONTROL PLAN
WPAF EXPANSION

BY: BRG
April 27, 2001
PN: 135807.BA.07

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	AMOUNT	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	FOR FURNISHING AND INSTALLING SEWER PIPE							
Item 1a	For Furnishing and Installing 36" RCP Sewer Pipe	LF	1800	$115	$207,000	$31,050	$35,708	$273,758
ITEM 2	FOR EXCAVATION (Including Disposal)							
Item 2a	For Trench Excavations up to 15 feet Deep	CY	125	$60	$7,500	$1,125	$1,294	$9,919
Item 2b	For Excavation of Structures	CY	4000	$40	$160,000	$24,000	$27,600	$211,600
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIAL							
Item 3a	For Dense Graded Aggregate (DGA)	CY	800	$20	$16,000	$2,400	$2,760	$21,160
Item 3b	For ¾" Broken Stone	CY	400	$15	$6,000	$900	$1,035	$7,935
ITEM 4	FOR PAVEMENT RESTORATION INCLUDING SUBGRADE PREPARATION							
Item 4a	For Bituminous Concrete Pavement	CY	25	$240	$6,000	$900	$1,035	$7,935
ITEM 5	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 5a	For Sheeting up to 15 feet Deep	SY	140	$60	$8,400	$1,260	$1,449	$11,109
ITEM 6	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 6a	For Concrete (including forms)	CY	100	$450	$45,000	$6,750	$7,763	$59,513
ITEM 7	FOR FLOW BYPASS AND DEWATERING							
Item 7a	For 6" Pump	HR	400	$80	$32,000	$4,800	$5,520	$42,320
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	For Sluice Gates and Electric Operators	EA	4	$15,000	$60,000	$9,000	$10,350	$79,350
Item 8b	For Chemical Feed Equipment and Piping Modifications	LS	1	$50,000	$50,000	$7,500	$8,625	$66,125
ITEM 9	FOR DEMOLITION/MODIFICATIONS TO EXISTING FACILITIES							
	For Primary Clarifier Channel Modifications	LS	1	$100,000	$100,000	$15,000	$17,250	$132,250
ITEM 10	INSTRUMENTATION AND CONTROLS	LS	1	$46,148.64	$46,149	$6,922	$7,961	$61,032
ITEM 11	MOBILIZATION	LS	1	$98,400.43	$98,400	$14,760	$16,974	$130,135
							TOTAL:	$1,114,139

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: CML
06-Dec-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	Step Screens								
Item 1a	Boulevard Pump Station	EA	3	$147,000.00	$441,000	$44,100	$72,765	$83,680	$641,545
Item 1b	East Street Pump Station	EA	3	$147,000.00	$441,000	$44,100	$72,765	$83,680	$641,545
Item 1c	James Street Siphon	EA	2	$147,000.00	$294,000	$29,400	$48,510	$55,787	$427,697
Item 1d	East Shore Treatment Plant	EA	3	$147,000.00	$441,000	$44,100	$72,765	$83,680	$641,545
								TOTAL:	$2,352,331

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP
CSO # 015

BY: BRG
26-Apr-2000
PN: 135807.BA.05

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	FOR REHABILITATION OF MANHOLES AND WEIRS							
Item 1a	2 Man Crew	HR	16	$ 42	$ 672	$ 101	$ 116	$ 889
Item 1a	Construction or Reconstruction with Brick Masonry	SF	0	$ 40	$ -	$ -	$ -	$ -
Item 1b	Plastering Walls of Manholes and Weirs	SF	0	$ 12	$ -	$ -	$ -	$ -
Item 1c	Raising or Removing Stop Log Weir	LF	4	$ 25	$ 100	$ 15	$ 17	$ 132
ITEM 2	FOR FLOW BYPASS AND DEWATERING							
Item 2a	For 4" Pump	HR	8	$ 80	$ 640	$ 96	$ 110	$ 846
ITEM 3	FOR TRAFFIC CONTROL (includes 2 police men)	HR	8	$ 100	$ 800	$ 120	$ 138	$ 1,058
ITEM 4	FOR CONFINED SPACE ENTRY							
Item 4a	2 Man Crew plus Entry Equipment	DAY	1	$ 750	$ 750	$ 113	$ 129	$ 992
ITEM 5	MOBILIZATION	LS	1	$ 500	$ 500	$ 75	$ 86	$ 661
							TOTAL:	$ 4,578

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

PN: 135807.BA.08

Item	Work Division	Unit Cost		Number	Unit	One-Time Cost	Annual Cost	Comments
Street Sweeping	DPW	$ 64.35	mile	5280	miles/yr	$ -	$ 339,800	1 more cleaning/mo citywide between Apr and Nov
New Street Sweeper	DPW	$ 141,572.15	each	1	each	$ 141,600	$ -	Pelican 3-wheeled Sweeper (CN Wood)
Visual inspection of CSO Outfalls	DPW	$ 643.51	each	2	inspec/month	$ -	$ 1,300	
TOTAL						**$ 141,600**	**$ 341,100**	

ENR Construction Cost Index
1991 to 2000 1.29

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

BY: CML
06-Dec-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1 O&M	Floatables/Debris Removal For Removal 2 Operators	HR	432	$40	$17,280			$2,592	$19,872
								TOTAL:	$19,872
								TOTAL:	$19,872

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: STCP

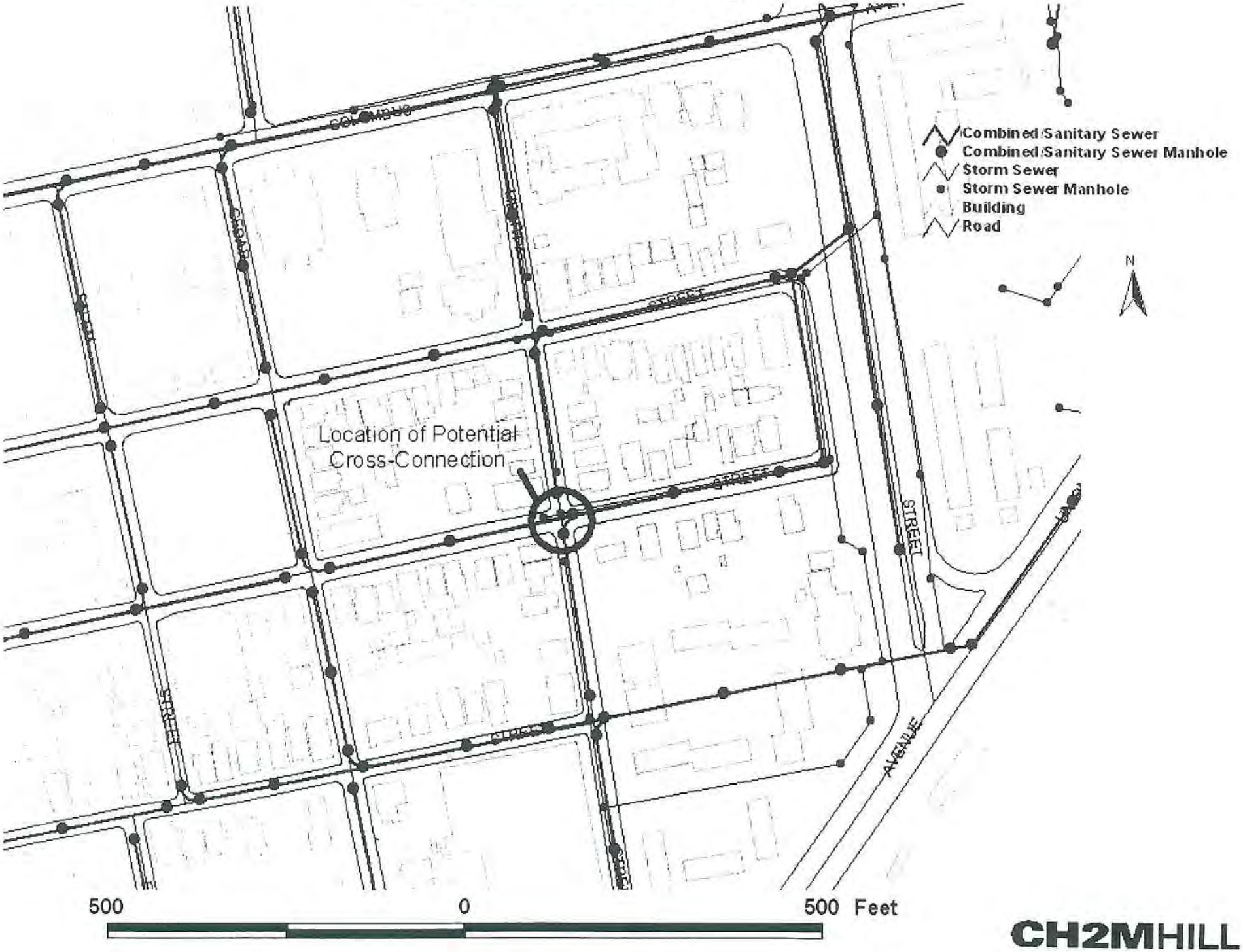
BY: BRG
18-Oct-2000
PN: 135807.BA.08

	DESCRIPTION	QTY	UNT	INSTALLED COST UNIT$	INSTALLED COST AMOUNT	MOB/BOND/INS 10%	OH & P 15%	CONTINGENCY 15%	TOTAL
ITEM 1	For CSO Block Testing								
	Operator (2)	HR	16	$40.00	$640				
	Annual Frequency	EA	110	$640	$70,400			$10,560	$80,960
ITEM 2	Database Management								
	Supervisor	HR	96	$53.00	$5,088			$763	$5,851
ITEM 3	Compliance Reporting								
	Supervisor	HR	96	$53.00	$5,088			$763	$5,851
ITEM 4	Modeling								
	Engineer	HR	80	$100.00	$8,000			$1,200	$9,200
								ANNUAL O&M TOTAL:	$101,862
ITEM 5	Purchase/Install Flow Meters*	EA	12	$9,000	$108,000			$16,200	$124,200

*Area x Velocity Flowmeters (Badger 530Q); 24" to 100" pipe; assumes primary flow control structure in place

PURCHASE TOTAL: $124,200

Carlisle St/Liberty St



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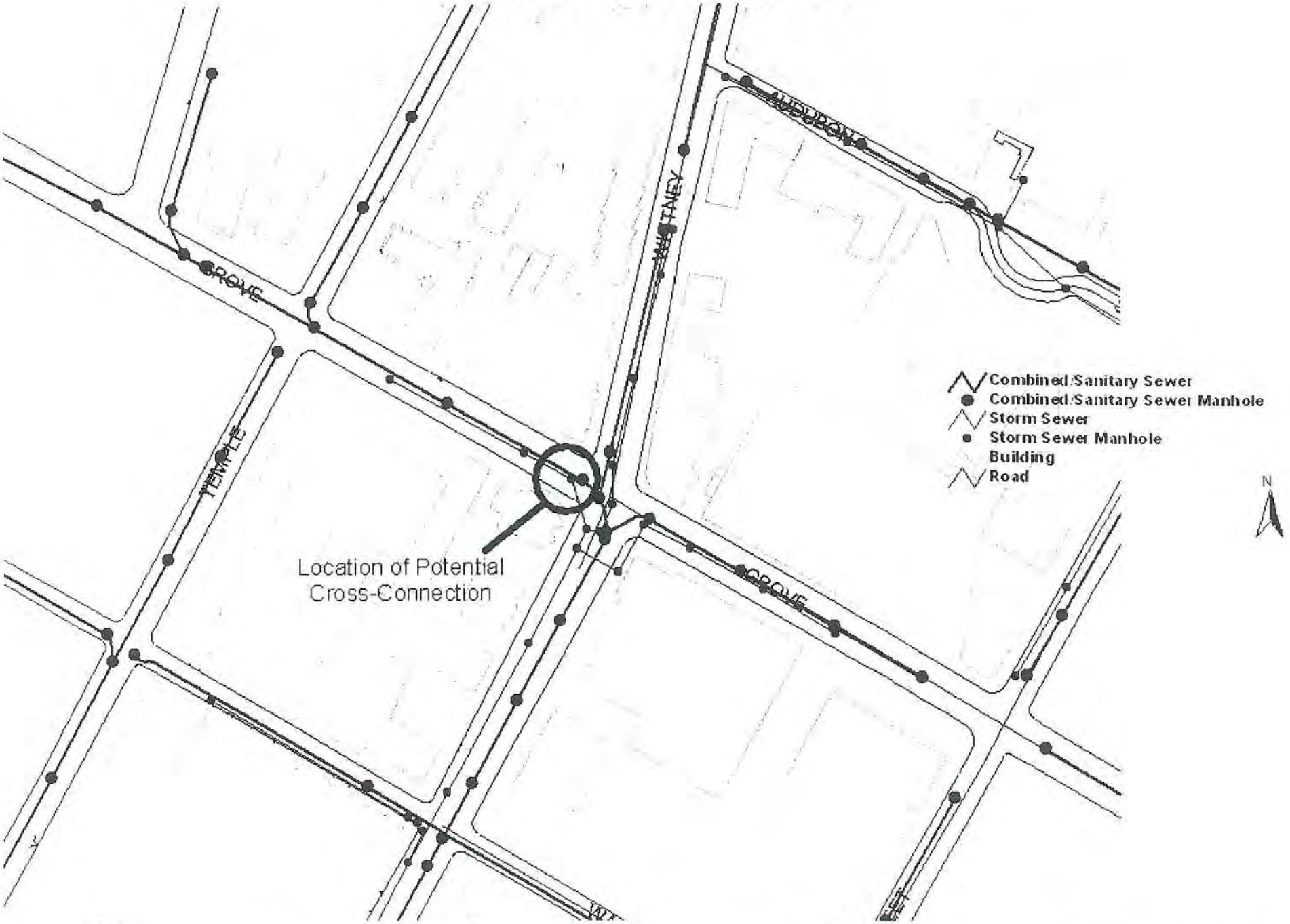
Grove St / Whitney Ave



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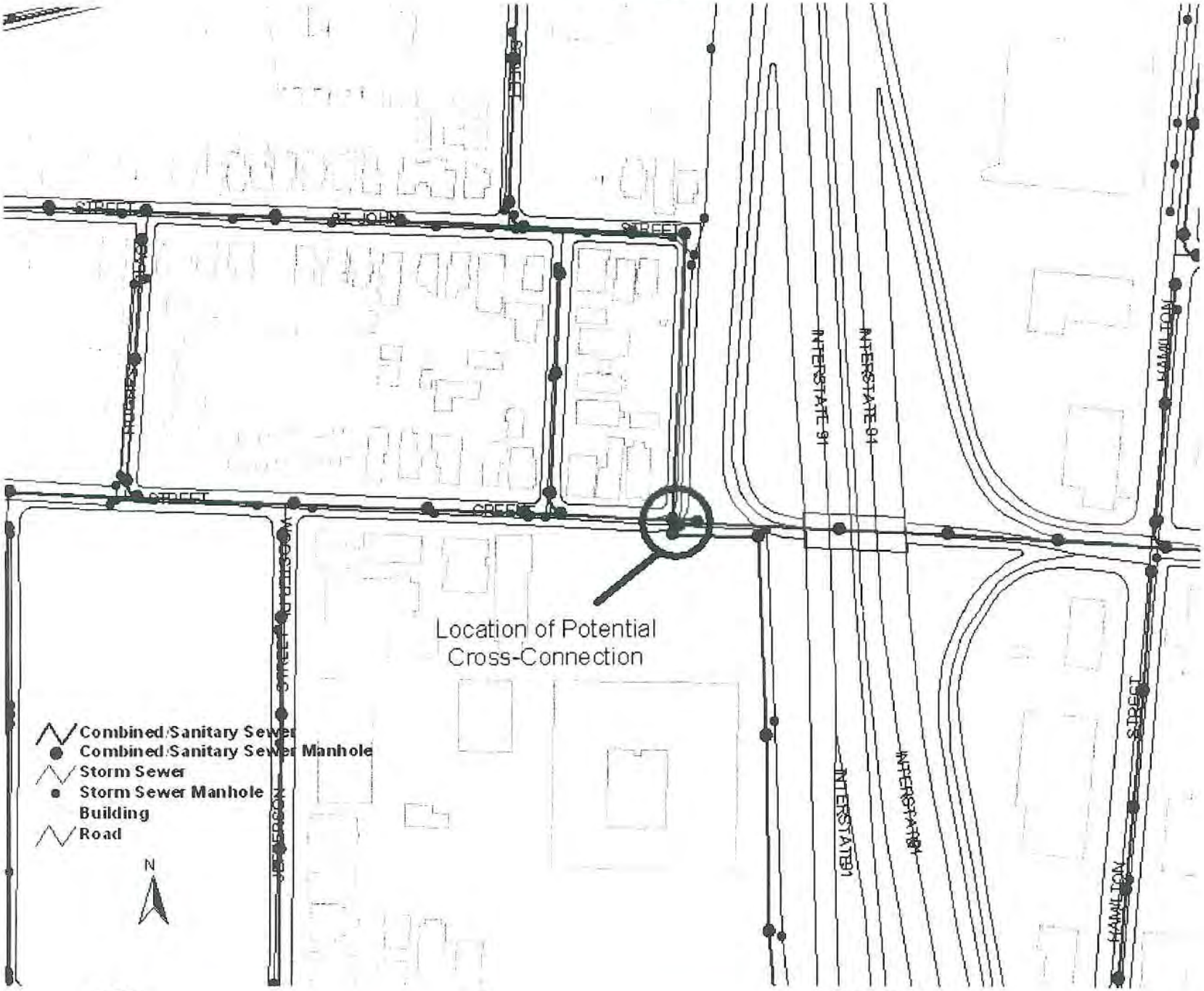

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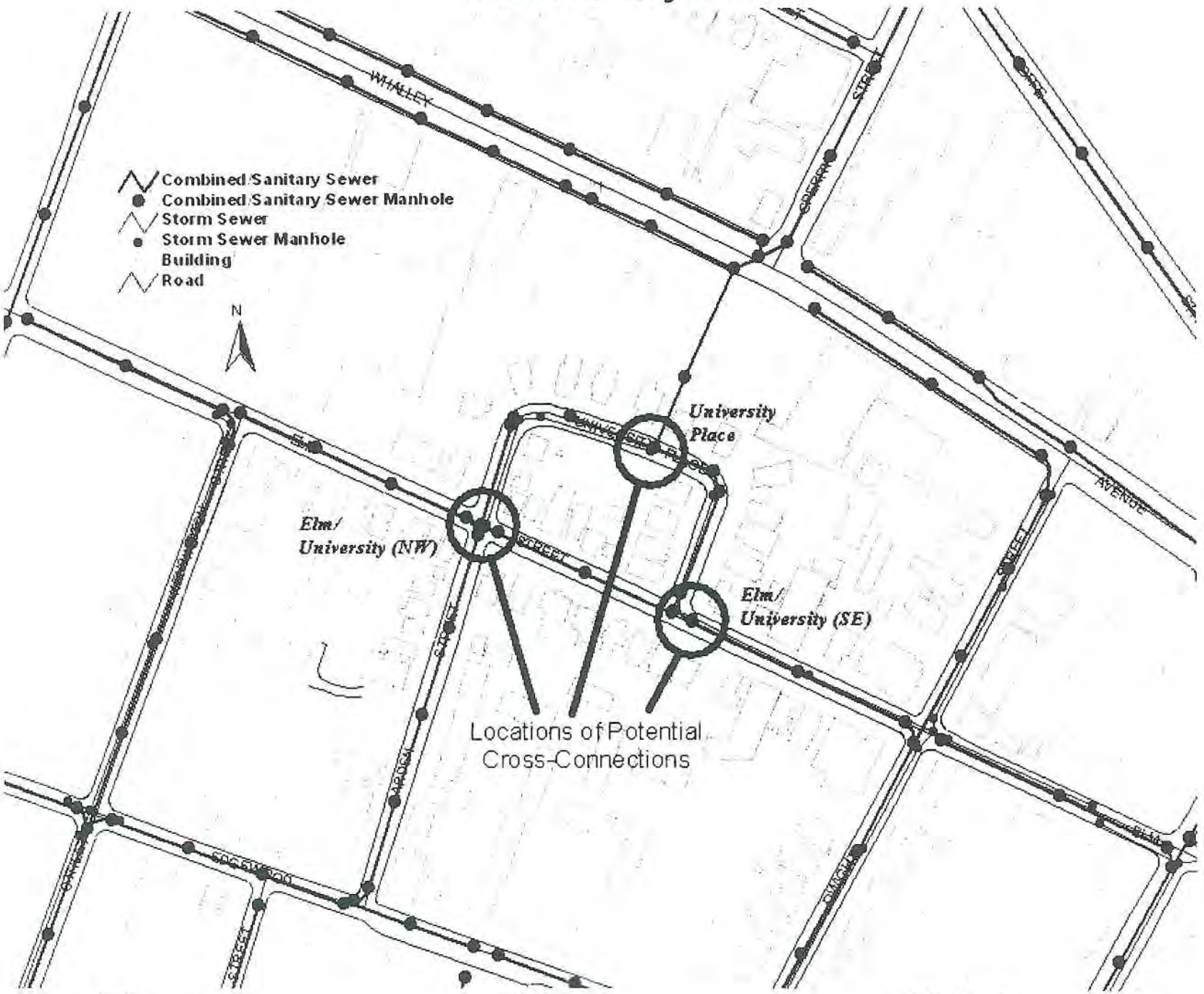

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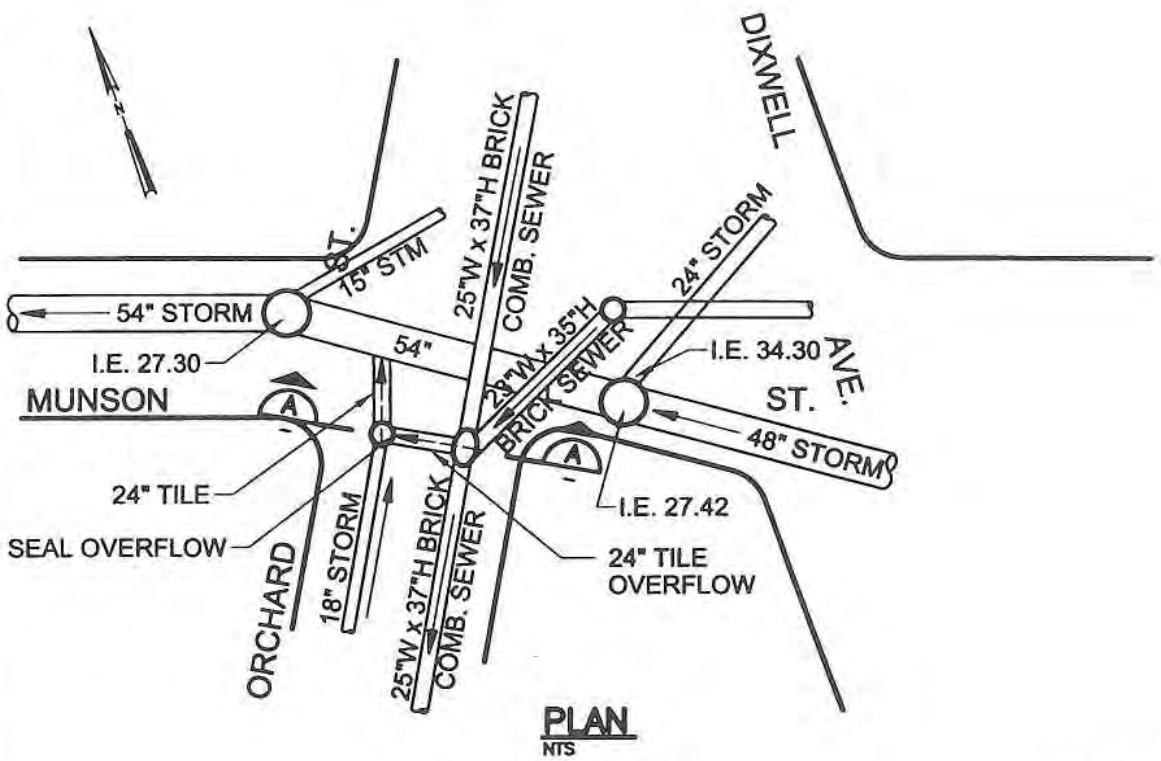
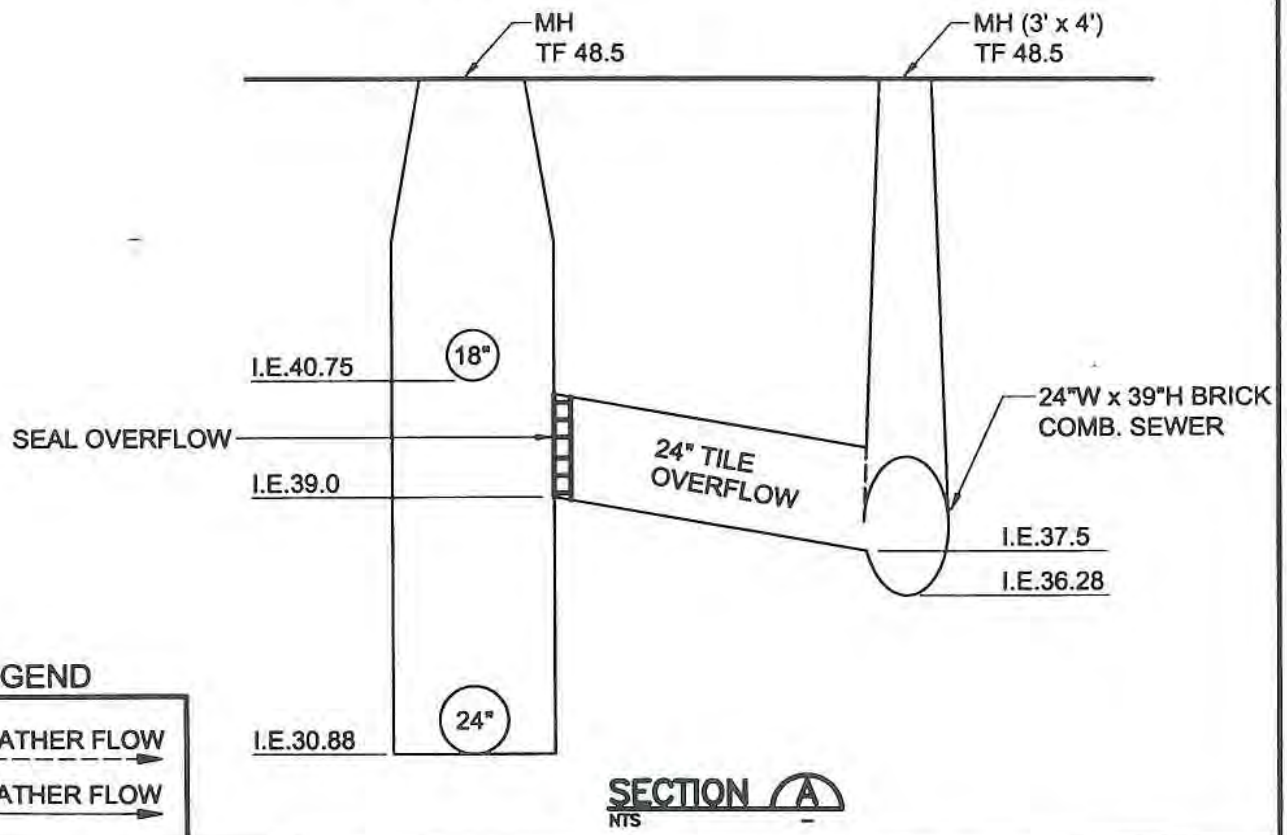


PLAN
NTS



SECTION A
NTS

LEGEND

WET WEATHER FLOW

DRY WEATHER FLOW

CITY OF NEW HAVEN
LONG–TERM CSO CONTROL PLAN
CSO 008
MUNSON STREET AT ORCHARD STREET

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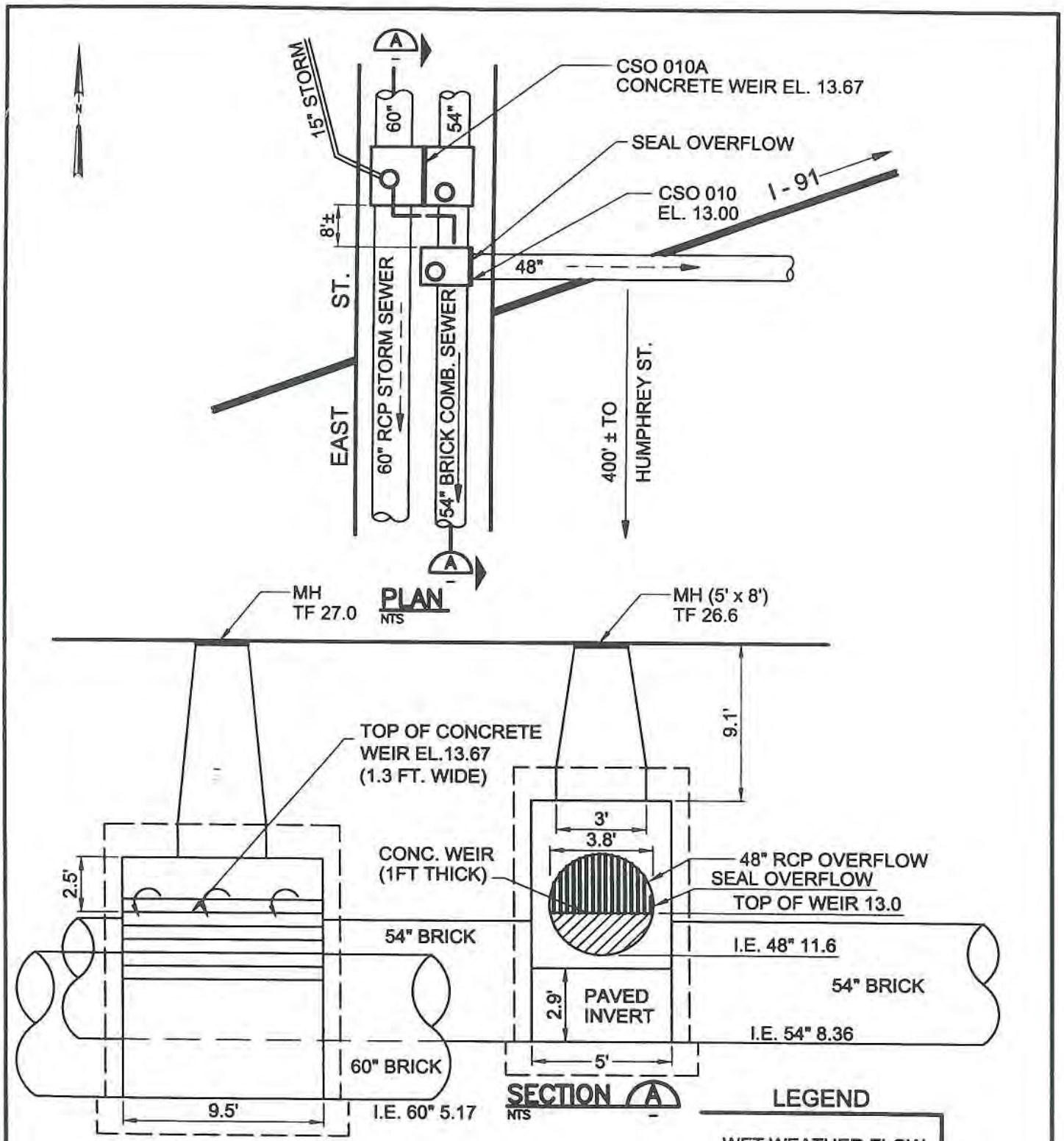
MARCH 22, 2000 OF8.dwg



CITY OF NEW HAVEN
LONG–TERM CSO CONTROL PLAN
CSO 010/010A
EAST STREET AT I–91

CH2MHILL

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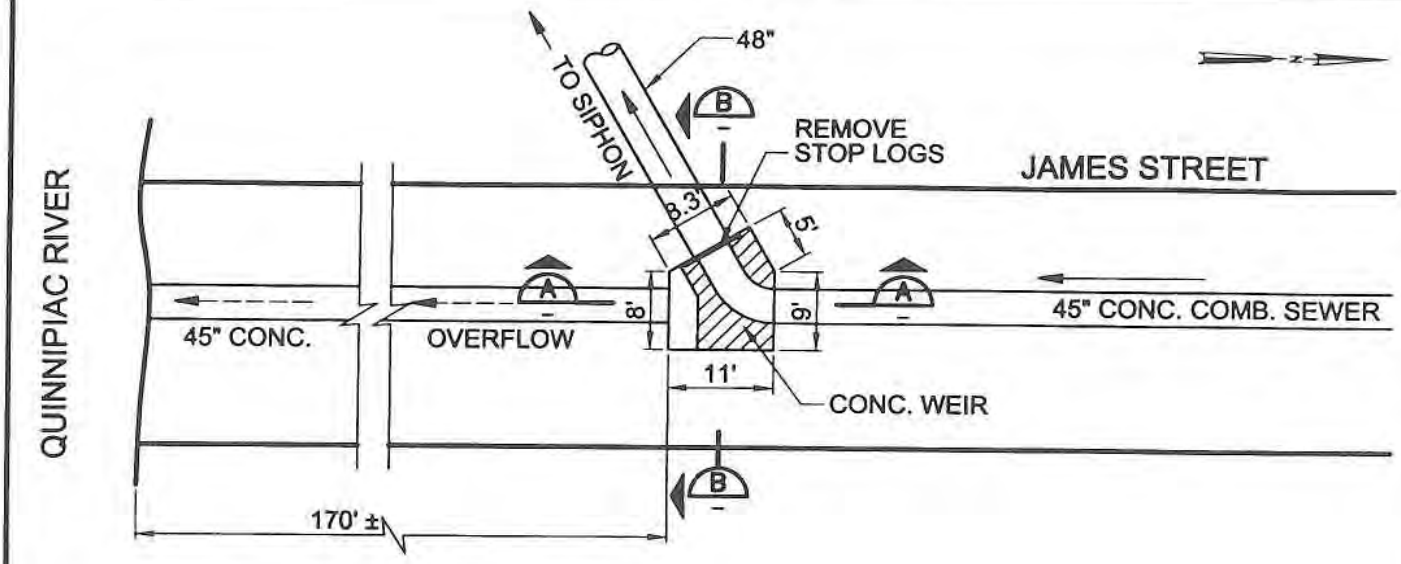
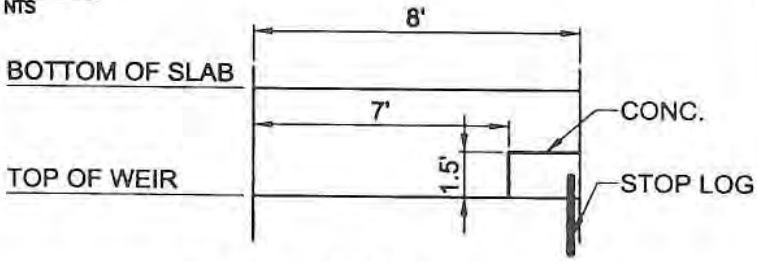


PLAN
NTS



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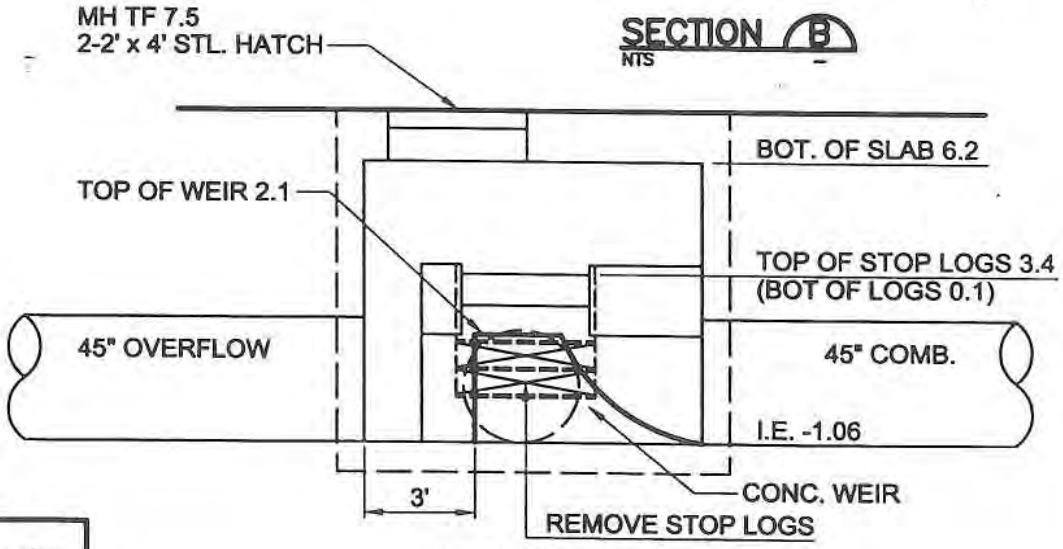

SECTION A
NTS

LEGEND

WET WEATHER FLOW

DRY WEATHER FLOW

CITY OF NEW HAVEN
LONG–TERM CSO CONTROL PLAN
CSO 015
JAMES STREET

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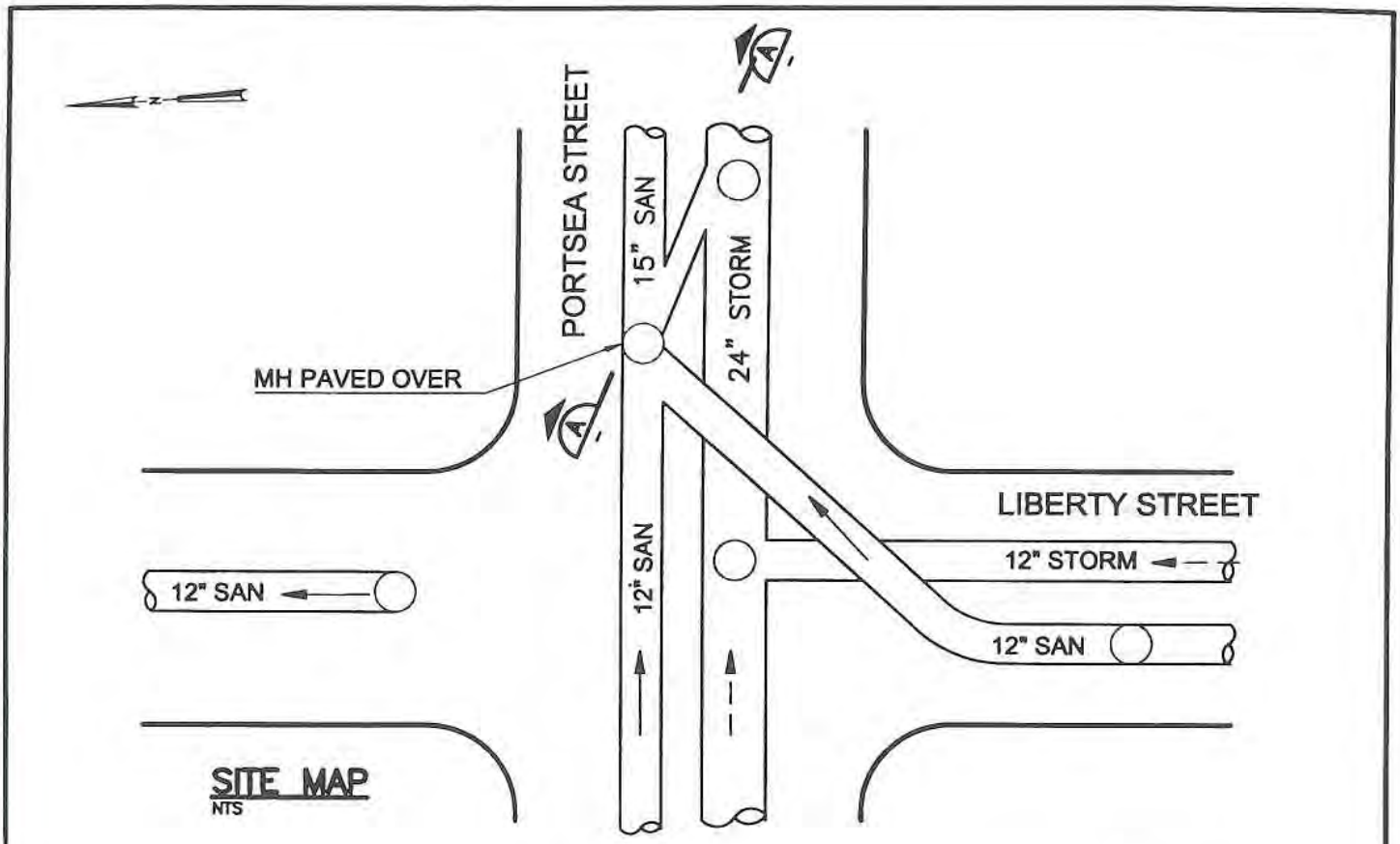
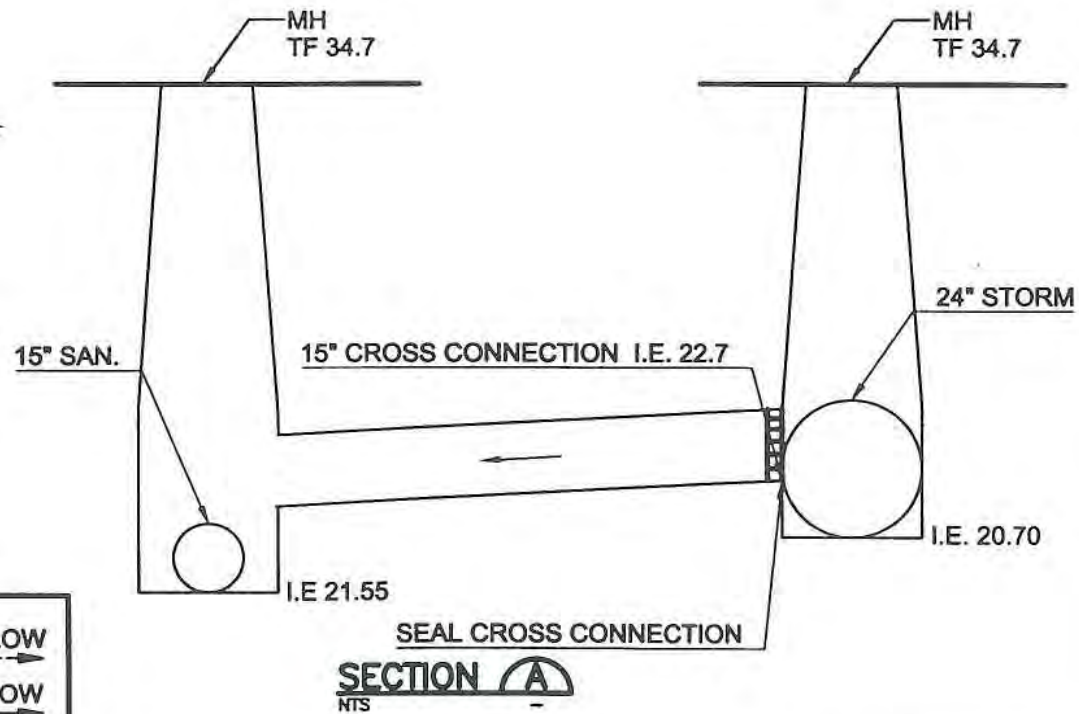




LEGEND

WET WEATHER FLOW

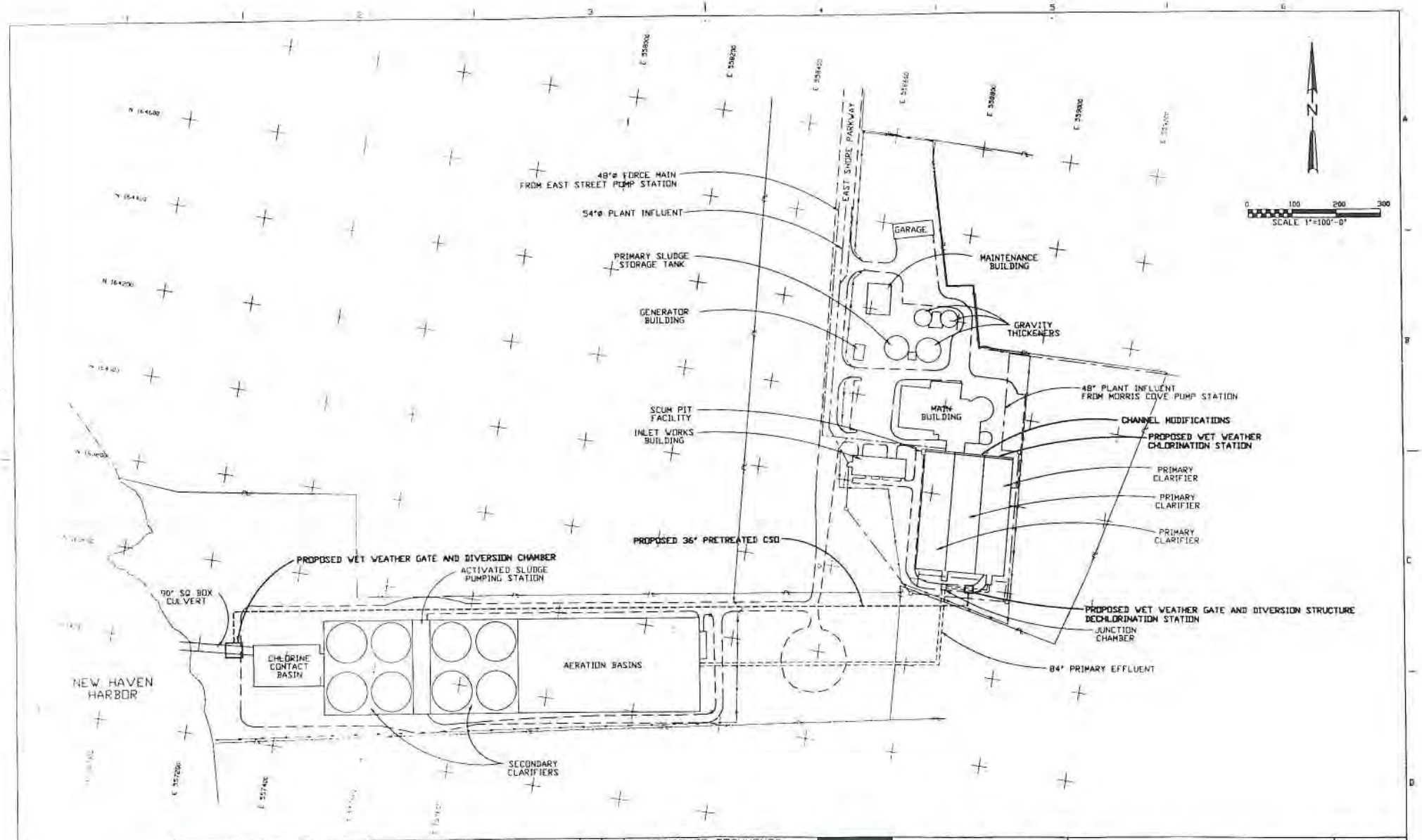
DRY WEATHER FLOW

CITY OF NEW HAVEN
LONG–TERM CSO CONTROL PLAN

PORTSEA AND LIBERTY

CH2MHILL

MARCH 22, 2000 PORT–LIB.DWG



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CITY OF NEW HAVEN
LONG TERM SOLIDS AND FLOATABLES CONTROL PLAN

CITY OF NEW HAVEN, CT

OVERALL SITE PLAN

SHEET	1
DWG NO.	1
DATE	APRIL 2000
PROJ NO.	805

April 25, 2000

APPENDIX C

Long-Term Control Plan Cost and Site Details

Cost Development Basis

The cost estimates contained in this report are considered "order-of-magnitude." According to the American Association of Cost Engineers, an order-of-magnitude estimate is an approximate estimate made without detailed engineering data. The costs were estimated based on vendor quotes for major pieces of equipment and percentage allowances for mechanical, yard piping, electrical, instrumentation and control, and site work. An order of magnitude estimate is normally expected to be accurate within +50 percent or –30 percent.

The cost estimates shown, along with any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time the cost estimate was prepared. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, firm selected for final engineering design, and other variable factors. As a result, the final project costs will vary from the cost estimates presented herein.

The following assumptions were used in preparing these cost estimates:

- All costs are in year 2000 dollars and are based on average U.S. labor and material rates for urban areas in the Northeast.
- The construction cost estimates represent the cost for facility construction. The construction cost estimates do not include costs for design engineering, legal and other administrative fees, environmental studies and reports, or regulatory negotiation.

Appendix C Contents

This appendix includes the following:

- Table 3-1 is repeated here as Table C-1 for ease in following backup
- Cost details for all costs presented in Table C-1 presented in the following order:
  - Summary by location (LTCPRehab.xls)
  - Monitoring cost backup (Monitoring.xls)
  - Roof leader disconnect cost backup (roof leader disconnect.xls)
  - Sewer modification cost backup (Sewer.xls)
  - Pump station modification cost backup (Pump Stations.xls)
  - Sewer separation cost backup (Sewer Separation.xls)
  - Storage tank construction cost backup (NH_tank.xls)
  - Storage tank O&M cost backup (O&M costs.xls)
- Summary table of storage tank volumes followed by overview graphic and site plans of possible storage tank locations

TABLE C-1 New Haven Long-Term CSO Control Plan Recommendations

Location	2-Year Storm Impact	Recommendation	Year 2000 $	
			Coll. Syst. Eval. & Const. Cost	O&M Cost
BOULEVARD SEWERSHED				
Ramsdell	Street flooding & sewer backups	1) Perform collection system evaluation and confirm if a 10" diameter, 250 LF bottleneck exists on Ramsdell Street 2) Perform rehabilitation focusing on the Brooklawn Circle area[1] and, if follow-up monitoring verifies that problems continue after the collection system evaluation and rehabilitation is complete, consider increasing 1,700 LF of 15" pipe (or 1,450 LF of 15" pipe and 250 LF of 10" pipe if bottleneck was confirmed) to 30" along Ramsdell Street from Fountain Street to Whalley Avenue, 225 LF of 8" pipe to 15" along Fountain Street from Cooper Place to Ramsdell Street, and 450 LF of 12" pipe to 24" along Lowin Avenue midway between Judwin Avenue and Fountain Street plus along Fountain Street between Lowin Avenue and Ramsdell Street (new sewer inverts should also be lowered to match pipe crowns)	$800,000	n/a
CSO 006 (Whalley/Fitch), Whalley/Blake	CSO = 4.6 MG, street flooding, & sewer backups	1) Perform collection system evaluation 2a) Using additional monitoring information from the system evaluation, model the following scenario: a) completing sewer separation in this catchment, b) constructing new sewer to reroute Whalley Avenue flows around the upper Boulevard interceptor, connecting to the interceptor at Chapel Street, c) increasing capacity of the West Rock Pump Station, d) abandoning existing connection between upper and lower Whalley Avenue at Fitch Street, and e) constructing storage tank to address remaining CSO 2b) Compare the above modeling scenario to the following sewer system modification: a) adding 8,600 LF of parallel sewer along Whalley Avenue from the City limits to Fitch Street (includes 6,565 LF of 30" diameter, 2,036 LF of 36" diameter, and 8 LF of 42" diameter pipe - new sewer inverts should be lowered to match pipe crowns), b) reconstructing regulator, and c) constructing 5.5 MG CSO storage tank (storage tank may be downsized by approximately 20% if sewer modifications discussed in Item 3a are not performed) 3) Select and construct preferred sewer system modification	$15,800,000	$14,000
CSO 008 (Munson/Orchard), Moreland/Goffe	CSO = 0.2 MG, street flooding, & sewer backups	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation	$3,100,000	n/a
Chapel Street upstream of 005	Street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation and consider increasing 1,800 LF of 12" pipe to 24" along Chapel Street from Alden Avenue to Yale Avenue (new sewer inverts should be lowered to match pipe crowns)	$600,000	n/a
CSO 005 (Boulevard/Derby)	CSO = 5.2 MG	1) Perform collection system evaluation 2) Identify sediment source, implement sedimentation controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 4.2 MG storage tank	$39,800,000	$27,000
CSO 004 (Boulevard/Legion)	CSO = 6.0 MG	1) Perform collection system evaluation 2) Identify sources of sedimentation, consider implementation of controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 4.9 MG storage tank		$25,000
CSO 003 (Boulevard/Orange)	CSO = 4.3 MG	1) Perform collection system evaluation 2) Identify sources of sedimentation, consider implementation of controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 3.9 MG storage tank		$16,000
CSO 002 (Blvd/Lamberton)	CSO = 1.0 MG	1) Perform collection system evaluation 2) Identify sources of sedimentation, consider implementation of controls, and remove sediment 3) Perform sewer system modifications or rehabilitation 4) Construct approximately 0.9 MG storage tank	$4,300,000	$5,000
CSO 024 (Blvd Pump Station)	CSO = 3.3 MG	1) Perform collection system and pump station evaluation and monitor impacts of current controls project that will provide more reliable control over influent sluice gate 2) Work with ConnDOT to eliminate significant wet-weather inflow from I-95[1] 3) Perform sewer system and pump station modifications or rehabilitation 4) Construct approximately 3.2 MG storage tank	$11,200,000	$5,000
Long Wharf Pump Station	Street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation 3) If problems continue after rehabilitation, consider increasing pump station maximum pumping rate from 700 to 2240 gpm in conjunction with increasing the force main diameter from 6" to 10"	$300,000	n/a

TABLE C-1 New Haven Long-Term CSO Control Plan Recommendations

Location	2-Year Storm Impact	Recommendation	Year 2000 $	
			Coll. Syst. Eval. & Const. Cost	O&M Cost
EAST STREET SEWERSHED				
CSO 013 and nearby cross-connection (East Rock Road)	CSO = 0.1 MG & cross connection to storm sewer	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's collection system 2) Perform sewer system modifications or rehabilitation	$1,200,000	n/a
CSO 012 (Mitchell/Nicoll)	CSO = 1.5 MG	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's collection system 2) Perform sewer system modifications or rehabilitation 3) If necessary, construct approximately 0.7 MG storage tank	$6,800,000	$7,000
CSO 010 (East/I-91)	CSO = 0.8 MG	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation; if monitoring confirms conveyance problems, consider increasing 850 LF of 18" pipe to 30" along State Street from Grove Street to Trumbull Street 3) Construct approximately 6.0 MG storage tank for 011, 014, and Humphrey Pump Station	$28,000,000	n/a
CSO 011 (Humphrey/I-91)	CSO = 7.9 MG			$18,000
CSO 014 (Trumbull/Orange)	CSO = 0.8 MG			
East/Ives CSO	CSO = 0.3 MG	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation	$800,000	n/a
Humphrey Pump Station	CSO = 0.1 MG & street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation 3) Using additional monitoring data, assess whether more detailed hydraulic modeling of this catchment should be performed (i.e including smaller diameter neighborhood pipes). If so, model and compare with previous model results. If results are similar and surcharge persists, consider increasing the maximum pump capacity from 350 to 1,050 gpm in conjunction with increasing the force main diameter from 6" to 10" and increasing 530 LF of 18" pipe to 30" along Mill River Street from just south of the northbound I-91 lane (just north of the end of Mill River Street) to approximately Humphrey Street in conjunction with an additional 20 LF of 10" pipe to 30" connecting this pipe to the pump station 4) Monitor to confirm CSO control. If storage is still needed, combine storage requirement with storage tank for CSOs 011/014	$600,000	n/a
S. Frontage/Davenport CSO	CSO = 0.7 MG	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation and consider a) moving Union Pump Station one city block north and adding 6000 LF of 36" force main from the Union PS to the East Street PS to maximize conveyance through the Union PS, b) increasing 75 LF of parallel pipe from 8" and 15" to 24" parallel pipes upstream of the Union PS near the intersection of Union and Columbus Avenues 3) Construct an approximately 1.2 MG storage tank for CSO 025 and George/Temple CSO and, if still necessary, an approximately 0.2 MG storage tank for South Frontage/Davenport	$17,400,000	$5,000
CSO 025 (Union Pump Station)	CSO = 2.7 MG			$5,000
George/Temple CSO	CSO = 0.9 MG			
Union/Columbus Avenues & Water Street	Street flooding			n/a
CSO 021 (East St Pump Station)	CSO = 4.2 MG	1) Perform collection system and pump station evaluation 2) Perform sewer system modifications or rehabilitation 3) Construct approximately 0.6 MG storage tank for CSO 021 4) Perform pump station modifications and consider increasing the max pump capacity from 29,700 gpm to 43,540 gpm which the model suggests will increase conveyance to the plant by about 17 mgd	$5,500,000	$12,000

TABLE C-1 New Haven Long-Term CSO Control Plan Recommendations

Location	2-Year Storm Impact	Recommendation	Year 2000 $	
			Coll. Syst. Eval. & Const. Cost	O&M Cost
EAST SHORE SEWERSHED				
Barnes Pump Station	CSO = 0.3 MG, street flooding, & basement backups	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's system 2) Perform extensive sewer system rehabilitation[2]	$2,200,000	n/a
Quinnipiac Pump Station	CSO = 0.5 MG & street flooding	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's system 2) Perform extensive sewer system rehabilitation[2]	$1,400,000	n/a
CSO 020 (Quinnipiac/Clifton)	CSO = 0.4 MG & street flooding	1) Perform collection system evaluation and work with surrounding communities to reduce their wet weather flow into New Haven's system 2) Perform extensive sewer system rehabilitation[1]	$100,000	n/a
CSO 018 (N. Front/Lombard)	CSO = 0.6 MG, street flooding, & basement backups	1) Perform collection system evaluation 2) Perform sewer system rehabilitation and sewer separation; consider installing a new sanitary interceptor along Front, River, and James Streets and a low lift pump station near the James Street siphon to provide sanitary sewers with steeper slopes 3) Seal 018 and 019 and construct 0.1, 0.2, and 0.2 MG storage tanks for 016, 015 and 009, respectively, as necessary.	$45,100,000	n/a
CSO 019 (N. Front/Pine)	CSO = 0.9 MG, street flooding, & basement backups			n/a
CSO 016 (Poplar/River)	CSO = 3.7 MG & street flooding			$16,000
CSO 015 (James St. Siphon)	CSO = 3.6 MG & street flooding			$56,000
CSO 009 (James/Grand)	CSO = 2.4 MG & street flooding			$12,000
Murphy/Market Pump Station	Street flooding	1) Street built below flood elevation, no recommendations to alter road included here[1], perform collection system evaluation 2) Perform sewer system modifications modifications if necessary	$200,000	n/a
Morris Cove	Street flooding	1) Perform collection system evaluation 2) Perform sewer system rehabilitation focusing on excessive I/I in the Dean, Concord, and Townsend Street areas and work with surrounding communities on reducing wet weather flow into New Haven's system[2]. If necessary, consider increasing 1,500 LF of 18" pipe to 36" along Lighthouse Road and Morris Causeway between Cove Street and the Morris Cove PS and increasing the max pump capacity from 10,025 gpm to 11,350 gpm	$2,800,000	n/a
Woodward Pump Station	CSO = 0.1 MG & street flooding	1) Perform collection system evaluation 2) Perform sewer system modifications or rehabilitation 3) If necessary, construct 0.1 MG storage tank	$800,000	$15,000
CSO 022 (Allen Place)	CSO active but volume not quantified	1) Perform collection system evaluation 2a) Connect laterals of buildings on the south side of Forbes Ave between Townsend Ave and Woodward Ave to sanitary sewer along Forbes Ave to eliminate sanitary flow from the highway drainage pipes and thus eliminate CSO 2b) Bulkhead connection to 8" sanitary pipe in chamber at Allen Place to eliminate cross-connection	$100,000	n/a
		TOTALS	$188,900,000	$238,000

[1] Recommendation or comment provided by City and/or WPCA

[2] Recommendation and part of cost estimate provided by City and/or WPCA

LTCPRehab.xls

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
SUMMARY

Location	Estimated Cost
Boulevard Sewershed	
Ramsdell	$800,000
CSO 006, Whalley, Blake	$15,800,000
CSO 008, Moreland, Goffe	$3,100,000
Chapel Street upstream of 005	$600,000
CSOs 005, 004, 003	$39,800,000
CSO 002	$4,300,000
CSO 024 and Boulevard Pump Station	$11,200,000
Long Wharf Pump Station	$300,000
East Street Sewershed	
CSO 013 and nearby cross connection	$1,200,000
CSO 012, Mitchell Pump Station area	$6,800,000
CSO 010/011/014	$28,000,000
East/Ives CSO	$800,000
Humphrey Pump Station	$600,000
CSO 025, George/Temple CSO, So. Frontage/Davenport CSO, Union/Columbus Avenues, Water Street	$17,400,000
CSO 021 and East Street Pump Station	$5,500,000
East Shore Sewershed	
Barnes Pump Station	$2,200,000
Quinnipiac Pump Station	$1,400,000
CSO 020	$100,000
CSOs 018, 019, 016, 015, and 009	$45,100,000
Murphy/Market Pump Station	$200,000
Morris Cove and Morris Cove Pump Station	$2,800,000
Woodward Pump Station	$800,000
CSO 022	$100,000
TOTALS:	**$188,900,000**

Summary by Task:

CSO Tank Construction Cost	$86,931,468
Monitoring Costs	$4,554,500
Pump Station Upgrades	$14,583,848
Roof Leader Disconnects	$39,358,564
Sewer Separation Costs	$28,083,453
Sewer Upgrades	$10,194,593
Modeling	$24,000
Rehabilitation Costs (given by City/WPCA)	$5,195,039
	$188,900,000

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
RAMSDELL
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1a)	Disconnect any remaining roof leaders in partially separated areas	*Included in CSO 006*
1b)	Monitoring	*Included in CSO 006*
2)	Sewer modifications	$801,563
		$801,563

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 006, WHALLEY, BLAKE
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1a)	Disconnect any remaining roof leaders in partially separated areas	$0
1b)	Monitoring	$350,817
2)	Modeling	$12,000
3a)	Increase in Sewer Capacity	$3,625,155
3b)	Construction of CSO Storage Tank	$11,782,895
		$15,770,867

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 008, MORELAND, GOFFE
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$114,700
2)	Disconnect any remaining roof leaders in partially separated areas	$2,992,000
		$3,106,700

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CHAPEL STREET UPSTREAM OF CSO 005
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1a)	Disconnect any remaining roof leaders in partially separated areas	*Included in CSO 005*
1b)	Monitoring	*Included in CSO 005*
2)	Increase in Sewer Capacity	$607,500
		$607,500

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSOs 005, 004, 003
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$739,032
2)	Identify sediment sources, implement controls, & remove sediment	$67,500
3)	Disconnect any remaining roof leaders in partially separated areas	$9,189,942
4)	Construction of CSO Storage Tanks	$29,779,789
		$39,776,262

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 002
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$205,911
2)	Identify sediment sources, implement controls, & remove sediment	*incl in CSO 003-005*
3)	Disconnect any remaining roof leaders in partially separated areas	$709,334
4)	Construction of CSO Storage Tank	$3,404,751
		$4,319,996

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 024 / Boulevard Pump Station
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$122,552
3a)	Disconnect any remaining roof leaders in partially separated areas	$1,635,942
3b)	Upgrade pump station	$1,775,250
4)	Construction of CSO Storage Tank	$7,707,470
		$11,241,214

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
LONG WHARF PUMP STATION
Boulevard Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	*Included in CSO 024*
2)	Disconnect any remaining roof leaders in partially separated areas	*Included in CSO 024*
3)	Increase pump station capacity	$251,181
		$251,181

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 013
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$110,995
2)	Disconnect any remaining roof leaders in partially separated areas	$1,119,195
		$1,230,190

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 012, Mitchell Pump Station area
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$224,855
2)	Disconnect any remaining roof leaders in partially separated areas	$3,980,202
3)	Construction of CSO Storage Tank	$2,551,851
		$6,756,908

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSOs 010, 011, 014
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$513,415
2a)	Disconnect any remaining roof leaders in partially separated areas	$9,135,081
2b)	Increase in Sewer Capacity	$344,250
3)	Construction of CSO Storage Tank	$18,024,952
		$28,017,699

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
EAST/IVES CSO
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$107,742
2)	Disconnect any remaining roof leaders in partially separated areas	$660,000
		$767,742

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
HUMPHREY PUMP STATION
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$94,358
2)	Disconnect any remaining roof leaders in partially separated areas	$0
3a)	Modeling	$12,000
3b)	Increase Pump Station Capacity	$275,535
3c)	Increase in Sewer Capacity	$222,750
4)	Construction of CSO Storage Tank	*Included in CSO 011-014*
		$604,643

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSOs 025, GEORGE/TEMPLE, S. FRONTAGE/DAVENPORT, and UNION/COLUMBUS AVE., WATER ST.
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$600,821
2a)	Disconnect any remaining roof leaders in partially separated areas	$3,351,502
2b)	Relocation of pump station	$6,674,400
2c)	Increase in sewer capacity	$50,625
3)	Construction of CSO Storage Tanks	$6,771,034
		$17,448,381

* Roof leader disconnection and monitoring cost of Carlisle/Liberty and Portsea/Liberty included under CSO 025

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 021/East Street Pump Station
East Street Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$123,254
2)	Disconnect any remaining roof leaders in partially separated areas	$1,676,000
3)	Construction of CSO Storage Tank	$2,070,329
4)	Upgrade pump station and increase pump station capacity	$1,633,500
		$5,503,083

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
BARNES PUMP STATION (BPS)
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$160,913
2)	Perform extensive sewer system rehabilitation[1]	$2,039,087
		$2,200,000

[1] Recommendation and total cost provided by City and/or WPCA

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
QUINNIPIAC PUMP STATION (QPS)
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$189,798
2)	Perform extensive sewer system rehabilitation[1]	$1,210,202
		$1,400,000

[1] Recommendation and total cost provided by City and/or WPCA

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 020
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$100,253
2)	Perform extensive sewer system rehabilitation[1]	*incl in Barnes PS/ Quinnipiac PS*
		$100,253

[1] Recommendation provided by City and/or WPCA

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSOs 018, 019, 016, 015, 009
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$591,282
2a)	Complete Sewer Separation for areas not yet separated	$28,083,453
2b)	Disconnect any remaining roof leaders in partially separated areas	$4,909,366
2c)	Construction of new sanitary interceptor	$3,766,500
2d)	Construction of new pump station	$3,622,860
3)	Construction of CSO Storage Tanks	$4,121,611
		$45,095,073

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
MURPHY/MARKET PUMP STATION
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	*Included in CSO 015*
2a)	Disconnect any remaining roof leaders in partially separated areas	*Included in CSO 015*
2b)	Increase pump station capacity if necessary	$175,622
		$175,622

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
MORRIS COVE AND MORRIS COVE PUMP STATION
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1a)	Monitoring	*Included in CSO WPS*
2a)	Disconnect any remaining roof leaders in partially separated areas	*Included in CSO WPS*
2b)	Sewer rehabilitation[1]	$1,915,750
2c)	Increase in sewer capacity	$708,750
2d)	Upgrade pump station	$175,500
		$2,800,000

[1] Recommendation and total cost provided by City and/or WPCA

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
WOODWARD PUMP STATION (WPS)
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1)	Monitoring	$110,120
2)	Disconnect any remaining roof leaders in partially separated areas	$0
3)	Construction of CSO Storage Tank	$716,787
		$826,906

CITY OF NEW HAVEN
LTCP RECOMMENDATIONS FOR CSO AND FLOOD CONTROL
COST ESTIMATE
CSO 022
East Shore Sewershed

Project:
Facility:
File Name: LTCP Rehab.xls
BY: UIC
April 27, 2001

	DESCRIPTION	TOTAL
1a)	Monitoring	$93,684
2a)	Disconnect any remaining roof leaders in partially separated areas	$0
2b)	Reconnect building laterals and bulkhead sanitary connection[1]	$30,000
		$123,684

[1] Recommendation and cost estimate provided by City and/or WPCA

Monitoring.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
MONITORING PROGRAM COST ESTIMATE

Location	Organization	Flowmeters	Smoke Testing cost	Smoke Testing analysis	TV Inspection cost	TV Inspection insp.	TV Inspection eng/tech	TV Inspection data anls	Desktop Analysis	TM Report	Subtotal
002	$6,000	$66,000	$18,000	$7,500	$56,017	$10,109	$1,784	$3,500	$22,000	$15,000	$205,911
003	$6,000	$33,000	$6,000	$7,500	$5,925	$1,069	$189	$3,500	$22,000	$15,000	$100,183
004	$6,000	$33,000	$6,000	$7,500	$13,416	$2,421	$427	$3,500	$22,000	$15,000	$109,265
005	$6,000	$198,000	$48,000	$7,500	$189,376	$34,176	$6,031	$3,500	$22,000	$15,000	$529,584
006	$6,000	$132,000	$19,200	$7,500	$120,115	$21,677	$3,825	$3,500	$22,000	$15,000	$350,817
008	$6,000	$33,000	$6,000	$7,500	$17,900	$3,230	$570	$3,500	$22,000	$15,000	$114,700
009	$6,000	$33,000	$6,000	$7,500	$22,119	$3,992	$704	$3,500	$22,000	$15,000	$119,815
010	$6,000	$33,000	$6,000	$7,500	$25,291	$4,564	$805	$3,500	$22,000	$15,000	$123,661
011	$6,000	$33,000	$6,000	$7,500	$18,292	$3,301	$583	$3,500	$22,000	$15,000	$115,176
012	$6,000	$33,000	$6,000	$7,500	$31,084	$5,610	$990	$3,500	$22,000	$15,000	$130,684
013	$6,000	$33,000	$6,000	$7,500	$14,843	$2,679	$473	$3,500	$22,000	$15,000	$110,995
014	$6,000	$99,000	$14,400	$7,500	$88,408	$15,955	$2,816	$3,500	$22,000	$15,000	$274,578
015	$6,000	$33,000	$6,000	$7,500	$20,147	$3,636	$642	$3,500	$22,000	$15,000	$117,424
016	$6,000	$33,000	$6,000	$7,500	$37,105	$6,696	$1,182	$3,500	$22,000	$15,000	$137,983
018	$6,000	$33,000	$6,000	$7,500	$23,695	$4,276	$755	$3,500	$22,000	$15,000	$121,725
019	$6,000	$33,000	$6,000	$7,500	$1,100	$199	$35	$3,500	$22,000	$15,000	$94,334
020	$6,000	$33,000	$6,000	$7,500	$5,982	$1,080	$191	$3,500	$22,000	$15,000	$100,253
021	$6,000	$33,000	$6,000	$7,500	$24,956	$4,504	$795	$3,500	$22,000	$15,000	$123,254
022	$6,000	$33,000	$6,000	$7,500	$564	$102	$18	$3,500	$22,000	$15,000	$93,684
024	$6,000	$33,000	$6,000	$7,500	$24,377	$4,399	$776	$3,500	$22,000	$15,000	$122,552
025	$6,000	$66,000	$9,600	$7,500	$50,131	$9,047	$1,597	$3,500	$22,000	$15,000	$190,374
Barnes PS	$6,000	$49,500	$7,200	$7,500	$41,419	$7,475	$1,319	$3,500	$22,000	$15,000	$160,913
Carlisle/Liberty	$6,000	$33,000	$6,000	$7,500	$763	$138	$24	$3,500	$22,000	$15,000	$93,925
East/Ives	$6,000	$33,000	$6,000	$7,500	$12,160	$2,194	$387	$3,500	$22,000	$15,000	$107,742
George/Temple	$6,000	$33,000	$6,000	$7,500	$25,935	$4,680	$826	$3,500	$22,000	$15,000	$124,442
Humphrey PS	$6,000	$33,000	$6,000	$7,500	$1,120	$202	$36	$3,500	$22,000	$15,000	$94,358
Mitchell PS	$6,000	$33,000	$6,000	$7,500	$967	$174	$31	$3,500	$22,000	$15,000	$94,172
Portsea/Liberty	$6,000	$33,000	$6,000	$7,500	$940	$170	$30	$3,500	$22,000	$15,000	$94,139
Quinnipiac PS	$6,000	$66,000	$9,600	$7,500	$49,655	$8,961	$1,581	$3,500	$22,000	$15,000	$189,798
S. Frontage/Davenport	$6,000	$33,000	$6,000	$7,500	$4,075	$735	$130	$3,500	$22,000	$15,000	$97,941
Woodward PS	$6,000	$33,000	$6,000	$7,500	$14,122	$2,548	$450	$3,500	$22,000	$15,000	$110,120
TOTAL	**$186,000**	**$1,468,500**	**$270,000**	**$232,500**	**$942,000**	**$170,000**	**$30,000**	**$108,500**	**$682,000**	**$465,000**	**$4,554,500**

Roof Leader Disconnect.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
ROOF LEADER DISCONNECTION COST ESTIMATE

Location	Buildings (ea)	Area (ac)	Buildings /Acre	unit cost	% partially separated	cost
002	2,299	383.10	6.00	$4,000	8%	709,334
003	141	40.50	3.48	$4,000	100%	564,000
004	414	91.70	4.51	$4,000	40%	658,733
005	5,901	1295.00	4.56	$4,000	34%	7,967,210
006	3,686	821.40	4.49	$4,000	0%	0
008	748	122.40	6.11	$4,000	100%	2,992,000
009	780	151.30	5.16	$4,000	41%	1,264,342
010	816	172.90	4.72	$4,000	74%	2,401,041
011	696	125.10	5.56	$4,000	27%	760,342
012	1,033	212.60	4.86	$4,000	93%	3,852,202
013	303	101.50	2.99	$4,000	92%	1,119,195
014	2,394	604.50	3.96	$4,000	62%	5,973,698
015	469	137.80	3.40	$4,000	22%	409,037
016	1,644	253.70	6.48	$4,000	6%	409,266
018	736	162.00	4.54	$4,000	96%	2,826,720
019	52	7.50	6.93	$4,000	0%	0
020	196	40.90	4.79	$4,000	0%	0
021	419	170.60	2.46	$4,000	100%	1,676,000
022	18	3.90	4.62	$4,000	0%	0
024	906	166.70	5.43	$4,000	45%	1,635,942
025	757	342.80	2.21	$4,000	58%	1,741,997
Barnes PS	1,247	283.20	4.40	$4,000	0%	0
Carlisle/Liberty	55	5.20	10.58	$4,000	0%	0
East/Ives	165	83.20	1.98	$4,000	100%	660,000
George/Temple	514	177.30	2.90	$4,000	72%	1,489,504
Humphrey PS	45	7.70	5.84	$4,000	0%	0
Mitchell PS	32	6.60	4.85	$4,000	100%	128,000
Portsea/Liberty	69	6.40	10.78	$4,000	0%	0
Quinnipiac PS	1,080	339.50	3.18	$4,000	0%	0
S. Frontage/Davenport	30	27.90	1.08	$4,000	100%	120,000
Woodward PS	427	96.60	4.42	$4,000	0%	0
TOTAL	**28,072**	**6441.50**				**39,358,564**
unit cost	$4,000	/building				

Assumptions:
1) None of the roof leaders in the "Combined" catchment type are to be disconnected.
2) There are no roof leaders connected to the Sanitary Sewer in the "fully separated" catchment area.

RLs
roof leader disconnect.xls
04/27/2001

Sewer.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
SEWER REHABILITATION COST ESTIMATE

Location	Description	Unit	Qty	Installed Cost/Unit	Amount	Overhead and Profit 15%	Contingency 20%	Subtotal
Boulevard Sewershed								
Ramsdell	For Furnishing and Installing 15" PVC Sewer Pipe	LF	225	$250	$56,250	$8,438	$11,250	$75,938
	For Furnishing and Installing 24" PVC Sewer Pipe	LF	450	$250	$112,500	$16,875	$22,500	$151,875
	For Furnishing and Installing 30" RCP Sewer Pipe	LF	1700	$250	$425,000	$63,750	$85,000	$573,750
CSO 006, Whalley, Blake	For Furnishing and Installing 30" RCP Sewer Pipe	LF	6565	$300	$1,969,500	$295,425	$393,900	$2,658,825
	For Furnishing and Installing 36" RCP Sewer Pipe	LF	2036	$350	$712,600	$106,890	$142,520	$962,010
	For Furnishing and Installing 42" RCP Sewer Pipe	LF	8	$400	$3,200	$480	$640	$4,320
Chapel Street upstream of 005	For Furnishing and Installing 24" PVC Sewer Pipe	LF	1800	$250	$450,000	$67,500	$90,000	$607,500
CSO 002-005	For Sediment Identification, Controls, & Removal	DAY	5	$10,000	$50,000	$7,500	$10,000	$67,500
East Street Sewershed								
CSO 010/011/014	For Furnishing and Installing 30" RCP Sewer Pipe	LF	850	$300	$255,000	$38,250	$51,000	$344,250
Humphrey Pump Station	For Furnishing and Installing 30" RCP Sewer Pipe	LF	550	$300	$165,000	$24,750	$33,000	$222,750
CSO 025, George/Temple CSO, So. Frontage/Davenport CSO, Union/Columbus Avenues, Water Street	For Furnishing and Installing <30" PVC Sewer Pipe	LF	150	$250	$37,500	$5,625	$7,500	$50,625
East Shore Sewershed								
Morris Causeway near MCPS	For Furnishing and Installing 36" RCP Sewer Pipe	LF	1500	$350	$525,000	$78,750	$105,000	$708,750
CSO 018/019/016/009/015	For Furnishing and Installing 30" RCP Sewer Pipe	LF	9300	$300	$2,790,000	$418,500	$558,000	$3,766,500
							TOTALS:	**$10,194,593**

Pump Stations.xls

CITY OF NEW HAVEN
Pump Station Rehabilitation
COST ESTIMATE
SUMMARY

Location	Estimated Cost
Long Wharf	$251,181
Humphrey	$275,535
East Street	$1,633,500
Murphy-Market	$175,622
Morris Cove	$175,500
Boulevard	$1,775,250
Union Street	$6,674,400
new James Street	$3,622,860
TOTALS:	**$14,583,848**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
Long Wharf Pump Station
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1 Item 1a	FOR INCREASE IN PUMP SIZE For Replacing a 350 gpm pump with a 1,200 gpm pump	EA	2	$25,000	$50,000	$7,500	$10,000	$67,500
ITEM 2 Item 2a	FOR INCREASE IN PIPE SIZE For Furnishing and Installing a 10" DIP Force Main	LF	146	$110	$16,060	$2,409	$3,212	$21,681
ITEM 3	ELECTRICAL SERVICE UPGRADE	LS	1	$30,000	$30,000	$4,500	$6,000	$40,500
ITEM 4	CONTROL PANEL UPGRADES	LS	1	$25,000	$25,000	$3,750	$5,000	$33,750
ITEM 5	GENERATOR UPGRADES	LS	1	$30,000	$30,000	$4,500	$6,000	$40,500
ITEM 6	SITE WORK	LS	1	$15,000	$15,000	$2,250	$3,000	$20,250
ITEM 7	MOBILIZATION	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
							TOTAL:	**$251,181**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
Humphrey Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1	FOR INCREASE IN PUMP SIZE							
Item 1a	For Replacing a 175 gpm pump with a 1,200 gpm pump	EA	2	$25,000	$50,000	$7,500	$10,000	$67,500
ITEM 2	FOR INCREASE IN PIPE SIZE							
Item 2a	For Furnishing and Installing a 24" DIP Force Main	LF	310	$110	$34,100	$5,115	$6,820	$46,035
ITEM 3	ELECTRICAL SERVICE UPGRADE	LS	1	$30,000	$30,000	$4,500	$6,000	$40,500
ITEM 4	CONTROL PANEL UPGRADES	LS	1	$25,000	$25,000	$3,750	$5,000	$33,750
ITEM 5	GENERATOR UPGRADES	LS	1	$30,000	$30,000	$4,500	$6,000	$40,500
ITEM 6	SITE WORK	LS	1	$15,000	$15,000	$2,250	$3,000	$20,250
ITEM 7	MOBILIZATION	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
							TOTAL:	**$275,535**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
East Street Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1	INSTALL ADDITIONAL PUMP (14,500gpm)	EA	1	$40,000	$40,000	$6,000	$8,000	$54,000
ITEM 2	FOR UPDATE IN PUMPS	EA	4	$40,000	$160,000	$24,000	$32,000	$216,000
ITEM 3	ELECTRICAL SERVICE UPGRADE	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
ITEM 4	GENERATOR UPGRADES	LS	1	$100,000	$100,000	$15,000	$20,000	$135,000
ITEM 5	SITE WORK	LS	1	$30,000	$30,000	$4,500	$6,000	$40,500
ITEM 6	FOR VENTILATION AND ODOR CONTROL	LS	1	$800,000	$800,000	$120,000	$160,000	$1,080,000
ITEM 7	MOBILIZATION	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
							TOTAL:	**$1,633,500**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
Murphy/Market Pump Station
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1	FOR INCREASE IN PUMP SIZE							
Item 1a	For Replacing a 160 gpm pump with a 245 gpm pump	EA	2	$10,000	$20,000	$3,000	$4,000	$27,000
ITEM 2	FOR INCREASE IN PIPE SIZE							
Item 2a	For Furnishing and Installing a 8" DIP Force Main	LF	319	$110	$35,090	$5,264	$7,018	$47,372
ITEM 3	ELECTRICAL SERVICE UPGRADE	LS	1	$15,000	$15,000	$2,250	$3,000	$20,250
ITEM 4	CONTROL PANEL UPGRADES	LS	1	$15,000	$15,000	$2,250	$3,000	$20,250
ITEM 5	GENERATOR UPGRADES	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
ITEM 6	SITE WORK	LS	1	$5,000	$5,000	$750	$1,000	$6,750
ITEM 7	MOBILIZATION	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
							TOTAL:	**$175,622**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
Morris Cove Pump Station
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1 Item 1a	FOR INCREASE IN PUMP SIZE For Replacing a 4,865 gpm pump with a 6,190 gpm pump	EA	1	$15,000	$15,000	$2,250	$3,000	$20,250
ITEM 2	FOR INCREASE IN PIPE SIZE	LS	1	$25,000	$25,000	$3,750	$5,000	$33,750
ITEM 3	ELECTRICAL SERVICE UPGRADE	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
ITEM 4	CONTROL PANEL UPGRADES	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
ITEM 5	GENERATOR UPGRADES	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
ITEM 6	SITE WORK	LS	1	$10,000	$10,000	$1,500	$2,000	$13,500
ITEM 7	MOBILIZATION	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
							TOTAL:	**$175,500**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
Boulevard Pump Station
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1	FOR UPDATE IN PUMPS	EA	4	$40,000	$160,000	$24,000	$32,000	$216,000
ITEM 2	ELECTRICAL SERVICE UPGRADE	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 3	GENERATOR UPGRADES	LS	1	$70,000	$70,000	$10,500	$14,000	$94,500
ITEM 4	SITE WORK	LS	1	$15,000	$15,000	$2,250	$3,000	$20,250
ITEM 5	FOR VENTILATION AND ODOR CONTROL	LS	1	$1,000,000	$1,000,000	$150,000	$200,000	$1,350,000
ITEM 6	MOBILIZATION	LS	1	$20,000	$20,000	$3,000	$4,000	$27,000
							TOTAL:	**$1,775,250**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
Union Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1	NEW PUMP STATION	LS	1	$2,500,000	$2,500,000	$375,000	$500,000	$3,375,000
ITEM 2	NEW 36" FORCE MAIN SEWER PIPE	LF	6000	$350	$2,100,000	$315,000	$420,000	$2,835,000
ITEM 3	NEW SCREENS	EA	2	$147,000	$294,000	$44,100	$58,800	$396,900
ITEM 4	MOBILIZATION	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
							TOTAL:	**$6,674,400**

Project:
Facility:
File Name: Pump Stations.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
Pump Station Upgrades
new James Street Pump Station
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
ITEM 1	NEW 48" RCP (INCLUDED IN SEWER REHABILITATION)	LF	0	$400	$0	$0	$0	$0
ITEM 2	NEW 30" FORCE MAIN SEWER PIPE	LF	96	$300	$28,800	$4,320	$5,760	$38,880
ITEM 3	NEW PUMP STATION (4 mgd peak dry wetaher/20 mgd peak wet weather)	LS	1	$2,500,000	$2,500,000	$375,000	$500,000	$3,375,000
ITEM 4	LAND ACQUISITION	Ac	1	$100,000	$100,000	$15,000	$20,000	$135,000
ITEM 5	PLUG AND ABANDON EXISTING 54" BRICK SEWER	LF	96	$50	$4,800	$720	$960	$6,480
ITEM 6	MOBILIZATION	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
							TOTAL:	**$3,622,860**

Sewer Separation.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
SEWER SEPARATION COST WORKSHEET

CSO Location	Full Sewer Separation Cost	Overhead and Profit (15%)	Contingency (20%)	Total Cost
009	$8,411,420	$1,261,713	$1,682,284	$11,355,417
015	$3,426,830	$514,025	$685,366	$4,626,221
016	$8,411,420	$1,261,713	$1,682,284	$11,355,417
018	$182,448	$27,367	$36,490	$246,305
019	$370,440	$55,566	$74,088	$500,094
TOTALS	**20,802,558.00**	**$3,120,384**	**$4,160,512**	**$28,083,453**

[1]Full Sewer Separation Cost for CSOs 009, 015 and 016 from TM#13
[2]Full Sewer Separation Cost for CSO 018 = 1008 LF 12" PVC @ $181.00/LF
[3]Full Sewer Separation Cost for CSO 019 = 756 LF 42" PVC @ $490.00/LF

NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
SUMMARY

Location	2-year Storage Volume (MG)	Estimated Construction Cost	Cost/Gallon
Boulevard Sewershed			
002	0.9	$3,404,751	$3.78
003	3.9	$8,765,813	$2.25
004	4.9	$11,219,393	$2.29
005	4.2	$9,794,582	$2.33
006	5.5	$11,782,895	$2.14
024	3.2	$7,707,470	$2.41
East Street Sewershed			
011 & 014	6.0	$18,024,952	$3.00
012	0.7	$2,551,851	$3.65
021	0.6	$2,070,329	$3.45
George/Temple & 025	1.2	$5,092,462	$4.24
S. Frontage/Davenport	0.2	$1,678,571	$8.39
East Shore Sewershed			
009	0.2	$2,420,734	$12.10
015	0.2	$999,845	$5.00
016	0.1	$701,032	$7.01
Woodward	0.1	$716,787	$7.17
TOTALS:	**31.9**	**$86,931,468**	**$2.73**
Average Tank Size =	1.7		

Estimate Summary

Project: CITY OF NEW HAVEN
Facility: LONG TERM CSO CONTROL PLAN
File Name: NH_tank.xls **Unit Cost and Assumption Worksheet**

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	INSTALLED COST/UNIT ($)	
ITEM 1	FOR FURNISHING AND INSTALLING SEWER PIPE			
Item 1a	For Furnishing and Installing <24" PVC Sewer Pipe	LF	$250	
Item 1a	For Furnishing and Installing 36" RCP Sewer Pipe	LF	$350	
Item 1a	For Furnishing and Installing 42" RCP Sewer Pipe	LF	$400	
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	$450	
Item 1a	For Furnishing and Installing 54" RCP Sewer Pipe	LF	$450	
Item 1a	For Furnishing and Installing 60" RCP Sewer Pipe	LF	$500	
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	$90	
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)			
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	$20	*Assume 2-foot excavation on each side of pipe*
Item 2b	For Trench Excavations up to 10 feet deep (Force Main)	CY	$15	
Item 2c	For Excavation of Structures	CY	$45	*Assume 5-foot excavation @ perimeter of proposed structures*
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS			
Item 3a	For Dense Graded Aggregate	CY	$20	*Assumes 6" (12" placed) of DGA under pipes*
Item 3b	For 3/4" Broken Stone	CY	$18	*Assumes 12" (24" placed) of Broken Stone under tank*
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING			
Item 4a	For Sheeting up to 25 feet deep	SY	$50	*Assume sheeting depth to 5 feet below excavation*
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT			
Item 5a	For Concrete (including forms)	CY	$400	*Assume 24-inch wall thickness +30% allowance*
ITEM 6	LAND ACQUISITION			
Item 6a	For the Construction of Storage Tanks	AC	$100,000	
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES			
Item 7a	For Furnishing and Installing Manholes	EA	$2,000	
ITEM 8	FOR MECHANICAL EQUIPMENT			
Item 8a	Miscellaneous Mechanical	LS	$60,000	
Item 8b	For Odor Control	LS	$75,000	
Item 8c	For Pumps	LS	$50,000	
ITEM 9	SITE WORK	LS	@5%	*Assume @ 5% Subtotal Items 1-8*
ITEM 10	MOBILIZATION	LS	@10%	*Assume @ 10% Subtotal Items 1-8*
ITEM 11	PERMITTING FOR NEW CSO	LS	$25,000	

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 002
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	525	$450	$236,250	$35,438	$47,250	$318,938
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	38	$90	$3,420	$513	$684	$4,617
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	3270	$20	$65,400	$9,810	$13,080	$88,290
Item 2c	For Excavation of Structures	CY	14100	$45	$634,500	$95,175	$126,900	$856,575
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	170	$20	$3,400	$510	$680	$4,590
Item 3b	For 3/4" Broken Stone	CY	600	$18	$10,800	$1,620	$2,160	$14,580
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1830	$50	$91,500	$13,725	$18,300	$123,525
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	2080	$400	$832,000	$124,800	$166,400	$1,123,200
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.3719	$100,000	$37,190	$0	$7,438	$44,628
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	1	$2,000	$2,000	$300	$400	$2,700
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$141,570	$141,570	$21,236	$28,314	$191,120
ITEM 10	MOBILIZATION	LS	1	$283,140	$283,140	$42,471	$56,628	$382,239
							TOTAL:	**$3,404,751**

Tank Info (ft)	
Length	90
Width	90
Depth	15
Cover	21

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	525	Sewer
Length	38	Force
Manholes	1	
Acreage	0.372	

Storage	908,820	900,000 G
Cost/Gal.	$3.78	$3,404,751
Lookup	$3.78	$3,438,118

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 003
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 54" RCP Sewer Pipe	LF	240	$450	$108,000	$16,200	$21,600	$145,800
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	70	$90	$6,300	$945	$1,260	$8,505
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	610	$20	$12,200	$1,830	$2,440	$16,470
Item 2c	For Excavation of Structures	CY	36200	$45	$1,629,000	$244,350	$325,800	$2,199,150
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	90	$20	$1,800	$270	$360	$2,430
Item 3b	For 3/4" Broken Stone	CY	2610	$18	$46,980	$7,047	$9,396	$63,423
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	2460	$50	$123,000	$18,450	$24,600	$166,050
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	7860	$400	$3,144,000	$471,600	$628,800	$4,244,400
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	1.61387	$100,000	$161,387	$0	$32,277	$193,664
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$364,490	$364,490	$54,674	$72,898	$492,062
ITEM 10	MOBILIZATION	LS	1	$728,970	$728,970	$109,346	$145,794	$984,110
							TOTAL:	**$8,765,813**

Tank Info (ft)

Length	185
Width	190
Depth	15
Cover	8

Pipe Info (ft)

Diameter	4.5	
Depth	10	
Length	240	Sewer
Length	70	Force
Manholes	0	
Acreage	1.614	

Storage	3,943,830	3,900,000 G
Cost/Gal.	$2.25	$8,765,813
Lookup	$2.25	$8,864,327

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 004
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	191	$450	$85,950	$12,893	$17,190	$116,033
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	65	$90	$5,850	$878	$1,170	$7,898
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	680	$20	$13,600	$2,040	$2,720	$18,360
Item 2c	For Excavation of Structures	CY	52000	$45	$2,340,000	$351,000	$468,000	$3,159,000
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	70	$20	$1,400	$210	$280	$1,890
Item 3b	For 3/4" Broken Stone	CY	3270	$18	$58,860	$8,829	$11,772	$79,461
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	3130	$50	$156,500	$23,475	$31,300	$211,275
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (Including forms)	CY	9710	$400	$3,884,000	$582,600	$776,800	$5,243,400
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	2.02479	$100,000	$202,479	$0	$40,496	$242,975
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$466,510	$466,510	$69,977	$93,302	$629,789
ITEM 10	MOBILIZATION	LS	1	$933,010	$933,010	$139,952	$186,602	$1,259,564
							TOTAL:	**$11,219,393**

Tank Info (ft)	
Length	210
Width	210
Depth	15
Cover	12

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	191	Sewer
Length	65	Force
Manholes	1	
Acreage	2.025	

Storage	4,948,020	4,900,000 G
Cost/Gal.	$2.29	$11,219,393
Lookup	$2.29	$11,329,343

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 005
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	432	$450	$194,400	$29,160	$38,880	$262,440
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	138	$90	$12,420	$1,863	$2,484	$16,767
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	1280	$20	$25,600	$3,840	$5,120	$34,560
Item 2c	For Excavation of Structures	CY	42000	$45	$1,890,000	$283,500	$378,000	$2,551,500
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	160	$20	$3,200	$480	$640	$4,320
Item 3b	For 3/4" Broken Stone	CY	2820	$18	$50,760	$7,614	$10,152	$68,526
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	2740	$50	$137,000	$20,550	$27,400	$184,950
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	8450	$400	$3,380,000	$507,000	$676,000	$4,563,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	1.74472	$100,000	$174,472	$0	$34,894	$209,366
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$407,260	$407,260	$61,089	$81,452	$549,801
ITEM 10	MOBILIZATION	LS	1	$814,520	$814,520	$122,178	$162,904	$1,099,602
							TOTAL:	**$9,794,582**

Tank Info (ft)	
Length	190
Width	200
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	432	Sewer
Length	138	Force
Manholes	1	
Acreage	1.745	

Storage	4,263,600	4,200,000 G
Cost/Gal.	$2.33	$9,794,582
Lookup	$2.33	$9,942,900

Project:
Facility:
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 006
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 36" RCP Sewer Pipe	LF	158	$350	$55,300	$8,295	$11,060	$74,655
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	87	$90	$7,830	$1,175	$1,566	$10,571
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	330	$20	$6,600	$990	$1,320	$8,910
Item 2c	For Excavation of Structures	CY	50100	$45	$2,254,500	$338,175	$450,900	$3,043,575
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	60	$20	$1,200	$180	$240	$1,620
Item 3b	For 3/4" Broken Stone	CY	3670	$18	$66,060	$9,909	$13,212	$89,181
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	2900	$50	$145,000	$21,750	$29,000	$195,750
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	10820	$400	$4,328,000	$649,200	$865,600	$5,842,800
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	2.27273	$100,000	$227,273	$0	$45,455	$272,727
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$489,480	$489,480	$73,422	$97,896	$660,798
ITEM 10	MOBILIZATION	LS	1	$962,080	$962,080	$144,312	$192,416	$1,298,808
ITEM 11	PERMITTING FOR NEW CSO	LS	1	$25,000	$25,000	$3,750	$5,000	$33,750
							TOTAL:	**$11,782,895**

Tank Info (ft)	
Length	220
Width	225
Depth	15
Cover	8

Pipe Info (ft)		
Diameter	3	
Depth	10	
Length	158	Sewer
Length	87	Force
Manholes	1	
Acreage	2.273	

Storage	5,553,900	5,500,000 G
Cost/Gal	$2.14	$11,782,895
Lookup	$2.14	$11,898,367

Project:
Facility:
File Name: NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 024
Boulevard Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	515	$450	$231,750	$34,763	$46,350	$312,863
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	40	$90	$3,600	$540	$720	$4,860
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	1380	$20	$27,600	$4,140	$5,520	$37,260
Item 2c	For Excavation of Structures	CY	31200	$45	$1,404,000	$210,600	$280,800	$1,895,400
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	160	$20	$3,200	$480	$640	$4,320
Item 3b	For 3/4" Broken Stone	CY	2150	$18	$38,700	$5,805	$7,740	$52,245
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	2320	$50	$116,000	$17,400	$23,200	$156,600
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	6550	$400	$2,620,000	$393,000	$524,000	$3,537,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	1.32691	$100,000	$132,691	$0	$26,538	$159,229
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$320,480	$320,480	$48,072	$64,096	$432,648
ITEM 10	MOBILIZATION	LS	1	$640,960	$640,960	$96,144	$128,192	$865,296
							TOTAL:	**$7,707,470**

Tank Info (ft)

Length	170
Width	170
Depth	15
Cover	9

Pipe Info (ft)

Diameter	4	
Depth	10	
Length	515	Sewer
Length	40	Force
Manholes	0	
Acreage	1.327	

Storage	3,242,580	3,200,000 G
Cost/Gal	$2.41	$7,707,470
Lookup	$2.41	$7,810,028

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 009
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	1620	$450	$729,000	$109,350	$145,800	$984,150
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	650	$90	$58,500	$8,775	$11,700	$78,975
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	4800	$20	$96,000	$14,400	$19,200	$129,600
Item 2c	For Excavation of Structures	CY	2800	$45	$126,000	$18,900	$25,200	$170,100
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	590	$20	$11,800	$1,770	$2,360	$15,930
Item 3b	For 3/4" Broken Stone	CY	140	$18	$2,520	$378	$504	$3,402
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	700	$50	$35,000	$5,250	$7,000	$47,250
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	600	$400	$240,000	$36,000	$48,000	$324,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.08264	$100,000	$8,264	$0	$1,653	$9,917
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$100,660	$100,660	$15,099	$20,132	$135,891
ITEM 10	MOBILIZATION	LS	1	$201,310	$201,310	$30,197	$40,262	$271,769
							TOTAL:	**$2,420,734**

Tank Info (ft)	
Length	45
Width	40
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	4	
Depth	10	
Length	1620	Sewer
Length	650	Force
Manholes	2	
Acreage	0.083	

Storage	201,960	200,000 G
Cost/Gal.	$12.10	$2,420,734
Lookup	$12.10	$2,444,457

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 011/014
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 54" RCP Sewer Pipe	LF	3870	$450	$1,741,500	$261,225	$348,300	$2,351,025
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	30	$90	$2,700	$405	$540	$3,645
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	21930	$20	$438,600	$65,790	$87,720	$592,110
Item 2c	For Excavation of Structures	CY	76300	$45	$3,433,500	$515,025	$686,700	$4,635,225
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	1230	$20	$24,600	$3,690	$4,920	$33,210
Item 3b	For 3/4" Broken Stone	CY	4010	$18	$72,180	$10,827	$14,436	$97,443
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	4100	$50	$205,000	$30,750	$41,000	$276,750
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	11760	$400	$4,704,000	$705,600	$940,800	$6,350,400
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	3.33333	$100,000	$333,333	$0	$66,667	$400,000
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$749,480	$749,480	$112,422	$149,896	$1,011,798
ITEM 10	MOBILIZATION	LS	1	$1,498,960	$1,498,960	$224,844	$299,792	$2,023,596
							TOTAL:	**$18,024,952**

Tank Info (ft)

Length	230
Width	235
Depth	15
Cover	18

Pipe Info (ft)

Diameter	4.5	
Depth	10	
Length	3870	Sewer
Length	30	Force
Manholes	10	
Acreage	3.333	

Storage	6,064,410	6,000,000 G
Cost/Gal	$3.00	$18,024,952
Lookup	$3.00	$18,218,450

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 012
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	364	$450	$163,800	$24,570	$32,760	$221,130
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	73	$90	$6,570	$986	$1,314	$8,870
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	1410	$20	$28,200	$4,230	$5,640	$38,070
Item 2c	For Excavation of Structures	CY	9000	$45	$405,000	$60,750	$81,000	$546,750
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	130	$20	$2,600	$390	$520	$3,510
Item 3b	For 3/4" Broken Stone	CY	480	$18	$8,640	$1,296	$1,728	$11,664
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1320	$50	$66,000	$9,900	$13,200	$89,100
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	1700	$400	$680,000	$102,000	$136,000	$918,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.29385	$100,000	$29,385	$0	$5,877	$35,262
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$106,110	$106,110	$15,917	$21,222	$143,249
ITEM 10	MOBILIZATION	LS	1	$212,220	$212,220	$31,833	$42,444	$286,497
							TOTAL:	**$2,551,851**

Tank Info (ft)

Length	80
Width	80
Depth	15
Cover	13

Pipe Info (ft)

Diameter	4	
Depth	10	
Length	364	Sewer
Length	73	Force
Manholes	1	
Acreage	0.294	

Storage	718,080	700,000 G
Cost/Gal	$3.65	$2,551,851
Lookup	$3.65	$2,617,761

Project: CITY OF NEW HAVEN
Facility: LONG TERM CSO CONTROL PLAN
File Name: NH_tank.xls — CSO STORAGE TANK COST ESTIMATE
CSO 015
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 48" RCP Sewer Pipe	LF	55	$450	$24,750	$3,713	$4,950	$33,413
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	32	$90	$2,880	$432	$576	$3,888
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	140	$20	$2,800	$420	$560	$3,780
Item 2c	For Excavation of Structures	CY	2600	$45	$117,000	$17,550	$23,400	$157,950
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	30	$20	$600	$90	$120	$810
Item 3b	For 3/4" Broken Stone	CY	140	$18	$2,520	$378	$504	$3,402
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	660	$50	$33,000	$4,950	$6,600	$44,550
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	600	$400	$240,000	$36,000	$48,000	$324,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.08264	$100,000	$8,264	$0	$1,653	$9,917
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$41,580	$41,580	$6,237	$8,316	$56,133
ITEM 10	MOBILIZATION	LS	1	$83,150	$83,150	$12,473	$16,630	$112,253
							TOTAL:	**$999,845**

Tank Info (ft)

Length	45
Width	40
Depth	15
Cover	8

Pipe Info (ft)

Diameter	4	
Depth	30	
Length	55	Sewer
Length	32	Force
Manholes	0	
Acreage	0.083	

Storage	201,960	200,000 G
Cost/Gal	$5.00	$999,845
Lookup	$5.00	$1,009,644

Project: CITY OF NEW HAVEN
Facility: LONG TERM CSO CONTROL PLAN
File Name: NH_tank xls — CSO STORAGE TANK COST ESTIMATE
CSO 016
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 54" RCP Sewer Pipe	LF	0	$450	$0	$0	$0	$0
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	30	$90	$2,700	$405	$540	$3,645
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	0	$20	$0	$0	$0	$0
Item 2c	For Excavation of Structures	CY	1600	$45	$72,000	$10,800	$14,400	$97,200
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	10	$20	$200	$30	$40	$270
Item 3b	For 3/4" Broken Stone	CY	70	$18	$1,260	$189	$252	$1,701
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	540	$50	$27,000	$4,050	$5,400	$36,450
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	350	$400	$140,000	$21,000	$28,000	$189,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.04132	$100,000	$4,132	$0	$826	$4,959
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$29,150	$29,150	$4,373	$5,830	$39,353
ITEM 10	MOBILIZATION	LS	1	$58,300	$58,300	$8,745	$11,660	$78,705
							TOTAL:	**$701,032**

Tank Info (ft)	
Length	30
Width	30
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	4.5	
Depth	10	
Length	0	Sewer
Length	30	Force
Manholes	0	
Acreage	0.041	

Storage	100,980	100,000 G
Cost/Gal.	$7.01	$701,032
Lookup	$7.01	$707,902

Project: CITY OF NEW HAVEN
Facility: LONG TERM CSO CONTROL PLAN
File Name: NH_tank.xls — CSO STORAGE TANK COST ESTIMATE

CSO 021

East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 66" RCP Sewer Pipe	LF	60	$500	$30,000	$4,500	$6,000	$40,500
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	50	$90	$4,500	$675	$900	$6,075
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	260	$20	$5,200	$780	$1,040	$7,020
Item 2c	For Excavation of Structures	CY	7800	$45	$351,000	$52,650	$70,200	$473,850
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	30	$20	$600	$90	$120	$810
Item 3b	For 3/4" Broken Stone	CY	420	$18	$7,560	$1,134	$1,512	$10,206
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1210	$50	$60,500	$9,075	$12,100	$81,675
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	1520	$400	$608,000	$91,200	$121,600	$820,800
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.25826	$100,000	$25,826	$0	$5,165	$30,992
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$86,090	$86,090	$12,914	$17,218	$116,222
ITEM 10	MOBILIZATION	LS	1	$172,170	$172,170	$25,826	$34,434	$232,430
							TOTAL:	**$2,070,329**

Tank Info (ft)	
Length	75
Width	75
Depth	15
Cover	12

Pipe Info (ft)		
Diameter	5.5	
Depth	10	
Length	60	Sewer
Length	50	Force
Manholes	0	
Acreage	0.258	

Storage	631,125	600,000 G
Cost/Gal.	$3.45	$2,070,329
Lookup	$3.45	$2,177,727

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
George/Temple & CSO 025
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 30" RCP Sewer Pipe	LF	2700	$350	$945,000	$141,750	$189,000	$1,275,750
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	32	$90	$2,880	$432	$576	$3,888
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	6500	$20	$130,000	$19,500	$26,000	$175,500
Item 2c	For Excavation of Structures	CY	13300	$45	$598,500	$89,775	$119,700	$807,975
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	660	$20	$13,200	$1,980	$2,640	$17,820
Item 3b	For 3/4" Broken Stone	CY	820	$18	$14,760	$2,214	$2,952	$19,926
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	1540	$50	$77,000	$11,550	$15,400	$103,950
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	2730	$400	$1,092,000	$163,800	$218,400	$1,474,200
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.88441	$100,000	$88,441	$0	$17,688	$106,129
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$211,750	$211,750	$31,763	$42,350	$285,863
ITEM 10	MOBILIZATION	LS	1	$423,490	$423,490	$63,524	$84,698	$571,712
							TOTAL:	**$5,092,462**

Tank Info (ft)	
Length	105
Width	105
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	2.5	
Depth	10	
Length	2700	Sewer
Length	32	Force
Manholes	5	
Acreage	0.884	

Storage	1,237,005	1,200,000 G
Cost/Gal	$4.24	$5,092,462
Lookup	$4.24	$5,249,501

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
Woodward Pump Station CSO
East Shore Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 24" RCP Sewer Pipe	LF	60	$250	$15,000	$2,250	$3,000	$20,250
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	30	$90	$2,700	$405	$540	$3,645
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	100	$20	$2,000	$300	$400	$2,700
Item 2c	For Excavation of Structures	CY	1500	$45	$67,500	$10,125	$13,500	$91,125
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	20	$20	$400	$60	$80	$540
Item 3b	For 3/4" Broken Stone	CY	70	$18	$1,260	$189	$252	$1,701
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	480	$50	$24,000	$3,600	$4,800	$32,400
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	350	$400	$140,000	$21,000	$28,000	$189,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.04132	$100,000	$4,132	$0	$826	$4,959
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$29,810	$29,810	$4,472	$5,962	$40,244
ITEM 10	MOBILIZATION	LS	1	$59,610	$59,610	$8,942	$11,922	$80,474
							TOTAL:	**$716,787**

Tank Info (ft)

Length	30
Width	30
Depth	15
Cover	7

Pipe Info (ft)

Diameter	2	
Depth	10	
Length	60	Sewer
Length	30	Force
Manholes	0	
Acreage	0.041	

Storage	100,980	100,000 G
Cost/Gal.	$7.17	$716,787
Lookup	$7.17	$723,811

Project
Facility
File Name NH_tank.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
South Frontage/Davenport CSO
East Street Sewershed

BY: UIC
April 27, 2001

	DESCRIPTION	UNIT	QTY	INSTALLED COST/UNIT	AMOUNT	OVERHEAD AND PROFIT 15%	CONTINGENCY 20%	TOTAL
Item 1a	For Furnishing and Installing 36" RCP Sewer Pipe	LF	1082	$350	$378,700	$56,805	$75,740	$511,245
Item 1b	For Furnishing and Installing 6" DIP Force Main	LF	67	$90	$6,030	$905	$1,206	$8,141
ITEM 2	FOR EXCAVATION AND BACKFILL (Including Dewatering and Disposal)							
Item 2a	For Trench Excavations up to 25 feet deep (Sewer Pipe)	CY	2410	$20	$48,200	$7,230	$9,640	$65,070
Item 2c	For Excavation of Structures	CY	2800	$45	$126,000	$18,900	$25,200	$170,100
ITEM 3	FOR FURNISHING AND PLACING SELECT MATERIALS							
Item 3a	For Dense Graded Aggregate (DGA)	CY	260	$20	$5,200	$780	$1,040	$7,020
Item 3b	For 3/4" Broken Stone	CY	140	$18	$2,520	$378	$504	$3,402
ITEM 4	FOR FURNISHING, INSTALLING AND REMOVING SHEETING							
Item 4a	For Sheeting up to 25 feet deep	SY	700	$50	$35,000	$5,250	$7,000	$47,250
ITEM 5	FOR FURNISHING AND PLACING CONCRETE AND REINFORCEMENT							
Item 5a	For Concrete (including forms)	CY	600	$400	$240,000	$36,000	$48,000	$324,000
ITEM 6	LAND ACQUISITION							
Item 6a	For the Construction of Storage Tanks	AC	0.08264	$100,000	$8,264	$0	$1,653	$9,917
ITEM 7	FOR INSTALLATION OF SANITARY MANHOLES							
Item 7a	For Furnishing and Installing Manholes	EA	0	$2,000	$0	$0	$0	$0
ITEM 8	FOR MECHANICAL EQUIPMENT							
Item 8a	Miscellaneous Mechanical	LS	1	$60,000	$60,000	$9,000	$12,000	$81,000
Item 8b	For Odor Control	LS	1	$75,000	$75,000	$11,250	$15,000	$101,250
Item 8c	For Pumps	LS	1	$50,000	$50,000	$7,500	$10,000	$67,500
ITEM 9	SITE WORK	LS	1	$69,800	$69,800	$10,470	$13,960	$94,230
ITEM 10	MOBILIZATION	LS	1	$139,590	$139,590	$20,939	$27,918	$188,447
							TOTAL:	**$1,678,571**

Tank Info (ft)	
Length	45
Width	40
Depth	15
Cover	10

Pipe Info (ft)		
Diameter	2	
Depth	10	
Length	1082	Sewer
Length	67	Force
Manholes	1	
Acreage	0.083	

Storage	201,960	200,000 G
Cost/Gal	$8.39	$1,678,571
Lookup	$8.39	$1,695,021

O&M costs.xls

CITY OF NEW HAVEN
Operations & Maintenance Plan for CSO Tanks
COST ESTIMATE
SUMMARY

Location	Estimated Cost
Boulevard Sewershed	
CSO 006	$14,000
CSO 005	$27,000
CSO 004	$25,000
CSO 003	$16,000
CSO 002	$5,000
East Street Sewershed	
CSO 012	$7,000
CSO 011/014	$18,000
CSO 009	$12,000
CSO 016	$16,000
CSO 015	$18,000
new James Street Pump Station	$38,000
East Shore Sewershed	
S. Frontage/Davenport	$5,000
CSO 021/East Street Pump Station	$12,000
CSO G/I & 025/Union Pump Station	$5,000
CSO 024/Boulevard Pump Station	$15,000
Woodward Pump Station	$5,000
TOTALS:	**$238,000**

CITY OF NEW HAVEN
Operations & Maintenance Plan for CSO Tanks
COST ESTIMATE
SUMMARY

O&M	(Average year Storm Event Data)				
			Overflow per Event		
Overflow Site		Storage Volume	Frequency	Volume	Duration
006	Whalley/Fitch	5.5	19	0.4	2
005	Blvd/Derby	4.2	44	0.4	6
004	Blvd/Legion	4.9	39	1.0	5
003	Blvd/Orange	3.9	26	0.6	3
002	Blvd/Lamberton	0.9	7	0.1	1
012	Mitchell/Nicoll	0.7	14	0.1	2
011/014	011/014	6.0	25	1.3	3
009	James/Grand	0.2	28	0.2	3
016	Poplar/River	0.1	39	0.4	5
015	James St Siphon	0.2	45	1.0	5
SFD	S. Frontage/Davenport	0.2	8	0.3	3
021	East St PS	0.6	26	2.0	4
025	UPS and G/T	1.2	7	1.2	2
024	Blvd PS	3.2	26	1.2	4
WPS	Woodward Pump Station	0.1	8	0.3	3

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 002
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	35	hr/yr	$1,400	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	17.5	hr/yr	$928	1 Supervisor per crew (2.5 man hrs/event)	
							$4,560
Electric Costs							
Motors	$45	event	7	event/yr	$315	30 HP motors @ 1 kW/HP	
							$315
Expendables							
Disposal of solids	$110	ton	0.035	ton/yr	$4	Based on West New York, NJ report	
							$4
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	70	miles/yr	$53	Includes gas	
							$53
TOTAL ANNUAL O&M Cost					**$4,931**	Excluding Truck and Maintenance	$4,931

Cost Assumptions

Storage Volume	0.9	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	7		Input Value
Average volume per overflow	0.1	MG	Input value
Average overflow duration	1	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 003
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	130	hr/yr	$5,200	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	65	hr/yr	$3,445	1 Supervisor per crew (2.5 man hrs/event)	
							$10,877
Electric Costs							
Motors	$195	event	26	event/yr	$5,070	30 HP motors @ 1 kW/HP	
							$5,070
Expendables							
Disposal of solids	$110	ton	0.78	ton/yr	$86	Based on West New York, NJ report	
							$86
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	260	miles/yr	$195	Includes gas	
							$195
TOTAL ANNUAL O&M Cost					**$16,228**	Excluding Truck and Maintenance	$16,228

Cost Assumptions

Storage Volume	3.9	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	26		Input Value
Average volume per overflow	0.6	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 004
Boulevard Sewershed

BY: UIC
April 27. 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	195	hr/yr	$7,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	97.5	hr/yr	$5,168	1 Supervisor per crew (2.5 man hrs/event)	
							$15,200
Electric Costs							
Motors	$245	event	39	event/yr	$9,555	30 HP motors @ 1 kW/HP	
							$9,555
Expendables							
Disposal of solids	$110	ton	1.95	ton/yr	$215	Based on West New York, NJ report	
							$215
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	390	miles/yr	$293	Includes gas	
							$293
TOTAL ANNUAL O&M Cost					**$25,262**	Excluding Truck and Maintenance	$25,262

Cost Assumptions

Storage Volume	4.9	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	39		Input Value
Average volume per overflow	1	MG	Input value
Average overflow duration	5	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 005
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	220	hr/yr	$8,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	110	hr/yr	$5,830	1 Supervisor per crew (2.5 man hrs/event)	
							$16,862
Electric Costs							
Motors	$210	event	44	event/yr	$9,240	30 HP motors @ 1 kW/HP	
							$9,240
Expendables							
Disposal of solids	$110	ton	0.88	ton/yr	$97	Based on West New York, NJ report	
							$97
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	440	miles/yr	$330	Includes gas	
							$330
TOTAL ANNUAL O&M Cost					**$26,529**	Excluding Truck and Maintenance	$26,529

Cost Assumptions

Storage Volume	4.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	44		Input Value
Average volume per overflow	0.4	MG	Input value
Average overflow duration	6	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 006
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	95	hr/yr	$3,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	47.5	hr/yr	$2,518	1 Supervisor per crew (2.5 man hrs/event)	
							$8,550
Electric Costs							
Motors	$275	event	19	event/yr	$5,225	30 HP motors @ 1 kW/HP	
							$5,225
Expendables							
Disposal of solids	$110	ton	0.38	ton/yr	$42	Based on West New York, NJ report	
							$42
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	190	miles/yr	$143	Includes gas	
							$143
TOTAL ANNUAL O&M Cost					**$13,959**	Excluding Truck and Maintenance	$13,959

Cost Assumptions

Storage Volume	5.5	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	19		Input Value
Average volume per overflow	0.4	MG	Input value
Average overflow duration	2	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 012
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	70	hr/yr	$2,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	35	hr/yr	$1,855	1 Supervisor per crew (2.5 man hrs/event)	
							$6,887
Electric Costs							
Motors	$35	event	14	event/yr	$490	30 HP motors @ 1 kW/HP	
							$490
Expendables							
Disposal of solids	$110	ton	0.07	ton/yr	$8	Based on West New York, NJ report	
							$8
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	140	miles/yr	$105	Includes gas	
							$105
TOTAL ANNUAL O&M Cost					**$7,490**	Excluding Truck and Maintenance	$7,490

Cost Assumptions

Storage Volume	0.7	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	14		Input Value
Average volume per overflow	0.1	MG	Input value
Average overflow duration	2	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 011/014
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	125	hr/yr	$5,000	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	62.5	hr/yr	$3,313	1 Supervisor per crew (2.5 man hrs/event)	
							$10,545
Electric Costs							
Motors	$300	event	25	event/yr	$7,500	30 HP motors @ 1 kW/HP	
							$7,500
Expendables							
Disposal of solids	$110	ton	1.625	ton/yr	$179	Based on West New York, NJ report	
							$179
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	250	miles/yr	$188	Includes gas	
							$188
TOTAL ANNUAL O&M Cost					**$18,411**	Excluding Truck and Maintenance	$18,411

Cost Assumptions

Storage Volume	6.0	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	25		Input Value
Average volume per overflow	1.3	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
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File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 009
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	140	hr/yr	$5,600	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	70	hr/yr	$3,710	1 Supervisor per crew (2.5 man hrs/event)	
							$11,542
Electric Costs							
Motors	$10	event	28	event/yr	$280	30 HP motors @ 1 kW/HP	
							$280
Expendables							
Disposal of solids	$110	ton	0.28	ton/yr	$31	Based on West New York, NJ report	
							$31
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	280	miles/yr	$210	Includes gas	
							$210
TOTAL ANNUAL O&M Cost					**$12,063**	Excluding Truck and Maintenance	$12,063

Cost Assumptions			
Storage Volume	0.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	28		Input Value
Average volume per overflow	0.2	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 016
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	195	hr/yr	$7,800	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	97.5	hr/yr	$5,168	1 Supervisor per crew (2.5 man hrs/event)	
							$15,200
Electric Costs							
Motors	$5	event	39	event/yr	$195	30 HP motors @ 1 kW/HP	
							$195
Expendables							
Disposal of solids	$110	ton	0.78	ton/yr	$86	Based on West New York, NJ report	
							$86
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	390	miles/yr	$293	Includes gas	
							$293
TOTAL ANNUAL O&M Cost					**$15,773**	Excluding Truck and Maintenance	$15,773

Cost Assumptions

Storage Volume	0.1	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	39		Input Value
Average volume per overflow	0.4	MG	Input value
Average overflow duration	5	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 015
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	225	hr/yr	$9,000	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	112.5	hr/yr	$5,963	1 Supervisor per crew (2.5 man hrs/event)	
							$17,195
Electric Costs							
Motors	$10	event	45	event/yr	$450	30 HP motors @ 1 kW/HP	
							$450
Expendables							
Disposal of solids	$110	ton	2.25	ton/yr	$248	Based on West New York, NJ report	
							$248
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	450	miles/yr	$338	Includes gas	
							$338
TOTAL ANNUAL O&M Cost					**$18,230**	Excluding Truck and Maintenance	$18,230

Cost Assumptions

Storage Volume	0.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	45		Input Value
Average volume per overflow	1	MG	Input value
Average overflow duration	5	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
S. Frontage/Davenport
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	40	hr/yr	$1,600	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	20	hr/yr	$1,060	1 Supervisor per crew (2.5 man hrs/event)	
							$4,892
Electric Costs							
Motors	$10	event	8	event/yr	$80	30 HP motors @ 1 kW/HP	
							$80
Expendables							
Disposal of solids	$110	ton	0.12	ton/yr	$13	Based on West New York, NJ report	
							$13
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	80	miles/yr	$60	Includes gas	
							$60
TOTAL ANNUAL O&M Cost					**$5,045**	Excluding Truck and Maintenance	$5,045

Cost Assumptions

Storage Volume	0.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	8		Input Value
Average volume per overflow	0.3	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 021/East Street Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	130	hr/yr	$5,200	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	65	hr/yr	$3,445	1 Supervisor per crew (2.5 man hrs/event)	
							$10,877
Electric Costs							
Motors	$30	event	26	event/yr	$780	30 HP motors @ 1 kW/HP	
							$780
Expendables							
Disposal of solids	$110	ton	2.6	ton/yr	$286	Based on West New York, NJ report	
							$286
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	260	miles/yr	$195	Includes gas	
							$195
TOTAL ANNUAL O&M Cost					**$12,138**	Excluding Truck and Maintenance	$12,138

Cost Assumptions

Storage Volume	0.6	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	26		Input Value
Average volume per overflow	2	MG	Input value
Average overflow duration	4	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO George/Temple & 025/Union Pump Station
East Street Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	35	hr/yr	$1,400	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	17.5	hr/yr	$928	1 Supervisor per crew (2.5 man hrs/event)	
							$4,560
Electric Costs							
Motors	$60	event	7	event/yr	$420	30 HP motors @ 1 kW/HP	
							$420
Expendables							
Disposal of solids	$110	ton	0.42	ton/yr	$46	Based on West New York, NJ report	
							$46
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	70	miles/yr	$53	Includes gas	
							$53
TOTAL ANNUAL O&M Cost					**$5,078**	Excluding Truck and Maintenance	$5,078

Cost Assumptions

Storage Volume	1.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	7		Input Value
Average volume per overflow	1.2	MG	Input value
Average overflow duration	2	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
CSO 024/Boulevard Pump Station
Boulevard Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	130	hr/yr	$5,200	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	65	hr/yr	$3,445	1 Supervisor per crew (2.5 man hrs/event)	
							$10,877
Electric Costs							
Motors	$160	event	26	event/yr	$4,160	30 HP motors @ 1 kW/HP	
							$4,160
Expendables							
Disposal of solids	$110	ton	1.56	ton/yr	$172	Based on West New York, NJ report	
							$172
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	260	miles/yr	$195	Includes gas	
							$195
TOTAL ANNUAL O&M Cost					**$15,404**	Excluding Truck and Maintenance	$15,404

Cost Assumptions

Storage Volume	3.2	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	26		Input Value
Average volume per overflow	1.2	MG	Input value
Average overflow duration	4	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project:
Facility:
File Name: O&M Costs.xls

CITY OF NEW HAVEN
LONG TERM CSO CONTROL PLAN
CSO STORAGE TANK COST ESTIMATE
Woodward Pump Station
East Shore Sewershed

BY: UIC
April 27, 2001

Work Division	Unit Cost		No.	Units	Annual Cost	Comments/Assumptions	
O&M Crew							
Operator	$40	hr	40	hr/yr	$1,600	2 Operators per crew required for cleaning after every event (5 man hours/event)	
Mechanic	$40	hr	24	hr/yr	$960	Mechanic only required for periodic maintenance of automatic flushing system and pumps	
Electrician	$53	hr	24	hr/yr	$1,272	Electrician only required for periodic maintenance of pumps and flushing system and pumps	
Supervisor	$53	hr	20	hr/yr	$1,060	1 Supervisor per crew (2.5 man hrs/event)	
							$4,892
Electric Costs							
Motors	$5	event	8	event/yr	$40	30 HP motors @ 1 kW/HP	
							$40
Expendables							
Disposal of solids	$110	ton	0.12	ton/yr	$13	Based on West New York, NJ report	
							$13
Equipment Costs							
Utility Truck	$50,000	truck	0.1424	CRF	$7,119	ten year service life @ 7% interest	
Truck Maintenance	25%	of truck annual cost			$1,780	yearly maintenance cost of truck	
Mileage	$0.75	mile	80	miles/yr	$60	Includes gas	
							$60
TOTAL ANNUAL O&M Cost					**$5,005**	Excluding Truck and Maintenance	$5,005

Cost Assumptions

Storage Volume	0.1	MG	Input Value
Pump Rate	1000	GPM	
Number of overflows/yr	8		Input Value
Average volume per overflow	0.3	MG	Input value
Average overflow duration	3	hr	Input Value
Screenings per volume	100	lbs/MG	
Mileage per event	10	miles	
Interest rate on vehicle purchase	7%		
Capital recovery factor	0.1424		
Electric Rate	$0.10	kW-hr	

Project: CITY OF NEW HA
Facility: LONG TERM CSO CON
File Name: O&M Costs.xls CSO STORAGE TANK COS
New James Street Pur
East Shore Sewer

Work Division	Unit Cost		No.	Units	Annual Cost
O&M Crew					
Operator	$40	hr	130	hr/yr	$5,200
Mechanic	$40	hr	130	hr/yr	$5,200
Electrician	$53	hr	24	hr/yr	$1,272
Supervisor	$53	hr	24	hr/yr	$1,272
Utilities					
Electric/Heating/Communications		LS			$10,000
Expendables					
Disposal of solids	$110	ton	130	ton/yr	$14,300
Equipment Costs					
Utility Truck	$50,000	truck	0.1424	CRF	$7,119
Truck Maintenance	25%	of truck annual cost			$1,780
Mileage	$0.75	mile	1300	miles/yr	$975
TOTAL ANNUAL O&M Cost					**$38,219**

Cost Assumptions

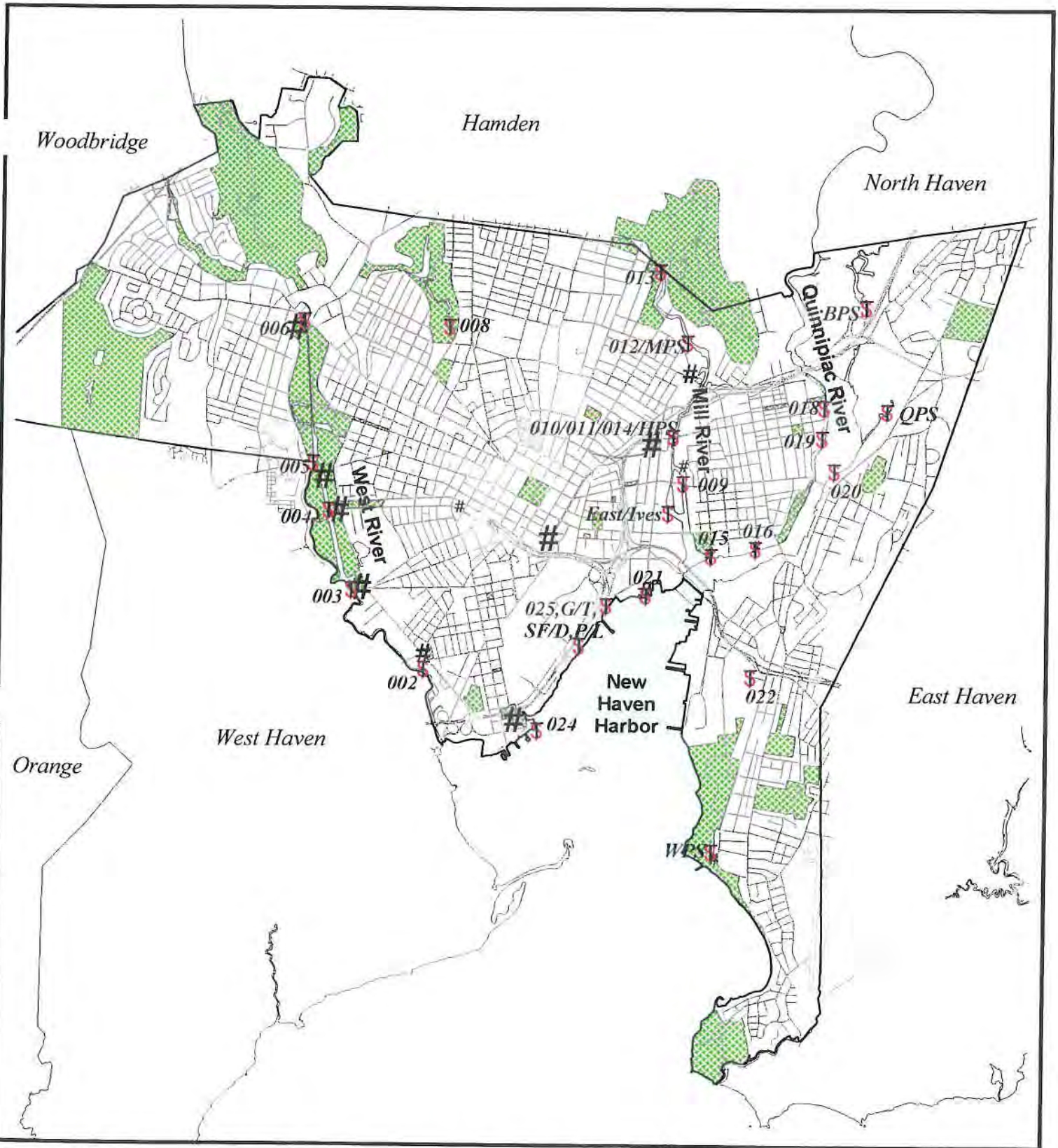
Screenings per volume	100	lbs/MG
Mileage per visit	10	miles
Interest rate on vehicle purchase	7%	
Capital recovery factor	0.1424	

AVEN
TROL PLAN
ST ESTIMATE
np Station
rshed

BY: UIC
April 27, 2001

Comments/Assumptions	
2 workers per crew @ 2.5 visits/week (more or less depending on dry or wet weather) Electrician or Lead Mechanic/Supervisor only required for periodic maintenance of equipment	$12,944
Allowance	$10,000
Based on West New York, NJ report	$14,300
ten year service life @ 7% interest yearly maintenance cost of truck Includes gas	$975
Excluding Truck and Maintenance	$38,219

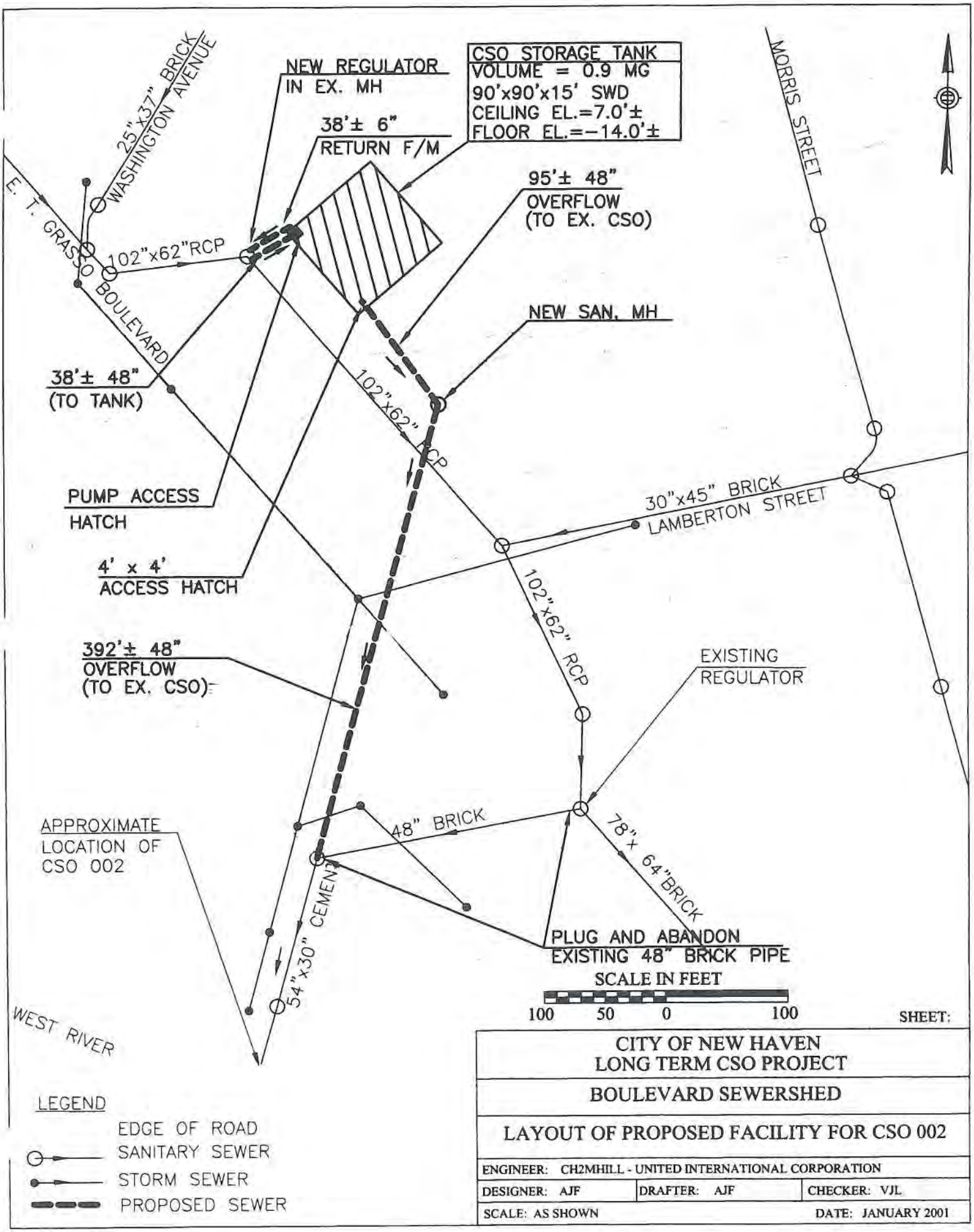
New Haven Long-Term CSO Control Plan Storage Tank Volumes				
NPDES #	Location	Volume (MG)		Volume (MG)
WEST RIVER				
006	Whalley/Fitch	5.5		**5.5**
005	Blvd/Derby	4.2		**4.2**
004	Blvd/Legion	4.9		**4.9**
003	Blvd/Orange	3.9		**3.9**
002	Blvd/Lamberton	0.9		**0.9**
	TOTAL	19.3		**19.3**
BEAVER PONDS				
008	Munson/Orchard			**no tank**
	TOTAL	0.0		**0.0**
MILL RIVER				
013	East Rock Rd			**no tank**
n/a	Cross connection at 013			**n/a**
012	Mitchell/Nicoll	0.7		**0.7**
n/a	Mitchell Pump Station			**no tank**
010	East/I-91 (upstream)			**no tank**
010	East/I-91 (downstream)			**no tank**
011	Humphrey/I-91	5.7	build 1 tank for these 3 OF pipes	**6.0**
014	Trumbull/Orange	0.3		
n/a	Humphrey Pump Station	0.04		
009	James/Grand	0.2		**0.2**
n/a	East/Ives			**no tank**
	TOTAL	7.0		**7.0**
QUINNIPIAC RIVER				
n/a	Barnes Pump Station			**no tank**
n/a	Quinnipiac Pump Station			**no tank**
018	N.Front/Lombard			**no tank**
019	N.Front/Pine			**no tank**
020	Quinnipiac/Clifton			**no tank**
016	Poplar/River	0.1		**0.1**
015	James St Siphon	0.2		**0.2**
	TOTAL	0.3		**0.3**
NEW HAVEN HARBOR				
n/a	S. Frontage/Davenport	0.2		**0.2**
n/a	Portsea/Liberty			**no tank**
021	East St PS	0.6		**0.6**
025	Union PS	0.9	build 1 tank for these 2 OF pipes	**1.2**
n/a	George/Temple	0.3		
022	Allen Place			**no tank**
024	Blvd PS	3.2		**3.2**
n/a	Woodward Pump Station	0.1		**0.1**
	TOTAL	5.3		**5.3**
	GRAND TOTAL	31.9		**31.9**



Locations of Proposed Storage Tanks

New Haven Long Term CSO Control Plan

CH2MHILL



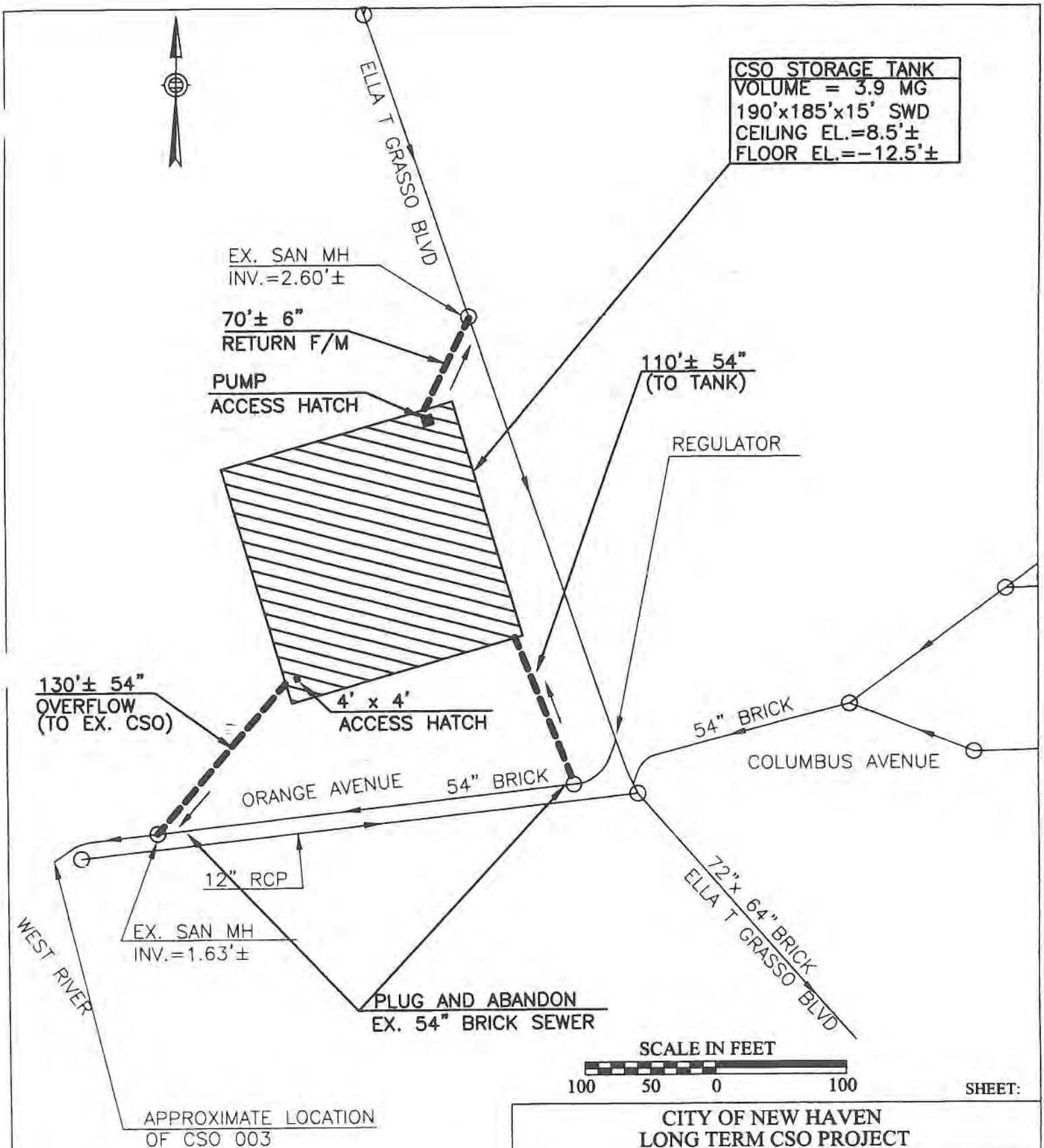
SHEET:

CITY OF NEW HAVEN
LONG TERM CSO PROJECT

BOULEVARD SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR CSO 002

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: AJF	DRAFTER: AJF	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001



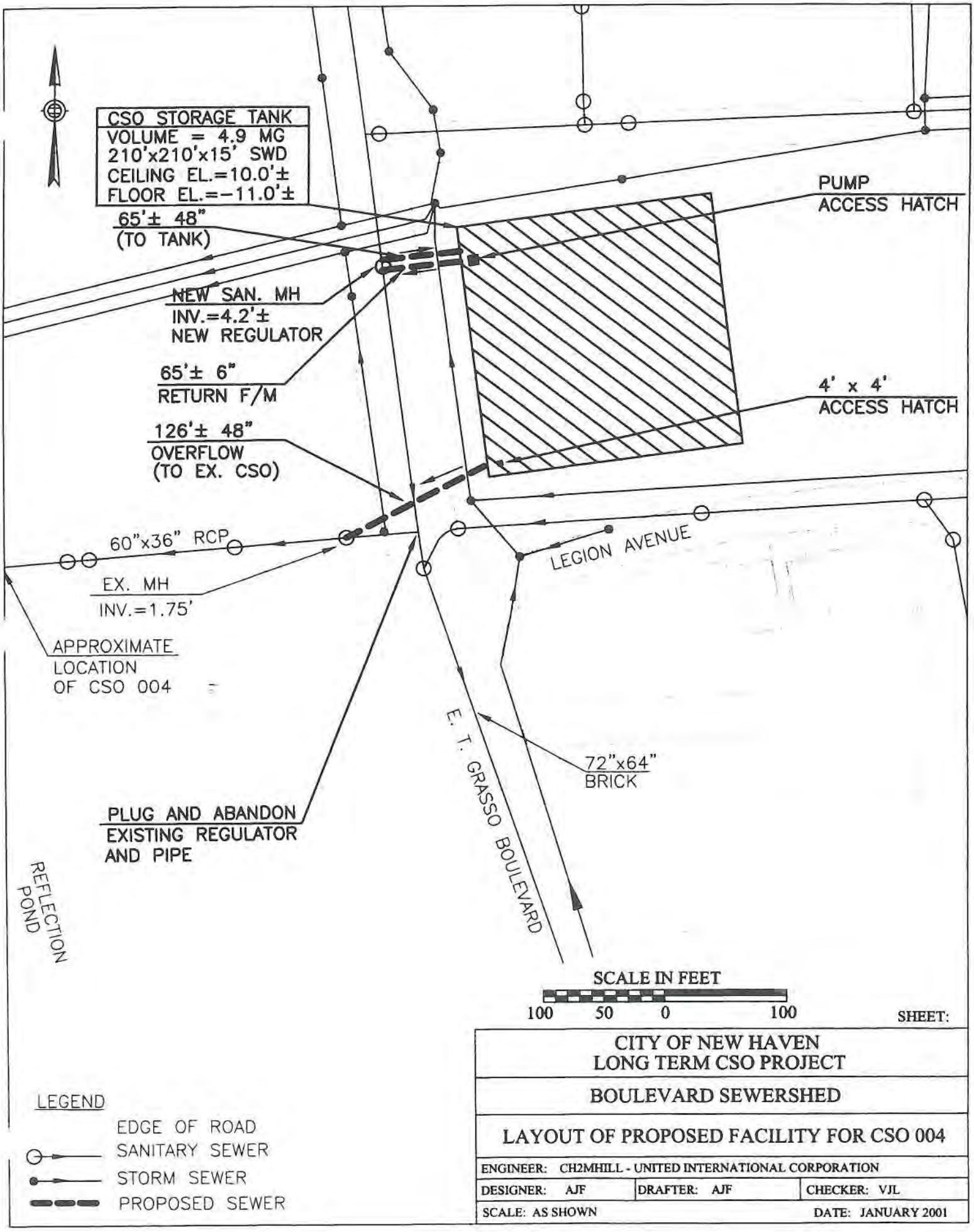
SHEET:

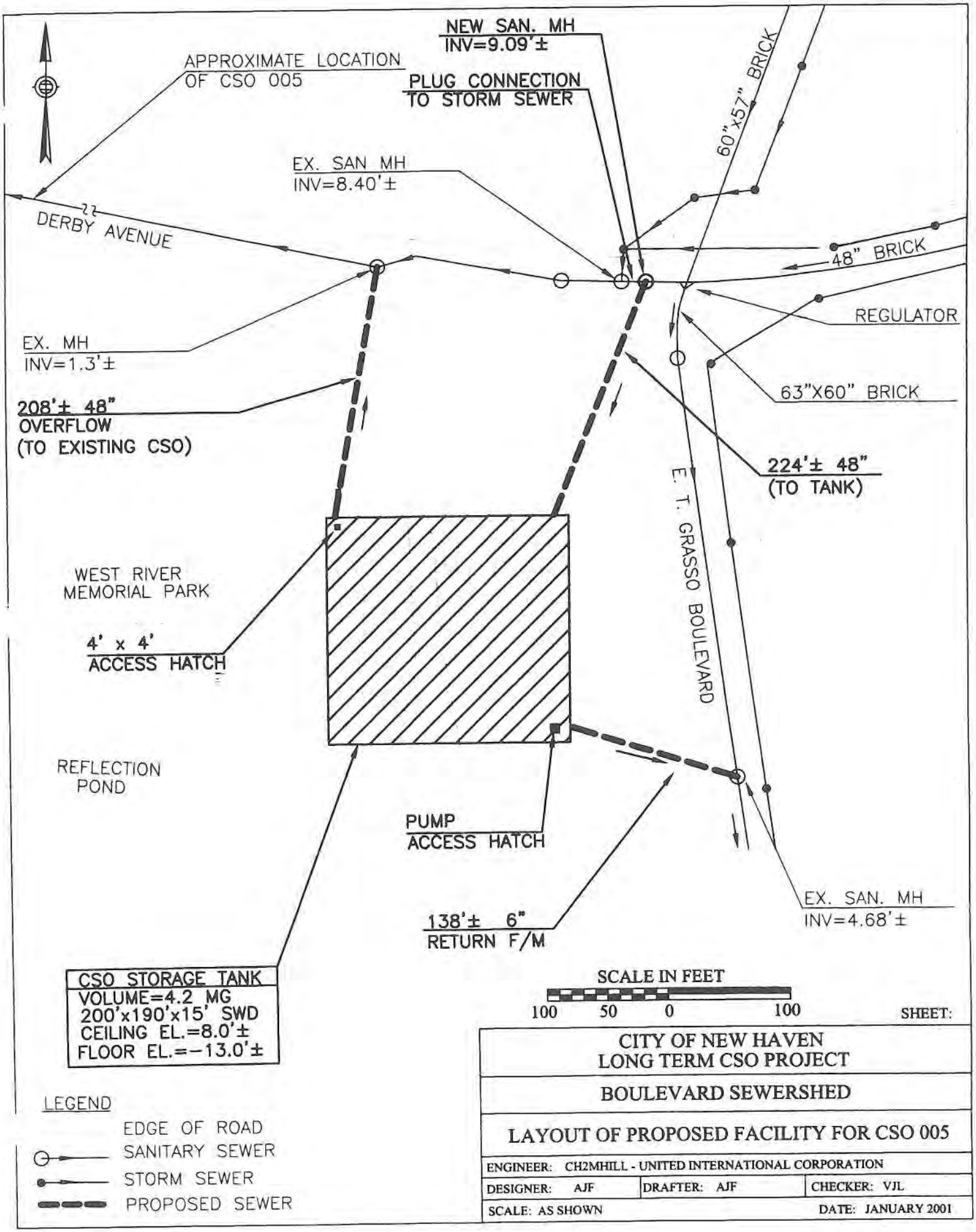
CITY OF NEW HAVEN
LONG TERM CSO PROJECT

BOULEVARD SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR CSO 003

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: JEL	DRAFTER: JEL	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001


CSO STORAGE TANK
VOLUME = 4.9 MG
210'x210'x15' SWD
CEILING EL.=10.0'±
FLOOR EL.=-11.0'±
65'± 48"
(TO TANK)
NEW SAN. MH
INV.=4.2'±
NEW REGULATOR
65'± 6"
RETURN F/M
126'± 48"
OVERFLOW
(TO EX. CSO)
PUMP
ACCESS HATCH
4' x 4'
ACCESS HATCH
60"x36" RCP
EX. MH
INV.=1.75'
APPROXIMATE
LOCATION
OF CSO 004
LEGION AVENUE
E. T. GRASSO BOULEVARD
72"x64"
BRICK
PLUG AND ABANDON
EXISTING REGULATOR
AND PIPE
REFLECTION
POND
SCALE IN FEET
100 50 0 100
SHEET:
CITY OF NEW HAVEN
LONG TERM CSO PROJECT
BOULEVARD SEWERSHED
LAYOUT OF PROPOSED FACILITY FOR CSO 004
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION
DESIGNER: AJF
DRAFTER: AJF
CHECKER: VJL
SCALE: AS SHOWN
DATE: JANUARY 2001
LEGEND
EDGE OF ROAD
SANITARY SEWER
STORM SEWER
PROPOSED SEWER



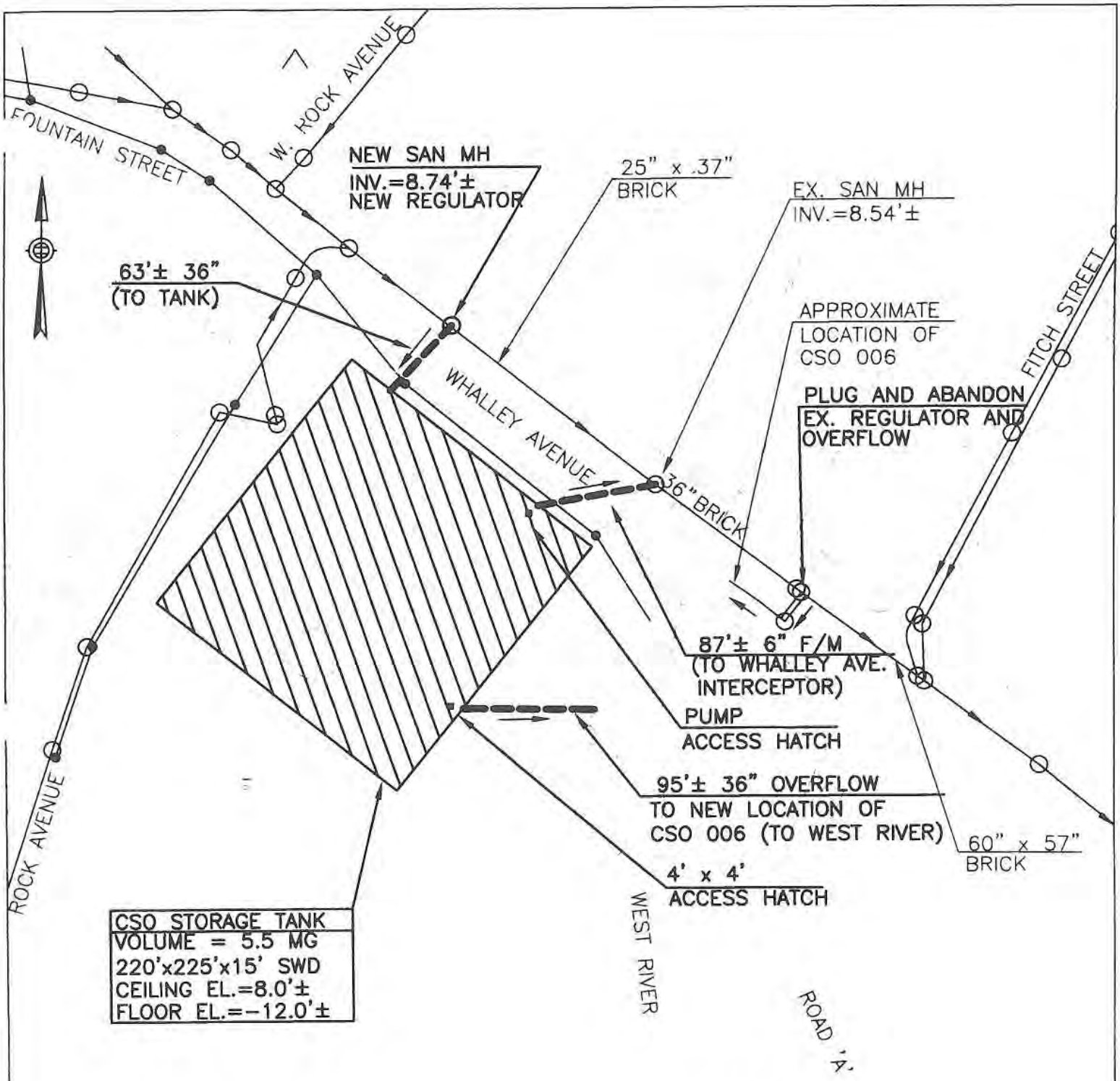
SHEET:

CITY OF NEW HAVEN
LONG TERM CSO PROJECT

BOULEVARD SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR CSO 005

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: AJF	DRAFTER: AJF	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001



SCALE IN FEET

100 50 0 100

SHEET:

CITY OF NEW HAVEN
LONG TERM CSO PROJECT

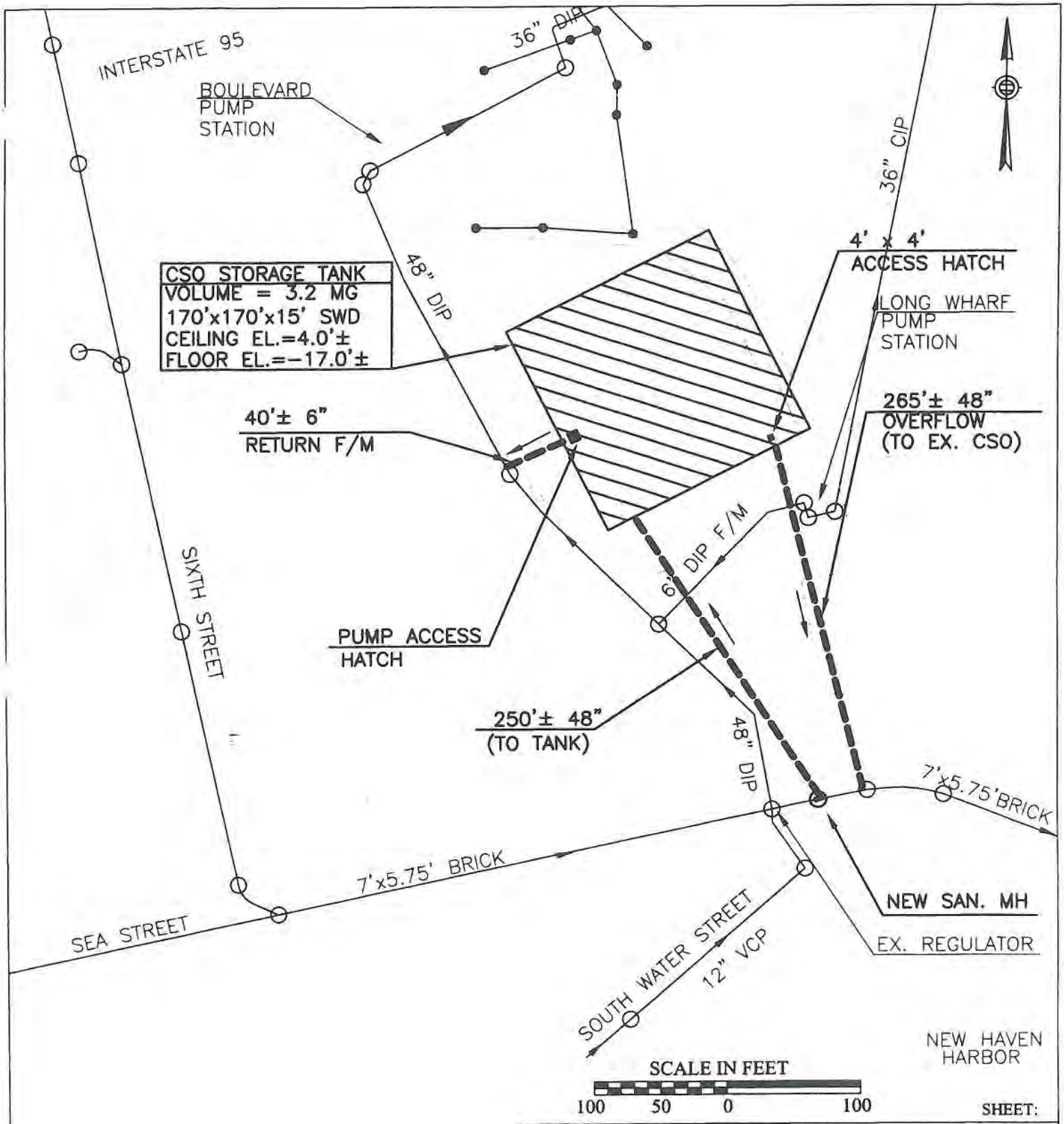
BOULEVARD SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR CSO 006

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: AJF	DRAFTER: AJF	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001

LEGEND

- EDGE OF ROAD
- SANITARY SEWER
- STORM SEWER
- PROPOSED SEWER

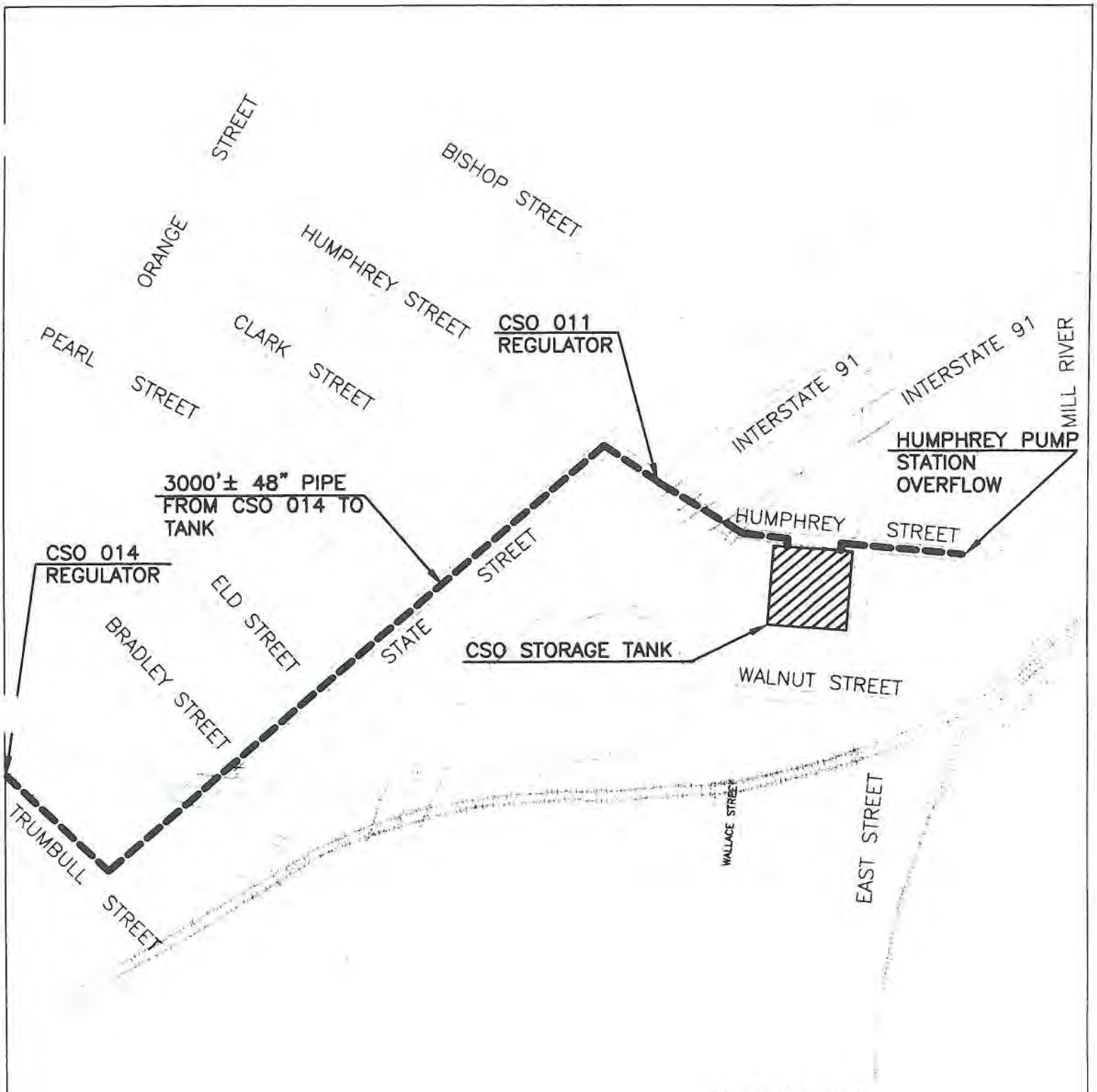


CITY OF NEW HAVEN
LONG TERM CSO PROJECT

BOULEVARD SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR CSO 024

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: AJF	DRAFTER: AJF	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001



SCALE IN FEET

400 200 0 400

SHEET:

CITY OF NEW HAVEN
LONG TERM CSO PROJECT

EAST STREET SEWERSHED

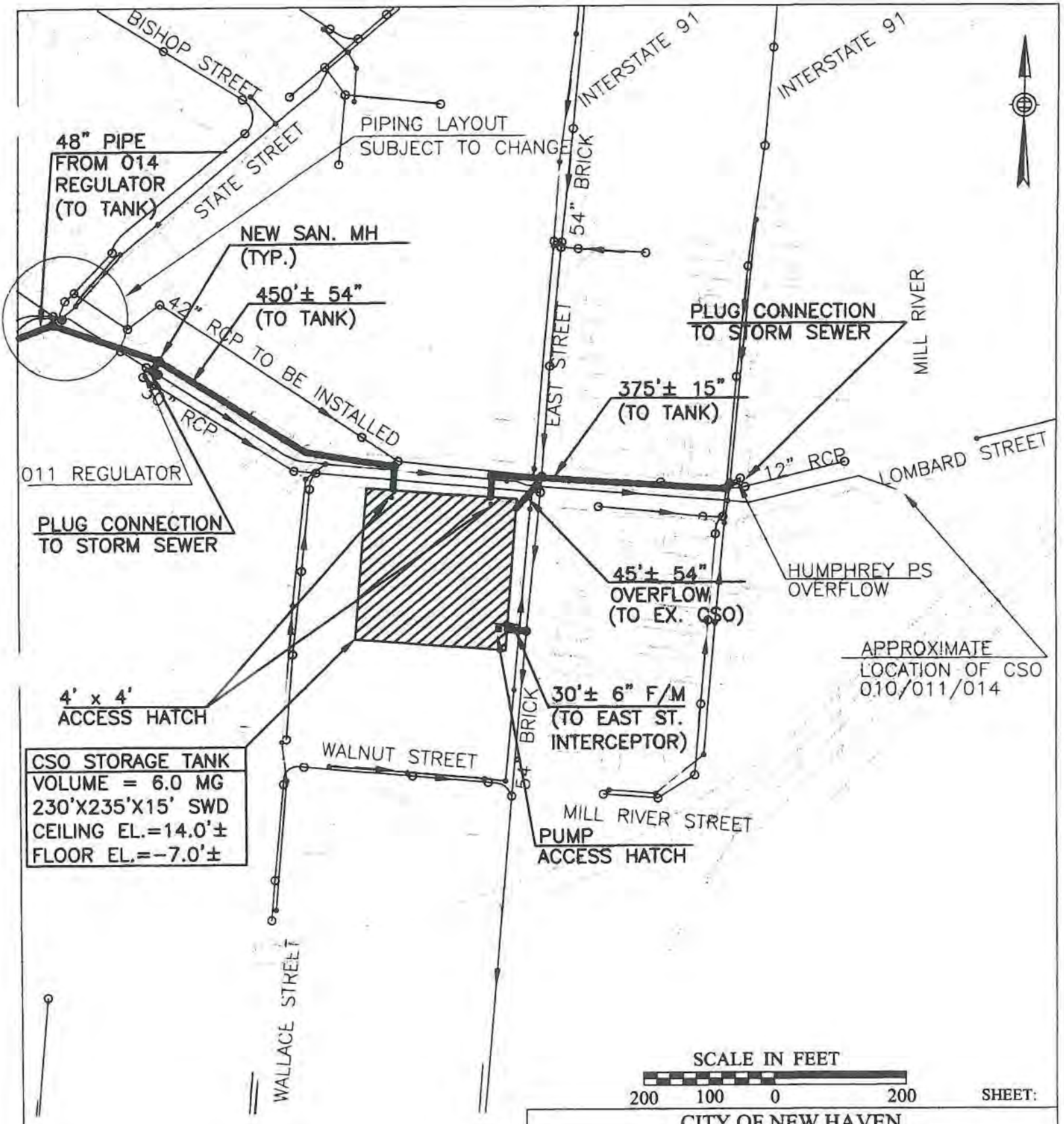
LOCATION OF PROPOSED FACILITY FOR CSO 011,014
AND THE HUMPHREY PUMP STATION OVERFLOW

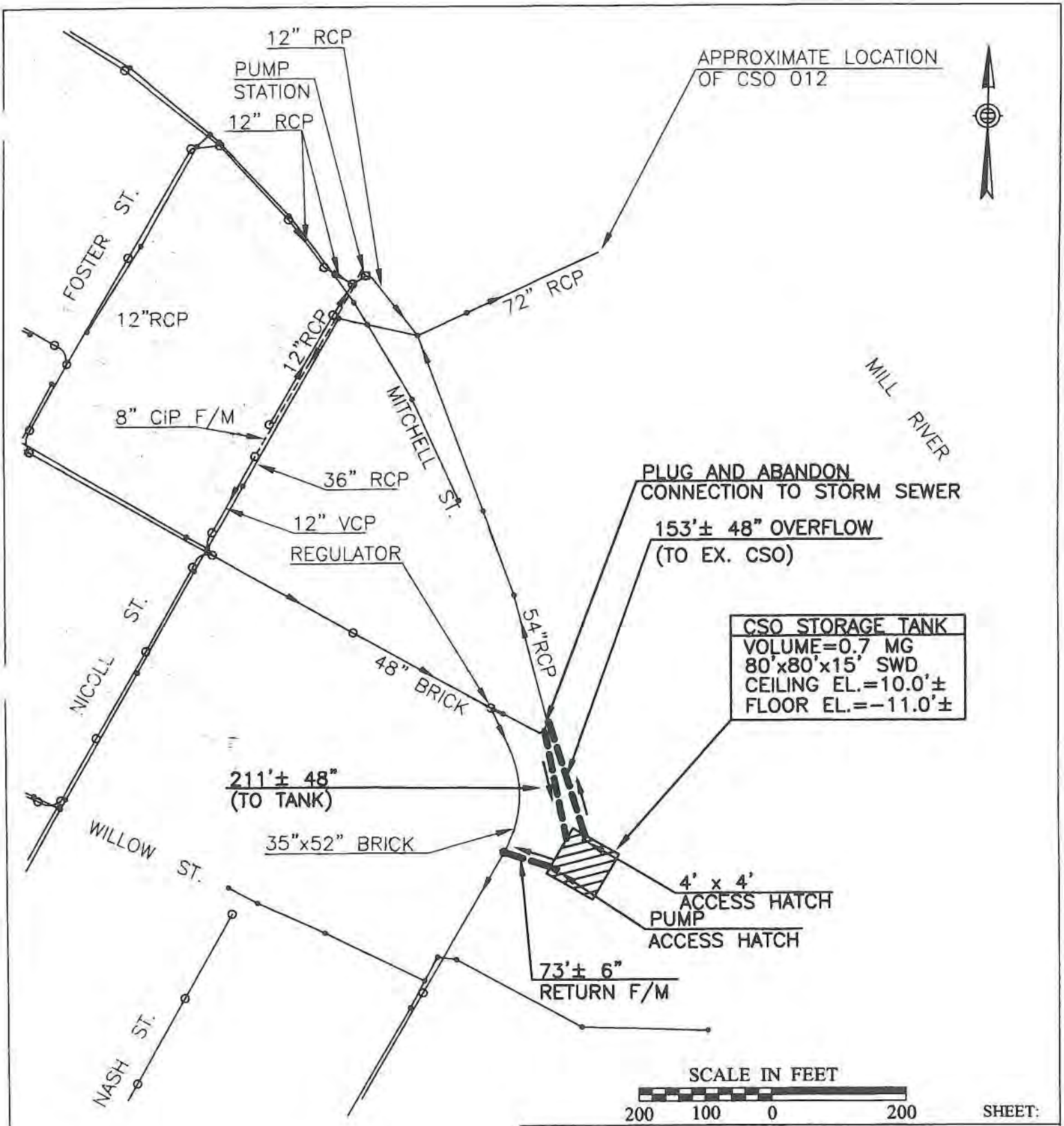
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: NVK	DRAFTER: NVK	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001

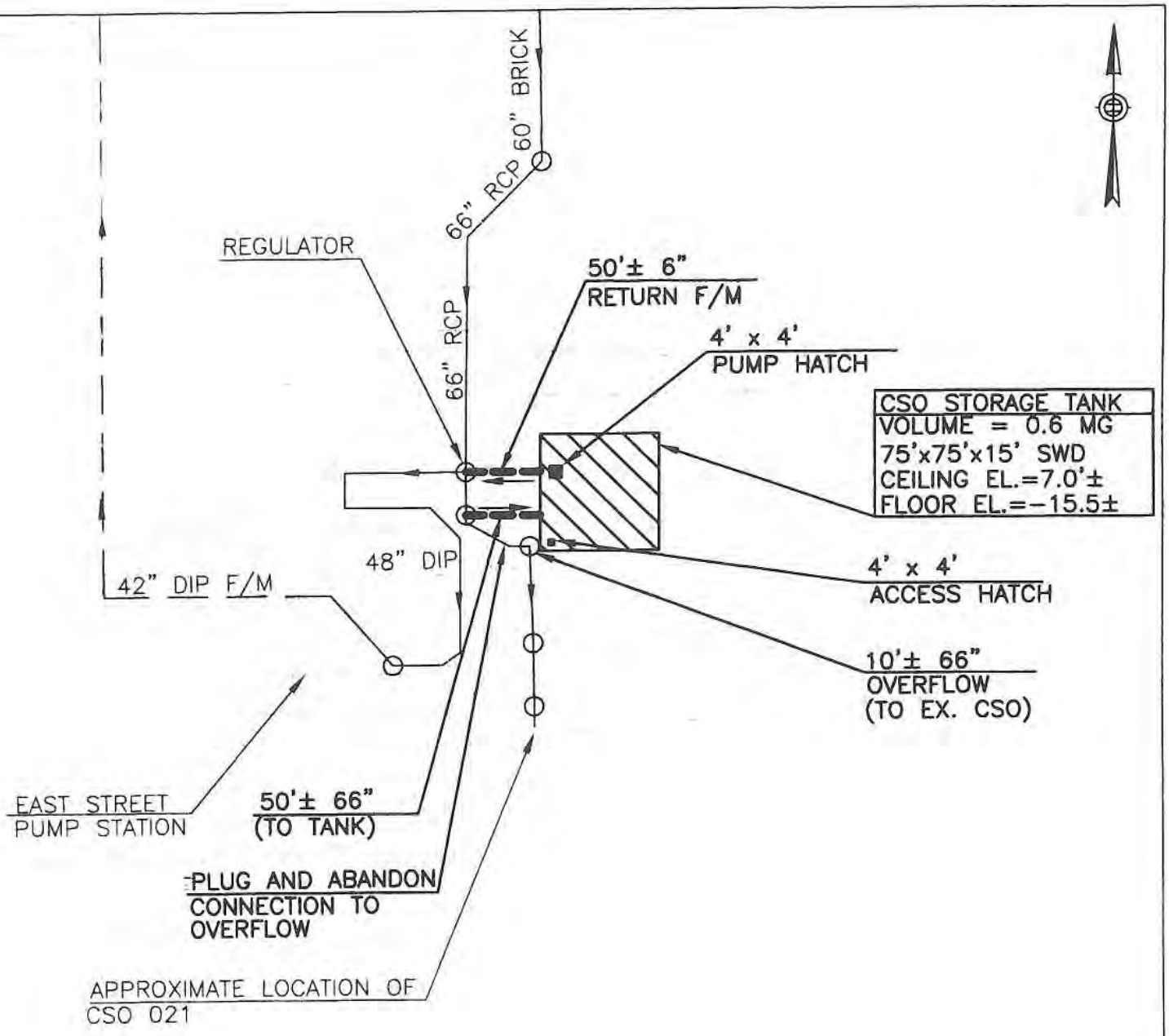
LEGEND

EDGE OF ROAD

PROPOSED SEWER


BISHOP STREET
STATE STREET
INTERSTATE 91
INTERSTATE 91
PIPING LAYOUT
SUBJECT TO CHANGE
48" PIPE
FROM 014
REGULATOR
(TO TANK)
NEW SAN. MH
(TYP.)
450'± 54"
(TO TANK)
42" RCP TO BE INSTALLED
54" BRICK
EAST STREET
MILL RIVER
PLUG CONNECTION
TO STORM SEWER
375'± 15"
(TO TANK)
30" RCP
011 REGULATOR
12" RCP
LOMBARD STREET
PLUG CONNECTION
TO STORM SEWER
45'± 54"
OVERFLOW
(TO EX. CSO)
HUMPHREY PS
OVERFLOW
APPROXIMATE
LOCATION OF CSO
010/011/014
4' x 4'
ACCESS HATCH
30'± 6" F/M
(TO EAST ST.
INTERCEPTOR)
CSO STORAGE TANK
VOLUME = 6.0 MG
230'X235'X15' SWD
CEILING EL.=14.0'±
FLOOR EL.=-7.0'±
WALNUT STREET
54" BRICK
MILL RIVER STREET
PUMP
ACCESS HATCH
WALLACE STREET
LEGEND
EDGE OF ROAD
SANITARY SEWER
STORM SEWER
PROPOSED SEWER
SCALE IN FEET
200 100 0 200
SHEET:
CITY OF NEW HAVEN
LONG TERM CSO PROJECT
EAST STREET SEWERSHED
LAYOUT OF PROPOSED FACILITY FOR CSO 011,014
AND THE HUMPHREY PUMP STATION OVERFLOW
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION
DESIGNER: NVK
DRAFTER: NVK
CHECKER: VJL
SCALE: AS SHOWN
DATE: JANUARY 2001


12" RCP
PUMP STATION
12" RCP
APPROXIMATE LOCATION OF CSO 012
FOSTER ST.
12"RCP
12"RCP
72" RCP
MILL RIVER
MITCHELL ST.
8" CIP F/M
36" RCP
PLUG AND ABANDON CONNECTION TO STORM SEWER
12" VCP
REGULATOR
153'± 48" OVERFLOW (TO EX. CSO)
NICOLL ST.
54"RCP
CSO STORAGE TANK
VOLUME=0.7 MG
80'x80'x15' SWD
CEILING EL.=10.0'±
FLOOR EL.=-11.0'±
48" BRICK
211'± 48" (TO TANK)
35"x52" BRICK
WILLOW ST.
4' x 4' ACCESS HATCH
PUMP ACCESS HATCH
73'± 6" RETURN F/M
NASH ST.
SCALE IN FEET
200 100 0 200
SHEET:
CITY OF NEW HAVEN
LONG TERM CSO PROJECT
EAST STREET SEWERSHED
LAYOUT OF PROPOSED FACILITY FOR CSO 012
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION
DESIGNER: AJF
DRAFTER: AJF
CHECKER: VJL
SCALE: AS SHOWN
DATE: JANUARY 2001
LEGEND
EDGE OF ROAD
SANITARY SEWER
STORM SEWER
PROPOSED SEWER



SCALE IN FEET

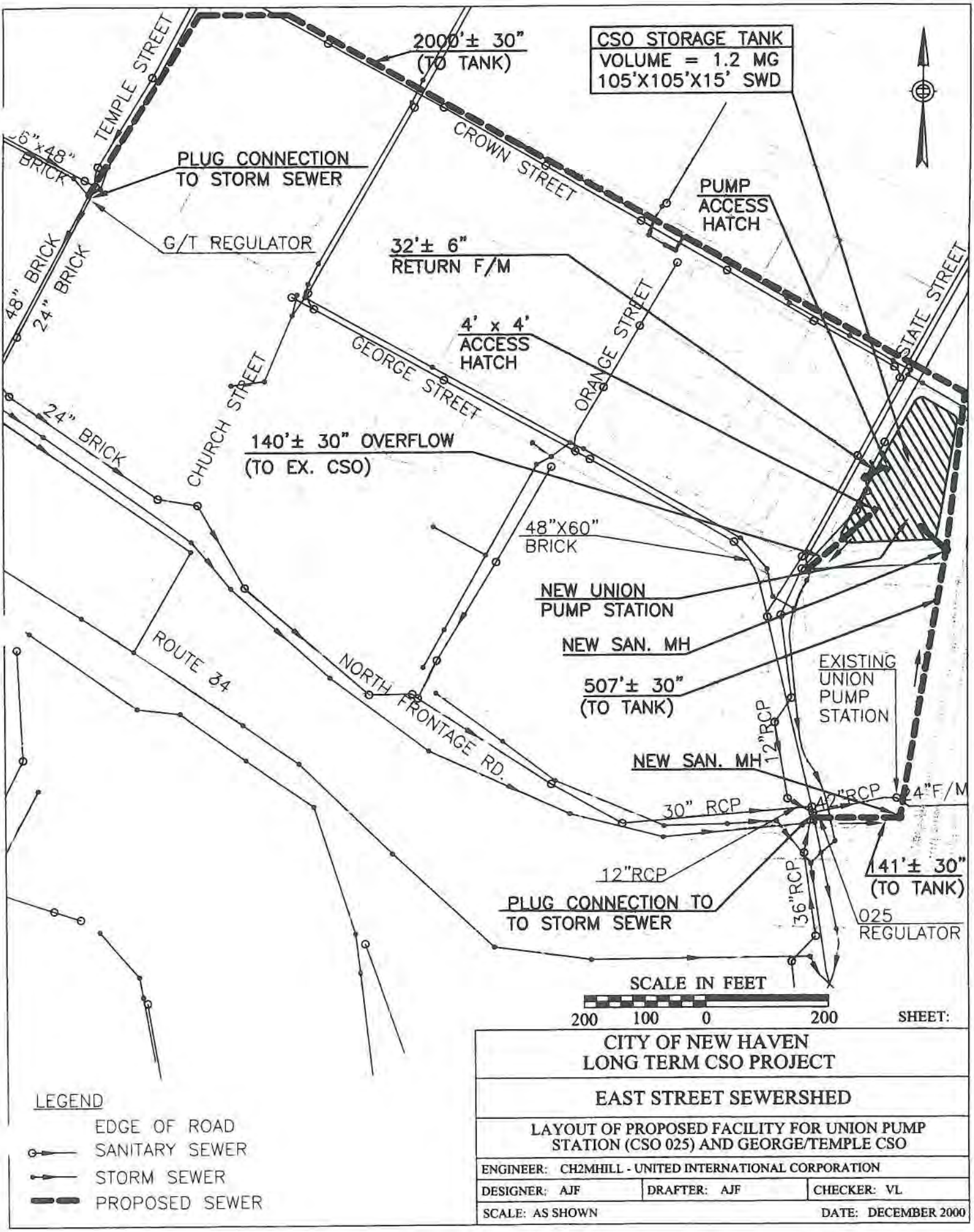
100 50 0 100

SHEET:

CITY OF NEW HAVEN LONG TERM CSO PROJECT		
EAST STREET SEWERSHED		
LAYOUT OF PROPOSED FACILITY FOR CSO 021		
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: NVK	DRAFTER: NVK	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001

LEGEND

- EDGE OF ROAD
- SANITARY SEWER
- STORM SEWER
- PROPOSED SEWER

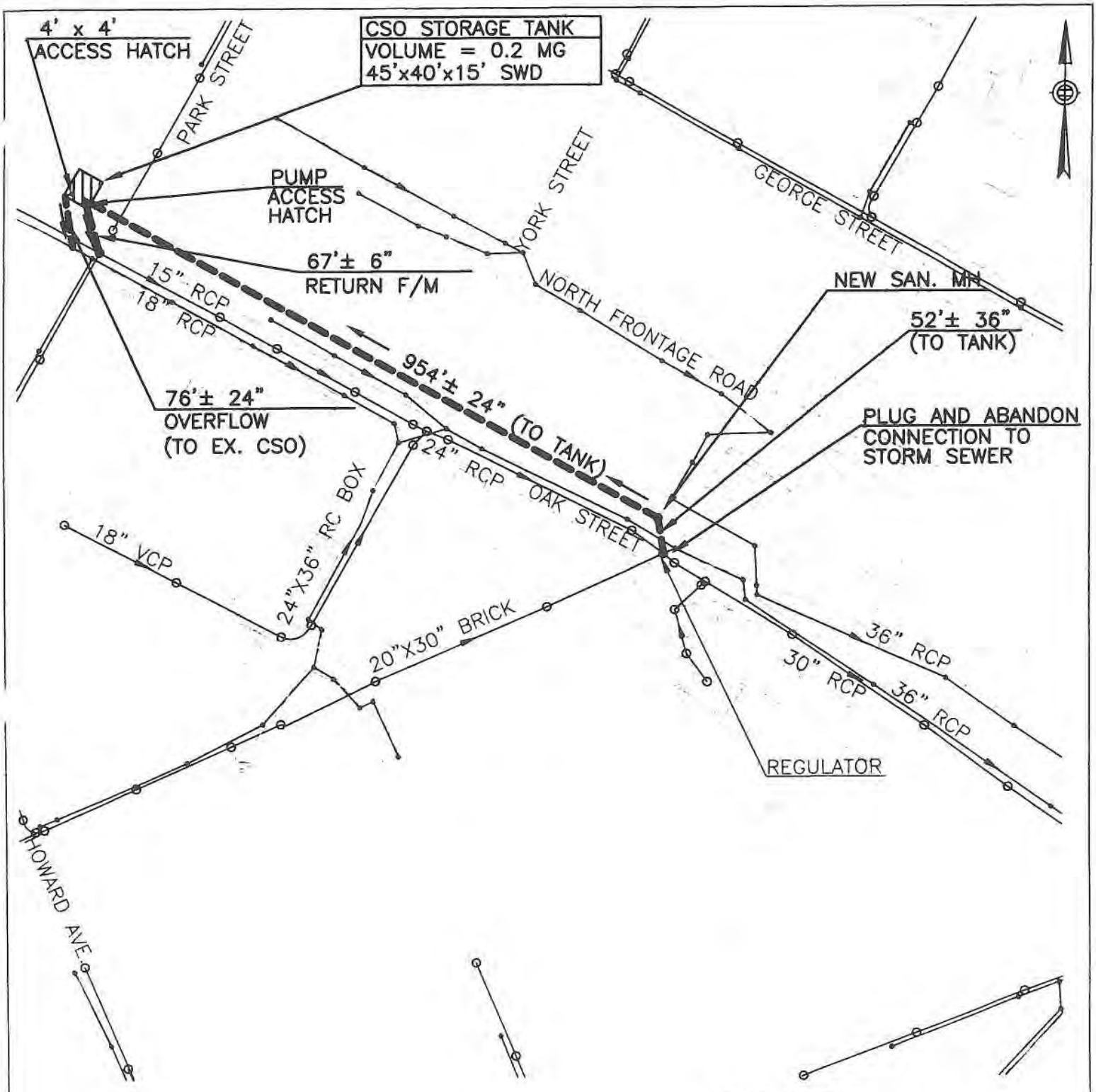


CITY OF NEW HAVEN
LONG TERM CSO PROJECT

EAST STREET SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR UNION PUMP STATION (CSO 025) AND GEORGE/TEMPLE CSO

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: AJF	DRAFTER: AJF	CHECKER: VL
SCALE: AS SHOWN		DATE: DECEMBER 2000



SCALE IN FEET

200 100 0 200

SHEET:

LEGEND

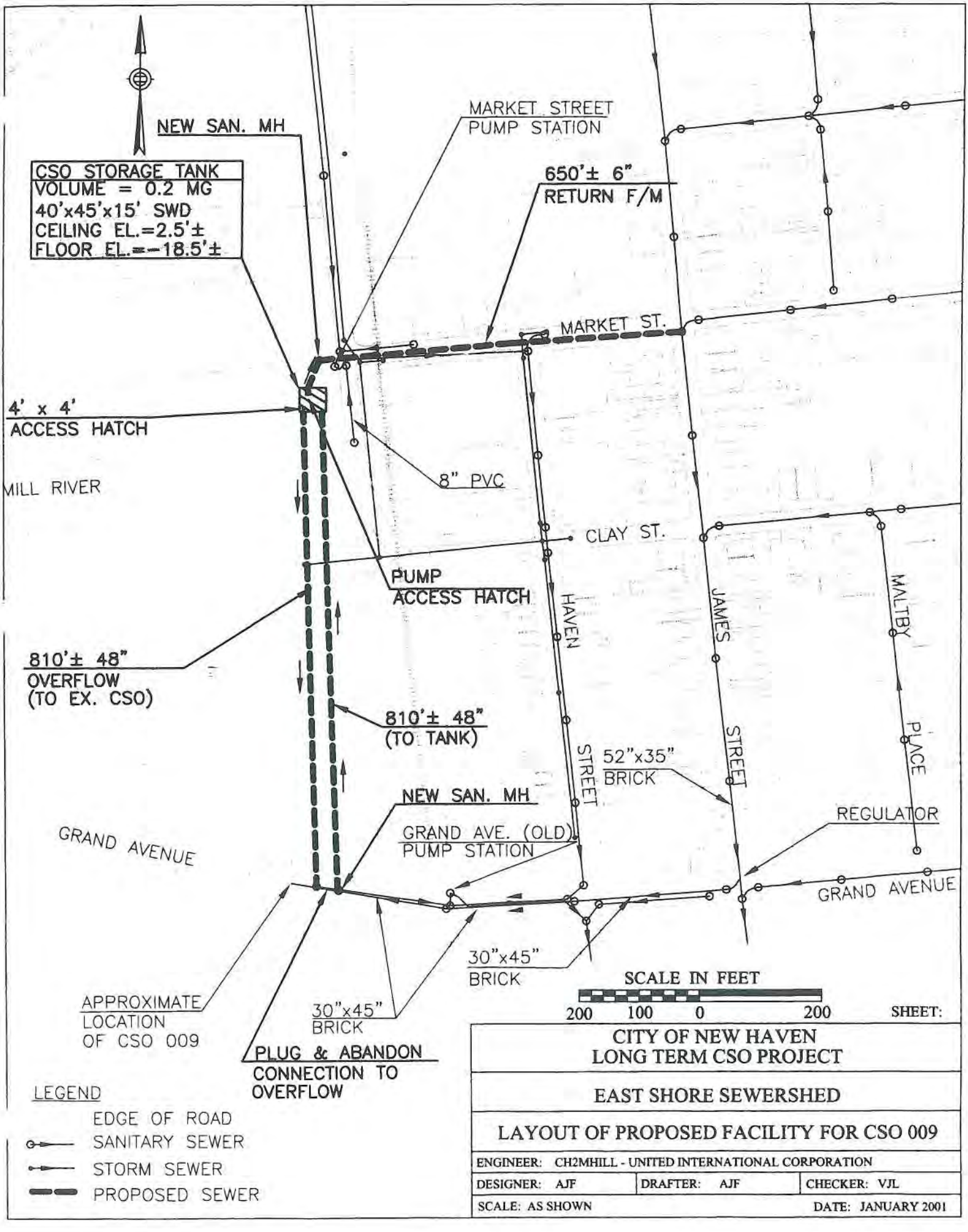
- EDGE OF ROAD
- SANITARY SEWER
- STORM SEWER
- PROPOSED SEWER

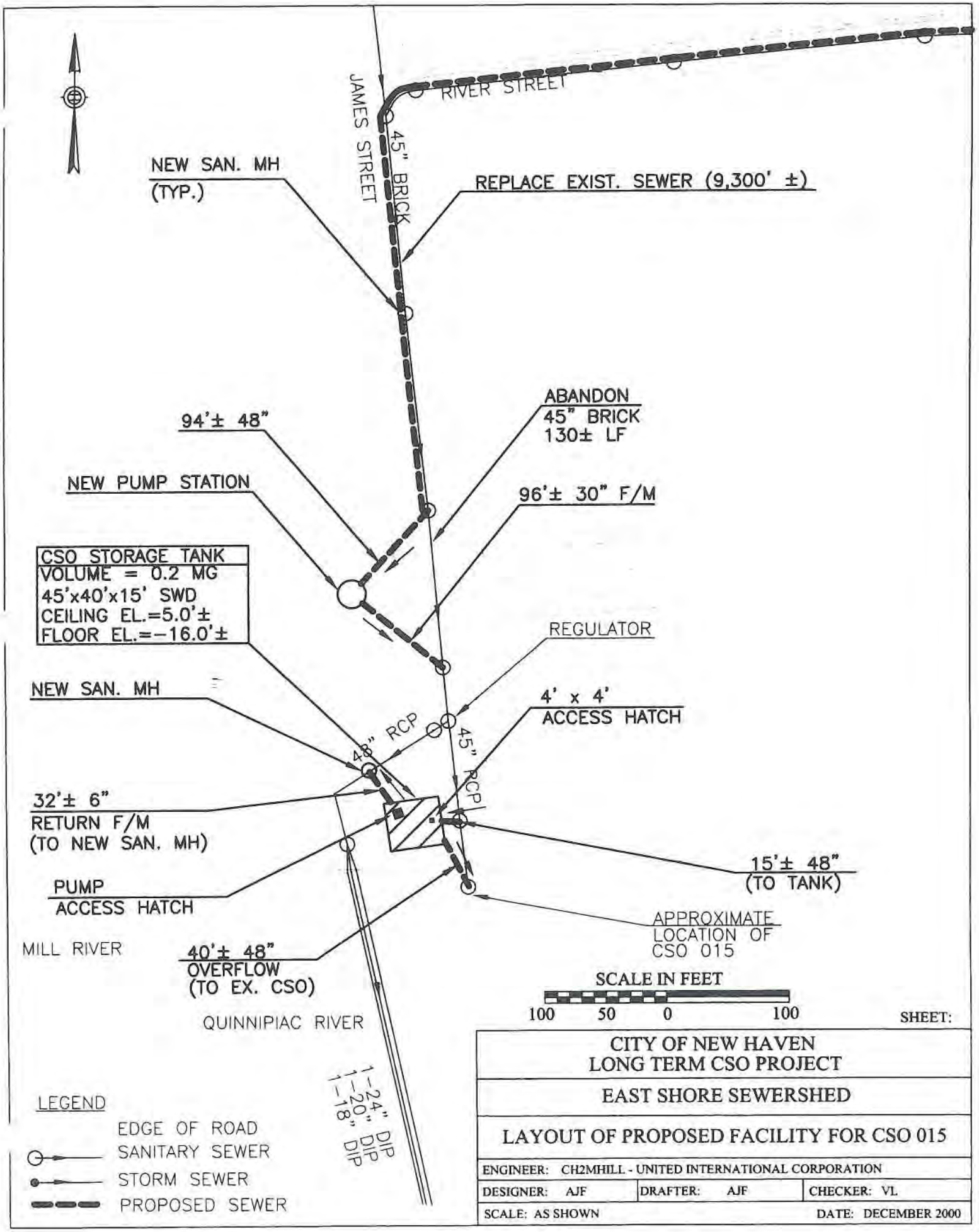
CITY OF NEW HAVEN
LONG TERM CSO PROJECT

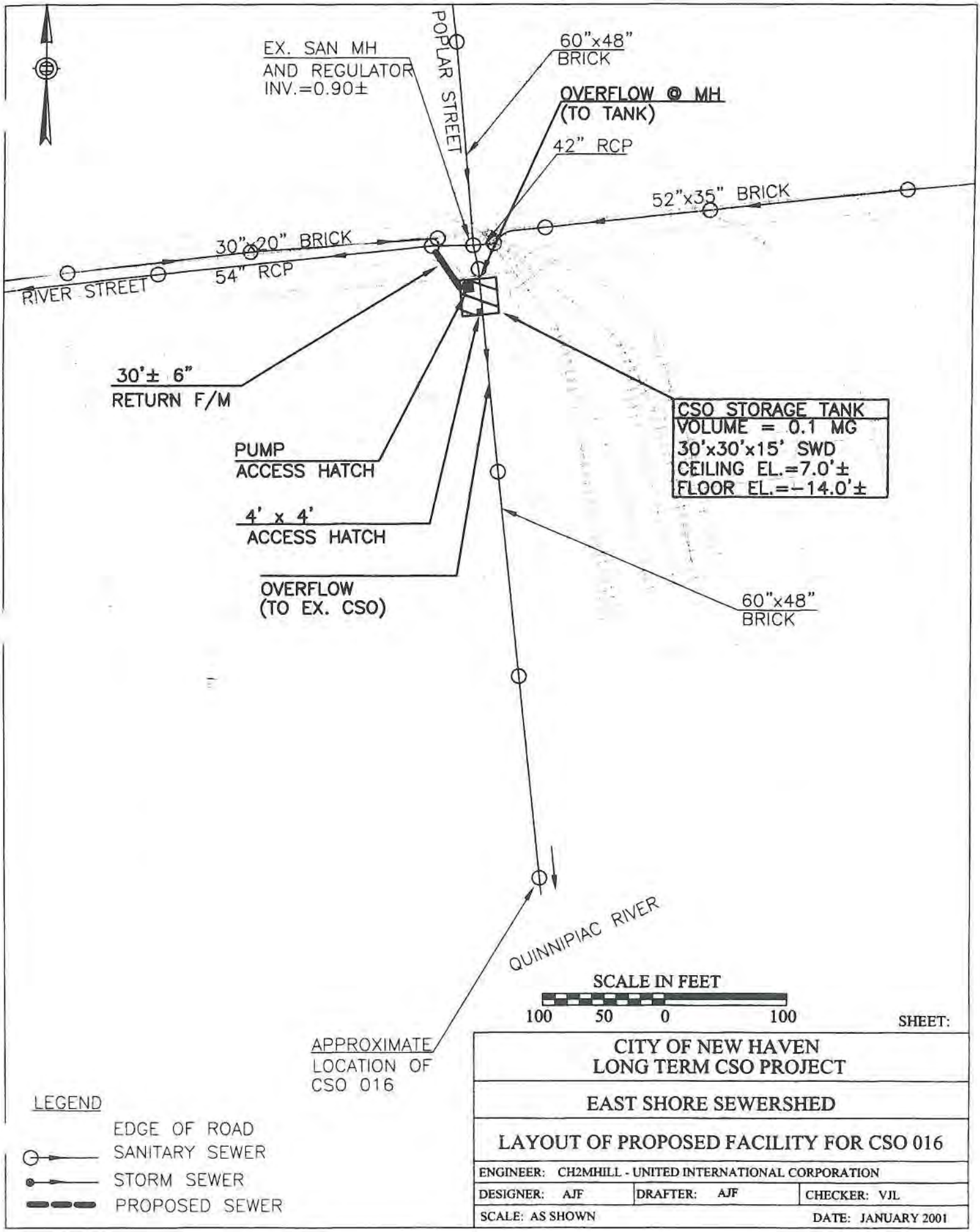
EAST STREET SEWERSHED

LAYOUT OF PROPOSED FACILITY
FOR S. FRONTAGE / DAVENPORT CSO

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: NVK	DRAFTER: NVK	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001


NEW SAN. MH
MARKET STREET PUMP STATION
CSO STORAGE TANK
VOLUME = 0.2 MG
40'x45'x15' SWD
CEILING EL.=2.5'±
FLOOR EL.=-18.5'±
650'± 6"
RETURN F/M
MARKET ST.
4' x 4'
ACCESS HATCH
8" PVC
MILL RIVER
CLAY ST.
PUMP
ACCESS HATCH
HAVEN
STREET
JAMES
STREET
MALTBY
PLACE
810'± 48"
OVERFLOW
(TO EX. CSO)
810'± 48"
(TO TANK)
52"x35"
BRICK
NEW SAN. MH
GRAND AVE. (OLD)
PUMP STATION
REGULATOR
GRAND AVENUE
GRAND AVENUE
30"x45"
BRICK
SCALE IN FEET
200 100 0 200
SHEET:
APPROXIMATE
LOCATION
OF CSO 009
30"x45"
BRICK
PLUG & ABANDON
CONNECTION TO
OVERFLOW
LEGEND
EDGE OF ROAD
SANITARY SEWER
STORM SEWER
PROPOSED SEWER
CITY OF NEW HAVEN
LONG TERM CSO PROJECT
EAST SHORE SEWERSHED
LAYOUT OF PROPOSED FACILITY FOR CSO 009
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION
DESIGNER: AJF
DRAFTER: AJF
CHECKER: VJL
SCALE: AS SHOWN
DATE: JANUARY 2001


RIVER STREET
JAMES STREET
45" BRICK
NEW SAN. MH
(TYP.)
REPLACE EXIST. SEWER (9,300' ±)
ABANDON
45" BRICK
130± LF
94'± 48"
NEW PUMP STATION
96'± 30" F/M
CSO STORAGE TANK
VOLUME = 0.2 MG
45'x40'x15' SWD
CEILING EL.=5.0'±
FLOOR EL.=-16.0'±
REGULATOR
NEW SAN. MH
4' x 4'
ACCESS HATCH
48" RCP
45" RCP
32'± 6"
RETURN F/M
(TO NEW SAN. MH)
15'± 48"
(TO TANK)
PUMP
ACCESS HATCH
APPROXIMATE
LOCATION OF
CSO 015
MILL RIVER
40'± 48"
OVERFLOW
(TO EX. CSO)
QUINNIPIAC RIVER
1-24" DIP
1-20" DIP
1-18" DIP
LEGEND
EDGE OF ROAD
SANITARY SEWER
STORM SEWER
PROPOSED SEWER
SCALE IN FEET
100 50 0 100
SHEET:
CITY OF NEW HAVEN
LONG TERM CSO PROJECT
EAST SHORE SEWERSHED
LAYOUT OF PROPOSED FACILITY FOR CSO 015
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION
DESIGNER: AJF
DRAFTER: AJF
CHECKER: VL
SCALE: AS SHOWN
DATE: DECEMBER 2000



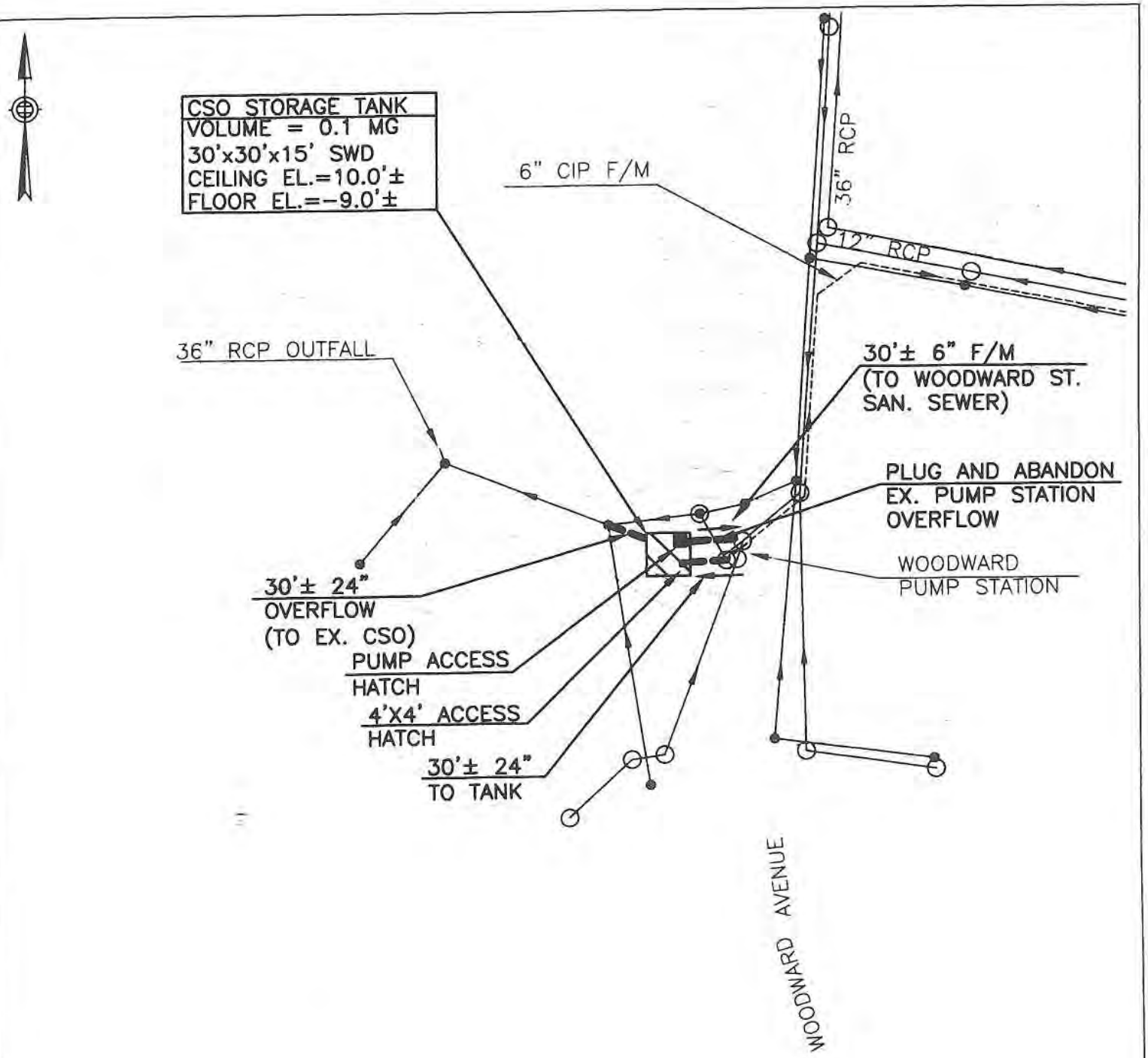
SHEET:

CITY OF NEW HAVEN
LONG TERM CSO PROJECT

EAST SHORE SEWERSHED

LAYOUT OF PROPOSED FACILITY FOR CSO 016

ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: AJF	DRAFTER: AJF	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001



SCALE IN FEET

100 50 0 100

SHEET:

CITY OF NEW HAVEN LONG TERM CSO PROJECT		
EAST SHORE SEWERSHED		
LAYOUT OF PROPOSED FACILITY FOR WOODWARD PUMP STATION CSO		
ENGINEER: CH2MHILL - UNITED INTERNATIONAL CORPORATION		
DESIGNER: NVK	DRAFTER: NVK	CHECKER: VJL
SCALE: AS SHOWN		DATE: JANUARY 2001

LEGEND

- EDGE OF ROAD
- SANITARY SEWER
- STORM SEWER
- PROPOSED SEWER

APPENDIX D

Financial Model Details

City of New Haven WPCA Operating Budget (Revenues & Expenses)

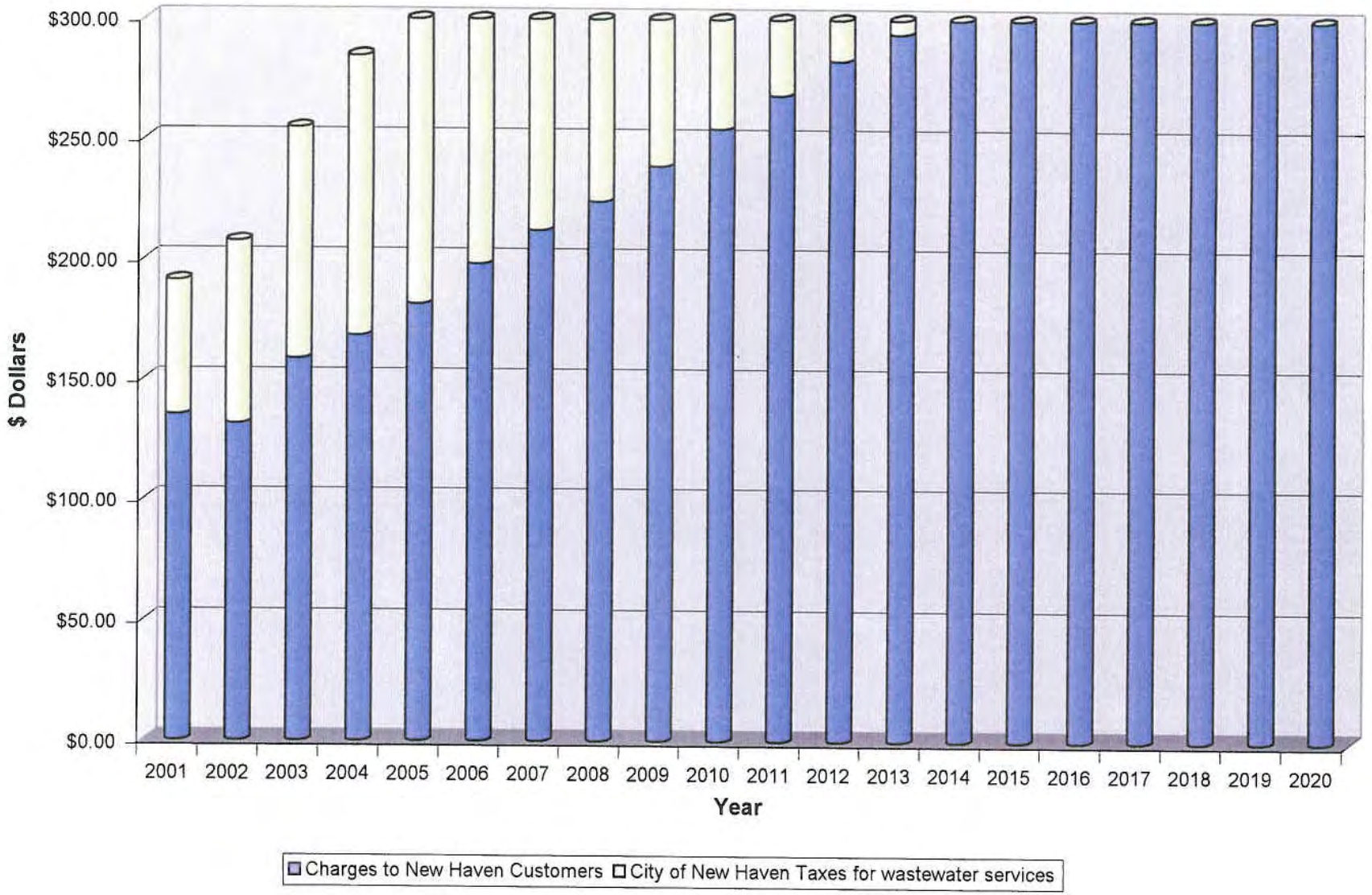
	1998	1999	2000	2001
Operating revenues:				
New Haven Customers	9,909,369	9,326,751	8,522,700	8,013,000
Contract Customers	6,021,098	5,365,010	4,170,000	3,525,000
Other	1,329,708	2,616,839	280,000	421,000
Total Operating revenues	17,260,175	17,308,600	12,972,700	11,959,000
Total operating expenses:	11,884,422	16,310,108	14,132,700	13,529,000
Operating income	**5,375,753**	**998,492**	**(1,160,000)**	**(1,570,000)**
Nonoperating revenues (expenses)				
Interest income	278,568	488,578	1,160,000	1,570,000
Interest expense	(453,629)	(292,796)		
Loss on disposal of equipment	0	(104,666)		
Total nonoperating revenues, net	(175,061)	91,116	1,160,000	1,570,000
Income before operating transfers	**5,200,692**	**1,089,608**	**0**	**0**
Net Operating transfers	(210,000)	(210,000)	0	0
Net Income	**4,990,692**	**879,608**	**0**	**0**
Fund equity:				
Contributed capital from grants & reimbursements	68,735,502	67,333,284		
Retained earnings:	7,884,078	11,371,532		
Total fund equity	**76,619,580**	**78,704,816**	**0**	**0**

Source: Financial Report dated June 30, 1998 and Proposed Operating Budget For the Fiscal Year Ending June 30, 2001

blue text = direct inputs

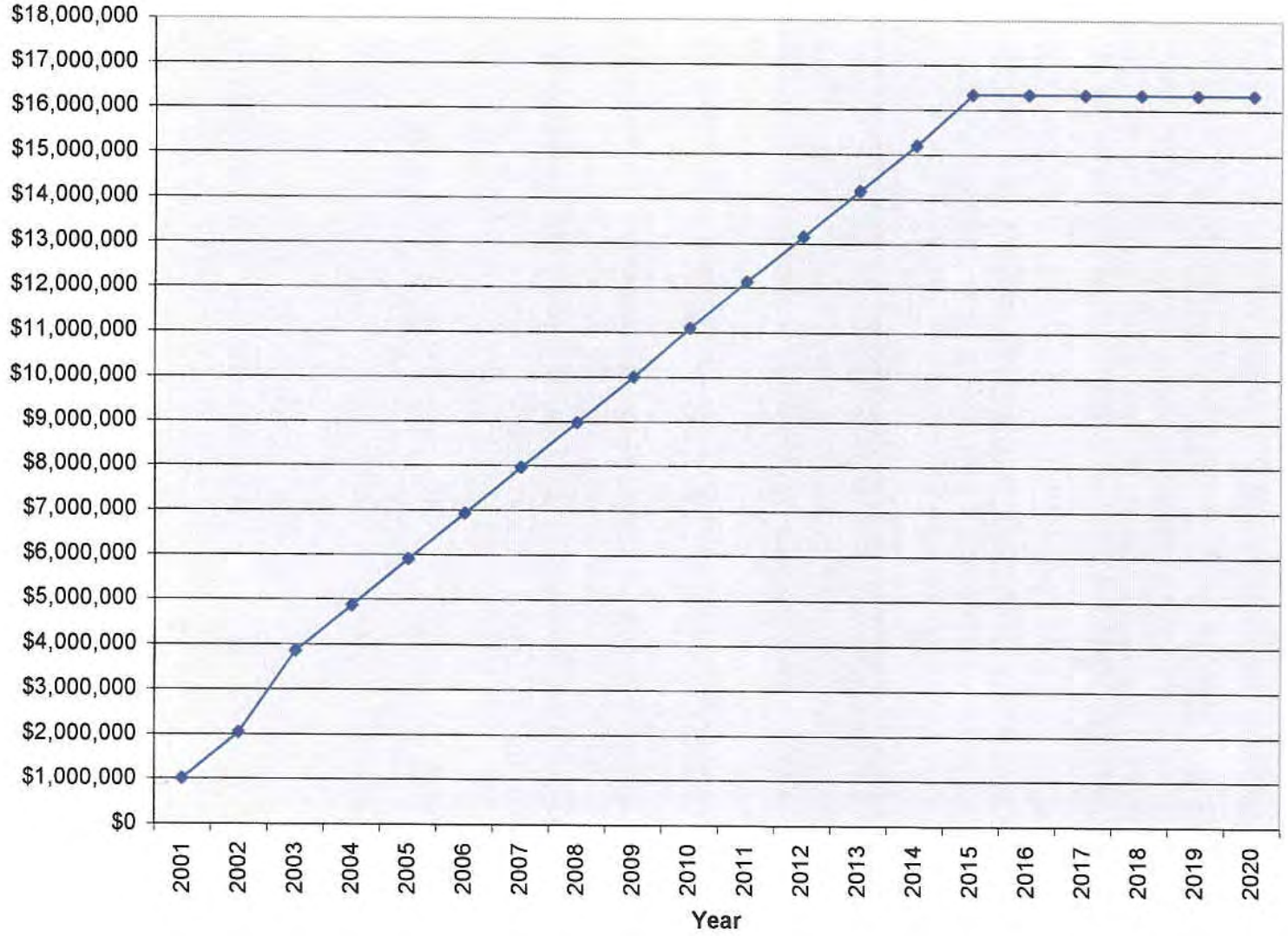
black text = spreadsheet calculations

Annual Charges to Customers for Wastewater Services

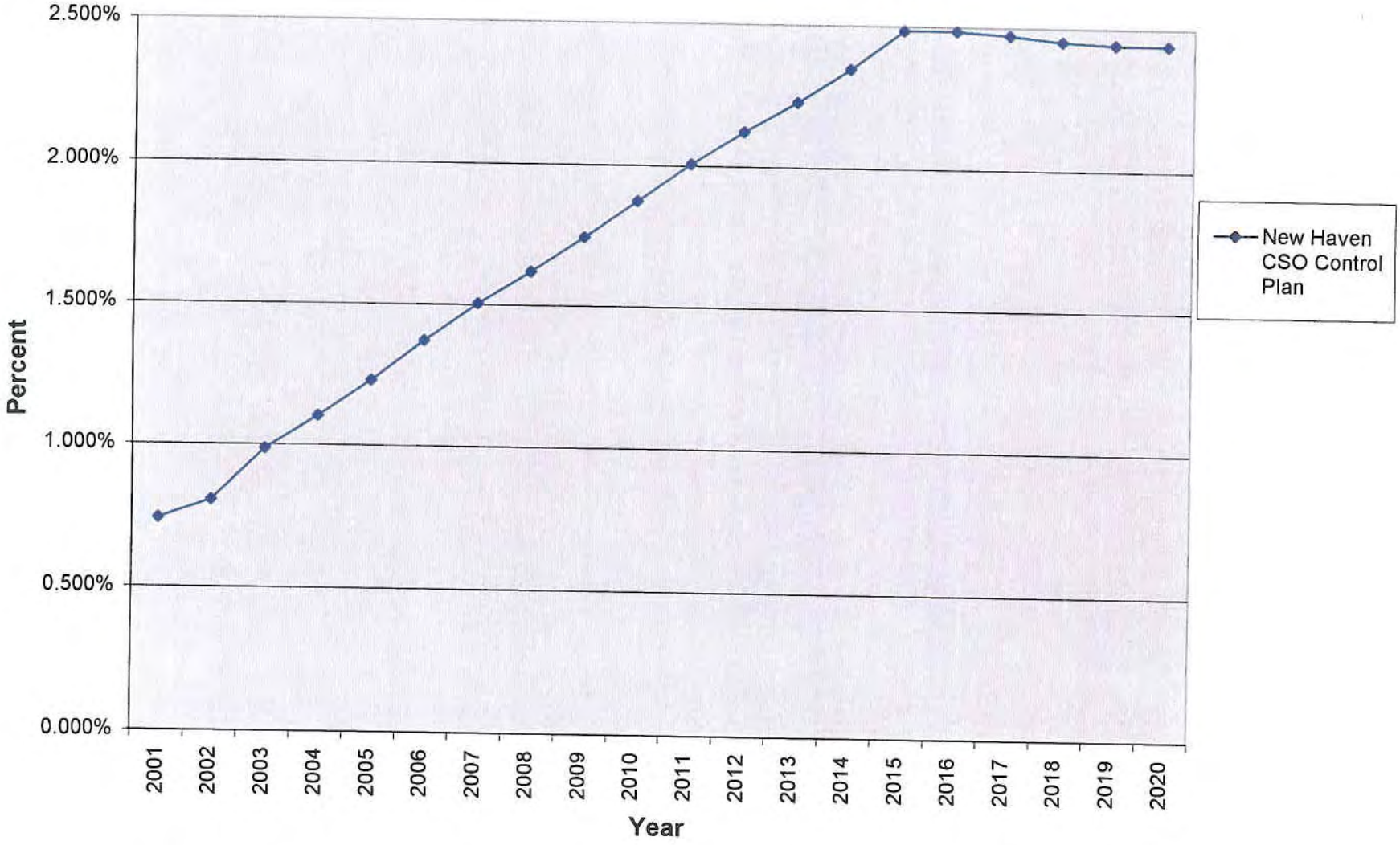


Total Annual Costs of New Haven CSO Control Plan

(60/40 split of total cost between WPCA and City of New Haven)



Total Annual Wastewater Charge to Customers as Percent Median Income



NH_financial_04_11_01.xls \ Grph%Inc

Printed on 04/30/2001

Financial Options

State's annual contribution of direct funds for capital costs of CSO plan	$0	Entered as an assumption. Must be zero if B4 is a positive number.
State's contribution of funds for a percentage of capital costs of CSO plan	0%	Entered as an assumption. Must be zero if B3 is a positive number.
Engineering and Contingency costs as percentage of construction costs	35%	
WPCA pays for all of rehabilitation costs of CSO plan	☐ YES	Currently applies only to Alternative 3 where rehab = $157million See adjustments in Alt3 <CSOCosts> and <DebtService> worksheets

Input Data

Current rates for residential customers (monthly)	$12.48	minimum charge for 5 CCF or less of water usage per month
Current rates for residential customers (quarterly)	$23.48	minimum charge for 15 CCF or less of water usage per 3 months
	$1.10	per 100-cubic feet/month over 5 CCF/monthly or 15 CCF/tri-monthly
Current rate for residential customers with private source of water (quarterly)	$33.38	per 3 months for a single family based on 14 CCF usage ($59.78 for duplex residence or $26.40 for each additional dwelling for multiple dwelling units)
Service charge per bill (administrative)	$6.98	
Total number customers*	25,375	
Total number residential customers	22,404	
Total number commercial customers	2,525	
Total number industrial customers	141	
Total number public authority customers	305	
Total annual volume billing to all New Haven customers	7,447,262	CCF (100-cubic feet)
Typical quarterly volume billing to NH residential customers	24	CCF (100-cubic feet)
Total annual volume billing to NH residential customers	2,150,784	CCF (100-cubic feet)
Minimum charge per residential customer per year	$93.92	
Typical charge per residential customer per year	$133.52	
Total annual dollar billing by WPCA to residential customers	$2,991,382	
Estimated Growth in customer base	None anticipated	
Population served in East Haven	25,585	
Population served in Hamden	48,890	
Population served in New Haven	124,383	
Population served in Woodbridge	931	
Median Household Income	$25,811	NOTE: Based on fax from Walt Sinnott/CTDEP
New Haven property tax base	$3,192,837,041	
New Haven mean or typical value of a home	$94,224	
Interest rate on bonds	5.600%	The assumption here is that all CSO work will be bonded through CWF @2% interest instead of the GO bonds at 5.6% by the City whether the debt service is paid through WPCA user charges or City property taxes. **NOTE: if the State contributes funds then interest rate drops to 2%.**
Financing cost on bonds	2.000%	
Term for bonds in years	20	
Capital Outlay for projects	$0	
Borrowing limit or legal debt margin	$522,122,843	

Source for Input Data: Memorandum from Ray Smedberg/New Haven WPCA dated May 1, 2000
Rate information from WPCA Proposed Sewer User Charges to be Effective July 1, 2000 and April 4, 2000 Letter of Transmittal To Honorable Commissioners of the WPCA
Populations of Towns served by WPCA from 1998 Annual Report of South Central Connecticut Regional Water Authority
Debt limitation from Yr 2000 Bond Issue Prospectus
Property Tax information and typical home value from City of New Haven Office of Assessor, (203) 946-6047. Aileen Tokuda spoke with Dave Ambrose on May 30, 2000.
Source for Median Household Income: New Haven--Meriden, CT MSA Data from 1990 US Census Data http://venus.census.gov/cdrom/lookup/958388317
* Some 'customers" have more than one meter or dwelling unit being served (multi-family, condominium, apartment, public housing, commercial complexes, etc.)

Construction Costs for CSO Short & Long-Term Control Plan

	Project Duration (yrs)	Total Construction Costs	First Five Fiscal Years					Second Five Fiscal Years				
			2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New Haven CSO Control Plan	15	$219,701,000	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090

O&M Costs for CSO Short & Long-Term Control Plan

	Asset Life (yrs)	Annual O&M Costs	First Five Fiscal Years					Second Five Fiscal Years				
			2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New Haven CSO Control Plan	50	na	$0	$0	$797,000	$797,000	$797,000	$811,000	$818,000	$818,000	$818,000	$886,000

Source for Construction and O&M Costs and project durations provided in New Haven LTCP Final Report Appendices (CH2M HILL 2001)
Only storage has identified O&M costs + new James Street Pump Station.
red text = direct inputs from CSO study
black text = spreadsheet calculations

Construction Costs for CSO Short & Long-Term Control Plan

	Project Duration (yrs)	Total Construction Costs	Third Five Years					Fourth Five Years				
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
New Haven CSO Control Plan	15	$219,701,000	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$0	$0	$0	$0	$0

O&M Costs for CSO Short & Long-Term Control Plan

	Asset Life (yrs)	Annual O&M Costs	Third Five Years					Fourth Five Years				
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
New Haven CSO Control Plan	50	na	$906,000	$906,000	$911,000	$911,000	$1,035,000	$1,035,000	$1,035,000	$1,035,000	$1,035,000	$1,035,000

Source for Construction and O&M Costs and project durations provided in New Ha
Only storage has identified O&M costs + new James Street Pump Station.

red text = direct inputs from CSO study

black text = spreadsheet calculations

Past Debt Service for City of New Haven and Projected New Debt Service Requirements for Alternatives A through H

Past Debt Service for City of New Haven on CSO projects

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past Bond Issues	$1,060,000	$1,060,000	$960,000	$0	$1,600,000	$1,600,000	$1,600,000	$0	$0	$600,000	$1,600,000	$1,600,000	$850,000	$1,600,000																			
Debt Service on FY 1988 Bonds	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226													
Debt Service on FY 1989 Bonds		$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226	$91,226												
Debt Service on FY 1990 Bonds			$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620	$82,620											
Debt Service on FY 1991 Bonds				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0										
Debt Service on FY 1992 Bonds					$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700									
Debt Service on FY 1993 Bonds						$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700									
Debt Service on FY 1994 Bonds							$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700								
Debt Service on FY 1995 Bonds								$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0						
Debt Service on FY 1996 Bonds									$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0					
Debt Service on FY 1997 Bonds										$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637	$51,637					
Debt Service on FY 1998 Bonds											$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700				
Debt Service on FY 1999 Bonds												$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700			
Debt Service on FY 2000 Bonds													$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153	$73,153		
Debt Service on FY 2001 Bonds														$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700	$137,700
Total Annual Debt Service paid by City	$91,226	$182,452	$265,072	$265,072	$402,772	$540,472	$678,172	$678,172	$678,172	$729,810	$867,510	$1,005,209	$1,078,363	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,124,836	$1,033,610	$950,990	$950,990	$813,290	$675,590	$537,890	$537,890	$537,890	$486,253	$348,553	$210,853	$137,700
Taxes on Past Bonds Issued for past CSO projects																																	

Source: email message from Lisa Bardon to Ray Smedberg on May 2, 2000

Projected Debt Service Requirements for Alternatives A through H

N Haven CSO Control Plan	First Five Fiscal Years					Second Five Fiscal Years					Third Five Fiscal Years					Fourth Five Fiscal Years				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Projected New Capital Requirements	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$19,773,090	$0	$0	$0	$0	$0
Projected Bond Issues	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$11,863,854	$0	$0	$0	$0	$0
Debt Service on FY 2001 Bonds	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2002 Bonds		$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2003 Bonds			$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2004 Bonds				$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2005 Bonds					$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2006 Bonds						$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2007 Bonds							$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2008 Bonds								$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2009 Bonds									$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2010 Bonds										$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2011 Bonds											$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2012 Bonds												$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2013 Bonds													$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2014 Bonds														$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2015 Bonds															$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032	$1,021,032
Debt Service on FY 2016 Bonds																$0	$0	$0	$0	$0
Debt Service on FY 2017 Bonds																	$0	$0	$0	$0
Debt Service on FY 2018 Bonds																		$0	$0	$0
Debt Service on FY 2019 Bonds																			$0	$0
Debt Service on FY 2020 Bonds																				$0
Total Annual Debt Service For New WPCA Debt: Revenue Bonds	$1,021,032	$2,042,065	$3,063,097	$4,084,130	$5,105,162	$6,126,194	$7,147,227	$8,168,259	$9,189,292	$10,210,324	$11,231,356	$12,252,389	$13,273,421	$14,294,454	$15,315,486	$15,315,486	$15,315,486	$15,315,486	$15,315,486	$15,315,486
Total Annual City Taxes paid by New Haven customers to service debt on New CSO projects	$680,688	$1,361,377	$2,042,065	$2,722,753	$3,403,441	$4,084,130	$4,764,818	$5,445,506	$6,126,194	$6,806,883	$7,487,571	$8,168,259	$8,848,947	$9,529,636	$10,210,324	$10,210,324	$10,210,324	$10,210,324	$10,210,324	$10,210,324
Current Outstanding Debt Service On Bonds for WPCA	$2,020,953	$1,723,522	$1,996,735	$1,583,554	$1,351,411	$1,491,682	$1,437,478	$1,239,901	$1,231,848	$1,223,733	$1,145,302	$1,104,443	$804,015	$765,428	$708,002	$559,047	$302,958	$61,856	$35,213	$0
Current Outstanding Debt Service On Bonds for City of New Haven on Past CSO projects	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,216,062	$1,124,836	$1,033,610	$950,990	$950,990	$813,290	$675,590	$537,890	$537,890	$537,890	$486,253	$348,553	$210,853	$137,700
Total Annual WPCA Debt Service, Including Existing and Projected New Debt	$3,041,985	$3,765,587	$5,059,832	$5,667,684	$6,456,573	$7,617,876	$8,584,705	$9,408,160	$10,421,140	$11,434,057	$12,376,658	$13,356,832	$14,077,436	$15,059,882	$16,023,488	$15,874,533	$15,618,444	$15,377,342	$15,350,699	$15,315,486
Total Annual City Taxes paid by New Haven customers to service debt on all CSO projects	$1,896,751	$2,577,439	$3,258,127	$3,938,816	$4,619,504	$5,300,192	$5,980,880	$6,570,342	$7,159,804	$7,757,873	$8,438,561	$8,981,549	$9,524,538	$10,067,526	$10,748,214	$10,748,214	$10,696,577	$10,558,877	$10,421,177	$10,348,024

"Current Outstanding Debt" Source: WPCA City of New Haven Cost of Service Study, date March 30, 2001
Gand Debt Service Sharing Schedules for New Haven WPCA from RSM McGladrey, Inc. May 23, 2000 and May 25, 2000 letter from RSM McGladrey for FY 2016-2020.

gray text = inputs from different worksheet within this workbook

blue text = direct inputs

City of New Haven Cost Allocation for Sewer Usage Rates

New Haven CSO Control Plan	First Five Fiscal Years					Second Five Fiscal Years					Third Five Fiscal Years					Fourth Five Fiscal Years				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operations and Maintenance																				
Collection & Pumping	$643,030	$592,700	$575,710	$587,470	$604,040	$616,121	628,443	641,012	653,832	666,909	$680,247	693,852	707,729	721,884	736,321	$751,048	766,069	781,390	797,018	$812,958
Boulevard Pumping Station	$206,540	$196,940	$192,270	$195,600	$201,470	$205,499	209,609	213,802	218,078	222,439	$226,888	231,426	236,054	240,775	245,591	$250,503	255,513	260,623	265,835	$271,152
East Shore Plant	$4,075,150	$4,036,570	$4,062,030	$4,162,890	$4,286,840	$4,372,577	4,460,028	4,549,229	4,640,213	4,733,018	$4,827,678	4,924,232	5,022,716	5,123,171	5,225,634	$5,330,147	5,436,750	5,545,485	5,656,394	$5,769,522
East Street Pump Station	$127,290	$122,280	$119,070	$120,020	$123,610	$126,082	128,604	131,176	133,799	136,475	$139,205	141,989	144,829	147,725	150,680	$153,693	156,767	159,903	163,101	$166,363
Accounting	$151,120	$142,020	$146,150	$150,410	$154,790	$157,886	161,044	164,264	167,550	170,901	$174,319	177,805	181,361	184,988	188,688	$192,462	196,311	200,237	204,242	$208,327
General Administration	$560,410	$432,570	$441,760	$451,250	$461,030	$470,251	479,656	489,249	499,034	509,014	$519,195	529,579	540,170	550,974	561,993	$573,233	584,698	596,391	608,319	$620,486
Additional costs for new CSO	$0	$0	$797,000	$797,000	$797,000	$811,000	$818,000	$818,000	$818,000	$886,000	$906,000	$906,000	$911,000	$911,000	$1,035,000	$1,035,000	$1,035,000	$1,035,000	$1,035,000	$1,035,000
Debt Repayment calculated	$3,041,985	$3,765,587	$5,059,832	$5,667,684	$6,456,573	$7,617,876	$8,584,705	$9,408,160	$10,421,140	$11,434,057	$12,376,658	$13,356,832	$14,077,436	$15,059,882	$16,023,488	$15,874,533	$15,818,444	$15,377,342	$15,350,699	$15,315,486
Debt Repayment as estimated in Cost of Service Study	$2,271,723	$2,166,549	$2,629,232	$2,411,094	$2,376,780															
Receivable Management Cost	$1,500,000	$808,804	$787,708	$798,103	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869	$835,869
Replacement Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Costs before adjustments	$10,305,525	$10,097,471	$12,181,530	$12,930,427	$13,921,222	$15,213,161	$16,305,958	$17,250,761	$18,387,515	$19,594,682	$20,686,059	$21,797,583	$22,657,165	$23,776,268	$25,003,264	$24,996,487	$24,885,420	$24,792,240	$24,916,478	$25,035,163
Other Revenue	($1,853,156)	($1,950,810)	($1,962,205)	($1,973,941)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)	($1,986,029)
Administrative fee differential	$463,485	$488,139	$516,249	$545,344	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434	$575,434
Total adjusted costs	$8,915,854	$8,634,800	$10,735,574	$11,501,830	$12,510,627	$13,802,566	$14,895,363	$15,840,166	$16,976,920	$18,184,087	$19,275,464	$20,386,988	$21,246,570	$22,365,673	$23,592,669	$23,585,892	$23,474,825	$23,381,645	$23,505,883	$23,624,568
Amount to be Recovered by High Strength Surcharges	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)
Estimated Amount to be Recovered by Sewer User Charges	$7,545,592	$6,435,761	$6,907,974	$6,848,240	$7,033,834															
Calculated Amount to be Recovered by Sewer User Charges	$8,315,854	$8,034,800	$10,135,574	$10,901,830	$11,910,627	$13,202,566	$14,295,363	$15,240,166	$16,376,920	$17,584,087	$18,675,464	$19,786,988	$20,646,570	$21,765,673	$22,992,669	$22,985,892	$22,874,825	$22,781,645	$22,905,883	$23,024,568
Billable volume (CCF) per RWA	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262	7,447,262
City Taxes paid to Service Debt for past & new CSO	$1,896,751	$2,577,439	$3,258,127	$3,938,816	$4,619,504	$5,300,192	$5,980,880	$6,570,342	$7,159,804	$7,757,873	$8,438,561	$8,981,549	$9,524,538	$10,067,526	$10,748,214	$10,748,214	$10,696,577	$10,558,877	$10,421,177	$10,348,024
Estimated Rate per CCF for New Haven Customers	$1.01	$0.86	$0.93	$0.92	$0.94															
Calculated Rate per CCF for New Haven Customers	$1.12	$1.08	$1.36	$1.46	$1.60	$1.77	$1.92	$2.05	$2.20	$2.36	$2.51	$2.66	$2.77	$2.92	$3.09	$3.09	$3.07	$3.06	$3.08	$3.09
City Taxes paid by each customer to service debt on CSO	$55.98	$76.06	$96.15	$116.24	$136.33	$156.41	$176.50	$193.90	$211.29	$228.94	$249.03	$265.06	$281.08	$297.10	$317.19	$317.19	$315.67	$311.60	$307.54	$305.38
Average annual billing to New Haven Customers (excluding property taxes paid for CSO work)	**$135.12**	**$131.49**	**$158.57**	**$168.45**	**$181.46**	**$198.11**	**$212.20**	**$224.38**	**$239.03**	**$254.59**	**$268.66**	**$282.99**	**$294.07**	**$308.49**	**$324.31**	**$324.22**	**$322.79**	**$321.59**	**$323.19**	**$324.72**
Average annual billing to New Haven Customers (including property taxes paid for CSO work)	**$191.09**	**$207.56**	**$254.72**	**$284.69**	**$317.78**	**$354.52**	**$388.70**	**$418.27**	**$450.32**	**$483.53**	**$517.69**	**$548.04**	**$575.15**	**$605.60**	**$641.50**	**$641.41**	**$638.46**	**$633.19**	**$630.73**	**$630.10**
Annual Wastewater Charge as % of Median Household Income	0.523%	0.509%	0.614%	0.653%	0.703%	0.768%	0.822%	0.869%	0.926%	0.986%	1.041%	1.096%	1.139%	1.195%	1.256%	1.256%	1.251%	1.246%	1.252%	1.258%
Including taxes paid for wastewater service	0.740%	0.804%	0.987%	1.103%	1.231%	1.374%	1.506%	1.621%	1.745%	1.873%	2.006%	2.123%	2.228%	2.346%	2.485%	2.485%	2.474%	2.453%	2.444%	2.441%

Source of Inputs: Cost of Service Study dated March 31, 2000

blue text = direct inputs

black text = spreadsheet calculations

gray text = inputs from different worksheet within this workbook

green text = extrapolated from prior direct inputs

Average Annual Billing to New Haven Customers

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Mean
1 Charges	$135.12	$131.49	$158.57	$168.45	$181.46	$198.11	$212.20	$224.38	$239.03	$254.59	$268.66	$282.99	$294.07	$308.49	$324.31	$324.22	$322.79	$321.59	$323.19	$324.72	$249.92
1 Tax	$55.98	$76.06	$96.15	$116.24	$136.33	$156.41	$176.50	$193.90	$211.29	$228.94	$249.03	$265.06	$281.08	$297.10	$317.19	$317.19	$315.67	$311.60	$307.54	$305.38	$220.73

Annual Wastewater Charge of Alternatives as % of Median Household Income

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Mean
New Haven CSO Control Plan	0.740%	0.804%	0.987%	1.103%	1.231%	1.374%	1.506%	1.621%	1.745%	1.873%	2.006%	2.123%	2.228%	2.346%	2.485%	2.485%	2.474%	2.453%	2.444%	2.441%	1.823%

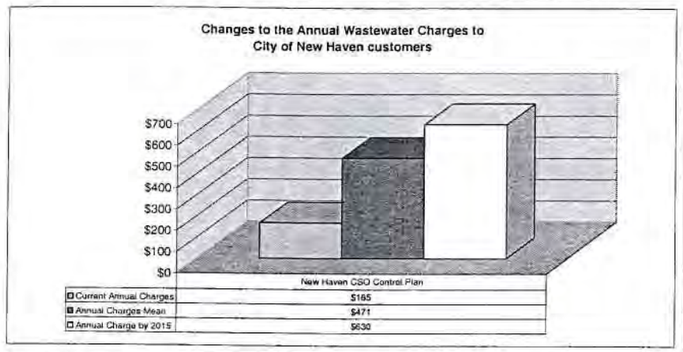
Total Annual Costs to WPCA for CSO Alternatives

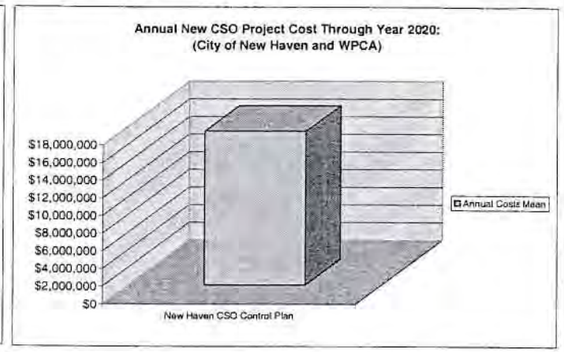
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Mean
New Haven CSO Control Plan	$1,021,032	$2,042,065	$3,860,097	$4,881,130	$5,902,162	$6,937,194	$7,965,227	$8,986,259	$10,007,292	$11,096,324	$12,137,356	$13,158,389	$14,184,421	$15,205,454	$16,350,486	$16,350,486	$16,350,486	$16,350,486	$16,350,486	$16,350,485	$10,774,366

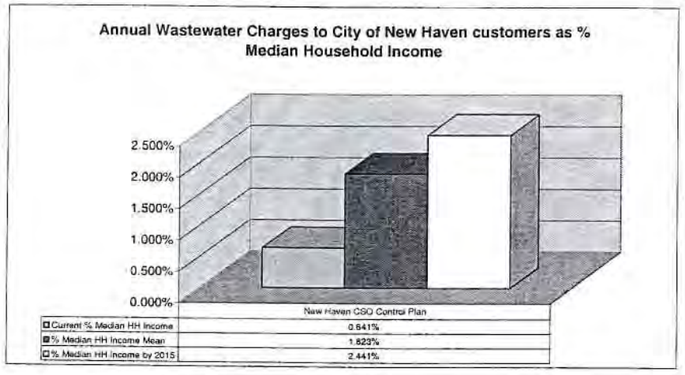
Total Annual Costs to City for CSO Alternatives

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Mean
New Haven CSO Control Plan	$680,688	$1,361,377	$2,042,065	$2,722,753	$3,403,441	$4,084,130	$4,764,818	$5,445,506	$6,126,194	$6,806,883	$7,487,571	$8,168,259	$8,848,947	$9,529,636	$10,210,324	$10,210,324	$10,210,324	$10,210,324	$10,210,324	$10,210,324	$6,636,711

	Annual Costs Mean	Annual Cost by Year 2020	Current Annual Charges	Annual Charges Mean	Annual Charge by 2015	Current % Median HH Income	% Median HH Income Mean	% Median HH Income by 2015
New Haven CSO Control Plan	$17,411,077	$26,560,810	$165	$471	$630	0.641%	1.823%	2.441%







State Grant coverage c

1	0%
2	10%
3	25%

Engineering and Conti

1	0%
2	10%