City of Youngstown, Ohio

Combined Sewer Overflow Long Term Control Plan

Technical Report
Final CSO Control Alternatives

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City of Youngstown
Combined Sewer Overflow Long Term Control Plan
Technical Report
(Final CSO Control Alternatives)

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Exhibit 2 Attendance LTCP Meeting Convened 8/30/11
Exhibit 3 Letter Dated 12/8/11Submitting “Draft” of Technical Report to EPA
Exhibit 4 Letter Dated 4/11/12 from USEPA Commenting on Technical Report
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CHAPTER 1
Executive Summary

1.1 Introduction

The EPA Combined Sewer Overflow Policy (CSO Policy) for combined sewer systems (CSS) is an unfunded mandate that imparts a large degree of flexibility upon the regulated entity. Each municipality is to complete a variety of steps based on the complexity of its CSS. Based on the CSO Policy municipalities operating public wastewater treatment plants must develop a Long Term Control Plan (LTCP) to control combined sewer overflows (CSOs) to abate pollution from their CSS. The financial burden of the costly capital improvements is borne by the municipalities through its users of the system in the form of increased sewer rates.

In order to satisfy the CSO Policy, in 1997 the City of Youngstown (City) initiated their LTCP to reduce the impacts of CSOs in their CSS. In January of 2003 the City developed and submitted the "Financial Assessment and Implementation Schedule Report". This was the final document required by Ohio EPA, which completed the City's LTCP requirements.

1.2 City's Existing LTCP

The City developed a LTCP tailored to the City's CSS to reduce the impact of CSOs on the environment. The comprehensive planning approach consisted of three major steps: characterization of the system, development and evaluation of control alternatives, and selection and implementation of the controls.

Consistent with the CSO Policy the City developed and evaluated an array of CSO control alternatives for their CSS. The alternative ultimately selected and adopted by the City provided for expanding the wet weather capacity of the WWTP from 80 MGD to 157 MGD and captures for treatment the 5 most voluminous CSOs. This alternative captures for treatment 86% of wet weather flow annually. The CSO Policy requirement is a minimum 85% capture. The intent of the City's adopted alternative was to meet the conditions of the CSO Policy's presumptive approach and to provide cost-effective measures that improve the efficiency of the CSS. The City's adopted alternative would improve the percent capture from the current 68.5% to 86%. The cost for this alternative was estimated at $100 million in 2002 dollars. This alternative was reported to Ohio EPA in the "Evaluation of the CSO Control Alternatives" dated June 2002.

The City examined the financial and logistical impacts of implementing the adopted CSO control alternative and predicated on the time needed for financing the design, construction and operation of the improvements plus management of the financial burden to the residential users, the City proposed the following schedule to implement and monitor the short term nine minimum controls (NMC) improvements and the adopted long term CSO control alternative.

- Milestone 1: Upgrade the WWTP. Completed in Year 10.
- Milestone 2: Capture for treatment/storage CSO's 6002, 6003, 6004. Completed in Year 16.
- Milestone 3: Relocate CSO's 6015 and 6016 to CSO 6017. Completed in Year 20.
- Milestone 4: Capture for treatment/storage CSO 6017. Completed in Year 24.

- Milestone 5: Capture for treatment/storage CSO 6043. Completed in Year 28.
- Milestone 6: Post Construction Monitoring. Completed in Year 30.

The 30-year implementation schedule was presented in the "Financial Assessment and Implementation Schedule Report" submitted to Ohio EPA in January of 2003 that finalized the City's LTCP requirements.

The LTCP submitted by the City has not been approved by the EPA to date. In general, it was EPA's position that the City could afford to eliminate the CSOs to the waters of Mill Creek then control all other CSOs in the CSS to 4 to 6 overflows annually. This option would increase the percent capture in the CSS to 93 %. The CSO improvements lifecycle cost was estimated in excess of $324 million and were to be completed in approximately 15 years.

1.3 LTCP Meetings and Correspondence

On April 12, 2011 the City received correspondence from U.S. EPA requesting the City meet with U.S. and Ohio EPA to discuss a list of proposed CSO control measures that would be financially achievable and ultimately result in an approved LTCP. The U.S. EPA also indicated that they would no longer pursue the position that the City could afford $324 million of CSS improvements. This was predicated on U.S. EPA's Financial Contractor's determination that the $324 million of improvements to the City's CSS would place "High Burden" on the City's households served by the system. Refer to USEPA correspondence dated April 12, 2011 as Exhibit 1.

The meeting was convened at the North East District Office of Ohio EPA on August 30, 2011 to discuss and clarify the USEPA proposals. U.S. EPA was represented by Reginald Pallesen, Regional Council; Newton Allen, Environmental Engineer; and Mark Klingenstein, SAIC Consultants. Ohio EPA was represented by John Kwolek, Section Chief. The City was represented by Anthony Farris, Law Director; Dan Pribich, Assn't Law Director; Charles Shasho, Deputy Director of Public Works; Thomas Mirante, Superintendent WWTP; Dan Markowitz, Arcadis Consultants; John Pierko, Jeremy Gaston and Joe Catullo of ms consultants. Refer to meeting attendance record as Exhibit 2.

The meeting was initiated by U.S. EPA supporting a LTCP having a two phased project approach. After some discussion it was determined that the first phase improvements would include the expansion of the City's wet weather treatment capacity and the elimination of CSOs to the waters of Mill Creek. Under the second phase, projects to consider were storage facilities at CSOs 6015, 6017, 6043 and 6057, and green infrastructure projects. An implementation schedule is to be provided for the projects in the first phase. An implementation schedule for phase two projects would not be required at this time. By the conclusion of the meeting the following initiatives were resolved.

- The City is to prepare a "Technical Report" containing a two phase approach. Phase 1 projects will include project costs and implementation schedules. Phase 2 projects must also be a part of the report with estimated project costs. An implementation schedule for phase 2 projects would not be required.

- The "Technical Report" together with all prior submitted documents will complete the City's requirements for an approvable LTCP in compliance with the CSO Policy. The approval of this "Technical Report" by Ohio EPA and U.S. EPA with concurrence by the City of Youngstown will constitute the City of Youngstown's official LTCP and satisfy the conditions of the consent order.

1.4 Initial "Technical Report" Submittal

On December 8, 2011 the City submitted a "Technical Report" presenting phase 1 projects with estimated project costs and a schedule implementation of said projects. The report also included phase 2 projects with associated estimated project costs. Refer to the City's submittal letter dated December 8, 2011 as Exhibit 3.

On April 11, 2012 the City received review comments from USEPA regarding the "Technical Report". According to the comment letter USEPA indicated the report contained a number of "deficiencies and omissions" and required the City to make the revisions to the report. Refer to USEPA correspondence dated April 11, 2012 as Exhibit 4.

On May 15, 2012 an audio conference was called to discuss the USEPA comment letter. The participants were Reginald Pallesen, Regional Council USEPA; Mark Klingenstein, SAIC Consultants; John Kwolek, Section Chief Ohio EPA; Anthony Farris, City Law Director; Charles Shasho, Deputy Director of Public Works, City; Thomas Mirante, Superintendent WWTP, City; and John Pierko, Jeremy Gaston and Joe Catullo of ms consultants. The issues in the UEPA comment letter were discussed and addressed. The discussions were formulized in a letter from the City to USEPA. Refer to the City's correspondence dated July 3, 2012 as Exhibit 5.

On September 11, 2012 the City received a counter reply from EPA regarding the City's July 3rd letter. Refer to USEPA correspondence dated September 11, 2012 as Exhibit 6.

From September of 2012 through May of 2013 several conference meeting were held to address USEPA's comments concerning the technical report submitted in December of 2011. The culmination of the meetings resulted with the City's submittal of an approvable final draft report dated May of 2013 for review and approval by the EPA. The submittal of the May 2013 technical report is a matter of record.

For the period from June 2013 through September 2014, issues regarding the May 2013 report generated a series of meetings and discussions between the EPA and the city of Youngstown that finally resulted in changes to the May 2013 report that was acceptable to the EPA and the city of Youngstown. Accordingly, the city of Youngstown authorized the preparation of the final long term control plan technical report.

1.5 Final Long Term Control Plan Technical Report

The City of Youngstown's technical report document is presented to Ohio EPA and USEPA for confirmation as the City's final long term control plan. The document shall be titled "The City of Youngstown Combined Sewer Overflow Long Term Control Plan, Technical Report, and Final Combined Sewer Overflow Alternatives dated December 3, 2014.

The final long term control plan technical report is presented in two phases:

Phase 1 Projects:

- Upgrade the existing wastewater treatment to a capacity to 80 MGD.
- Construct a new 100 MGD wet weather treatment facility.
- Provide for a direct conduit from CSO 6057 to the wastewater treatment facilities with a peak capacity of 100 MGD.
- Provide for the elimination of CSOs to the waters of Mill Creek by upgrading a portion of the Mill Creek CSS and centralize the flow to CSO 6004.

Phase 2 Projects:

- Provide storage for CSOs 6015, 6016 and 6017 at CSO 6017
- Provide storage at CSO 6043
- Investigate green infrastructure projects

The City of Youngstown Combined Sewer Overflow Long Term Control Plan, Technical Report, and Final Combined Sewer Overflow Alternatives dated December 3, 2014, fulfills the conditions of the current consent decree between the City and EPA, and satisfies the provisions of the Combined Sewer Overflow Policy. And, where it differs, supersedes the City's prior combined sewer overflow submissions, including the June 2002 Evaluations of CSO Alternatives, the January 2003 Financial Assessment and Implementation Schedule Report, and the December 2011 and May 2013 Technical Report submission.

1.6 Report Content

Chapter 1: Executive Summary

Chapter 2: Existing Baseline Conditions

Chapter 3: Proposed Wet Weather Treatment Facilities Including Plant Modifications and Estimated Construction and Project Costs.

Chapter 4: Elimination of CSOs to the Waters of Mill Creek, Including Preliminary Pipe Sizes and Preliminary Alignment, and Estimated Construction and Project Costs.

Chapter 5: Implementation Schedule

Chapter 6: Provide Storage at CSO 6017 for CSOs 6015, 6016 and 6017, Including Estimated Construction and Project Costs.
Provide Storage at CSO 6043, Including Estimated Construction and Project Costs.

Chapter 7: Green Infrastructures Projects

Chapter 8: Completed System Improvement Projects

CHAPTER 2
Existing Baseline Conditions

2.1 Introduction

The City of Youngstown completed the characterization of their combined sewer system (CSS) in June of 2000 with the submittal of the Combined Sewer System Characterization Report. Characterization of the CSS was accomplished to satisfy a condition of the City's National Pollutant Discharge Elimination System (NPDES) Permit. The report outlined the estimated values, on an average annual basis, of the volume, frequency, duration and pollutant loading from each of the combined sewer overflows (CSOs) in the existing CSS. The annual values were a response to various precipitation events utilizing XP-SWMM computer simulation.

The methodology used for predicting the average annual values was to select a representative number of historical precipitation events for the region and perform continuous simulation for a selected period of time. The regional rain gage, located at the Youngstown Regional Airport provided fifty years (1948-1979) of hourly rainfall data through the National Climatic Data Center (NCDC). The raw rain data was processed through the Statistics Block of XP-SWMM to perform a storm event analysis, which provided storm volume, peak intensity, average-intensity, duration, and start time for each storm event. The statistical process also determined that 1981-1985 is the period of five consecutive years that is most representative of the period of record. Accordingly, this 5-period of rainfall events was selected for computer simulation.

2.2 Simulation Results

The calibrated portions of the model were assembled until the entire collection system was contained in a single file. The size of the SWMM network required the simulation process to be performed on an individual basis for the five consecutive years. It was necessary to simulate each year individually due to size constraints of post- processing computer applications.

The data output from the simulation focused on the frequency, volume, duration and pollutant loading from each overflow. The simulation results for period 1981 through period 1985 were performed for all the CSOs in the City's CSS. The simulated average baseline values for all CSOs are outlined in the characteristic report dated June 2000.

2.3 CSOs of Interest

For the purpose of this report the simulated average baseline values for the CSOs of interest are shown in Tables 2-1, 2-2, 2-3 and 2-4. Tables 2-1 and 2-2 identify the CSOs influenced in the Phase 1 project improvements. Tables 2-3 and 2-4 show the CSOs influenced by the Phase 2 project improvements. The column labeled "Frequency" presents the annual average occurrences of overflows. The columns labeled "Volume" and "Duration" is the average values calculated for each overflow for the five-year simulation period. The pollutant loading calculations are located in the "Loading" columns and estimate the annual average discharge from each overflow based on the average of the five-year simulation output parameters. Refer to Figures 2.1, 2.2, and 2.3 for the location of the CSOs of interest.

PHASE 1 CSO BASELINE VALUES

Table 2-1: Annual Average CSO Values to Mill Creek								
EPA Number	Name	Location	Receiving Stream	Frequency (No.)	Volume (Mgal)	Duration (Hrs)	$CBOD_5$ Loading (Lbs)	TSS Loading (Lbs)
6005	RC #18	Intersection of Price & Halls Heights.	Mill Creek	9.4	10.63	56.4	926	9031
6006	RC #15	Park Drive 300' Ft. South of Slippery Road	Mill Creek	10.4	11.05	44.3	865	9328
6007	O.F. #11	Volney Road 250 Ft. North of Genessee Drive	Mill Creek	0.6	0.15	1.8	10	125
6008	RC #9	Park Drive 200 Ft. North of Parkside Ave.	Mill Creek	9.0	5.02	46.2	470	4294
6009	RC #7	Park Drive Near Idora Park Dance Hall	Mill Creek	12.2	2.90	39.7	197	2432
6011	RC #8	Park Drive Near Kiawatha Drive at Foot Bridge	Mill Creek	5.2	3.42	19.6	250	2881
6012	O.F. #6	Kiawatha Drive & Glenwood Ave.	Mill Creek	0.0	0.00	0.0	0	0
6013	O.F. #5	Anoka Drive & Glenwood Ave.	Mill Creek	0.2	0.01	0.2	0	2
6014	RC #4	Ferndale & Glenwood	Mill Creek	10.6	20.88	69.5	2422	18225
6056	O.F.M.H.	Genessee @ Park Drive	Mill Creek	0.6	0.02	1.0	2	22
6067	O.F.M.H.	Overflow Chamber @ Glenmere	Mill Creek	10.0	2.06	57.4	177	1756
6068	O.F.M.H	Overflow @Bellevista & Calvary Run	Calvary Run	1.0	0.98	1.6	66	825
6069	O.F.M.H	Dunlap Ave. & Junction Street	Bears Den	0.0	0.00	0.0	0	0
6073	O.F.M.H.	Overflow Manhole @ Rogers Near Lanterman Rd.	Mill Creek	1.0	0.06	2.0	4	51
6074	O.F.M.H.	Overflow Manhole @ Brentwood Near Volney Rd.	Mill Creek	0.0	0.00	0.0	0	0
6093	O.F.M.H.	Overflow in Front Of 432 Wilkenson	Mill Creek	0.0	0.00	0.0	0	0
6096	O.F.M.H.	Hartford Ave. & Walden Court	Calvary Run	1.0	0.08	1.4	5	64
6104	O.F.M.H.	Intersection of Glenwood & Cohasset	Mill Creek	2.0	0.85	4.6	53	701
			TOTAL	73.2	58.11	345.7	5447	49737

Table 2-2: Annual Average CSO Values to the Mahoning River								
EPA Number	StructureNumber	Location	Receiving Stream	Frequency (No.)	Volume (Mgal)	Duration (Hrs)	$CBOD_5$ Loading (Lbs)	TSS Loading (Lbs)
6057	RC #104	@ Weatherbee Coat Co. Along Wall	Mahoning River	54.8	357.54	402.9	74360	334888
			TOTAL	54.8	357.54	402.9	74360	334888

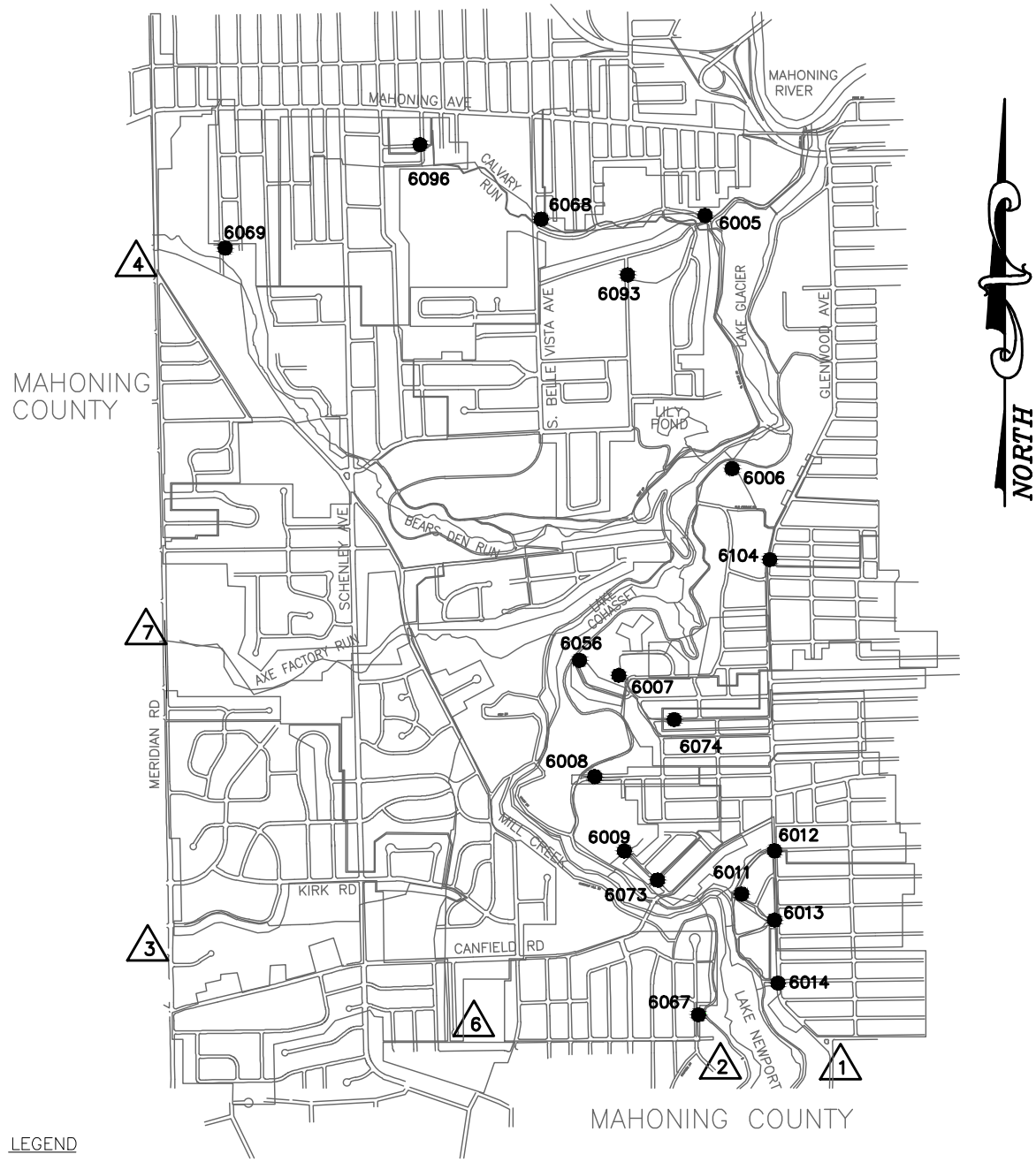
PHASE 2 CSO BASELINE VALUES

Table 2-3: Annual Average CSO Values to Jones Creek								
EPA Number	Structure Number	Location	Receiving Stream	Frequency (No.)	Volume (Mgal)	Duration (Hrs)	$CBOD_5$ Loading (Lbs)	TSS Loading (Lbs)
6015	O.F. #1	Hylda Street @ Yo. & So. Rr. Tracks	Jones Creek	50.0	77.40	246.8	6633	65529
6016	RC #2	Indianola Ave. @ Yo. & So. Rr Tracks	Jones Creek	18.4	0.60	43.8	40	511
6017	RC #3	Yo. & So. Rr Tracks @ South Side Park	Jones Creek	69.8	167.10	589.7	17593	144472
			TOTAL	138.2	245.10	880.3	24266	210512

Table 2-4: Annual Average CSO Values to the Mahoning River								
EPA Number	Structure Number	Location	Receiving Stream	Frequency (No.)	Volume (Mgal)	Duration (Hrs)	$CBOD_5$ Loading (Lbs)	TSS Loading (Lbs)
6043	OF #103	In Scholl Choffins Yard by Pump Station	Mahoning River	48.2	74.20	149.2	5529	62584
			TOTAL	48.2	74.20	149.2	5529	62584

2.4 Summary

Continuous simulation enables a wide range of storms with varying characteristics to be included in the assessment of how the CSS responds to precipitation events. This chapter illustrates the results at each overflow from the 5-year continuous simulation model. The model was hydraulically calibrated and verified using extensive flow meter and rain gauge data. The pollutant values for TSS and $CBOD_5$ for urban runoff were obtained from the NURP dataset. These simulated baseline conditions will be compared to the simulated values resulting from the improvements proposed in this report.



LEGEND

6006 OVERFLOW STRUCTURE (PERMIT #)

COMBINED SEWER

DRAINAGE AREA BOUNDARY

3 METER CHAMBER

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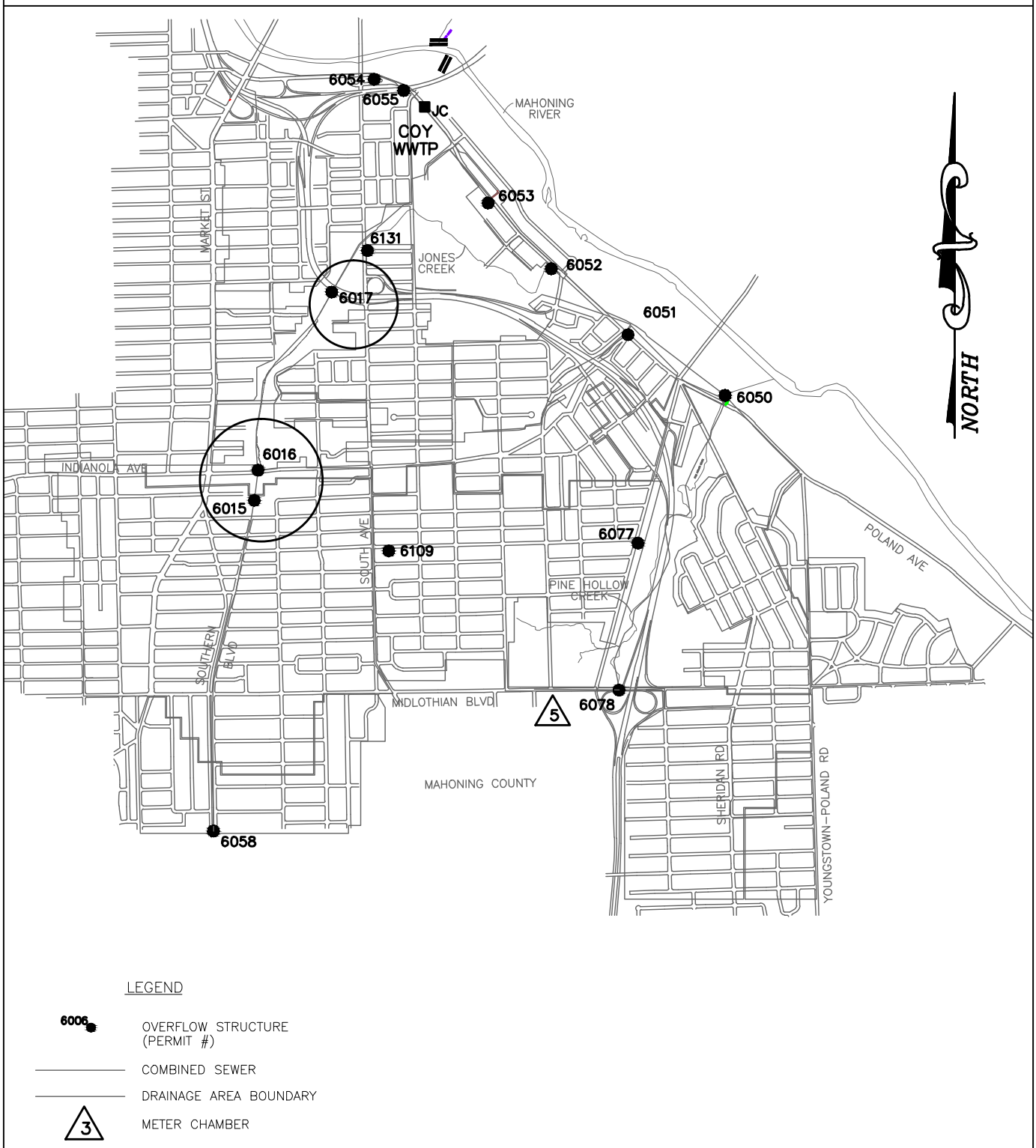
FIGURE 2.1

MILL CREEK DRAINAGE AREA



LEGEND

6006 OVERFLOW STRUCTURE (PERMIT #)

COMBINED SEWER

DRAINAGE AREA BOUNDARY

3 METER CHAMBER

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FIGURE 2.2

POLAND AVENUE DRAINAGE AREA

YOUNGSTOWN CSO

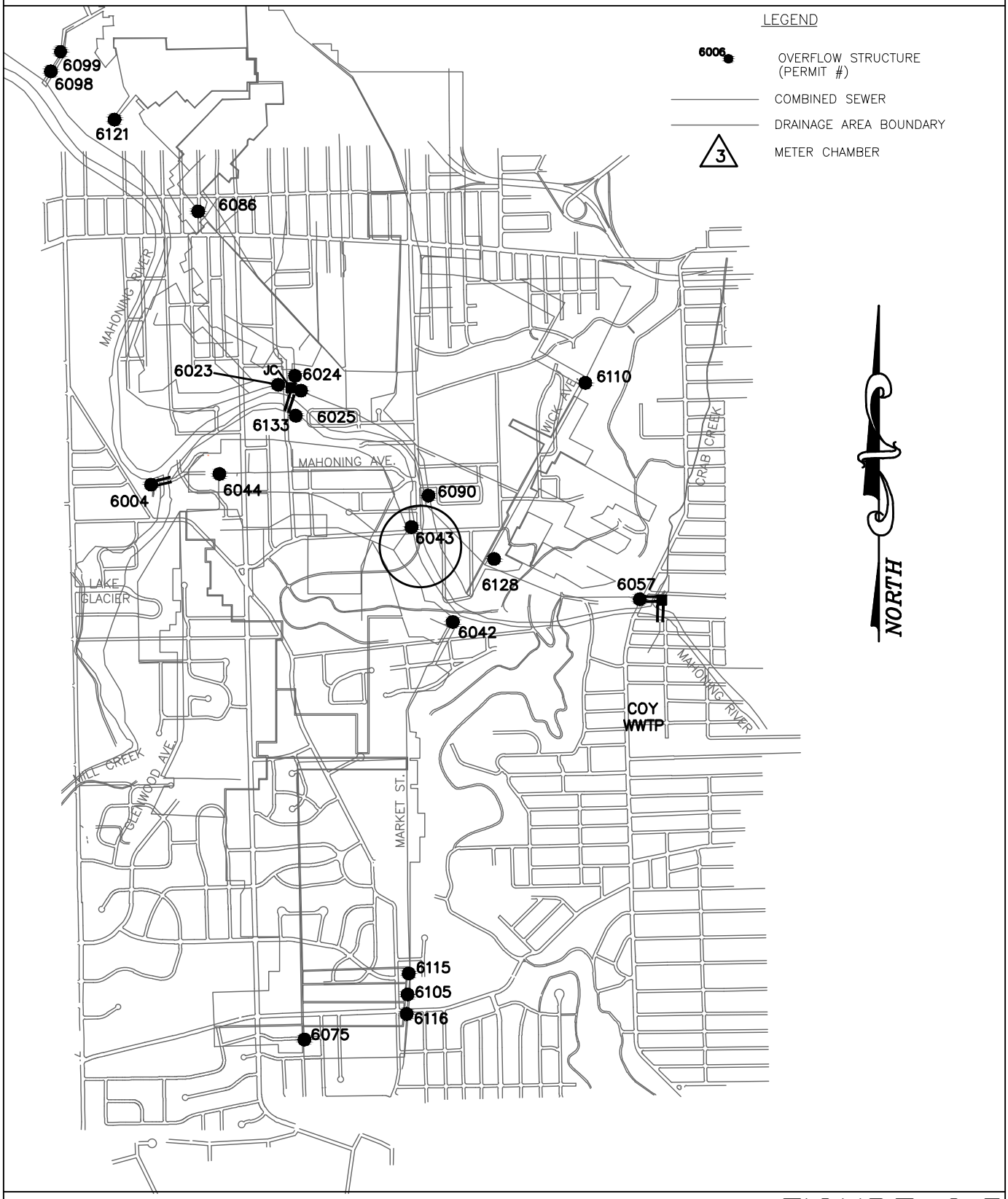

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FIGURE 2.3

MAHONING RIVER DRAINAGE AREA

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CHAPTER 3
Expand and Upgrade Wastewater Treatment Facilities

3.1 Introduction

The existing Youngstown wastewater treatment plant is located along the Mahoning River at river mile 19.4. The plant is approximately two miles southeast of the Youngstown central business district bounded by Gibson Street, Alpine Street and Poland Avenue with a service area of approximately 35,000 acres. The primary plant went into operation in 1965 and was upgraded to a secondary facility in the late 1980's. The wastewater treatment plant has an average daily flow of 35 MGD and treats a peak capacity of approximately 80 MGD. Figure 3.1 diagrams flow through the existing facility.

As part of the LTCP, the City will expand the wastewater treatment plant to 180 MGD to treat additional wet weather flows on-site, and upgrade several existing treatment processes and associated equipment. The expansion will entail construction of a new 100 MGD high-rate treatment facility to treat additional wet weather flows coming into the plant. The 100 MGD high-rate treatment capacity includes the overflows to be captured from the existing CSO 6057 outfall. CSO 6057 is located at the confluence of Crab Creek and the Mahoning River and is the most voluminous CSO in the City's CSS. Currently the CSO activates 55 times on an average annual basis with an average per annum volume of 357.5 million gallons. With the upgrading the existing WWTP and the completion 100 MGD wet weather facility a significant decrease in overflow discharge from this CSO will result.

The expansion and upgrade of the wastewater treatment facilities are explained in more detail below.

3.2 High-Rate Treatment Facility

A high-rate treatment facility will be provided to treat wet weather flows in excess of 80 MGD. As shown in the aerial plan view on Figure 3.2, the new wet weather high-rate treatment site will include an influent junction chamber, standby generator, raw sewage pump station with coarse bar screens, fine screening and grit, ballasted flocculation, flow metering, high-rate disinfection, cascade aeration and dechlorination. An overall process flow schematic through the entire high-rate treatment facility is shown on Figure 3.3. These facilities are described further below.

3.2.1 Influent Junction Chamber (Part 1)

The new influent junction chamber will combine all existing plant influent flows (via an 84" pipe) as well as previous overflow volume from CSO 6057 (via a 96" pipe) into a single flow control structure. Solids and recycle flows from the high-rate treatment facility may also be returned to the influent junction chamber. All flows entering the junction chamber will be directed to the new raw sewage pump station.

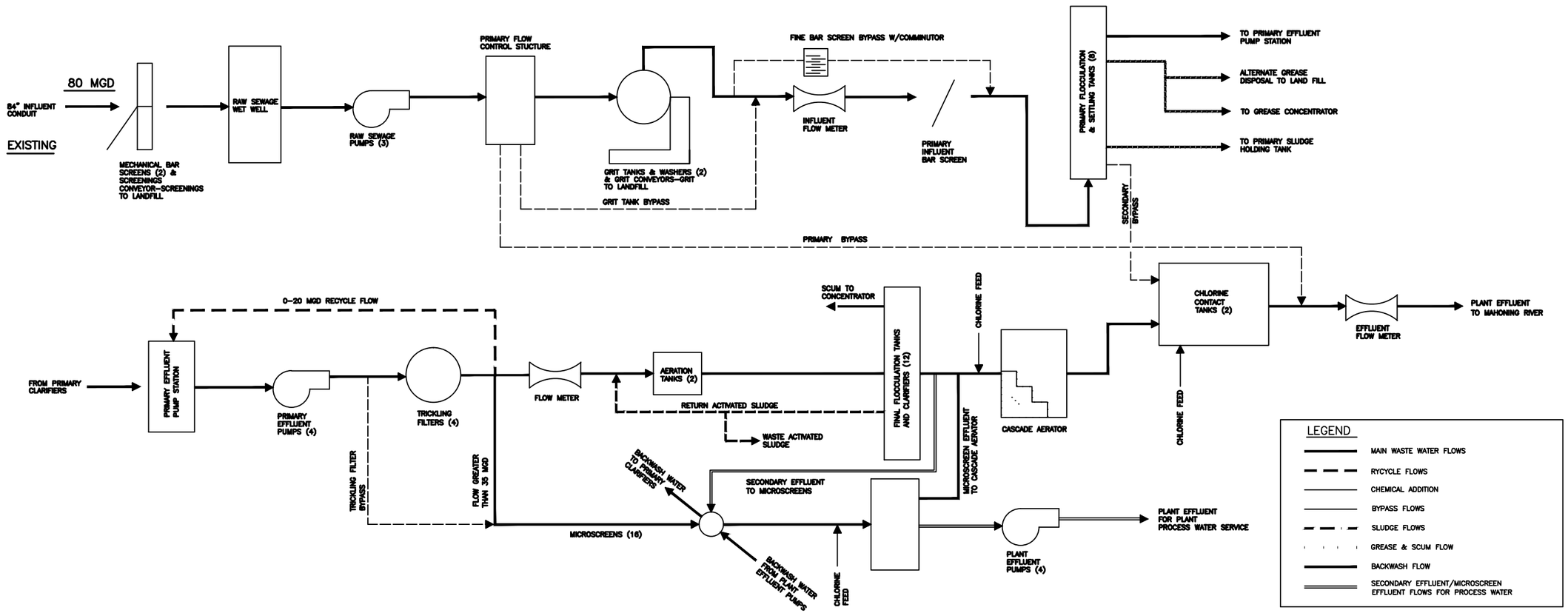

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FIGURE 3.1
FLOW DIAGRAM
EXISTING PLANT

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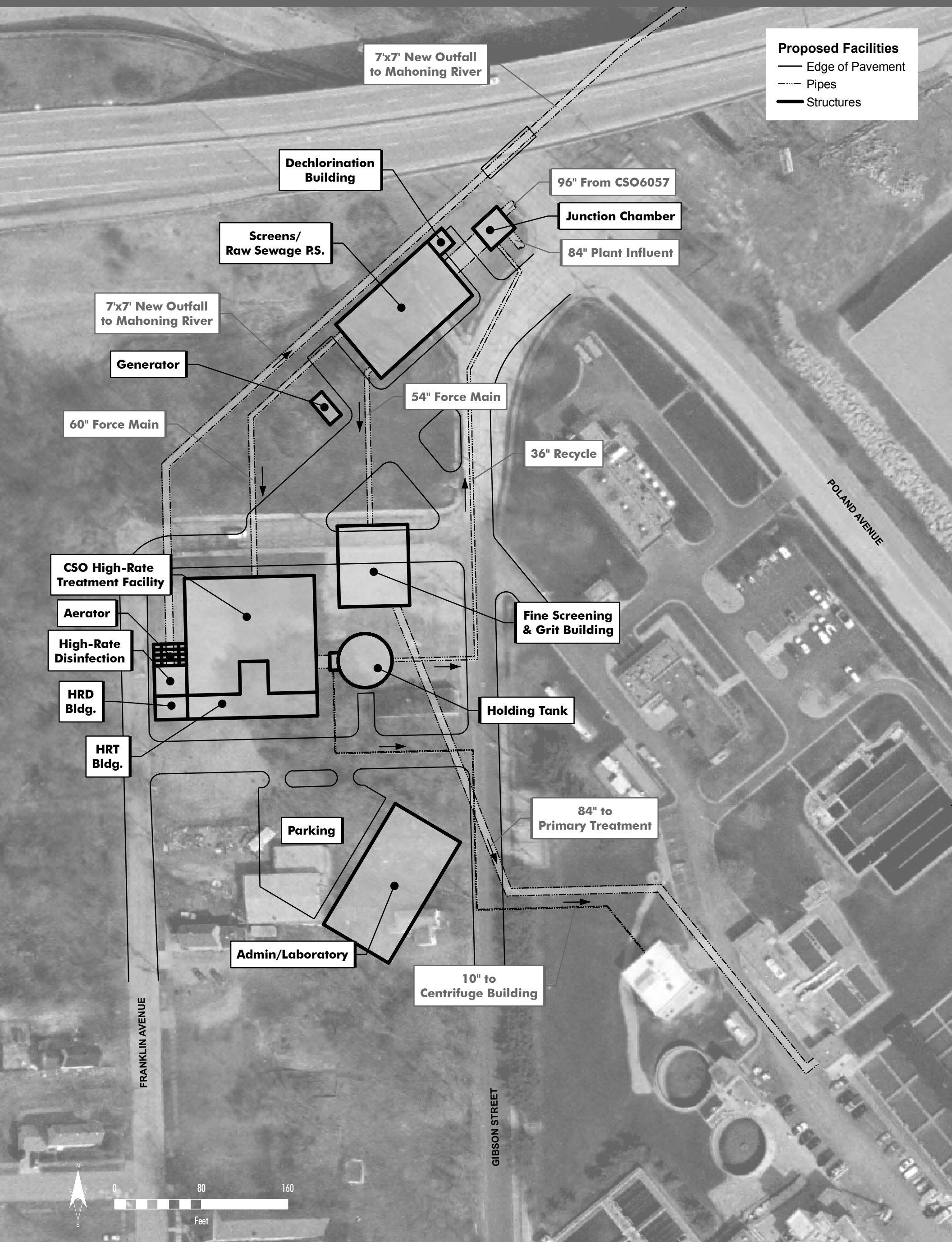
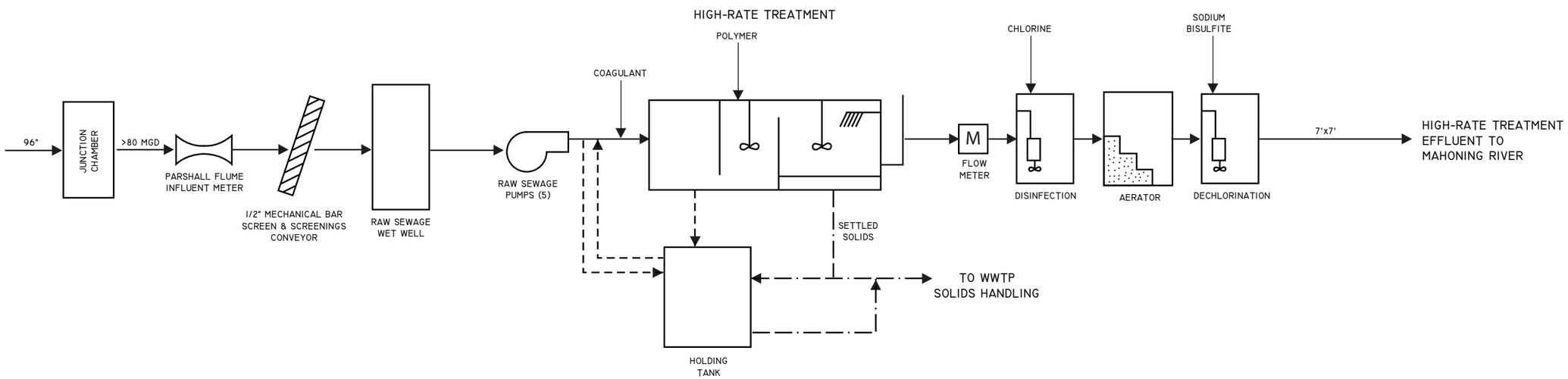


Figure 3.2
Proposed CSO High-Rate Treatment Facilities



LEGEND

- MAIN WASTE WATER FLOWS
- RECYCLE FLOWS
- CHEMICAL ADDITION

Figure 3.3
High-Rate Treatment Facility Process Flow Schematic, Flows >80 MGD

3.2.2 Raw Sewage Pump Station (Part 1)

The new raw sewage pump station will have a firm pumping capacity of 180 MGD comprising inverter duty rated dry pit submersible pumps with two separate wet wells to isolate WWTP flows from the high-rate treatment facility flows. All flow entering the pump station will first be measured with parshall flumes and screened with ½-inch mechanically cleaned (front raked, front return) bar screens. Flows up to 80 MGD will be directed to the WWTP dedicated wetwell and pumped to new fine screening and grit removal facilities. Flows in excess of 80 MGD will be directed to a separate wet weather wetwell and pumped to the high-rate treatment facility. The influent parshall flumes will help match pump speed to flow.

A 2,000 kW standby generator will be located adjacent to the Raw Sewage Pump Station providing dedicated back-up power for the entire high-rate treatment site. New switchgear will also be provided as part of the high-rate treatment facility project.

3.2.3 Fine Screening and Grit Building (Part 1)

Influent flows up to 80 MGD will be pumped to the new Fine Screening and Grit Building for preliminary treatment. Fine screening will consist of three band screens with ¼-inch spacing. Fine screenings will be washed and compacted before conveyed to the collections drop-off area. Screened flow will then pass through a vortex grit removal and concentrator system and subsequently flow by gravity to the existing WWTP primary settling tanks. Concentrated grit will be washed and dewatered before being sent to the collections area. The building will be arranged such that compacted screenings and dewatered grit can be collected together via a common drive-through collections area.

3.2.4 Wet Weather High-Rate Treatment (Part 2)

3.2.4.1 Ballasted Flocculation

All wet weather flows in excess of 80 MGD will be pumped directly to the new high-rate treatment facility utilizing ballasted flocculation and high-rate chemical disinfection. The high rate treatment facility will utilize best available technology approved in Ohio to provide 85% TSS removal and disinfection of wet weather flows prior to discharging to the Mahoning River.

Ballasted flocculation technology is a combination of physical and chemical processes to accomplish enhanced primary settling. This physical-chemical treatment employs coagulant and polymer addition, along with flocculation, to form a floc that has significantly higher settling velocities than conventional wastewater treatment floc. The ballasted flocculation process facilitates significantly higher surface overflow rates compared to conventional settling. Following this enhanced solids removal step, the wet weather flow will be metered before proceeding to high-rate disinfection, cascade aeration, and dechlorination.

A holding tank will be provided as part of the ballasted flocculation process for multiple operational uses. This tank can be used to attenuate initial filling of wet weather events, as necessary, until the entire system is fully on-line. The tank may also be used to store solids

produced by the high rate treatment process until the WWTP can adequately handle them. A return pipe will be provided to the new influent junction chamber to recycle process flows or solids from the holding tank.

3.2.4.2 High-Rate Disinfection

During an annual period from May 1 through October 31, disinfection of the ballasted flocculation effluent will be required before discharging to the Mahoning River. The disinfection of wet weather flows can present unique treatment challenges because of their intermittent nature, variable flow rate, wide temperature variation, and inconsistent water quality. Due to the challenges that are associated with CSOs, high-rate disinfection treatment processes have been developed.

Conventional disinfection kill is governed by the relationship of disinfectant concentration multiplied by contact time (C x T), where high-rate disinfection kill includes a measure of mixing intensity (G) expressed as time^{-1} (C x G x T). Chlorination serves primarily to destroy or deactivate disease-producing microorganisms. Generally, bacteria are more susceptible to chlorination than viruses. The disinfection effectiveness is largely a function of the chemical form of the disinfecting species. Chlorine is applied to the waste stream in molecular or hypochlorite form.

Chlorination utilizing high-rate mixing (i.e. through the use of vacuum induction mixers) can increase disinfection performance and reduce contact time. This is possible as the high-rate induction mixers immediately subjects microorganisms to molecular chlorine (before potential formation of chloramines) and provides greater disinfectant exposure by virtue of an increased velocity gradient and intensity.

3.2.4.3 Dechlorination

Free chlorine and combined chlorine residuals are toxic to aquatic life at certain concentrations. It is therefore sometime necessary to dechlorinate (i.e. reduce chlorine compounds) the disinfected effluent before it is discharged into a receiving water.

Dechlorination may be accomplished through injection of any suitable reductant, such as a solution of sodium bisulfite or sulfur dioxide into the process flow, following the chlorination process. A potential problem with dechlorination is the possible depletion of dissolved oxygen by excess sulfite ion. Cascade aeration will be provided immediately following high-rate disinfection to raise the dissolved oxygen concentration prior to dechlorination.

The dechlorination process is nearly an instantaneous reaction, subsequently the reductant can be added close to the receiving water discharge point, allowing more contact time for disinfection. Given this, the dechlorination storage and feed building is proposed to be located contiguous with the Raw Sewage Pump Station, downstream of the high-rate treatment facility. Following dechlorination, wet weather flows will be discharged through a new 7 ft. x 7 ft. dedicated outfall to the Mahoning River, as shown on Figure 3.4.

Figure 3.4
High-Rate Treatment Mahoning River Outfall

3.2.5 Administration Building and Laboratory

A new Administration Building and laboratory is proposed for the high-rate treatment site. The building is proposed to be located such that it overlooks the entire WWTP and CSO treatment facility.

The new building is principal as it will serve as the central fiber routing point and location for a modern Supervisory Control and Data Acquisition (SCADA) system. It is anticipated that the high-rate treatment facility will add an additional 2,000 I/O to the existing 5,000 analog and digital signals from the existing WWTP. The new SCADA system and location will facilitate more effective oversight and control for all of Youngstown's wastewater facilities.

This facility will further comprise a much needed modern and expanded laboratory for plant personnel. The current lab is inadequate for the staff to properly run all necessary analytical testing required. Further, the current building does not provide adequate office space for current plant operations and does not have any space to allocate to the operations of the new CSO Treatment facility. The new building will also afford an opportunity for a multi-functional community and training room. The existing Administration Building will be demolished upon completion of the new facility.

3.2.6 Capital Construction Cost Estimate

The total capital construction cost estimate for the 100 MGD high-rate treatment facility as described herein is $62,010,000. This estimate includes capturing flows from CSO 6057 and conveying them to the new influent junction chamber as well a new outfall to the Mahoning River. All predictable contractor expenses, contingency, escalation, and property acquisition costs are also included. An itemized breakdown of the high-rate treatment facility capital cost estimate can be found in Appendix D.

3.3 Waste Water Treatment Plant Upgrade

In addition to the new 100 MGD high-rate treatment facility, improvements to the existing wastewater treatment plant are planned to provide 80 MGD treatment reliability for another 25 years. Besides enhanced long-term reliability, the planned treatment plant improvements will reduce maintenance requirements and risk for the operators.

Figure 3.5 shows an aerial plan view of the proposed improvements for the Youngstown WWTP, and Figure 3.6 depicts a process flow schematic through the upgraded facility. A précis of the planned WWTP improvements follows.

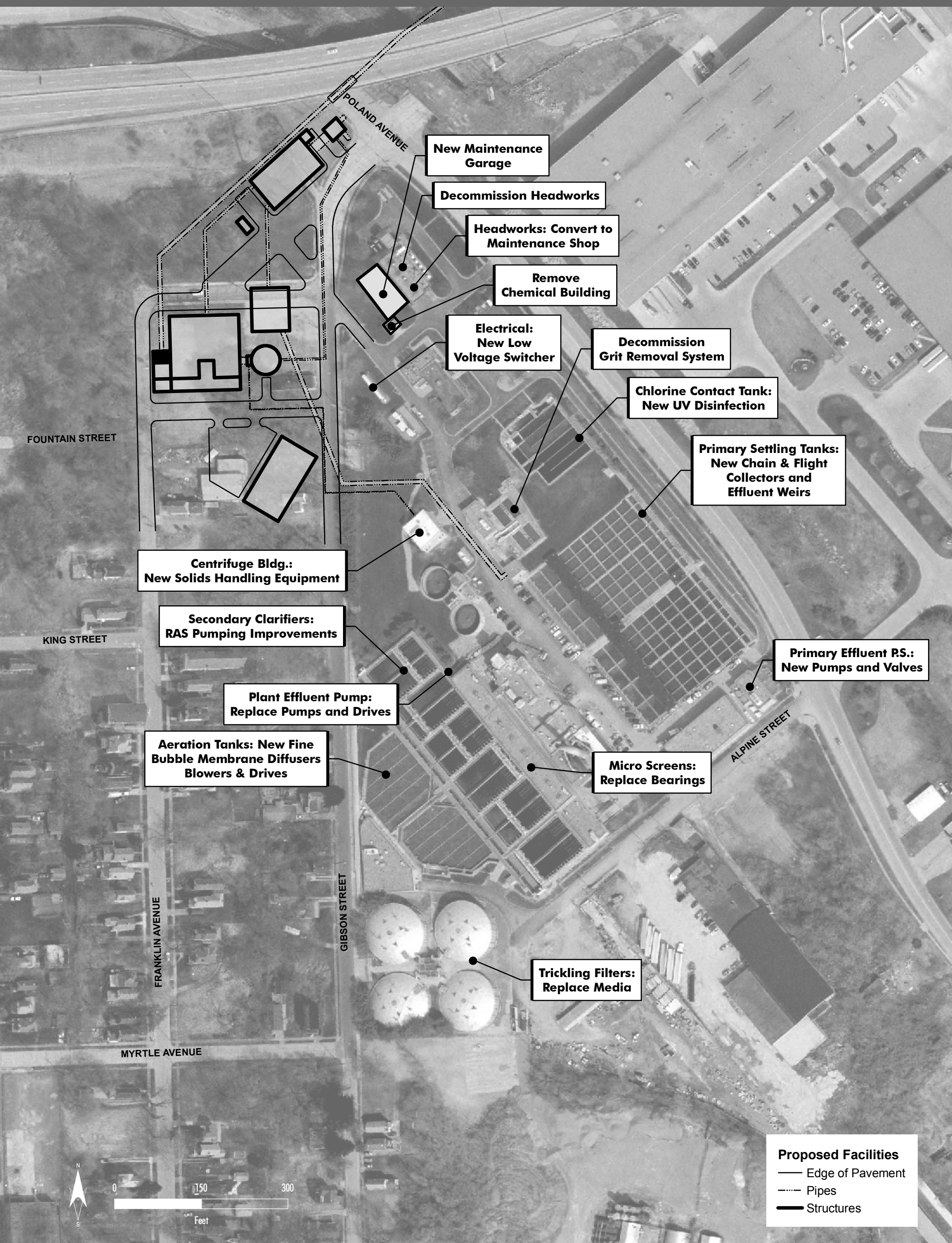


Figure 3.5
WWTP Improvements Overview

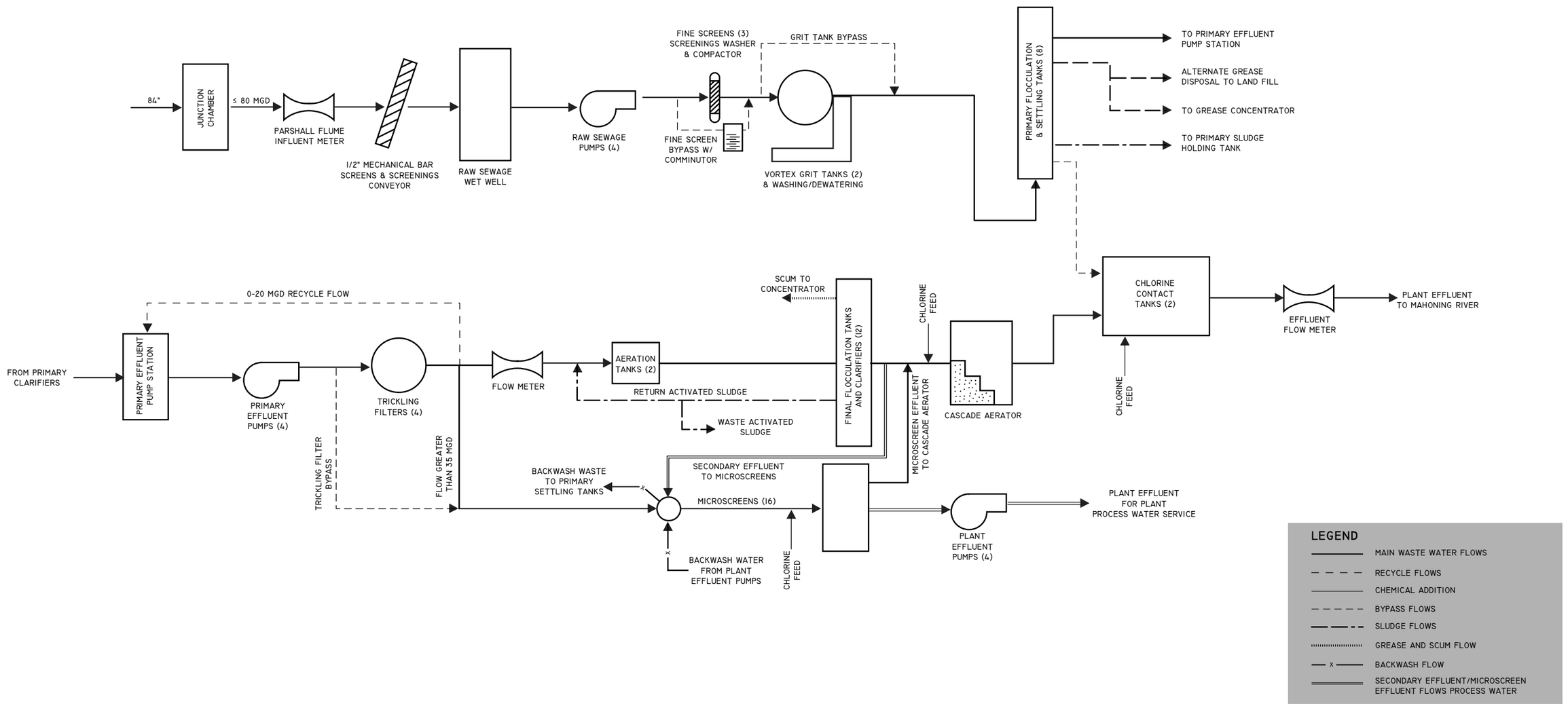


Figure 3.6
WWTP Process Flow Schematic, Flows ≤80 MGD

3.3.1 Preliminary Treatment Improvements

a. Decommission Headworks
The existing screens, raw sewage pumps and associated ancillary devices will be removed and salvaged as appropriate. Various building levels will be filled in and the grade level will be converted to a new maintenance shop.

b. Maintenance Garage
A new maintenance garage will be built contiguous with the new maintenance shop area as part of the Headworks building decommissioning.

c. Demolish Chemical Storage Building
All existing equipment will be removed and the existing structure will be demolished.

d. Decommission Grit Removal/ Screening Facility and Equipment
The existing grit handling and removal equipment will be removed, and the grit tanks will be modified and filled as a reusable green area.

e. Medium Voltage Substation/Switchgear
The medium voltage substation will be decommissioned and new main switchgear provided.

3.3.2 Primary Treatment Improvements

a. Primary Settling Tanks
The existing chain and flight collector mechanisms and effluent weirs will be replaced, along with requisite structural modifications. New sludge pumps, grease/scum pumps and heating improvements are required.

b. Primary Effluent P.S.
The existing pump station will require the replacement of the original pumps systems with dry-pit submersible pumps and new state of the art variable speed drive systems.

3.3.3 Secondary Treatment Improvements

a. Trickling Filters
The stacked media and associated support and underdrain system will be removed and replaced with new. Facility improvements will include painting as well as upgrades to the domes, handrail, sidewalks, stairwells, and grating. Rotary distributor improvements are not anticipated.

b. Aeration Tanks
The existing diffusers will be replaced with new fine bubble membrane diffusers. The drop headers and air distribution piping will also be upgraded to accommodate the new diffuser assemblies. It is also contemplated to install energy efficient blowers on variable speed drives to optimize the process electrical demand.

c. Secondary Clarifiers

The existing return activated sludge pump systems are in need of replacement due to age and operational concerns. It is proposed to install submersible pumps in the bottom of the tank in conjunction with new sludge withdrawal headers to withdraw sludge into the existing sludge trough. It is not anticipated to require much structural repairs, however, as in a majority of plant areas, a significant amount of painting will be required.

d. Microscreen Building

All microscreen bearings will be removed, inspected and replaced with new as deemed appropriate for an additional 25 years service life. Due to their age, the current drive units are also in need of replacement.

e. Plant Effluent Pumps

Each of the plant effluent pumps will be replaced. The new plant effluent pumps will be larger to accommodate the additional high-rate treatment facility requirements and provided with inverter duty motors and variable frequency drives.

f. Disinfection

It is anticipated to convert an existing chlorine contact tank channel to a new low pressure high output UV disinfection system. Remove and decommission existing chlorine gas system and the sulfur dioxide system.

Note: The WWTP is experiencing operational problems with the existing disinfection system. Although there has been no recent violation of disinfection, fecal coliform kill, the system has violated the chlorine residual requirement. According to the monthly operational reports for year 2011 six violations of chlorine residual have been documented. For year 2012 four violations of chlorine residual have occurred. This problem appears to be associated with flow pacing the dosage of chlorine and sulfur dioxide.

Accordingly, as an first step in the planning and design of the wet weather treatment facility a preliminary design report (PDR) solely for the purpose of evaluating the existing disinfection system will be initiated to determine the cause of the malfunction and the recommended interim resolution, pending the removal and replacement of the existing system planned in year seven of the implementation schedule. Should a reliable interim solution to the existing system be identified, implementation could begin in one to two years thus resolving the current condition. If however it is decided, after the evaluation of the existing system is completed, that the system cannot be made reliable, the PDR shall then modify the dates in the implementation schedule to provide a reliable and compliant system by the end of year 5 of the LTCP. The PDR will be submitted to OEPA for review and approval prior to implementation of the recommended measures.

g. Overall WWTP

The entire plant is in need of a repainting and minor structural repairs as well as some process piping modifications/replacement due to age and wear caused by over 20 years of extensive usage.

3.3.4 Solids Handling Improvements

a. Centrifuge Building/Sludge Handling Building

Due to the additional solids generated by the high-rate treatment facility, it is anticipated that an additional sludge holding tank will be required. Also the existing belt thickener and belt filter presses will be removed and replaced with new gravity belt thickeners and filter presses or other appropriate equipment as to handle solids from the WWTP and wet weather high-rate treatment. Building improvements will include painting and structural modifications, while no sludge handling building expansion is anticipated. Solids disposal will remain the same as current.

3.3.5 Capital Construction Cost Estimate

The total capital construction cost estimate for upgrading the existing 80-MGD wastewater treatment plant explicated herein is $37,247,600. Further breakdown of the existing wastewater treatment plant upgrade capital cost estimate can be found in Appendix D.

CHAPTER 4
Elimination of CSO's to Mill Creek

4.1 Introduction

The waters of Mill Creek, within the Park District's boundary, are designated a State Resource Water, Warm Water Habitat and a Primary Contact recreation stream. (OAC 3745-1-25)

According to the State of Ohio CSO Strategy adopted in March of 1995, and the City's current NPDES Permit, CSOs to state resource waters shall be identified and given the highest priority for elimination, relocation or treatment. The Strategy further states that overflow to state resource waters shall be eliminated or relocated whenever physically and economically achievable. If elimination or relocation is not possible, treatment must be provided that will result in attainment of water quality standards and designated uses. This is consistent with the City's NPDES Permit, which gives priority to CSOs located in sensitive areas. The conforming language in the Permit and the Strategy designates Mill Creek and its surroundings as sensitive. The purpose of this chapter is to address the CSOs tributary to Mill Creek in a manner consistent with the NPDES Permit and the Ohio CSO Strategy.

4.2 Current Conditions

A portion of the City's CSS flows through the Mill Creek Metropolitan Park District situated in the southwest portion of the City and within the Mill Creek drainage area. The City of Youngstown transports combined sewage north through the Park District in the Mill Creek Collector Sewers. Currently the collector sewers have 18 overflows that discharge to the waters of Mill Creek. 15 overflow directly to Mill Creek, 2 to Calvary Run and 1 to Bears Den Run, which are both tributary to Mill Creek. CSO 6108, tributary to Bears Den Run was eliminated in 2007 with the completion of the Orchard Meadow Project on West Drive and is not counted in the above overflows. Consistent with the Ohio CSO Strategy regarding state waters, the CSOs within Mill Creek Park were identified. Refer to Figure 4.1.

4.3 Mill Creek CSOs

The CSOs to Mill Creek activate during certain storm events. The frequency, volume, duration and pollutant loadings of overflowing that occurs on an average annual basis, based on 50 years rainfall data (1948-1997) was analyzed. Continuous simulation of 5 years of data (1981-1985) which, closely represented the 50-year period of record, was used in XP-SWMM to determine the average annuals values shown in Table 4-1.

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FIGURE 4.1

MILL CREEK DRAINAGE AREA

Table 4-1 Average Annual Values-Mill Creek CSOs

#	EPA No.	Name	Location	Receiving Stream	Frequency (No.)	Volume (MG)	Duration (Hrs)	$CBOD_5$ Loading (Lbs)	TSS Loading (Lbs)
1	6005	RC #18	Intersection Of Price & Halls Heights.	Mill Creek	9.4	10.63	56.4	926	9031
2	6006	RC #15	Park Drive 300' Ft. South Of Slippery Road	Mill Creek	10.4	11.05	44.3	865	9328
3	6007	O.F. #11	Volney Road 250 Ft. North Of Genessee Drive	Mill Creek	0.6	0.15	1.8	10	125
4	6008	RC #9	Park Drive 200 Ft. North Of Parkside Ave.	Mill Creek	9.0	5.02	46.2	470	4294
5	6009	RC #7	Park Drive Near Idora Parkdance Hall	Mill Creek	12.2	2.90	39.7	197	2432
6	6011	RC #8	Park Drive Near Kiawatha Drive At Foot Bridge	Mill Creek	5.2	3.42	19.6	250	2881
7	6012	O.F. #6	Kiawatha Drive And Glenwood Ave.	Mill Creek	0.0	0.00	0.0	0	0
8	6013	O.F. #5	Anoka Drive & Glenwood Ave.	Mill Creek	0.2	0.01	0.2	0	2
9	6014	RC #4	Ferndale & Glenwood	Mill Creek	10.6	20.88	69.5	2422	18225
10	6056	O.F.M.H	Genessee @ Park Drive	Mill Creek	0.6	0.02	1.0	2	22
11	6067	O.F.M.H	Overflow Chamber @ Glenmere	Mill Creek	10.0	2.06	57.4	177	1756
12	6068	O.F.M.H	Calvary Run Drive @ S. Bella Vista Ave	Calvary Run	1.0	0.98	1.6	66	825
13	6069	O.F.M.H	Dunlap Ave and Junction Street	Bears Den	0.0	0.00	0.0	0	0
14	6073	O.F.M.H	Overflow Manhole @ Rogers Near Lanterman Rd.	Mill Creek	1.0	0.06	2.0	4	51
15	6074	O.F.M.H.	Overflow Manhole @ Brentwood Near Volney Rd.	Mill Creek	0.0	0.00	0.0	0	0
16	6093	O.F.M.H.	Overflow In Front Of 432 Wilkenson	Mill Creek	0.0	0.00	0.0	0	0
17	6096	O.F.M.H	Hartford Ave. and Walden Court	Calvary Run	1.0	0.08	1.4	5	64
18	6104	O.F.M.H.	Intersection Of Glenwood & Cohasset	Mill Creek	2.0	0.85	4.6	53	701
			TOTAL		73.2	58.11	345.7	5447	49737

4.4 Youngstown's CSS

The City's existing CSS was designed to have its capacity exceeded during wet weather events. Accordingly, the EPA CSO Policy allows overflowing to occur only on a limited basis during wet weather and in the case of CSOs to the waters to Mill Creek the U.S. EPA has previously stipulated that the CSOs be eliminated or relocated according to the State Policy. To accommodate this prerequisite and based on the 2002 report "Evaluation of CSO Control Alternatives" upsizing and/or relocating portions of the existing CSS in the Mill Creek drainage area was the most favorable option to eliminate CSOs to the waters of Mill Creek.

4.5 Application of the Design Storm

Based on historical wet weather data the 5-year 6-hour design storm was developed to evaluate the upsizing the City's CSS for the elimination of CSOs in the system. Refer to Chapter 4 of the Development of CSO Alternatives Report, submitted to OEPA in January of 2002.

Using the XP-SWMM storm water model the design storm (5-year, 6 hour storm) was simulated through the existing CSS in the Mill Creek Drainage Area. The peak rates of overflowing for each CSO to Mill Creek were generated. The CSO values are shown in Figure 4.2. The design storm was then simulated through several upsized options for the Mill Creek CSS. With the incremental upsizing of portions of the Mill Creek CSS the peak rate results were ultimately reduced to zero indicating the elimination of CSOs to the waters of Mill Creek from the Mill Creek CSS. This process produced three basic alternatives for eliminating CSOs to the waters of Mill Creek.

The proposed alternatives with associated cost are presented in the next sections:

<u>Alternative 1:</u>

This alternative proposes the replacement of existing combined sewer with a 5' X 10' box culvert along West Glacier Drive from CSO 6004 to CSO 6006. Then, installing a new relocated 48" combined sewer from CSO 6006 to Glenwood Avenue and then within the Glenwood Avenue right of way to Metering Chamber #1. The existing combined sewer from CSO 6006 to Metering Chamber #1 through Mill Creek Park will remain in service. The construction of this alternative will eliminate combined sewer overflowing to the waters of Mill Creek. Refer to Figure 4.3.

<u>Alternative 1A</u>

This alternative proposes the replacement of existing combined sewer with a 5' X 10' box culvert along West Glacier Drive from CSO 6004 to CSO 6006. Then, installing a new relocated 48" combined sewer from CSO 6006 to Glenwood Avenue and then constructing a 36" force-main within the Glenwood Avenue right of way to a pump station located at CSO 6012, the construct a 48" combined sewer to Metering Chamber #1. The existing combined sewer from CSO 6006 to Metering Chamber #1 through Mill Creek Park will remain in service. The construction of this alternative will eliminate combined sewer overflowing to the waters of Mill Creek. Refer to Figure 4.3.

YOUNGSTOWN CSO

- NO CHANGES TO THE EXISTING CSS
- VOLUME AND RATES FOR 5 YEAR/6 HOUR STORM

MILL CREEK DRAINAGE AREA			5-YEAR, 6-HOUR DESIGN STORM	
E.P.A. ID #	STRUCTURE NUMBER	RECEIVING STREAM	VOLUME (Mgal)	PEAK RATE (mgd)
6005	RC #18	MILL CREEK	6.65	27.94
6006	RC #15	MILL CREEK	6.38	41.45
6007	OF #11	MILL CREEK	0.34	3.69
6008	RC #9	MILL CREEK	1.11	5.03
6009	RC #7	MILL CREEK	1.54	8.15
6011	RC #8	MILL CREEK	2.82	14.47
6012	OF #6	MILL CREEK	0.00	0.00
6013	OF #5	MILL CREEK	0.00	0.00
6014	RC #4	MILL CREEK	12.71	20.32
6056	OFMH	MILL CREEK	0.02	0.46
6067	OFMH	MILL CREEK	1.38	5.11
6068	OFMH	CALVARY RUN	0.52	10.77
6069	OFMH	BEARS DEN RUN	0.00	0.00
6073	OFMH	MILL CREEK	0.06	0.96
6074	OFMH	MILL CREEK	0.00	0.00
6093	OFMH	MILL CREEK	0.00	0.00
6096	OFMH	CALVARY RUN	0.07	1.35
6104	OFMH	MILL CREEK	0.99	11.59

△ DRAINAGE AREAS FOR METER CHAMBERS FROM MAHONING COUNTY EXTEND BEYOND THE CITY CORPORATION LIMIT

LEGEND

6006 ● OVERFLOW STRUCTURE (PERMIT #)

41.45 CSO PEAK RATE FROM EXISTING SYSTEM FOR A 5 YEAR, 6 HOUR STORM (MGD)

COMBINED SEWER

DRAINAGE AREA BOUNDARY

△3 METER CHAMBER

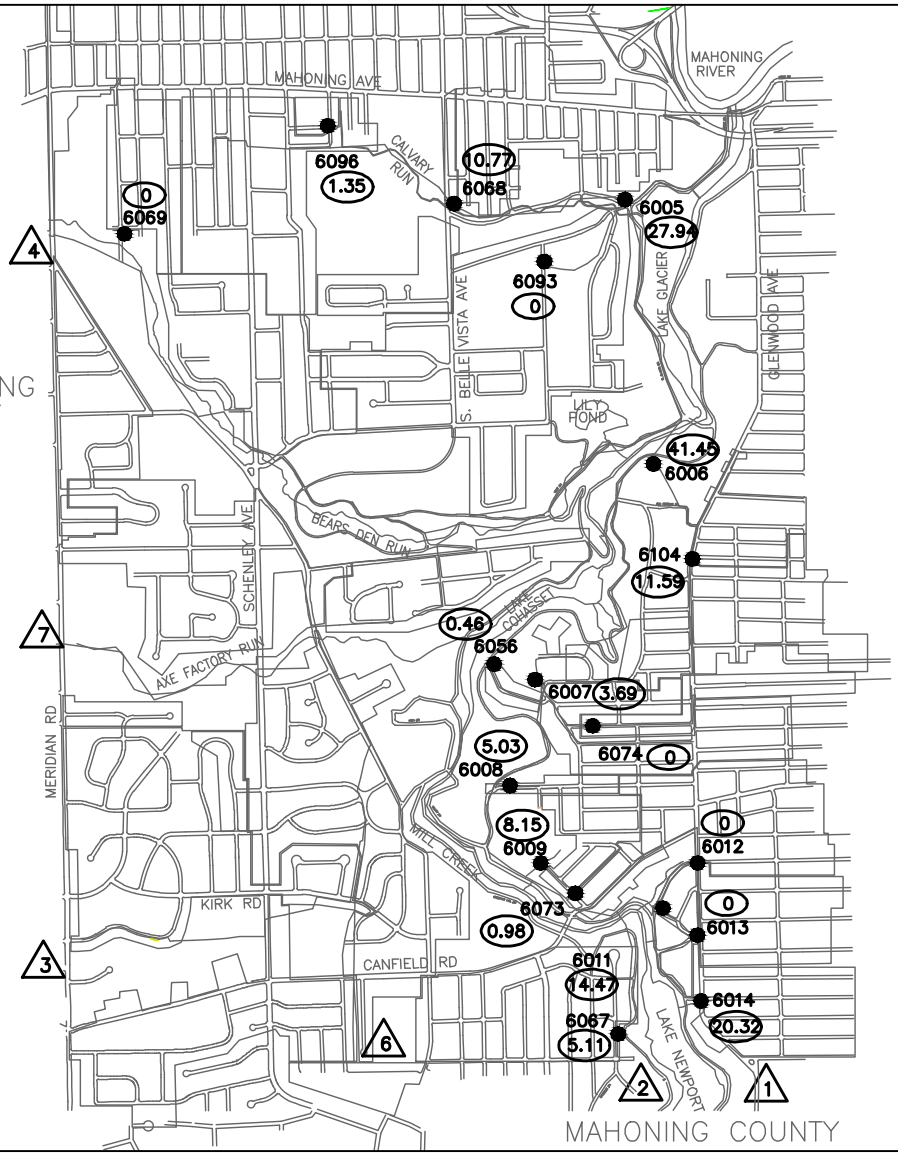

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FIGURE 4.2

5 YEAR, 6 HOUR EVENT
MILL CREEK DRAINAGE AREA

YOUNGSTOWN CSO

LEGEND

6006 OVERFLOW STRUCTURE (PERMIT #)

0 CSO VOLUME FROM NEW SYSTEM FOR A 5 YEAR, 6 HOUR STORM (IN MILLION GALLONS)

COMBINED SEWER

DRAINAGE AREA BOUNDARY

3 METER CHAMBER

- RELOCATE EXISTING CSS
- INCREASE CONVEYANCE CAPACITY FOR A 5 YEAR/6 HOUR STORM
- VOLUME AND RATES CENTALIZED AT 6003/6004

MILL CREEK DRAINAGE AREA			5-YEAR, 6-HOUR DESIGN STORM	
E.P.A. ID #	STRUCTURE NUMBER	RECEIVING STREAM	VOLUME (Mgal)	PEAK RATE (mgd)
6005	RC #18	MILL CREEK		
6006	RC #15	MILL CREEK	0.00	0.00
6007	OF #11	MILL CREEK	0.00	0.00
6008	RC #9	MILL CREEK	0.00	0.00
6009	RC #7	MILL CREEK	0.00	0.00
6011	RC #8	MILL CREEK	0.00	0.00
6012	OF #6	MILL CREEK	0.00	0.00
6013	OF #5	MILL CREEK	0.00	0.00
6014	RC #4	MILL CREEK	0.00	0.00
6056	OFMH	MILL CREEK	0.00	0.00
6067	OFMH	MILL CREEK	0.00	0.00
6068	OFMH	CALVARY RUN	0.00	0.00
6069	OFMH	BEARS DEN RUN	0.00	0.00
6073	OFMH	MILL CREEK	0.00	0.00
6074	OFMH	MILL CREEK	0.00	0.00
6093	OFMH	MILL CREEK	0.00	0.00
6096	OFMH	CALVARY RUN	0.00	0.00
6104	OFMH	MILL CREEK	0.00	0.00

✳ CSO 6004 OVERFLOWS TO THE MAHONING RIVER

△ DRAINAGE AREAS FOR METER CHAMBERS FROM MAHONING COUNTY EXTEND BEYOND THE CITY CORPORATION LIMIT

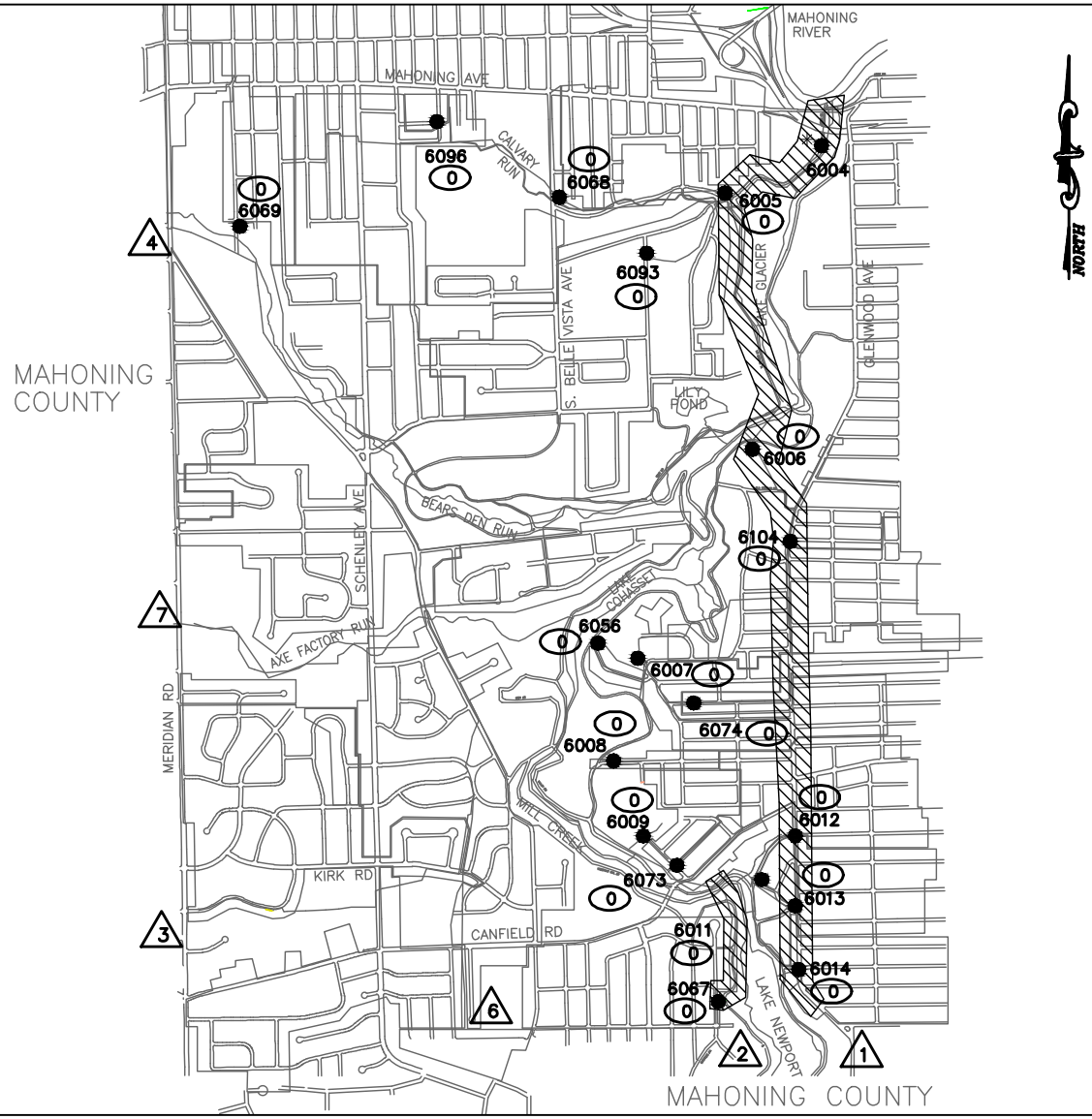

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FIGURE 4.3

5 YEAR, 6 HOUR EVENT
MILL CREEK DRAINAGE AREA

Alternative 2:

This alternative proposes the replacement of existing combined sewer with a 5' X 10' box culvert along West Glacier Drive from CSO 6004 to CSO 6006, then installing a 60", 48" and 36" combined sewer from CSO 6006 to CSO 6014. The construction the new sewer will follow the route of the existing sewer through Mill Creek Park. The construction of this alternative will eliminate combined sewer overflowing to the waters of Mill Creek. Refer to Figure 4.4.

The following alternatives with associated cost are presented in the next sections of this chapter to eliminate CSOs to the waters of Mill Creek.

4.6 Alternative #1, Gravity Sewer & Tunnel Proposal (Preliminary Plan, Appendix A)

Eliminate CSOs 6005, 6068, 6069*, 6093*, 6096

Begin at Station 0+00 (RC#19, 6004) and proceed south to Station 21+79 (RC#18, 6005). Replace 600 lineal feet of 42" sewer, 2100 lineal feet of 60" and 250 lineal feet of 24" on Price Road with approximately 2179 lineal feet of 5' x 10' reinforced concrete box culvert. Replace 3200 lineal feet of 24" with 3200 lineal feet of 48" along Calvary Run.

The installation of this portion of new box culvert eliminates overflowing at 6005, 6068, 6069, 6093, and 6096; and further reinforces that no overflowing will occur at 6069 and 6093. *Note: 6069 and 6093 showed no overflowing under existing conditions when the 5-year 6-hour storm was simulated over the drainage area.

Eliminate CSO 6006

Begin at Station 21+79 (RC#18, 6005) and proceed southerly on West Glacier Drive to Station 57+83 at the intersection of West Street and West Glacier Drive. Replace approximately 3400 lineal feet of 60" sewer with 3604 lineal feet 5' x 10' reinforced concrete box culvert. Then proceed south from Station 57+83 across Mill Creek with 615 lineal feet of a proposed 5' x 10' reinforced concrete box culvert to Station 63+98 (RC15, 6006).

The installation of this portion of new box culvert eliminates overflowing from CSO 6006.

Eliminate CSO 6104

Begin at Station 63+98 (RC15, 6006) and proceed southerly to Old Furnace Road then easterly to Glenwood Avenue, then south on Glenwood to Station 80+29 (CSO 6104) at the intersection of Glenwood Avenue and Cohasset Drive. Install approximately 1631 lineal feet of 48" sewer.

The installation of this portion of 48" sewer eliminates overflowing from CSO 6104.

YOUNGSTOWN CSO

LEGEND

6006 OVERFLOW STRUCTURE (PERMIT #)

0 CSO VOLUME FROM NEW SYSTEM FOR A 5 YEAR, 6 HOUR STORM (IN MILLION GALLONS)

COMBINED SEWER

DRAINAGE AREA BOUNDARY

3 METER CHAMBER

- RELOCATE EXISTING CSS
- INCREASE CONVEYANCE CAPACITY FOR A 5 YEAR/6 HOUR STORM
- VOLUME AND RATES CENTRALIZED AT 6003/6004

MILL CREEK DRAINAGE AREA			5-YEAR, 6-HOUR DESIGN STORM	
E.P.A. ID #	STRUCTURE NUMBER	RECEIVING STREAM	VOLUME (Mgal)	PEAK RATE (mgd)
6005	RC #18	MILL CREEK		
6006	RC #15	MILL CREEK	0.00	0.00
6007	OF #11	MILL CREEK	0.00	0.00
6008	RC #9	MILL CREEK	0.00	0.00
6009	RC #7	MILL CREEK	0.00	0.00
6011	RC #8	MILL CREEK	0.00	0.00
6012	OF #6	MILL CREEK	0.00	0.00
6013	OF #5	MILL CREEK	0.00	0.00
6014	RC #4	MILL CREEK	0.00	0.00
6056	OFMH	MILL CREEK	0.00	0.00
6067	OFMH	MILL CREEK	0.00	0.00
6068	OFMH	CALVARY RUN	0.00	0.00
6069	OFMH	BEARS DEN RUN	0.00	0.00
6073	OFMH	MILL CREEK	0.00	0.00
6074	OFMH	MILL CREEK	0.00	0.00
6093	OFMH	MILL CREEK	0.00	0.00
6096	OFMH	CALVARY RUN	0.00	0.00
6104	OFMH	MILL CREEK	0.00	0.00

* CSO 6004 OVERFLOWS TO THE MAHONING RIVER

△ DRAINAGE AREAS FOR METER CHAMBERS FROM MAHONING COUNTY EXTEND BEYOND THE CITY CORPORATION LIMIT

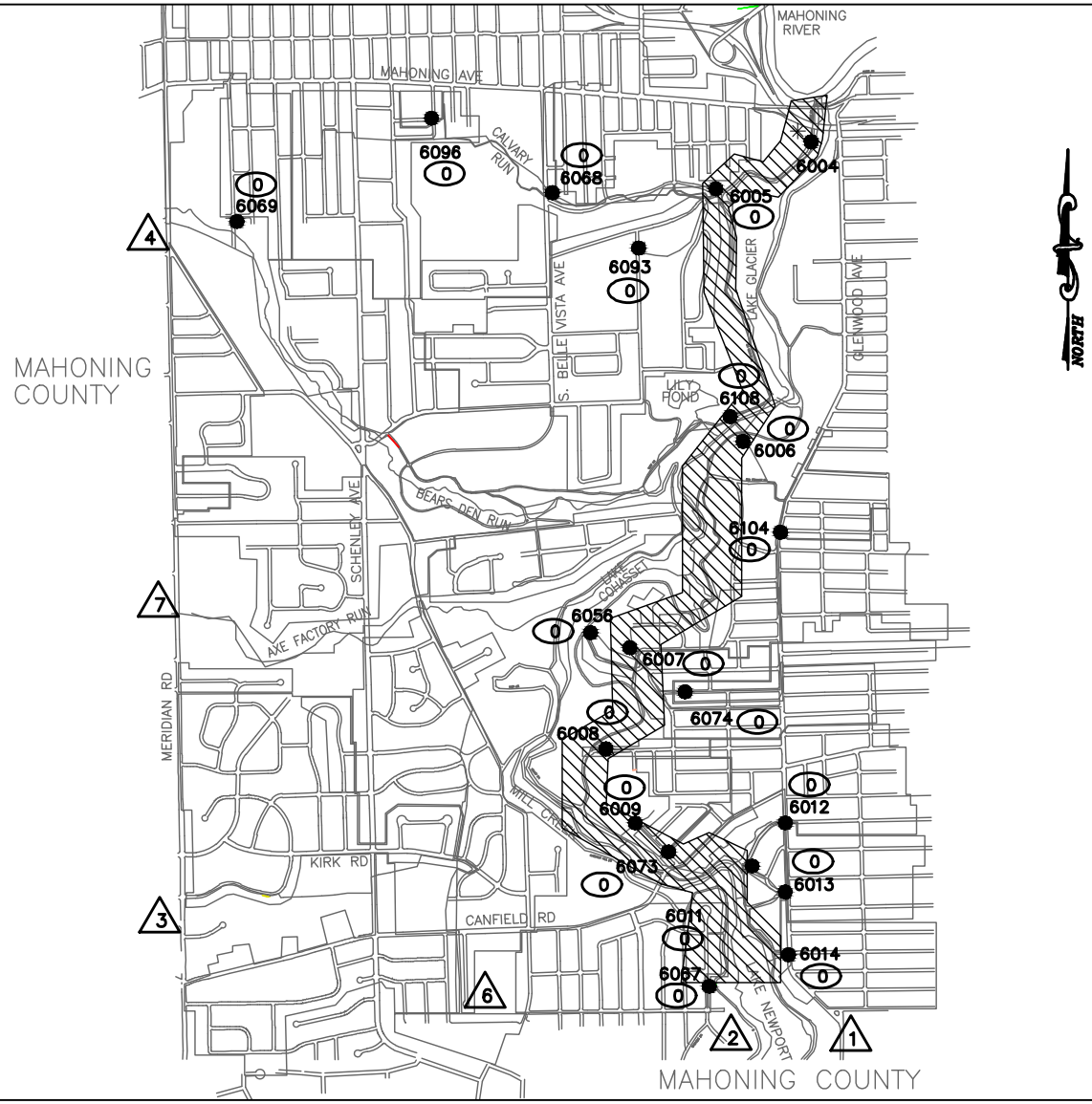

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FIGURE 4.4
5 YEAR, 6 HOUR EVENT
MILL CREEK DRAINAGE AREA

N:\61\04314 CSO Initiative\Admin\Reports\LTCP Figures (2013)\Figure 04.4.dwg, 4.4, 11/5/2014 9:40:58 AM, jleson, 1:1

Eliminate CSOs 6007, 6008, 6009, 6011, 6012*, 6013*, 6014, 6056, 6073, 6074*,

Begin at Station 80+29 (CSO 6104) and proceed south on Glenwood Avenue to Station 128+02 (OFC#6, 6012) and install approximately 4773 lineal feet of 48" sewer. Then proceed south on Glenwood Avenue from Station 128+02 (OFC#6, 6012) to Station 139+60 (OFC#5, 6013) and install approximately 1158 lineal feet of 48" sewer. Then Proceed south on Glenwood Avenue from Station 139+60 (OFC#5, 6013) to Station 146+77 (RC4, 6014) and install approximately 717 lineal feet of 48" sewer. From 146+77 (RC4, 6014) on Glenwood Avenue at Ravenwood Avenue install approximately 1215 lineal feet of 48" sewer to metering chamber MCl located between Glenwood Avenue and East Newport Drive at the Mahoning County line.

The installation of the 48" sewer along Glenwood Avenue relocates flows from MC1, CSOs 6012, 6013 and 6014 to the proposed 5' x 10' box culvert at Station 63+98 (RC15, 6006). This new 48' sewer will also relieve surcharging in the existing sewer through Mill Creek Park, thereby eliminating CSOs 6007, 6008, 6009, 6056, 6073 and 6074. *Note: 6012, 6013 and 6074 showed no overflowing when the 5-year 6-hour storm was simulated under existing conditions over the drainage area. The increased capacity of the new sewers further reinforces that no overflowing will occur at these locations. The existing sewers in Mill Creek are to remain in service.

Eliminate CSO 6067

Begin at Station 0+00 (MH# 1) on Old West Mill Drive and proceed south along West Newport Drive approximately 1732 lineal to Station 17+23 (MH# 5) which, approximately 250 lineal feet will be aerial sewer . Then proceed westerly approximately 258 lineal from Station 17+23 (MH# 5) to Station 19+81 (MH# 6), then southerly approximately 305 feet from Station 19+81 (MH# 6) to Station 22+86 (OFC6067).

By replacing approximately 2286 lineal feet of 24"sewer with new 36" sewer eliminates overflow 6067.

Project Cost Alternative 1 (Refer to Appendix E)

Alternative 1 involves the installation of approximately 2286 lineal feet of 36" sewer, 6397 lineal feet of 5' x 10' box culvert and approximately 9495 lineal feet of 48" sewer. A substantial portion of the 48" sewer, approximately 6100 lineal feet, will be installed using small diameter tunneling methods.

The estimated project cost for Alternative 1 is $46,667,098.00.

4.7 Alternative #1A, Gravity Sewer & Pump Station Proposal (Preliminary. Plan, Appendix B)

Eliminate CSOs 6005, 6068, 6069*, 6093*, 6096

Begin at Station 0+00 (RC#19, 6004) and proceed south to Station 21+79 (RC#18, 6005).

Replace 600 lineal feet of 42” sewer, 2100 lineal feet of 60” and 250 lineal feet of 24” on Price Road with approximately 2179 lineal feet of 5’ x 10’ reinforced concrete box culvert. Replace 3200 lineal feet of 24” with 3200 lineal feet of 48” along Calvary Run.

The installation of this portion of new box culvert eliminates overflowing at 6005, 6068, 6069, 6093 and 6096; and further reinforces that no overflowing will occur at 6069 and 6093. *Note: 6069 and 6093 showed no overflowing under existing conditions when the 5-year 6-hour storm was simulated over the drainage area.

Eliminate CSO 6006

Begin at Station 21+79 (RC#18, 6005) and proceed southerly on West Glacier Drive to Station 57+83 at the intersection of West Street and West Glacier Drive. Replace approximately 3400 lineal feet of 60” sewer with 3604 lineal feet 5’ x 10’ reinforced concrete box culvert. Then proceed south from Station 57+83 across Mill Creek with 615 lineal feet of a proposed 5’ x 10’ reinforced concrete box culvert to Station 63+98 (RC15, 6006).

The installation of this portion of new box culvert eliminates overflowing from CSO 6006.

Eliminate CSO 6104

Begin at Station 63+98 (RC15, 6006) and proceed southerly to Old Furnace Road then easterly to Glenwood Avenue, then south on Glenwood to Station 80+29 (CSO 6104) at the intersection of Glenwood Avenue and Cohasset Drive. Install approximately 1631 lineal feet of 48” sewer.

The installation of this portion of 48” sewer eliminates overflowing from CSO 6104.

Eliminate CSOs 6007, 6008, 6009, 6011, 6012*, 6013*, 6014, 6056, 6073, 6074*,

Begin at Station 80+29 (CSO 6104) and proceed south on Glenwood Avenue to Station 81+77 (MH# 26) and install approximately 548 lineal feet of 48” sewer. Then proceed south on Glenwood Avenue from Station 81+77 (MH# 26) to Station 128+02 to a proposed pump station and install approximately 4225 lineal feet of 36” forcemain. Then Proceed south on Glenwood Avenue from Station 128+02 (proposed pump station) to Station 139+60 (OFC# 5, 6013) and install approximately 1158 lineal feet of 48” sewer. Then Proceed south on Glenwood Avenue from Station 139+60 (OFC# 5, 6013) to Station 146+77 (RC4, 6014) and install approximately 717 lineal feet of 48” sewer. From 146+77 (RC4, 6014) on Glenwood Avenue at Ravenwood Avenue install approximately 1215 lineal feet of 48” sewer to metering chamber, MC1 between Glenwood Avenue and East Newport Drive at the Mahoning County line

The installation of the 48” sewer and pump station along Glenwood Avenue relocates flows from MC1, CSOs 6012, 6013 and 6014 to the proposed 5’ x 10’ box culvert at Station 63+98 (RC15, 6006). This new pump station and 48’ sewer will also relieve surcharging in the existing sewer through Mill Creek Park, thereby eliminating CSOs 6007, 6008, 6009, 6056, 6073 and 6074. *Note: 6012, 6013 and 6074 showed no overflowing when the 5-year 6-hour storm was simulated under existing conditions over the drainage area. The increased capacity of the new

sewers further reinforces that no overflowing will occur at these locations.

Eliminate CSO 6067

Begin at Station 0+00 (MH# 1) on Old West Mill Drive and proceed south along West Newport Drive approximately 1732 lineal to Station 17+23 (MH# 5) which, approximately 250 lineal feet will be aerial sewer lineal feet . Then proceed westerly approximately 258 lineal from Station 17+23 (MH# 5) to Station 19+81 (MH# 6), then southerly approximately 305 feet from Station 19+81 (MH# 6) to Station 22+86 (OFC6067).

By replacing approximately 2286 lineal feet of 24"sewer with new 36" sewer eliminates overflow 6067.

Project Cost Alternative 1A (Refer to Appendix E)

Alternative 1A involves the installation of approximately 2286 lineal feet of 36" sewer approximately 6397 lineal feet of 5x10 box culvert and approximately 5268 lineal feet of 48" sewer, a pump station with approximately 4225 lineal feet of 36" forcemain.

The estimated project cost for Alternative 1A is $47,769,588.00.

4.8 Alternative #2, Replace Gravity Sewer Following Existing Alignment (Preliminary Plan, Appendix C)

Eliminate CSOs 6005, 6068, 6069*, 6093*, 6096

Begin at Station 0+00 (RC#19, 6004) and proceed south to Station 21+79 (RC#18, 6005). Replace 600 lineal feet of 42" sewer, 2100 lineal feet of 60" and 250 lineal feet of 24" on Price Road with approximately 2179 lineal feet of 5' x 10' reinforced concrete box culvert. Replace 3200 lineal feet of 24" with 3200 lineal feet of 48" along Calvary Run.

The installation of this portion of new box culvert eliminates overflowing at 6005, 6068, 6069, 6093 and 6096; and further reinforces that no overflowing will occur at 6069 and 6093. *Note: 6069 and 6093 showed no overflowing under existing conditions when the 5-year 6-hour storm was simulated over the drainage area.

Eliminate CSO 6006

Begin at Station 21+79 (RC#18, 6005) and proceed southerly on West Glacier Drive to Station 57+83 at the intersection of West Street and West Glacier Drive. Replace approximately 3400 lineal feet of 60" sewer with 3604 lineal feet 5' x 10' reinforced concrete box culvert. Then proceed south from Station 57+83 across Mill Creek with 634 lineal feet of a proposed 5' x 10' reinforced concrete box culvert to Station 64+17 (RC15, 6006).

The installation of this portion of new box culvert eliminates overflowing from CSO 6006.

Eliminate CSO 6007 and 6104

Begin at Station 64+17 (RC15, 6006) and proceed southerly along the route of the existing sewer in Mill Creek Park to Station 120+30 (RC10, 6007) and replace approximately 5613 of existing 36' sewer with approximately 5613 lineal feet of 60" of which, approximately 260 lineal feet is aerial sewer.

The installation of this portion of 60" sewer eliminates overflowing from CSO 6104 and 6007.

Eliminate CSOs , 6008, 6056 and *6074

Begin at Station 120+30 (RC10, 6007) and proceed southerly along the route of the existing sewer in Mill Creek Park to Station 140+38 (RC9, 6008) and replace approximately 2008 lineal feet of 36" with 1157 lineal feet of 60"sewer and 851 lineal feet of 48" sewer.

The installation of this portion of 60" and 48" sewers eliminates overflowing from CSO 6008, 6056 and 6074. *Note: 6074 showed no overflowing under existing conditions when the 5-year 6-hour storm was simulated over the drainage area. The increased capacity of the new sewers further reinforces that no overflowing will occur at these locations.

Eliminate CSOs , 6009, 6073,6011, *6012, *6013, 6014

Begin at to Station 140+38 (RC9, 6008) and proceed southerly along the route of the existing sewer in Mill Creek Park to Station 200+36 (RC4, 6014) and replace approximately 5998 lineal feet of 27" and 36" of existing sewer with approximately 1960 lineal feet of 48" of which, approximately 260 lineal feet is aerial sewer, and 4038 lineal feet of 36" sewer of which, approximately 250 lineal feet is aerial sewer. *Note: 6012 and 6013 showed no overflowing under existing conditions when the 5-year 6-hour storm was simulated over the drainage area. The increased capacity of the new sewers further reinforces that no overflowing will occur at these locations.

Eliminate CSO 6067

Begin at Station 0+00 (MH# 1) on Old West Mill Drive and proceed south along West Newport Drive approximately 1732 lineal to Station 17+23 (MH# 5) which, approximately 250 lineal feet will be aerial sewer. Then proceed westerly approximately 258 lineal from Station 17+23 (MH# 6) to Station 19+81 (MH# 6), then southerly approximately 305 feet from Station 19+81 (MH# 6) to Station 22+86 (OFC 6067).

By replacing approximately 2286 lineal feet of 24"sewer with new 36" sewer eliminates overflow 6067.

Project Cost Alternative 2 (Refer to Appendix E)

Alternative 2 involves the installation of approximately 6324 lineal feet of 36" sewer, approximately 6417 lineal feet of 5' x 10' box culvert, approximately 6479 lineal feet of 60" sewer, and approximately 3102 lineal feet of 48" sewer.

The estimated project cost for Alternative 2 is $48,987,610.00.

4.9 Recommended Alternative

Alternative 1:

Alternative 1 proposes to install gravity sewer from RC 19 (CSO 6004) on Price Road at the Mahoning River along West Glacier Drive, across Mill Creek to Glenwood Avenue, then south on Glenwood Avenue to Metering Chamber MC1 at the Mahoning County line. Alternative 1 also includes the replacement of an existing 24" sewer with a new 36" sewer along West Newport Drive and Glenmere to CSO 6067. Refer to Appendix A. The estimated cost of this alternative is $46,667,098.00.

Alternative 1A:

Alternative 1A proposes to install gravity sewer from RC 19 (CSO 6004) on Price Road at the Mahoning River along West Glacier Drive, across Mill Creek to Glenwood Avenue, then south on Glenwood Avenue with a forcemain to a pump station at Glenwood Avenue and Almyra, then gravity sewer to Metering Chamber MC1 at the Mahoning County line. Alternative 1A also includes the replacement of an existing 24" sewer with a new 36" sewer along West Newport Drive and Glenmere to CSO 6067. Refer to Appendix B. The estimated cost of this alternative is $47,769,588.00

Alternative 2:

Alternate 2 proposes to replace the existing sewer with new gravity sewer along the existing route of the existing sewer from RC 19 (CSO 6004) on Price Road at the Mahoning River to Metering Chamber MC1 at the Mahoning County line. Alternative 2 also includes the replacement of an existing 24" sewer with a new 36" sewer along West Newport Drive and Glenmere to CSO 6067. Refer to Appendix C. The estimated cost of this alternative is $48,987,610.00.

As noted above the estimated project costs are similar. Alternatives 1 and 2 propose all gravity sewers; however Alternative 2 will create much more environmental damage to the ecosystem in Mill Creek Park. Alternative1 and 1A are comparable in cost; however Alternative 1A proposes a sizable pump station to handle normal and wet weather flows and will be costly to operate and maintain. Accordingly, Alternative 1 is recommended for implementation.

4.10 Implementation of Alternative 1

Alternative 1 is proposed to be implemented in four parts as listed below:

Part 1: Design and construct gravity sewer from RC19 (CSO 6004) to RC18 (6005), $5.6 Million
Part 2: Design and construct gravity sewer from RC18 (6005) to RC15 (6006), $10.8 Million
Part 3: Design and construct gravity sewer from RC15 (6006) to Glenwood and Almyra Avenue, $16.5 Million
Part 4: Design and construct gravity sewer from Glenwood and Almyra Avenue to MC1, $13.8 Million.

4.11 Interpretation of CSO Elimination

The XPSMM collection system model was employed to determine alternatives for upgrading the CSS in the Mill Creek drainage area that would have the capacity to convey wet weather flows within the system without causing CSOs to the waters of Mill Creek. The design storm method, derived from 50 years of historical data, was used and simulated throughout the Mill Creek CSS.

Model simulation based on historical rainfall data is possibly the most accurate method to estimate how an existing CSS reacts to wet weather conditions and how proposed upgrades will affect the CSS under the same set of wet weather conditions. However, neither design storm simulation nor continuous simulation methods can reliably estimate results if weather conditions in the future differ significantly from patterns documented in the past 50-plus years. Nor do the simulations account for isolated storm events larger than those encountered during the documented period.

Implementation of Alternative 1 will result in control of all CSOs in the Mill Creek drainage area and physical elimination of some of these CSOs, during Phase I of the LTCP. Upon completion of Alternative 1, no CSO in the Mill Creek drainage area will discharge during any storm event that does not exceed the design storm. Although the City's goal is to physically eliminate all of the CSOs in the Mill Creek drainage area, either by removing the structures or by permanently plugging the outfalls, some of the CSOs may have to physically remain open during Phase I of the LTCP in order to deal with storm events that exceed the design storm.

The City will complete, and submit to OEPA no later than April 15, 2021 a Preliminary Design Report (PDR) for the proposed CSS in the Mill Creek Drainage Area. The PDR will include simulations of wet weather conditions in the Mill Creek Drainage Area and the Mahoning River Basin, using the model revised to reflect the effects on the CSS of a set of proposed improvements. Through design iterations in the PDR process, the City will: 1) establish the specific improvements to be implemented to assure that no CSO in the Mill Creek drainage area discharges during a storm event that does not exceed the design storm; and 2) determine the maximum number of CSOs, and identify those CSOs, that can be physically eliminated during Phase I of the LTCP. Any CSO in the Mill Creek Drainage Area that is not physically eliminated in Phase I of the LTCP will be addressed in Phase II.

4.12 Summary

Three alternatives were developed and proposed in this report. The alternative recommended is cost-effected and causes the least damage to the ecosystem in Mill Creek Park.

Currently, the CSOs to Mill Creek culminate at the confluence of Mill Creek and the Mahoning River. By increasing the capacity of the CSS in the Mill Creek Drainage Area and centralizing the flow to the junction chamber at CSO 6004 eliminates the CSO discharges to the waters of Mill Creek.

The environmental benefits include the following:

- The pollution loading from the discharge of CSOs to the waters of Mill Creek will be eliminated. Refer to Table 4-1.

- The pollution loading from Mill Creek to the Mahoning River will be reduced. Mill Creek is tributary to the Mahoning. Currently the CSO pollutant loads from Mill Creek are conveyed to the Mahoning River. With the completion of the new sewer system the pollutant loads will be conveyed to the Mahoning River within the combined sewer system and outlet to the Mahoning River at CSO 6004. The upgraded Mill Creek combined sewer system not only has the capacity to convey wet weather flows without overflows to Mill Creek but has additional capacity to store addition wet weather flows. In-line storage of approximately 1.68 million gallons in the upgraded sewer system reduces pollutant loading to the Mahoning River from Mill Creek. Table 4-2 reflects the average annual value results from 5 years of continuous simulation of historical wet weather events.

Table 4-2 Average Annual Value Comparisons-Mill Creek CSOs

	Existing System			Proposed System			Reduction	
	Volume	Loading (TSS)	Loading (CBOD)	Volume	Loading (TSS)	Loading (CBOD)	Loading (TSS)	Loading (CBOD)
	MG	LBS	LBS	MG	LBS	LBS		
Mill Creek CSOs	58.11	49,737	5447	0.00	0.00	0.00		
CSO 6004	20.41	18,335	3030	57.7	51,834	6229		
Total	78.52	68,072	8477	57.7	51,834	6229	16,238	2248

CHAPTER 5
Implementation Schedule

5.1 Introduction

The CSO Policy recognizes the need to address the relative importance of environmental and financial issues when developing an implementation schedule for CSO control alternatives that are contained in a municipality's LTCP. The Policy provides general boundaries for determining a permittee's ability to finance CSO Control improvements. According to the CSO Policy, an implementation schedule should be based on a permittee's financial capability. A proposed implementation scheduled with associated costs was developed for the next several years to complete the Phase 1 projects listed in this report, namely the treatment improvements in Chapter 3 and the elimination of CSOs to the waters of Mill Creek in Chapter 4.

The City has examined the financial and logistical impacts of implementing the Phase 1 improvements. Predicated on the time needed for financing the design and construction of the improvements plus managing the burden to the residential users, the City of Youngstown is accepting the implementation schedule itemized on page 5-2 of this report.

5.2 Implementation Schedule Milestones Treatment Improvements

The following are milestones for treatment improvements.

Initiate Design WWTP	January 5, 2015
Substantial Completion WWTP Improvements	March 27, 2020
Initiate Design Wet Weather Facility Part I	March 16, 2017
Initiate Construction of Wet Weather Facility Part I:	February 7, 2022
Finalize Design Wet Weather Facility Part II	July 29, 2024
Initiate Construction of Wet Weather Facility Part II:	January 26, 2026
Sub. Comp. & Place in Service, Wet Weather Facility Part II:	February 26, 2029

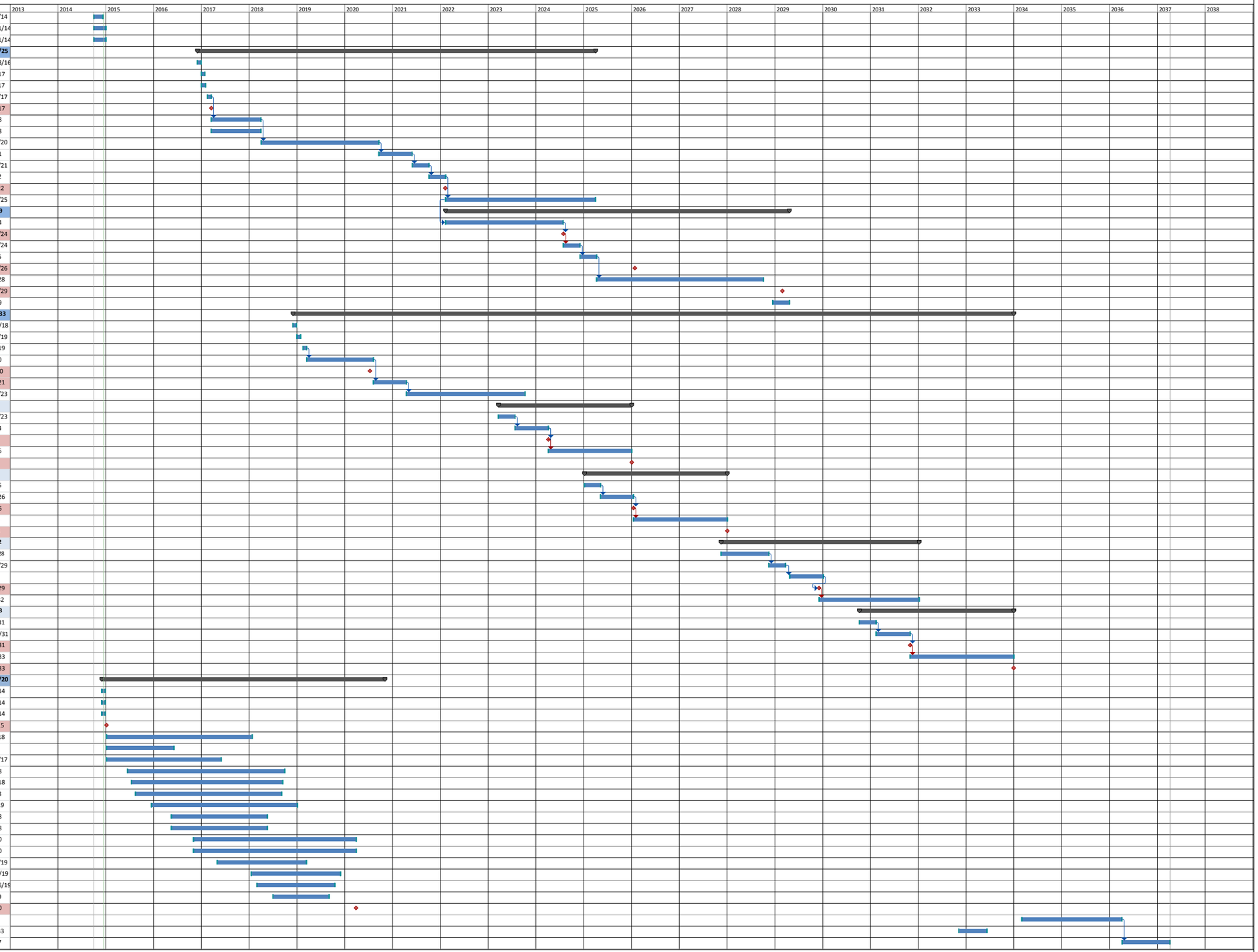
5.3 Implementation Schedule Milestones Mill Creek Improvements

The following are milestones for Mill Creek sewer improvements.

Initiate Design Mill Creek Part I &II:	July 11, 2020
Complete and Submit to EPA the PDR:	April 15, 2021
Initiate Construction Mill Creek Part I:	April 5, 2024
Substantial Completion & Place in Service Part I:	January 2, 2026
Initiate Construction Mill Creek Part II:	January 16, 2026
Substantial Completion & Place in Service Part II:	January 1, 2028
Initiate Construction Mill Creek Part III:	December 4, 2029
Substantial Completion & Place in Service Mill Creek Part III:	January 7, 2032
Initiate Construction Mill Creek Part IV:	October 31, 2031
Substantial Completion & Place in Service Mill Creek Part IV:	December 30, 2033

City of Youngstown
CSO Implementation Schedule

Task	Task Name	Start	Duration	Finish
1	Submission of Technical Report	Wed 10/1/14	49 days	Mon 12/8/14
2	Approval of LTCP by City	Wed 10/1/14	66 days	Wed 12/31/14
3	Approval of LTCP by USEPA	Wed 10/1/14	66 days	Wed 12/31/14
4	**Wet Weather Facility Part I (Pump Sta. Screening and Grit)**	**Thu 12/1/16**	**2173 days**	**Mon 3/31/25**
5	Solicitation of Consultant	Thu 12/1/16	20 days	Wed 12/28/16
6	Selection of Consultant	Sun 1/1/17	20 days	Thu 1/26/17
7	Negotiation of Scope of Work	Sun 1/1/17	23 days	Tue 1/31/17
8	Council/Board of Control Approval - Consultant Selection	Thu 2/16/17	20 days	Wed 3/15/17
9-1	Milestone - Initiate WWF Design Part I	Thu 3/16/17	0 days	Thu 3/16/17
9-2A	Preliminary Design of Wet Weather Facility	Thu 3/16/17	272 days	Fri 3/30/18
9-2B	Preliminary Design Report - Disinfection System	Thu 3/16/17	272 days	Fri 3/30/18
9-3	Final Design of Wet Weather Facility	Mon 4/2/18	643 days	Wed 9/16/20
9-4	Agency Review of Wet Weather Facility	Thu 9/17/20	182 days	Fri 5/28/21
9-5	Financing of Wet Weather Facility	Mon 5/31/21	91 days	Mon 10/4/21
9-6	Bidding of Wet Weather Facility	Tue 10/5/21	91 days	Tue 2/8/22
9-7	Milestone - Initiate WWF Construction Part I	Mon 2/7/22	0 days	Mon 2/7/22
9-8	Construction of Wet Weather Facility	Wed 2/9/22	819 days	Mon 3/31/25
10	**Wet Weather Facility Part II**	**Wed 2/9/22**	**1878 days**	**Fri 4/20/29**
10-1	Final Design of Wet Weather Facility	Wed 2/9/22	643 days	Fri 7/26/24
10-2	Milestone - Finalize WWF Design Part II	Mon 7/29/24	0 days	Mon 7/29/24
10-3	Financing of Wet Weather Facility	Mon 7/29/24	91 days	Mon 12/2/24
10-4	Bidding of Wet Weather Facility	Tue 12/3/24	91 days	Tue 4/8/25
10-5	Milestone - Initiate WWF Construction Part II	Mon 1/26/26	0 days	Mon 1/26/26
10-6	Construction of Wet Weather Facility	Wed 4/9/25	910 days	Tue 10/3/28
10-7	Milestone - Substantial Completion & Place in Service WWF Part II	Mon 2/26/29	0 days	Mon 2/26/29
10-8	Wet Weather Performance Analysis & Evaluation	Thu 12/14/28	92 days	Fri 4/20/29
11	**Mill Creek Interceptor**	**Sat 12/1/18**	**3935 days**	**Fri 12/30/33**
11-1	Solicitation of Consultant	Sat 12/1/18	20 days	Thu 12/27/18
11-2	Selection/Negotiation of Scope of Work with Consultant	Tue 1/1/19	20 days	Mon 1/28/19
11-3	Council/Board of Control Approval - Consultant Selection	Sat 2/16/19	20 days	Thu 3/14/19
11-4	Preliminary Design and Modeling of Mill Creek Interceptor	Sat 3/16/19	365 days	Thu 8/6/20
11-5	Milestone - Initiate MCI Design Part I and II	Sat 7/11/20	0 days	Sat 7/11/20
11-6	Milestone - Preliminary Design Report	Fri 8/7/20	180 days	Thu 4/15/21
11-7	Final Design of Mill Creek Interceptor (Part I and II)	Fri 4/16/21	647 days	Mon 10/9/23
11-8	**Part I**	**Mon 3/20/23**	**729 days**	**Fri 1/2/26**
11.8.1	Agency Review of Mill Creek Interceptor	Mon 3/20/23	91 days	Mon 7/24/23
11.8.2	Bidding and Financing of Mill Creek Interceptor	Tue 7/25/23	183 days	Thu 4/4/24
11.8.3	Milestone - Initiate MCI Construction Part I	Fri 4/5/24	0 days	Fri 4/5/24
11.8.4	Construction of Mill Creek Interceptor Part I	Fri 4/5/24	455 days	Thu 1/1/26
11.8.5	Milestone - Substantial Completion & Place in Service Part I	Fri 1/2/26	0 days	Fri 1/2/26
11.9	**Part II**	**Mon 1/6/25**	**780 days**	**Sat 1/1/28**
11.9.1	Agency Review of Mill Creek Interceptor	Mon 1/6/25	89 days	Thu 5/8/25
11.9.2	Bidding and Financing of Mill Creek Interceptor	Fri 5/9/25	180 days	Thu 1/15/26
11.9.3	Milestone - Initiate MCI Construction Part II	Fri 1/16/26	0 days	Fri 1/16/26
11.9.4	Construction of Mill Creek Interceptor Part II	Fri 1/16/26	512 days	Sat 1/1/28
11.9.5	Milestone - Substantial Completion & Place in Service Part II	Sat 1/1/28	0 days	Sat 1/1/28
11-10	**Part III**	**Tue 11/16/27**	**1082 days**	**Wed 1/7/32**
11-10.1	Final Design of Mill Creek Interceptor (Part III and IV)	Tue 11/16/27	261 days	Tue 11/14/28
11-10.2	Agency Review of Mill Creek Interceptor	Wed 11/15/28	91 days	Wed 3/21/29
11-10.3	Bidding and Financing of Mill Creek Interceptor	Tue 4/24/29	184 days	Fri 1/4/30
11-10.4	Milestone - Initiate MCI Construction Part III	Tue 12/4/29	0 days	Tue 12/4/29
11-10.5	Construction of Mill Creek Interceptor Part III	Tue 12/4/29	547 days	Wed 1/7/32
11-11	**Part IV**	**Tue 10/8/30**	**844 days**	**Fri 12/30/33**
11-11.1	Agency Review of Mill Creek Interceptor	Tue 10/8/30	91 days	Tue 2/11/31
11-11.2	Bidding and Financing of Mill Creek Interceptor	Wed 2/12/31	187 days	Thu 10/30/31
11-11.3	Milestone - Initiate MCI Construction Part IV	Fri 10/31/31	0 days	Fri 10/31/31
11-11.4	Construction of Mill Creek Interceptor Part IV	Fri 10/31/31	566 days	Fri 12/30/33
11-11.5	Milestone - Substantial Completion & Place in Service Part IV	Fri 12/30/33	0 days	Fri 12/30/33
12	**Waste Water Treatment Plant**	**Mon 12/1/14**	**1546 days**	**Mon 11/2/20**
12-1	Solicitation of Consultant	Mon 12/1/14	20 days	Fri 12/26/14
12-2	Selection/Negotiation of Scope of Work with Consultant	Mon 12/1/14	20 days	Fri 12/26/14
12-3	Council/Board of Control Approval - Consultant Selection	Mon 12/1/14	20 days	Fri 12/26/14
12-4	Milestone - Initiate WWTP Design/PTI Approval/Construction	Mon 1/5/15	0 days	Mon 1/5/15
12-5	Aeration Tanks	Mon 1/5/15	797 days	Tue 1/23/18
12-6	Trickling Filter Media (Early Action Replacement)	Mon 1/5/15	370 days	Fri 6/3/16
12-7	Electrical Switchgear and Improvements	Mon 1/5/15	628 days	Wed 5/31/17
12-8	Laboratory & SCADA Building	Tue 6/16/15	859 days	Fri 9/28/18
12-9	Sludge Handling Expansion (HRT Facility)	Thu 7/16/15	826 days	Thu 9/13/18
12-10	Plant SCADA Upgrade	Sun 8/16/15	798 days	Tue 9/4/18
12-11	Secondary Clarifiers	Wed 12/16/15	796 days	Wed 1/2/19
12-12	Micro-Screen Improvements	Mon 5/16/16	525 days	Fri 5/18/18
12-13	Final Effluent Pumps	Mon 5/16/16	525 days	Fri 5/18/18
12-14	Primary Settling Tanks	Tue 11/1/16	889 days	Fri 3/27/20
12-15	Primary Effluent P.S.	Tue 11/1/16	889 days	Fri 3/27/20
12-16	Trickling Filter Improvements	Mon 5/1/17	488 days	Wed 3/13/19
12-17	Sludge Handling Improvements	Tue 1/16/18	488 days	Thu 11/28/19
12-18	Disinfection System Improvements	Thu 3/1/18	425 days	Wed 10/16/19
12-19	Raw Sewage P.S. Decommission and Conversion	Sun 7/1/18	308 days	Tue 9/3/19
12-20	Milestone - Finalize WWTP Improvements	Fri 3/27/20	0 days	Fri 3/27/20
13	Post Construction Monitory Program Report	Fri 3/3/34	546 days	Fri 4/4/36
14	LTCP Phase 2 Financial Capabilities Assessment	Sat 11/6/32	154 days	Wed 6/8/33
15	LTCP Phase 2 Project Considerations	Mon 4/7/36	262 days	Tue 4/7/37



Project: 04314 Project Schedule

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress | Manual Progress

ms consultants, inc.

CHAPTER 6
Storage at CSOs 6017 and 6043

6.1 Introduction

As previously indicated U.S. EPA would support a LTCP having a two phased project approach. The first phase improvements would include the expansion of the City's wet weather treatment capacity plus the elimination of CSOs to the waters of Mill Creek. Under Phase 2, projects to consider were storage facilities at CSOs 6017 and 6043. Figure 6-1 depicts the general location of the facilities. Other locations within the CSS may also be considered for improvements to control CSO discharges pending further evaluation of the CSS. Examples of potential locations include, but not limited to, CSOs 6003 and 6004.

6.2 CSOs 6015, 6017, and 6043

The City's CSS was continuously simulated through XP-SWMM using 5-years of historical rainfall data. As a result and described in the "Development of CSO Control Alternatives Report" dated January 2002, CSOs 6015, 6017, and 6043 are among the most voluminous CSOs in the City's CSS. Based on continuous simulation of the existing CSS the total volume of discharge on an average annual basis from the three overflows was 283.9 million gallons as shown in Table 6-1.

Table 6-1 CSO Voluminous Dischargers

E.P.A. ID #	Structure Number	Location	Sanitary Drainage Area	Receiving Stream	Annual Volume (Mgal)	Annual Frequency (No.)
6015	OF#1	Hylda Street/Indianola @ Yo. & So. Rr Tracks	Poland / Woodland Avenue	Jones Creek	66.8	50.0
*6016/6017	RC#3/ RC#2	Indianola/ South Side Park @Yo. & So. Rr Tracks @	Poland / Woodland Avenue	Jones Creek	154.0	88.0
6043	Of #103	In Scholl Choffins Yard By Pump Station	Mahoning River Collector	Mahoning River	63.1	48.0
Total					283.9	186.0

*** Volume included with 6017**

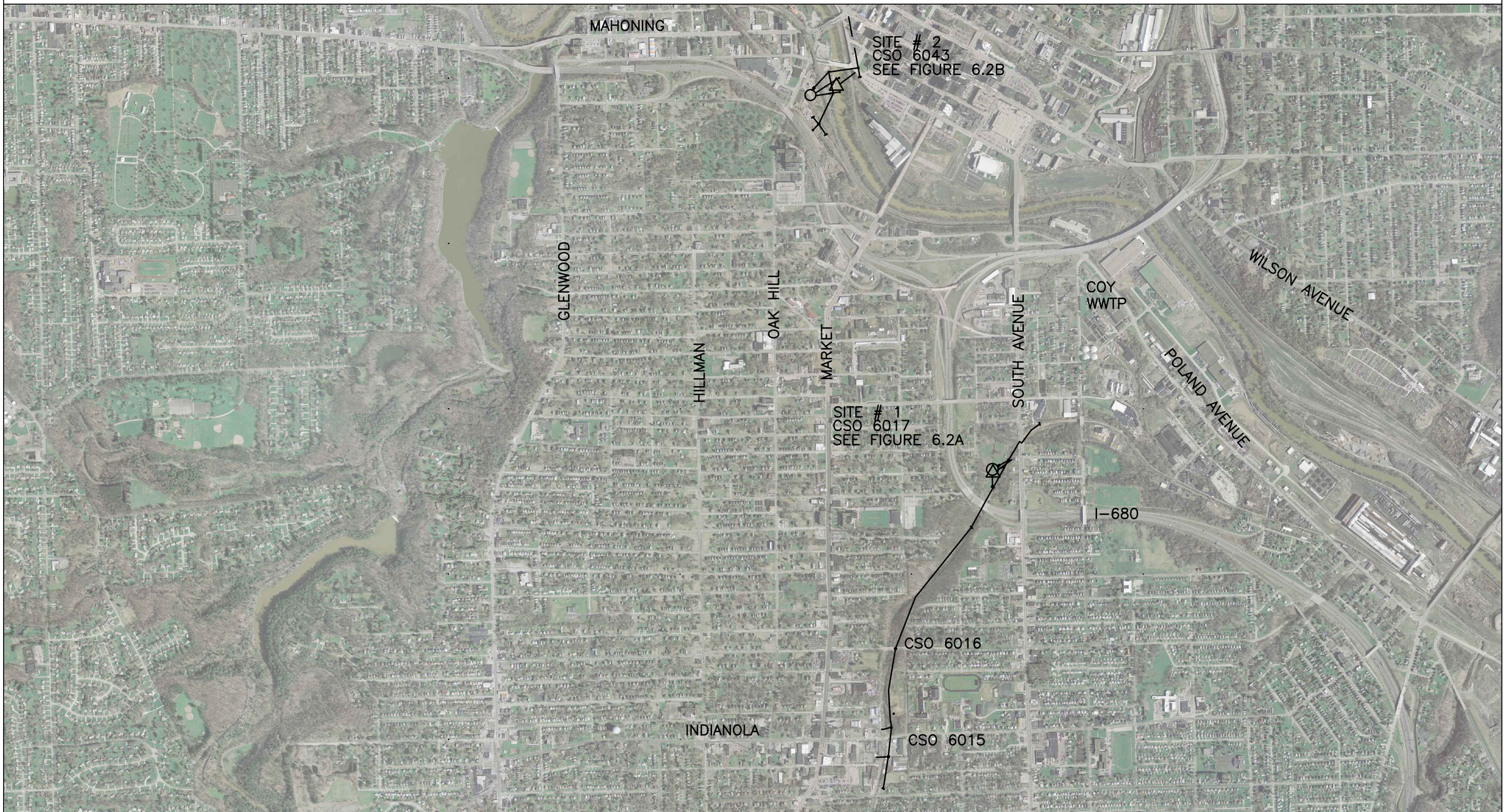


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FIGURE 6.1
CSOs: 6015, 6016, 6017, 6043

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6.3 Application of the Design Storm

The EPAs CSO Policy allows overflowing to occur only on a limited basis during wet weather and in the case of CSOs to the waters of Jones Creek and the Mahoning River overflows may occur four times per year on average. In the 2002 report "Development of CSO Control Alternatives, Chapter 4 the 6-month 6-hour storm based on historical wet weather data was developed to satisfy this condition. Accordingly, the 6-month 6-hour design storm is used to determine the storage required at CSOs 6015, 6016, 6017, and 6043.

Using XP-SWMM and simulating the 6-month 6-hour storm over the drainage area resulted in the storage required at CSOs 6015, 6016, 6017, and 6043. Refer to Table 6-2.

Table 6-2 CSO Required Storage

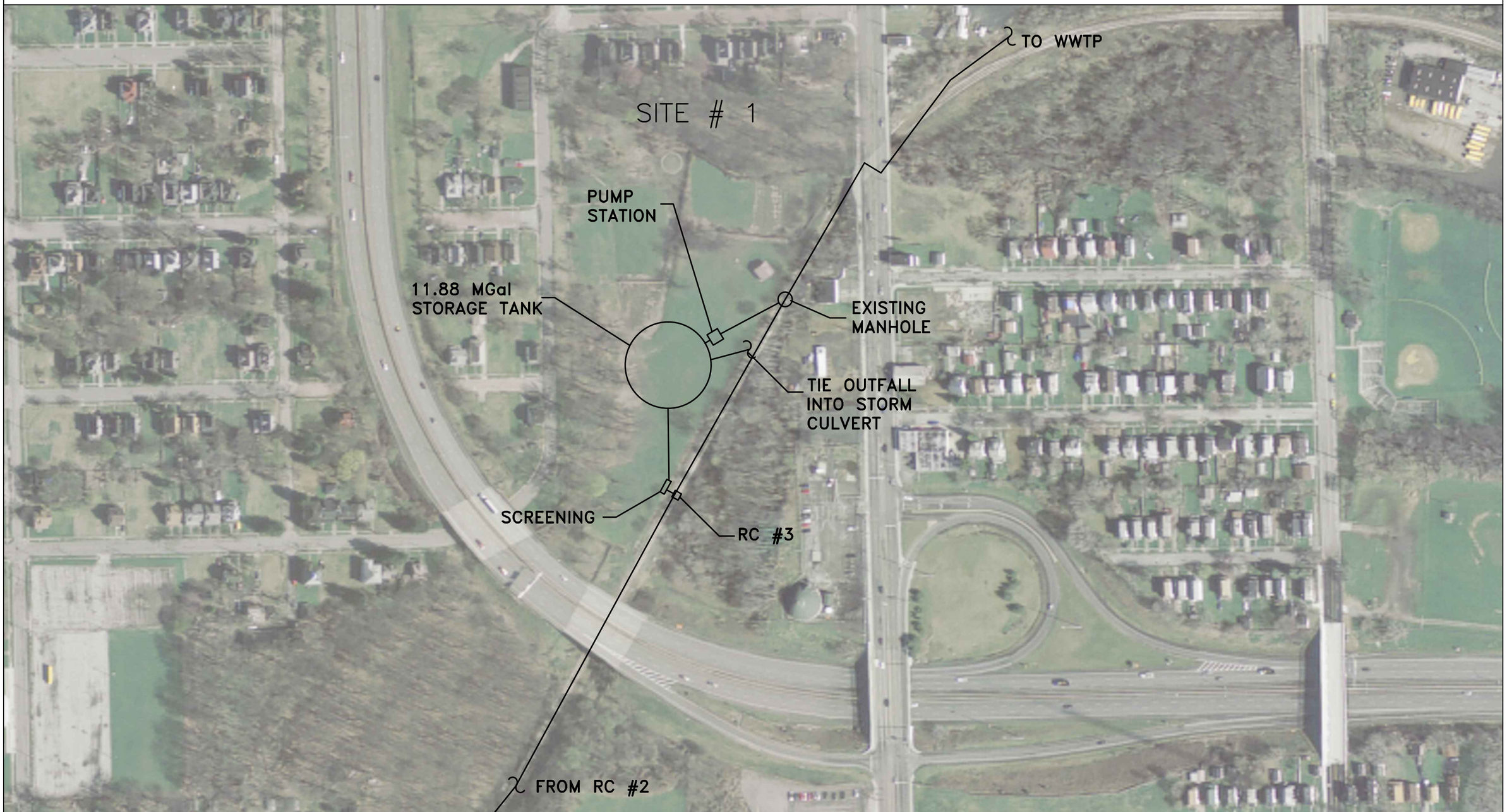
E.P.A. ID #		Structure Number	Location	Sanitary Drainage Area	Receiving Stream	Storage Volume (Mgal)
	6015	OF #1	Hylda Street @ Yo. & So. Rr Tracks	Poland / Woodland Avenue	Jones Creek	4.23
	6016	RC#2	Indianola @ Yo. & So. Tracks	Poland / Woodland Avenue	Jones Creek	0.17
	6017	RC #3	Yo. & So. Rr Tracks @ South Side Park	Poland / Woodland Avenue	Jones Creek	7.48
Site # 1 Storage	*6017			Total		**11.88**
Site # 2 Storage	6043	Of #103	In Scholl Choffins Yard By Pump Station	Mahoning River Collector	Mahoning River	**5.24**

*** Includes storage for 6015, 6016 and 6017.**

6.4 Storage Facilities

<u>Storage @ CSO 6017</u>

This storage facility is located in the Poland/Woodland Drainage area in the southwest portion of the City. Refer to Figure 6.2a. The facility involves the installation of screening



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1" = 200'

FIGURE 6.2A
STORAGE @ 6017
POLAND / WOODLAND DRAINAGE AREA

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facility, a pump station and 11.88 million gallon holding tank. The storage tank is sized to centralize overflows at CSO 6017 from the elimination of CSO 6015 and CSO 6016 by increased pipe capacities from CSO 6015 to CSO 6017. The installation of the storage facility at CSO 6017 limits overflowing to 4 to 6 occurrences per year on average.

Storage CSO 6043

This storage facility is located in the Mahoning River Drainage area in the northern portion of the City. Refer to Figure 6.2b. The facility involves the installation of screening facility, pump station and 5.24 million gallon holding tank. One optional configuration is shown on Figure 6.2b. The flow at RC 103 (CSO 6043) will be diverted to the storage tank and the existing outfall from CSO 6043 to the Mahoning River will be eliminated. The tank will be emptied by pumping to the Marshall Street Pump Station. A new outfall from the storage to the Mahoning River will be provided. The installation of this storage facility limits overflowing to 4 to 6 occurrences per year on average.

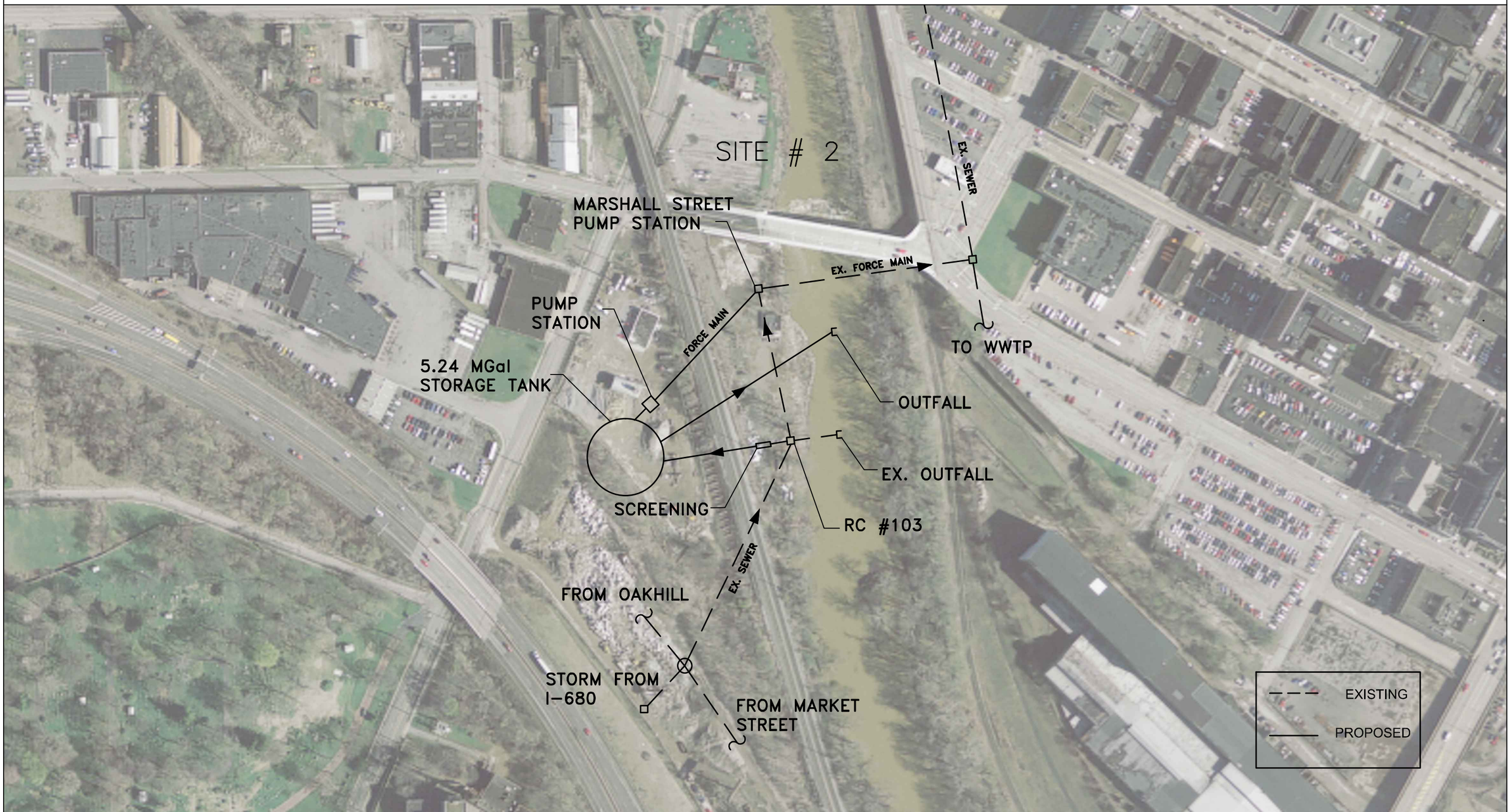
6.5 Project Cost

The estimated project cost for storage at CSO 6017 and new sewer from CSO 6015 to CSO 6017 is $33,109,379. Refer to Appendix F.

The estimated project cost for storage at CSO 6043 is $14,467,159. Refer to Appendix F.

6.6 Summary

Currently the volume of overflowing from CSO's 6015, 6016, 6017 totals 220.8 MG. These overflows trip a total of 138 times annually. By replacing the existing combined sewer between CSO's 6015, 6016 and 6017 with a new sewer of greater capacity eliminates CSO's 6015 and 6017 and diverts the addition flow to CSO 6017. By providing storage at CSO 6017 the frequency of overflowing from CSO 6017 will be reduced from 138 times annually to 4 to 6 times annually. Likewise, at CSO 6043, under existing conditions, the annual volume of overflowing is 63.1 MG with a frequency of 48 annually. By providing storage at CSO 6043 the frequency of overflowing will be reduced from 48 times annually to 4 to 6 times annually. These improvements to the CSS will reduce the overflowing from these locations significantly.



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1" = 200'

FIGURE 6.2B
STORAGE @ 6043
MAHONING RIVER DRAINAGE AREA

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CHAPTER 7

Green Infrastructure Projects

7.1 Introduction

A Green Infrastructure program includes storm water control measures to store, infiltrate, and evapotranspirate storm water before it makes its way into the combined sewer system. Green Infrastructure typically costs less to install and maintain when compared to traditional forms of infrastructure, while naturally managing storm water, reducing flooding risk and improving water quality.

Green Infrastructure initiatives should be well coordinated with other local and regional activities so that these conservation initiatives do not become reactive or narrowly focused and consequently not integrate well with other efforts. A well planned and managed Green Infrastructure program can be utilized to provide environmental protection, a higher quality of life within communities, as well as regulatory predictability for landowners and investors. Green infrastructure projects can also foster community cohesiveness by engaging all residents in the planning, planting and maintenance of the sites.

Some examples of Green Infrastructure projects include:

- Permeable pavements (alleys, sidewalks, parking areas, public recreation areas)
- Constructed wetlands and trees
- Rain gardens
- Greenway trails
- Bioretention swales and systems

Use of Green Infrastructure projects may reduce the long-term cost of Youngstown's CSO program while embracing the use of sustainable and environmentally friendly practices. Green Infrastructure cost-effective practices can provide additional green space and redevelopment to the city while simultaneously addressing the city's regulatory water quality issue.

7.2 Green Infrastructure Plan

As part of the Phase II Consent Decree requirements, Youngstown will prepare a Green Infrastructure Plan. The Green Infrastructure Plan will identify specific Green Infrastructure control measures which will help reduce wet weather flows into the combined sewer system. Moreover, the plan will propose processes for locating, designing, constructing, operating, and evaluating Green Infrastructure control measures. The City will describe how it plans to adjust the hydrologic model parameters directly related to the Green Infrastructure control measures as necessary to accommodate changes caused by shifts in runoff hydrology from the Green Infrastructure control measures.

Youngstown will provide for and describe in the plan, a public participation process that actively involves affected public entities and residents in the decision-making for selection of Green

Infrastructure control measures, including locations where the Green Infrastructure control measures will be sited. Neighborhoods with low income households and high minority concentrations will be given apposite consideration in the selection process. Emphasis will be given to collaborative decision making with community groups whenever possible in developing the Green Infrastructure Plan.

With cooperation from the Office of Economic Development and Development Incentive Manager, the city will also look to assess the use of vacant lots for green infrastructure projects and leverage economic development opportunities in designated redevelopment corridors. This effort may help reduce the long-term program cost while enhancing neighborhoods, providing economic development opportunities, and rebuilding the community.

As part of the Green Infrastructure Plan, the city will further identify planned operation and maintenance activities, with associated schedule, for managing each Green Infrastructure control measure. The city will also demonstrate how it will be able to retain permanent access and sufficient control over the land devoted to the Green Infrastructure control measures set forth in the plan.

7.3 Green Infrastructure Co-Benefits

Within an agreed upon time frame following EPA's approval of Youngstown's Green Infrastructure Plan, the city will prepare a report that will identify and enumerate expected co-benefits of the implemented Phase II Green Infrastructure control measures. The city shall describe the methods to be used to develop and analyze co-benefits. Instances of co-benefits to be identified and enumerated may include:

- Provision for recreational benefits
- Neighborhood aesthetics
- Ecological/ecosystem benefits
- Socio-economic and quality of life benefits to low-income or minority populations
- Energy savings
- Property values
- Life cycle cost savings
- Air quality
- Jobs

In conjunction with identifying tangible Green Infrastructure co-benefits, the EPA should give consideration for the City of Youngstown to identify Green Infrastructure control measures that can be used to capture additional wet weather flows that will decrease the amount of Gray Infrastructure control measures required by the Consent Decree (e.g. "Green-for-Gray" exchange), and in due course provide further co-benefits for Youngstown neighborhoods.

7.4 Post-Construction Monitoring Plan

The city will prepare a Green Infrastructure post-construction monitoring plan to help assess the performance and effectiveness of the Green Infrastructure control measures on a watershed-

specific and/or site-specific scale. The Green Infrastructure post-construction monitoring plan shall establish procedures for conducting performance evaluations on the fully constructed and operating Green Infrastructure control measures.

Watershed-Specific Post-Construction Monitoring Programs

The scope of the watershed-specific post-construction monitoring program will include collecting rainfall and wet weather flow data in sufficient detail to allow:

- Characterization of the Green Infrastructure measures' performance within the given watershed.
- Hydrologic adjustment of the watershed portion of the collection system model to determine the impacts of the Green Infrastructure measures on system performance within the subject watershed.

Site-Specific Post-Construction Monitoring Programs

The site-specific post-construction monitoring program shall establish:

- The approach as to how the various types of Green Infrastructure control measures are to be implemented.
- How Green Infrastructure measures will function to control wet weather flows (e.g., through storage, infiltration, and/or evapotranspiration).
- The monitoring and assessment methods that will be used to evaluate the performance and effectiveness of the various types of practices (i.e. monitoring practices during and after rain events to gauge storage and/or infiltration performance).

Under the site-specific program, it is important that performance evaluations assess the practice effectiveness in terms of the function the given Green Infrastructure control measure was intended to fulfill.

CHAPTER 8

Completed System Improvement Projects

8.1 Introduction

The City of Youngstown's final combined sewer overflow (CSO) alternatives are proposed projects to increase capture of wet weather flows by increasing the wet weather treatment capacity at the City's wastewater treatment plant, the construction of satellite storage facilities at locations along the combined sewer system (CSS) and by increasing the capacity of segments of the CSS to eliminate CSO's to sensitive areas in Mill Creek Park. These proposed projects are outlined in Phase 1 and Phase 2 of this Technical Report. This chapter addresses capital improvement projects completed by the City that have reduced clear water to the CSS and projects that provide for additional storage in the CSS.

Capital improvements projects associated with the CSS are identified as project improvements that resolve flooding issues by installing storm sewers, the demolition of structures, and projects to replace deteriorated combined sewers. These projects are wholly funded by the City and are an essential part of the City's long term control plan (LTCP). Where new storm sewers are installed, existing catch basins are disconnected from the CSS, removed and replaced. New catch basins are connected to the new storm sewer that carries clear water away from the CSS to a receiving stream. When structures are demolished the drains and laterals are disconnection removing combined sewage from the CSS. Where existing combined sewers are replaced the new combined sewers are sized to handle design flows plus additional capacity for in line storage targeting down pipe overflowing.

The following capital improvement projects have increased the effectiveness of the CSS.

8.2 Sewer Separation Projects

The **Marshall Street Sewer Separation Project** completed in 2010 resolved street flooding and basement backups by installing a new storm sewer system, including new catch basins all separated from the CSS. The existing catch basins were removed and disconnected from the CSS. The new storm sewer system discharges directly to the Mahoning River. This resulted in an annual volume **of 951,500** gallons removed from the CSS.

The basis for determining of the volume of storm water removed from the CSS is as follows:

The City of Youngstown's LTCP reviewed and utilized 50 years of rain data to develop storms that would regulate CSO's. Based on historical data, storms exceeding a 5 Year-6 Hour storm occur approximately once per year. Accordingly, the (5 Year-6 Hour) storm was used in the following analysis.

Results from XPSWWM:

- Total Precipitation for 5 Year-6 Hour Storm: 2.19 inches
- Marshall Street Drainage Area (Catchment): 16 acres (Refer to Figure 8.1)

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STORM SEWER PROJECTS
CITY OF YOUNGSTOWN, OHIO

MARSHALL STREET SEPARATION PROJECT

SCALE: 1 = 175'

FIGURE 8.1

Calculation for Marshall Street Drainage Area:

- 2.19 inches / 12.0 inches = 0.1825 feet
- 16 acres X 0.1825 feet = 2.92 acre-feet
- 2.92 acre-feet X 43,560 square feet/acre = 128,195.2 cubic feet
- 128,195.2 cubic feet X 7.48 gallons/ cubic feet = 951,420 gallons

The **Andrews Avenue Sewer Separation Project** completed in 2009 resolved street flooding and basement backups by installing a new storm sewer system, including new catch basins all separated from the CSS. The existing catch basins were removed and disconnected from the CSS. The new storm sewer system discharges directly to Crab Creek. This resulted in an annual volume of **5,173,000** gallons removed from the CSS.

The basis for determining the volume of storm water removed from the CSS is as follows:

The City of Youngstown's LTCP reviewed and utilized 50 years of rain data to develop storms that would regulate CSO's. Based on historical data, storms exceeding a 5 Year-6 Hour storm occur approximately once per year. Accordingly, the (5 Year-6 Hour) storm was used in the following analysis.

Results from XPSWWM:

- Total Precipitation for 5 Year-6 Hour Storm: 2.19 inches
- Andrews Avenue Drainage Area (Catchment): 87 acres (Refer to Figure 8.2)

Calculation for Andrews Avenue Drainage Area:

- 2.19 inches / 12.0 inches = 0.1825 feet
- 87 acres X 0.1825 feet = 15.88 acre-feet
- 15.88 acre-feet X 43,560 square feet/acre = 691,623.9 cubic feet
- 691,623.9 cubic feet X 7.48 gallons/ cubic feet = 5,173,347 gallons.

The **Woodland Avenue Improvement Project** completed in 2010 resolved street flooding and basement backups by installing a new storm sewer system, including new catch basins all separated from the CSS. The existing catch basins were removed and disconnected from the CSS. The new storm sewer system discharges directly to Mahoning River. This resulted in an annual volume of **1,486,000** gallons removed from the CSS.

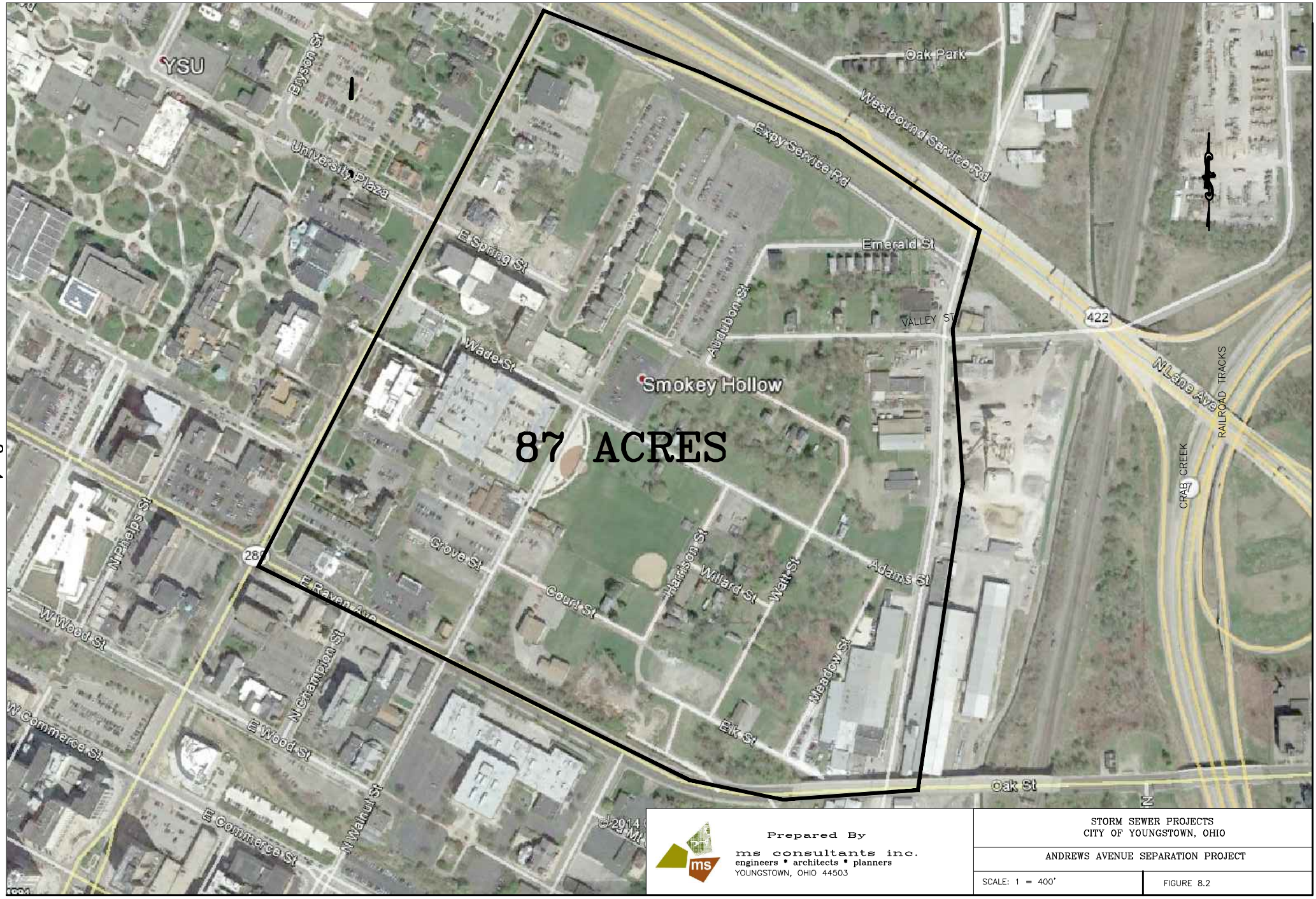
The basis for determining the volume of storm water removed from the CSS is as follows:

The City of Youngstown's LTCP reviewed and utilized 50 years of rain data to develop storms that would regulate CSO's. Based on historical data, storms exceeding a 5 Year-6 Hour storm occur approximately once per year. Accordingly, the (5 Year-6 Hour) storm was used in the following analysis.

Results from XPSWWM:

- Total Precipitation for 5 Year-6 Hour Storm: 2.19 inches
- Woodland Avenue Drainage Area (Catchment): 25 acres (Refer to Figure 8.3)

Calculation for Woodland Avenue Drainage Area:



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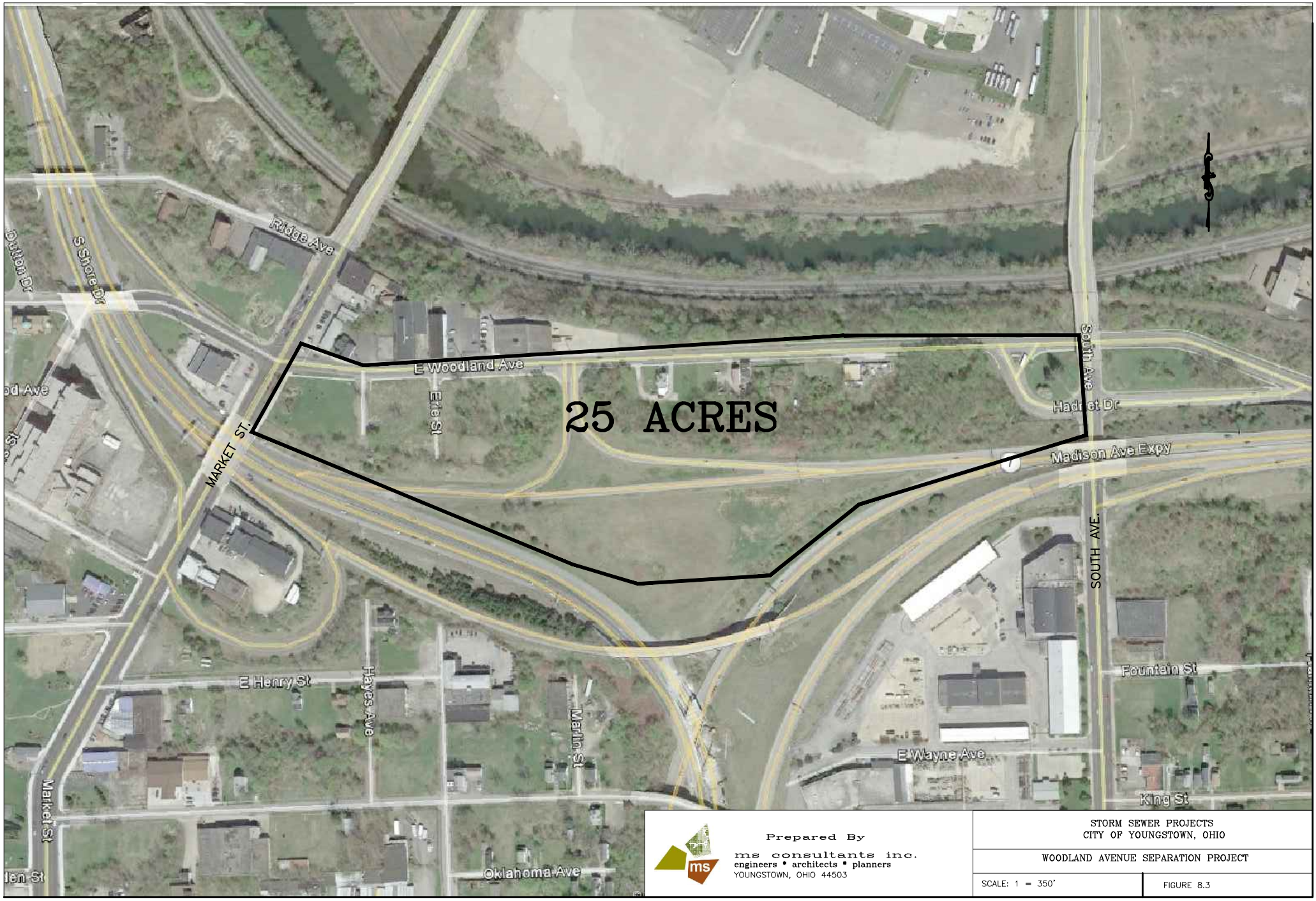
STORM SEWER PROJECTS
CITY OF YOUNGSTOWN, OHIO

ANDREWS AVENUE SEPARATION PROJECT

SCALE: 1 = 400'

FIGURE 8.2



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STORM SEWER PROJECTS
CITY OF YOUNGSTOWN, OHIO

WOODLAND AVENUE SEPARATION PROJECT

SCALE: 1 = 350'

FIGURE 8.3

- 2.19 inches / 12.0 inches = 0.1825 feet
- 25 acres X 0.1825 feet = 4.56 acre-feet
- 4.56 acre-feet X 43,560 square feet/acre = 193,633.6 cubic feet
- 193,633.6 cubic feet X 7.48 gallons/ cubic feet = 1,485,779 gallons

The **McGuffey Heights Sewer Separation Project** completed in 2007 resolved street flooding and basement backups by installing a new storm sewer system, including new catch basins all separated from the CSS. The existing catch basins were removed and disconnected from the CSS. The new storm sewer system discharges directly to a receiving stream. This resulted in an annual volume of **2,199,000** gallons removed from the CSS.

The basis for determining the volume of storm water removed from the CSS is as follows:

The City of Youngstown's LTCP reviewed and utilized 50 years of rain data to develop storms that would regulate CSO's. Based on historical data, storms exceeding a 5 Year-6 Hour storm occur approximately once per year. Accordingly, the (5 Year-6 Hour) storm was used in the following analysis.

Results from XPSWWM:

- Total Precipitation for 5 Year-6 Hour Storm: 2.19 inches
- McGuffey Heights Drainage Area (Catchment): 37 acres (Refer to Figure 8.4)

Calculation for Andrews Avenue Drainage Area:

- 2.19 inches / 12.0 inches = 0.1825 feet
- 37 acres X 0.1825 feet = 6.75 acre-feet
- 6.75 acre-feet X 43,560 square feet/acre = 294,030.0 cubic feet
- 294,030.0 cubic feet X 7.48 gallons/ cubic feet = 2,199,344 gallons.

8.3 Demolition Program

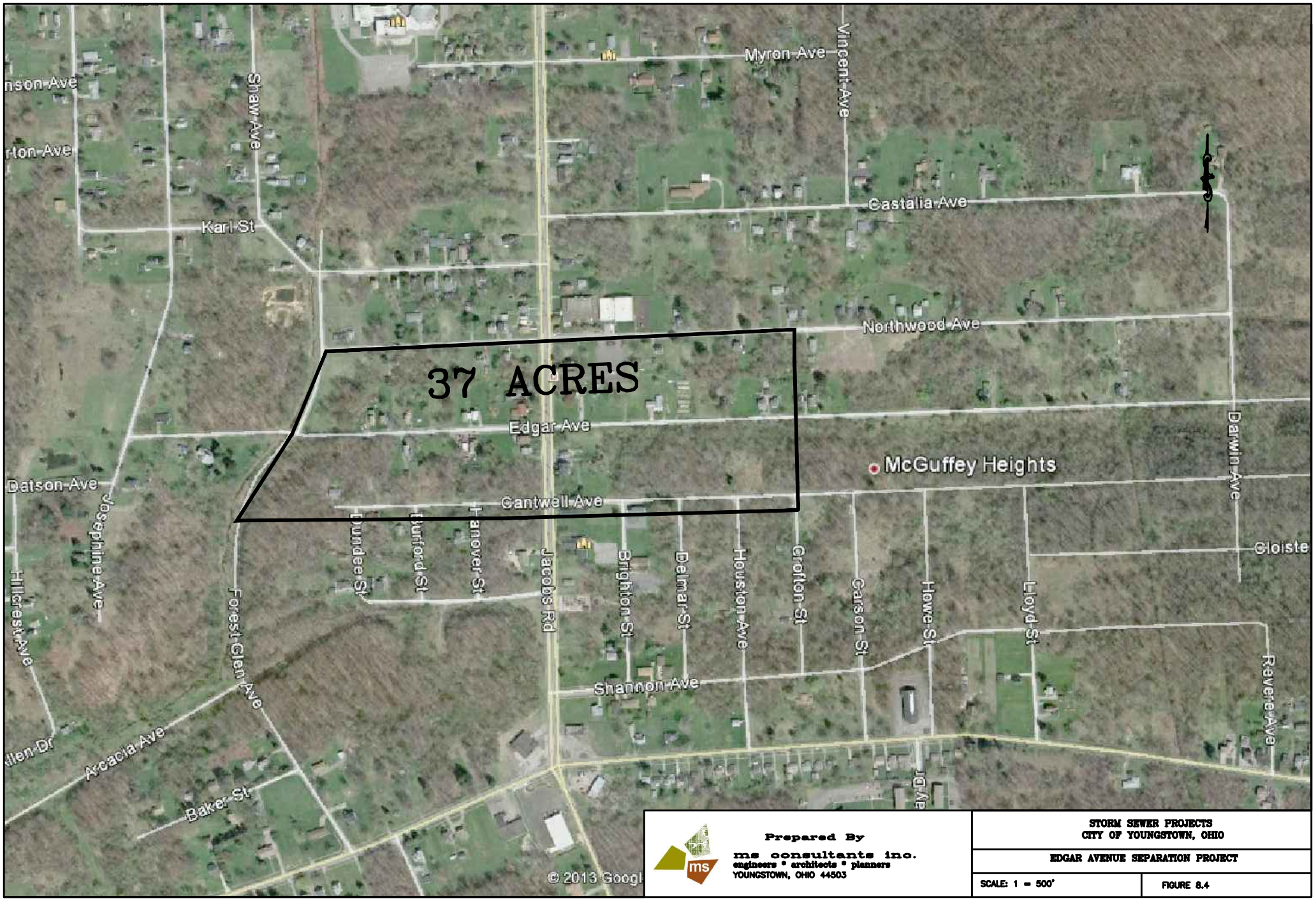
Over the past 19 years the City has invested in a program to demolish structures no longer in service. Starting in 1994 through 2012 the City has demolished over 10,000 structures. The demolition program has eliminated an estimated **35,678,000** gallons of storm water and an estimated **2,100,000** gallons of wastewater from the CSS.

The basis for determining the volume of storm water removed from the CSS is as follows:

The City of Youngstown's LTCP reviewed and utilized 50 years of rain data to develop storms that would regulate CSO's. Based on historical data, storms exceeding a 5 Year-6 Hour storm occur approximately once per year. Accordingly, the (5 Year-6 Hour) storm was used in the following analysis prior to demolition then subsequent to demolition.

Results from XPSWWM:

- Total Precipitation for 5 Year-6 Hour Storm: 2.19 inches
- Average Catchment Per Home: 0.15 acres



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STORM SEWER PROJECTS
CITY OF YOUNGSTOWN, OHIO

EDGAR AVENUE SEPARATION PROJECT

SCALE: 1 = 500'

FIGURE 8.4

Calculation for 10,000 Structures Prior to Demolition :

- Runoff Coefficient (C) = 0.9
- 2.19 inches / 12.0 inches = 0.1825 feet
- 10,000 X 0.15 Acres X 0.1825 feet = 273.75 acre-feet
- 273.75 acre-feet X 43,560 square feet/acre 11,924,550 cubic feet
- 11,924,512 cubic feet X 7.48 gallons/ cubic feet = 89,195,634 gallons
- 89,195,634 X 0.9 = 80,276,071 gallons

Calculation for 10,000 Structures Subsequent to Demolition:

- Runoff Coefficient (C) = 0.5
- 2.19 inches / 12.0 inches = 0.1825 feet
- 10,000 X 0.15 Acres X 0.1825 feet = 273.75 acre-feet
- 273.75 acre-feet X 43,560 square feet/acre 11,924,550 cubic feet
- 11,924,512 cubic feet X 7.48 gallons/ cubic feet = 89,195,634 gallons
- 89,195,634 X 0.5 = 44,597,817 gallons

Volume Eliminated From the CSS:

- 80,276,071 – 44,597,817 = 35,678,254

The basis for determining the volume of wastewater removed from the CSS is as follows:

Based on City records water consumption has fallen from 2.891 billion gallons in 1994 to 1.878 billion gallons in 2011, a drop of over 1.0 billion gallons. A part of the decrease is from demolished structures. Below is a conservative estimate of wastewater eliminated from the CSS due to service lateral disconnections from the demolished structures.

Calculation for 10,000 Structures Demolition:

- 10,000 X 210 gallons = 2,100,000 gallons

8.4 CSS Improvement Projects

The **Orchard Meadow Overflow Project** completed in 2008 resolved the issue of a non-permitted overflow to Bears Den Run a tributary to Mill Creek. The cost of the project was approximately $6,000,000.00. The project involved the replacement of approximately 1800 lineal feet of 36" and 42" combined sewer with 1880 lineal feet of 60" sewer. Approximately 930 lineal feet was deep tunnel installation. The new 60" combined sewer provides in-line storage of **152,000** gallons to off-set the influence of the additional flow in the CSS resulting from the elimination of the Orchard Meadow Overflow.

The proposed **Mill Creek Combined Sewer Replacement Project** will eliminate CSOs to Mill Creek. The upgraded combined sewer system not only has the capacity to convey wet weather flows without CSOs to Mill Creek but has the capacity to store addition wet weather flows. In-line storage capacity of approximately **1.68** million gallons will reduce volumes and pollutant loading to the Mahoning River. Table 8-1 reflects the difference between the current and proposed average annual value from 5 years of continuous simulation of historical wet weather events from Mill Creek CSOs.

Table 8-1 Average Annual Value Comparisons-Mill Creek CSOs									
	Existing System			Proposed System			Reduction		
	Vol.	Load. (TSS)	Load. (CBOD	Vol.	Load. (TSS)	Load. (CBOD	Vol.	Load. (TSS)	Load. (CBO
	MG	LBS	LBS	MG	LBS	LBS	MG	LBS	LBS
Mill Cr. CSOs	58.11	49,737	5,447	0.00	0.00	0.00			
CSO 6004	20.41	18,335	3,030	57.7	51,834	6,229			
Total	78.52	68,072	8,477	57.7	51,834	6,229	20.8	16,238	2,248

The proposed **West/Division Street Combined Sewer Improvement Project** is currently under design and scheduled for completion in 2014. The project is proposed to eliminate three CSO's by replacing approximately 11,000 lineal feet of under sized and deteriorated combined sewer with new larger combined sewer. The cost of the project is estimated at $9,000,000.00. The new combined sewer was designed to provide in-line storage of **136,000** gallons and will influence the influence CSOs in the CSS downpipe from this improvement. Using Table 8-2 and the CSS Schematic in Appendix G as a reference, the influence of the in-line storage compared to the current conditions can be compared.

Model Condition 1: Under current conditions (Existing West/Division Sewer, CSO 6121 eliminated, Normal Flow Up-Pipe of CSO 6098 @ 0.35 MGD, CSOs 6098, 6099, and 6023 Open, 80 MGD Treated at the WWTP) Column "B" of Table 8-2 lists the CSOs annual volumes totaling 414.49 million gallons.

Model Condition 2: Under the proposed West/Division Sewer Improvement (CSO 6121 eliminated, Normal Flow Up-Pipe of CSO 6098 @ 0.50 MGD, 0.136 MG Storage, CSOs 6098 & 6099 Blocked, CSO 6023 Open) Column "C" of Table 8-2 lists the CSOs annual volumes totaling 413.66 million gallons confirming that the in-line storage for the proposed West/Division Sewer Improvement is sufficient. There was no real change in down pipe overflowing. Also note the annual overflow volume decreased from 4.31 MG to 3.62 MG at CSO 6023 reflecting the influence of up pipe storage.

Model Condition 3: Conditions downpipe under the proposed West/Div. Sewer Improvement (CSO 6121 eliminated, Normal Flow Up-Pipe of CSO 6098 @ 0.50 MGD, 0.136 MG Storage, CSOs 6098, 6099, 6023 Blocked, 180 MGD Treated at the WWTP) Column "E" of Table 8-2 lists the CSOs annual volumes totaling 88.00 MG a decrease of CSOs annual volumes of 326.49 MG.

Table 8-2 West/Division In-Line Storage						
A	Combined Sewer Overflows (CSOs)					
	* West/Division Project CSOs					
	** CSOs Downstream to WWTP					
B	Continuous Simulation Run Through Existing Combined Sewer System (CSS), Normal Flow for West/Division 0.35 MGD, All CSOs Open, 80 MGD Treated at WWTP .					
C	Continuous Simulation Run Through Existing CSS With the New West/Division Sewer. Normal Flow at 0.50 MGD. 0.136 MG Storage, CSOs 6098 and 6099 Blocked, CSO 6023 Open, 80 MGD Treated at WWTP.					
D	Increase/Decrease at CSOs					
E	Continuous Simulation Run Through Existing CSS With the New West/Division Sewer. Normal Flow at 0.50 MGD. 0.136 MG Storage, CSOs 6098, 6099 and 6023 Closed, 180 MGD Treated at WWTP.					
F	Increase/Decrease at CSOs					
	A	B	C	D	E	F
		EXISTING CSS (MG) 80 MGD Wet Weather Treatment	WEST/DIV. PROJECT, CSO 6023 OPEN (MG)	INCREASE/ DECREASE (MG)	WEST/DIV. PROJECT, CSO 6023 BLOCKED & 180 MGD WET WEATHER TREATMENT (MG)	INCREASE/ DECREASE (MG)
		Normal Flow 0.35 MGD	Normal Flow 0.50 MGD (0.136 MG Storage)			
	CSO	ANNUAL VOLUME	ANNUAL VOLUME	ANNUAL VOLUME	ANNUAL VOLUME	ANNUAL VOLUME
		(MG)	(MG)	(MG)	(MG)	(MG)
		All CSOs Open	CSOs 6098, 6099 Blocked, 6023 Open		CSOs 6098, 6099 and 6023 Blocked	
	*6098	0.35	0.00	-0.35	0.00	-0.35
	*6099	0.25	0.00	-0.25	0.00	-0.25
	*6023	4.31	3.62	-0.69	0.00	-4.31
	**6024	5.09	5.09	0.00	1.92	-3.17
	**6025	8.53	8.71	0.18	2.26	-6.27
	**6090	13.94	14.02	0.08	4.84	-9.10
	**6128	0.01	0.01	0.00	0.00	-0.01
	**6057	358.29	358.39	0.10	65.03	-293.26
	**6053	20.14	20.14	0.00	10.99	-9.15
	**6054	3.58	3.58	0.00	2.96	-0.62
	Total CSOs Annual Volume	**414.49**	**413.56**		**88.00**	
	Increase/Decrease			**-0.93**		**-326.49**

8.5 Summary

The aforesaid capital improvement projects and demolition program, independent of the CSO Program identified as Phase 1 and Phase 2 of this Technical Report, have an essential role in the efficacy of the City's CSS. The City of Youngstown intends to give sewer separation and demolition projects high priority on their capital improvements list; and, where feasible provide in-line storage when replacing segments of combined sewer in their CSS.

Table 8-3 summarizes the completed sewer separation projects that have reduced the volume of storm water entering CSS. The table also reflects combined sewer improvements that have provided in-line storage to neutralize the additional flow caused by the elimination of CSOs.

Table 8-3 CSS Volume Reduction and In-Line Storage Provisions Projects		
Project	Status	Volume Reduction
		(Gallons)
Marshall Street Sewer Separation Project	Completed	951,500
Andrews Avenue Sewer Separation Project	Completed	5,173,000
Woodland Avenue Improvement Project	Completed	1,486,000
McGuffey Heights Sewer Separation Project	Completed	2,199,000
Demolition Program	On-Going	35,678,000
Total		45,487,000
Project	Status	In-Line Storage
		(Gallons)
Orchard Meadow CSO Elimination Project	Completed	152,000
Mill Creek Combined Sewer Replacement Project	Proposed	1,680,000
West/Division Combined Sewer Imp. Project	Proposed	136,000
Total		1,968,000

EXHIBIT 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Tel. 312-886-0555
Fax. 312-582-5886
pallesen.reginald@epa.gov

April 12, 2011

Charles T. Shasho
Deputy Director of Public Works
City of Youngstown
26 South Phelps Street
Youngstown, OH 44503

Dear Mr. Shasho,

As you know, in 2002 the United States, the State of Ohio, and the City of Youngstown entered into a Consent Decree in *United States v. City of Youngstown,* No. 4:98CV2438 (N.D. Ohio 2002), to resolve long-standing Clean Water Act violations concerning the City's sewer system. The Consent Decree required Youngstown to develop and implement a Long Term Control Plan (LTCP) to eliminate combined sewer overflows (CSOs) to Mill Creek Park and the Mahoning River. The City, U.S. EPA and Ohio EPA have been unable to reach agreement on financial capabilities, control measures, and a construction schedule necessary for approval of the LTCP. Based on a new financial analysis, U.S. EPA and Ohio EPA intend to propose revised control measures and a flexible construction schedule to allow Youngstown to complete the LTCP and begin projects to expand the City's Waste Water Treatment Plant, eliminate CSOs in Mill Creek Park, and construct storage tanks to mitigate CSOs to the Mahoning River.

U.S. EPA's financial contractor, Industrial Economics, has completed a review of Youngstown's Draft Revised Median Household Income (MHI) Analysis, prepared by Erik R. Johnson of Red Oak Consulting, dated April 3, 2009. The Red Oak analysis relied on the City's November 7, 2008, response to an Industrial Economics report dated September 26, 2008. U.S. EPA appreciates the cooperation of the City and its consultants in providing GIS files and other information to Industrial Economics to support and clarify the City's MHI analysis.

Industrial Economics found the City's methodology to delineate the sewer service area to be sound, and otherwise generally agreed with the methods that the City used to estimate the households served outside the City limits and the related MHI for the entire service area. However, Industrial Economics updated its analysis and some of the City's accounts calculations using the 2007 American Community Survey (ACS) data. More importantly, Industrial Economics utilized a Residential Indicator analysis that follows U.S. EPA's *Combined Sewer Overflow Guidance* and the methodology from its September 26, 2008, report, rather than the rate projection analysis employed by the City. Nonetheless, Industrial Economics reached similar conclusions regarding the Residential Indicator, and determined that the $310 million cost projected in 2002 for the LTCP resulted in a "High Burden" for households served by Youngstown's system.

The High Burden determination warrants a change in the LTCP Implementation Schedule. U.S. EPA and Ohio EPA previously discussed with Youngstown some additional Control Alternatives Analysis regarding costs associated with controls for further reductions in the number of projected CSO events per year. However, given the High Burden determination, an additional Alternatives Analysis at this time would be premature. In addition, it is untenable to further delay implementing badly needed controls pending additional financial capabilities projections and analyses, a comprehensive Control Alternatives determination, and final performance standards.

Accordingly, U.S. EPA and Ohio EPA are proposing a phased Implementation Schedule for Youngstown's LTCP, primarily utilizing control alternatives identified in the City's June 2002 *Evaluation of CSO Control Alternatives*. Under the first eight-year phase of the LTCP, the City would implement and complete the following projects: 1) refurbishment and expansion of the headworks at the Waste Water Treatment Plant, including provisions for disinfection of all effluent; 2) elimination of all CSOs in Mill Creek Park and construction of treatment or storage facilities at CSO 6003; and 3) construction of a 7.65 MG storage tank at CSO 6017.

Likely projects for the second phase of the LTCP include: 1) construction of a 20 MG storage tank at CSO 6057; 2) construction of smaller storage tanks at CSOs 6015, 6043, 6046, and 6053; 3) green infrastructure; and 4) implementation of new treatment technologies. However, at the end of Phase I, prior to implementation of Phase II, the remainder of the LTCP would be reassessed to determine what additional steps could and should be taken to complete the LTCP and allow the City to meet Water Quality Standards regarding its discharges to the Mahoning River. This would require: 1) an updated CSO Alternatives Report; 2) additional Control Alternatives Analyses; 3) a performance analysis and evaluation for those controls already in place; 4) an updated Financial Capabilities Assessment; and 5) a new Implementation Schedule for the rest of the LTCP.

We would like to schedule a meeting as soon as practicable, preferably at the Ohio EPA offices in Twinsburg, so that we can clarify the proposal for phased implementation of the City's LTCP and discuss and resolve any other issues necessary to finalize the LTCP. Please reply with some suggested dates so that we can set up such a meeting. Both U.S. EPA and Ohio EPA are anxious to conclude this extraordinarily long process and move the City toward required control of its sewer overflows and compliance with the Consent Decree and the Clean Water Act.

Sincerely,

/s/

Reginald A. Pallesen
Associate Regional Counsel

cc: Iris Guglucello, Youngstown
John Kwolek, Ohio EPA
Newton Ellens, U.S.EPA
Barbara VanTil, U.S. EPA

EXHIBIT 2

City Of Youngstown - LTCP Meeting

8/30/2011

John Kwolek	Ohio EPA	330-963-1251 john.kwolek@epa.state.oh.us
Thomas S. Miranto III	City of Youngstown WWTP	330-742-8820 TomMIR@CITYOFYOUNGSTOWNOH.com
Daniel Markowitz	Malcolm Pirnie / ARCADIS	330 515 5671 danomarkowitz@arcadis-us.c
Anthony Farris	Youngstown Law Dept.	(330) 742-8874 ajf@cityofyoungstownoh.com
CHARLES SHASHO	" Public Works	330-742-8800 CS.HASHO@CITYOFYOUNGSTOWNOH.co
JOE CATULLO	MS CONSULTANTS	330-744-5321 jcatullo@msconsultants.
DAN T. PRIBICH	YOUNGSTOWN LAW DEPT.	330-742-8874 dtpribich@cityofyoungstownoh.com
JEREMY GASTON	ms consultants	330-744-5321 jgaston@msconsultants.com
John PIERKO	ms consultants	330 744 5321 jpierko@msconsultants.com
Newton Ellens	USEPA	312-353-5562 ellens.newton@epa.gov
Reg Pallesen	U.S. EPA JURL	312-886-0555 pallesen.reginald@epa.gov
Mark Klingenstein	SAIC	973-429-2911 mark.j.klingenstein@saic.com

EXHIBIT 3

Department of Law

ANTHONY J. FARRIS, Director Of Law

City of Youngstown, Ohio

Mayor Charles P. Sammarone

City Hall Youngstown, Ohio 44503 330/742-8874

December 8, 2011

Mr. Reginald A. Pallesen
Office of Regional Counsel (C-14J)
U.S. EPA, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

RE: City of Youngstown Technical Draft
United States v. City of Youngstown, No. 4:98 CV 2438
(ND Ohio 2002)

Dear Mr. Pallesen:

Enclosed please find two (2) copies of the technical draft prepared by the City of Youngstown for your review. I have also sent a copy to John Kwolek and Mark J. Klingenstein.

It is our hope that you will find the series of projects described within to be satisfactory for Phase I of our potential Long Term Control Plan. If you have any concerns or qualms about the document, please contact me and we will make every effort to address them.

I look forward to hearing from you.

Sincerely yours,

Anthony J. Farris

Anthony J. Farris
Law Director

AJF/dmb

cc: John Kwolek, District Engineer, Division of Water
Northeast District Office, 2110 East Aurora Road
Twinsburg, Ohio 44087

Mark J. Klingenstein, Senior Environmental Engineer
Logistics and Product Solutions Group, Science Applications
International Corporation, 155 Passaic Avenue, Second Floor
Fairfield, New Jersey 07004

EXHIBIT 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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77 WEST JACKSON BOULEVARD
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April 11, 2012

Anthony J. Farris
Law Director
City Hall
City of Youngstown
Youngstown, Ohio 44503

Dear Mr. Farris,

The U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency have reviewed the Technical Report (Final CSO Control Alternatives) submitted by the City of Youngstown on December 11, 2011. Although the Technical Report constitutes a significant step toward completion of an approvable Long Term Control Plan (LTCP) for the City, it still contains a number of deficiencies and omissions, which are detailed below. U.S. EPA and the Ohio EPA would like the City to revise the Technical Report, consistent with the following comments, and resubmit it as the final CSO Control Alternatives section of the LTCP.

CSO 6003 Control

The selected alternative (Alternative 1) for much of the Mill Creek area is the construction of new, larger sewers, which will consolidate and increase the flow, perhaps by as much as 30 million gallons per year of new flow, at CSO 6003 on the Mahoning River. However, it is unclear if and when Youngstown plans to construct treatment or storage facilities to control overflows at CSO 6003.

In its previous Control Alternatives Analysis, Youngstown proposed a 13 MG storage tank at CSO 6003. And, in its April 12, 2011, letter to the City proposing a phased LTCP implementation schedule, U.S. EPA specifically cited "elimination of all CSOs in Mill Creek Park and construction of treatment or storage facilities at CSO 6003" as required controls for Phase I. Among other things, the concentration of flow and continued overflows at CSO 6003 may be an issue regarding Ohio's anti-degradation policy. Some alternative to address overflows at CSO 6003 in Phase I must be included in the CSO Control Alternatives Report.

Youngstown proposes construction of over a half mile of 5x10 foot box sewer upstream of CSO 6003 to eliminate CSOs in Mill Creek Park. The City should investigate the possibility of using this sewer for inline storage, as it could possibly provide almost a million gallons of storage capacity. This would likely involve the addition of an inflatable dam and a relatively small

dewatering pump station. Expanding the size of the box sewer pipe might provide an opportunity for additional storage. While 1 MG will not fully address the Mill Creek CSO volumes flowing to CSO 6003 in a typical year, it would likely capture a meaningful fraction of the annual volume, and may provide some justification for including construction of treatment or additional storage facilities at CSO 6003 later in a Phase I that is longer than the eight-year schedule originally proposed by U.S. EPA.

Mill Creek CSO Elimination

As noted, Youngstown proposes to eliminate CSOs in Mill Creek Park by constructing new, larger sewers to replace those on which many of the current CSOs are located. This is an ambitious project that would address many of the long-standing CSO problems in the Park. The City proposes to design and construct these sewers in four phases, with design of the first phase to be completed in 2020 and construction of the last phase to be completed in 2025. However, it appears that the City is not fully-committed to completing the entire Mill Creek CSO elimination project.

In regard to Phase I of the LTCP, Youngstown states in Section 5.3 of the Technical Report that it will perform a financial capability assessment in the 3rd quarter of 2018 to determine the feasibility of the proposed Mill Creek construction schedule, as well as to determine how many phases of the new sewer project will ultimately be completed. In regard to Phase II of the LTCP, the City states in Section 5.3 that, "based on the actual costs associated with wet weather treatment and the existing plant improvements, the option to contemplate Phase 2 projects in lieu of the Mill Creek Improvements may be a consideration."

The failure to complete the entire Mill Creek CSO elimination project is unacceptable. As Youngstown notes in Section 4.1 of the Technical Report, Mill Creek Park is a sensitive area and Mill Creek is designated as a State Resource Water, a Warm Water Habitat and a Primary Contact recreation stream. Elimination of CSOs in the Park has long been the subject of discussions between the City, U.S. EPA and the Ohio EPA. The City must commit in the CSO Control Alternatives Report to implementing and completing the entire Mill Creek CSO elimination project on a fixed schedule.

In addition, Youngstown observes that a number of CSOs in Mill Creek Park (CSOs 6012, 6013, 6074, 6069, and 6093) do not show activation in the XP-SWMM storm water model 5-year 6-hour storm event, and therefore do not require control. The City should also note whether any of these CSOs show any activations based upon its NMC #1 CSO inspection program.

Implementation Schedules

Youngstown's Technical Report contains implementation schedules that are much longer than those the Agencies originally proposed, and the schedules appear to be open-ended. In its April 12, 2011, letter, U.S. EPA proposed an eight-year Phase I implementation schedule, with, among other things, an updated Financial Capabilities Analysis at the end of Phase I, prior to the implementation of Phase II. In Section 5.3 of the Technical Report, the City is proposing an

eight-year schedule for completing Wet Weather Facilities and WWTP Improvements, and then a consecutive five-year schedule for completion of the Mill Creek CSO elimination project, for a total 13-year Phase I implementation schedule. As noted, this implementation schedule does not include any treatment or storage at CSO 6003, and, apparently, the City qualifies the schedule by suggesting a reassessment of financial capability in the 3rd quarter of 2018 to determine the feasibility of implementing the proposed schedule for the Mill Creek CSO elimination project, as well as suggesting that Phase II projects might be substituted for Mill Creek projects.

U.S. EPA and the Ohio EPA are not opposed to adjusting the length of the Phase I schedules, depending on the specific controls to be constructed, but the Agencies cannot approve an uncertain 13-year schedule for Phase I that does not even include a remedy at CSO 6003. The Agencies sought to accommodate some of Youngstown's concerns with the traditional LTCP by allowing a phased implementation schedule and a new Financial Capabilities Analysis after the first phase. However, the Agencies cannot agree to condition the LTCP on multiple reassessments of the City's financial condition. In the CSO Control Alternatives Report, the City should determine a shorter, more substantive implementation schedule for Phase I; eliminate the proposed 2018 financial capability reassessment; commit to completion of the entire Mill Creek CSO elimination project in Phase I; and include an alternative for control at CSO 6003.

Mill Creek Permits

The selected alternative for the Mill Creek basin (Alternative 1) includes a box culvert under Mill Creek. It is assumed that the installation will include an open cut of the stream. However, there is no reference in the Technical Report to U.S. Corps of Engineers or Ohio EPA permits, and the costs in Appendix E do not include permitting costs. Also, there is no reference to surveying the area for wetlands. These two items should be specifically addressed in the revised CSO Control Alternatives Report as procedural considerations so that all parties are informed of any permitting requirements.

WWTP Rehabilitation

Youngstown is proposing significant rehabilitation of its existing Waste Water Treatment Plant, at a cost of $37 million. It is not clear that all of the proposed work is needed at this time. The City appears to be rehabilitating in Phase I everything that it thinks may be needed at the WWTP over the next 25 years. CSO projects that impact human health and the environment are a higher priority than non-critical WWTP upgrades. Also, the City is proposing to replace its existing chlorine-based disinfection system with UV. The City should explain why this switch in disinfection technology is necessary - rehabilitating the existing system would likely be less expensive.

Youngstown is proposing construction of a new Administrative/Laboratory Building. The City notes that the existing laboratory is cramped, but it does not explore more cost-efficient options, such as expanding the existing building or just building a new lab. It is not clear that a new building should have higher priority than other direct control projects that are being deferred.

Youngstown is also is proposing to use a high dosage/high rate mixing/short contact time chlorination system with its new High-Rate Treatment (HRT) facility. The City should determine from the Ohio EPA what criteria must be met for issuance of a PTI for such a system. The City should also have a secondary plan for HRT disinfection should the high dosage/high rate system not be capable of meeting the required criteria.

Cost Accounting in the Technical Report

Youngstown provides descriptions of the Phase I elements in Chapter 3 of the Technical Report, and detailed costing in Appendix D. Although each element in Chapter 3 seems to be accounted for in Appendix D, the groupings are confusing. For example, the fine screening and grit building is described in Section 3.2.3 as part of the HRT facility; however, Figure 3.3 does not show it as part of the treatment train. Then, the fine screening and grit building is included in the cost estimate for the HRT facility. It would be helpful if Youngstown could group elements and costs in the system where they are being used, and provide an explanation of those that are included in both or split the costs between the two. Also, it does not appear that the influent to the HRT system will receive grit removal or screening, both of which are necessary pretreatment steps for HRT.

CSO 6057

Youngstown has included reduction of CSO 6057 overflow frequency in the HRT facility cost estimate and description. However, other than noting in Section 3.2.1 of the Technical Report that the previous overflow volume from CSO 6057 would enter a new junction box via a 96 inch pipe and be directed to a new raw sewage pump station, few details are provided. The City must describe in greater detail in the CSO Control Alternatives Report the means by which CSO 6057 will be addressed.

In Section 6.4 of the Technical Report, Youngstown defers storage volume estimates for CSO 6057 until after completion of the HRT facility and post-construction monitoring. Since the City does not provide any estimate of the reduction in frequency and volume of discharge from CSO 6057 that will be affected by Phase I, it is difficult to determine if this response is adequate. Youngstown should describe its collection system model's predictions for the degree to which CSO 6057 will be eliminated by the WWTP/HRT projects.

WWTP Flow Schematics

Technical Report Figure 3.6 shows the WWTP process flow schematic for flows of less than 80 MGD. The Figure shows a "recycle flow" (based only on line type – it is unlabeled) directed from the primary clarifier effluent to the chlorine contact tank. Presumably this is the secondary bypass that will no longer be used, except perhaps during "emergency" conditions. On Figure 3.1 depicting the existing flow path, this stream is labeled "secondary bypass." In the revised CSO Control Alternatives Report, the City should provide corrected flow schematics and clarify the anticipated future use of the bypass.

Storage at CSO 6043

Technical Report Figure 6.2B depicting a storage project at CSO 6043 is unclear and confusing. In the revised CSO Control Alternatives Report, Youngstown should clarify the structures and flows in this Figure, and more thoroughly explain the storage project, including detailing how wastewater will be diverted from the existing Marshall Street pump station to the storage tank. In addition, the Report should include a description of how this storage project will impact the wet well overflow frequency and volume for the Marshall Street pump station.

CSO Technologies

Although Chapter 8 of the Technical Report *CSO Technologies* is informative, it seems out of place in a final CSO Control Alternatives Report. Youngstown should consider omitting this chapter from the revised Report.

U.S. EPA and the Ohio EPA would like to discuss with Youngstown and its consultants the process and timeline for revising the CSO Control Alternatives Report and completing the City's LTCP. Please contact me to schedule a conference call for this purpose. The Agencies appreciate Youngstown's efforts in completing the Technical Report. We remain confident that an approvable LTCP to bring the City into compliance with the Consent Decree and the Clean Water Act can be achieved in the very near future.

Sincerely,

Reginald A. Pallesen
Associate Regional Counsel

EXHIBIT 5

Department of Law

ANTHONY J. FARRIS, Director Of Law

City of Youngstown, Ohio

Mayor Charles P. Sammarone

City Hall Youngstown, Ohio 44503 330/742-8874

July 3, 2012

Mr. Reginald A. Pallesen
Associate Regional Counsel
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

RE: Response of City of Youngstown

Dear Mr. Pallesen:

The City of Youngstown appreciates the time the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency EPA representatives spent with us on May 15, 2012, to discuss the comments provided towards our *Technical Report (Final CSO Control Alternatives)* issued on December 9, 2011. We felt the discussion was productive and helped both sides elucidate on their latest concerns.

As you know, the City is sensitive to the consequence of reaching a LTCP agreement that is realistic. We are committed to reaching an agreement with the agency on a phased implementation schedule that will improve water quality in the Mahoning River and Mill Creek, while being responsive to the City's current and long-term economic condition. This letter is a follow-up response to the May 15, 2011, request for clarification and attempt to address comments and questions raised on the *CSO Control Alternatives Report.*

Mill Creek CSOs

The *CSO Control Alternatives Report* dated December 2011 proposed the installation of a new box culvert and larger sewers to eliminate the CSOs tributary to Mill Creek. This proposal will facilitate additional storage in the proposed sewer as well in the

existing sewer to control flows that are attributable to Mill Creek CSOs and centralized to the Mahoning River through CSO 6004. In addition, as part of the Phase I improvements, the City proposes to consider a new siphon barrel downstream of CSO 6004 to aid in controlling overflows at CSO 6004 if upstream pipe storage is not sufficient.

The City is committed to eliminating CSOs within Mill Creek Park and will properly address the required storage and/or treatment requirements within the basin through additional modeling. Through the modeling effort, should a more effective option become apparent without compromising the ultimate objective of elimination of CSOs to Mill Creek, the identified option will be implemented as part of the conceptual design phase.

In regards to CSO 6003, the City will determine during the conceptual design phase the practicality of unifying CSO 6004 with CSO 6003 even though the elimination of Mill Creek CSOs will have no impact on CSO 6003.

CSO 6057

The construction of a new 100 MGD high-rate treatment facility adjacent to the existing WWTP is proposed to effectively control activation of CSO 6057. During wet weather events, controlled flows from CSO 6057 that previously entered the Mahoning River will be captured and conveyed to the new high-rate treatment facility to provide 85% TSS removal and disinfection. The capture at CSO 6057 will eliminate an estimated 50 overflow events and 360 million gallons of untreated combined sewage into the Mahoning River annually. Also, as a point of clarifications, Phase I of the wet weather facility will include the pump station, screening and grit removal facilities.

WWTP Rehabilitation and Cost Accounting

As a means of clarification for the agency, fine screening and grit removal will be incorporated into the new CSO High-Rate Treatment Facility. Figures 3.2 and 3.3 attached have been revised to clarify the proposed treatment process. Appendix D will be modified in the revised *CSO Control Alternatives Report* to help

clarify the accounting of these capital costs. Further design details and cost refinements will be dependent on the ballasted flocculation process ultimately selected.

It is expected that the City will require a new control system to account for the additional I/O generated from the CSO High-Rate Treatment Facility as well as the upgraded wastewater plant processes. As an alternative to constructing a new Administration Building as proposed in the initial *CSO Control Alternatives Report,* the City will consider reusing the existing Administration Building for administrative purposes (e.g. staff housing), and subsequently construct a new laboratory/control building to house an expanded and contemporary laboratory and a modern SCADA system and servers. The new control system is essential to accommodate several thousand I/O points collectively from the collection system, upgraded WWTP and CSO High-Rate Treatment Facility. Due to existing WWTP site constraints, the new laboratory/control building is projected to be sited near the CSO High-Rate Treatment Facility. The determination as to the type of control system (PC based, PLC control, or DCS), and the requisite building size needed will be made during the conceptual design phase. This approach will necessitate a control room addition to the existing Administration Building to facilitate new fiber optic construction for the existing WWTP and subsequently curtail construction costs.

WWTP Flow Schematics

Figure 3.6, *WWTP Flow Schematic, Flows ≤ 80 MGD,* included the initial *CSO Control Alternatives Report,* has been updated to reflect the abandonment of the secondary treatment bypass, see revised Figure 3.6 attached. Flows in excess of approximately 80 MGD will be conveyed to the new CSO High-Rate Treatment Facility, and flows to the WWTP will be regulated via new raw sewage pumps.

Permitting

The City acknowledges the need for a proactive permitting response in addressing combined sewer overflows. Further, the City recognizes the procedural considerations and schedule impacts that accompany this response. As discussed during our May 15, 2012, call, the City is committed and prepared to work efficiently with

the U.S. Army Corps of Engineers and Ohio EPA for the array of Phase I improvements. We will also actively engage the Mill Creek Park District during all endeavors associated with the Mill Creek improvements.

The implementation schedule provided in the initial *CSO Control Alternatives Report* included provisions for agency reviews during each of the Phase I activities proposed. We will provide additional clarity for securing the appropriate permits in our revised implementation schedule in an effort to meet the permitting requirements associated with the CSO Control Alternatives identified.

CSO Technologies

As suggested during our May 15 call, we will remove *Chapter 8, CSO Technologies*, from our revised *CSO Control Alternatives Report* to help mitigate any mis-interpreted commitments.

Implementation Schedule

The City and EPA officials have agreed to engage a phased LTCP implementation schedule. As originally proposed by the agency in its April 12, 2011, letter, the City will perform an updated Financial Capabilities Analysis following the completion of Phase I, prior to initiation of Phase II. The revised implementation schedule reflects this approach while eliminating the interim financial capability assessment previously shown in the 3rd quarter of 2018.

For the agency's benefit and better cost accounting, we have prioritized improvements at the existing WWTP and have incorporated the individual projects into the revised implementation schedule. A copy of the revised schedule is attached.

Along with the U.S. and Ohio EPA's mission, the City is committed to gaining approval of our LTCP, and is eager to begin reducing CSO environmental impacts. We look forward to continuing, and ultimately finalizing, LTCP negotiations with EPA. We trust the narrative offered herein helps clarify outstanding issues with the agency prior to submitting our revised Technical Report.

If there is anything further we can do to promote clarity, please let us know. We look forward to hearing from you.

Sincerely yours,

Anthony J. Farris
Law Director

AJF/dmb

EXHIBIT 6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
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Tel. 312-886-0555
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pallesen.reginald@epa.gov

September 11, 2012

Anthony J. Farris
Law Director
City Hall
City of Youngstown
Youngstown, Ohio 44503

Dear Mr. Farris,

The U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency have considered your July 3, 2012, letter regarding proposed revisions to the Technical Report (Final CSO Control Alternatives) submitted by the City of Youngstown on December 9, 2011. We are generally pleased with the revisions, and believe that the parties are now very close to completion of an approvable Long Term Control Plan (LTCP) for the City. However, there are a few items about which we have comments or need clarification, as set out below. Upon resolution of these items, the U.S. EPA and the Ohio EPA would like the City to do one last revision the Technical Report and resubmit it as the Final LTCP.

CSO 6003/6004 Control

We better understand the relationship of CSOs 6003 and 6004 regarding the Mill Creek CSO elimination project. We will not require CSO 6003 to be addressed in Phase I of the LTCP. And, we do not see any particular advantage to combining CSOs 6003 and 6004 during Phase I. Rather, we would like a commitment from the City to consider control of CSO 6003 in Phase II of the LTCP, along with previously discussed control of CSOs 6015, 6016, 6017, and 6043.

We are comfortable with the proposed schedule for modeling increased flows in the Mill Creek basin; the possibility of a siphon barrel downstream of CSO 6004; and the use of new and existing Mill Creek sewers for wet weather storage. However, we expect that the increased flows at CSO 6004 resulting from the elimination of CSOs in Mill Creek Park will not cause more frequent overflows at CSO 6004 or additional CSO activation downstream of the new siphon. Accordingly, we would like a commitment from the City to construct during Phase I of the LTCP storage, treatment and/or other controls at and downstream of CSO 6004 to, at a minimum, assure, based on the results of the modeling, that additional flows from the Mill Creek CSO elimination project do not result in increased CSO activation at and below CSO 6004 and violate the Clean Water Act anti-degradation policy regarding the Mahoning River.

Mill Creek CSO Elimination

We would like the City to confirm that the selected alternative for the Mill Creek CSO elimination project is Alternate 1 in the December 2011 Technical Report, which is essentially Alternative 3 in the June 2002 CSO Control Alternatives Report. We are pleased with the new schedule to implement and complete the entire Mill Creek CSO elimination project in Phase I of the LTCP. We would like the City to confirm that the reference in your July 2012 letter to "eliminating CSOs within Mill Creek Park" means complete, physical elimination of the CSOs, and not merely reduction of annual overflow events. Also, we assume that the phrase in the letter "a more effective option" refers to storage and/or treatment in the Mill Creek basin and not to elimination of the CSOs in Mill Creek Park. Moreover, any such more effective option may be implemented only with approval of the U.S. EPA and the Ohio EPA.

Implementation Schedules

We are also pleased with Youngstown's consolidation of the Phase I implementation schedules. Although the overall schedule for Phase I of the LTCP is longer than the agencies originally proposed, we think that the schedule is reasonable, given the scope of work and expenditures to which the City is committing.

In the revised implementation schedule, the City refers to sub-parts of certain Phase I projects as "Phase I" and "Phase II" (for example, "Wet Weather Facility Phase I" and "Wet Weather Facility Phase II" and "Mill Creek Interceptor Phase I, Phase II, Phase III, Phase IV"). We think this terminology is confusing since the two phases of the LTCP have been nominated as Phase I and Phase II. Accordingly, we suggest that these subparts be renamed as "Wet Weather Facility Part 1" and "Wet Weather Facility Part 2" and "Mill Creek Interceptor Part 1, Part 2," etc.

The implementation schedule for the Waste Water Treatment Plant upgrade includes Disinfection System Improvements in years seven and eight of Phase I of the LTCP. Problems with the existing disinfection system cause the WWTP to be in Significant Noncompliance during the disinfection season. Therefore, we would like the City to consider moving the Disinfection System Improvements up to years three and four of the schedule.

Finally, the proposed LTCP Phase II Financial Capabilities Assessment and Project Considerations are set in years 15 and 16 of the implementation schedule, after the completion of all Phase I projects. We would like the City to consider moving those activities up to years 12 and 13 of the schedule, making them concurrent with the final stages of Phase I. This would allow detailed planning for Phase II to begin right at the time Phase I is completed, and thereby minimize delay between the two phases of the LTCP.

CSO 6057/Wet Weather Facility

After clarification and further review, we have concluded that the proposed CSO 6057/Wet Weather Facility project is an excellent project. The City and its consultants are to be commended for developing and planning this project. Implementation of this project, along with

the concurrent WWTP upgrade and Mill Creek CSO elimination project, will result in very substantial improvements to both the integrity of the City's wastewater collection and treatment infrastructure and the environment in Mill Creek Park and the Mahoning River.

We would like the City to confirm that "Wet Weather Facility Phase I" ("Wet Weather Facility Part 1," under the terminology suggested above) includes the pump station and screening and grit removal facilities, and that "Wet Weather Facility Phase II" ("Wet Weather Facility Part 2") consists of the rest of the project, which is everything in Technical Report Figure 3.3. The preliminary cost estimate for the Wet Weather Facility should be updated and broken down by schedule item. Finally, the City should confirm the capacity of the Wet Weather Facility.

WWTP Upgrade

The revised proposal and schedules for the Waste Water Treatment Plant upgrade are acceptable to us, with the provision that the City consider accelerating by four years the Disinfection System Improvements, as noted above. Also, contrary to our earlier concern about the City's proposal to replace its existing chlorine-based disinfection system with UV, we now agree that UV disinfection should be utilized. The Ohio EPA prefers UV disinfection over chlorination because of the potential problems associated with sulfite chemicals used for de-chlorination. In addition, UV seems to be effective at meeting the new E. coli standards set by the Ohio EPA.

Storage at CSO 6043

Our earlier concerns regarding the proposed CSO 6043 storage project were not addressed in your July 3, 2012, letter. The City should clarify the structures and flows in the depiction of the CSO 6043 storage project in Technical Report Figure 6.2B, and more thoroughly explain the storage project, including detailing how wastewater will be diverted from the existing Marshall Street pump station to the storage tank and describing how this storage project will impact the wet well overflow frequency and volume for the Marshall Street pump station.

Construction Milestones

Paragraph 11 of the Consent Decree in United States v. City of Youngstown, No. 4:98CV2438 (N.D. Ohio 2002), provides the following:

> As part of its proposed Implementation Schedule submitted pursuant to Paragraph 10(b) above, Youngstown shall propose to Ohio EPA and U.S. EPA, for review and approval, at least five milestones for which stipulated penalties shall apply, pursuant to Paragraph 38, if the milestones are not achieved in accordance with the approved Implementation Schedule for the LTCP. The milestones proposed by Youngstown shall relate to and be consistent with the proposed Implementation Schedule and shall be based on objective criteria such that Youngstown, U.S. EPA, and Ohio EPA shall each be capable of, on the associated milestone date, determining with certainty whether Youngstown has completed that milestone. The final milestone shall be the submission of the Post Construction Monitoring Program Report.

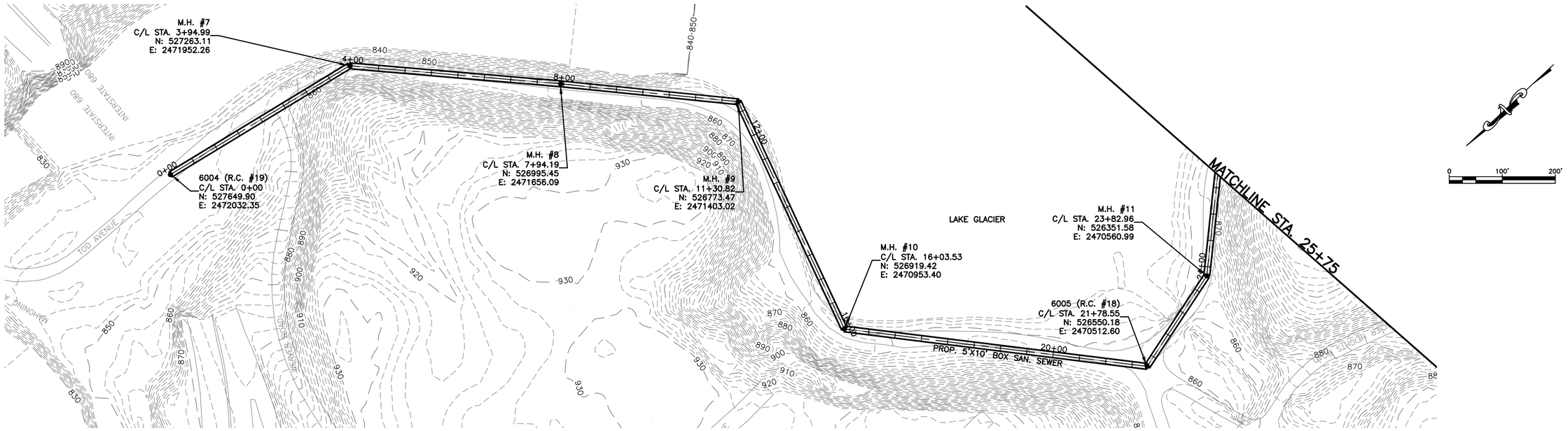
We would like the City to propose at least five Construction Milestones to comply with the requirements of the Consent Decree. We suggest a milestone at the end of each of the four major Phase I projects (Wet Weather Facility Part 1, Wet Weather Facility Part 2, Mill Creek CSO elimination project, and WWTP upgrade), plus a final, overall Post-Construction Performance Monitoring Report and milestone. A Construction Milestone for each of the four Mill Creek CSO elimination project parts should also be considered. In addition, the City should provide plans for a Post-Construction Performance Monitoring Program that addresses each of the four major Phase I projects.

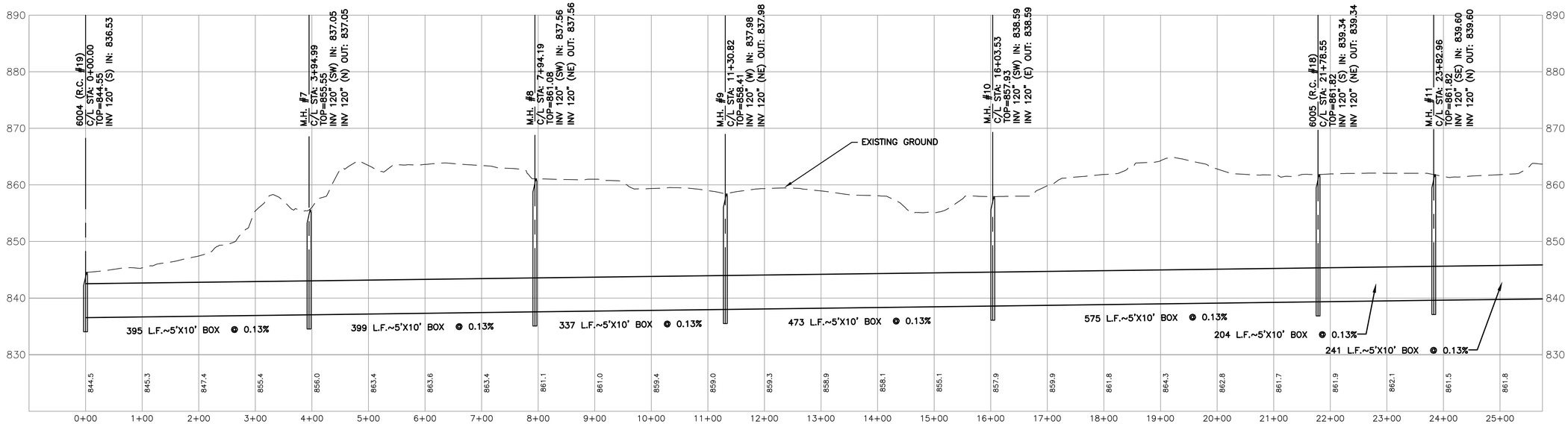
Once again, I suggest that we schedule a conference call to discuss these few remaining items regarding revision of the Technical Report. Once these items are resolved, we expect that the City will submit the revised Technical Report as its Final LTCP, with a specification that the Final LTCP includes by reference, updates and, where it differs, supersedes the City's prior submissions, including the June 2002 Evaluation of CSO Control Alternatives, January 2003 Financial Assessment and Implementation Schedule Report, and 2011 Technical Report. At that point, U.S. EPA and Ohio EPA staff personnel will recommend to our respective senior managers that the City's Final LTCP be approved.

We are very close to achieving an approvable LTCP to bring the City into compliance with the Consent Decree and the Clean Water Act. Thank you for your continued cooperation.

Sincerely,

Reginald A. Pallesen
Associate Regional Counsel





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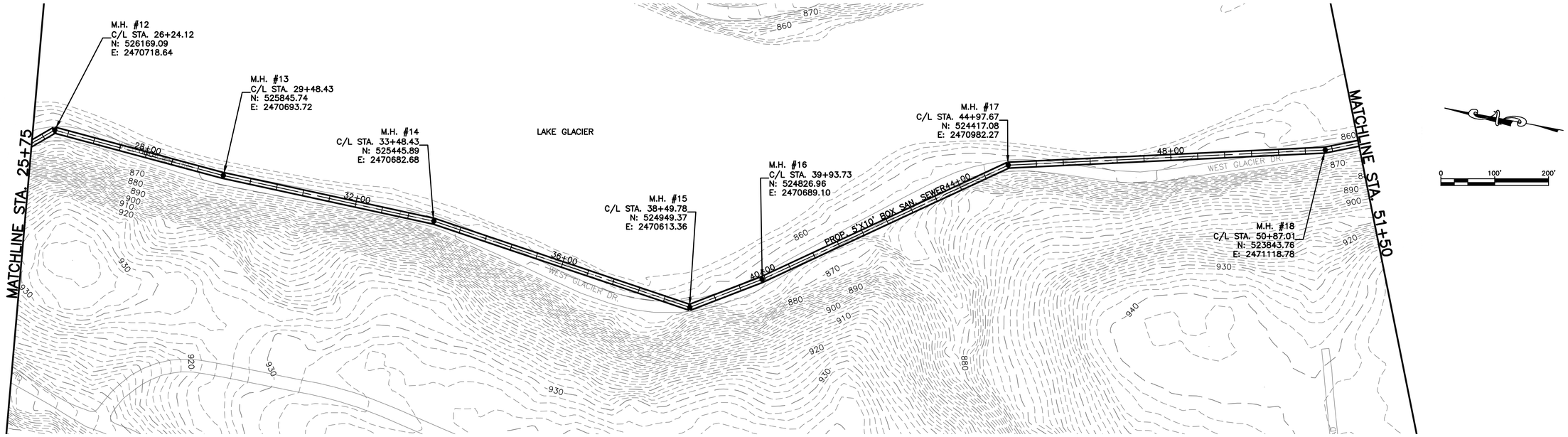

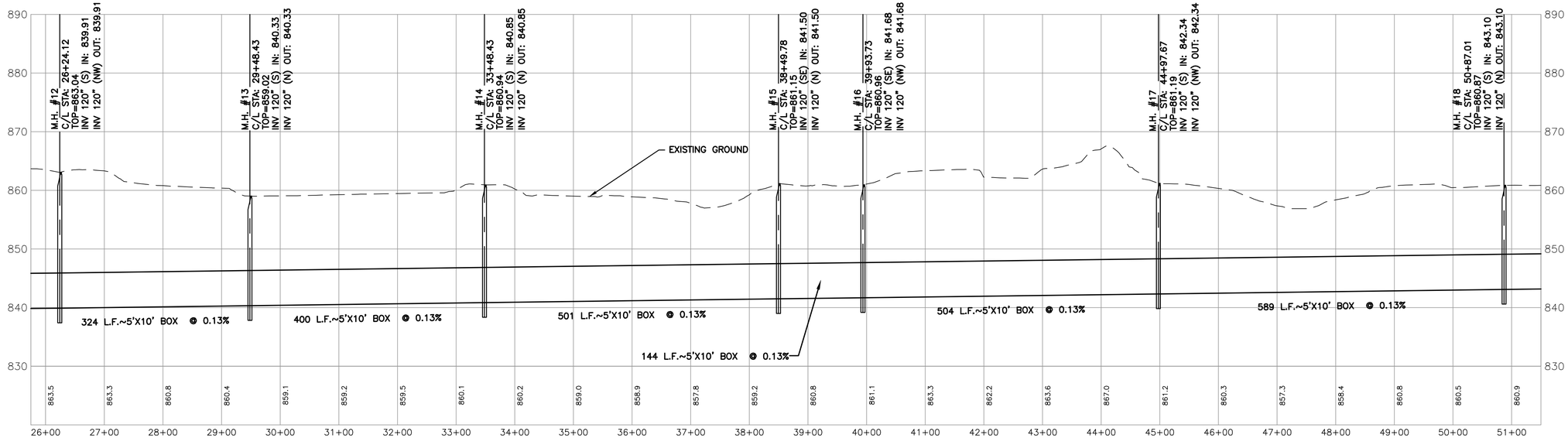

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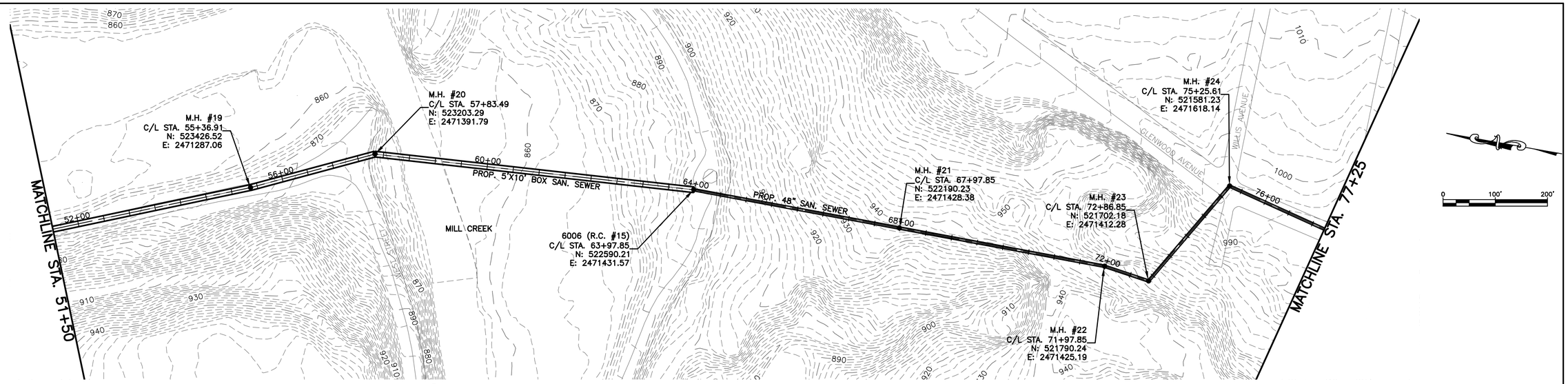

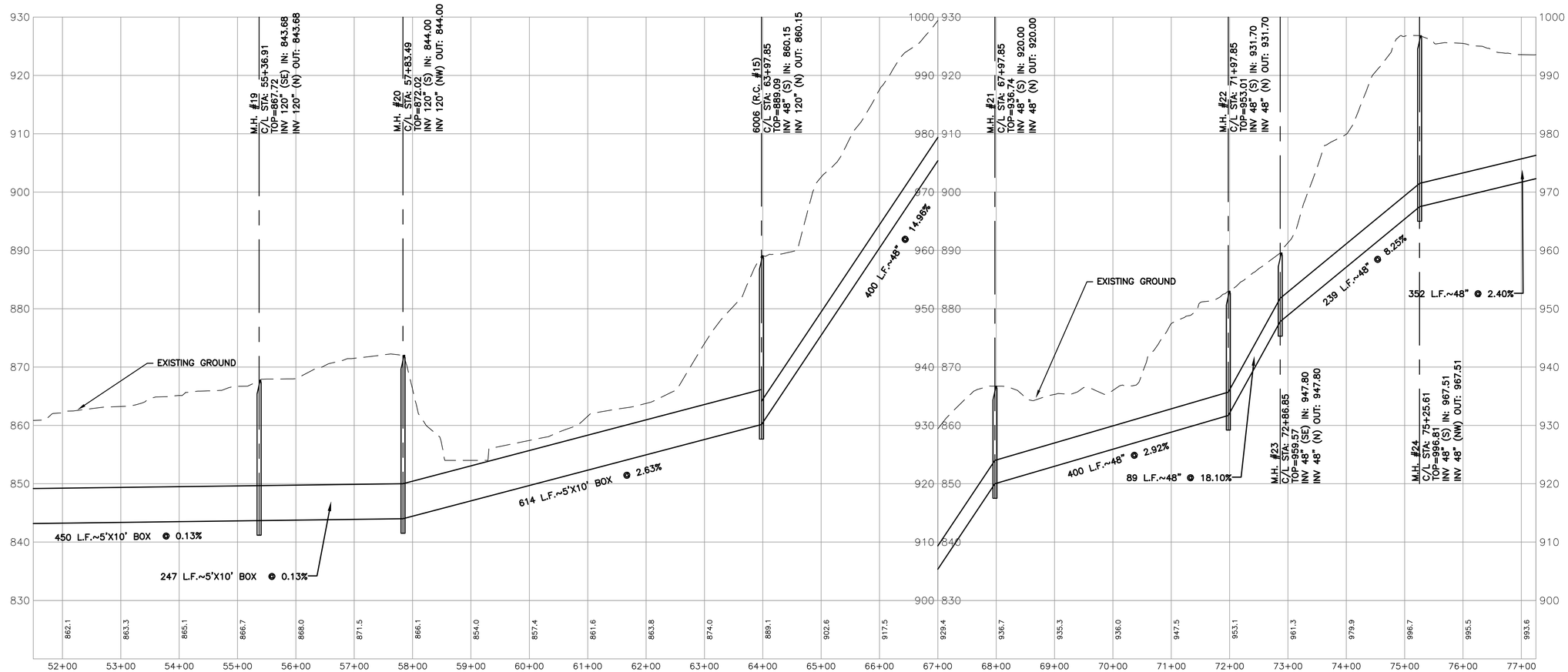

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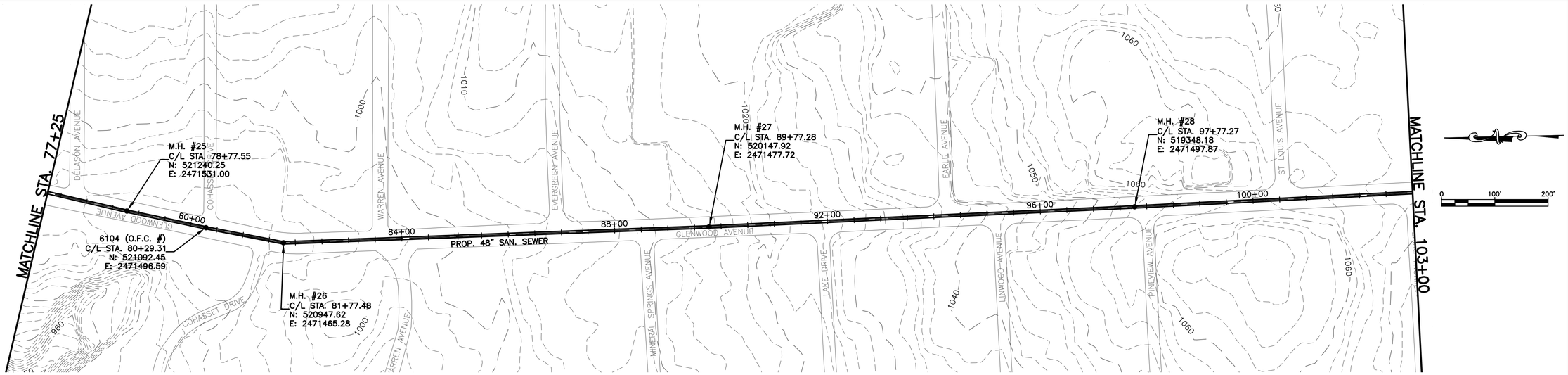

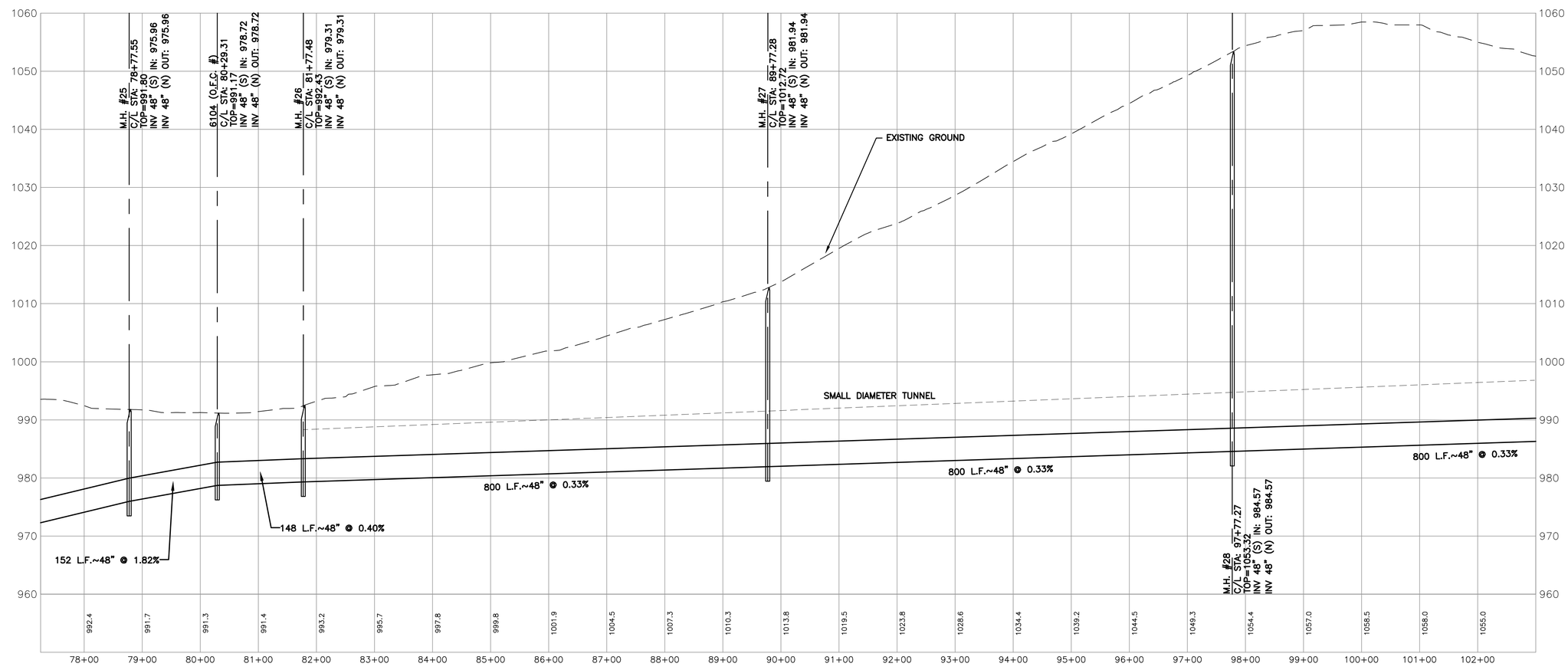

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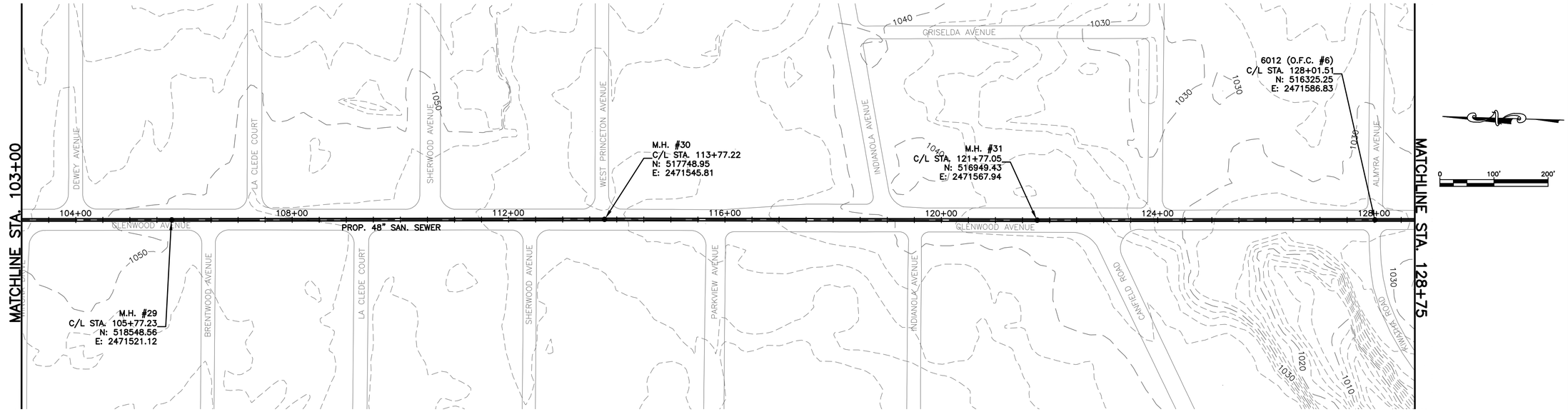

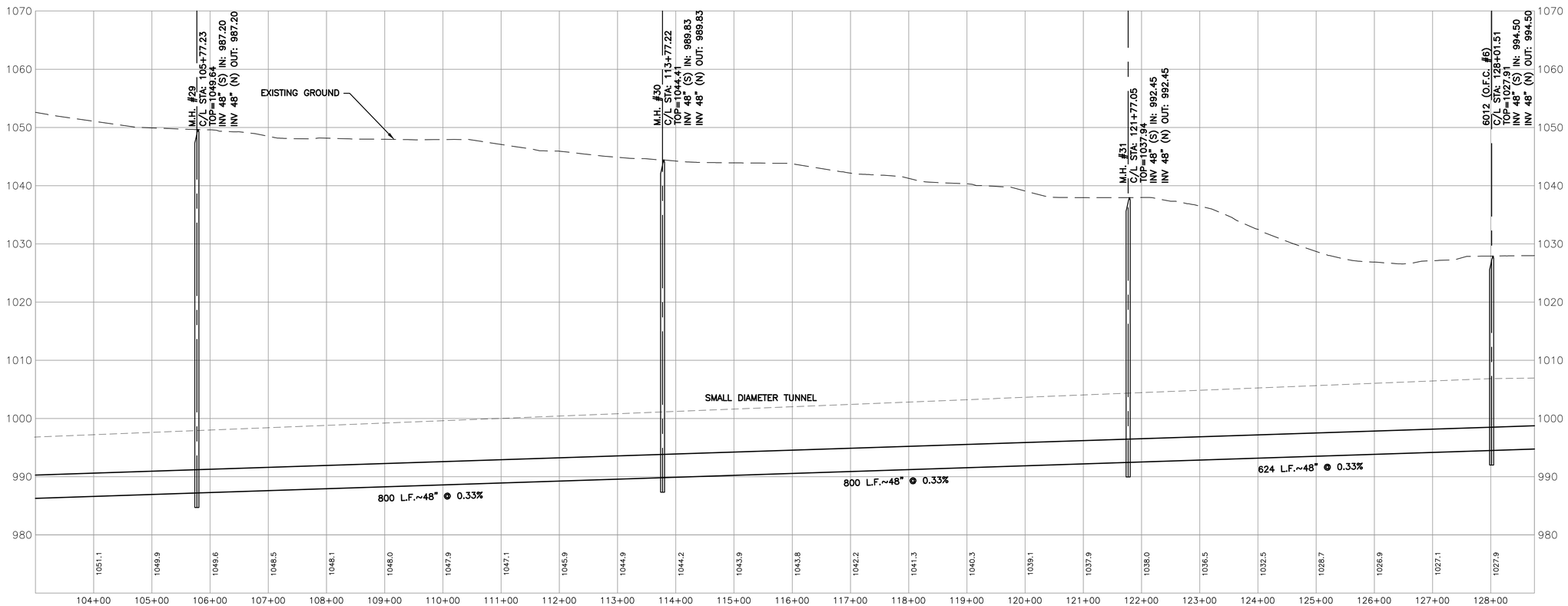

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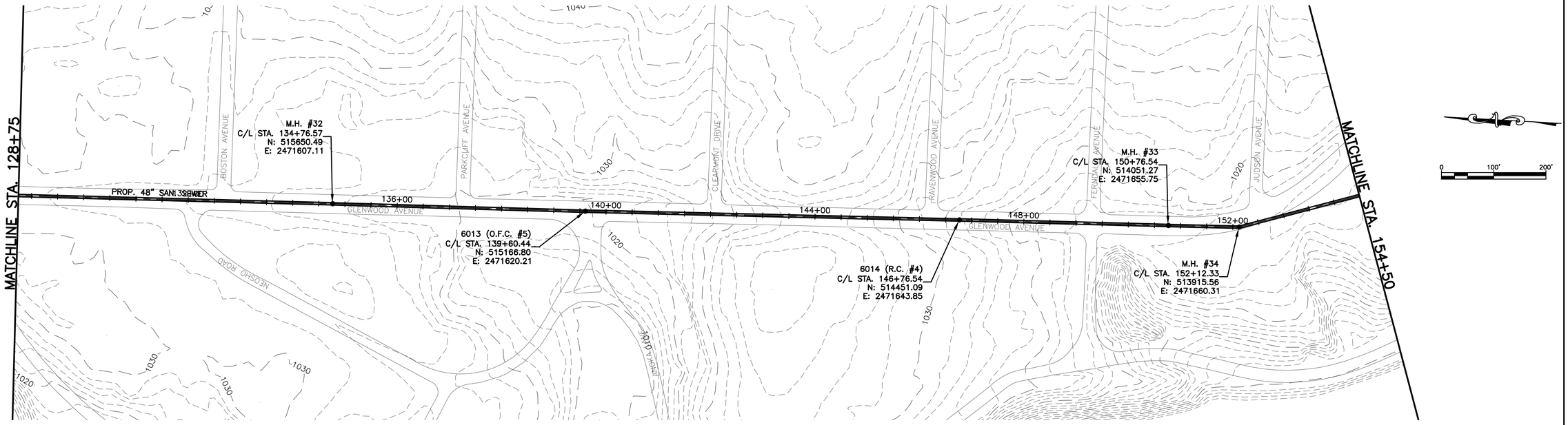

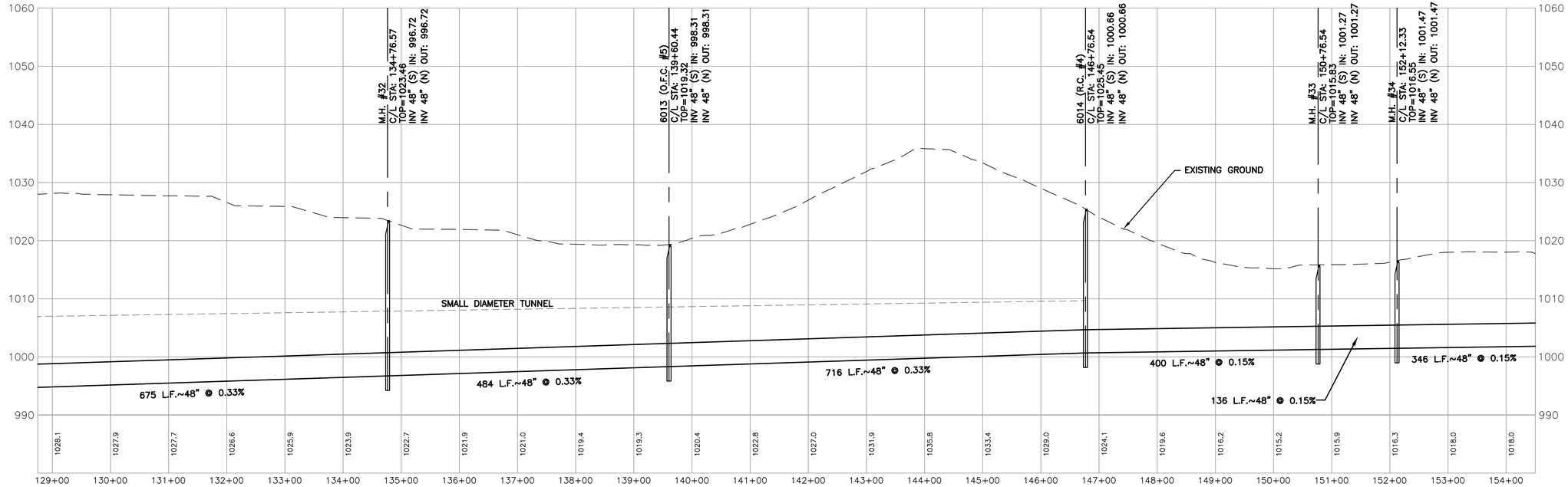

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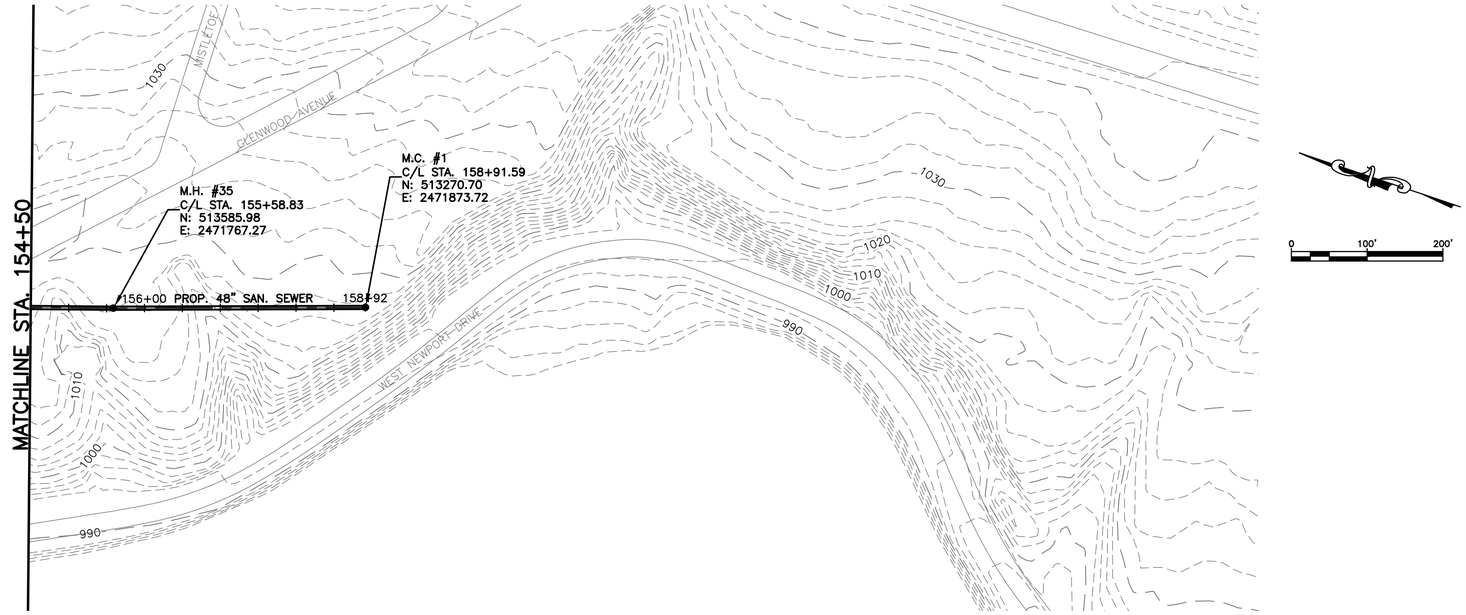

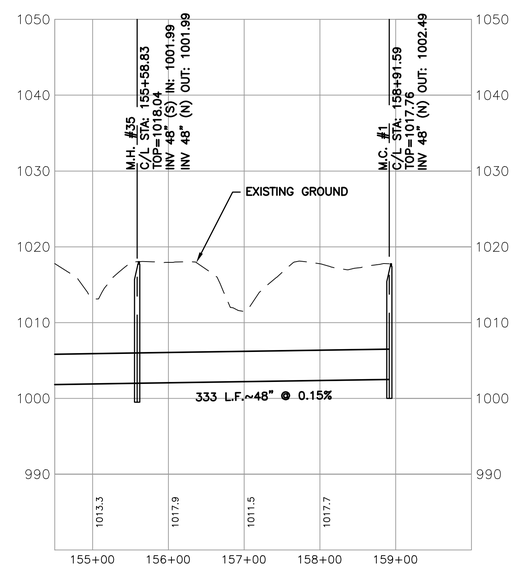

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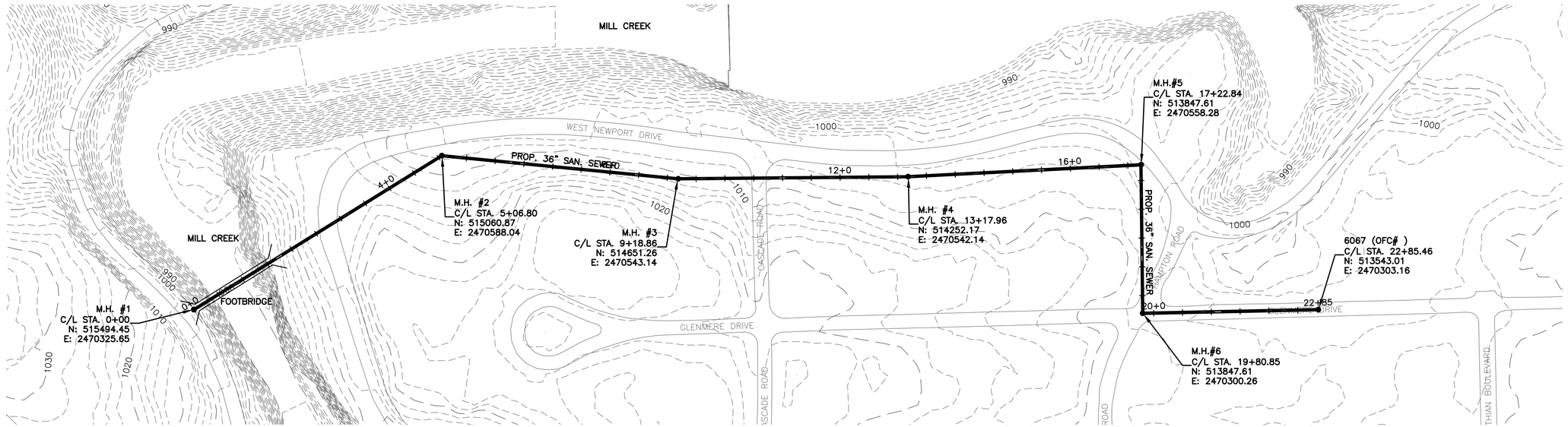

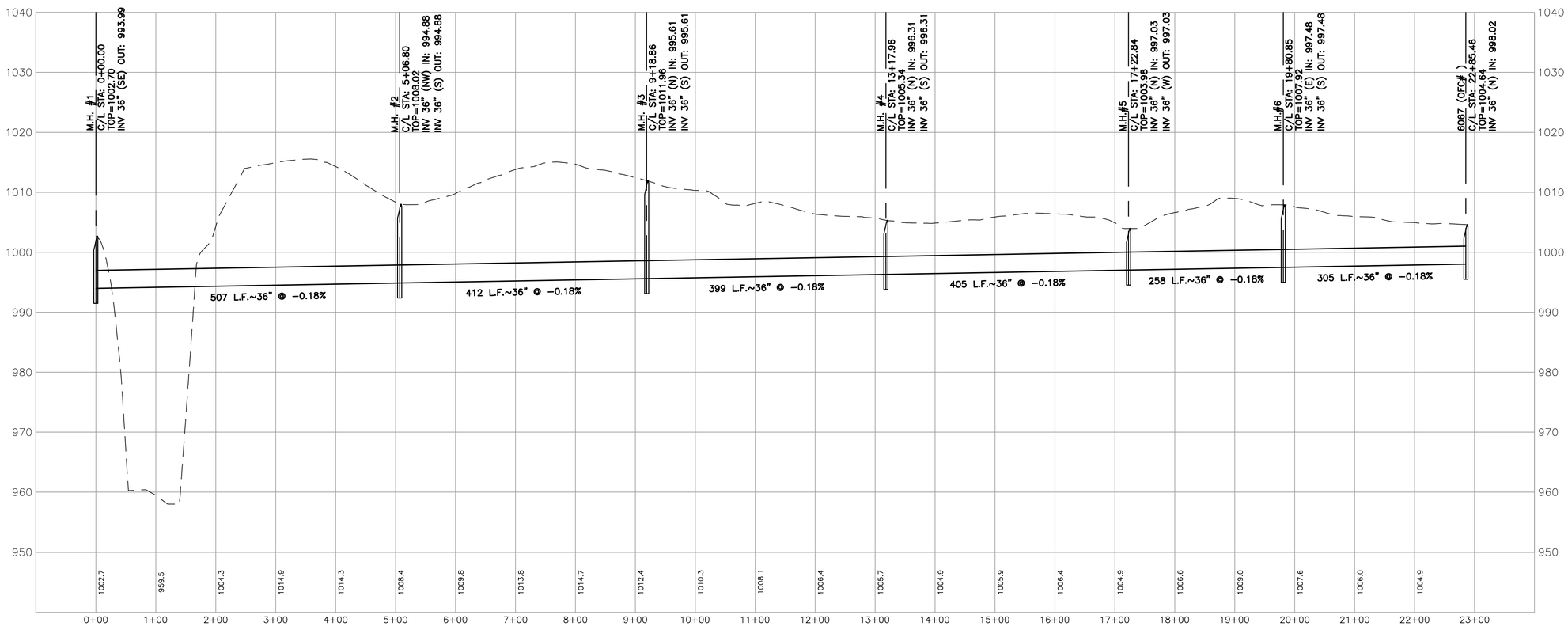

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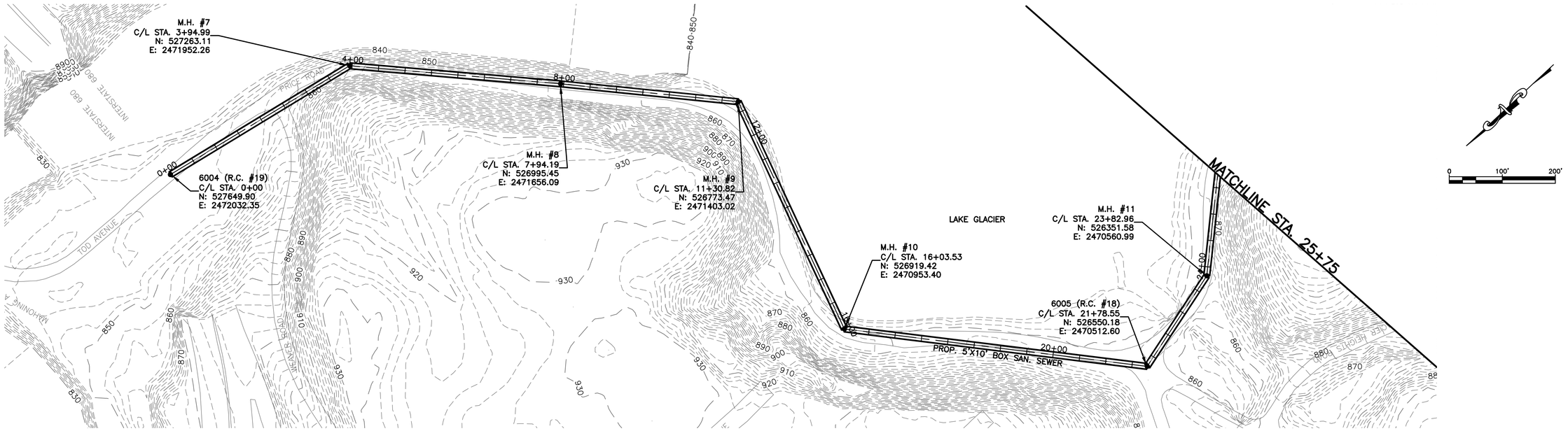

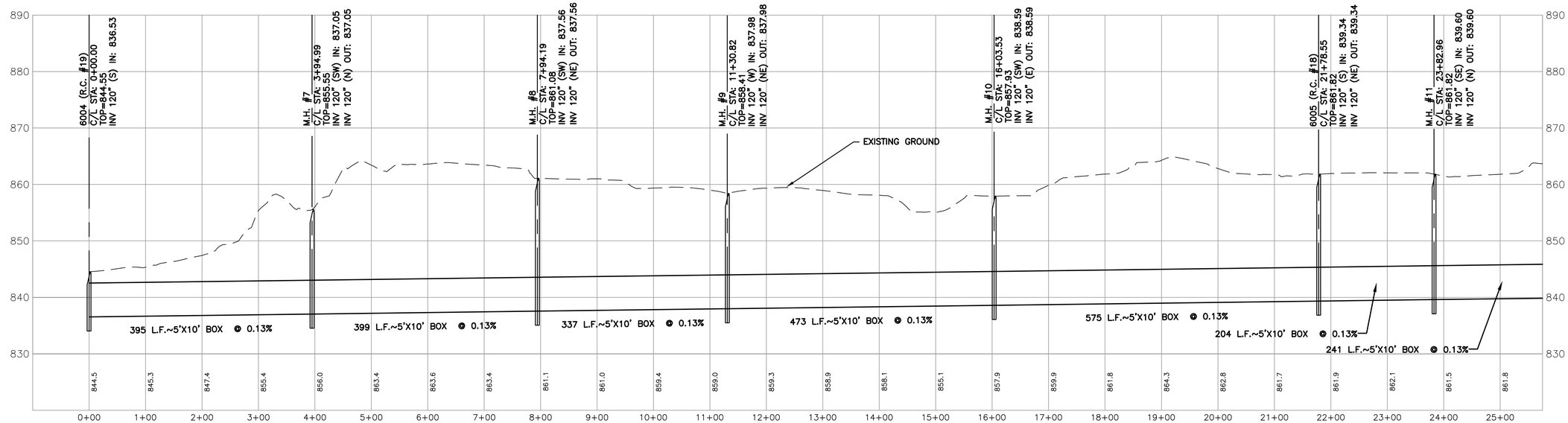

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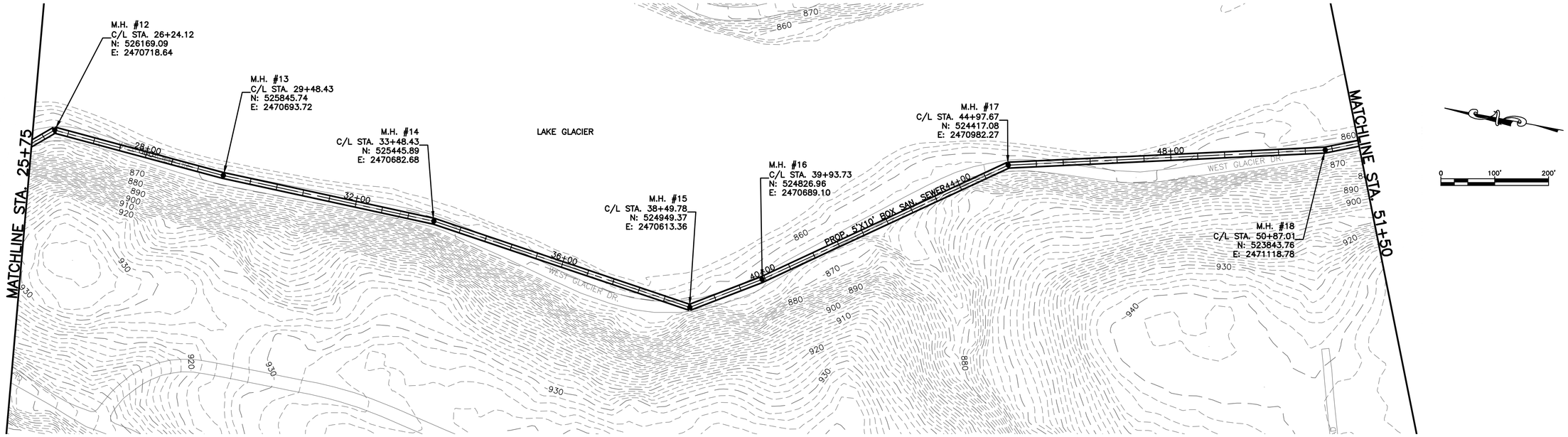

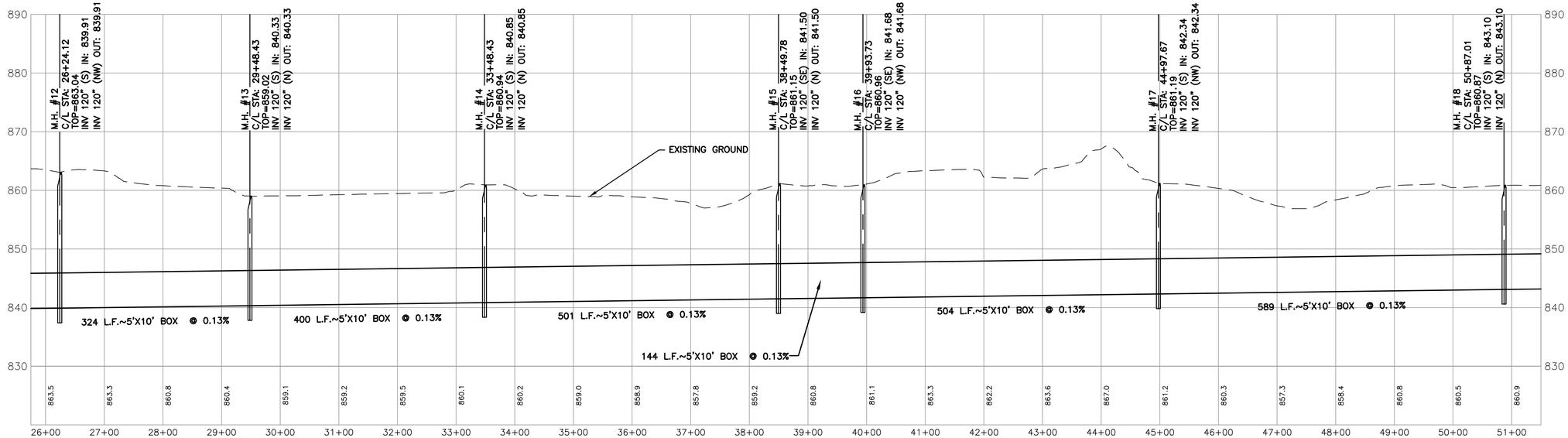

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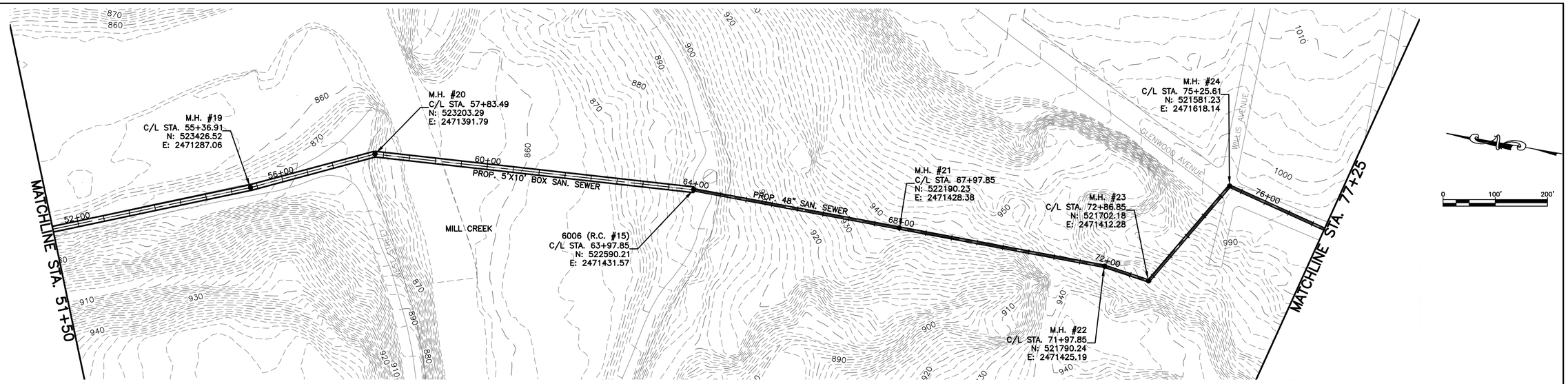

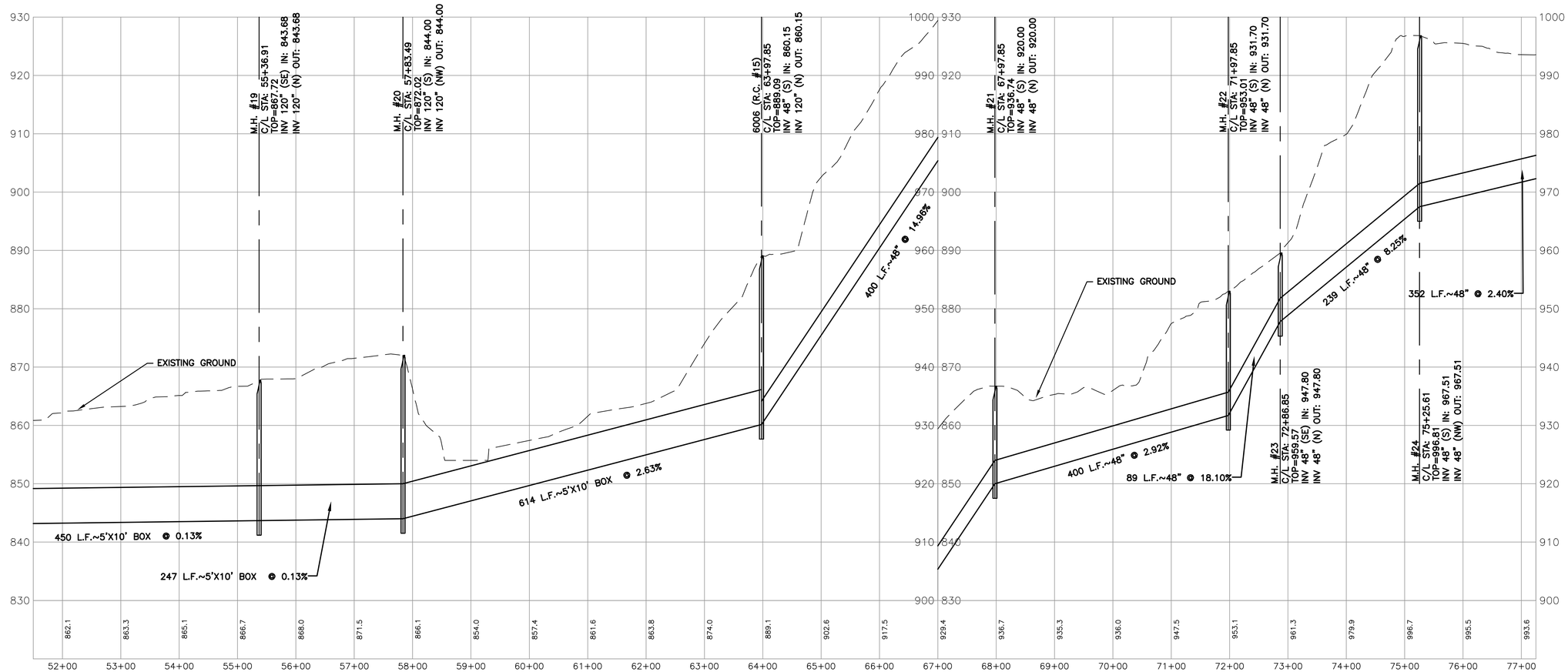

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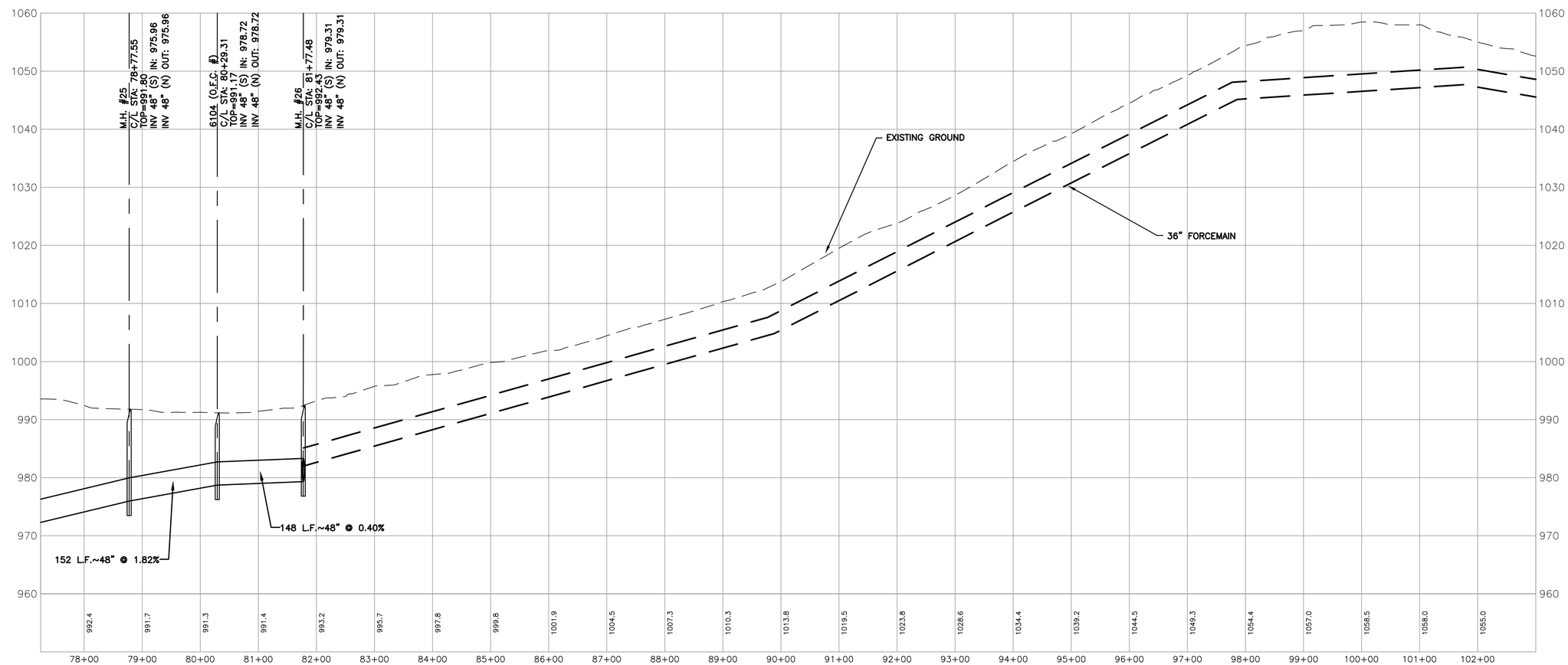

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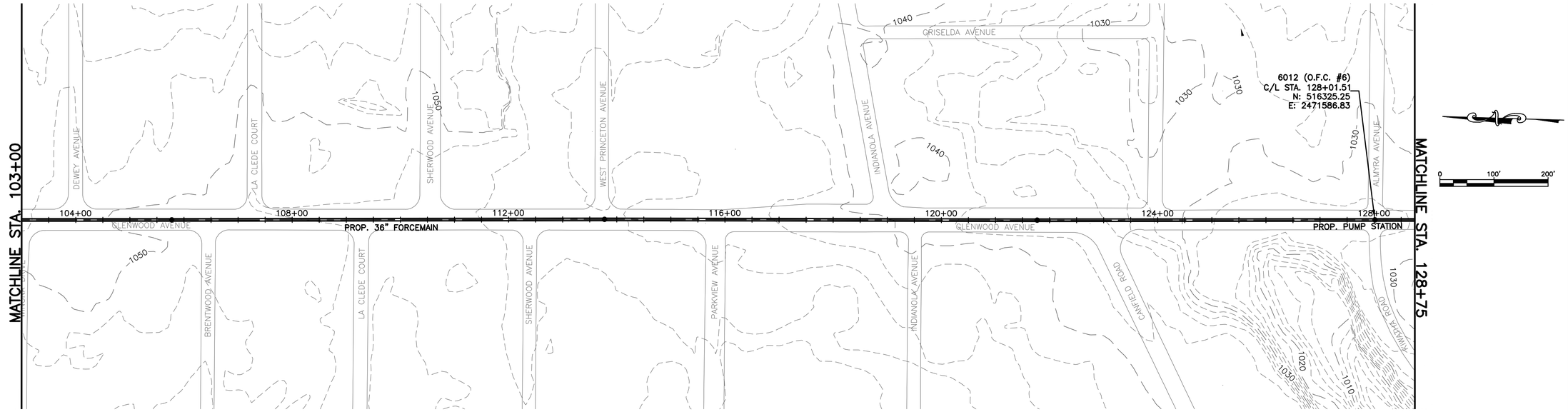

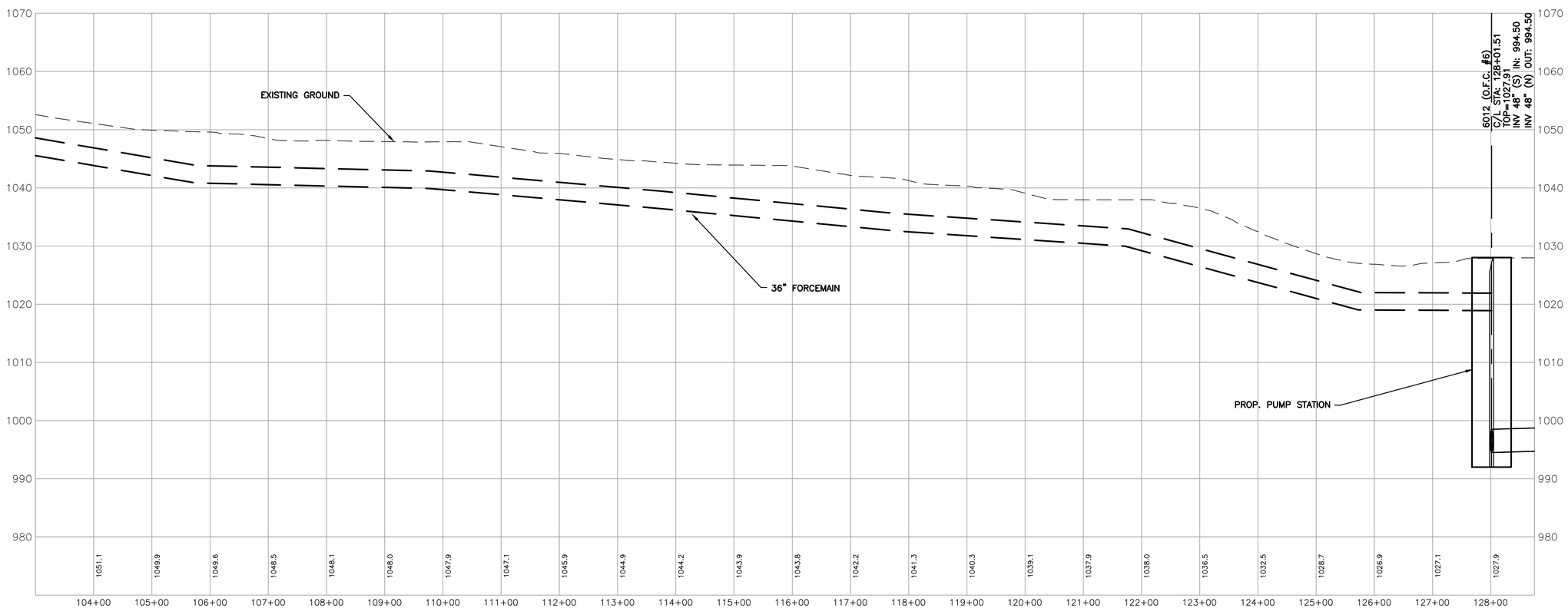

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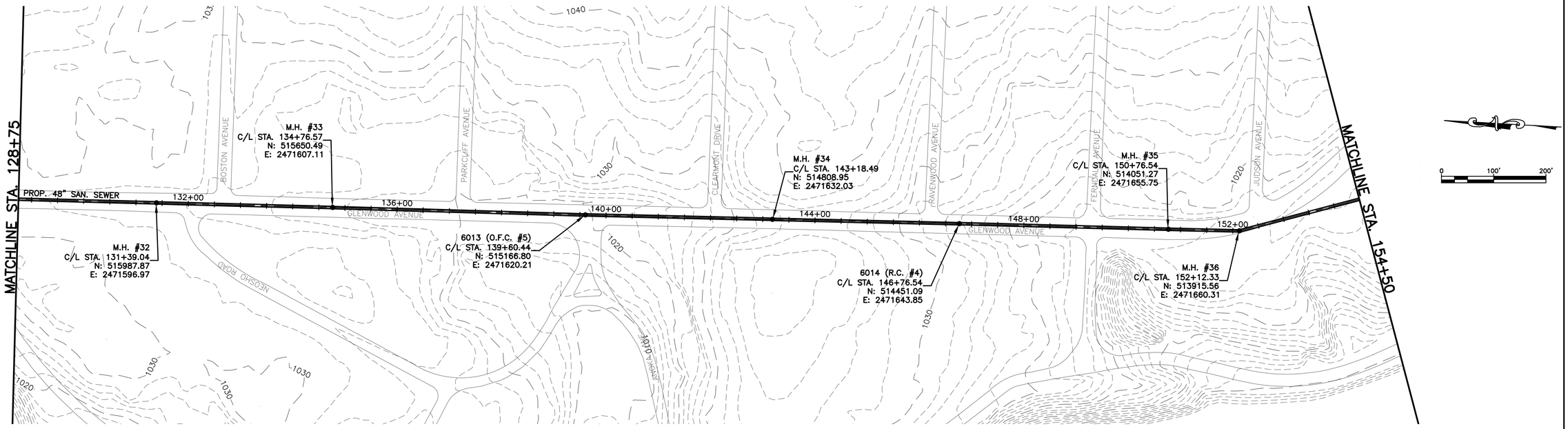

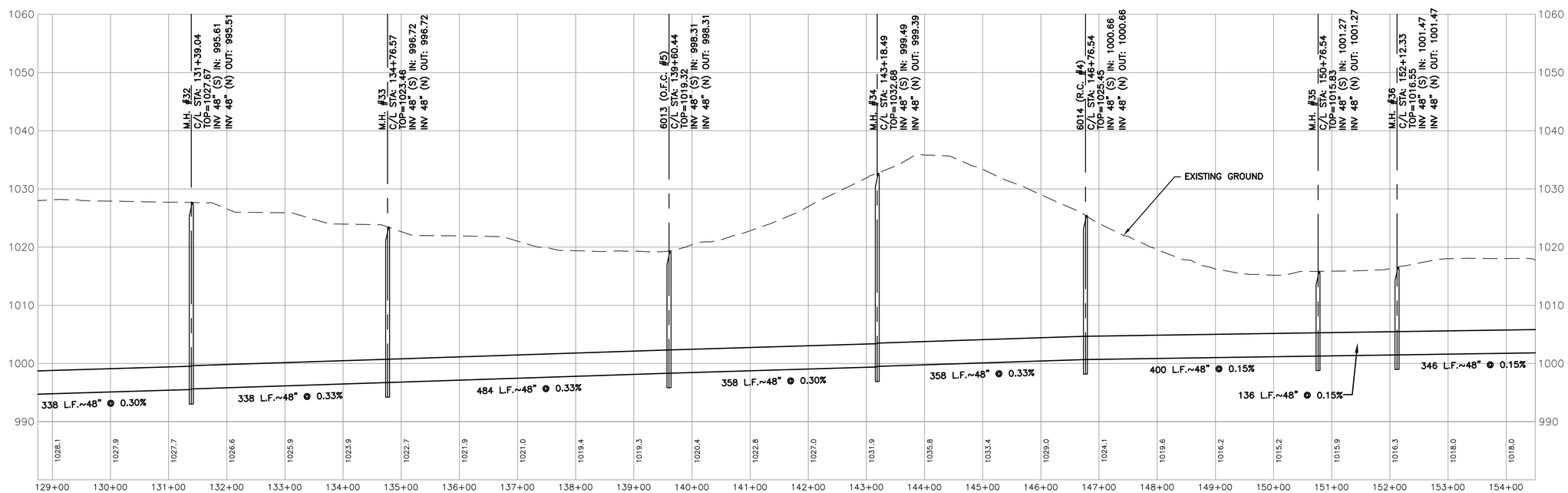

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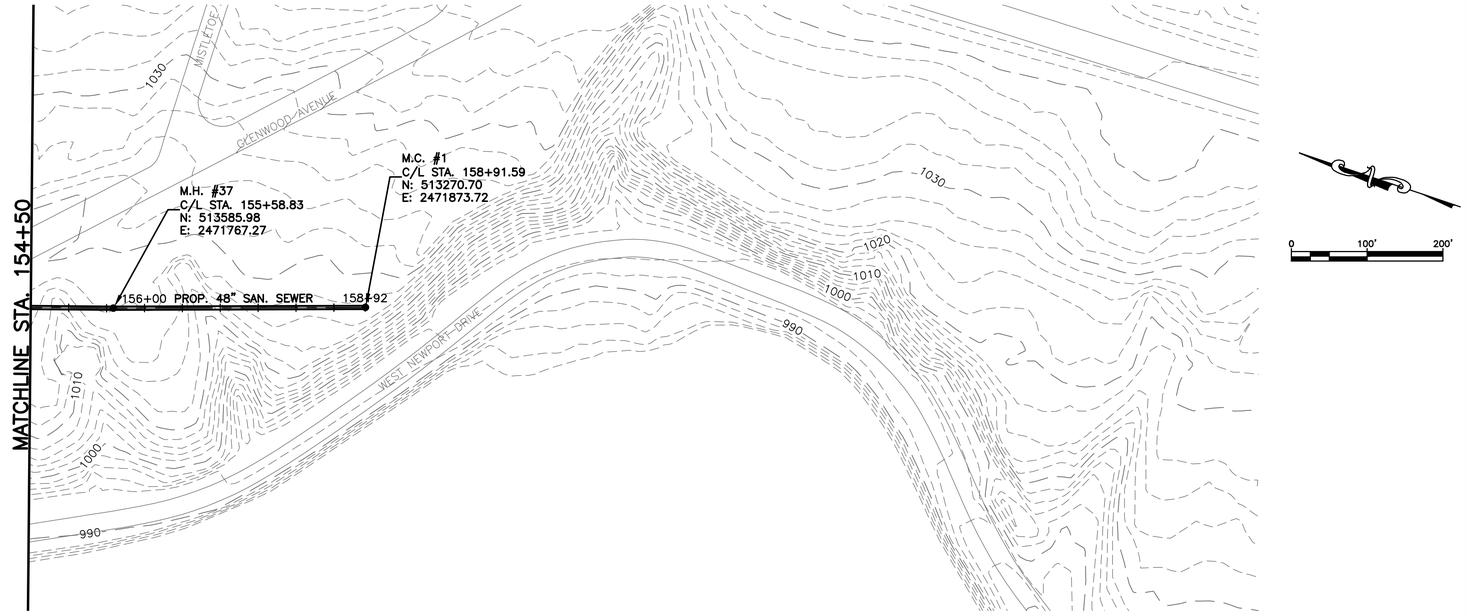

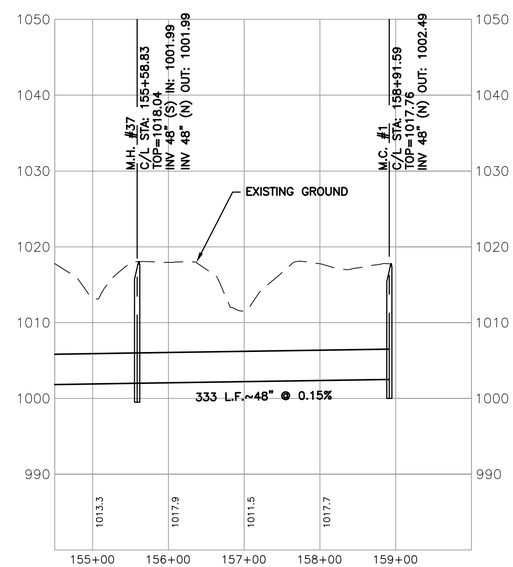

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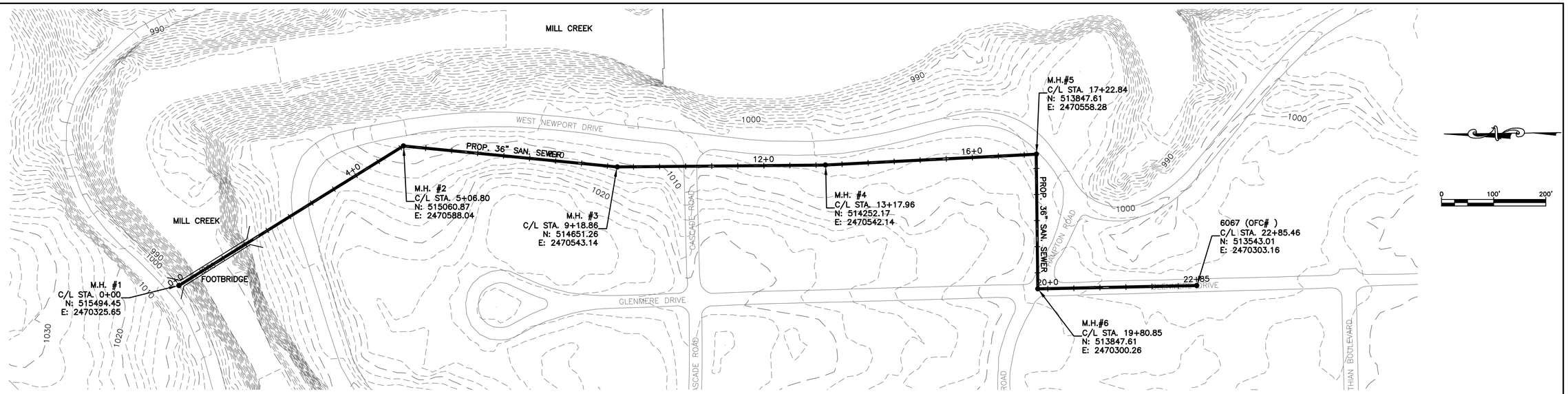

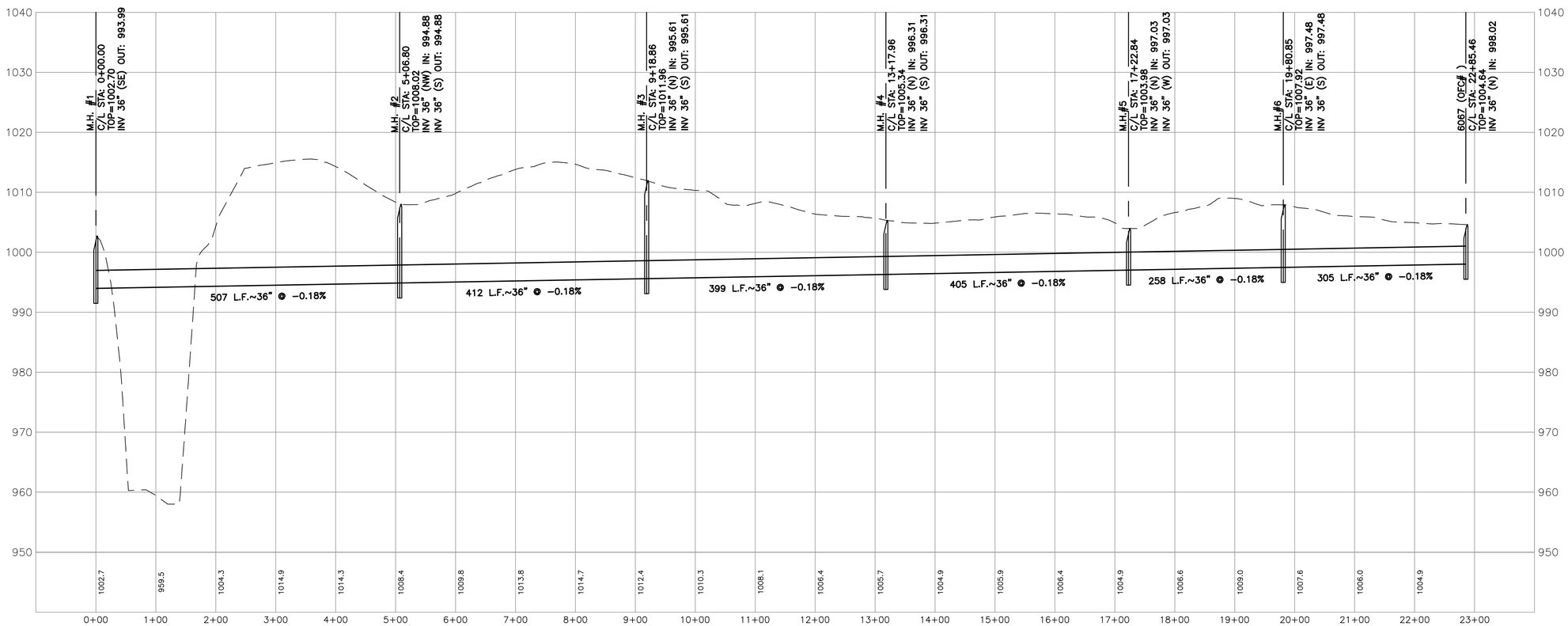

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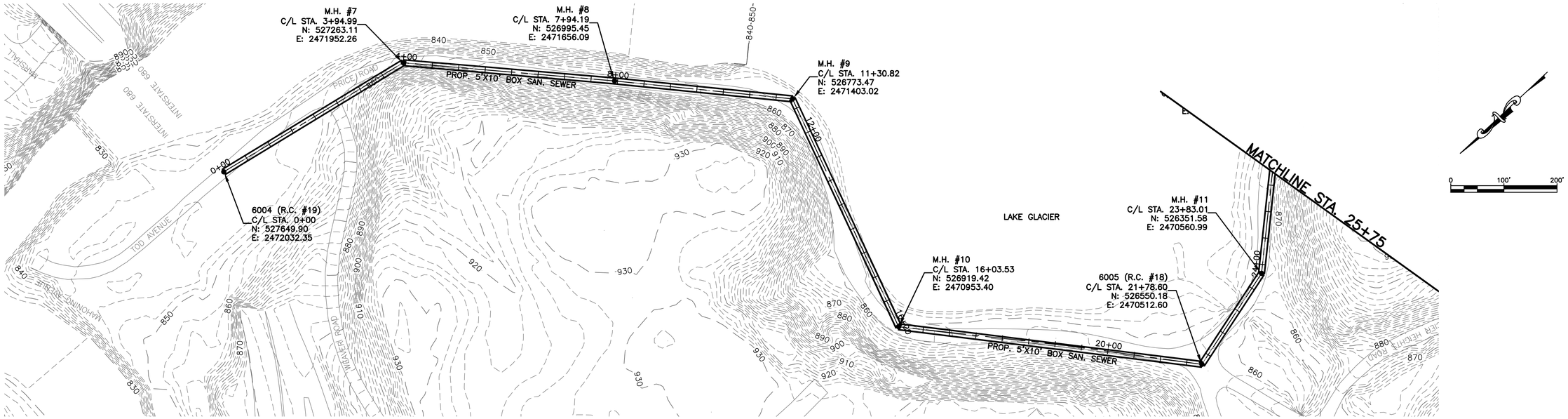

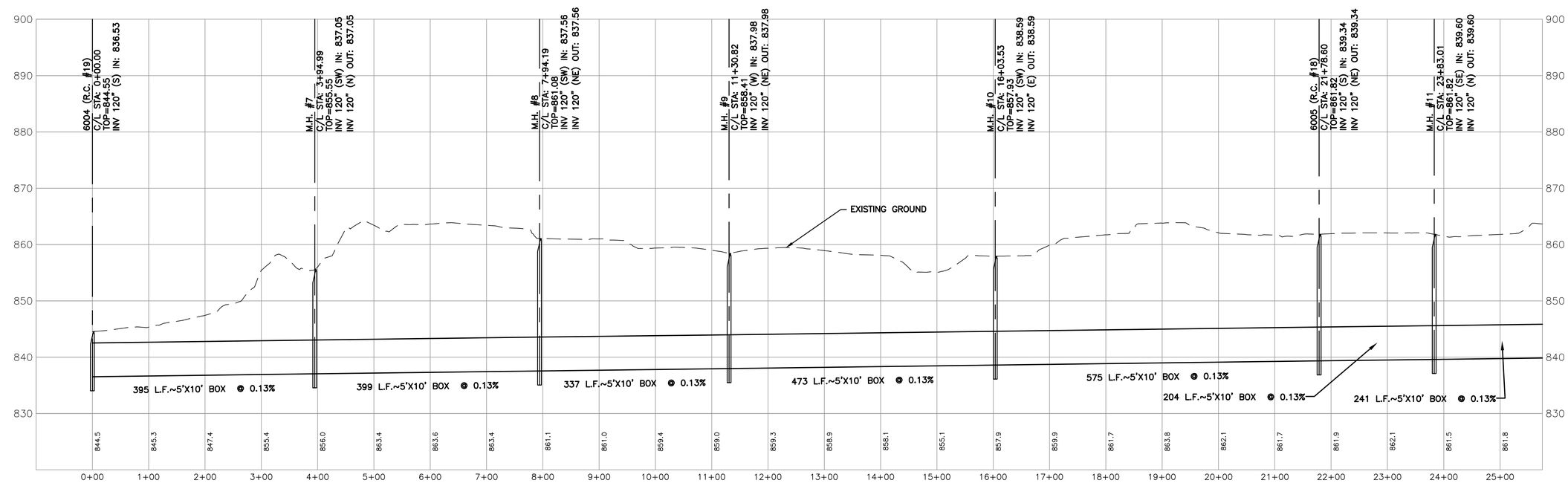

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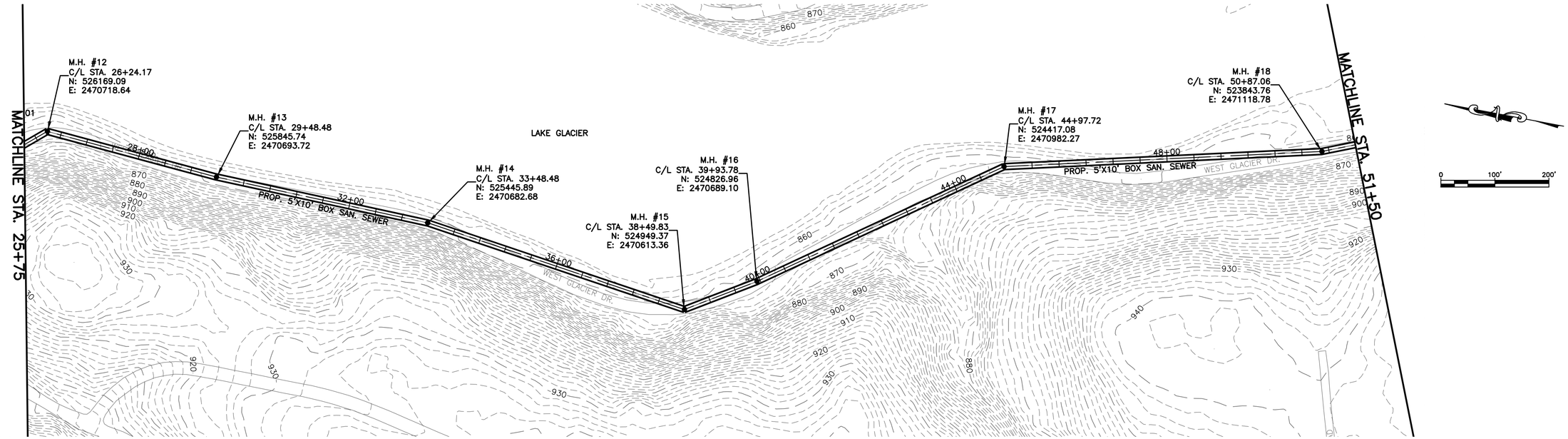

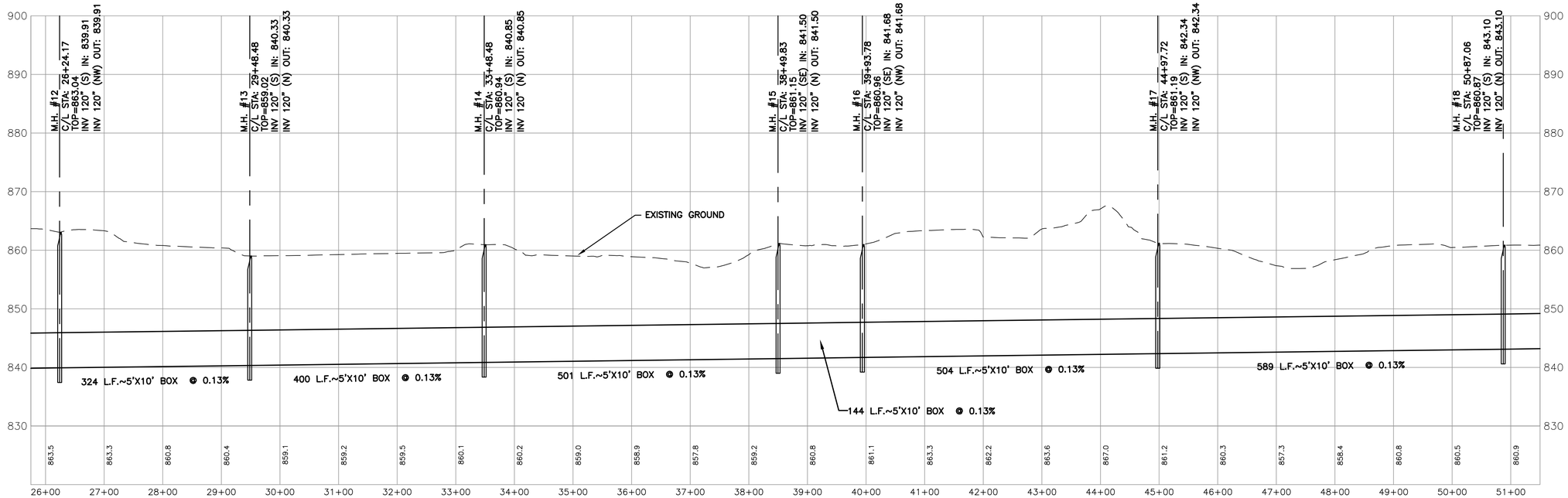

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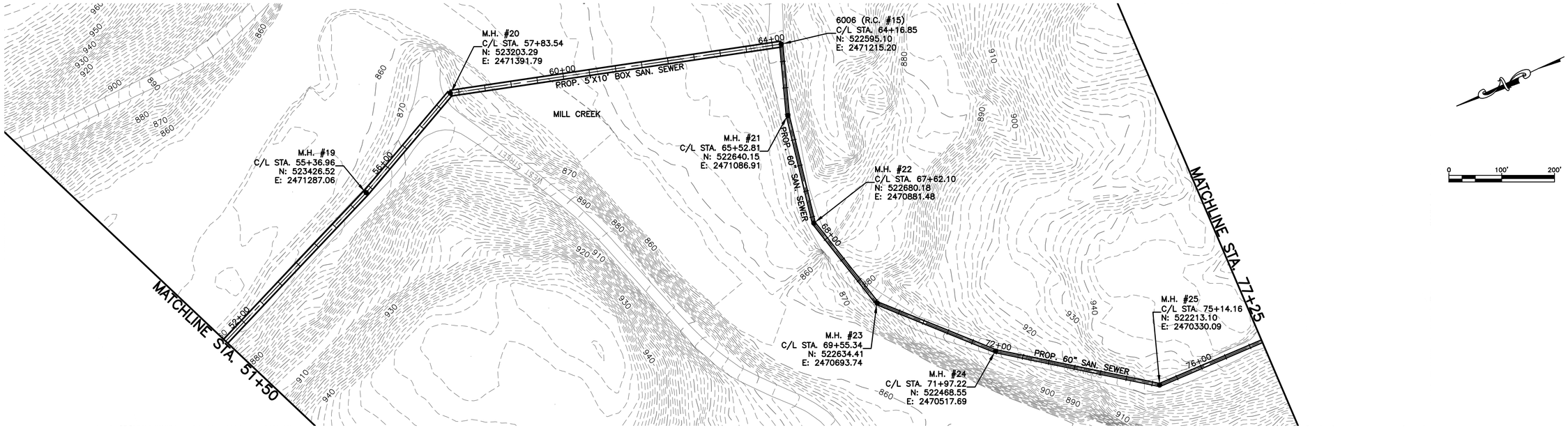

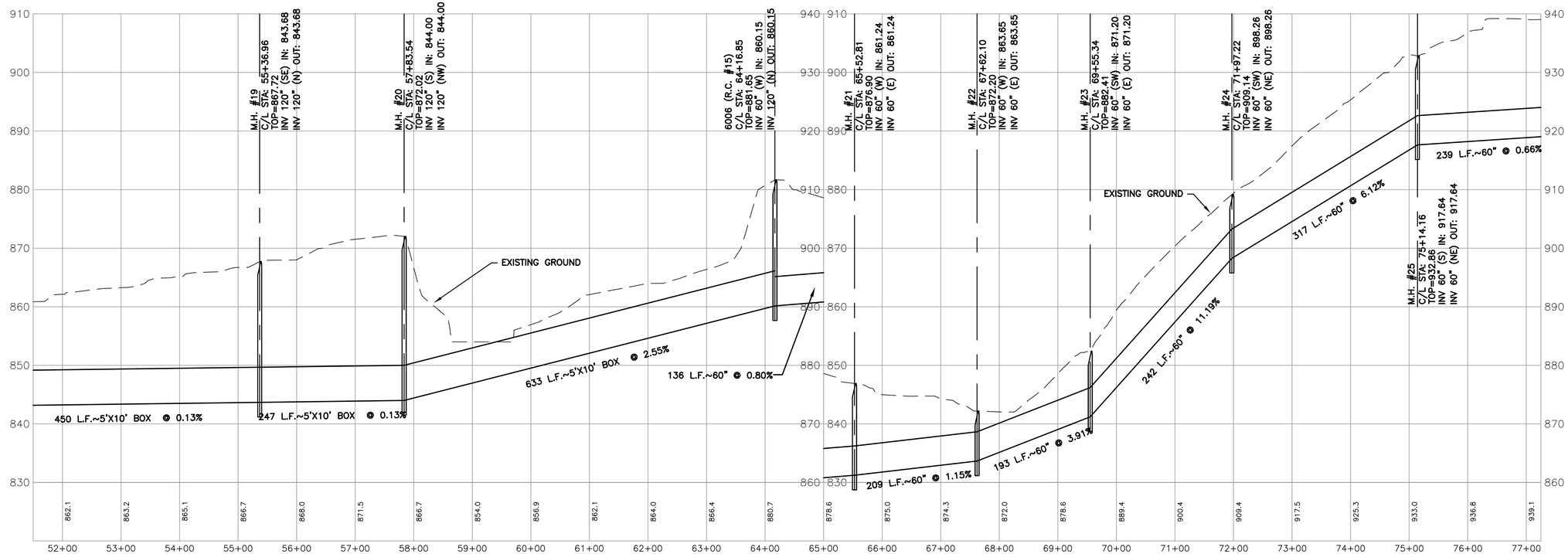

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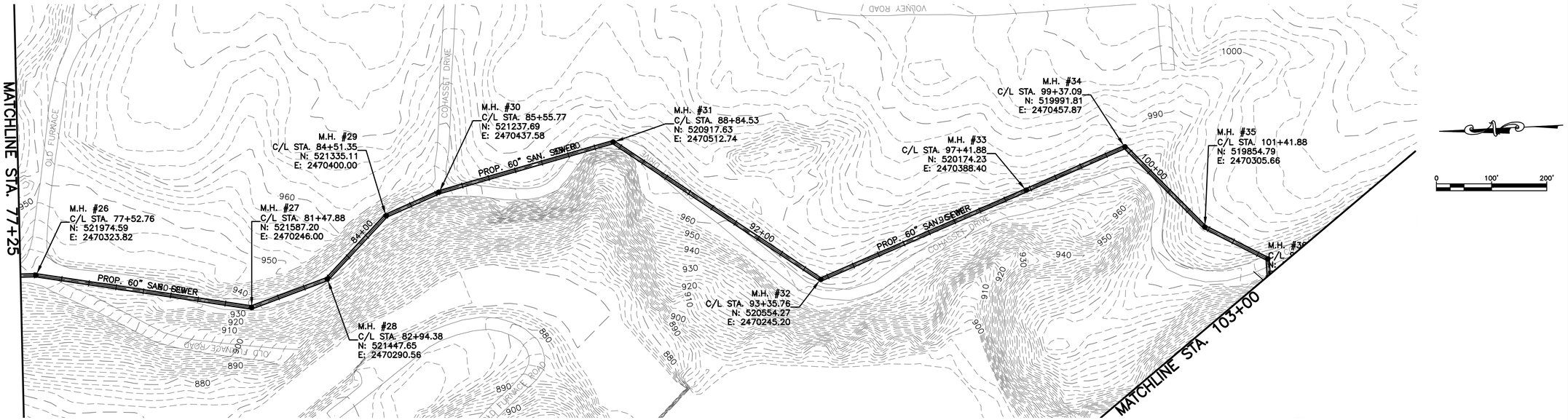

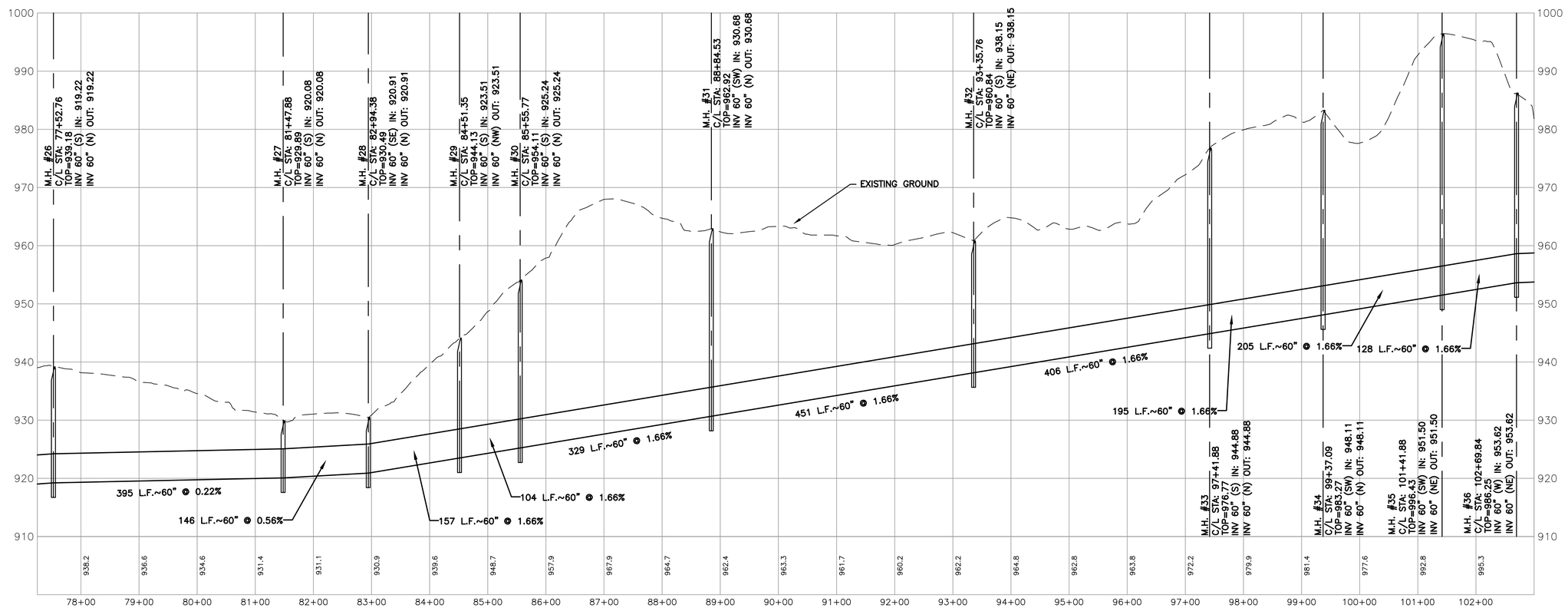

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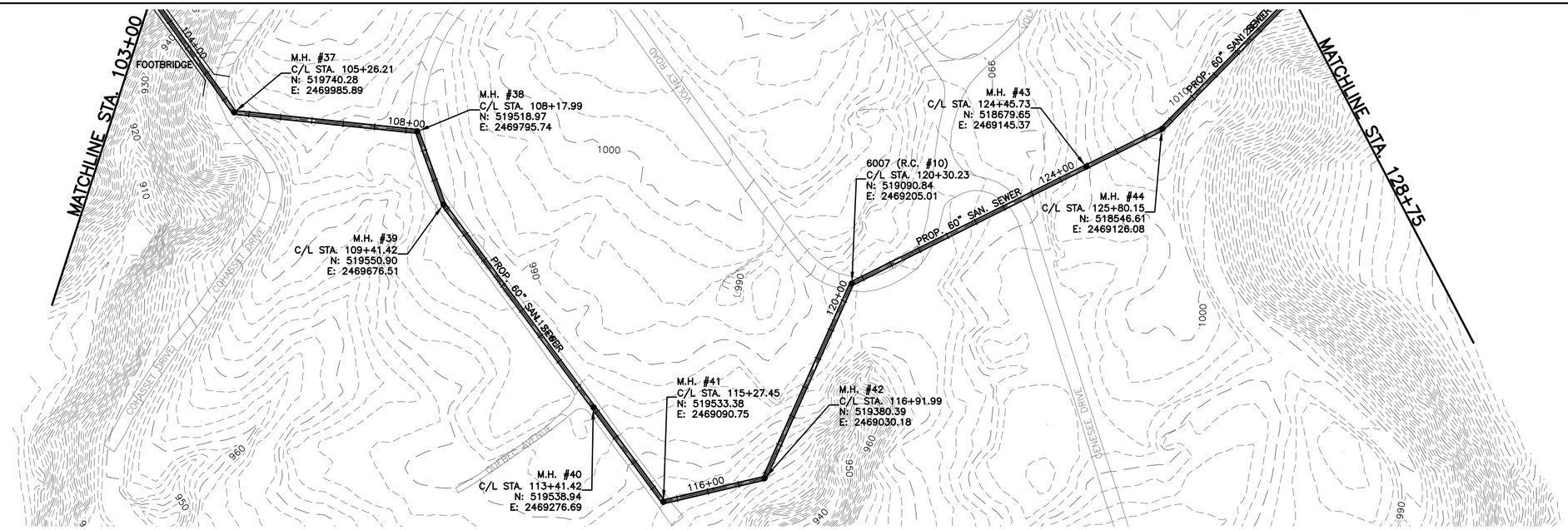

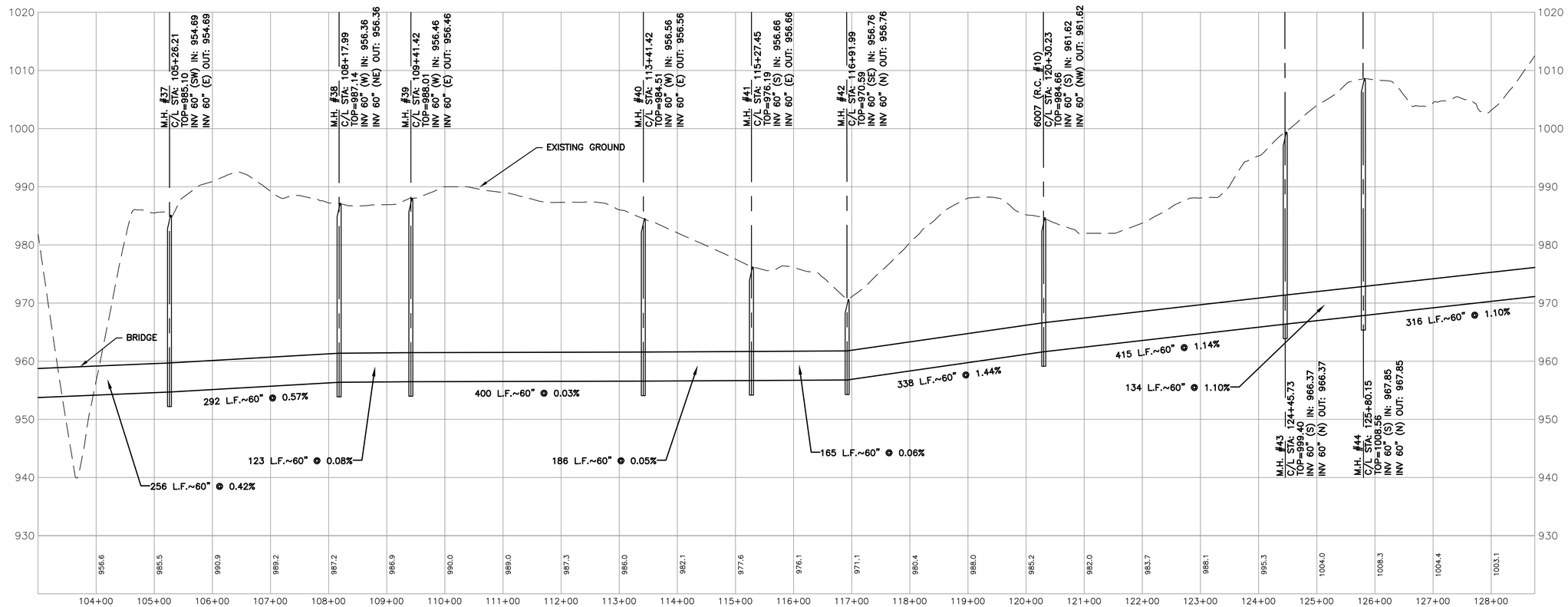

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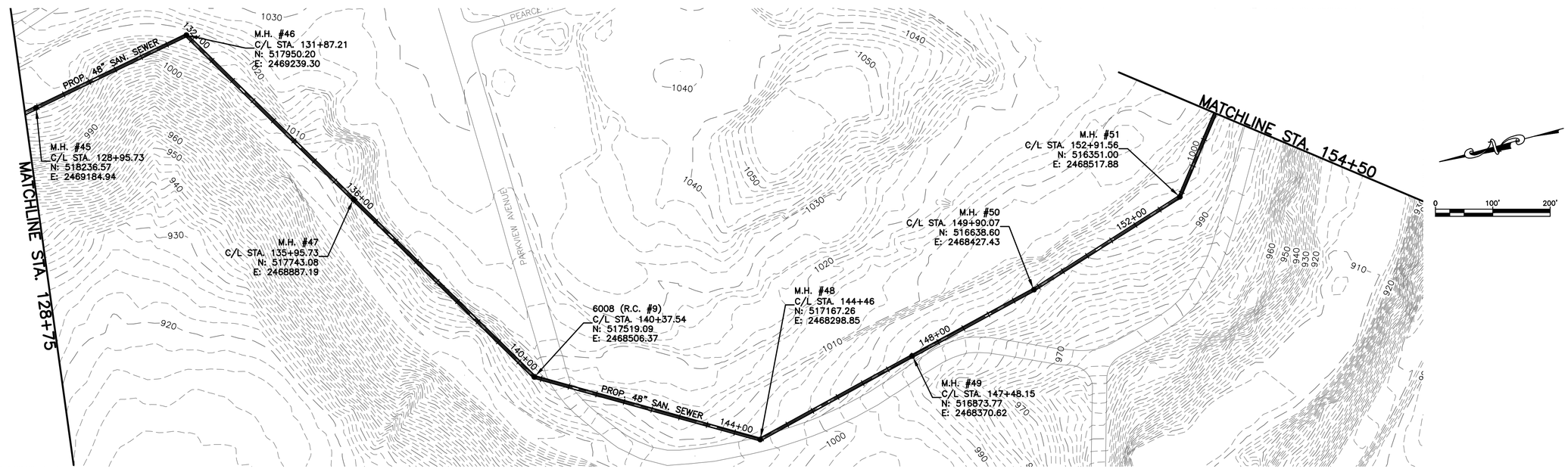

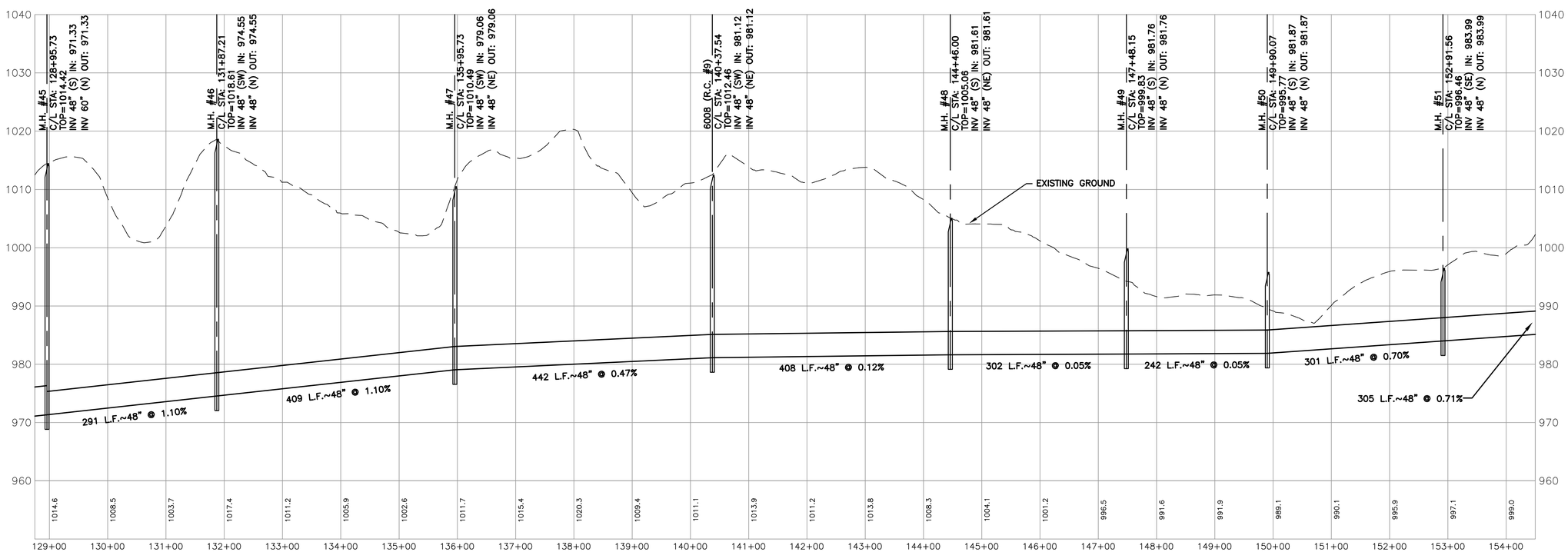

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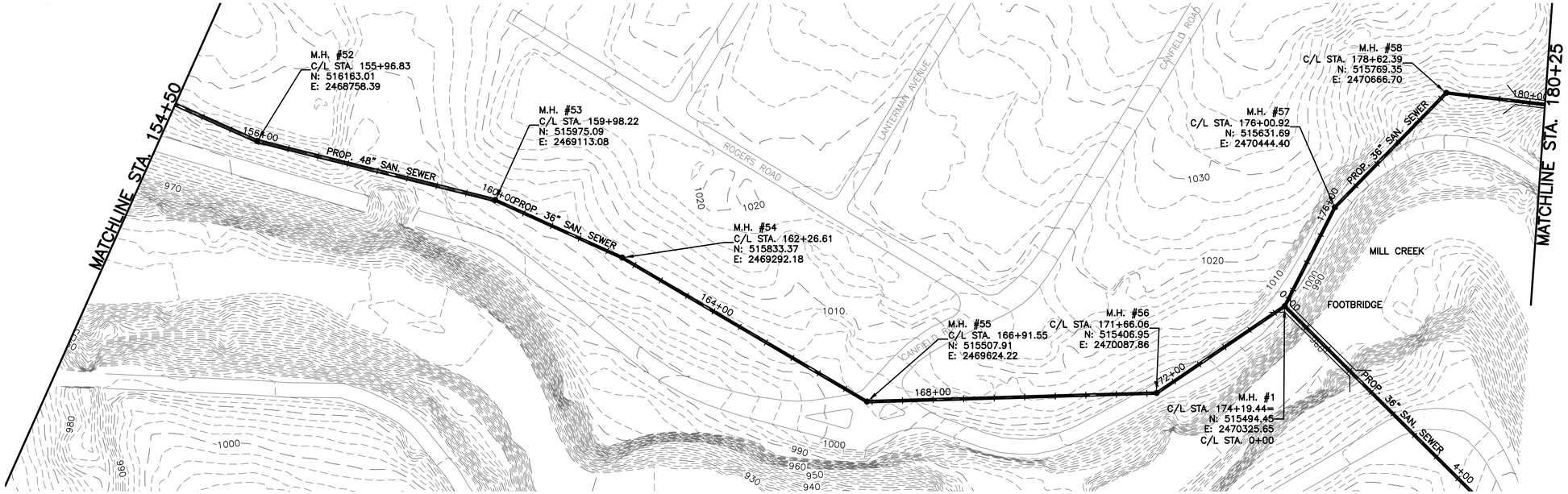

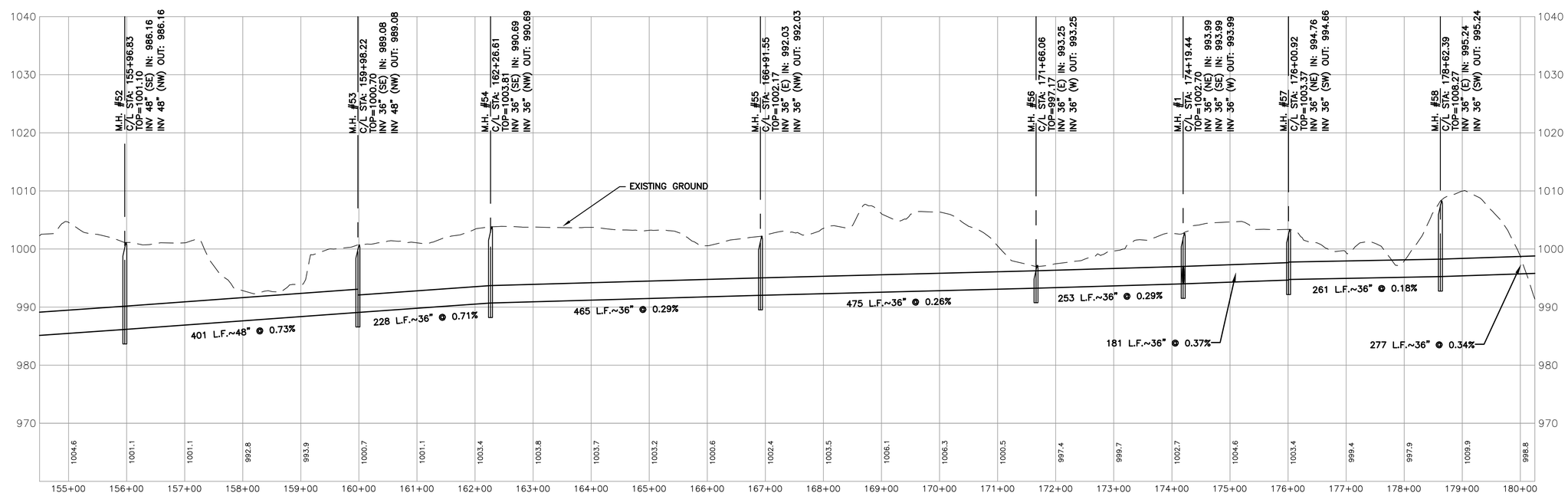

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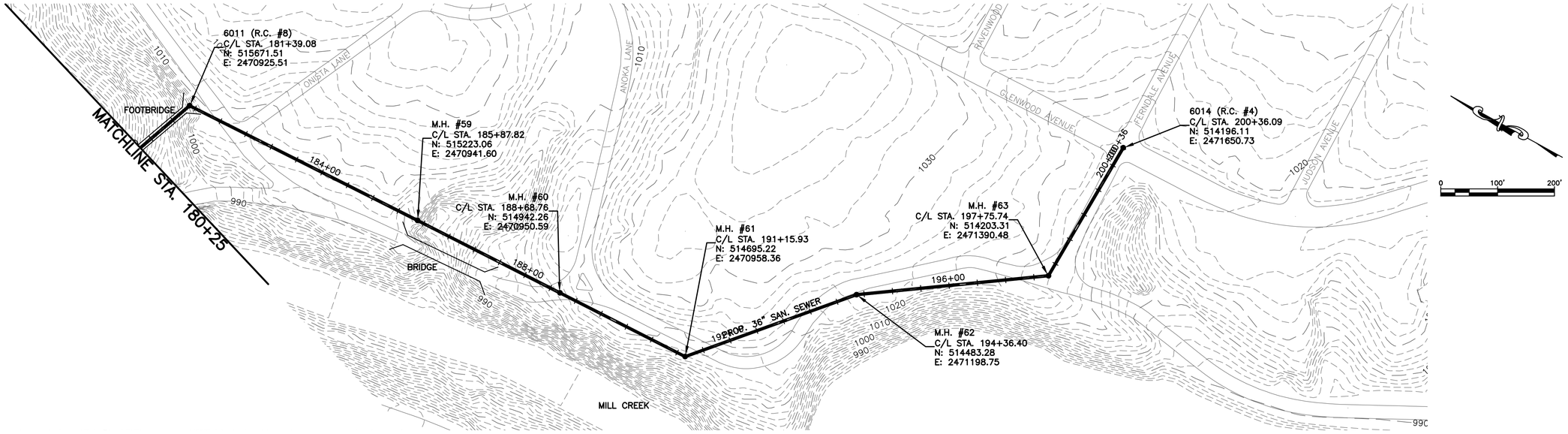

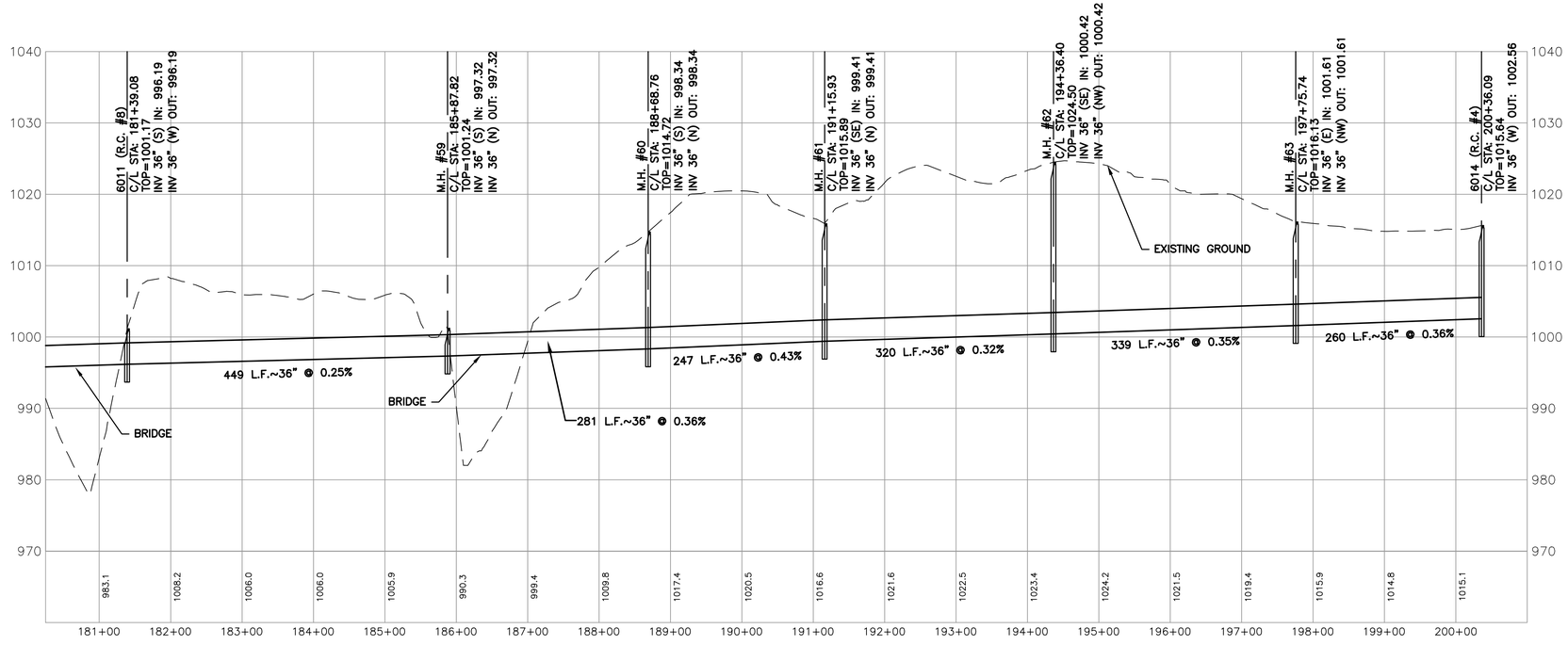

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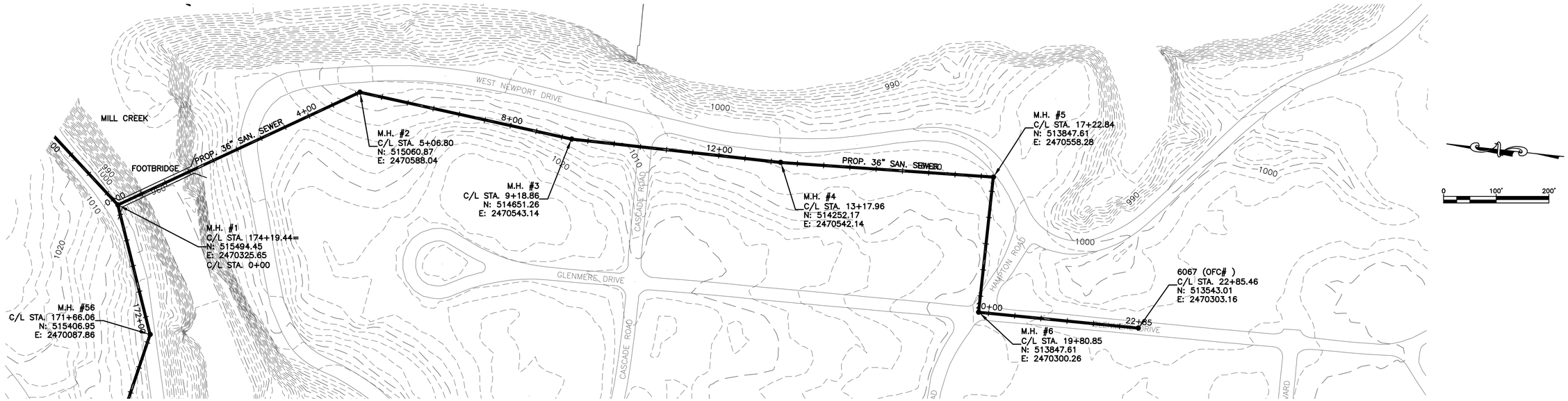

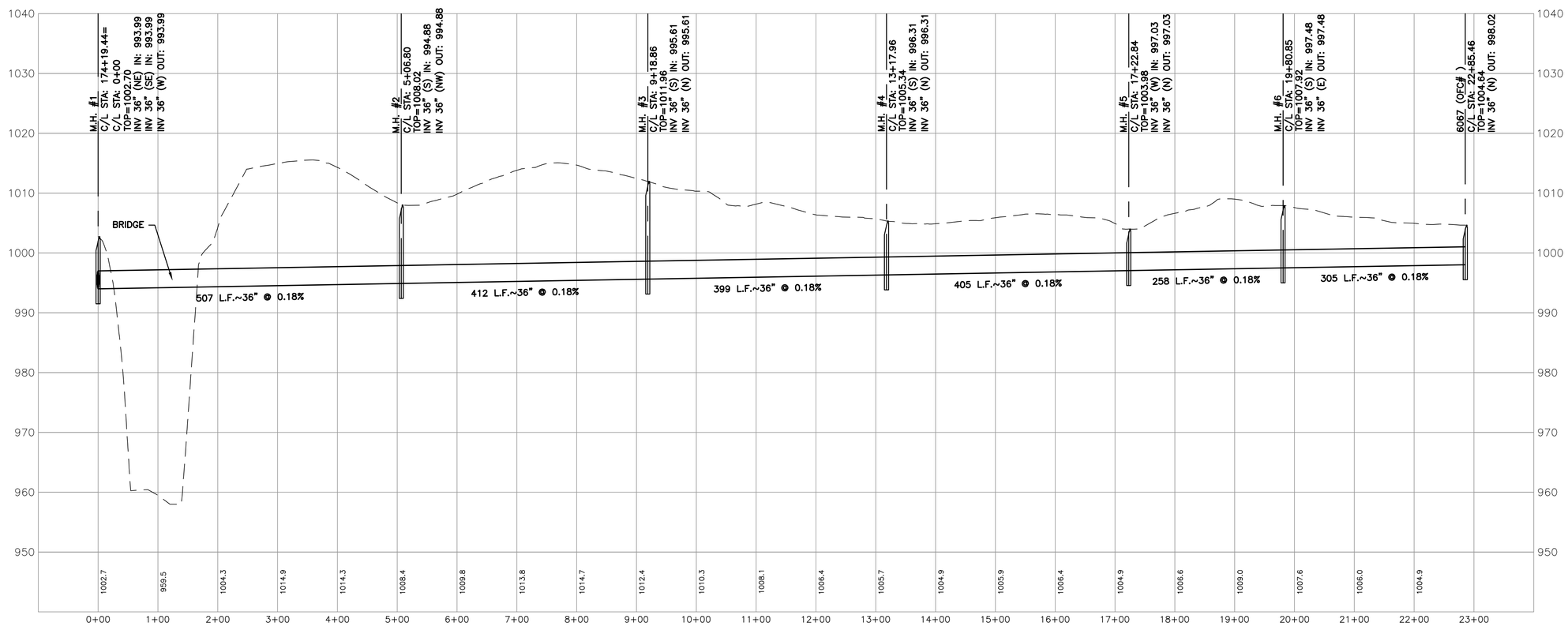

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Youngstown WWTP Wet Weather Treatment Expansion to 180 MGD Wet Weather Facility Treatment Site Construction Estimate							
Description	**Notes**	**Qty**	**Units**	**Material**	**Labor/Equip**	**Unit Cost Installed**	**Amount**
Junction Chamber and Site Work	**High-Rate Treatment Site**						
Demolition/Clearing/Site Prep		1	ls			$100,000	$100,000
Bulk Excavation	45 ft. Depth w/ Limited Haul	840	cy	$0	$16.00	$16.00	$13,440
Reinforced Concrete	Influent Junction Chamber	380	cy			$1,200.00	$456,000
Sluice Gate (Electric Actuator)	Influent Flow Control & Isolation	2	ea	$68,000	$35,000	$103,000	$206,000
Backfill	Influent Junction Chamber	300	cy	$10	$15.00	$25.00	$7,500
84" Yard Piping	From Plant Influent	240	lf			$1,200.00	$288,000
96" Yard Piping	From CSO 6057	1,540	lf			$1,400.00	$2,156,000
HRT Recycle Flow Piping	36" DIP	500	lf			$210.00	$105,000
Access/Maintenance Drives	CSO Treatment Site	1	ls			$350,000	$350,000
Existing Roadway Improvements	Gibson Street/Franklin Ave.	1	ls			$200,000	$200,000
Drainage and Storm Sewers	CSO Treatment Site	1	ls			$150,000	$150,000
Site Restoration/Landscaping	CSO Treatment Site	1	ls			$120,000	$120,000
Standby Generator	2000 kW	1	ea	$580,000	$150,000	$730,000	$730,000
Subtotal							**$4,881,900**
Raw Sewage Pump Station	**180 MGD**						
Bar Screens	Mech. Bar Screen (1/2")	4	ea	$265,000	$90,000	$355,000	$1,420,000
Bar Rack (Bypass)	2 Bypasses (1/Screen Pair)	1	ls	$16,000	$20,000	$36,000	$36,000
Slide Gates (Manual Actuators)	Channel & Equip. Isolation	16	ea	$10,400	$2,500	$12,900	$206,400
Sluice Gate (Electric Actuator)	Wet Well Isolation	1	ea	$68,000	$35,000	$103,000	$103,000
Raw Sewage Pumps (WWTP)	Inverter Duty Motors						
35 MGD	Dry Pit Submersible	3	ea	$280,000	$80,000	$360,000	$1,080,000
20 MGD	Dry Pit Submersible	1	ea	$190,000	$70,000	$260,000	$260,000
Raw Sewage Pumps (CSO Treatment)	Inverter Duty Motors						
40 MGD	Dry Pit Submersible	3	ea	$285,000	$80,000	$365,000	$1,095,000
20 MGD	Dry Pit Submersible	1	ea	$180,000	$70,000	$250,000	$250,000
10 MGD	Dry Pit Submersible	1	ea	$145,000	$65,000	$210,000	$210,000
Variable Frequency Drives	Incl. Electronic Bypass	9	ea	$42,000	$15,000	$57,000	$513,000
Parshall Flume	9-ft Throat	2	ea	$7,600	$10,000	$17,600	$35,200
Screenings Roll-Off Area		1	ls	$15,000	$10,000	$25,000	$25,000
Bulk Excavation	50 ft. Depth w/ Limited Haul	11,600	cy	$0	$16.00	$16.00	$185,600
Grating	1.25" FRP Covered Grating	1	ls	$30,000	$12,000	$42,000	$42,000
Stairwells		1	ls			$90,000	$90,000
Building	Masonry Exterior	6,700	sf	-	-	$60.00	$402,000
Bridge Crane	20-ton	1	ea	$46,000	$50,000	$96,000	$96,000
Handrail & Platforms		1	ls	$25,000	$20,000	$45,000	$45,000
Reinforced Concrete		750	cy			$1,200.00	$900,000
Elevator		1	ls	-	-	$90,000	$90,000
Backfill & Cleanup	On-Site	1,800	cy	$5	$15.00	$20.00	$36,000
Grout Fill		170	cy			$300.00	$51,000
Gate Valve		9	ea	$25,000	$5,000	$30,000	$270,000
Ball Valve	Hydraulic Control	9	ea	$30,000	$5,000	$35,000	$315,000
Plug Valve	8" Isolation	1	ea	$5,400	$2,000	$7,400	$7,400
Check Valve		9	ea	$16,000	$2,500	$18,500	$166,500
Interior Piping & Fittings	Raw Sewage Pumps	1	ls			$140,000	$140,000
Magnetic Flow Meter	8" (low CSO flow return)	1	ea	$5,800	$2,000	$7,800	$7,800
Level Sensors	Bubbler Systems	2	ea	$10,000	$6,000	$16,000	$32,000
Force Main (54" DIP)	To Screening & Grit Bldg.	150	l.f.			$600.00	$90,000
Force Main (60" DIP)	To CSO Treatment Facility	280	l.f.			$650.00	$182,000
Electrical		1	ls			$1,000,000	$1,000,000
Painting		1	ls			$150,000	$150,000
Subtotal							**$9,531,900**
Fine Screening & Grit Building	**80 MGD**						
Fine Screens	Band Screen (6 mm)	3	ea.	$280,000	$90,000	$370,000	$1,110,000
Washer/Compactor		2	ea.	$105,000	$70,000	$175,000	$350,000
Conveyor		1	ls	$130,000	$70,000	$200,000	$200,000
Slide Gates (Manual Actuators)	Channel & Equip. Isolation	6	ea.	$8,800	$2,500	$11,300	$67,800
Grit Removal System (Eutek HeadCell, SlurryCup, Grit Snail)	Separation, Classifying, Washing and Dewatering	2	ea	$320,000	$150,000	$470,000	$940,000
Grit Pump	Dry Pit, Recessed Impeller	3	ea	$38,000	$10,000	$48,000	$144,000
Screenings Conveyor		1	ls	$80,000	$55,000	$135,000	$135,000
Reinforced Concrete		650	cy			$1,200.00	$780,000
Grout Fill		140	cy			$250.00	$35,000
Interior Piping		1	ls	$25,000	$40,000	$65,000	$65,000
Bulk Excavation		1,800	cy		$16.00	$16.00	$28,800
Backfill & Cleanup	Building On-Site	400	cy	$15	$15.00	$30.00	$12,000
Screenings & Grit Unloading Area	Drive Through	1	ls	$25,000	$15,000	$40,000	$40,000
Grating	1.25" FRP Covered Grating	1	ls	$35,000	$14,000	$49,000	$49,000
Handrail & Platforms		1	ls	$20,000	$16,000	$36,000	$36,000
Building	Masonry Exterior	4,900	sf			$60.00	$294,000
84" Yard Piping	To Primary Treatment	640	lf			$800.00	$512,000

Stairwells		1	ls			$70,000	$70,000
Electrical		1	ls			$350,000	$350,000
Painting		1	ls			$90,000	$90,000
Subtotal							**$5,308,600**
High-Rate Treatment Facility	**100 MGD**						
Ballasted Floccuation HRT	2 x 50 MGD Trains	1	ls	$4,150,000	$4,000,000	$8,150,000	$8,150,000
HRT Building	Chem. Storage, Handling & Elec.	2,800	sf			$120.00	$336,000
Induction Mixers		4	ea	$20,500	$9,000	$29,500	$118,000
Sampling Station		1	ls	$3,000	$5,000	$8,000	$8,000
Chemical Storage Tanks	Coagulant, Polymer, Disinfection, Dechlorination	1	ls	$140,000	$20,000	$160,000	$160,000
High-Rate Disinfection Contact Tank		1	ls			$250,000	$250,000
HRD Building		900	sf			$100.00	$90,000
Jib Crane	HRD Contact Tank	2	ea	$12,000	$6,000	$18,000	$36,000
Chemical Feed Pumps & Accessories	Separate from Actiflo Supply	1	ls	$100,000	$85,000	$185,000	$185,000
CSO Effluent Meter		1	ls	$50,000	$6,000	$56,000	$56,000
Aeration Structure		1	ls	$40,000	$45,000	$85,000	$85,000
Dechlorination Building		650	sf			$120.00	$78,000
HRT Process Piping		1	ls	$90,000	$100	$90,100	$90,100
Holding Tank (Pre-Cast/Pre-Stressed)	550,000 gallons (open)	1	ls			$440,000	$440,000
Pump Station	Holding Tank	1	ls			$90,000	$90,000
Solids Discharge Piping		1	ls	$60,000	$45,000	$105,000	$105,000
Bulk Excavation		4,600	cy	$0	$16.00	$16.00	$73,600
Reinforced Concrete		860	cy			$1,200.00	$1,032,000
Backfill & Cleanup		750	cy	$5	$13.00	$18.00	$13,500
Grout Fill		160	cy			$190.00	$30,400
Grating		1	ls	$40,000	$16,000	$56,000	$56,000
Handrail & Platforms		1	ls	$30,000	$22,000	$52,000	$52,000
Stairwells		1	ls			$95,000	$95,000
Electrical		1	ls			$540,000	$540,000
Painting		1	ls			$95,000	$95,000
Subtotal							**$12,264,600**
High-Rate Treatment Outfall	**Treated CSO to Mahoning River**						
High-Rate Treatment Outfall	7' x 7' Box Culvert	1,800	lf			$1,400.00	$2,520,000
Subtotal							**$2,520,000**
SCADA/Elecrtical Switchgear							
Electrical Renovation		1	ls			$3,000,000	$3,000,000
SCADA System Upgrade	New Administration Building	1	ls			$1,500,000	$1,500,000
Subtotal							**$4,500,000**
Administration Bldg./Laboratory							
Administration Offices & Laboratory	Incl. Furnishings & Utilities	9,100	sf			$200.00	$1,820,000
Parking Area		1	ls			$80,000	$80,000
Misc. Equipment		1	ls			$225,000	$225,000
Site Work/Drainage		1	ls			$75,000	$75,000
Subtotal							**$2,200,000**
						CSO Treatment Construction SUBTOTAL	**$41,207,000**
Administrative Markups							
Escalation to Midpoint	2% per Annum (2 Years)	5.0%					$2,060,000
High-Rate Treatment Contingency		10%					$4,121,000
Property Acquisition							$200,000
Administrative Markups Total							*$6,381,000*
Contractor Expense							
Mobilization		1.0%					$412,000
Overhead & Profit		8%					$3,297,000
Insurance		2.5%					$1,030,000
Bonds		1.5%					$618,000
Start-Up, Training, O&M		1.5%					$618,000
Contractor Expense Total							*$5,975,000*
Engineering/Construction Expense							
Preliminary Design		3.5%					$1,442,000
Final Design		6.0%					$2,472,000
Interest during Construction		2.0%					$824,000
Bonding/Financing		1.5%					$618,000
Construction Administrative Costs		7.5%					$3,091,000
Engineering Expense Total							*$8,447,000*
						Wet Weather Facility Project TOTAL	**$62,010,000**

Youngstown WWTP Wet Weather Treatment Expansion to 180 MGD WWTP Improvements Construction Estimate							
Description	**Notes**	**Qty**	**Units**	**Material**	**Labor/Equip**	**Unit Cost Installed**	**Amount**
Decommissioning							
Raw Sewage P.S.		1	ls			$140,000	$140,000
Grit Tanks		1	ls			$75,000	$75,000
Medium Voltage Substation		1	ls			75000	$75,000
Chemical Building		1	ls			$20,000	$20,000
Chlorination		1	ls			$100,000	$100,000
Subtotal							**$410,000**
Primary Settling Tanks							
Effluent Weir Modifications		1	ls	$45,000	$120,000	$165,000	$165,000
Replace Chain & Flight Equipment		1	ls	$1,100,000	$650,000	$1,750,000	$1,750,000
Structural Modifications		1	ls			$150,000	$150,000
Handrail		1	ls			$175,000	$175,000
Piping Repairs		1	ls	$25,000	$75,000	$100,000	$100,000
Sludge Pumps		1	ls	$100,000	$75,000	$175,000	$175,000
Subtotal							**$2,515,000**
Primary Effluent P.S.							
Pumps and Valves		1	ls	$1,500,000	$350,000	$1,850,000	$1,850,000
Electrical		1	ls	$225,000	$175,000	$400,000	$400,000
Painting		1	ls	$7,500	$20,000	$27,500	$27,500
Subtotal							**$2,277,500**
Trickling Filters							
Stacked Media Replacement	Incl. Pier and Underdrain	1	ls	$1,800,000	$550,000	$2,350,000	$2,350,000
Subtotal							**$2,350,000**
Aeration Tanks							
Diffuser Replacement	Fine Bubble Membrane	1	ls	$620,000	$450,000	$1,070,000	$1,070,000
Blower/Drive Replacement		5	ea	$65,000	$75,000	$140,000	$700,000
Air Header/Piping Improvements		1	ls	$250,000	$300,000	$550,000	$550,000
Subtotal							**$2,320,000**
Secondary Clarifiers							
Remove Traveling Bridge Equipment		1	ls			$90,000	$90,000
New Collector Mechanisms	Incl. Hydraulic/Struct. Mods.	1	ls	$1,550,000	$750,000	$2,300,000	$2,300,000
Modify RAS Pumping		1	ls	$250,000	$150,000	$400,000	$400,000
Misc. Piping Improvements		1	ls	$80,000	$80,000	$160,000	$160,000
Electrical		1	ls	$80,000	$80,000	$160,000	$160,000
Painting		1	ls	$50,000	$75,000	$125,000	$125,000
Subtotal							**$3,235,000**
Micro-Screening							
Bearing Replacement		16	ea	$5,000	$7,500	$12,500	$200,000
Electrical Improvements		16	ea	$7,500	$15,000	$22,500	$360,000
Subtotal							**$560,000**
Final Effluent Pumps							
Pumps and Drives		4	ea	$45,000	$15,000	$60,000	$240,000
Electrical		4	ea	$40,000	$25,000	$65,000	$260,000
Painting		1	ls	$12,000	$25,000	$37,000	$37,000
Subtotal							**$537,000**
UV Disinfection System							
Low Pressure/High Intensity UV System	2 banks/channel; 2 channels	1	ls	$1,390,000	$450,000	$1,840,000	$1,840,000
Demolition		1	ls		$60,000	$60,000	$60,000
Reinforced Concrete		80	cy			$1,200.00	$96,000
Electrical		1	ls			$220,000	$220,000
Grout Fill		50	cy			$300.00	$15,000
Misc. Metals		1	ls			$5,500	$5,500
Grating		1	ls			$24,000	$24,000
Handrail		1	ls	$14,000	$12,000	$26,000	$26,000
Subtotal							**$2,260,500**
Sludge Handling							
Sludge Storage Tank	470,000 gallons (open)	1	ea.			$405,000	$405,000
Gravity Belt Thickener	3 meter	1	ea.	$240,000	$120,000	$360,000	$360,000
Belt Filter Press	2 meter (Stacked Rollers)	5	ea.	$320,000	$120,000	$440,000	$2,200,000
Electrical Sludge Improvements		1	ls	$250,000	$250,000	$500,000	$500,000
Sludge Pumps/Piping		1	ls	$200,000	$150,000	$350,000	$350,000
Subtotal							**$3,815,000**
SCADA/ELECTRICAL SWITCHGEAR							
Electrical Rennovation		1	ls			$2,000,000	$2,000,000

SCADA System Upgrade	New Administration Building	1	ls			$1,000,000	$1,000,000
Subtotal						.	**$3,000,000**
Building & Civil/Site Work							
Convert P.S. to Maintenance Shop		1	ls			$200,000	$200,000
New Maintenance Garage		5,000	sf			$175.00	$875,000
Access Drive Improvements		1	ls			$150,000	$150,000
Subtotal							**$1,225,000**
						WWTP Improvements SUBTOTAL	**$24,505,000**
Administrative Mark-Ups							
Escalation to Midpoint		5.0%					$1,225,250
WWTP Improvements Contingency		10%					$2,450,500
Administrative Expense Total							***$3,675,750***
Contractor Expense							
Mobilization		1.0%					$245,050
Overhead & Profit		10%					$2,450,500
Insurance		2.5%					$612,625
Bonds		1.5%					$367,575
Start-Up, Training, O&M		1.5%					$367,575
Contractor Expense Total							***$4,043,325***
Engineering/Construction Expense							
Preliminary Design		3.5%					$857,675
Final Design		6.0%					$1,470,300
Interest during Construction		2.0%					$490,100
Bonding/Financing		1.5%					$367,575
Construction Administrative Costs		7.5%					$1,837,875
Engineering Expense Total							***$5,023,525***
						WWTP Improvements TOTAL	**$37,247,600**

Description	Notes	Qty	Unit	Material	Labor/ Equip	Unit Cost Installed	Ammount
Glenwood Ave Sewer							
SWP3		1	LS			$50,000.00	$50,000.00
60" Diameter Pipe Removed		5784	LF			$45.00	$260,280.00
60" Diameter Pipe Removed (Bore)		615	LF			$100.00	$61,500.00
24" Diameter Pipe Removed		1328	LF			$20.00	$26,560.00
18" Diameter Pipe Removed		200	LF			$20.00	$4,000.00
15" Diameter Pipe Removed		200	LF			$15.00	$3,000.00
12" Diameter Pipe Removed		200	LF			$10.00	$2,000.00
Concrete Curb Removal		1000	LF			$4.00	$4,000.00
Pavement Removed		16066	SY			$8.00	$128,528.00
Trees Removed		20	EA			$400.00	$8,000.00
5'x10' Box Culvert		5784	LF			$1,400.00	$8,097,600.00
5'x10' Box Culvert (Beneath River)		615	LF			$2,000.00	$1,230,000.00
48" Diameter Pipe		2997	LF			$500.00	$1,498,500.00
48" Diameter Pipe (Micro Tunnel)		6500	LF			$1,600.00	$10,400,000.00
6' Diameter Manholes		28	EA			$15,000.00	$420,000.00
24' Micro Tunnel Shaft		9	EA			$95,000.00	$855,000.00
Type 6 Curb		1000	LF			$10.00	$10,000.00
1 1/2" Milling		6546	SY			$20.00	$130,920.00
8" Concrete Pavement		23394	SY			$60.00	$1,403,640.00
2" Intermediate Asphalt		1059	CY			$220.00	$232,980.00
1 1/2" Surface Asphalt		980	CY			$250.00	$245,000.00
Tack Coat		3300	GAL			$4.00	$13,200.00
4" Top Soil, Seeding		3066	SY			$10.00	$30,660.00
Glenwood Sub-Total							**$25,065,368.00**
Glenmere Drive Sewer							
SWP3		1	LS			$5,000.00	$5,000.00
Concrete Curb Removal		48	LF			$4.00	$192.00
24" Diameter Pipe Removed		1981	LF			$20.00	$39,620.00
20" Diameter Pipe Removed		305	LF			$20.00	$6,100.00
Pavement Removed		973	SY			$8.00	$7,784.00
Manhole Removed		8	EA			$500.00	$4,000.00
36" Diameter Pipe Installed		2286	LF			$450.00	$1,028,700.00
6' Diameter Manholes		7	EA			$15,000.00	$105,000.00
Bridge Replacement/Aerial Sewer		1	EA			$850,000.00	$850,000.00
1 1/2" Milling		777	SY			$20.00	$15,540.00
Type 6 Curb		48	LF			$10.00	$480.00
8" Concrete Pavement		973	SY			$60.00	$58,380.00
2" Intermediate Asphalt		55	CY			$220.00	$12,100.00
1 1/2" Surface Asphalt		41	CY			$250.00	$10,250.00
Tack Coat		55.35	GAL			$4.00	$221.40
4" Top Soil, Seeding		4444.44	SY			$10.00	$44,444.44
Glenmere Sub-Total							**$2,132,896.00**
Construction Sub-Total							**$27,198,264.00**
Administrative Markups							
Escalation to Midpoint	2% Per Annum (3 Years)	6.0%					$1,631,895.84
Contingencies		15.0%					$4,079,739.60
Property Acquisition							$50,000.00
Admin Markups Sub-Total							**$5,761,635.44**
Contractor Espense							
Mobilization, Bonds, Ins.		1.5%					$494,398.49
OH&P		12.0%					$3,955,187.93
Insurance		2.5%					$823,997.49
Bonds		1.5%					$494,398.49
Start-Up, Training, O&M		0.0%					$0.00
Contractor Expense Sub-Total							**$5,767,982.40**
Construction Cost							**$38,727,881.84**
Engineering/Construction Expense							
Preliminary Design		3.5%					$1,355,475.86
Final Design		6.0%					$2,323,672.91
Interest During Construction		2.0%					$774,557.64
Bonding/Financing		1.5%					$580,918.23
Construction Administration Costs		7.5%					$2,904,591.14
Misc Expense Sub-Total							$7,939,215.78
						Project Cost	**$46,667,097.62**

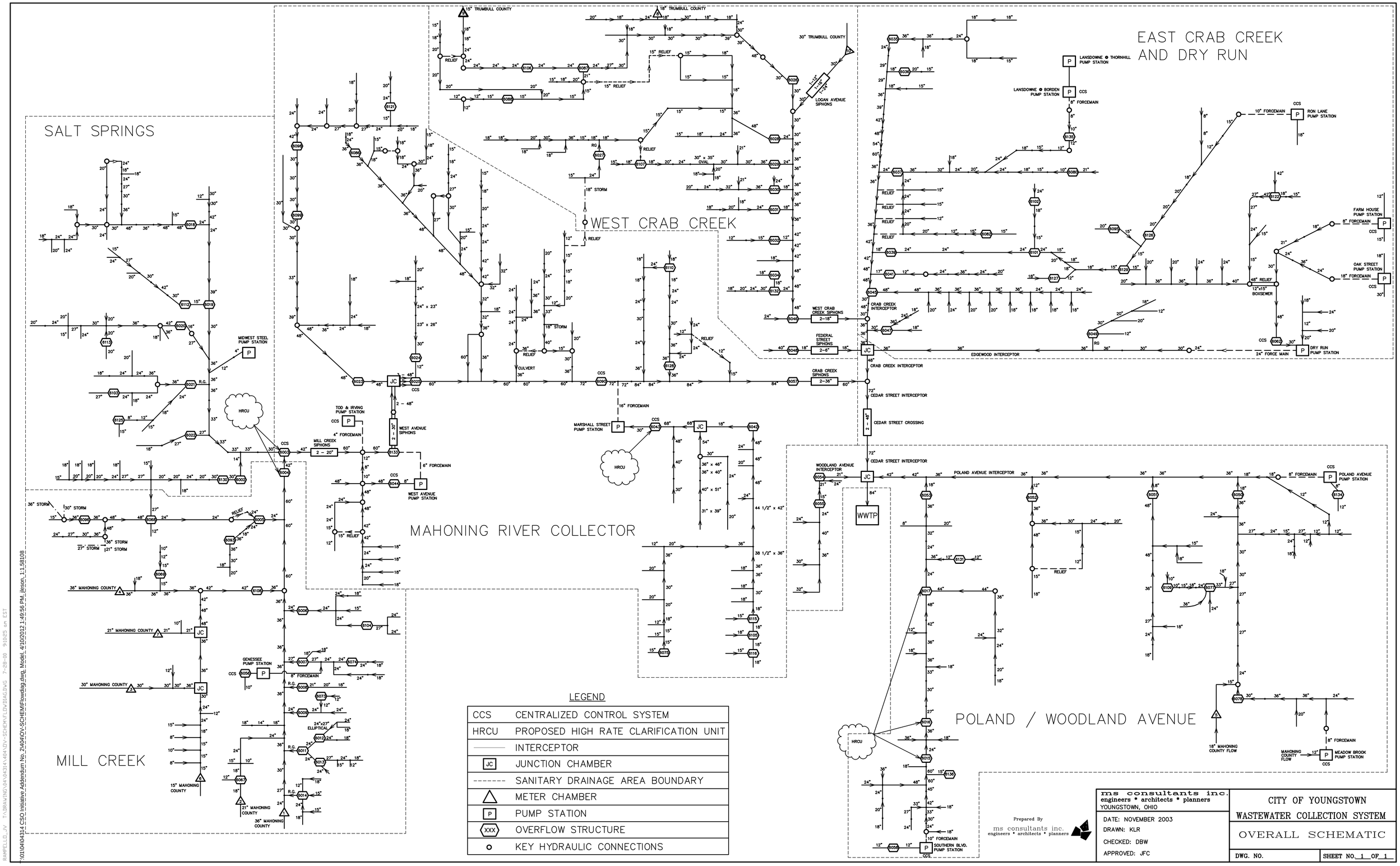
Description	Notes	Qty	Unit	Material	Labor/ Equip	Unit Cost Installed	Ammount
Glenwood Ave Sewer							
SWP3		1	LS			$50,000.00	$50,000.00
60" Diameter Pipe Removed		5784	LF			$45.00	$260,280.00
60" Diameter Pipe Removed (Bore)		615	LF			$100.00	$61,500.00
27" Diameter Pipe Removed		1328	LF			$25.00	$33,200.00
18" Diameter Pipe Removed		200	LF			$20.00	$4,000.00
15" Diameter Pipe Removed		200	LF			$15.00	$3,000.00
12" Diameter Pipe Removed		200	LF			$10.00	$2,000.00
Concrete Curb Removal		1000	LF			$4.00	$4,000.00
Pavement Removed		16066	SY			$8.00	$128,528.00
Trees Removed		20	EA			$400.00	$8,000.00
5'x10' Box Culvert		5784	LF			$1,400.00	$8,097,600.00
5'x10' Box Culvert (Beneath River)		615	LF			$2,000.00	$1,230,000.00
48" Diameter Pipe		5319	LF			$500.00	$2,659,500.00
36" Forcemain		4625	LF			$320.00	$1,480,000.00
6' Diameter Manholes		34	EA			$10,000.00	$340,000.00
Pump Station		1	EA			$8,500,000.00	$8,500,000.00
Type 6 Curb		1000	LF			$10.00	$10,000.00
1 1/2" Milling		28706	SY			$20.00	$574,120.00
8" Concrete Pavement		23394	SY			$60.00	$1,403,640.00
2" Intermediate Asphalt		1242	CY			$220.00	$273,240.00
1 1/2" Surface Asphalt		2202	CY			$250.00	$550,500.00
Tack Coat		4306	GAL			$4.00	$17,223.60
4" Top Soil, Seeding		3066	SY			$10.00	$30,660.00
Glenwood Sub-Total							**$25,720,991.60**
Glenmere Drive Sewer							
SWP3		1	LS			$5,000.00	$5,000.00
Concrete Curb Removal		48	LF			$4.00	$192.00
24" Diameter Pipe Removed		1981	LF			$20.00	$39,620.00
20" Diameter Pipe Removed		305	LF			$20.00	$6,100.00
Pavement Removed		973	SY			$8.00	$7,784.00
Manhole Removed		8	EA			$500.00	$4,000.00
36" Diameter Pipe Installed		2286	LF			$450.00	$1,028,700.00
6' Diameter Manholes		7	EA			$15,000.00	$105,000.00
Bridge Replacement/Aerial Sewer		1	EA			$850,000.00	$850,000.00
1 1/2" Milling		777	SY			$20.00	$15,540.00
Type 6 Curb		48	LF			$10.00	$480.00
8" Concrete Pavement		973	SY			$60.00	$58,380.00
2" Intermediate Asphalt		55	CY			$220.00	$12,100.00
1 1/2" Surface Asphalt		41	CY			$250.00	$10,250.00
Tack Coat		55.35	GAL			$4.00	$221.40
4" Top Soil, Seeding		4444.44	SY			$10.00	$44,444.44
Glenmere Sub-Total							**$2,120,796.00**
Construction Sub-Total							**$27,841,787.60**
Administrative Markups							
Escalation to Midpoint	2% Per Annum (3 Years)	6.0%					$1,670,507.26
Contingencies		15.0%					$4,176,268.14
Property Acquisition							$50,000.00
Admin Markups Sub-Total							**$5,896,775.40**
Contractor Espense							
Mobilization, Bonds, Ins.		1.5%					$506,078.44
OH&P		12.0%					$4,048,627.56
Insurance		2.5%					$843,464.07
Bonds		1.5%					$506,078.44
Start-Up, Training, O&M		0.0%					$0.00
Contractor Expense Sub-Total							**$5,904,248.52**
Construction Cost							**$39,642,811.52**
Engineering/Construction Expense							
Preliminary Design		3.5%					$1,387,498.40
Final Design		6.0%					$2,378,568.69
Interest During Construction		2.0%					$792,856.23
Bonding/Financing		1.5%					$594,642.17
Construction Administration Costs		7.5%					$2,973,210.86
Misc Expense Sub-Total							$8,126,776.36
						Project Cost	**$47,769,587.88**

Description	Notes	Qty	Unit	Material	Labor/ Equip	Unit Cost Installed	Ammount
Glenwood Ave Sewer							
SWP3		1	LS			$50,000.00	$50,000.00
60" Diameter Pipe Removed		5484	LF			$45.00	$246,780.00
60" Diameter Pipe Removed (Bore)		634	LF			$100.00	$63,400.00
36" Diameter Pipe Removed		11723	LF			$35.00	$410,305.00
30" Diameter Pipe Removed		977	LF			$30.00	$29,310.00
27" Diameter Pipe Removed		921	LF			$30.00	$27,630.00
Manhole Removed		71	EA			$500.00	$35,500.00
Concrete Curb Removal		1000	LF			$4.00	$4,000.00
Pavement Removed		34434	SY			$8.00	$275,472.00
Trees Removed		50	EA			$400.00	$20,000.00
5'x10' Box Culvert		5784	LF			$1,400.00	$8,097,600.00
5'x10' Box Culvert (Beneath River)		615	LF			$2,000.00	$1,230,000.00
60" Diameter Pipe		6479	LF			$910.00	$5,895,890.00
48" Diameter Pipe		3103	LF			$540.00	$1,675,620.00
36" Diameter Pipe		4039	LF			$450.00	$1,817,550.00
6' Diameter Manholes		63	EA			$15,000.00	$945,000.00
Bridge Replacement/Aerial Sewer		3	EA			$850,000.00	$2,550,000.00
Type 6 Curb		1000	LF			$10.00	$10,000.00
8" Concrete Pavement		34434	SY			$60.00	$2,066,040.00
2" Intermediate Asphalt		1907	CY			$220.00	$419,540.00
1 1/2" Surface Asphalt		1439	CY			$250.00	$359,750.00
Tack Coat		1943	GAL			$4.00	$7,770.60
4" Top Soil, Seeding		17778	SY			$10.00	$177,777.78
Glenwood Sub-Total							**$26,364,935.38**
Glenmere Drive Sewer							
SWP3		1	LS			$5,000.00	$5,000.00
Concrete Curb Removal		48	LF			$4.00	$192.00
24" Diameter Pipe Removed		1981	LF			$20.00	$39,620.00
20" Diameter Pipe Removed		305	LF			$20.00	$6,100.00
Pavement Removed		973	SY			$8.00	$7,784.00
Manhole Removed		8	EA			$500.00	$4,000.00
36" Diameter Pipe Installed		2286	LF			$450.00	$1,028,700.00
6' Diameter Manholes		7	EA			$15,000.00	$105,000.00
Bridge Replacement/Aerial Sewer		1	EA			$850,000.00	$850,000.00
1 1/2" Milling		777	SY			$20.00	$15,540.00
Type 6 Curb		48	LF			$10.00	$480.00
8" Concrete Pavement		973	SY			$60.00	$58,380.00
2" Intermediate Asphalt		55	CY			$220.00	$12,100.00
1 1/2" Surface Asphalt		41	CY			$250.00	$10,250.00
Tack Coat		55	GAL			$4.00	$221.40
4" Top Soil, Seeding		4444	SY			$10.00	$44,444.44
Glenmere Sub-Total							**$2,187,811.84**
Construction Sub-Total							**$28,552,747.22**
Administrative Markups							
Escalation to Midpoint	2% Per Annum (3 Years)	6.0%					$1,713,164.83
Contingencies		15.0%					$4,282,912.08
Property Acquisition							$50,000.00
Admin Markups Sub-Total							**$6,046,076.92**
Contractor Espense							
Mobilization, Bonds, Ins.		1.5%					$518,982.36
OH&P		12.0%					$4,151,858.90
Insurance		2.5%					$864,970.60
Bonds		1.5%					$518,982.36
Start-Up, Training, O&M		0.0%					$0.00
Contractor Expense Sub-Total							**$6,054,794.22**
Construction Cost							**$40,653,618.36**
Engineering/Construction Expense							
Preliminary Design		3.5%					$1,422,876.64
Final Design		6.0%					$2,439,217.10
Interest During Construction		2.0%					$813,072.37
Bonding/Financing		1.5%					$609,804.28
Construction Administration Costs		7.5%					$3,049,021.38
Misc Expense Sub-Total							$8,333,991.76
						Project Cost	**$48,987,610.13**

New Sewer from CSO 6015 to CSO 6017					
Item	Quantity	Unit	Unit Cost	Unit Total	Amount
42" Sewer	1980	LF	$395	$782,100	$782,100
48" Sewer	2645	LF	$460	$1,216,700	$1,216,700
Manholes	18	ea	$6,000	$108,000	$108,000
Concrete Structures	3	ea	$35,000	$105,000	$105,000
36"-48" Pipe Removed	4400	LF	$60	$264,000	$264,000
Site Work (SWP3)	1	LS	$176,000	$176,000	$176,000
Restoration	1	LS	$220,000	$220,000	$220,000
Sub-Total					**$2,871,800**
Mobilization, Bonds, Insurance	0.05				$143,590
	0.12				$344,616
	0.2				$574,360
Construction Cost					**$3,934,366**
Engineering	0.09				$354,093
Construction Administration	0.09				$354,093
Interest During Construction	0.07				$275,406
Bond Council	0.05				$196,718
Legal	0.03				$118,031
Property	0.02				$78,687
Project Cost					**$5,311,394**

5.24 MG Holding Tank @ 6043					
Item	Quantity	Unit	Unit Cost	Unit Total	Amount
Tank	1	ea	$3,983,400	$3,983,400	$3,983,400
Pump Station	1	ea	$690,000	$690,000	$690,000
Excavation	41000	cy	$60	$2,460,000	$2,460,000
Foundation	1	ea	$90,000	$90,000	$90,000
Electrical	1	ea	$186,000	$186,000	$186,000
Site Work	1	ea	$150,000	$150,000	$150,000
Restoration	1	ea	$88,800	$88,800	$88,800
Odor Control	1	ea	$174,000	$174,000	$174,000
Sub-Total					**$7,822,200**
Mobilization, Bonds, Insurance	0.05				$391,110
	0.12				$938,664
	0.2				$1,564,440
Construction Cost					**$10,716,414**
Engineering	0.09				$964,477
Construction Administration	0.09				$964,477
Interest During Construction	0.07				$750,149
Bond Council	0.05				$535,821
Legal	0.03				$321,492
Property	0.02				$214,328
Project Cost					**$14,467,159**

11.88 MG Holding Tank @ 6017					
Item	Quantity	Unit	Unit Cost	Unit Total	Amount
Tank	1	ea	$7,184,000	$7,184,000	$7,184,000
Pump Station	1	ea	$985,000	$985,000	$985,000
Excavation	97000	cy	$60	$5,820,000	$5,820,000
Foundation	1	ea	$125,000	$125,000	$125,000
Electrical	1	ea	$400,000	$400,000	$400,000
Site Work	1	ea	$175,000	$175,000	$175,000
Restoration	1	ea	$126,000	$126,000	$126,000
Odor Control	1	ea	$215,000	$215,000	$215,000
Sub-Total					**$15,030,000**
Mobilization, Bonds, Insurance	0.05				$751,500
	0.12				$1,803,600
	0.2				$3,006,000
Construction Cost					**$20,591,100**
Engineering	0.09				$1,853,199
Construction Administration	0.09				$1,853,199
Interest During Construction	0.07				$1,441,377
Bond Council	0.05				$1,029,555
Legal	0.03				$617,733
Property	0.02				$411,822
Project Cost					**$27,797,985**


SALT SPRINGS
MIDWEST STEEL PUMP STATION
HRCU
MILL CREEK
15" MAHONING COUNTY
21" MAHONING COUNTY
36" MAHONING COUNTY
30" MAHONING COUNTY
GENESSEE PUMP STATION
WEST CRAB CREEK
MAHONING RIVER COLLECTOR
15" TRUMBULL COUNTY
18" TRUMBULL COUNTY
30" TRUMBULL COUNTY
LOGAN AVENUE SIPHONS
WEST CRAB CREEK SIPHONS
FEDERAL STREET SIPHONS
CRAB CREEK SIPHONS
CRAB CREEK INTERCEPTOR
EDGEWOOD INTERCEPTOR
CEDAR STREET INTERCEPTOR
CEDAR STREET CROSSING
TOD & IRVING PUMP STATION
WEST AVENUE SIPHONS
MILL CREEK SIPHONS
WEST AVENUE PUMP STATION
MARSHALL STREET PUMP STATION
EAST CRAB CREEK AND DRY RUN
LANSDOWNE @ THORNHILL PUMP STATION
LANSDOWNE @ BORDEN PUMP STATION
RON LANE PUMP STATION
FARM HOUSE PUMP STATION
OAK STREET PUMP STATION
DRY RUN PUMP STATION
24" FORCE MAIN
POLAND / WOODLAND AVENUE
WOODLAND AVENUE INTERCEPTOR
POLAND AVENUE INTERCEPTOR
POLAND AVENUE PUMP STATION
WWTP
SOUTHERN BLVD. PUMP STATION
MEADOW BROOK PUMP STATION
18" MAHONING COUNTY FLOW
MAHONING COUNTY FLOW
LEGEND
CCS CENTRALIZED CONTROL SYSTEM
HRCU PROPOSED HIGH RATE CLARIFICATION UNIT
INTERCEPTOR
JC JUNCTION CHAMBER
SANITARY DRAINAGE AREA BOUNDARY
METER CHAMBER
PUMP STATION
OVERFLOW STRUCTURE
KEY HYDRAULIC CONNECTIONS
Prepared By
ms consultants inc.
engineers * architects * planners
ms consultants inc.
engineers * architects * planners
YOUNGSTOWN, OHIO
DATE: NOVEMBER 2003
DRAWN: KLR
CHECKED: DBW
APPROVED: JFC
CITY OF YOUNGSTOWN
WASTEWATER COLLECTION SYSTEM
OVERALL SCHEMATIC
DWG. NO.
SHEET NO. 1 OF 1