CUY-90-14.90

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APPENDIX DR-02

Conceptual Drainage Evaluation
(Reference Document)

State of Ohio
Department of Transportation
Jolene M. Molitoris, Director

Innerbelt Bridge
Construction Contract Group 1 (CCG1)

Revision Date: March 4, 2010

Conceptual Drainage Evaluation

TABLE OF CONTENTS

1. INTRODUCTION

The Conceptual Drainage Design has been prepared in an effort to determine potential conceptual drainage solutions for implementation on the Central Viaduct Design Build Project. This document has been divided into two sections. The first section, *Tie-In to Existing*, has been included as it was integral in coordination with NEORSD and City of Cleveland WPC in developing specifications for post-construction flow in existing combined sewer systems on this project. Both organizations indicated that an increase in peak flows to any point on their existing systems could not be tolerated, thus presenting the possibility of the GCRTA aerial storm sewer crossing.

The second section of this document, *Proposed Storm-Only Systems* presents conceptual options for storm sewer design. Preliminary BMP calculations have also been performed for all three storm sewer systems, serving the Commercial Road region, the East Bank, and the West Bank of the project.

2. TIE-IN TO EXISTING

A. NARRATIVE

The following is a preliminary comparison of pre-construction and post-construction storm flows to combined sewers on the East and West Banks of the Cuyahoga River.

In the Commercial Road Region the drainage areas were considered in regards to the location of the GCRTA alignment because of the potential complexity of constructing and maintaining a proposed storm-only trunk line that crosses the GCRTA tracks. Baker has undergone an analysis of the drainage in this region based on (1) considering the region as a whole (involving a drainage crossing of the GCRTA tracks) and (2) considering the region if only drainage south of the GCRTA alignment is routed into a storm-only system.

The drainage areas and coefficients of runoff, C, were determined using engineering judgment and knowledge of the post-construction site conditions. The discharge was computed for each drainage area following the procedure outlined in the ODOT L&D Manual Vol. 2 using the Rational Method.

After consulting with NEORSD, it was determined the storm-only trunk line would be necessary to carry flow across the GCRTA alignment since the increase in peak flows to CSO-94 (29.60 cfs, as outlined in the East Bank Pre vs. Post table) was deemed unacceptable by NEORSD.

Attached is a table for the East Bank drainage areas and a table for the West bank drainage areas. The corresponding areas of interest are displayed graphically, outlined in light blue. Each drainage area was determined based on information from ODOT's proposed right of way lines and existing combined sewer information from B&N's BMP Study.

The ODOT CDSS Design Software was used to determine the pipe sizes required for each storm-only sewer system.

Note that on the east bank drainage area graphic are two small areas outlined in orange and green. The orange area represents the post-construction drainage area for section VFF. The green areas represent the pre-construction drainage areas for sections A and B. These drainage areas change in size between the pre-construction and post-construction condition due to changes in topography.

Note that drainage areas are grouped based on the existing capture of the areas per the B&N BMP study. B&N's BMP maps show the CSO Sewersheds in the project location to which these areas contribute.

Once proposed storm-only systems were preliminarily designed, the proposed flows were compiled to determine the overall effect that proposed construction in Construction Contract Group 1 would have on the existing drainage systems assuming the combined sewers are continued to be used to supplement proposed storm-only systems.

The East Bank Pre vs. Post Flows table demonstrates that approximately 3.65 cfs of flow will be added to the CSO-90 system north of the GCRTA. As also seen in this table, approximately 9.60 cfs of flow will be removed from the CSO-90 system south of the GCRTA, due to the installation of the storm-only sewer system. This results in a net decrease in flow to the CSO-90 sewer system of approximately 5.96 cfs. CSO-235 will see a net decrease of approximately 3.94 cfs, and CSO-94 will see a net increase of approximately 29.60 cfs. Recall that these values do not take into account the proposed GCRTA crossing. The installation of a closed system crossing of the GCRTA lines should potentially reduce all CSO adjustments to negative values.

In the West Bank Region the drainage areas were considered in regards to natural flow patterns and proposed roadway alignments. The majority of proposed work on the West bank will be designed to drain into a proposed storm-only sewer. The following analysis describes the potential effect routing a relatively small percentage of the proposed runoff into the existing combined sewer.

The analysis performed only takes into account the drainage areas within this project's limits that are draining into the combined sewer system (CSO-80) in both pre-construction and post-construction condition. This analysis does not take into consideration the removal of approximately 20 acres of surrounding project site currently draining into the combined sewer system. These 20 acres are proposed to be drained through a new storm-only system.

The area in the region of the proposed West 14th/Abbey loop ramp is changing significantly, considering the removal of significant impervious area. Much of this area currently drains into the 24" trunk line along the Fairfield Avenue. Area D will drain into the proposed storm-only system, thus reducing the area flowing into the 24" trunk line. The remaining area that does maintain its flow into the 24" trunk line has reduced its impervious area from a pre-condition C-factor in area E of 0.62 to a post condition C-factor of 0.47, and in area F a pre-condition C-factor of 0.64 with a post condition C-factor of 0.44. This creates a decrease in flow to the system with flows decreasing by 1.48 cfs in area E and by 1.82 cfs in area F. Areas J1, J2, and J3 also flow into the combined sewer, but there is projected to be no measurable change in peak flows from the pre-construction condition.

The exhibits under "Proposed Flow Changes to Existing NEORSD Combined Sewer System" ***do*** take into account the use of a proposed aerial storm crossing of the GCRTA alignment, unlike the "Pre vs. Post" calculations, which were performed under the assumption of no use of an aerial crossing. These drawings convey the change in flows that the existing combined sewer network is estimated to see based on the proposed preliminary design.

B. TABLES AND EXHIBITS

- **EAST BANK DRAINAGE PRE VS. POST FLOWS TABLE AND PLAN VIEW**
- **WEST BANK DRAINAGE PRE VS. POST FLOWS TABLE AND PLAN VIEW**
- **PROPOSED FLOW CHANGES TO EXISTING NEORSD COMBINED SEWER SYSTEM**

EAST BANK
PRE VS. POST FLOWS

18" trunk line draining NE along Old Commercial / Central Viaduct

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-94 Increase in Peak 10 yr. Discharge (ft^3/sec)
VA	1.12	1.12	0.90	0.90	0.00	10.00	10.00	5.10	5.10	5.14	5.14	0.00
VD	0.78	0.78	0.90	0.90	0.00	10.00	10.00	5.10	5.10	3.58	3.58	0.00
VGG	0.75	0.75	0.90	0.90	0.00	10.00	10.00	5.10	5.10	3.44	3.44	0.00
												0.00

24" trunk line draining NW along Broadway Avenue

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-90 Increase in Peak 10 yr. Discharge (ft^3/sec)
VFF	0.84	1.38	0.50	0.66	0.16	10.00	10.00	5.10	5.10	2.14	4.64	2.50
VEE	0.28	0.28	0.90	0.90	0.00	10.00	10.00	5.10	5.10	1.28	1.28	0.00
VDD	0.37	0.38	0.50	0.80	0.30	20.09	20.09	3.58	3.58	0.66	1.09	0.43
VCC	0.50	0.50	0.90	0.90	0.00	10.00	10.00	5.10	5.10	2.29	2.29	0.00
												2.93

60" trunk line E along Carnegie Avenue

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-90 Increase in Peak 10 yr. Discharge (ft^3/sec)
VBB	3.67	3.67	0.85	0.90	0.05	17.19	17.19	3.90	3.90	12.18	12.90	0.72
												0.72

96" trunk line NW along East 9th Street

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-94 Increase in Peak 10 yr. Discharge (ft^3/sec)
VY	0.86	0.86	0.90	0.90	0.00	10.00	10.00	5.10	5.10	3.94	3.94	0.00
VAA	1.63	1.63	0.70	0.85	0.15	20.09	20.09	3.58	3.58	4.08	4.95	0.87
VZ	1.15	1.15	0.60	0.85	0.25	16.21	16.21	4.03	4.03	2.78	3.94	1.16
												2.03

66" trunk line in front of parking lot leads to East 9th Street

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-94 Increase in Peak 10 yr. Discharge (ft^3/sec)
VX	11.91	11.91	0.80	0.80	0.00	18.23	18.23	3.78	3.78	36.01	36.01	0.00
												0.00

Regions draining to proposed storm-only system*

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-235 Decrease in Peak 10 yr. Discharge (ft^3/sec)
VG	0.98	0.00	0.79	0.00	N/A	10.00	0.00	5.10	0.00	3.94	0.00	-3.94
VE	0.83	0.00	0.84	0.00	N/A	10.00	0.00	5.10	0.00	3.55	0.00	-3.55
CC (part)	0.86	0.00	0.70	0.00	N/A	10.00	0.00	5.10	0.00	3.07	0.00	-3.07
CD	0.54	0.00	0.80	0.00	N/A	16.99	0.00	3.93	0.00	1.70	0.00	-1.70
CE	0.49	0.00	0.82	0.00	N/A	10.00	0.00	5.10	0.00	2.05	0.00	-2.05
CF	0.8	0.00	0.50	0.00	N/A	10.00	0.00	5.10	0.00	2.04	0.00	-2.04
CG	0.94	0.00	0.80	0.00	N/A	16.99	0.00	3.93	0.00	2.96	0.00	-2.96
CH	0.79	0.00	0.86	0.00	N/A	10.00	0.00	5.10	0.00	3.46	0.00	-3.46
												-22.76

24" trunk line N along Broadway Avenue

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Increase in C	Time of Conc., T (min) (pre)	Time of Conc., T (min) (post)	Intensity, i (in/hr) (pre)	Intensity, i (in/hr) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	CSO-94 Increase in Peak 10 yr. Discharge (ft^3/sec)
A	0.54	2.12	0.75	0.85	0.10	10.00	10.00	5.10	5.10	2.06	9.18	7.12
B	4.46	7.17	0.86	0.86	0.00	16.99	16.99	3.93	3.93	15.07	24.23	9.16
C	2.38	2.38	0.85	0.90	0.05	10.00	10.00	5.10	5.10	10.31	10.91	0.61
CI	0	0.70	N/A	0.90	N/A	N/A	10.00	N/A	5.10	0.00	3.21	3.21
BA	0	0.74	N/A	0.90	N/A	N/A	10.85	N/A	4.91	0.00	3.27	3.27
BB	0	0.95	N/A	0.90	N/A	N/A	10.85	N/A	4.91	0.00	4.20	4.20
												27.57

Regions draining to proposed storm-only system

Section	Drainage Area, A (acres) (pre)	Drainage Area, A (acres) (post)	Coefficient of Runoff, C (pre)	Time of Conc., T (min) (pre)	Intensity, i (in/hr) (pre)	Peak 10 yr. Discharge (pre) (ft^3/sec)	CSO-90 Decrease in Peak 10 yr. Discharge (ft^3/sec)
VB	0.97	0.00	0.82	10.00	5.10	4.05	4.05
VI	0.91	0.00	0.81	10.00	5.10	3.76	3.76
VK	0.39	0.00	0.90	10.00	5.10	1.79	1.79
							9.60

CSO-90		CSO-94	
Peak Discharge (pre)	Increase (cfs)	Peak Discharge (pre)	Increase (cfs)
		5.14	0.00
		3.58	0.00
		3.44	0.00
2.14	2.50		
1.28	0.00		
0.66	0.43		
2.29	0.00		
12.18	0.72		
		3.94	0.00
		4.08	0.87
		2.78	1.16
		36.01	0.00
4.05	-4.05		
3.76	-3.76		
1.79	-1.79		
28.16	**-5.96**	**86.41**	**29.60**

CSO-90: Net Increase in Peak 10 year Discharge = -5.96 cfs
CSO-90: Net Percentage Increase in Peak 10 year Discharge = -21.2%**

CSO-94: Net Increase in Peak 10 year Discharge = 29.60 cfs
CSO-94: Net Percentage Increase in Peak 10 year Discharge = 34.3%**

*- A small amount of flow will be removed from CSO 235; however no flow is being added to CSO 235. There will be a net decrease of 3.94 cfs to the CSO 235 sewer system.

** - Percentage increases are not a percentage increase to the CSO as a whole. This is simply the increased percentage of peak discharge considering only the drainage areas affected by this analysis.

EAST BANK DRAINAGE
PLAN VIEW

Legend
- = Drainage Areas Used in This Analysis
- = Drainage Areas
- = Post Construction Drainage Area (if different from pre-construction area)
- = Pre Construction Drainage Area (if different from post-construction area)

VAA 1.63 Ac
VX 11.91 Ac
VZ 1.15 Ac
VCC 0.50 Ac
VBB 3.67 Ac
VY 0.86 Ac
VGG 0.75 Ac
VFF 0.84 Ac
VDD 0.38 Ac
VEE 0.28 Ac
VB 0.97 Ac
VE 0.83 Ac
VD 0.78 Ac
VG 0.98 Ac
VF 0.74 Ac
CM 0.12 Ac
CJ 0.72 Ac
CL 0.39 Ac
CK 0.33 Ac
VI 0.91 Ac
VJ 0.61 Ac
VK 0.39 Ac
VC 0.15 Ac
CD 0.54 Ac
CE 0.49 Ac
CC 1.48 Ac
CB 1.18 Ac
CA 0.91 Ac
CH 0.79 Ac
CG 0.94 Ac
VH 0.34 Ac
CF 0.80 Ac
VL 1.71 Ac
VM 1.04 Ac
VN 0.41 Ac
VO 0.24 Ac
VP 1.15 Ac
VQ 0.65 Ac
VR 0.83 Ac
VS 0.48 Ac
VT 0.74 Ac
VU 0.41 Ac
VV 0.97 Ac
VW 0.49 Ac
A 2.12 Ac
B 1.17 Ac
C 2.38 Ac
CI 1.18 Ac
BA 0.74 Ac
BB 0.95 Ac
GCRTA
MH1
MH2
MH3
MH4
MH5
MH6
MH7
MH8
MH9
MH10
MH11
MH 12
Railrood Pier
ONTARIO STREET
CARNEGIE AVENUE
PAINE AVE
COMMERCIAL ROAD
BROADWAY AVENUE
FALL ROAD
Ext. Line

WEST BANK
PRE VS. POST FLOWS

Intensity Zone: A
Frequency: 10 years
Intensity, i: See Figures 1101-2 & 1101-3

24" trunk line along Fairfield Avenue — **CSO-80**

Section	Drainage Area (acres)	Coefficient of Runoff, C (pre)	Coefficient of Runoff, C (post)	Decrease in C	Time of Conc. (Tc) (pre)	Time of Conc. (Tc) (post)	Intensity (i) (pre)	Intensity (i) (post)	Peak 10 yr. Discharge (pre) (ft^3/sec)	Peak 10 yr. Discharge (post) (ft^3/sec)	Decrease in Peak 10 yr. Discharge (ft^3/sec)
E	1.54	0.62	0.47	-0.15	10.00	12.11	5.10	4.67	4.86	3.38	-1.48
F	1.63	0.64	0.44	-0.20	10.00	11.06	5.10	4.87	5.32	3.49	-1.82

Total Increase in Peak 10 year Discharge = -3.30

Net West Bank (CSO-80) Increase in Peak 10 year Discharge* = -3.30 cfs
Net West Bank (CSO-80) Increase in Peak 10 year Discharge = -32.5%**

* - This decrease in peak 10 year discharge (all affecting CSO-80) only takes into consideration drainage areas within this project's limits that are draining into the combined sewer system in both the pre-construction and post-construction condition. This does not take into consideration the additional decrease that will be achieved from removing from the combined system in total appx. 20 acres of surrounding project site that currently drain into the combined sewer sytem. These 20 acres are proposed to be drained though a new storm only system and are not included in the peak discharge calculations.

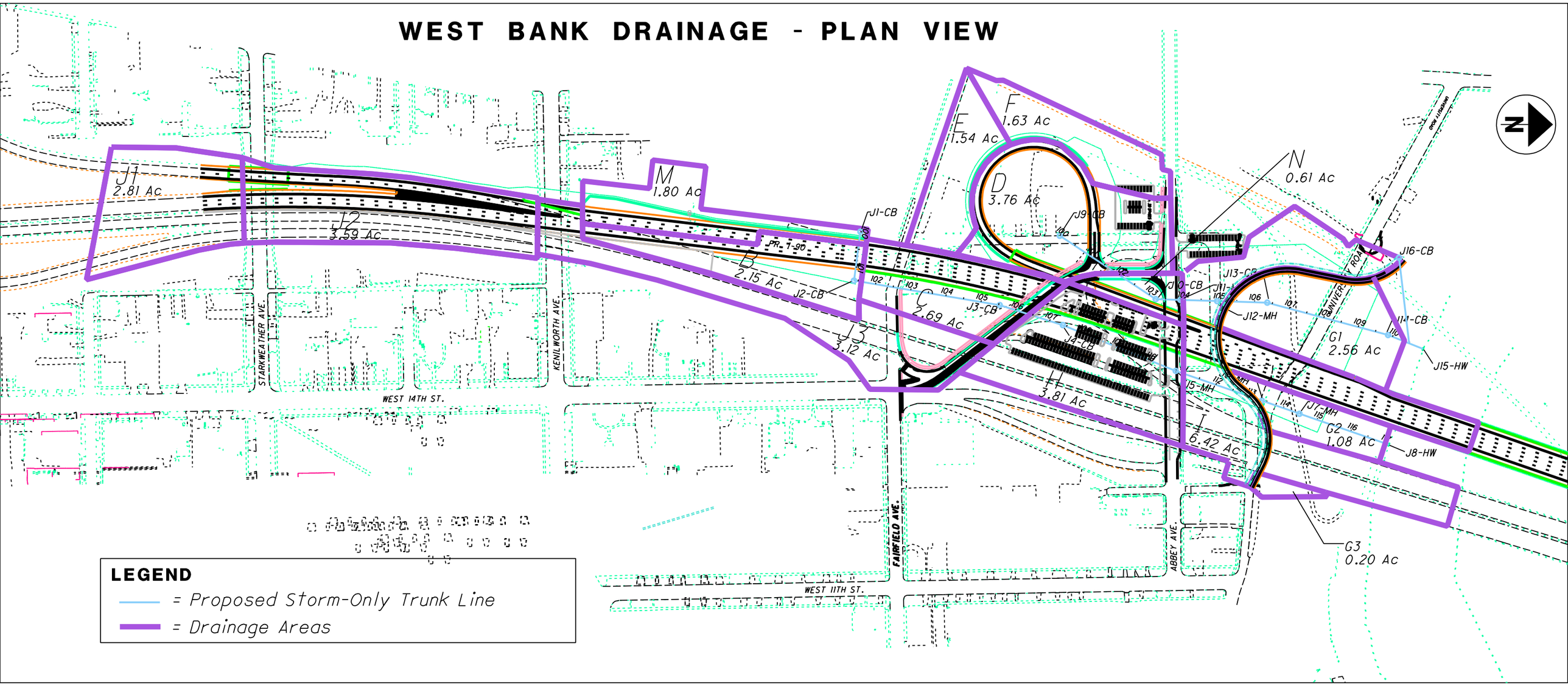
** - Percentage increases are not a percentage increase to the CSO as a whole. This is simply the increased percentage of peak discharge considering only the drainage areas affected by this analysis.

Pre vs. Post Drainage Acreage

	CSO-80*		NEW STORM SYSTEM	
Section	Drainage Area (pre) (acres)	Drainage Area (post) (acres)	Drainage Area (pre) (acres)	Drainage Area (post) (acres)
J	9.52	9.52		
B	2.15			2.15
C	2.69			2.69
D	3.76			3.76
E	1.54	1.54		
F	1.63	1.63		
G	3.84			3.84
H	3.81			3.81
I	6.42			6.42
M	1.80			1.80
N	0.61			0.61
	37.77	**12.69**		

Decrease in Acreage Contributing to CSO-80= 25.08 acres

WEST BANK DRAINAGE - PLAN VIEW



LEGEND

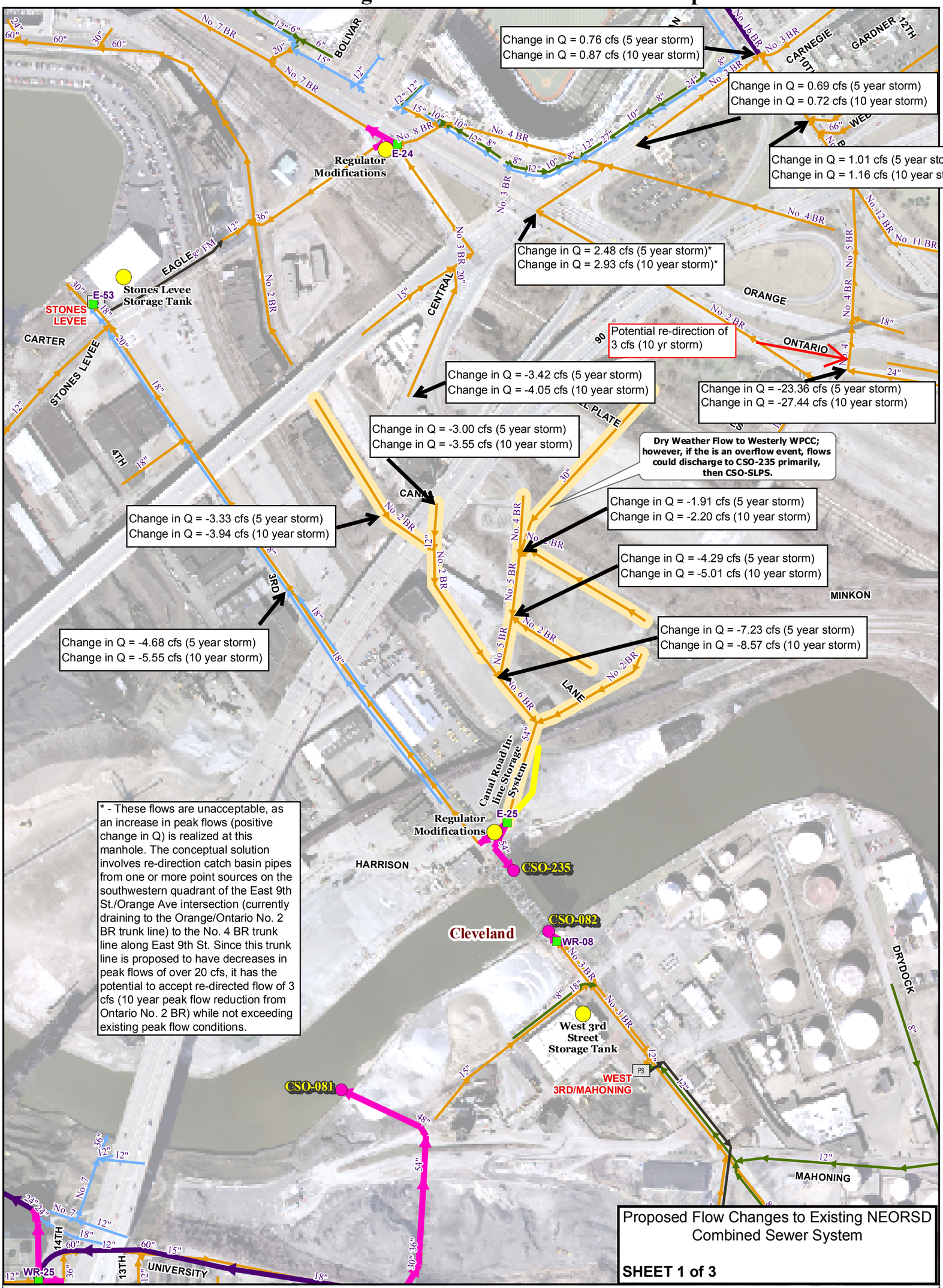
= Proposed Storm-Only Trunk Line

= Drainage Areas

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

NPDES Permit Point 235 Possible Tributary Flows Area with Long Term Control Plan Facilities Map

ETS_SR_20090511C



300
Feet

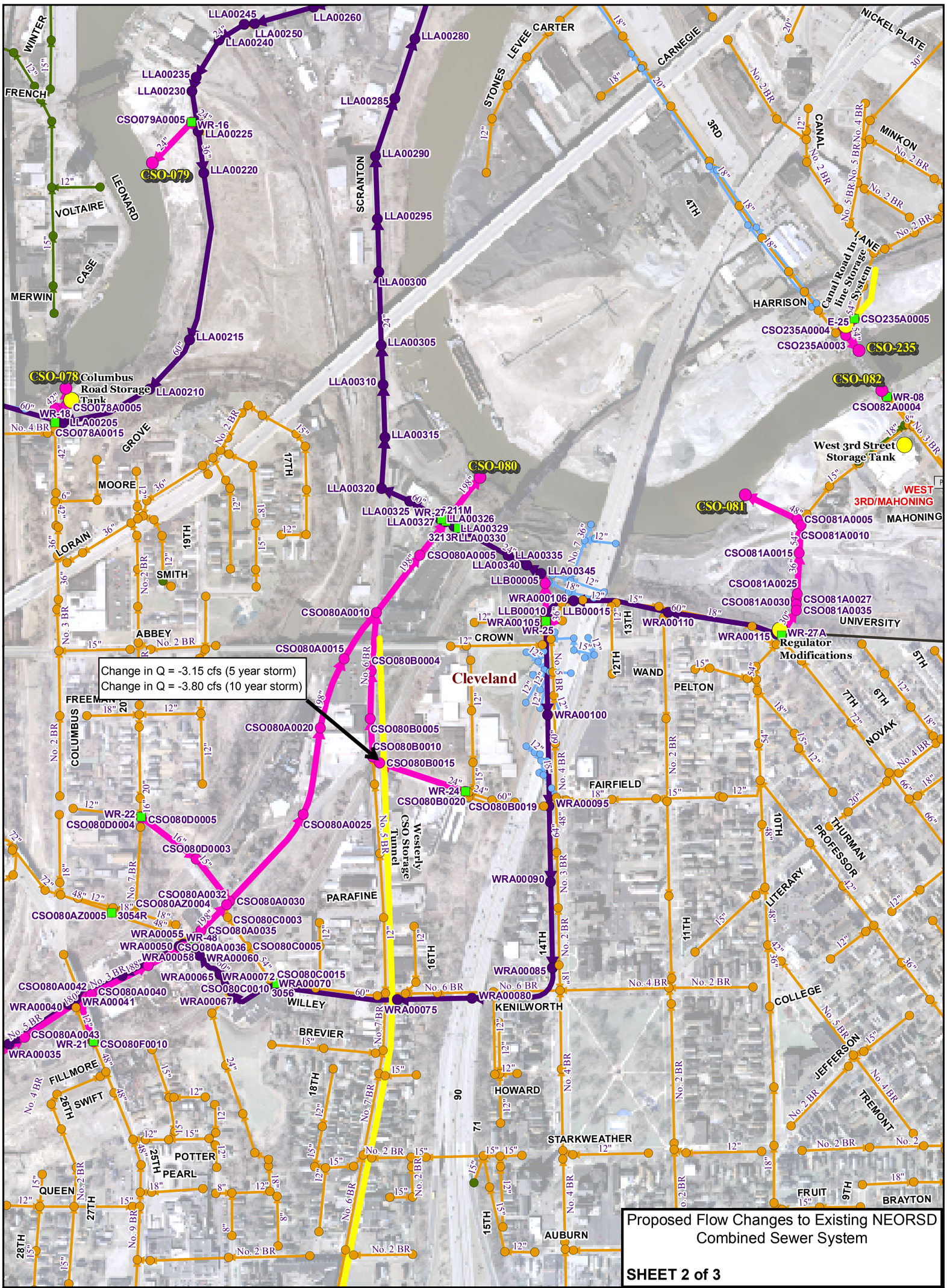
NEORSD CSO Outfall
NEORSD Flow Regulating Structure
NEORSD Pump Station
WPC Pump Station
NEORSD Long Term Control Projects - Point
NEORSD Long Term Control Projects - Line
NEORSD Sewer Pipe
NEORSD CSO Responsibility
WPC Combined Sewer
WPC Sanitary Sewer
WPC Storm Sewer
CSO-235 Primary Possible Tributary Flows

Date: July 30, 2009
Creator: ETS Department
Purpose: NA
Project: ETS_SR_20090511C

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

NPDES Permit Point 080 Area Map with Long Term Control Plan Map

ETS_SR_20090511C



500 Feet

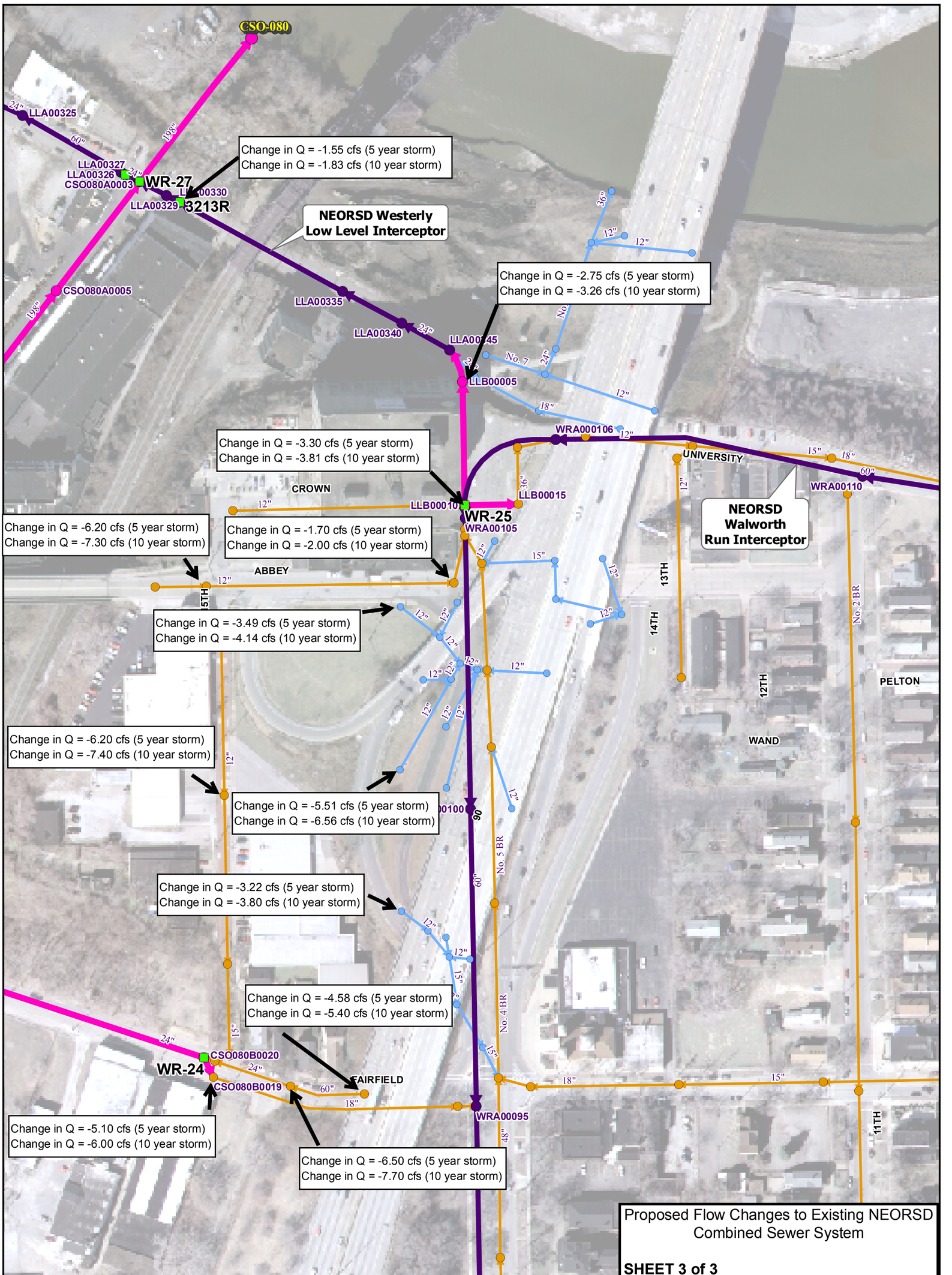
Date: July 30, 2009
Creator: ETS Department
Purpose: NA
Project: ETS_SR_20090511C

- NEORSD CSO Outfall
- NEORSD Flow Regulating Structure
- NEORSD Pump Station
- WPC Pump Station
- NEORSD Long Term Control Projects - Point
- NEORSD Interceptor Node
- NEORSD CSO Responsible Node
- Local Sanitary Node
- Local Combined Node
- Local Storm Node
- NEORSD Long Term Control Projects - Line
- NEORSD Sewer Pipe
- NEORSD CSO Responsibility
- WPC Combined Sewer
- WPC Sanitary Sewer
- WPC Storm Sewer

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

Innerbelt Drainage in the Area of West 14th Street and University

ETS_SR_20090511C



Proposed Flow Changes to Existing NEORSD Combined Sewer System

SHEET 3 of 3

N

140
Feet

- NEORSD CSO Outfall
- NEORSD Regulators
- NEORSD Interceptor Node
- NEORSD ICRS
- NEORSD CSO Control Node
- NEORSD CSO Responsible Node
- Local Sanitary Node
- Local Combined Node
- Local Storm Node
- INTERCEPTOR
- ICRS
- CSO CONTROL
- CSO RESPONSIBILITY
- COMBINED
- SANITARY
- STORM

Date: June 3, 2009
Creator: ETS Department
Purpose: NA
Project: ETS_SR_20090511C

3. Proposed Storm-Only Systems

A. NARRATIVE

This narrative describes the conceptual locations and design of BMP's for the Broadway Avenue/Commercial Road Drainage System, the East Bank Drainage System, and the West Bank Drainage System within the Central Viaduct Project.

For the Commercial Road Area Drainage System, exfiltration trenches are shown as one feasible alternative. The overall concept places several exfilitration trenches along East Ninth Street, East Fourteenth Street, Broadway Avenue, and Commercial Road. The exfiltration trenches will drain into the proposed storm sewer trunk-line via the proposed curb catch basin. The proposed storm sewer trunk-line will then convey the treated runoff directly into the Cuyahoga River.

Areas that currently drain into existing systems are marked on the attached plan view and are areas A, B, C, CI, BA, and BB. In the post-construction condition these drainage areas will not continue to drain into the existing sewer systems. These areas will be collected by the proposed drainage system and piped across the GCRTA alignment.

See attached for conceptual exfiltration trench BMP calculations and layout plans for the potential treatment scenario.

For the East Bank Drainage System, standard detention or bioretention are considered to be two feasible options. Bioretention cell design is shown as an example. The overall concept places several bioretention cells between the existing and proposed I-90 structures. Additionally, a single BMP area (BMP #1 in attached layout plan) could be treated by an exfiltration trench BMP or collected by a standard storm sewer system and piped to BMP#2 for treatment, depending on the final configuration of the Fire House and Museum layout. Either treatment plan for BMP #1 would discharge into the proposed storm sewer trunk-line, which will then carry and discharge the treated East Bank storm water into the Cuyahoga River.

The bioretention cells are proposed to be located at the pier locations to collect the proposed I-90 structure drainage. ODOT stated the proposed I-90 structure will not have any storm water conveyance across the bridge, therefore all the drainage will be collected at the piers using a series of scuppers and brought down to be treated. Areas that currently drain into existing systems will not be included into the proposed trunk line (Canal Rd. and W 3rd St.).

The section between the Cuyahoga River and W 3rd St. is proposed to utilize the bioretention BMPs located near every other pier. Due to the existing nature of this area (flat), a pair of pier locations will have a `landing pad' of rock channel to modify the deck drainage to overland flow and convey the storm water into the prescribed bioretention cell. If bioretention is used, the DBT will need to develop a grading plan to allow for adequate design and function of the bioretention cell, defined in the L&D Vol. 2 Section 1117.6. The discharge of the flow will enter the proposed storm sewer trunk line, ultimately discharging into the river.

For the West Bank Drainage System, the Vegetated Biofilter Ditch was chosen as a feasible BMP treatment system for this section of the project. The Vegetated Biofilter Ditch was introduced to treat the storm runoff for the areas between the existing and proposed I-90 structures as well as the areas west of the proposed I-90 structure. The treated storm runoff from each Vegetated Biofilter Ditch is collected by a proposed ditch inlet that is connected to the proposed storm sewer trunk-line that ultimately discharges into the Cuyahoga River. There are two such proposed storm sewer trunk-lines that outlet into the Cuyahoga River. These trunk-lines are locations on either side of the proposed 1-90 structure. Two areas (infield of the West 14th / Abbey exit ramp, and the area between the two bridges, south of Abbey and east of WB I-90) have been specified as logical locations for use of detention.

The Vegetated Biofilter Ditches are to be located in the vicinity of the proposed pier locations to collect the proposed I-90 structure drainage. ODOT stated the proposed I-90 structure will not have any storm water conveyance across the bridge, therefore all the runoff will be collected at the piers using a series of scuppers and brought down to be treated by the Vegetated Biofilter Ditch.

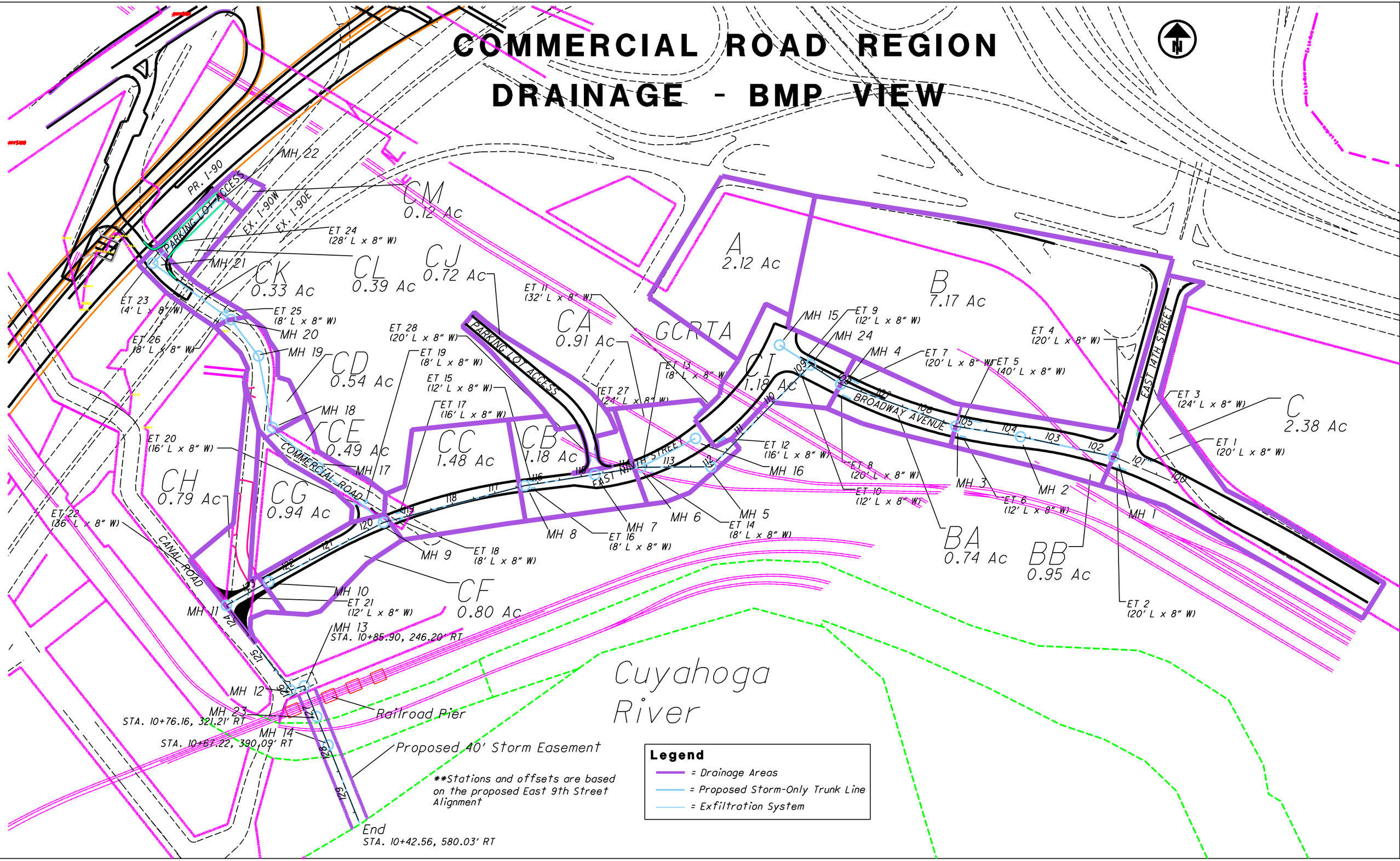
Certain areas that currently drain into existing systems will continue to drain to existing areas E, F, and J. In the post-construction condition, there will be slight decreases in flow for areas E and F, and no change in flow for area J.

See attached for conceptual Vegetated Biofilter Ditch calculations and layout plans for the potential treatment scenario.

B. TABLES AND EXHIBITS

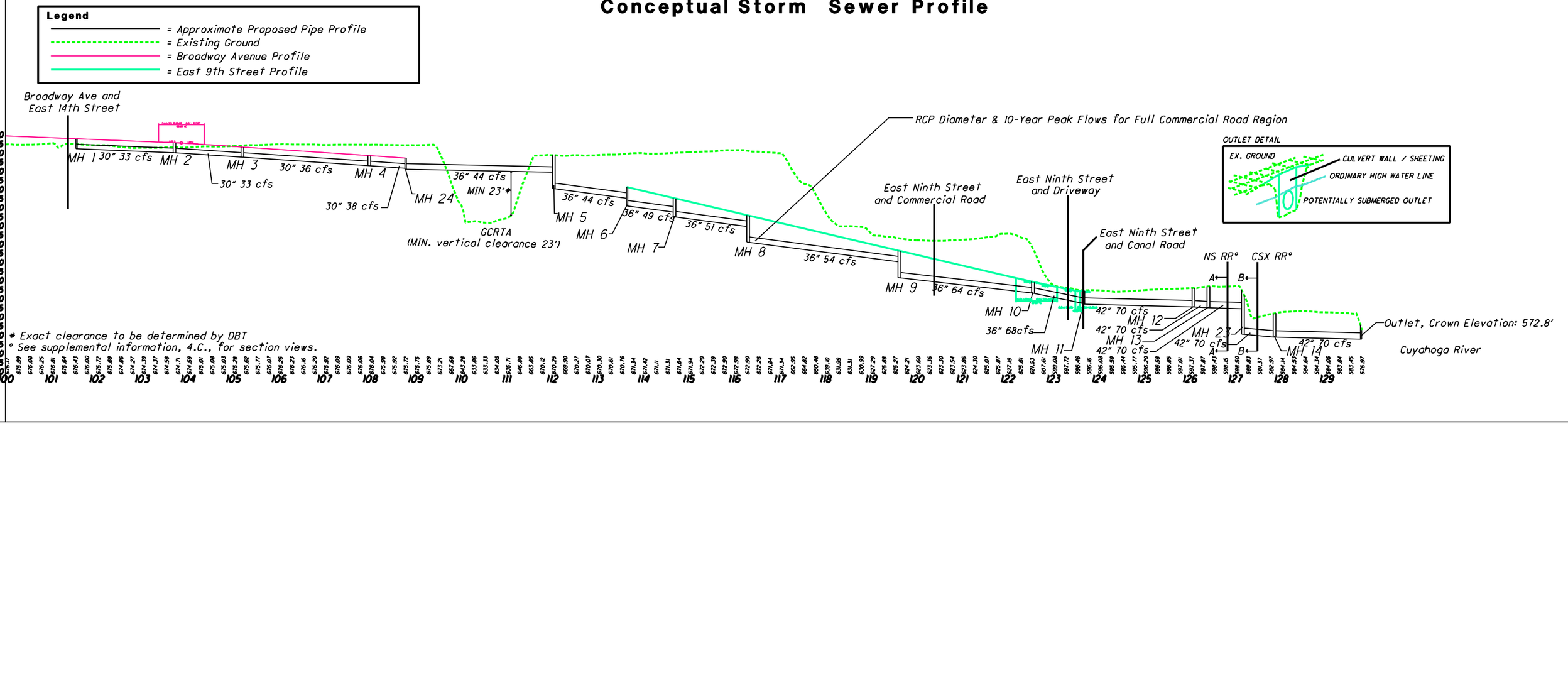
- COMMERCIAL ROAD REGION DRAINAGE BMP PLAN VIEW AND STORM SEWER PROFILE VIEW
- EAST BANK DRAINAGE BMP PLAN VIEW AND STORM SEWER PROFILE VIEW
- WEST BANK DRAINAGE BMP PLAN VIEW AND STORM SEWER PROFILE VIEWS

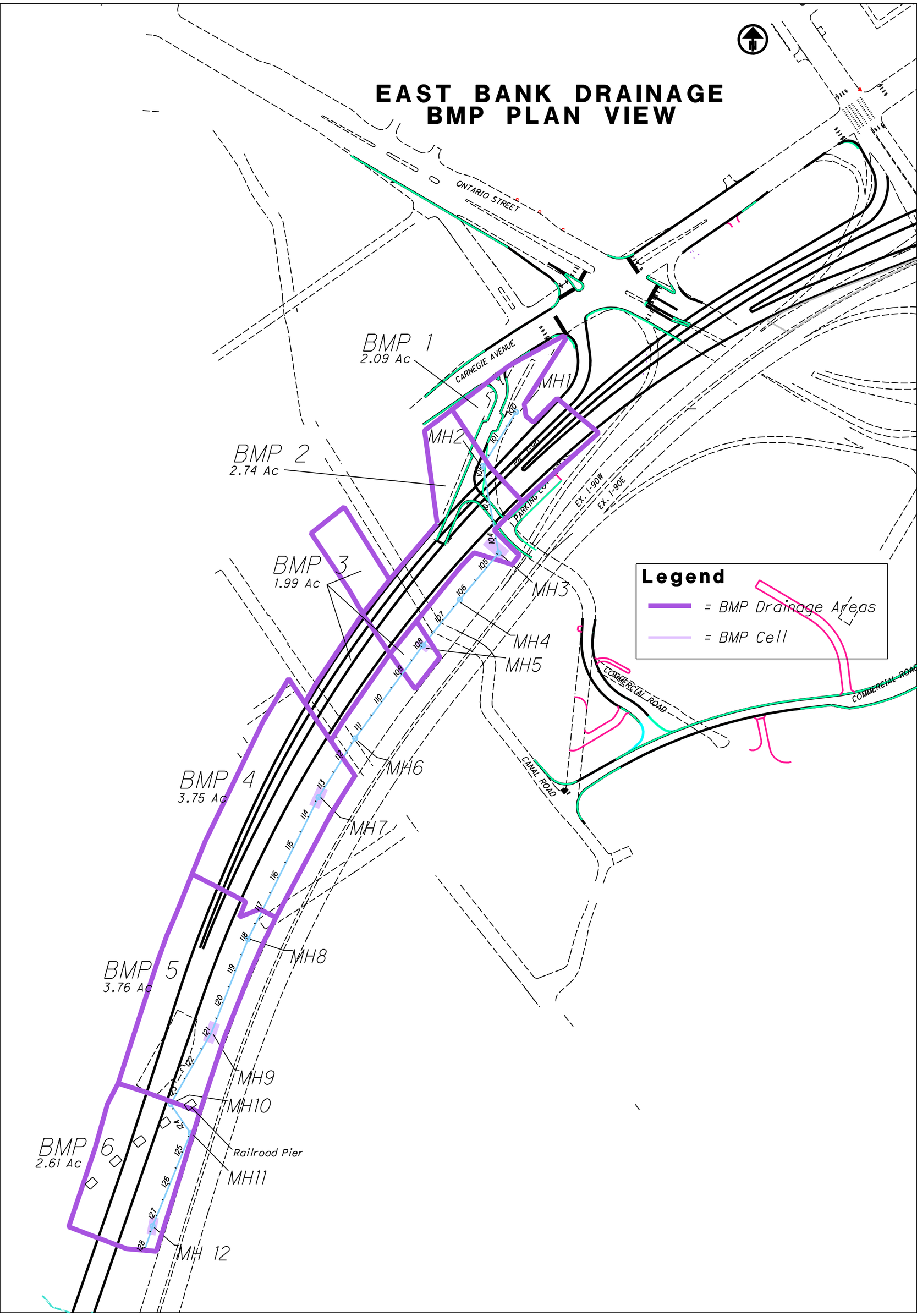
COMMERCIAL ROAD REGION
DRAINAGE - BMP VIEW



Commercial Road Region

Conceptual Storm Sewer Profile



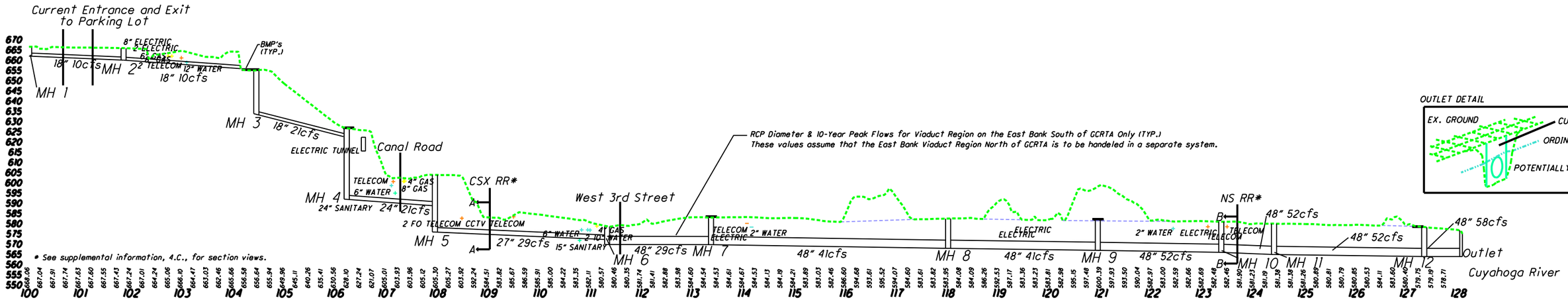

EAST BANK DRAINAGE
BMP PLAN VIEW
ONTARIO STREET
CARNEGIE AVENUE
BMP 1
2.09 Ac
BMP 2
2.74 Ac
BMP 3
1.99 Ac
BMP 4
3.75 Ac
BMP 5
3.76 Ac
BMP 6
2.61 Ac
MH1
MH2
MH3
MH4
MH5
MH6
MH7
MH8
MH9
MH10
MH11
MH 12
Railroad Pier
PARKING LOT
EX. I-90W
EX. I-90E
COMMERCIAL ROAD
CANAL ROAD
Legend
= BMP Drainage Areas
= BMP Cell

East Bank Viaduct
Conceptual Storm Sewer Profile

Legend

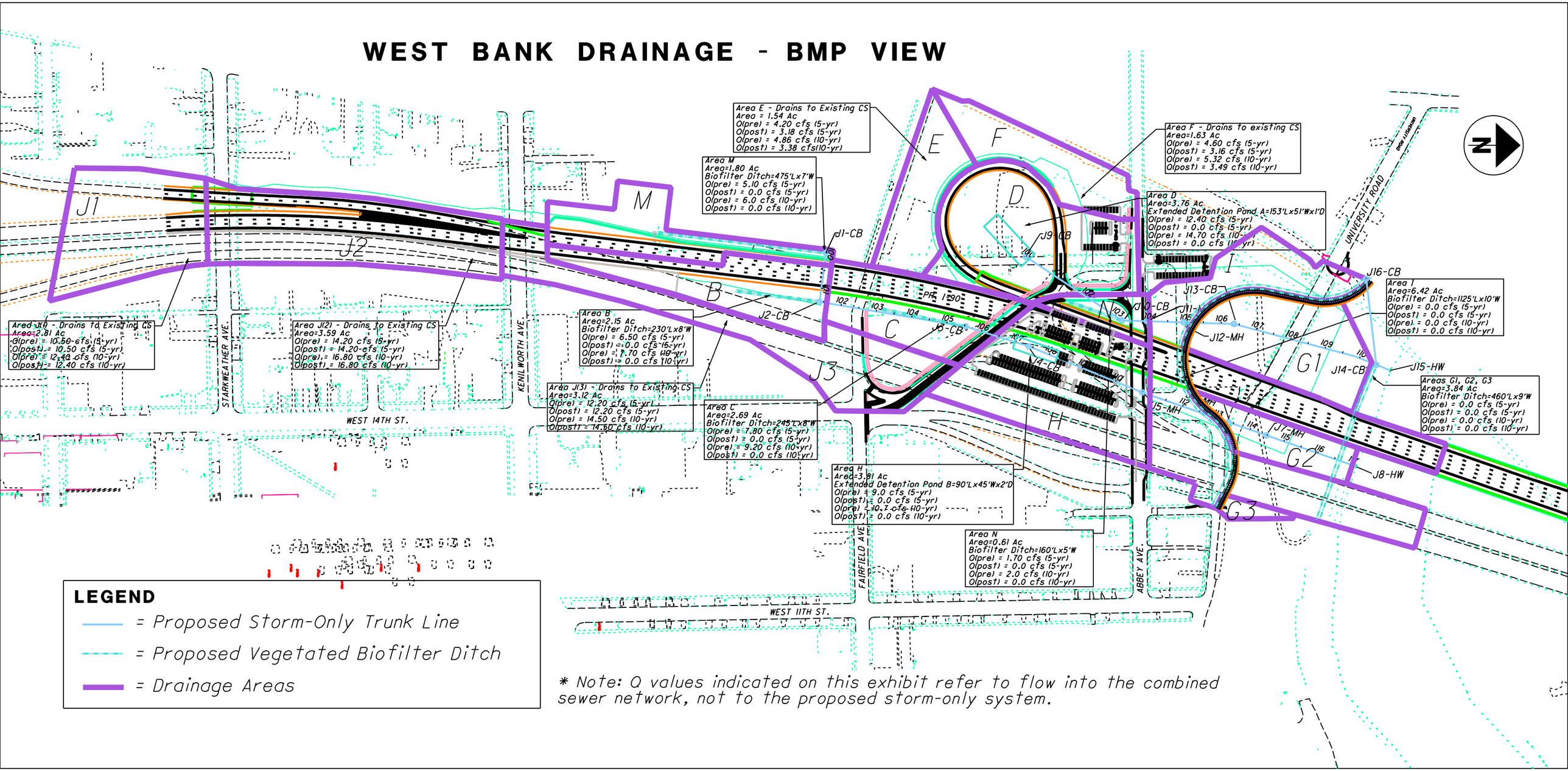
= Approximate Proposed Pipe Profile
= Existing Ground
= Approximate Elevation of Land Under Aggregate Piles

** Utility locations are approximate.



OUTLET DETAIL

WEST BANK DRAINAGE - BMP VIEW

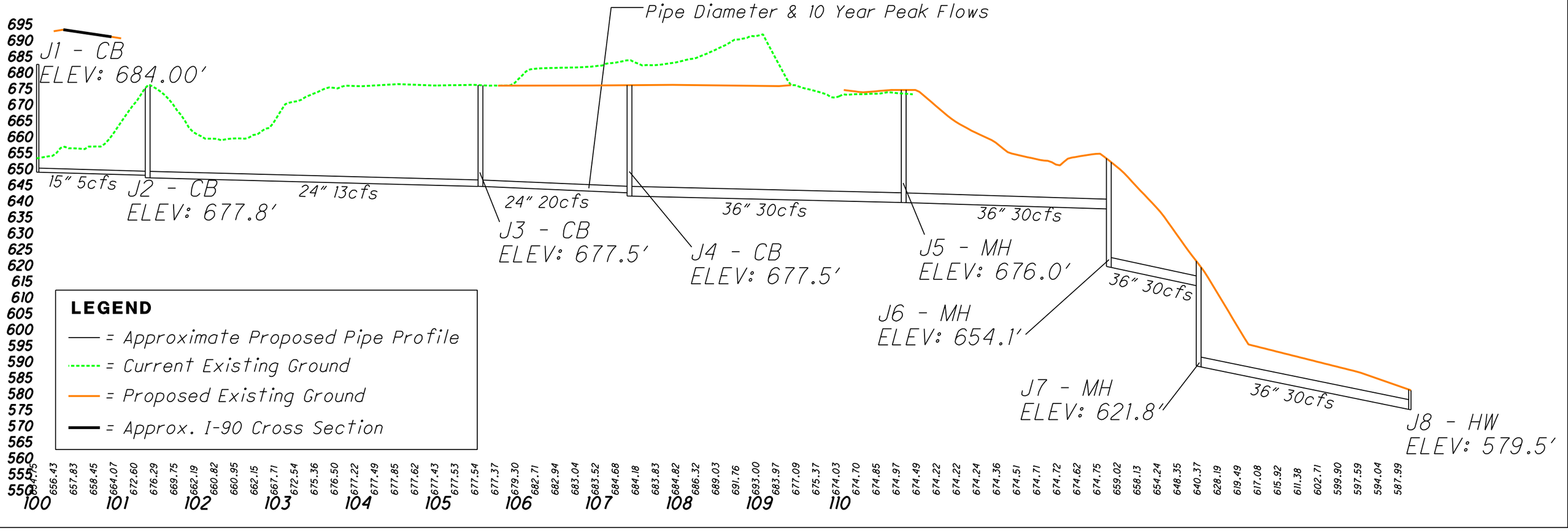


LEGEND

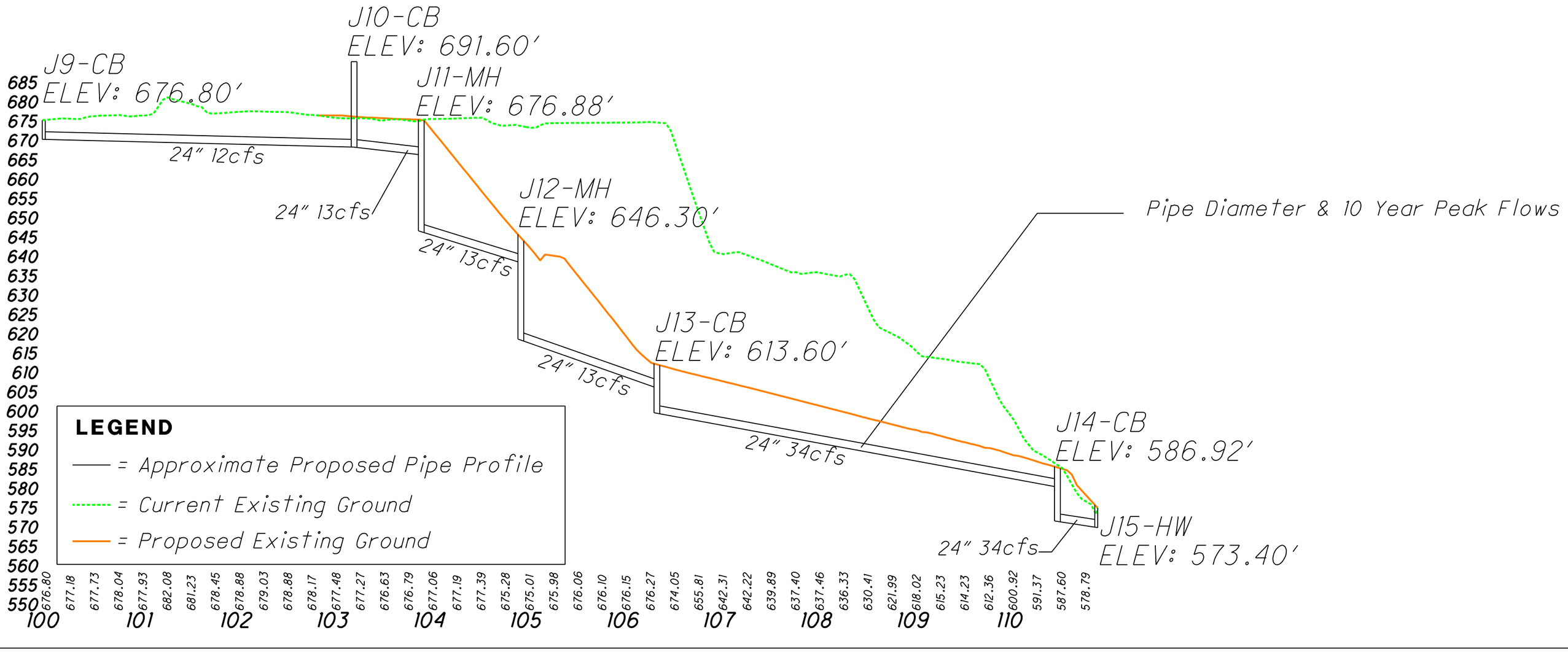
- = Proposed Storm-Only Trunk Line
- = Proposed Vegetated Biofilter Ditch
- = Drainage Areas

* Note: Q values indicated on this exhibit refer to flow into the combined sewer network, not to the proposed storm-only system.

West Bank Viaduct
Conceptual Storm Sewer Profile
East of I-90 Mainline



West Bank Viaduct
Conceptual Storm Sewer Profile
West of I-90 Mainline



4. Supplemental Information

A. ODOT CDSS Program Calculations

- Commercial Road Region Drainage System Calculations
- East Bank Drainage System Calculations
- West Bank Drainage System Calculations

STORM SEWER SYSTEM

PID : 77332 **Date :** 02/11/2010 **Project :** Innerbelt Plan **Location :** Cleveland, OH

Description : Broadway Ave/Commercial Road Drainage **Designer :** KB

Rainfall Area: A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

Minimum Pipe Size : 12.00 **Tailwater Elevation (ft.):** 576.00

JUNCTION From	To	STATION From	To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
1	2			9.55 9.55	8.31 8.31	16.99	3.93	4.73	32.6	39.3	30	216.5	0.0102	673.80 671.60	8.28	38.55	0.0122	676.55 673.91	679.30 677.10	2.75	3.00	CB 3A 0.015
2	3			0.00 9.55	0.00 8.31	17.43	3.88	4.70	32.2	39.0	30	149.1	0.0161	671.60 669.20	9.98	48.52	0.0120	673.40 671.50	677.10 674.70	3.70	3.00	CB 3A 0.015
3	4			0.95 10.50	0.86 9.16	17.67	3.85	4.50	35.2	41.3	30	278.5	0.0169	669.20 664.50	10.36	49.67	0.0135	671.24 667.49	674.70 670.00	3.46	3.00	CB 3A 0.015
4	24			0.74 11.24	0.67 9.83	18.12	3.79	4.50	37.3	44.3	30	81.3	0.0172	664.50 663.10	10.55	50.19	0.0155	667.49 666.23	670.00 668.60	2.51	3.00	CB 3A 0.015
24	5			0.00 11.24	0.00 9.83	18.25	3.78	4.50	43.9	52.4	36	323.8	0.0052	662.60 660.90	6.71	45.05	0.0082	666.23 663.58	668.60 670.10	2.37	3.00	CB 3A 0.015
5	6			0.00 11.24	0.00 9.83	19.06	3.69	4.48	42.9	52.1	36	159.5	0.0332	652.00 646.70	14.14	113.35	0.0081	653.49 649.37	670.10 652.70	16.61	15.10	CB 3A 0.015
15	24			2.12 13.36	1.80 11.63	10.00	5.10	4.50	9.2	8.1	24	84.0	0.0036	663.90 663.60	4.13	12.61	0.0017	666.38 666.23	668.90 668.60	2.52	3.00	CB 3A 0.015
16	6			1.18 14.54	0.98 12.61	10.00	5.10	6.15	5.0	6.0	12	140.5	0.0591	657.00 648.70	10.21	8.07	0.0380	657.68 649.68	661.00 652.70	3.32	3.00	CB 3A 0.015

STORM SEWER SYSTEM

JUNCTION From	To	STATION From	To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
6	7			0.91 15.45	0.67 13.28	19.24	3.67	4.46	48.7	59.3	36	105.6	0.0332	642.50 639.00	14.60	113.22	0.0105	644.11 641.74	652.70 645.00	8.59	7.20	CB 3A 0.015
7	8			0.72 16.17	0.65 13.93	19.36	3.65	4.44	50.9	61.8	36	161.6	0.0334	636.50 631.10	14.81	113.66	0.0114	638.15 633.87	645.00 637.10	6.85	5.50	CB 3A 0.015
8	9			1.18 17.35	0.87 14.81	19.55	3.63	4.39	53.8	65.0	36	332.0	0.0325	622.50 611.70	14.86	112.15	0.0126	624.22 614.49	637.10 617.70	12.88	11.60	CB 3A 0.015
18	17			0.54 17.89	0.49 15.29	11.60	4.77	5.75	5.9	7.1	12	138.8	0.0389	620.90 615.50	8.83	6.55	0.0535	623.91 616.49	624.90 619.50	0.99	3.00	CB 3A 0.015
17	9			0.00 17.89	0.00 15.29	11.86	4.72	5.62	5.9	7.0	18	193.6	0.0093	615.00 613.20	5.32	9.44	0.0059	616.01 614.46	619.50 617.70	3.49	3.00	CB 3A 0.015
9	10			1.97 19.86	1.51 16.80	19.92	3.59	4.35	63.1	76.4	36	293.3	0.0286	603.00 594.60	14.71	105.23	0.0174	604.99 597.47	617.70 600.60	12.71	11.70	CB 3A 0.015
10	11			1.74 21.60	1.31 18.12	20.25	3.56	4.25	67.2	80.2	36	110.5	0.0362	593.00 589.00	16.32	118.29	0.0192	594.90 592.49	600.60 595.80	5.70	4.60	CB 3A 0.015
11	12			0.79 22.39	0.68 18.79	20.36	3.55	4.25	69.4	83.1	42	241.6	0.0062	588.50 587.00	8.14	73.91	0.0091	592.49 590.30	595.80 597.40	3.31	3.80	CB 3A 0.015
12	13			0.00 22.39	0.00 18.79	20.86	3.50	4.25	68.4	83.1	42	33.0	0.0151	587.00 586.50	11.82	115.42	0.0091	590.30 590.00	597.40 598.30	7.10	6.90	CB 3A 0.015
13	23			0.00 22.39	0.00 18.79	20.90	3.49	4.25	68.3	83.1	42	75.7	0.0066	586.50 586.00	8.39	76.25	0.0091	590.00 589.17	598.30 594.73	8.30	8.30	CB 3A 0.015
23	14			0.00 22.39	0.00 18.79	21.05	3.48	4.19	68.0	82.0	42	69.5	0.0230	572.00 570.40	13.86	142.36	0.0088	578.30 577.69	594.73 583.20	16.43	19.23	CB 3A 0.015

STORM SEWER SYSTEM

JUNCTION From	To	STATION From To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
14	25		0.00 22.39	0.00 18.79	21.14	3.47	4.19	67.9	82.0	42	191.5	0.0057	570.40 569.30	7.82	71.08	0.0088	577.69 576.00	583.20 574.00	5.51	9.30	CB 3A 0.015
19	18		0.00 22.39	0.00 18.79	11.33	4.82	5.75	3.6	4.3	12	165.5	0.0719	632.80 620.90	10.22	8.91	0.0198	633.31 623.91	636.80 624.90	3.49	3.00	CB 3A 0.015
20	19		0.33 22.72	0.30 19.09	11.16	4.85	5.88	3.7	4.4	12	103.8	0.0732	640.40 632.80	10.29	8.99	0.0207	640.92 633.74	644.40 636.80	3.48	3.00	CB 3A 0.015
21	20		0.39 23.11	0.35 19.44	10.76	4.93	5.92	2.3	2.7	12	219.3	0.0739	656.60 640.40	9.08	9.03	0.0077	656.99 641.25	660.60 644.40	3.61	3.00	CB 3A 0.015
22	21		0.12 23.23	0.11 19.55	10.00	5.10	6.01	0.6	0.6	12	218.5	0.0375	664.80 656.60	4.78	6.43	0.0004	665.02 657.27	668.80 660.60	3.78	3.00	CB 3A 0.015

STORM SEWER SYSTEM

PID : 77332 **Date :** 10/27/2009 **Project :** Innerbelt Plan **Location :** Cleveland, OH

Description : East Bank Viaduct **Designer :** KB

Rainfall Area: A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

Minimum Pipe Size : 12.00 **Tailwater Elevation (ft.):** 576.00

JUNCTION From	To	STATION From	To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
1	2			2.09 2.09	1.88 1.88	10.00	5.10	6.08	9.6	11.4	18	185.1	0.0108	663.50 661.50	6.10	10.18	0.0157	665.81 662.89	668.06 667.38	2.25	3.06	CB 3A 0.015
2	3			0.00 2.09	0.00 1.88	10.51	4.99	5.94	9.4	11.2	18	260.1	0.0181	661.50 656.80	7.64	13.16	0.0150	662.63 658.19	667.38 656.53	4.75	4.38	CB 3A 0.015
3	4			2.74 4.83	2.47 4.35	11.07	4.87	5.89	21.2	25.6	18	177.0	0.0638	635.00 623.70	14.76	24.74	0.0790	639.18 625.19	656.53 628.23	17.35	20.03	CB 3A 0.015
4	5			0.00 4.83	0.00 4.35	11.27	4.83	5.82	21.0	25.3	24	172.8	0.0185	593.40 590.20	9.41	28.70	0.0166	594.96 592.08	628.23 605.37	33.27	32.83	CB 3A 0.015
5	6			1.99 6.82	1.72 6.07	11.58	4.77	4.74	29.0	28.8	27	337.3	0.0127	577.35 573.05	8.68	32.60	0.0115	582.63 578.76	605.37 580.20	22.74	25.77	CB 3A 0.015
6	7			0.00 6.82	0.00 6.07	12.23	4.65	4.74	28.2	28.8	48	203.7	0.0005	571.30 571.20	2.50	29.67	0.0005	578.76 578.65	580.20 584.48	1.44	4.90	CB 3A 0.015
7	8			3.75 10.57	3.16 9.23	13.59	4.42	4.74	40.8	43.8	48	464.4	0.0039	571.20 569.40	6.25	83.37	0.0012	578.65 578.08	584.48 583.95	5.83	9.28	CB 3A 0.015
8	9			0.00 10.57	0.00 9.23	14.82	4.23	4.74	39.0	43.8	48	293.3	0.0034	569.40 568.40	5.89	78.20	0.0012	578.08 577.72	583.95 599.66	5.87	10.55	CB 3A 0.015

STORM SEWER SYSTEM

JUNCTION From	To	STATION From	To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
9	10			3.76 14.33	3.38 12.62	15.65	4.11	4.74	51.8	59.8	48	241.9	0.0041	568.40 567.40	6.77	86.10	0.0023	577.72 577.16	599.66 582.42	21.94	27.26	CB 3A 0.015
10	11			0.00 14.33	0.00 12.62	16.25	4.03	4.74	50.8	59.8	48	103.4	0.0097	567.40 566.40	9.29	131.73	0.0023	577.16 576.92	582.42 581.40	5.26	11.02	CB 3A 0.015
11	12			0.00 14.33	0.00 12.62	16.43	4.00	4.74	50.5	59.8	48	294.3	0.0034	566.40 565.40	6.24	78.07	0.0023	576.92 576.24	581.40 579.85	4.48	11.00	CB 3A 0.015
12	13			2.61 16.94	2.35 14.97	17.22	3.90	4.74	58.4	71.0	48	74.6	0.0054	565.40 565.00	7.70	98.09	0.0032	576.24 576.00	579.85 576.40	3.61	10.45	CB 3A 0.015

STORM SEWER SYSTEM

PID : 77332 **Date :** 11/05/2009 **Project :** CUY-90 **Location :** Cleveland, OH

Description : West Bank Storm Sewer Trunkline Design - East of Proposed I-90 Structure **Designer :** AK

Rainfall Area: A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

Minimum Pipe Size : 15.00 **Tailwater Elevation (ft.):** 597.25

JUNCTION From	To	STATION From	To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
1	2			1.80 1.80	1.15 1.15	15.00	4.20	4.77	4.8	5.5	15	138.5	0.0072	650.45 649.45	4.42	5.12	0.0096	652.12 650.79	654.70 677.80	2.58	3.00	CB 2-2B 0.015
2	3			2.15 3.95	1.94 3.09	15.52	4.12	4.77	12.7	14.7	24	414.7	0.0065	648.70 646.00	5.60	17.02	0.0056	650.79 648.45	677.80 677.50	27.01	27.10	CB 2-2B 0.015
3	4			2.69 6.64	1.78 4.86	16.76	3.96	4.77	19.3	23.2	24	185.6	0.0108	646.00 644.00	7.37	21.89	0.0140	648.45 645.86	677.50 677.50	29.05	29.50	CB 2-2B 0.015
4	5			3.81 10.45	2.63 7.49	17.18	3.91	4.65	29.3	34.8	36	341.8	0.0059	643.00 641.00	6.69	47.56	0.0036	645.01 643.46	677.50 674.80	32.49	31.50	CB 2-2B 0.015
5	6			0.00 10.45	0.00 7.49	18.03	3.80	4.57	28.5	34.2	36	255.5	0.0078	641.00 639.00	7.43	55.01	0.0035	642.80 641.45	674.80 654.10	32.00	30.80	MH 3 0.015
6	7			0.00 10.45	0.00 7.49	18.60	3.74	4.55	28.0	34.1	36	111.9	0.0536	621.00 615.00	14.98	144.01	0.0035	622.03 617.45	654.10 621.80	32.07	30.10	MH 3 0.015
7	8			0.00 10.45	0.00 7.49	18.72	3.72	4.51	27.9	33.8	36	264.6	0.0510	590.00 576.50	14.70	140.45	0.0034	598.15 597.25	621.80 582.50	23.65	28.80	MH 3 0.015

STORM SEWER SYSTEM

PID : 77332 **Date :** 11/10/2009 **Project :** CU-90 **Location :** CUY-90(Westbank)

Description : West Bank Storm Sewer Trunline Design - West of Proposed I-90 Structure **Designer :** AK

Rainfall Area: A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

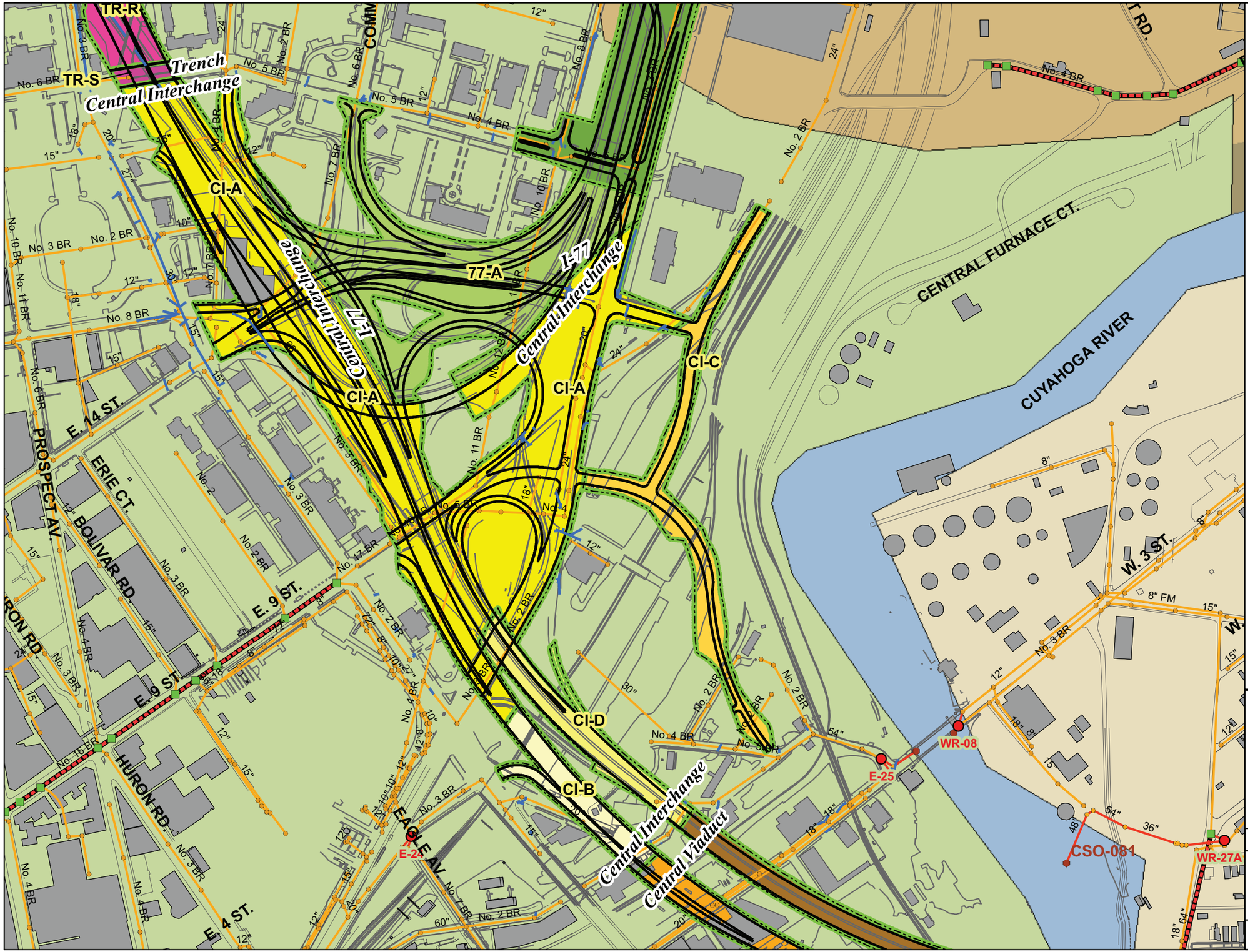
Minimum Pipe Size : 15.00 **Tailwater Elevation (ft.):** 581.00

JUNCTION From	To	STATION From	To	ΔAREA ΣAREA (acres)	ΔCA ΣCA	BEGIN TIME (min.)	RAINFALL INTENSITY (10 yrs.)	(25 yrs.)	DISCHARGE (cfs.) (10 yrs.)	(25 yrs.)	PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
9	10			3.76 3.76	2.82 2.82	15.00	4.20	4.96	11.8	14.0	24	322.6	0.0062	671.80 669.80	5.41	16.61	0.0051	673.29 671.47	676.80 677.20	3.51	3.00	CB 2-2B 0.015
10	11			0.61 4.37	0.39 3.21	15.99	4.06	4.94	13.0	15.9	24	69.4	0.0288	669.80 667.80	9.94	35.80	0.0065	670.77 669.52	677.20 676.88	6.43	5.40	CB 2-2B 0.015
11	12			0.00 4.37	0.00 3.21	16.11	4.04	4.92	13.0	15.8	24	103.0	0.0777	648.00 640.00	14.27	58.79	0.0065	648.74 641.72	676.88 646.30	28.14	26.88	CB 2-2B 0.015
12	13			0.00 4.37	0.00 3.21	16.23	4.03	4.90	12.9	15.7	24	140.7	0.0881	620.00 607.60	14.87	62.60	0.0064	620.71 609.31	646.30 613.60	25.59	24.30	MH 3 0.015
13	14			0.00 4.37	0.00 3.21	16.39	4.01	4.80	12.9	15.4	24	414.3	0.0461	601.00 581.92	11.77	45.26	0.0062	601.84 583.63	613.60 586.92	11.76	10.60	CB 2-2B 0.015
14	15			3.87 8.24	2.23 5.44	16.97	3.93	4.80	42.3	51.6	27	41.7	0.0383	572.75 571.15	14.71	56.53	0.0370	582.54 581.00	586.92 576.40	4.38	11.92	CB 2-2B 0.015
16	14			6.42 14.66	5.33 10.77	16.16	4.04	4.89	21.5	26.0	18	242.0	0.0623	597.50 582.42	14.62	24.45	0.0817	603.69 583.91	615.00 586.92	11.31	16.00	CB 2-2B 0.015

4. Supplemental Information

B. Burgess & Niple BMP Study Exhibits

- **Map 3, Preliminary East Bank BMP Areas**
- **Map 4, Preliminary West Bank BMP Areas**
- **Map 10, Collection System and Interceptor Flow Direction Map**



Legend

- CSO Outfall
- NEORSD Regulator
- NON NEORSD Manholes
- NEORSD Interceptor Manhole
- NON NEORSD CSO lines
- NEORSD Interceptor Pipe
- NEORSD Responsible Pipe
- Storm Lines
- IC-A Drainage Area ID
- Project Limits
- Westerly WWTP Sewershed Area
- Southerly WWTP Sewershed Area
- Easterly WWTP Sewershed Area

0 450 Feet

Key Map

Cleveland Innerbelt Corridor

Preliminary ODOT BMP Project Drainage Areas

CENTRAL INTERCHANGE **MAP 3**

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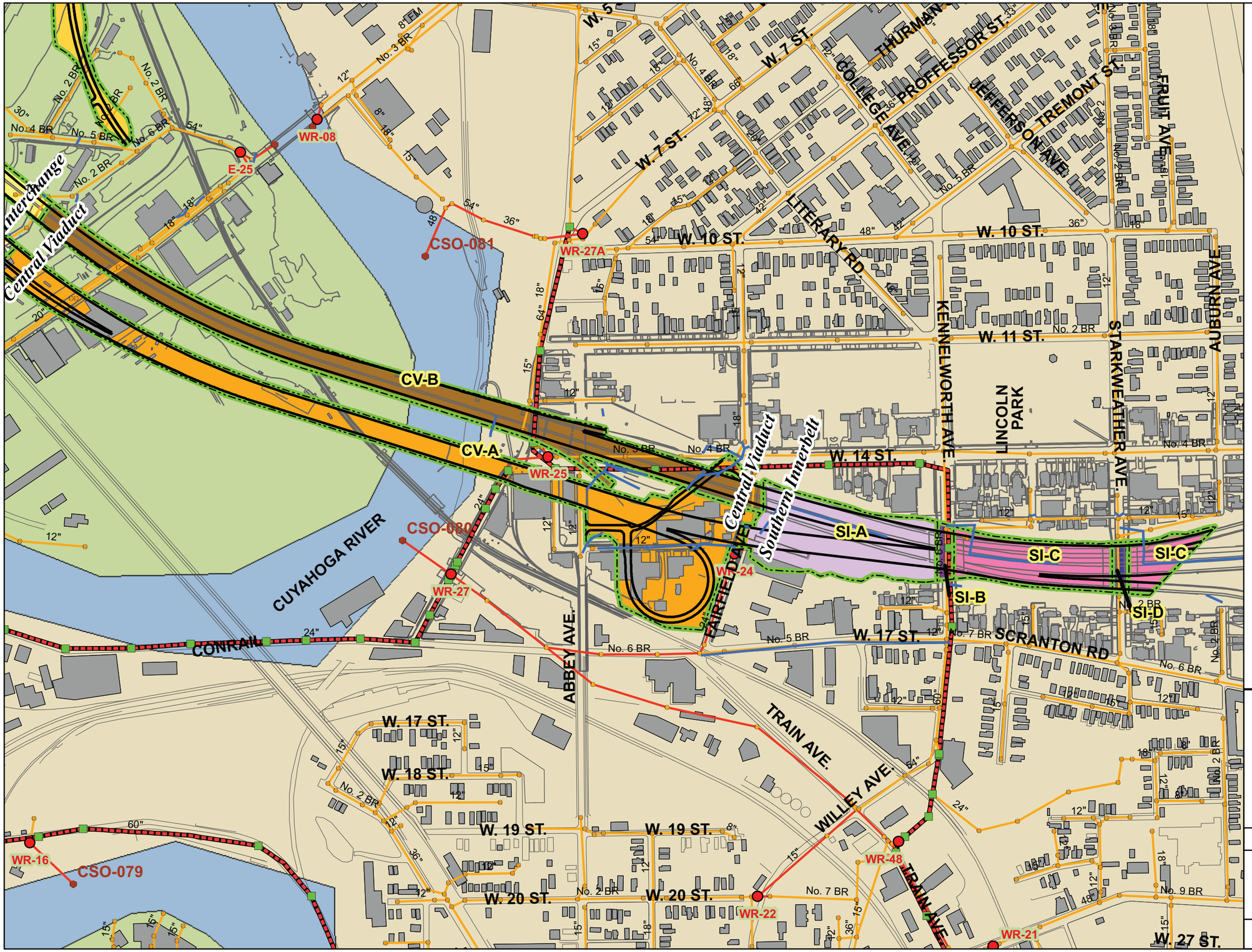

Cleveland Innerbelt Corridor

Preliminary ODOT BMP Project Drainage Areas

CENTRAL VIADUCT SOUTHERN INNERBELT

MAP 4

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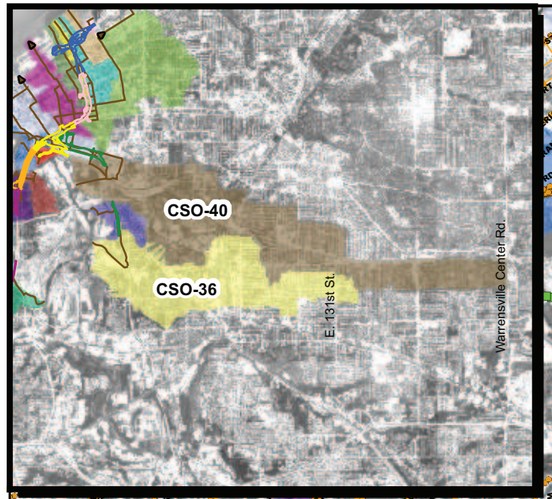

Legend

- CSO Outfall
- NEORSD Regulator
- NON NEORSD Manholes
- NEORSD Interceptor Manhole
- NON NEORSD CSO lines
- NEORSD Interceptor Pipe
- NEORSD Responsible Pipe
- Direction of Flow
- Innerbelt Curve
- Trench
- Central Interchange
- Central Viaduct
- I-77
- Southern Innerbelt

CSO Sewersheds

CSO-200	CSO-54	CSO-95
CSO-201	CSO-80	CSO-96
CSO-235	CSO-81	CSO-97
CSO-36	CSO-88	CSO-98
CSO-39	CSO-90	CSO-99
CSO-40	CSO-94	

N

0 1600 Feet

Key Map

CLEVELAND INNERBELT PLAN
OHIO DEPARTMENT OF TRANSPORTATION

B&N URS

Road to Clean Water

Cleveland Innerbelt Corridor

Collection System and Interceptor Flow Direction Map

EAST

MAP 10

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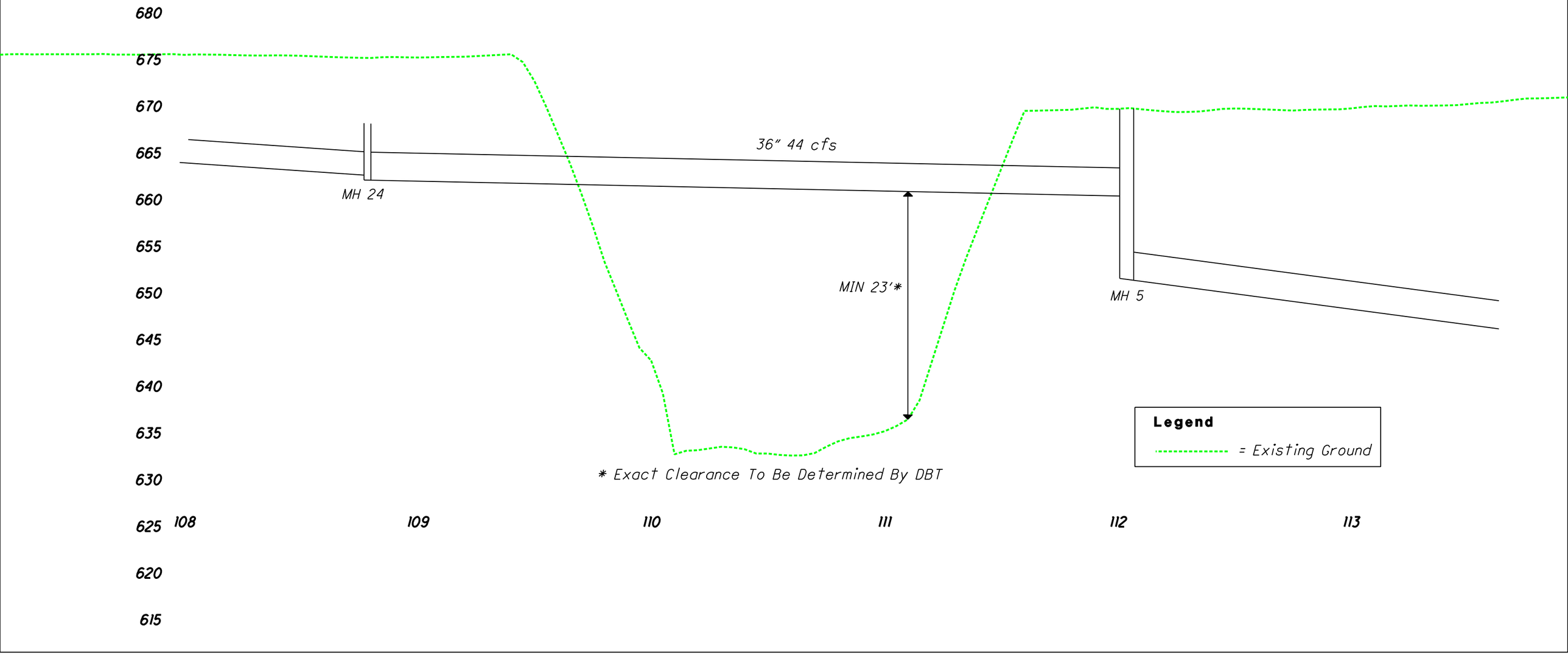
4. Supplemental Information

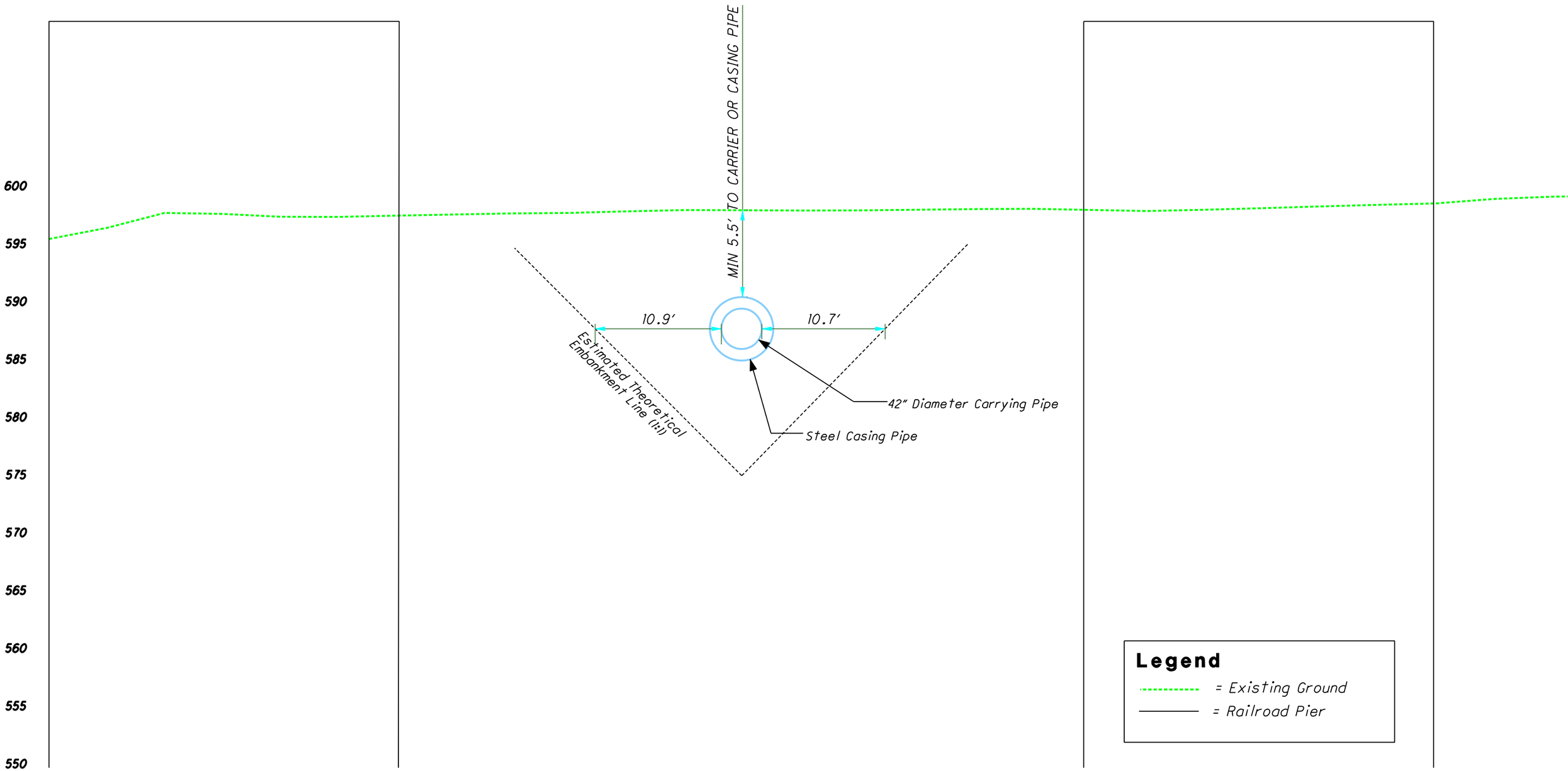
C. Drainage Pipe Railroad Crossing Exhibits

- East Ninth Street GCRTA Crossing
- East Ninth Street NS RR Crossing
- East Ninth Street CSX RR Crossing
- East Bank CSX RR Crossing
- East Bank NS RR Crossing

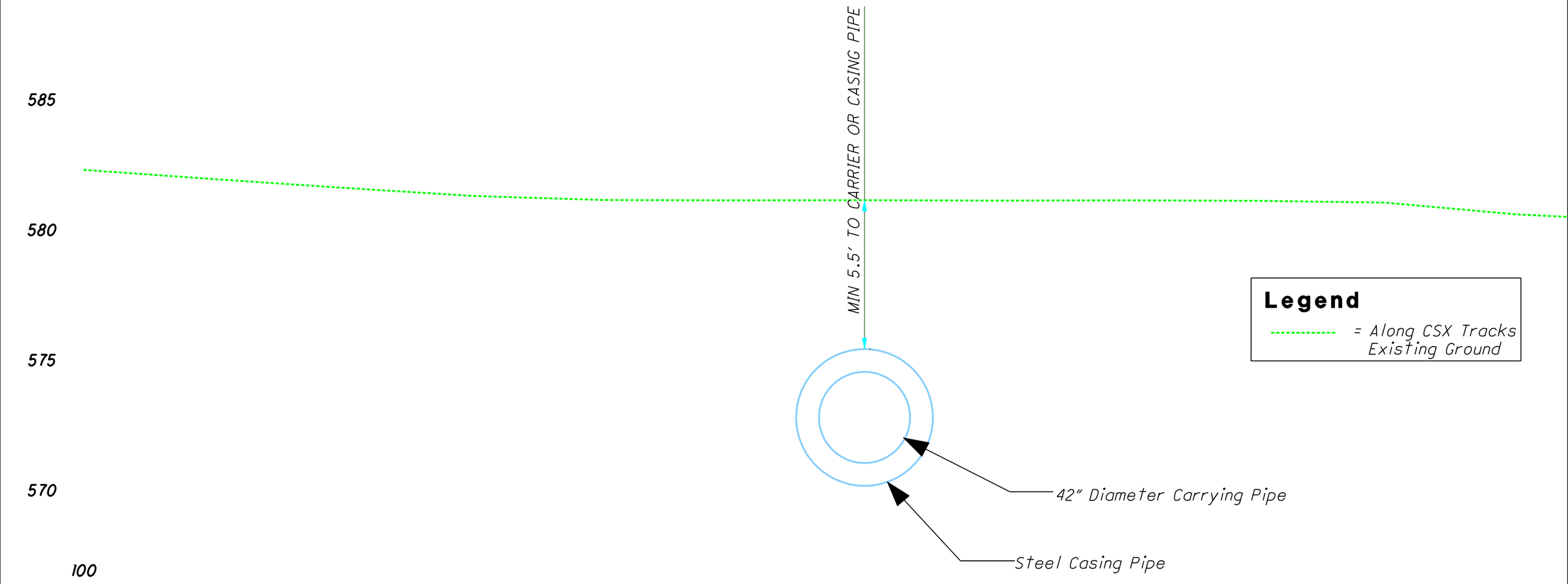
EAST NINTH STREET DRAINAGE
PIPE CLEARANCE OVER GCRTA



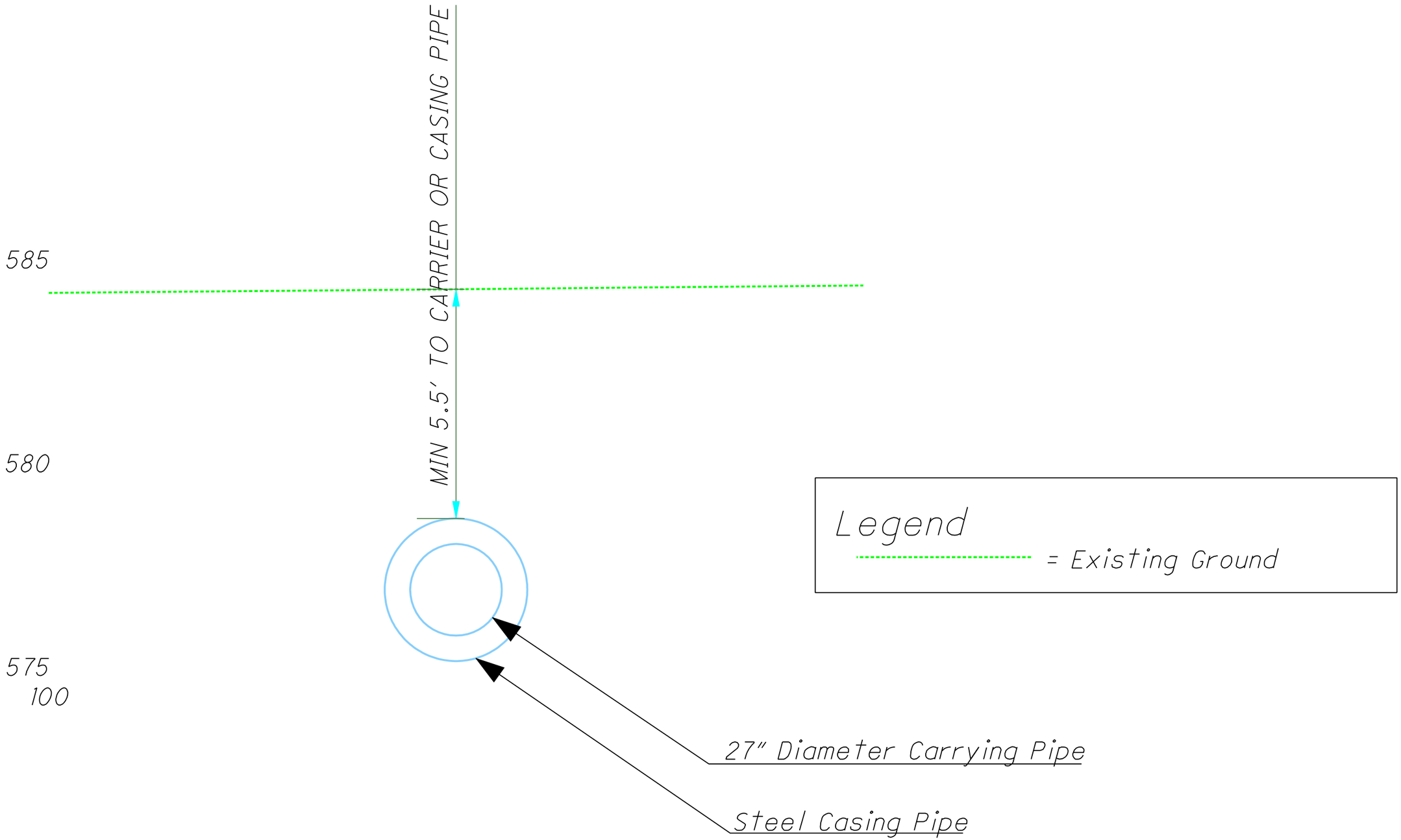
Commercial Road Region Drainage Pipe NS RR Crossing - Section A-A



Commercial Road Region Drainage Pipe
CSX RR Crossing - Section B-B



East Bank Drainage Pipe
CSX RR Crossing - Section A-A



East Bank Drainage Pipe NS RR Crossing - Section B-B