tnp

engineers
surveyors
landscape architects

JULY 2021

DRAINAGE ANALYSIS

FOR NHHIP SEGMENT 1 (I-45)

CSJ: 0500-03-446

Harris County, Texas

Prepared for:

Texas Department of Transportation

Prepared by: Teague Nall and Perkins, Inc. Firm Registration # F-230
12300 Dundee Court, Suite 212
Cypress, Texas 77429 | 832.220.1205
www.tnpinc.com

TABLE OF CONTENTS

TABLES

EXHIBITS

APPENDICIES

APPENDIX A- EXISTING AND PROPOSED TYPICAL SECTIONS

APPENDIX B- FEMA FIRM PANELS

APPENDIX C- FIELD PHOTOS

APPENDIX D- NOAA ATLAS 14 DATA

APPENDIX E- MITIGATION VOLUME ESTIMATE HYDROGRAPHS

APPENDIX F- CUT AND FILL CALCULATIONS

APPENDIX G- UTILITY CONFLICT INFORMATION

APPENDIX H- PRELIMINARY DRAINAGE COST ESTIMATE

APPENDIX I- NORTH HOUSTON HIGHWAY IMPROVEMENT PROJECT – PRELIMINARY DRAINAGE STUDY (ELECTRONIC COPY – ON USB)

List of Acronyms

AC	Acres
AC-FT	Acre-Feet
CAF	Combined Adjustment Factor
CFS	Cubic Feet Per Second
CSJ	Control-Section-Job
EOP	Edge of Pavement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FPS	Feet Per Second
FT	Feet
GIMS	Geographic Information Management System
IDF	Intensity-Duration-Frequency
I-45	Interstate Highway 45
I-69	Interstate 69
HDM	Hydraulic Design Manual
HCFCD	Harris County Flood Control District
HGL	Hydraulic Grade Line
HEC-RAS	Hydraulic Engineering Center- River Analysis System
HEC-HMS	Hydrologic Engineering Center - Hydrologic Modeling System
H.O.V.	High Occupancy Vehicle
LiDAR	Light Detection and Ranging
ML	Mainlanes
NAD	North American Datum
NAVD	North American Vertical Datum
NBFR	Northbound Frontage Road
NBML	Northbound Mainlane
NHHIP	North Houston Highway Improvement Project
NOAA	National Oceanic and Atmospheric Administration
PGL	Proposed Grade Line
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
ROW	Right-of-Way
SAM	Surveying and Mapping
SBFR	Southbound Frontage Road
SMBL	Southbound Mainlane
SH 288	State Highway 288
SWMM	Storm Water Management Model
TNP	Teague, Nall, and Perkins, Inc.

TNRIS	Texas Natural Resources Information System
TxDOT	Texas Department of Transportation
US 59	US Highway 59
USGS	United States Geological Survey
WSEL	Water Surface Elevation

1. INTRODUCTION

Teague, Nall, and Perkins, Inc. (TNP) conducted this report on behalf of the Texas Department of Transportation (TxDOT) Houston District for the North Houston Highway Improvement Project (NHHIP) on Interstate Highway 45 (I-45) Segment 1. The preliminary drainage analysis and design is authorized through Work Authorization No. 4 of TxDOT Contract 12-0IDP5013.

Study findings and recommendations are based upon best-available information and are subject to change as additional data becomes available.

1.1 Project Description and Location

This report summarizes the results and recommendations of the mitigation study to offset drainage impacts associated with the proposed improvements and widening of I-45 from North of Tidwell Road to South of Shepherd Drive (CSJ: 0500-03-445). This study is one of the four sections located in the NHHIP Segment 1 analysis.

The project is located within the Little White Oak Bayou [E101-00-00] watershed. The project consists of three existing cross drainage structures which drain to Little White Oak Bayou. The general topography of the project area is very flat overland slopes consisting of heavily developed commercial and residential areas for most of the I-45 project corridor. The study limits are from North of Tidwell Road to South of Shepherd Drive, spanning approximately 1.9 miles. See **Exhibit 1** for project location and limits.

The existing I-45 typical section consists of an eight-lane highway divided by a High-Occupancy vehicle (H.O.V.) lane with storm-sewer systems running along the main lanes and frontage roads. The proposed typical section will consist of the following:

- Southbound and Northbound Frontage Roads -2-12' lanes and a 15' shared lane
- Southbound and Northbound Mainlanes – 4-12' lanes with 2-12' shoulder on each side
- Southbound and Northbound Max Lanes – 2-12' lanes with a 12' shoulder in between the max lanes and mainlanes

The existing and proposed typical sections are shown in **Appendix A.**

1.2 Survey and Elevation Datum

The I-45 project coordinates are based on the Texas Coordinate System, South Central Zone (4204), North American Datum (NAD) of 1983 (CORS96; EPOCH 2002.00). Coordinates and distances are U.S. survey feet, displayed in surface values. These values can be

converted to NAD83 (GRID) values by applying the combined adjustment factor (CAF) of 1.00013 for Harris County with the following formula: SURFACE/CAF = GRID.

Elevations are in reference to the North American Vertical Datum (NAVD) of 1988 with a 2001 adjustment (NAVD 1988, 2001). Existing control was established by Surveying and Mapping (SAM) in March 2019.

1.3 Federal Emergency Management Agency (FEMA) Identification

The proposed project is located on FEMA Flood Insurance Rate Map (FIRM) panel 48201C0660M dated June 9, 2014 as shown in **Appendix B**. A portion of the southbound frontage road is in the 100-year and 500-year flood plain of Little White Oak Bayou which is Zone AE, base flood elevation determined, and Zone X respectively as shown in **Exhibit 1**.

1.4 Previous Report

A Preliminary Drainage Study for the NHHIP was developed by AECOM for TxDOT in November 2016 and covers all three NHHIP segments. The AECOM study limits were from I-69 and SH 288 south of downtown Houston to the interchange of I-45 and Beltway 8 North. The section from North of Tidwell Road to South of Shepherd Drive is in Segment 1. A copy of the AECOM report is provided in **Appendix I**.

1.5 Scope

The scope of work includes preparation of drainage design and analysis and drainage studies and reports for Segment 1 of the I-45 NHHIP for the section from North of Tidwell Road to South of Shepherd Drive. Scope items include the following:

- Locate existing outfalls, determine existing storm sewer and culvert sizes, and calculate design flows and water surface elevations (WSEL) for use in roadway geometry.
- Develop existing and proposed Storm Water Management Model (SWMM) models for the project area.
- Identify impacts to abutting properties and the 100-yr floodplain due to proposed highway improvements.
- Identify and describe outfalls, provide drainage area maps, sub-drainage area maps, floodplain cut and fill, mitigation recommendations, preliminary detention basin layouts, and a preliminary cost estimate.

1.6 Data Collection

Multiple sources aided in the development of the existing drainage analysis. Data used for this report included the following:

- As-built drawing provided by TxDOT
- Light Detection and Ranging (LiDAR) data
- Survey data provided by TxDOT and RODS Surveying, Inc.
- Harris County Flood Control (HCFCD) Hydraulic Engineering Center - River Analysis System (HEC-RAS) and Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS) models
- Aerial photography (TNRIS)
- Field reconnaissance (**Appendix C**)
- Google maps

2. Methodology

The following are applicable drainage design criteria for Segment 1, as provided by TxDOT:

- Existing drainage crossing design storm event: 100-year (Main Lanes) and 10-year (Frontage Roads)
- Proposed frontage road design: 10-year
- Proposed ramp design: 25-year
- Proposed main lanes and max lanes design: 100-year
- Roadside ditch and storm sewer design storm event: 10-year
- National Oceanic and Atmospheric Administration (NOAA) Atlas 14 – rainfall depths and intensities

2.1 Hydrology

The Rational method was used for on-site peak flow calculations on small watersheds (less than 200 acres) unaffected by complex hydrologic features as described in the Chapter 4, Section 12 of the TxDOT hydraulic design manual (HDM.)

The Rational Method equation is expressed as:

$$Q = CIA$$

Where:

Q = computed peak flow rate (cfs)
C = weighted runoff coefficient
I = average rainfall intensity (in/hr)
A = drainage area (acres)

The drainage areas consisted of pavement, commercial/development strip, residential development, and undeveloped/grass areas. A composite C-value was calculated for each drainage area. The following runoff coefficients were used:

FIGURE 2-1.1: Runoff Coefficients

Drainage Area Description	Runoff Coefficient
Pavement	0.90
Commercial/Development Strip	0.65
Residential Development	0.45
Undeveloped/Grass	0.35

A composite C-value and a time of concentration was calculated for each drainage area as per TxDOT criteria (10-minute minimum). Then, the rainfall intensity was calculated using the following equation:

$$I = \frac{b}{(t_c + d)^e}$$

Where:

I = design rainfall intensity (in/hr)
t_c = time of concentration (min)
e, b, d = coefficients for Harris County (EBDLKUP-2019-Vc6.2.10.xlsm)

The Harris County e, b, and d coefficients from the TxDOT HDM are as follows:

FIGURE 2-1.2: TxDOT Intensity-Duration-Frequency (IDF) Coefficient for Harris County

Annual Exeedance Probability	Return Period	e	b	d
10%	10-yr	0.7458	84.15	12.35
4%	25-yr	0.7247	95.89	12.51
2%	50-yr	0.7091	103.81	12.62
1%	100-yr	0.6963	113.68	13.16

The 24-hr rainfall depths were developed from NOAA Atlas 14 as shown in **Appendix D.**

FIGURE 2-1.3: NOAA Atlas 14 24-hr Rainfall Depth

Annual Exeedance Probability	Return Period	24-hr Rainfall Depth (in)
10%	10-yr	8.50
4%	25-yr	11.4
2%	50-yr	13.9
1%	100-yr	16.8

2.2 Hydraulics

XP-STORM (SWMM) version 2017.2 is used as the primary hydraulic modeling to analyze the drainage systems. Tailwater conditions from the FEMA effective model (E101-00-00) were incorporated in the existing and proposed hydraulic models.

The SWMM model was selected based on its ability to incorporate all aspects of the drainage system, such as precipitation data for all required events, channels, culverts, weirs, inlets, and detention facilities. The SWMM model utilizes a series of nodes and links to represent the hydraulic conveyance of the drainage system in a complex array of branched or looped drainage networks.

2.3 Model Development

The SWMM models were developed to evaluate the hydraulic relationship between the project drainage systems and the receiving streams. For this phase of the analysis, the SWMM models were designed to include the elements of the existing and proposed drainage systems to demonstrate the effectiveness of the systems to mitigate the impacts associated with the proposed project. In developing the SWMM model for the existing and proposed conditions, several components were needed to complete the SWMM models and are defined as follows:

- Detailed drainage areas for existing and proposed conditions were delineated using as-built plans, field reconnaissance, roadway profiles, lidar data, and aerial topography.
- The Rational Method was used to determine the peak flows and the Small Watershed Method was used to develop the runoff hydrographs for each of the areas, which were subsequently imported into the SWMM Hydraulic model. NOAA Atlas 14 rainfall depths and the HCFCD rainfall loss methods were used to determine the direct runoff for the Small Watershed Method.
- Runoff hydrographs were adjusted to coincide with the timing of the watershed hydrographs. This was accomplished by shifting the time to peak of the Small Watershed hydrograph such that the peak flow would occur at a time equal to 0.67 of the storm duration (24-hour) plus the time of concentration of its contributing drainage area. The use of the 0.67 factor is consistent with the peak rainfall ordinate on the HCFCD standard 24-hour storm distribution for watershed analysis. To maintain the relative impacts of the proposed roadway improvements to the outfalls, this method was applied to the existing and proposed condition models.
- The hydraulic mode of the SWMM model requires defined boundary conditions to represent the tailwater elevations at the outfall points in the drainage network and inflow from any contributing off-site areas upstream of the project. At Little White Oak Bayou, HEC-RAS and HEC-HMS were used to calculate a time-stage hydrograph from the effective FEMA models. Atlas 14 and FEMA effective model correlation for tailwater conditions are represented below:

FIGURE 2-3.1: ATLAS 14 to FEMA Effective Model Correlation

ATLAS 14	EQUIVALENT FEMA EFFECTIVE MODEL
100-YR	500-YR
50-YR	100-YR
10-YR	10-YR

- SWMM models developed for this analysis include a sheet flow aspect of the drainage system. Surface links were used to simulate carry-over (sheet flow) between successive nodes, where applicable.

2.4 Preliminary Drainage System Design Approach

Preliminary sizes for the storm drain system trunk lines were determined using TxDOT's 10-year drainage design criteria within GEOPAK Drainage. The areas draining to the TxDOT right-of-way (ROW) were used to develop the preliminary storm drain system trunk lines. Preliminary trunk line sizes were adjusted as necessary in the proposed mitigation analysis to accommodate the 100-year sheet flow and optimize the function of the detention basins.

Preliminary sizes of the cross drainage structures were based on the HCFCD planning study for Little White Oak Bayou as presented in a coordination meeting between TxDOT and HCFCD on October 5, 2020. A 12'x10' RCB was proposed for Outfall C5 and a 10'x8' RCB was proposed for Outfall C4.

3. Drainage Systems: Existing

The existing drainage systems contain a combination of storm sewers, cross drainage structures, and roadside ditches which convey storm water along I-45 to three (3) outfalls. The outfalls are listed below:

FIGURE 3: Existing Project Outfalls

OUTFALL	STATION	STRUCTURE SIZE	OUTFALLS INTO
C5	1508+84	2-6'X6' RCBs	E101-16-00
C4	1545+73	2-6'X5' RCBs	E101-18-00
O7	1591+38	3-36" RCPs	E101-18-04

The existing drainage areas were delineated using survey data, aerial photography, United States Geological Survey (USGS) contours, LiDAR data, as-built plans, and field reconnaissance. The existing overall drainage areas are shown in **Exhibit 2** and the drainage areas are shown in **Exhibit 3.** The existing hydrology is shown in **Table 1.**

3.1 Outfall C5 – Station 1508+84: E101-16-00

This system consists of roadside ditches and storm sewers that outfall into E101-16-00. The cross drainage structure drains from east to west through 2-6'X6' RCBs where it enters a channel at the TxDOT ROW.

The channel downstream of TxDOT's ROW consists of grass-lined trapezoidal section with an approximate bottom width of 5 feet, 2.5:1 side slopes, and depths ranging between 2 to 5 feet. It traverses residential and commercial development until it outfalls into Little White Oak Bayou south of Glenburnie Drive. The typical section is represented below:

FIGURE 3-1: Channel Downstream of C5

The existing channel does not contain the 10-yr storm event within the banks. Future HCFCD improvements are to upgrade the channel to a 12'x10' RCB from I-45 to Little White Oak Bayou.

The existing drainage layout is shown in **Exhibit 4,** and the existing offsite drainage layout is shown in **Exhibit 5**. Outfall C5 does not meet the frontage road drainage design criteria as shown in **Table 2**.

3.2 Outfall C4 – Station 1545+73: E101-18-00

This system consists of roadside ditches and storm sewers that outfall into E101-18-00. The cross drainage structure drains from east to west through 2-6'X5' RCBs where it enters a roadside ditch along the southbound frontage road (SBFR). The roadside ditch drains into a 36" and 84" RCP within the TxDOT ROW and connects to the Yale Street storm sewer system. The Yale Street storm sewer system drains south to Little White Oak Bayou in a 10'x8' RCB.

FIGURE 3-2: 10'x8' RCB Downstream of C4

Future HCFCD improvements are to extend the 10'x8' RCB upstream of I-45.

The existing drainage layout is shown in **Exhibit 4,** and the existing offsite drainage layout is shown in **Exhibit 5**. Outfall C4 meets the main lane drainage design criteria but does not meet the frontage road drainage design criteria as shown in **Table 2**.

3.3 Outfall O7 – Station 1591+38: E101-18-04

This system consists of roadside ditches and storm sewers that outfall into E101-18-04. The cross drainage structure drains from west to east through 3-36" RCPs. The northbound frontage road (NBFR) consists of 2-4'x2' RCBs from the north and 2-4'x2' RCB's from the

south. In total, 3-36" RCPs and 4-4'x2' RCBs drain into a concrete-lined channel located on the east side of I-45.

FIGURE 3-3: Concrete-lined Channel Downstream of O7 (E101-18-04)

The concrete-lined channel drains east and merges into E101-18-00 where it crosses I-45 at Outfall C4. The existing drainage layout is shown in **Exhibit 4,** and the existing offsite drainage layout is shown in **Exhibit 5**. Outfall O7 meets the main lane and frontage road drainage design criteria as shown in **Table 2**.

4. Drainage Systems: Proposed

The proposed drainage systems contain a combination of storm sewers, cross drainage structures, and roadside ditches which convey storm water along I-45 to three (3) outfalls. The outfalls are listed below:

FIGURE 4: Proposed Project Outfalls

OUTFALL	STATION	EXISTING STRUCTURE SIZE	PROPOSED STRUCTURE SIZE	OUTFALLS INTO
C5	1511+80	2-6'X6' RCBs	2-11'X6' RCBs	E101-16-00
C4	1548+90	2-6'X5' RCBs	1-10'X8' RCB	E101-18-00
O7	1591+45	3-36" RCPs	2-6'X4' RCBs	E101-18-04

The proposed overall drainage areas are shown in **Exhibit 6** and the drainage areas are shown in **Exhibit 7**. The proposed hydrology is shown in **Table 3.**

4.1 Estimated Mitigation Volume

The proposed storm sewer and cross drainage structures were modeled to determine the impacts of the proposed improvements. The existing and proposed hydrographs exiting TxDOT's ROW were evaluated for each outfall. The existing and proposed hydrographs for each outfall are shown in **Appendix E.** The estimated mitigation volumes are listed below:

FIGURE 4-1: 100-YR Estimated Mitigation Volume

OUTFALL	REQUIRED MITIGATION VOLUME (ACRE-FT)
C5	20
C4	7
O7	18

Proposed detention basins were established along the corridor and are shown in **Exhibit 8.** Preliminary mitigation requirements were evaluated and adjusted as necessary to mitigate the impacts associated with the proposed improvements.

4.2 Outfall C5 – Station 1511+80

The existing cross drainage structure drains from east to west through 2-6'X6' RCBs at an approximate 45-degree skew near station 1508+84. The proposed cross drainage structure crosses perpendicular to I-45 at station 1511+80. The proposed drainage layout is shown in **Exhibit 9,** and the proposed offsite drainage layout is shown in **Exhibit 10.**

Future HCFCD improvements propose a 12'x10' RCB in place of the existing channel for E101-16-00 from Little White Oak Bayou to upstream of I-45. These improvements would improve conveyance and provide additional outfall depth but would require regional mitigation to offset the improved conveyance to Little White Oak Bayou. Since the HCFCD improvements will not be in place when the I-45 construction begins, 2-11'x6' RCBs are proposed within the TxDOT ROW.

Three detention basin locations have been identified along the west side of I-45 and preliminary detention basin layouts are shown in **Exhibit 11**. The detention basins provide the following detention volumes:

FIGURE 4-2.2: Outfall C5 Proposed Detention Volumes

ID	STATION	DETENTION VOLUME (ACRE-FT)
C5 DETENTION 1	1515+00	1.60
C5 DETENTION 2	1506+00	16.20
C5 DETENTION 3	1495+00	31.85
TOTAL		49.65

Existing and proposed models were compared to quantify an impact downstream. The proposed detention basins for Outfall C5 exceed the required volume to mitigate I-45 proposed improvements as shown below:

FIGURE 4-2.3: Outfall C5 Proposed Detention Volumes

OUTFALL	REQUIRED MITIGATION VOLUME (ACRE-FT)	100-YR EXIST OUTFLOW (CFS)	100-YR PROPOSED OUTFLOW (CFS)	AVAILABLE DETENTION	EXCESS DETENTION (ACRE-FT)
C5	20.00	673.98	663.62	49.65	**29.65**

Proposed outfall C5 meets the main lane drainage design criteria and frontage road drainage design criteria as shown in **Table 4.**

4.3 Outfall C4 – Station 1548+90

The existing cross drainage structure drains from east to west through 2-6'X5' RCBs at an approximate 45-degree skew near station 1545+73. Future HCFCD improvements propose extending the 10'x8' RCB from Yale Street to upstream of I-45. The proposed culvert will cross perpendicular at station 1548+90. The proposed drainage layout is shown in **Exhibit 9,** and the proposed offsite drainage layout is shown in **Exhibit 10**.

Two detention basin locations have been identified along the west side of I-45 and preliminary detention basin layouts are shown in **Exhibit 12.** The detention basins provide the following detention volumes:

FIGURE 4-3.1: Outfall C4 Proposed Detention Volumes

ID	STATION	DETENTION VOLUME (ACRE-FT)
C4 DETENTION 1	1553+00	56.03
C4 DETENTION 2	1541+00	18.21
TOTAL		74.24

Existing and proposed models were compared to quantify an impact downstream. The proposed detention basins exceed the required volume to mitigate I-45 proposed improvements as shown below:

FIGURE 4-3.2: Outfall C4 Proposed Detention Volumes

OUTFALL	REQUIRED MITIGATION VOLUME (ACRE-FT)	EXIST OUTFLOW (CFS)	PROPOSED OUTFLOW (CFS)	AVAILABLE DETENTION	EXCESS DETENTION (ACRE-FT)
C4	7.00	738.65	646.35	74.24	**67.24**

Proposed outfall C4 meets the main lane and frontage road drainage design criteria as shown in **Table 4**.

4.4 Outfall O7 – Station 1591+45

The existing cross drainage structure drains from west to east and will be upsized to 2-6'x4' RCBs. The proposed pipe sizes were based on the outflow rate and limited cover. The proposed drainage layout is shown in **Exhibit 9,** and the proposed offsite drainage layout is shown in **Exhibit 10**.

A proposed detention basin location has been identified along the west side of I-45 near North Shepherd Drive. A preliminary detention basin layout is shown in **Exhibit 13**. The detention basin provides the following detention volume:

FIGURE 4-4.1: Outfall O7 Proposed Detention Volume

ID	STATION	DETENTION VOLUME (ACRE-FT)
O7 DETENTION 1	1595+00	19.86
TOTAL		19.86

Existing and proposed models were compared to quantify an impact downstream. The proposed detention basin exceeds the required volume to mitigate I-45 proposed improvements as shown below:

FIGURE 4-4.2: Outfall O7 Proposed Detention Volumes

OUTFALL	REQUIRED MITIGATION VOLUME (ACRE-FT)	100-YR EXIST OUTFLOW (CFS)	100-YR PROPOSED OUTFLOW (CFS)	AVAILABLE DETENTION (ACRE-FT)	EXCESS DETENTION (ACRE-FT)
O7	18.00	252.09	229.20	19.86	**1.86**

In addition to the proposed detention basin, a proposed 48" RCP at West Little York connects the SBFR storm sewer system to the C4 storm sewer system. This connection was designed to alleviate the increase in water surface elevation upstream of Outfall O7.

Proposed outfall O7 meets the main lane and frontage road drainage design criteria as shown in **Table 4**.

4.5 Floodplain Fill

Preliminary floodplain fill was calculated based on the I-45 schematic roadway profiles. Cross sections were drawn based on the profiles and the 100-yr effective floodplain elevations for Little White Oak Bayou were projected on the cross sections. Cut and fill areas were identified for each cross section and the average end method was used to compute the total cut and fill volume as shown in the cut and fill calculations in **Appendix F**. The total net floodplain fill for the project is approximately 11 acre-feet.

4.6 Proposed Frontage Road Profile Design

The I-45 schematic roadway profiles were plotted with the 10-yr, 50-yr, and 100-yr proposed water surface elevations as shown in **Exhibit 9**.

The NBFR and SBFR profiles were compared to the 10-yr proposed water surface elevations to identify where the frontage roads do not meet 10-yr criteria. The following roadway limits do not meet the 10-yr criteria:

- SBFR station 11494+35 to 11499+46
- NBFR station 11496+80 to 11520+02

Where the SBFR and NBFR schematic roadway profiles do not meet the 10-yr criteria, proposed level of service was evaluated further to include analysis of the 2-yr proposed water surface elevation, included on **Exhibit 9** sheets 1 and 2. Based on this evaluation the following observations and recommendations are provided:

- SBFR profile does meet a 2-yr level of service
    - Recommend no adjustment to the SBFR profile from SBFR station 11494+35 to 11499+46

- NBFR profile does not meet the 2-yr level of service from NBFR station 11496+80 to 11504+50
    - Recommend raising the NBFR profile to be above the 2-yr water surface elevation 11496+80 to 11504+50
    - Recommend an additional 10' of ROW be acquired from NBFR station 11496+80 to 11500+60 to provide room for grading and drainage
    - Recommend NBFR roadway profile and ROW width transitions south of station 11496+80 to tie into the recommended profile and ROW for the adjacent study section to the south
- The NBFR profile can be raised above the 10-yr water surface from station 11507+65 to 11520+02 without impact to adjacent properties
    - Recommend raising the NBFR profile to be above the 10-yr water surface elevation from station 11507+65 to 11520+02

The proposed storm sewer systems were designed for the 10-yr event. However, the tailwater from Little White Oak Bayou inundates the frontage roads between TNP's design section and the adjacent design section to the south. The proposed sheet flows at the section divide were coordinated with the adjacent section designer and will remain less than existing conditions. Further evaluation of regional flood reduction solutions will be necessary to lower the tailwater effects of Little White Oak Bayou to meet the 10-yr criteria at all locations along the proposed NBFR and SBFR.

4.7 Utility Conflicts

Within the project limits, potential utility conflicts with the proposed design were identified. Information on existing water and wastewater lines were found on The City of Houston Geographic Information Management System (GIMS). Overhead electric transmission lines were drawn using existing survey information and confirmed through aerial imagery. Utility conflicts identified in this study are preliminary and require further survey information to verify and confirm their locations.

Exhibit 14 shows potential utility conflicts within the project limits. **Appendix G** details the potential utility conflicts. **Figure 4-7.1** tabulates the number of potential utility conflicts by the utility.

FIGURE 4-7.1: Potential Utility Conflict Summary

Utility Type	Number of Potential Conflicts
Water Line	74
Wastewater Line	25

4.8 Preliminary Drainage Cost Estimate

A preliminary drainage cost was prepared for the proposed drainage components. Quantities were developed based on the preliminary drainage design for storm sewer, storm drains, detention basins, and cross drainage structures. The preliminary drainage cost of $21,911,533 includes a 20% contingency. The preliminary drainage construction cost estimate is shown in **Appendix H**.

5. Summary/Conclusions

The existing I-45 typical section consists of an eight-lane highway divided by an HOV lane with storm-sewer systems running along the main lanes and frontage roads. The proposed project will consist of the following:

- Southbound and Northbound Frontage Roads -2-12' lanes and a 15' shared lane
- Southbound and Northbound Mainlanes – 4-12' lanes with 2-12' shoulder on each side
- Southbound and Northbound Max Lanes – 2-12' lanes with a 12' shoulder in between the max lanes and mainlanes

The project consists of three existing cross drainage structures draining to Little White Oak Bayou. The general topography of the project area is very flat overland slopes consisting of heavily developed commercial and residential areas for the majority of the I-45 project corridor. The study limits are from North of Tidwell Road to South of Shepherd Drive, spanning approximately 1.9 miles.

Proposed drainage improvements have been designed and the following cross drainage structures have been modeled:

FIGURE 5.1: Existing and Proposed Cross Drainage Structures

OUTFALL	STATION	EXISTING STRUCTURE SIZE	PROPOSED STRUCTURE SIZE	OUTFALLS INTO
C5	1511+80	2-6'X6' RCBs	2-11'X6' RCBs	E101-16-00
C4	1548+90	2-6'X5' RCBs	1-10'X8' RCB	E101-18-00
O7	1591+45	3-36" RCPs	2-6'X4' RCBs	E101-18-04

Existing and proposed models have been developed for each cross drainage structure with the following outflow and mitigation provided:

FIGURE 5.2: Cross Drainage Outflow and Mitigation Summary

OUTFALL	REQUIRED MITIGATION VOLUME (ACRE-FT)	100-YR EXIST OUTFLOW (CFS)	100-YR PROPOSED OUTFLOW (CFS)	AVAILABLE DETENTION (ACRE-FT)	EXCESS DETENTION (ACRE-FT)
C5	20.00	673.98	663.62	49.65	**29.65**
C4	7.00	738.65	646.35	74.24	**67.24**
O7	18.00	252.09	229.20	19.86	**1.86**

A preliminary drainage cost was prepared for the proposed drainage components. Quantities were developed based on the preliminary drainage design for storm sewer, storm drains, detention basins, and cross drainage structures. The preliminary drainage cost of $21,911,533 includes a 20% contingency.

The proposed drainage improvements presented in this study will not adversely impact existing conditions for storm events up to and including the 100-year (Atlas 14) event.

TABLES

TABLE 1

TABLE 1 - EXISTING HYDROLOGY

I-45

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
	IMP%>>>	100	0	18	55																							
	C>>>>	0.9	0.35	0.45	0.65																							
EXISTING CONDITIONS:																												
I-45																												
O7-4-205	2.60	2.14	0.46	0.00	0.00	82.31	0.80	93.00	0.00	707.00	11.49	11.493	O7-4-205	0.75	3.00	1.25	12.20	10.87	9.58	7.90	6.66	5.03	25.47	22.68	20.00	16.49	13.89	10.51
O7-4-211	5.64	3.40	2.24	0.00	0.00	60.28	0.68	105.00	0.00	701.00	11.68	11.680	O7-4-211	0.75	3.00	1.25	12.14	10.81	9.53	7.86	6.62	5.00	46.66	41.55	36.63	30.20	25.44	19.24
O7-4-401	1.15	0.89	0.26	0.00	0.00	77.39	0.78	93.00	0.00	99.00	3.39	10.000	O7-4-401	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	11.37	10.14	8.95	7.40	6.24	4.72
O7-4-402	2.77	1.06	0.57	1.14	0.00	45.68	0.60	301.00	0.00	215.00	9.56	10.000	O7-4-402	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	21.24	18.95	16.73	13.82	11.66	8.83
O7-4-403	2.22	1.84	0.32	0.06	0.00	83.37	0.81	227.00	0.00	459.00	11.16	11.164	O7-4-403	0.75	3.00	1.25	12.32	10.97	9.68	7.98	6.73	5.09	22.11	19.70	17.37	14.33	12.08	9.14
O7-4-404	0.59	0.55	0.04	0.00	0.00	93.22	0.86	54.00	0.00	70.00	2.13	10.000	O7-4-404	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.49	5.79	5.11	4.22	3.56	2.70
O7-4-207	0.50	0.47	0.03	0.00	0.00	94.00	0.87	72.00	0.00	63.00	2.44	10.000	O7-4-207	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.53	4.93	4.35	3.60	3.03	2.30
O7-4-406	1.81	1.69	0.12	0.00	0.00	93.37	0.86	75.00	0.00	194.00	4.25	10.000	O7-4-406	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	19.92	17.77	15.69	12.96	10.93	8.28
O7-4-407	2.64	0.94	1.70	0.00	0.00	35.61	0.55	380.00	0.00	75.00	9.44	10.000	O7-4-407	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	18.37	16.39	14.47	11.95	10.08	7.63
O7-4-408	1.62	0.71	0.91	0.00	0.00	43.83	0.59	178.00	0.00	134.00	5.74	10.000	O7-4-408	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	12.20	10.89	9.61	7.94	6.70	5.07
O7-4-409	2.38	1.46	0.92	0.00	0.00	61.34	0.69	234.00	0.00	233.00	8.31	10.000	O7-4-409	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	20.85	18.60	16.42	13.57	11.44	8.67
O7-5-502	0.30	0.29	0.01	0.00	0.00	96.67	0.88	94.00	113.00	0.00	2.72	10.000	O7-5-502	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.37	3.01	2.66	2.19	1.85	1.40
O7-5-503	1.10	0.87	0.23	0.00	0.00	79.09	0.79	114.00	0.00	289.00	6.39	10.000	O7-5-503	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	11.01	9.82	8.67	7.16	6.04	4.57
O7-5-701	0.14	0.14	0.00	0.00	0.00	100.00	0.90	71.00	0.00	67.00	2.47	10.000	O7-5-701	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.61	1.43	1.26	1.04	0.88	0.67
O7-8-504	0.37	0.37	0.00	0.00	0.00	100.00	0.90	87.00	0.00	109.00	3.39	10.000	O7-8-504	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.24	3.79	3.34	2.76	2.33	1.76
O7-8-507	1.39	1.32	0.07	0.00	0.00	94.96	0.87	106.00	0.00	333.00	6.80	10.000	O7-8-507	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	15.45	13.79	12.17	10.06	8.48	6.42
O7-8-508	0.78	0.78	0.00	0.00	0.00	100.00	0.90	67.00	0.00	487.00	7.98	10.000	O7-8-508	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.95	7.98	7.05	5.82	4.91	3.72
O7-8-509	0.36	0.35	0.01	0.00	0.00	97.22	0.88	51.00	0.00	220.00	4.07	10.000	O7-8-509	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.06	3.62	3.20	2.64	2.23	1.69
O7-8-511	1.36	1.16	0.20	0.00	0.00	85.29	0.82	227.00	0.00	82.00	6.14	10.000	O7-8-511	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	14.20	12.67	11.18	9.24	7.79	5.90
O7-8-513	0.17	0.16	0.01	0.00	0.00	94.12	0.87	70.00	0.00	106.00	2.97	10.000	O7-8-513	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.88	1.68	1.48	1.22	1.03	0.78
O7-8-514	0.37	0.30	0.07	0.00	0.00	81.08	0.80	39.00	0.00	150.00	2.87	10.000	O7-8-514	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.75	3.35	2.96	2.44	2.06	1.56
O7-8-515	2.33	1.82	0.48	0.03	0.00	78.34	0.78	281.00	0.00	359.00	11.03	11.031	O7-8-515	0.75	3.00	1.25	12.36	11.02	9.72	8.02	6.76	5.11	22.50	20.05	17.68	14.59	12.30	9.30
O7-8-516	0.25	0.25	0.00	0.00	0.00	100.00	0.90	33.00	0.00	157.00	2.83	10.000	O7-8-516	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.87	2.56	2.26	1.87	1.57	1.19
O7-8-602	1.04	0.72	0.32	0.00	0.00	69.23	0.73	113.00	0.00	214.00	5.36	10.000	O7-8-602	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	9.69	8.64	7.63	6.30	5.32	4.03
O7-8-604	1.34	1.21	0.13	0.00	0.00	90.30	0.85	66.00	0.00	434.00	7.25	10.000	O7-8-604	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	14.46	12.90	11.39	9.41	7.94	6.01
O7-8-801	0.18	0.10	0.08	0.00	0.00	55.56	0.66	49.00	0.00	92.00	2.32	10.000	O7-8-801	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.50	1.34	1.18	0.98	0.83	0.63
O7-8-802	0.17	0.14	0.03	0.00	0.00	82.35	0.80	26.00	0.00	155.00	2.64	10.000	O7-8-802	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.74	1.55	1.37	1.13	0.95	0.72
O7-8-803	2.35	2.33	0.02	0.00	0.00	99.15	0.90	63.00	0.00	435.00	7.20	10.000	O7-8-803	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	26.82	23.92	21.12	17.45	14.72	11.14
O7-8-804	0.28	0.28	0.00	0.00	0.00	100.00	0.90	24.00	0.00	226.00	3.55	10.000	O7-8-804	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.21	2.87	2.53	2.09	1.76	1.33
O7-8-805	2.22	2.12	0.10	0.00	0.00	95.50	0.88	101.00	0.00	337.00	6.74	10.000	O7-8-805	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	24.76	22.09	19.51	16.11	13.59	10.29
O7-8-806	0.08	0.13	-0.05	0.00	0.00	162.50	1.24	31.00	0.00	77.00	1.72	10.000	O7-8-806	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.27	1.13	1.00	0.83	0.70	0.53
O7-8-808	0.15	0.15	0.00	0.00	0.00	100.00	0.90	23.00	0.00	50.00	1.18	10.000	O7-8-808	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.72	1.54	1.36	1.12	0.94	0.72
O7-8-809	0.71	0.71	0.00	0.00	0.00	100.00	0.90	97.00	0.00	230.00	5.22	10.000	O7-8-809	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.14	7.27	6.41	5.30	4.47	3.38
O7-O-002	2.59	1.62	0.97	0.00	0.00	62.55	0.69	36.00	0.00	418.00	6.37	10.000	O7-O-002	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	22.91	20.44	18.05	14.91	12.57	9.52
O7-O-003	0.35	0.00	0.35	0.00	0.00	0.00	0.35	65.00	0.00	83.00	2.55	10.000	O7-O-003	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.56	1.39	1.23	1.02	0.86	0.65
O7-O-501	0.03	0.00	0.03	0.00	0.00	0.00	0.35	14.00	0.00	24.00	0.63	10.000	O7-O-501	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	0.13	0.12	0.11	0.09	0.07	0.06
C4-2-201	1.39	1.24	0.15	0.00	0.00	89.21	0.84	82.00	0.00	246.00	5.10	10.000	C4-2-201	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	14.89	13.29	11.73	9.69	8.17	6.19
C4-2-202	2.87	2.61	0.26	0.00	0.00	90.94	0.85	146.00	0.00	353.00	7.95	10.000	C4-2-202	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	31.10	27.75	24.50	20.24	17.07	12.92
C4-2-205	1.34	1.20	0.14	0.00	0.00	89.55	0.84	124.00	0.00	234.00	5.88	10.000	C4-2-205	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	14.39	12.84	11.33	9.36	7.90	5.98
C4-2-206	0.58	0.51	0.07	0.00	0.00	87.93	0.83	115.00	0.00	53.00	3.26	10.000	C4-2-206	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.16	5.50	4.85	4.01	3.38	2.56
C4-2-207	0.82	0.72	0.10	0.00	0.00	87.80	0.83	144.00	0.00	48.00	3.84	10.000	C4-2-207	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.70	7.77	6.86	5.66	4.78	3.62
C4-2-208	3.01	2.86	0.15	0.00	0.00	95.02	0.87	312.00	0.00	337.00	11.43	11.427	C4-2-208	0.75	3.00	1.25	12.23	10.89	9.60	7.92	6.67	5.05	32.11	28.60	25.22	20.80	17.52	13.25
C4-2-209	2.75	2.53	0.22	0.00	0.00	92.00	0.86	77.00	0.00	416.00	7.26	10.000	C4-2-209	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	30.00	26.77	23.63	19.52	16.47	12.47
C4-2-210	1.17	1.15	0.02	0.00	0.00	98.29	0.89	69.00	0.00	642.00	10.09	10.093	C4-2-210	0.75	3.00	1.25	12.71	11.34	10.01	8.27	6.97	5.28	13.24	11.81	10.43	8.61	7.27	5.50
C4-3-101	15.79	9.08	1.73	4.98	0.00	63.18	0.70	390.00	0.00	873.00	20.31	20.307	C4-3-101	0.75	3.00	1.25	9.86	8.71	7.64	6.25	5.24	3.93	108.68	96.00	84.17	68.87	57.69	43.31
C4-3-102	4.04	0.19	0.24	3.61	0.00	20.79	0.47	362.00	0.00	840.00	19.24	19.244	C4-3-102	0.75	3.00	1.25	10.09	8.92	7.82	6.41	5.37	4.03	18.96	16.76	14.70	12.04	10.09	7.58
C4-3-103	8.38	1.48	0.94	5.96	0.00	30.46	0.52	418.00	0.00	857.00	20.72	20.716	C4-3-103	0.75	3.00	1.25	9.78	8.64	7.57	6.19	5.19	3.89	42.48	37.51	32.88	26.90	22.52	16.91
C4-3-104	2.01	1.61	0.04	0.36	0.00	83.32	0.81	184.00	0.00	295.00	8.02	10.000	C4-3-104	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	20.71	18.48	16.31	13.48	11.37	8.61
C4-3-301	7.94	7.52	0.38	0.04	0.00	94.80	0.87	237.00	0.00	1097.00	19.89	19.893	C4-3-301	0.75	3.00	1.25	9.95	8.79	7.71	6.31	5.29	3.97	68.84	60.83	53.34	43.66	36.58	27.47
C4-3-302	1.69	1.48	0.21	0.00	0.00	87.57	0.83	85.00	0.00	460.00	8.02	10.000	C4-3-302	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	17.91	15.98	14.11	11.66	9.83	7.44
C4-3-303	0.48	0.36	0.12	0.00	0.00	75.00	0.76	82.00	0.00	107.00	3.25	10.000	C4-3-303	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.66	4.16	3.67	3.04	2.56	1.94
C4-3-304	0.84	0.64	0.20	0.00	0.00	76.19	0.77	82.00	63.00	151.00	4.19	10.000	C4-3-304	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.23	7.35	6.49	5.36	4.52	3.42
C4-3-306	0.73	0.55	0.18	0.00	0.00	75.34	0.76	82.00	0.00	210.00	4.62	10.000	C4-3-306	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	7.11	6.35	5.60	4.63	3.90	2.96
C4-3-307	1.26	0.65	0.61	0.00	0.00	51.59	0.63	200.00	0.00	191.00	6.99	10.000	C4-3-307	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	10.18	9.08	8.02	6.62	5.59	4.23
C4-3-308	0.81	0.65	0.16	0.00	0.00	79.95	0.79	80.00	0.00	210.00	4.58	10.000	C4-3-308	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.18	7.30	6.45	5.32	4.49	3.40
C4-3-309	2.86	2.29	0.45	0.12	0.00	80.83	0.79	184.00	0.00	556.00	11.50	11.502	C4-3-309	0.75	3.00	1.25	12.20	10.86	9.58	7.90	6.66	5.03	27.72	24.69	21.77	17.95	15.13	11.44
C4-3-310	1.53	0.94	0.59	0.00	0.00	61.44	0.69	82.00	0.00	195.00	4.42	10.000	C4-3-310	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	13.41	11.97	10.57	8.73	7.36	5.57
C4-3-311	4.04	3.27	0.51	0.26	0.00	82.10	0.80	61.00	0.00	581.00	9.10	10.000	C4-3-311	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	41.28	36.83	32.51	26.86	22.65	17.15
C4-5-502	0.36	0.20	0.16	0.00	0.00	55.56	0.66	19.00	0.00	191.00	2.97	10.000	C4-5-502	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.01	2.68	2.37	1.96	1.65	1.25
C4-5-504	0.19	0.12	0.07	0.00	0.00	63.16	0.70	45.00	0.00	128.00	2.71	10.000	C4-5-504	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.69	1.51	1.33	1.10	0.93	0.70
C4-5-505	0.06	0.06	0.00	0.00	0.00	100.00	0.90	60.00	0.00	18.00	1.57	10.000	C4-5-505	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	0.69	0.61	0.54	0.45	0.38	0.29
C4-5-506	0.12	0.10	0.02	0.00	0.00	83.33	0.81	16.00	0.00	119.00	1.94	10.000	C4-5-506	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.24	1.10	0.97	0.80	0.68	0.51
C4-5-507	0.21	0.21	0.00	0.00	0.00	100.00	0.90	27.00	0.00	174.00	2.92	10.000	C4-5-507	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.41	2.15	1.90	1.57	1.32	1.00
C4-5-510	0.13	0.01	0.12	0.00	0.00	7.69	0.39	23.00	0.00	86.00	1.66	10.000	C4-5-510	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	0.65	0.58	0.51	0.42	0.36	0.27
C4-5-511	0.10	0.10	0.00	0.00	0.00	100.00	0.90	43.00	0.00	41.00	1.50	10.000	C4-5-511	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.15	1.02	0.90	0.75	0.63	0.48

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
C4-5-512	0.13	0.13	0.00	0.00	0.00	100.00	0.90	56.00	0.00	87.00	2.40	10.000	**C4-5-512**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.49*	*1.33*	*1.17*	*0.97*	*0.82*	*0.62*
C4-5-514	0.08	0.08	0.00	0.00	0.00	100.00	0.90	36.00	0.00	66.00	1.68	10.000	**C4-5-514**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.92*	*0.82*	*0.72*	*0.60*	*0.50*	*0.38*
C4-5-515	0.11	0.11	0.00	0.00	0.00	100.00	0.90	15.00	0.00	221.00	3.28	10.000	**C4-5-515**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.26*	*1.13*	*0.99*	*0.82*	*0.69*	*0.52*
C4-5-702	0.16	0.16	0.00	0.00	0.00	100.00	0.90	19.00	0.00	92.00	1.65	10.000	**C4-5-702**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.84*	*1.64*	*1.45*	*1.19*	*1.01*	*0.76*
C4-5-801	1.40	1.39	0.01	0.00	0.00	99.29	0.90	80.00	0.00	375.00	6.78	10.000	**C4-5-801**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*15.99*	*14.26*	*12.59*	*10.40*	*8.77*	*6.64*
C4-5-802	1.12	0.37	0.05	0.70	0.00	44.29	0.59	162.00	0.00	378.00	8.64	10.000	**C4-5-802**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.48*	*7.57*	*6.68*	*5.52*	*4.65*	*3.53*
C4-5-803	0.15	0.15	0.00	0.00	0.00	100.00	0.90	47.00	0.00	54.00	1.76	10.000	**C4-5-803**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.72*	*1.54*	*1.36*	*1.12*	*0.94*	*0.72*
C4-5-804	0.03	0.03	0.00	0.00	0.00	100.00	0.90	17.00	0.00	26.00	0.72	10.000	**C4-5-804**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.34*	*0.31*	*0.27*	*0.22*	*0.19*	*0.14*
C4-5-806	0.07	0.07	0.00	0.00	0.00	100.00	0.90	35.00	0.00	40.00	1.31	10.000	**C4-5-806**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.80*	*0.72*	*0.63*	*0.52*	*0.44*	*0.33*
C4-5-808	1.19	0.19	0.03	0.97	0.00	30.64	0.52	33.00	0.00	263.00	4.24	10.000	**C4-5-808**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.88*	*7.03*	*6.20*	*5.13*	*4.32*	*3.27*
C4-5-809	0.20	0.20	0.00	0.00	0.00	100.00	0.90	29.00	0.00	196.00	3.26	10.000	**C4-5-809**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-6-601	2.02	0.94	0.35	0.73	0.00	53.04	0.64	235.00	0.00	94.00	6.48	10.000	**C4-6-601**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*16.53*	*14.75*	*13.02*	*10.76*	*9.07*	*6.87*
C4-7-701	1.58	1.47	0.11	0.00	0.00	93.04	0.86	74.00	0.00	482.00	8.07	10.000	**C4-7-701**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*17.35*	*15.48*	*13.67*	*11.29*	*9.52*	*7.21*
C4-O-201	1.57	1.57	0.00	0.00	0.00	100.00	0.90	163.00	0.00	290.00	7.49	10.000	**C4-O-201**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*18.01*	*16.07*	*14.19*	*11.72*	*9.88*	*7.48*
C5-2-201	0.69	0.55	0.14	0.00	0.00	79.71	0.79	77.00	0.00	110.00	3.18	10.000	**C5-2-201**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.93*	*6.19*	*5.46*	*4.51*	*3.81*	*2.88*
C5-2-202	0.69	0.55	0.14	0.00	0.00	79.71	0.79	78.00	0.00	165.00	3.93	10.000	**C5-2-202**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.93*	*6.19*	*5.46*	*4.51*	*3.81*	*2.88*
C5-2-203	0.65	0.40	0.10	0.15	0.00	65.69	0.71	111.00	0.00	129.00	4.19	10.000	**C5-2-203**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.89*	*5.26*	*4.64*	*3.84*	*3.23*	*2.45*
C5-2-204	0.95	0.53	0.17	0.25	0.00	60.53	0.68	110.00	0.00	159.00	4.56	10.000	**C5-2-204**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.27*	*7.38*	*6.52*	*5.38*	*4.54*	*3.44*
C5-2-205	0.63	0.32	0.09	0.22	0.00	57.08	0.66	106.00	0.00	79.00	3.41	10.000	**C5-2-205**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.33*	*4.76*	*4.20*	*3.47*	*2.93*	*2.22*
C5-2-206	0.72	0.44	0.12	0.16	0.00	65.11	0.71	106.00	0.00	61.00	3.17	10.000	**C5-2-206**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.50*	*5.80*	*5.12*	*4.23*	*3.57*	*2.70*
C5-2-207	1.68	0.99	0.20	0.49	0.00	64.18	0.70	99.00	0.00	226.00	5.21	10.000	**C5-2-207**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*15.06*	*13.43*	*11.86*	*9.80*	*8.26*	*6.26*
C5-2-208	2.00	1.18	0.20	0.62	0.00	64.58	0.71	104.00	0.00	297.00	6.27	10.000	**C5-2-208**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*17.98*	*16.04*	*14.16*	*11.70*	*9.87*	*7.47*
C5-2-209	2.33	1.48	0.10	0.75	0.00	69.31	0.73	61.00	0.00	656.00	10.10	10.102	**C5-2-209**	0.75	3.00	1.25	*12.71*	*11.33*	*10.01*	*8.26*	*6.97*	*5.28*	*21.66*	*19.32*	*17.06*	*14.09*	*11.88*	*9.00*
C5-3-101	0.26	0.26	0.00	0.00	0.00	100.00	0.90	46.00	0.00	90.00	2.22	10.000	**C5-3-101**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.98*	*2.66*	*2.35*	*1.94*	*1.64*	*1.24*
C5-3-102	1.00	0.33	0.12	0.55	0.00	42.90	0.59	64.00	0.00	528.00	8.46	10.000	**C5-3-102**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.48*	*6.67*	*5.89*	*4.86*	*4.10*	*3.11*
C5-3-104	0.89	0.15	0.20	0.54	0.00	27.78	0.50	74.00	0.00	484.00	8.10	10.000	**C5-3-104**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.71*	*5.09*	*4.50*	*3.72*	*3.13*	*2.37*
C5-3-105	0.69	0.18	0.15	0.36	0.00	35.48	0.55	35.00	0.00	477.00	7.14	10.000	**C5-3-105**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.80*	*4.28*	*3.78*	*3.12*	*2.63*	*1.99*
C5-3-106	2.90	0.60	0.68	1.62	0.00	30.74	0.52	286.00	0.00	477.00	12.72	12.716	**C5-3-106**	0.75	3.00	1.25	*11.80*	*10.49*	*9.24*	*7.61*	*6.41*	*4.84*	*17.78*	*15.81*	*13.93*	*11.47*	*9.66*	*7.30*
C5-3-301	0.78	0.61	0.17	0.00	0.00	78.21	0.78	78.00	0.00	126.00	3.41	10.000	**C5-3-301**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.76*	*6.92*	*6.11*	*5.05*	*4.26*	*3.22*
C5-3-302	1.08	0.87	0.21	0.00	0.00	80.56	0.79	157.00	0.00	125.00	5.16	10.000	**C5-3-302**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.92*	*9.74*	*8.60*	*7.10*	*5.99*	*4.54*
C5-3-303	0.55	0.40	0.15	0.00	0.00	72.73	0.75	150.00	0.00	76.00	4.35	10.000	**C5-3-303**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.26*	*4.69*	*4.14*	*3.42*	*2.89*	*2.18*
C5-3-304	0.97	0.86	0.11	0.00	0.00	88.66	0.84	184.00	0.00	69.00	5.01	10.000	**C5-3-304**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.36*	*9.24*	*8.16*	*6.74*	*5.68*	*4.30*
C5-3-305	2.18	1.87	0.31	0.00	0.00	85.78	0.82	80.00	0.00	351.00	6.46	10.000	**C5-3-305**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*22.83*	*20.37*	*17.98*	*14.86*	*12.53*	*9.49*
C5-3-307	3.22	1.17	0.89	1.16	0.00	42.82	0.59	86.00	0.00	584.00	9.70	10.000	**C5-3-307**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*24.04*	*21.45*	*18.94*	*15.65*	*13.20*	*9.99*
C5-3-309	2.89	1.44	1.01	0.44	0.00	52.57	0.64	362.00	0.00	253.00	11.42	11.418	**C5-3-309**	0.75	3.00	1.25	*12.23*	*10.89*	*9.60*	*7.92*	*6.67*	*5.05*	*22.59*	*20.12*	*17.74*	*14.63*	*12.33*	*9.33*
C5-3-310	6.44	5.68	0.61	0.15	0.00	88.62	0.84	409.00	0.00	446.00	15.04	15.036	**C5-3-310**	0.75	3.00	1.25	*11.11*	*9.86*	*8.67*	*7.13*	*5.99*	*4.52*	*59.94*	*53.18*	*46.77*	*38.44*	*32.30*	*24.35*
C5-6-601	2.69	2.51	0.18	0.00	0.00	93.31	0.86	435.00	0.00	167.00	11.89	11.893	**C5-6-601**	0.75	3.00	1.25	*12.07*	*10.74*	*9.47*	*7.81*	*6.57*	*4.97*	*28.02*	*24.94*	*21.99*	*18.12*	*15.26*	*11.54*
C5-6-602	1.60	1.44	0.16	0.00	0.00	90.00	0.85	299.00	0.00	73.00	7.62	10.000	**C5-6-602**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*17.23*	*15.37*	*13.57*	*11.21*	*9.46*	*7.16*
C5-6-603	3.82	3.58	0.09	0.15	0.00	94.42	0.87	362.00	0.00	239.00	11.23	11.231	**C5-6-603**	0.75	3.00	1.25	*12.29*	*10.95*	*9.66*	*7.97*	*6.71*	*5.08*	*40.83*	*36.37*	*32.08*	*26.46*	*22.30*	*16.87*
C5-6-604	2.27	2.07	0.17	0.03	0.00	91.43	0.85	109.00	0.00	445.00	8.36	10.000	**C5-6-604**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*24.67*	*22.01*	*19.44*	*16.06*	*13.54*	*10.25*
C5-6-605	2.58	2.22	0.20	0.16	0.00	87.16	0.83	319.00	0.00	284.00	10.88	10.876	**C5-6-605**	0.75	3.00	1.25	*12.42*	*11.07*	*9.77*	*8.06*	*6.79*	*5.14*	*26.58*	*23.69*	*20.90*	*17.25*	*14.54*	*11.00*
C5-6-606	2.37	1.67	0.42	0.28	0.00	72.59	0.75	75.00	0.00	741.00	11.55	11.547	**C5-6-606**	0.75	3.00	1.25	*12.18*	*10.85*	*9.57*	*7.89*	*6.65*	*5.03*	*21.64*	*19.27*	*16.99*	*14.01*	*11.80*	*8.93*
C5-700	0.83	0.62	0.21	0.00	0.00	74.70	0.76	78.00	0.00	233.00	4.84	10.000	**C5-700**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.05*	*7.18*	*6.34*	*5.24*	*4.42*	*3.34*
C5-7-702	0.67	0.53	0.14	0.00	0.00	79.10	0.79	77.00	0.00	124.00	3.36	10.000	**C5-7-702**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.70*	*5.98*	*5.28*	*4.36*	*3.68*	*2.79*
C5-7-703	0.66	0.53	0.13	0.00	0.00	80.30	0.79	78.00	0.00	124.00	3.39	10.000	**C5-7-703**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.66*	*5.94*	*5.25*	*4.33*	*3.65*	*2.77*
C5-7-704	5.31	4.73	0.53	0.05	0.00	89.25	0.84	90.00	0.00	815.00	12.87	12.867	**C5-7-704**	0.75	3.00	1.25	*11.75*	*10.45*	*9.20*	*7.58*	*6.38*	*4.82*	*52.47*	*46.65*	*41.09*	*33.84*	*28.48*	*21.51*
O7-1-103	29.57	25.06	3.63	0.88	0.00	85.28	0.82	427.00	0.00	1672.00	31.78	31.782	**O7-1-103**	0.75	3.00	1.25	*8.03*	*7.05*	*6.15*	*4.99*	*4.16*	*3.10*	*194.57*	*170.71*	*148.89*	*120.94*	*100.75*	*75.04*
O7-1-104	0.65	0.38	0.27	0.00	0.00	58.46	0.67	86.00	0.00	111.00	3.39	10.000	**O7-1-104**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.56*	*4.96*	*4.38*	*3.62*	*3.05*	*2.31*
O7-1-105	3.66	3.49	0.17	0.00	0.00	95.36	0.87	164.00	0.00	727.00	13.34	13.338	**O7-1-105**	0.75	3.00	1.25	*11.60*	*10.31*	*9.08*	*7.48*	*6.29*	*4.75*	*37.14*	*33.01*	*29.07*	*23.93*	*20.13*	*15.20*
O7-1-107	0.62	0.07	0.55	0.00	0.00	11.29	0.41	32.00	0.00	305.00	4.78	10.000	**O7-1-107**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.26*	*2.91*	*2.56*	*2.12*	*1.79*	*1.35*
O7-1-109	0.58	0.44	0.14	0.00	0.00	75.86	0.77	118.00	0.00	101.00	3.97	10.000	**O7-1-109**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.67*	*5.06*	*4.47*	*3.69*	*3.11*	*2.36*
O7-1-111	0.53	0.43	0.10	0.00	0.00	81.13	0.80	165.00	0.00	91.00	4.88	10.000	**O7-1-111**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.38*	*4.80*	*4.24*	*3.50*	*2.95*	*2.24*
O7-1-502	1.35	1.14	0.21	0.00	0.00	84.44	0.81	249.00	0.00	77.00	6.56	10.000	**O7-1-502**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*14.01*	*12.50*	*11.04*	*9.12*	*7.69*	*5.82*
O7-1-504	1.81	1.68	0.13	0.00	0.00	92.82	0.86	193.00	0.00	108.00	5.73	10.000	**O7-1-504**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*19.85*	*17.71*	*15.64*	*12.92*	*10.89*	*8.25*
O7-1-506	0.03	0.02	0.01	0.00	0.00	66.67	0.72	24.00	0.00	21.00	0.81	10.000	**O7-1-506**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.27*	*0.24*	*0.22*	*0.18*	*0.15*	*0.11*
O7-1-508	0.86	0.77	0.09	0.00	0.00	89.53	0.84	302.00	0.00	18.00	6.95	10.000	**O7-1-508**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*9.23*	*8.24*	*7.27*	*6.01*	*5.07*	*3.84*
O7-1-510	3.74	3.62	0.12	0.00	0.00	96.79	0.88	618.00	0.00	68.00	14.64	14.640	**O7-1-510**	0.75	3.00	1.25	*11.22*	*9.96*	*8.76*	*7.20*	*6.06*	*4.57*	*37.04*	*32.87*	*28.92*	*23.78*	*19.99*	*15.07*
O7-1-511	0.26	0.26	0.00	0.00	0.00	100.00	0.90	68.00	0.00	85.00	2.64	10.000	**O7-1-511**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.98*	*2.66*	*2.35*	*1.94*	*1.64*	*1.24*
C4-O-901	15.96	2.52	0.35	13.09	0.00	30.55	0.52	571.00	0.00	763.00	22.86	22.862	**C4-O-901**	0.75	3.00	1.25	*9.37*	*8.26*	*7.24*	*5.91*	*4.94*	*3.70*	*77.60*	*68.43*	*59.91*	*48.93*	*40.93*	*30.67*
C4-O-903	27.90	4.98	0.00	22.92	0.00	32.64	0.53	1151.00	0.00	1288.00	42.75	42.751	**C4-O-903**	0.75	3.00	1.25	*6.90*	*6.03*	*5.24*	*4.23*	*3.51*	*2.60*	*102.10*	*89.17*	*77.48*	*62.61*	*51.94*	*38.45*
C4-O-912	29.27	10.96	0.00	18.31	0.00	48.70	0.62	1158.00	0.00	916.00	37.95	37.947	**C4-O-912**	0.75	3.00	1.25	*7.35*	*6.43*	*5.59*	*4.53*	*3.76*	*2.79*	*132.98*	*116.36*	*101.26*	*82.00*	*68.15*	*50.57*
C4-O-914	25.88	16.63	0.45	8.80	0.00	70.38	0.74	754.00	0.00	1138.00	31.93	31.929	**C4-O-914**	0.75	3.00	1.25	*8.02*	*7.03*	*6.13*	*4.98*	*4.15*	*3.09*	*152.97*	*134.20*	*117.03*	*95.06*	*79.19*	*58.98*
C4-O-915	60.98	13.94	0.11	46.93	0.00	36.71	0.55	2014.00	0.00	1060.00	58.89	58.889	**C4-O-915**	0.75	3.00	1.25	*5.78*	*5.03*	*4.35*	*3.49*	*2.88*	*2.12*	*194.92*	*169.43*	*146.58*	*117.75*	*97.22*	*71.41*
C4-O-918	10.93	7.83	0.00	3.10	0.00	76.74	0.77	143.00	0.00	1498.00	23.15	23.151	**C4-O-918**	0.75	3.00	1.25	*9.32*	*8.22*	*7.19*	*5.87*	*4.91*	*3.68*	*78.67*	*69.36*	*60.72*	*49.58*	*41.47*	*31.07*
OS-10	9.31	8.88	0.43	0.00	0.00	95.38	0.87	158.00	1091.00	162.00	11.73	11.732	**OS-10**	0.75	3.00	1.25	*12.12*	*10.79*	*9.51*	*7.84*	*6.61*	*5.00*	*98.70*	*87.87*	*77.47*	*63.87*	*53.80*	*40.68*
OS-14	150.57	8.76	1.94	139.87	0.00	22.54	0.47	442.00	2783.00	1755.00	48.68	48.683	**OS-14**	0.75	3.00	1.25	*6.43*	*5.61*	*4.86*	*3.92*	*3.25*	*2.40*	*459.94*	*400.94*	*347.76*	*280.36*	*232.15*	*171.31*
C5-O-901	100.94	14.74	0.00	86.20	0.00	29.97	0.52	321.00	1225.00	2007.00	40.70	40.699	**C5-O-901**	0.75	3.00	1.25	*7.08*	*6.19*	*5.38*	*4.35*	*3.61*	*2.68*	*368.67*	*322.25*	*280.17*	*226.60*	*188.13*	*139.40*
C5-O-902	84.01	10.95	0.00	73.06	0.00	28.69	0.51	472.00	2294.00	0.00	23.23	23.233	**C5-O-902**	0.75	3.00	1.25	*9.30*	*8.20*	*7.18*	*5.86*	*4.90*	*3.67*	*397.60*	*350.50*	*306.84*	*250.54*	*209.55*	*156.98*
C5-O-903	69.66	11.82	0.30	57.54	0.00	31.84	0.53	132.00	1233.00	1431.00	28.86	28.863	**C5-O-903**	0.75	3.00	1.25	*8.42*	*7.40*	*6.46*	*5.25*	*4.38*	*3.27*	*308.40*	*270.97*	*236.61*	*192.51*	*160.58*	*119.83*
C5-O-904	73.85	23.29	0.35	50.21	0.00	43.77	0.59	354.00	1683.00	882.00	28.98	28.977	**C5-O-904**	0.75	3.00	1.25	*8.40*	*7.38*	*6.45*	*5.24*	*4.37*	*3.26*	*366.99*	*322.44*	*281.53*	*229.04*	*191.04*	*142.55*
C4-O-001	118.68	51.51	1.14	66.03	0.00	53.42	0.64	311.00	2177.00	3708.00	68.45	68.446	**C4-O-001**	0.75	3.00	1.25	*5.30*	*4.60*	*3.97*	*3.18*	*2.62*	*1.92*	*405.53*	*351.71*	*303.65*	*243.24*	*200.35*	*146.59*
XS-43	14.97	5.06	1.34	8.57	0.00	44.11	0.59	803.00	0.00	506.00	24.59	24.591	**XS-43**	0.75	3.00	1.25	*9.07*	*7.99*	*6.99*	*5.70*	*4.77*	*3.57*	*80.54*	*70.94*	*62.06*	*50.63*	*42.31*	*31.67*

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
XS-31	48.18	1.33	0.04	46.81	0.00	20.25	0.46	1055.00	0.00	2258.00	53.55	53.551	**XS-31**	0.75	3.00	1.25	*6.10*	*5.31*	*4.60*	*3.70*	*3.06*	*2.25*	*135.92*	*118.31*	*102.49*	*82.48*	*68.20*	*50.21*
XS-40	8.65	0.00	0.62	8.03	0.00	16.71	0.44	396.00	0.00	495.00	15.40	15.400	**XS-40**	0.75	3.00	1.25	*11.01*	*9.77*	*8.59*	*7.06*	*5.93*	*4.47*	*42.19*	*37.42*	*32.91*	*27.03*	*22.71*	*17.12*
XS-37	9.93	2.05	0.25	7.63	0.00	34.48	0.54	660.00	0.00	479.00	21.05	21.053	**XS-37**	0.75	3.00	1.25	*9.71*	*8.58*	*7.52*	*6.15*	*5.15*	*3.86*	*52.12*	*46.02*	*40.33*	*32.98*	*27.62*	*20.72*
XS-33	20.07	3.54	2.49	14.04	0.00	30.23	0.52	892.00	0.00	721.00	29.44	29.436	**XS-33**	0.75	3.00	1.25	*8.34*	*7.32*	*6.39*	*5.20*	*4.34*	*3.24*	*86.52*	*76.00*	*66.35*	*53.96*	*45.00*	*33.57*
TOTAL	1102.03	360.57	42.35	699.11	0.00	44.14	0.59																					

TABLE 2

TABLE 2 - EXISTING CROSS DRAINAGE HYDRAULIC RESULTS									
OUTFALL	NODE	NODE LOCATION	10-YR WSEL	100-YR WSEL	ALLOWABLE HEADWATER			MEETS DRAINAGE CRITERIA	
					MAINLANE	SBFR	NBFR	10-YR	100-YR
O7	O7-O-001	U/S; SBFR, ML	79.72	80.50	82.60	82.28	80.16	YES	YES
C4	C4-400	U/S; NBFR, ML	77.46	78.63	78.79	77.06	76.53	NO	YES
C5	C5-600	U/S; NBFR, ML	71.22	71.80	72.36	70.60	70.50	NO	YES

EXISTING 10-YR

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-O7-O-500	L-O7-O-500	Natural	O7-O-000	C4-O-920	75.79	75.41	1	0	6.01	569.04	0.07	160.06	16.10	1.35	79.72	79.67
L_L-O7-500	L_L-O7-500	Circular	O7-500	O7-O-000	75.72	75.76	3	0	3.00	257.95	-0.02	24.08	15.76	1.17	79.72	79.72
L_L-O7-5-501	L_L-O7-5-501	Circular	O7-5-501	O7-500	76.72	75.72	1	0	1.50	81.47	1.23	9.89	16.00	5.56	79.92	79.72
L_L-O7-O-001	L_L-O7-O-001	Circular	O7-O-001	O7-500	75.52	75.72	3	0	3.00	44.32	-0.45	14.84	15.75	0.87	79.72	79.72
L_L-O7-5-502	L_L-O7-5-502	Circular	O7-5-502	O7-5-501	77.06	76.72	1	0	1.50	14.15	2.40	3.14	15.76	2.98	79.93	79.92
L-O7-5-502.1	L_L-O7-5-502.1	Trapezoidal	O7-5-502	O7-O-002	81.45	82.5	1	100	5.00	70.00	-1.50	0.00	0.00	0.00	0.00	0.00
L_L-O7-5-503	L_L-O7-5-503	Circular	O7-5-503	O7-5-501	77.29	76.72	1	0	1.50	91.17	0.63	6.99	16.00	3.93	80.30	79.92
L_L-O7-O-002	L_L-O7-O-002	Circular	O7-O-002	O7-O-001	76.14	75.52	1	0	2.50	20.90	2.97	14.89	15.75	4.17	79.72	79.72
L_L-O7-5-701	L_L-O7-5-701	Circular	O7-5-701	O7-5-502	77.08	77.08	1	0	1.50	24.95	0.00	1.01	15.76	1.62	79.93	79.93
L_L-O7-4-201 SS	L_L-O7-4-201	Rectangular	O7-4-201	O7-O-000	76.04	75.84	2	4	2.00	115.97	0.17	107.26	16.20	6.67	80.77	79.72
L_L-O7-4-201 RDWY	L_L-O7-4-201	Natural	O7-4-201	O7-O-000	80.48	81.02	1	0	10.00	115.97	-0.47	0.00	0.00	0.00	0.00	0.00
L_L-07-4-202 SS	L_L-O7-4-202	Rectangular	O7-4-202	O7-4-201	76.11	76.04	2	4	2.00	40.48	0.17	100.18	16.03	6.22	80.99	80.77
L_L-07-4-202 RDWY	L_L-O7-4-202	Natural	O7-4-202	O7-4-201	80.24	80.48	1	0	10.00	40.48	-0.59	16.30	16.29	1.71	80.99	80.93
L_L-O7-4-203 SS	L_L-O7-4-203	Circular	O7-4-203	O7-4-202	76.54	76.11	1	0	2.00	296.10	0.17	21.95	15.54	7.10	81.82	80.99
L_L-O7-4-203 RDWY	L_L-O7-4-203	Natural	O7-4-203	O7-4-202	80.36	80.24	1	0	10.00	296.10	0.04	89.79	16.21	2.96	81.82	81.21
L_L-O7-4-401	L_L-O7-4-401	Circular	O7-4-401	O7-4-202	76.5	76.11	1	0	2.00	48.14	0.81	7.25	16.00	2.29	81.01	80.99
L_L-O7-4-204 SS	L_L-O7-4-204	Circular	O7-4-204	O7-4-203	76.77	76.54	1	0	2.00	296.66	0.08	11.08	15.32	3.51	81.94	81.82
L_L-O7-4-204 RDWY	L_L-O7-4-204	Natural	O7-4-204	O7-4-203	80.45	80.36	1	0	10.00	296.66	0.03	62.28	16.17	1.58	81.94	81.82
L_L-O7-4-204 DITCH	L_L-O7-4-204	Natural	O7-4-204	O7-4-203	79.95	79.98	1	0	10.00	296.66	-0.01	24.41	16.17	2.15	81.94	81.82
L_L-O7-4-402 SS	L_L-O7-4-402	Circular	O7-4-402	O7-4-203	76.54	76.48	1	0	1.50	35.41	0.17	8.66	15.41	4.85	81.82	81.82
L_L-O7-4-402 RDWY	L_L-O7-4-402	Trapezoidal	O7-4-402	O7-4-203	80.36	80.33	1	100	5.00	35.41	0.09	12.79	15.99	0.68	81.82	81.82
L_L-O7-4-205	L_L-O7-4-205	Circular	O7-4-205	O7-4-204	76.84	76.77	1	0	2.00	68.46	0.10	16.34	16.00	5.15	82.22	81.94
L_L-07-4-206 SS	L_L-O7-4-206	Circular	O7-4-206	O7-4-204	76.92	76.77	1	0	1.50	194.87	0.08	7.42	19.08	4.16	81.99	81.94
L_L-07-4-206 RDWY	L_L-O7-4-206	Natural	O7-4-206	O7-4-204	80.79	80.45	1	0	10.00	194.87	0.17	45.99	16.22	1.38	81.99	81.94
L_L-07-4-206 DITCH	L_L-O7-4-206	Natural	O7-4-206	O7-4-204	80.47	79.95	1	0	10	194.87	0.267	18.575	16.231	2.1	81.99	81.94
L_L-O7-4-403 SS	L_L-O7-4-403	Circular	O7-4-403	O7-4-204	76.77	76.72	1	0	1.5	30.41	0.164	8.399	19.035	4.71	81.94	81.94
L_L-O7-4-403 RDWY	L_L-O7-4-403	Trapezoidal	O7-4-403	O7-4-204	80.48	80.45	1	100	5	30.41	0.099	13.647	15.996	0.82	81.94	81.94
L_L-O7-4-207 SS	L_L-O7-4-207	Circular	O7-4-207	O7-4-206	77.15	76.92	1	0	1.5	110.45	0.208	6.651	19.176	3.73	82.03	81.99
L_L-O7-4-207 RDWY	L_L-O7-4-207	Natural	O7-4-207	O7-4-206	80.65	80.79	1	0	10	110.45	-0.127	46.713	16.216	1.46	82.03	81.99
L_L-O7-4-207 DITCH	L_L-O7-4-207	Natural	O7-4-207	O7-4-206	80.57	80.47	1	0	10	110.45	0.091	14.374	16.212	1.94	82.03	81.99
L_L-O7-4-404 SS	L_L-O7-4-404	Circular	O7-4-404	O7-4-206	77.5	75.72	1	0	1.5	13.3	13.383	1.713	15.37	0.96	81.99	81.99
L_L-O7-4-404 RDWY	L_L-O7-4-404	Trapezoidal	O7-4-404	O7-4-206	80.78	80.77	1	100	5	13.3	0.075	3.659	15.993	0.09	81.99	81.99
L_L-07-4-208 SS	L_L-O7-4-208	Circular	O7-4-208	O7-4-207	77.19	77.15	1	0	1.5	279.63	0.014	5.853	19.695	3.29	82.13	82.03
L_L-07-4-208 RDWY	L_L-O7-4-208	Natural	O7-4-208	O7-4-207	80.92	80.65	1	0	10	279.63	0.097	46.223	16.197	1.47	82.13	82.03
L_L-07-4-208 DITCH	L_L-O7-4-208	Natural	O7-4-208	O7-4-207	80.7	80.57	1	0	10	279.63	0.046	12.414	16.196	1.74	82.13	82.03
L_L-O7-4-405 SS	L_L-O7-4-405	Circular	O7-4-405	O7-4-207	77.33	77.15	1	0	1.5	32	0.66	9.22	19.8	5.16	82.52	82.52
L_L-O7-4-405 RDWY	L_L-O7-4-405	Trapezoidal	O7-4-405	O7-4-207	81.5	81.47	1	100	5	32	0.1	4.832	16.253	0.81	82.52	82.52
L_L-O7-4-209 SS	L_L-O7-4-209	Circular	O7-4-209	O7-4-208	77.36	77.19	1	0	1.5	371.57	0.046	5.398	20.795	3.04	82.18	82.13
L_L-O7-4-209 RDWY	L_L-O7-4-209	Natural	O7-4-209	O7-4-208	80.48	80.92	1	0	10	371.57	-0.118	40.292	16.178	0.77	82.18	82.13
L_L-O7-4-209 DITCH	L_L-O7-4-209	Natural	O7-4-209	O7-4-208	80.34	80.7	1	0	10	371.57	-0.097	9.91	16.167	1.18	82.18	82.13
L_L-O7-4-406 SS	L_L-O7-4-406	Circular	O7-4-406	O7-4-208	78.02	77.19	1	0	1.5	29.6	2.804	6.215	19.72	3.49	82.13	82.13
L_L-O7-4-406 RDWY	L_L-O7-4-406	Trapezoidal	O7-4-406	O7-4-208	81	80.92	1	100	5	29.6	0.034	11.617	15.928	0.87	82.13	82.13
L_L-O7-4-210 SS	L_L-O7-4-210	Circular	O7-4-210	O7-4-209	77.4	77.36	1	0	1.5	207.43	0.005	5.148	20.993	2.9	82.20	82.18
L_L-O7-4-210 RDWY	L_L-O7-4-210	Natural	O7-4-210	O7-4-209	80.57	80.48	1	0	10	207.43	0.043	42.644	16.054	0.85	82.20	82.18
L_L-O7-4-407 SS	L_L-O7-4-407	Circular	O7-4-407	O7-4-209	77.95	77.36	1	0	1.5	64.6	0.913	6.427	15.138	3.62	82.18	82.18
L_L-O7-4-407 RDWY	L_L-O7-4-407	Trapezoidal	O7-4-407	O7-4-209	80.72	80.71	1	100	5	64.6	0.015	10.112	15.828	0.54	82.18	82.18
L_L-O7-4-211 SS	L_L-O7-4-211	Circular	O7-4-211	O7-4-210	77.43	77.4	1	0	1.5	119.28	0.05	8.638	15.609	4.82	82.49	82.20
L_L-O7-4-211 RDWY	L_L-O7-4-211	Trapezoidal	O7-4-211	O7-4-210	82.22	82.21	1	100	5	119.28	0.008	22.577	15.974	1.2	82.49	82.30
L_L-O7-4-212 SS	L_L-O7-4-212	Circular	O7-4-212	O7-4-210	77.42	77.4	1	0	1.5	233.59	0.021	-2.13	15.203	-1.24	82.20	82.20
L_L-O7-4-212 RDWY	L_L-O7-4-212	Natural	O7-4-212	O7-4-210	80.36	80.57	1	0	10	233.59	-0.09	11.987	16.225	-0.36	82.20	82.20
L_L-O7-4-408 SS	L_L-O7-4-408	Circular	O7-4-408	O7-4-210	76.95	77.4	1	0	1.5	59.27	-0.759	3.058	20.992	1.72	82.20	82.20
L_L-O7-4-408 RDWY	L_L-O7-4-408	Trapezoidal	O7-4-408	O7-4-210	81.22	81.16	1	100	5	59.27	0.101	6.668	16.203	0.17	82.20	82.20
L_L-O7-4-409 SS	L_L-O7-4-409	Circular	O7-4-409	O7-4-212	77.47	77.42	2	0	1.5	22.32	0.224	3.133	21.196	0.88	82.20	82.20
L_L-O7-4-409 RDWY	L_L-O7-4-409	Trapezoidal	O7-4-409	O7-4-212	80.37	80.36	1	100	5	28	0.036	13.125	16.004	0.23	82.20	82.20
L_L-O7-8-601 SS	L_L-O7-8-601	Rectangular	O7-8-601	O7-O-000	75.92	75.87	2	4	2	94.14	0.053	40.456	15.752	2.52	79.76	79.72
L_L-O7-8-601 RDWY	L_L-O7-8-601	Natural	O7-8-601	O7-O-000	80.57	81.02	1	0	10	94.14	-0.478	0	0	0	0.00	0.00

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-O7-8-602 SS	L_L-O7-8-602	Circular	O7-8-602	O7-8-601	75.99	75.92	2	0	2	94.12	0.074	39.363	15.656	6.24	79.88	79.76
L_L-O7-8-602 RDWY	L_L-O7-8-602	Natural	O7-8-602	O7-8-601	80.72	80.57	1	0	10	94.12	0.159	0	0	0	0.00	0.00
L_L-O7-8-602 DITCH	L_L-O7-8-602	Natural	O7-8-602	O7-8-601	79.09	78.72	1	0	10	94.12	0.393	12.323	16.438	3.07	79.88	79.76
L_L-O7-8-801	L_L-O7-8-801	Circular	O7-8-801	O7-8-601	76.5	75.92	1	0	1.5	26.19	2.215	0.96	15.753	1.98	79.76	79.76
L-L-O7-8-505 SS	L_L-O7-8-505	Circular	O7-8-505	O7-8-602	77.07	75.99	1	0	1.5	230.35	0.469	8.993	15.46	5.06	80.58	79.88
L-L-O7-8-505 RDWY	L_L-O7-8-505	Trapezoidal	O7-8-505	O7-8-602	83.52	83.32	1	100	5	230.35	0.087	0	0	0	0.00	0.00
L_L-O7-8-603 SS	L_L-O7-8-603	Circular	O7-8-603	O7-8-602	76.01	75.99	2	0	2	242.72	0.004	25.934	15.654	4.11	80.49	79.88
L_L-O7-8-603 RDWY	L_L-O7-8-603	Natural	O7-8-603	O7-8-602	79.81	80.72	1	0	10	242.72	-0.375	0	0	0	0.00	0.00
L_L-O7-8-603 DITCH	L_L-O7-8-603	Natural	O7-8-603	O7-8-602	80.22	79.09	1	0	10	242.72	0.466	1.156	16.113	0.73	80.49	79.88
L_L-O7-8-504 SS	L_L-O7-8-504	Circular	O7-8-504	O7-8-505	76.06	76.82	1	0	2	184.31	-0.412	2.142	16.304	-0.86	80.59	80.58
L_L-O7-8-504 RDWY	L_L-O7-8-504	Natural	O7-8-504	O7-8-505	80.28	80.54	1	0	10	184.31	-0.141	0.314	16.109	0.18	80.59	80.58
L-O7-8-504.1	L_L-O7-8-504.1	Trapezoidal	O7-8-504	O7-5-503	80.21	80.7	1	100	5	10	-4.9	0	0	0	80.59	80.58
L-O7-8-504.2	L_L-O7-8-504.2	Natural	O7-8-504	O7-5-502	80.21	81.45	1	0	0	128	-0.969	0	0	0	0.00	0.00
L_L-O7-8-507 SS	L_L-O7-8-506	Circular	O7-8-506	O7-8-505	77.35	76.82	1	0	2	151.18	0.351	7.435	15.452	2.9	80.61	80.58
L_L-O7-8-507 RDWY	L_L-O7-8-506	Natural	O7-8-506	O7-8-505	80.34	80.54	1	0	10	151.18	-0.132	0.483	16.044	0.3	80.61	80.58
L_L-O7-8-604 SS	L_L-O7-8-604	Circular	O7-8-604	O7-8-603	76.5	76.01	2	0	2	158.98	0.006	21.364	15.368	3.36	80.50	80.49
L_L-O7-8-604 RDWY	L_L-O7-8-604	Natural	O7-8-604	O7-8-603	79.54	79.81	1	0	10	158.98	-0.17	8.6	15.826	1.03	80.50	80.49
L_L-O7-8-604 DITCH	L_L-O7-8-604	Natural	O7-8-604	O7-8-603	81.16	80.22	1	0	10	158.98	0.591	0	0	0	0.00	0.00
L_L-O7-8-803 SS	L_L-O7-8-803	Circular	O7-8-803	O7-8-603	76.97	76.01	1	0	1	24.21	3.965	4.947	15.546	6.22	80.49	80.49
L_L-O7-8-511 RDWY.1	L_L-O7-8-803	Trapezoidal	O7-8-803	O7-8-603	79.81	79.79	1	100	5	24.21	0.083	16.726	16.001	0.95	80.49	80.49
L_L-O7-8-508 SS	L_L-O7-8-508	Circular	O7-8-508	O7-8-506	77.1	77.32	1	0	1.5	52.9	-0.416	2.265	17.029	1.27	80.61	80.61
L_L-O7-8-508 RDWY	L_L-O7-8-508	Trapezoidal	O7-8-508	O7-8-506	80.22	80.17	1	50	10	52.9	0.095	-4.172	16.004	-0.2	80.61	80.61
L_L-O7-8-605 SS	L_L-O7-8-605	Circular	O7-8-605	O7-8-604	76.13	76.5	2	0	2	56.45	0.213	17.957	15.361	2.79	80.50	80.50
L_L-O7-8-605 RDWY	L_L-O7-8-605	Natural	O7-8-605	O7-8-604	79.14	79.54	1	0	10	56.45	-0.709	8.136	15.743	0.76	80.50	80.50
L_L-O7-8-509 SS	L_L-O7-8-509	Circular	O7-8-509	O7-8-508	77.37	77.1	1	0	1.5	50.73	0.532	1.35	15.436	1.01	80.61	80.61
L_L-O7-8-509 RDWY	L_L-O7-8-509	Trapezoidal	O7-8-509	O7-8-508	80.22	80.17	1	50	5	50.73	0.099	-9.169	16.027	-0.43	80.61	80.61
L_L-O7-8-510	L_L-O7-8-510	Circular	O7-8-510	O7-8-605	76.13	75.72	1	0	2	183.18	0.224	8.929	15.335	2.84	80.55	80.50
L_L-O7-8-804 SS	L_L-O7-8-804	Circular	O7-8-804	O7-8-605	76.19	76.13	1	0	2	94.31	0.064	9.687	15.362	3.08	80.50	80.50
L_L-O7-8-804 RDWY	L_L-O7-8-804	Natural	O7-8-804	O7-8-605	79.03	79.14	1	0	10	94.31	-0.117	6.184	15.574	0.79	80.50	80.50
L_L-O7-8-511 SS	L_L-O7-8-511	Circular	O7-8-511	O7-8-510	76.47	75.72	1	0	1	21.23	3.533	3.415	15.365	4.29	80.55	80.55
L_L-O7-8-511 RDWY	L_L-O7-8-511	Trapezoidal	O7-8-511	O7-8-510	79.33	79.31	1	100	5	21.23	0.094	20.758	16.017	0.52	80.55	80.55
O7-8-511.1 RD	L_L-O7-8-511.1	Natural	O7-8-511	O7-8-509	79.8	80.05	1	0	0	98.4	-0.254	-12.315	16.02	-1.31	80.55	80.61
L_L-O7-8-512 SS	L_L-O7-8-512	Circular	O7-8-512	O7-8-510	75.88	75.72	1	0	1.5	146.6	0.109	5.997	15.337	3.37	80.54	80.55
L_L-O7-8-512 RDWY	L_L-O7-8-512	Natural	O7-8-512	O7-8-510	79.3	79.11	1	0	10	146.6	0.13	-15.598	16.035	0.84	80.54	80.55
L_L-O7-8-805 SS	L_L-O7-8-805	Circular	O7-8-805	O7-8-804	76.42	76.17	1	0	1.25	24.46	1.022	6.466	15.364	5.23	80.50	80.50
L_L-O7-8-805 RDWY	L_L-O7-8-805	Trapezoidal	O7-8-805	O7-8-804	79.3	79.28	1	100	5	24.46	0.082	14.94	15.771	0.73	80.50	80.50
L_L-O7-8-806 SS	L_L-O7-8-806	Circular	O7-8-806	O7-8-804	76.44	76.17	1	0	1.5	235.32	0.115	3.247	15.41	1.83	80.48	80.50
L_L-O7-8-806 RDWY	L_L-O7-8-806	Natural	O7-8-806	O7-8-804	79.57	79.03	1	0	10	235.32	0.229	-16.166	16.064	-0.61	80.48	80.50
L_L-O7-8-513	L_L-O7-8-513	Circular	O7-8-513	O7-8-512	76.81	76.4	1	0	1.5	45.64	0.898	2.142	15.752	2.95	80.56	80.54
L_L-O7-8-514 SS	L_L-O7-8-514	Circular	O7-8-514	O7-8-512	76.5	76	1	0	1.5	105.96	0.472	4.65	15.328	2.62	80.53	80.54
L_L-O7-8-514 RDWY	L_L-O7-8-514	Natural	O7-8-514	O7-8-512	79.6	79.3	1	0	10	105.96	0	-16.702	16.056	0.78	80.53	80.54
L_L-07-8-807 SS	L_L-O7-8-807	Circular	O7-8-807	O7-8-806	76.36	76.44	1	0	1.5	98.5	-0.081	3.085	15.413	1.73	80.44	80.48
L_L-07-8-807 RDWY	L_L-O7-8-807	Natural	O7-8-807	O7-8-806	79.72	79.57	1	0	10	98.5	0.152	-15.505	16.089	-1.04	80.44	80.48
L_L-O7-O-003	L_L-O7-O-003	Circular	O7-O-003	O7-8-513	76.79	76.81	1	0	1.5	8.6	-0.233	1.008	15.501	2.86	80.56	80.56
INTERSECTION AT E. LITTLE YORK RD	INTERSECTION AT E. LITTLE YORK RD	Trapezoidal	O7-8-515	O7-8-807	80.23	80.22	1	165	10	178	0	14.033	15.988	0.57	80.46	80.44
L_L-O7-8-515 SS	L_L-O7-8-515	Circular	O7-8-515	O7-8-514	77.02	76.5	1	0	1.5	108.1	0.481	4.093	15.329	2.31	80.46	80.53
L_L-O7-8-515 RDWY	L_L-O7-8-515	Natural	O7-8-515	O7-8-514	79.85	79.6	1	0	10	108.1	0.231	-17.427	16.066	-1.25	80.46	80.53
L_L-O7-O-501	L_L-O7-O-501	Circular	O7-O-501	O7-8-514	77.22	76.62	1	0	1.5	62.09	0.966	-0.489	18.656	1.67	80.53	80.53
L_L-O7-8-808	L_L-O7-8-808	Circular	O7-8-808	O7-8-807	76.72	76.52	1	0	1.5	15.18	1.318	1.095	15.75	0.61	80.44	80.44
L_L-O7-8-809 SS	L_L-O7-8-809	Circular	O7-8-809	O7-8-807	76.17	76.36	1	0	1.5	38.26	0.209	-4.114	16.036	-2.3	80.39	80.44
L_L-O7-8-809 RDWY	L_L-O7-8-809	Natural	O7-8-809	O7-8-807	79.62	79.72	1	0	10	38.26	-0.261	-27.259	16.118	-2.16	80.39	80.44
L-O7-8-809.1 RDWY	L_L-O7-8-809.1	Natural	O7-8-809	C4-2-210	79.58	78.72	1	0	0	535	0.228	35.349	16.122	2.22	80.39	79.75
L_L-O7-8-516 SS	L_L-O7-8-516	Circular	O7-8-516	O7-8-515	77.12	77.02	1	0	1.5	221.59	0.045	-2.743	15.659	-1.54	80.40	80.46
L_L-O7-8-516 RDWY	L_L-O7-8-516	Natural	O7-8-516	O7-8-515	79.18	79.85	1	0	10	221.59	-0.302	-18.377	16.156	-1.09	80.40	80.46
L-O7-8-516.1 RDWY	L_L-O7-8-516.1	Natural	O7-8-516	C4-3-311	79.81	79.28	1	0	0	297	0.178	14.283	16.173	1.1	80.40	80.34

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-O7-8-516.1 DITCH	L_L-O7-8-516.1	Trapezoidal	O7-8-516	C4-3-311	79.31	78.65	1	0	0.5	297	0.222	7.599	16.202	2.29	80.40	80.34
L_L-O7-8-802	L_L-O7-8-802	Circular	O7-8-802	O7-8-602	76.72	75.99	1	0	1.5	31.57	2.312	1.095	16.001	0.61	79.88	79.88
L_L-O7-8-507	L_L-O7-8-507	Circular	O7-8-507	O7-8-506	77.44	77.39	1	0	1.5	4.326	1.156	9.748	15.751	5.48	80.64	80.61
Link1348	Link1348	Trapezoidal	Node1273	O7-4-408	79.72	79.22	1	12	8	120	0.417	-2.246	15.133	-0.28	82.20	82.20
Link1349	Link1349	Trapezoidal	Node1275	O7-4-211	80.22	79.22	1	12	2	250	0.4	-8	15.544	-0.35	82.49	82.49
O7-1-101 SS	L_L-O7-1-101	Circular	O7-1-101	O7-O-004	74.57	74.47	1	0	5	106.383	0.094	189.123	16.256	10.74	79.03	78.40
O7-1-101 RD	L_L-O7-1-101	Trapezoidal	O7-1-101	O7-O-004	80.8	81	1	100	0.16	106.4	-0.188	0	0	0	0.00	0.00
O7-1-102 SS	L_L-O7-1-102	Circular	O7-1-102	O7-1-101	74.62	74.57	1	0	5	77.154	0.065	189.115	16.254	9.96	79.44	79.03
O7-1-102 RD	L_L-O7-1-102	Trapezoidal	O7-1-102	O7-1-101	81.9	80.8	1	100	5	77.2	1.425	0	0	0	0.00	0.00
O7-1-103 SS	L_L-O7-1-103	Circular	O7-1-103	O7-1-102	74.82	74.62	1	0	5	215.827	0.093	189.114	16.252	9.43	80.52	79.44
O7-1-103 RD	L_L-O7-1-103	Trapezoidal	O7-1-103	O7-1-102	81.06	81.9	1	100	5	215.8	-0.389	0	0	0	0.00	0.00
O7-1-104 SS	L_L-O7-1-104	Rectangular	O7-1-104	O7-1-103	74.92	74.82	1	5	3	125.639	0.08	70.317	16.369	4.67	80.81	80.52
O7-1-104 RD	L_L-O7-1-104	Trapezoidal	O7-1-104	O7-1-103	79.9	81.06	1	100	5	33	-3.515	0	0	0	80.81	80.52
L_L-O7-1-105	L_L-O7-1-105	Circular	O7-1-105	O7-1-104	75.76	74.92	1	0	1.5	92.051	0.913	23.636	16.001	13.04	85.02	80.81
L_L-O7-1-106	L_L-O7-1-106	Rectangular	O7-1-106	O7-1-104	75.02	74.92	1	5	3	104.544	0.096	43.985	15.613	2.92	80.84	80.81
L_L-O7-1-107	L_L-O7-1-107	Circular	O7-1-107	O7-1-106	76.67	75.02	1	0	1.5	20	8.25	5.451	15.318	7.27	80.84	80.84
L_L-O7-1-108	L_L-O7-1-108	Rectangular	O7-1-108	O7-1-106	75.07	75.02	1	5	3	67.799	0.074	41.918	15.614	2.79	80.85	80.84
L_L-O7-1-109	L_L-O7-1-109	Circular	O7-1-109	O7-1-108	75.12	75.07	1	0	1.5	9.636	0.519	18.537	16.743	10.35	80.81	80.85
L-O7-1-109.1	L_L-O7-1-109.1	Trapezoidal	O7-1-109	O7-1-104	79.8	79.9	1	100	5	169.9	-0.059	24.956	16.347	0.71	80.81	80.81
L_L-O7-1-110	L_L-O7-1-110	Rectangular	O7-1-110	O7-1-108	75.82	75.07	1	5	3	131.274	0.571	48.835	15.796	3.25	80.91	80.85
L_L-O7-1-111	L_L-O7-1-111	Circular	O7-1-111	O7-1-110	75.85	75.82	1	0	1.5	13.212	0.227	-6.449	16.267	-3.6	80.87	80.91
L-O7-1-111.1	L_L-O7-1-111.1	Natural	O7-1-111	O7-1-109	80.4	79.8	1	0	0	131.9	0.455	13.598	16.22	1.13	80.87	80.81
L_L-O7-1-501	L_L-O7-1-501	Rectangular	O7-1-501	O7-1-110	75.92	75.82	1	5	3	164.864	0.061	45.68	15.825	3.04	81.03	80.91
L_L-O7-1-502	L_L-O7-1-502	Circular	O7-1-502	O7-1-501	76.26	75.92	1	0	1.5	9.636	3.528	10.628	15.924	5.93	81.09	81.03
L-O7-1-502.1	L_L-O7-1-502.1	Natural	O7-1-502	O7-1-111	80.8	80.4	1	0	0	165	0.242	4.733	16.182	1.07	81.09	80.87
L_L-O7-1-503	L_L-O7-1-503	Rectangular	O7-1-503	O7-1-501	75.97	75.92	1	5	3	209.321	0.024	37.071	15.808	2.46	81.11	81.03
L_L-O7-1-504	L_L-O7-1-504	Circular	O7-1-504	O7-1-503	76.03	75.97	1	0	1.5	8.911	0.673	11.287	15.739	6.3	81.16	81.11
L-O7-1-504.1	L_L-O7-1-504.1	Natural	O7-1-504	O7-1-502	80.4	80.8	1	0	0	209.7	-0.191	6.902	16.16	0.78	81.16	81.09
L_L-O7-1-505	L_L-O7-1-505	Rectangular	O7-1-505	O7-1-503	76.39	75.97	1	5	3	98.099	0.428	27.48	15.825	1.83	81.13	81.11
L_L-O7-1-506	L_L-O7-1-506	Circular	O7-1-506	O7-1-505	76.55	76.39	1	0	1.5	9.265	1.727	6.809	16.02	3.8	81.16	81.13
L-O7-1-506.1	L_L-O7-1-506.1	Natural	O7-1-506	O7-1-504	80.7	80.4	1	0	0	98.1	0.306	5.169	16.193	0.58	81.16	81.16
L_L-O7-1-507	L_L-O7-1-507	Rectangular	O7-1-507	O7-1-505	76.79	76.39	1	5	3	97.161	0.412	25.124	15.723	2.2	81.14	81.13
L_L-O7-1-508	L_L-O7-1-508	Circular	O7-1-508	O7-1-507	76.83	76.79	1	0	1.5	10.444	0.383	13.398	15.767	7.5	81.22	81.14
L-O7-1-508.1	L_L-O7-1-508.1	Natural	O7-1-508	O7-1-506	80.44	80.7	1	0	0	96.5	-0.269	11.482	16.124	1.2	81.22	81.16
L_L-O7-1-509	L_L-O7-1-509	Circular	O7-1-509	O7-1-507	76.99	76.79	1	0	2	79.716	0.251	15.247	15.542	4.84	81.21	81.14
L_L-O7-1-510	L_L-O7-1-510	Circular	O7-1-510	O7-1-509	77.47	76.99	1	0	1.5	16.271	2.95	16.596	16.725	9.33	81.24	81.21
L-O7-1-510.1	L_L-O7-1-510.1	Natural	O7-1-510	O7-1-508	80.37	80.44	1	0	0	80	-0.087	15.985	16.079	1.67	81.24	81.22
L_L-O7-1-511	L_L-O7-1-511	Circular	O7-1-511	O7-1-509	76.92	76.99	1	0	1.5	158.332	0.044	6.034	16.718	3.38	81.24	81.21
L-O7-1-511.1	L_L-O7-1-511.1	Natural	O7-1-511	O7-1-510	81	80.37	1	0	0	160.3	0.393	-1.885	15.894	-0.27	81.24	81.24
O7-1-511.1 RD	L_L-O7-1-511.2	Trapezoidal	O7-1-511	O7-O-002	81	82.6	1	100	5	45	-3.556	0	0	0	81.24	81.24
L-C4-O-920	L-C4-O-920	Natural	C4-O-920	C4-O-919	75.41	75.2	1	0	4.7	452	0.046	149.119	16.215	1.54	79.67	79.61
L-C4-O-919	L-C4-O-919	Natural	C4-O-919	C4-O-918	75.2	73.35	1	0	3.839	482.43	0.383	136.325	16.224	0.86	79.61	79.60
L-C4-O-918	L-C4-O-918	Natural	C4-O-918	C4-O-917	73.35	74.62	1	0	6.07	311.89	-0.407	157.822	16.267	1.19	79.60	79.59
L-C4-O-917	L-C4-O-917	Natural	C4-O-917	C4-O-916	74.62	74.25	1	0	4.239	274.66	0.135	130.359	16.646	-0.13	79.59	79.59
L-C4-O-917.1	L-C4-O-917.1	Trapezoidal	C4-O-917	C4-O-917.1	78	80	1	30	3	670	-0.299	0	0	0	79.59	80.00
L-C4-O-916	L-C4-O-916	Natural	C4-O-916	C4-O-915	74.25	73.11	1	0	6.25	12.8	8.906	123.199	16.746	-0.49	79.59	79.59
L-C4-O-915 B1	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	72.92	1	5	3	778.4	0.101	52.773	16.933	3.5	79.59	78.34
L-XS-13-B2	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	73.24	1	5	3	778.4	0.06	52.756	16.933	3.5	79.59	78.34
L-XS-13-CHANNEL	L-C4-O-915	Trapezoidal	C4-O-915	C4-O-914	78.32	78.3	1	50	10	778.4	0.242	112.405	16.996	0.81	79.59	78.71
L-C4-O-914	L-C4-O-914	Natural	C4-O-914	C4-O-913	72.92	73.67	1	0	5.39	464.81	-0.161	223.234	16.845	3.23	78.34	77.99
L-C4-O-914.1	L-C4-O-914.1	Trapezoidal	C4-O-914	C4-O-914.1	77	78	1	80	2	424	-0.236	49.995	16.919	0.63	78.34	78.31
L-C4-O-913	L-C4-O-913	Natural	C4-O-913	C4-O-912	73.67	72.25	1	0	5.39	481.28	0.295	216.401	16.981	0.29	77.99	77.99
L-C4-O-912 B1	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.25	72.28	1	4	3	75.02	-0.04	72.072	15.988	6.32	77.99	77.98
L-XS-10.4-B2	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.3	72.27	1	4	3	75.02	0.04	72.086	15.985	6.27	77.99	77.98
L-XS-10.4-SPILL	L-C4-O-912	Natural	C4-O-912	C4-O-911	77.5	76	1	10	0.05	75.02	1.999	212.458	17.492	0.91	77.99	77.98
L-C4-O-907	L-C4-O-907	Natural	C4-O-907	C4-O-906	72.13	72.09	1	0	5.2	35.01	0.114	81.518	19.855	2.52	77.86	77.86

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-C4-O-907.1	L-C4-O-907.1	Natural	C4-O-907	C4-O-907.1	75	77	1	115	2.5	360	-0.556	57.114	17.36	0.14	77.86	77.86
L-C4-O-911	L-C4-O-911	Natural	C4-O-911	C4-O-910	72.27	72.59	1	0	5.62	312.14	-0.103	263.751	16.855	0.47	77.98	77.98
L-C4-O-910	L-C4-O-910	Natural	C4-O-910	C4-O-909	72.59	71.69	1	0	4.539	409.86	0.22	212.426	16.849	0.27	77.98	77.98
L-C4-O-910.1	L-C4-O-910.1	Natural	C4-O-910	C5-O-902	77.5	75.5	1	0	0	1490	0.134	25.489	17.878	0.49	77.98	76.30
L-C4-O-909.1	L-C4-O-909.1	Natural	C4-O-909	C4-O-909.1	76	77.5	1	0	0	200	-0.75	79.59	16.863	0.26	77.98	77.98
L-C4-O-909 CULV	L-C4-O-909	Rectangular	C4-O-909	C4-O-908	71.69	71.64	1	2	4	45.64	0.1	46.413	26.774	5.85	77.98	77.87
L-C4-O-909 SPILL	L-C4-O-909	Trapezoidal	C4-O-909	C4-O-908	76	75.9	1	5	5	45.64	0.219	98.996	17.482	2.23	77.98	77.87
L-C4-O-906	L-C4-O-906	Natural	C4-O-906	C4-O-905	72.09	71.65	1	0	6.56	96.36	0.457	81.559	19.858	1.76	77.86	77.86
Link1404	Link1404	Trapezoidal	C4-O-903	C4-2-203	77.5	77	1	45	3	200	0.355	-32.638	16.203	-1.12	77.75	77.84
L-C4-O-903 PIPE	L-C4-O-903	Circular	C4-O-903	C4-O-902	71.3	70.97	1	0	4	43.33	0.762	107.87	18.167	8.56	77.58	77.54
L-C4-O-903 RDWY	L-C4-O-903	Trapezoidal	C4-O-903	C4-O-902	77.7	77.1	1	35	2	43.33	1.385	0	0	0	77.58	77.54
L-C4-O-902 PIPE	L-C4-O-902	Circular	C4-O-902	C4-O-901	70.67	70.43	1	0	4	520.37	0.046	101.007	18.165	8.08	77.54	77.49
L-C4-O-902 RDWY	L-C4-O-902	Trapezoidal	C4-O-902	C4-O-901	77	76.5	1	35	2	520.37	0.096	27.159	17.209	1.65	77.54	77.49
L-C4-O-901 PIPE	L-C4-O-901	Circular	C4-O-901	C4-O-900	70.43	70.39	1	0	4	143.16	0	137.178	17.48	10.8	77.49	77.46
L-C4-O-901 RDWY	L-C4-O-901	Trapezoidal	C4-O-901	C4-O-900	76.6	76.4	1	35	5	143.16	0.14	59.78	16.379	2.04	77.49	77.46
L-C4-O-900	L-C4-O-900	Trapezoidal	C4-O-900	C4-400	70.39	69.51	1	10	6	63	1.397	148.733	17.438	2.65	77.46	77.46
L-C4-O-908	L-C4-O-908	Natural	C4-O-908	C4-O-907	71.64	72.13	1	0	5.58	239.72	-0.204	114.289	17.639	1.43	77.87	77.86
L-C4-O-904	L-C4-O-904	Natural	C4-O-904	C4-O-903	71.4	71.3	1	0	6.56	86.1	0.116	81.677	19.866	2.39	77.57	77.58
L-C4-O-905 PIPE	L-C4-O-905	Circular	C4-O-905	C4-O-904	71.65	71.4	1	0	3	48.45	0.516	73.015	22.481	10.29	77.86	77.57
L-C4-O-905 RDWY	L-C4-O-905	Trapezoidal	C4-O-905	C4-O-904	77.4	77	1	10	1	48.45	0.826	25.723	18.145	4.81	77.86	77.57
L-C5-O-902.1	L-C5-O-902.1	Trapezoidal	C5-O-902	C6-O-902.1	75.5	76.5	1	24	5	520	-0.192	0	0	0	76.30	76.50
L-C5-O-902 SS	L-C5-O-902	Rectangular	C5-O-902	C5-O-903	67.11	65.61	2	6	6	1800	0.083	275.944	19.086	4.19	76.30	75.28
L-C5-O-902 RD	L-C5-O-902	Trapezoidal	C5-O-902	C5-O-903	75.6	74	1	54	5	1800	0.083	92.932	16.461	1.62	76.30	75.28
L-C5-O-901.1	L-C5-O-901.1	Trapezoidal	C5-O-901	C6-O-901	76.5	75.5	1	80	5	2100	0.024	95.142	16.758	0.97	77.22	77.06
L-C5-O-901 SS	L-C5-O-901	Rectangular	C5-O-901	C5-O-902	68.8	67.11	1	7	6	1950	0.087	136.856	18.936	3.73	77.22	76.30
L-C5-O-901 RD	L-C5-O-901	Trapezoidal	C5-O-901	C5-O-902	77	75.5	1	54	5	1950	0.026	12.384	16.809	0.45	77.22	76.30
Link1367	Link1367	Natural	C4-O-000	Node1294	69.5	71.13	1	0	5.9	32.97	-4.944	314.493	16.026	2.62	77.37	77.36
803.1	L_L-C4-700	Rectangular	C4-700	C4-O-000	69.5	69.5	2	6	5	58.4	0	310.272	15.859	5.16	77.43	77.37
803.1.1	L_L-C4-700	Trapezoidal	C4-700	C4-O-000	76.5	76.4	1	50	5	58.4	0	166.692	16.289	3.1	77.43	77.37
L_L-C4-3-301 SS	L_L-C4-3-301	Rectangular	C4-3-301	C4-700	70.32	69.72	1	5	3	174.74	0.343	118.184	15.693	7.85	77.58	77.43
L_L-C4-3-301 RDWY	L_L-C4-3-301	Natural	C4-3-301	C4-700	76.25	76.26	1	0	10	174.74	-0.006	63.911	16.266	2.77	77.58	77.43
L_L-C4-3-301 DITCH	L_L-C4-3-301	Trapezoidal	C4-3-301	C4-700	74.69	74.47	1	0	1	174.74	0	139.21	16.181	2.56	77.58	77.43
L_L-C4-600	L_L-C4-600	Rectangular	C4-600	C4-700	69.51	69.5	2	6	5	282.94	0.004	192.24	17.44	3.2	77.44	77.43
L_L-C4-7-701 SS	L_L-C4-7-701	Circular	C4-7-701	C4-700	70.81	69.72	1	0	2	263.53	0.414	8.435	15.656	2.66	77.43	77.43
L_L-C4-7-701 RDWY	L_L-C4-7-701	Natural	C4-7-701	C4-700	74.6	76.26	1	0	10	263.53	-0.63	7.116	16.15	0.22	77.43	77.43
L_L-C4-3-302 SS	L_L-C4-3-302	Rectangular	C4-3-302	C4-3-301	71.27	70.32	1	5	3	293.71	0.323	83.975	15.444	5.58	77.73	77.58
L_L-C4-3-302 RDWY	L_L-C4-3-302	Natural	C4-3-302	C4-3-301	75.88	76.25	1	0	10	293.71	0	84.437	16.192	2.71	77.73	77.58
L_L-C4-3-302 DITCH	L_L-C4-3-302	Trapezoidal	C4-3-302	C4-3-301	75.25	74.69	1	0	1	293.71	0	89.134	16.163	1.78	77.73	77.58
L_L-C4-2-201 SS	L_L-C4-2-201	Circular	C4-2-201	C4-600	70.81	70.51	1	0	3	180.14	0.167	50.691	15.757	7.13	77.63	77.44
L_L-C4-2-201 RDWY	L_L-C4-2-201	Natural	C4-2-201	C4-600	76.27	76.44	1	0	10	180.14	-0.094	68.336	16.192	3.14	77.63	77.44
L_L-C4-400	L_L-C4-400	Rectangular	C4-400	C4-600	69.51	69.5	2	6	5	67.76	0.015	159.575	17.44	2.66	77.46	77.44
L_L-C4-6-601 SS	L_L-C4-6-601	Circular	C4-6-601	C4-600	70.84	70.51	1	0	2	231.98	0.142	-12.715	15.989	-4	76.92	77.44
L_L-C4-6-601 RDWY	L_L-C4-6-601	Natural	C4-6-601	C4-600	75.18	76.44	1	0	10	231.98	-0.543	-101.146	16.306	-3.63	76.92	77.44
601.1 RD	L_L-C4-6-601.1	Natural	C4-6-601	C4-5-801	75.5	74.36	1	0	0	457.5	0.249	119.22	16.28	2.75	76.92	76.76
L_L-C4-3-101 SS	L_L-C4-3-101	Circular	C4-3-101	C4-3-302	73.38	71.75	1	0	1.5	30.96	5.265	26.956	15.319	15.18	77.73	77.73
L_L-C4-3-101 RDWY	L_L-C4-3-101	Trapezoidal	C4-3-101	C4-3-302	76.26	75.25	1	100	5	30.96	3.262	68.579	16.016	2.37	77.73	77.73
L_L-C4-3-303 SS	L_L-C4-3-303	Rectangular	C4-3-303	C4-3-302	72.29	71.27	1	5	3	499.64	0.204	59.214	15.633	3.93	78.22	77.73
L_L-C4-3-303 RDWY	L_L-C4-3-303	Natural	C4-3-303	C4-3-302	77.05	75.88	1	0	10	499.64	0.234	90.333	16.144	2.94	78.22	77.73
L_L-C4-2-202 SS	L_L-C4-2-202	Circular	C4-2-202	C4-2-201	71.36	70.86	1	0	3	428.62	0.117	33.262	15.585	4.69	77.80	77.63
L_L-C4-2-202 RDWY	L_L-C4-2-202	Natural	C4-2-202	C4-2-201	76	76.27	1	0	10	428.62	-0.063	72.988	16.133	2.13	77.80	77.63
L_L-C4-3-304 SS	L_L-C4-3-304	Rectangular	C4-3-304	C4-3-303	72.18	72.29	1	5	3	151.66	0.073	52.965	15.484	3.59	78.36	78.22
L_L-C4-3-304 RDWY	L_L-C4-3-304	Natural	C4-3-304	C4-3-303	76.6	77.05	1	0	10	151.66	-0.297	93.209	16.096	2.91	78.36	78.22
L_L-C4-2-203 SS	L_L-C4-2-203	Circular	C4-2-203	C4-2-202	71.47	71.36	1	0	2.5	212.39	0.052	20.158	15.538	4.08	77.84	77.80
L_L-C4-2-203 RDWY	L_L-C4-2-203	Natural	C4-2-203	C4-2-202	76.32	76	1	0	10	212.39	0.151	66.25	16.149	2.03	77.84	77.80
L_L-C4-3-305 SS	L_L-C4-3-305	Rectangular	C4-3-305	C4-3-304	72.37	72.18	1	5	3	59.71	0.318	50.918	15.435	3.45	78.38	78.36
L_L-C4-3-305 RDWY	L_L-C4-3-305	Natural	C4-3-305	C4-3-304	76.72	76.6	1	0	10	59.71	0.201	101.586	16.092	2.65	78.38	78.36

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C4-2-204 SS	L_L-C4-2-204	Circular	C4-2-204	C4-2-203	71.72	71.47	1	0	2.5	166.67	0.15	20.015	15.492	4.05	77.98	77.84
L_L-C4-2-204 RDWY	L_L-C4-2-204	Natural	C4-2-204	C4-2-203	76.52	76.32	1	0	10	166.67	0.12	90.872	16.207	2.86	77.98	77.84
L-L-C4-3-102 SS	L_L-C4-3-102	Circular	C4-3-102	C4-3-305	73.4	73.25	1	0	1.5	44.8	0.335	21.001	15.331	11.83	78.38	78.38
L-L-C4-3-102 RDWY	L_L-C4-3-102	Trapezoidal	C4-3-102	C4-3-305	75.6	76.59	1	100	5	44.8	-2.21	37.014	15.998	0.43	78.38	78.38
L_L-C4-3-306 SS	L_L-C4-3-306	Rectangular	C4-3-306	C4-3-305	72.55	72.37	1	5	3	168.41	0.107	39.052	15.448	2.6	78.44	78.38
L_L-C4-3-306 RDWY	L_L-C4-3-306	Natural	C4-3-306	C4-3-305	76.96	76.72	1	0	10	168.41	0.143	68.999	16.079	2.04	78.44	78.38
L_L-C4-2-205	L_L-C4-2-205	Circular	C4-2-205	C4-2-204	71.78	71.49	1	0	1.5	6	4.833	8.945	15.751	4.97	78.00	77.98
L_L-C4-2-206 SS	L_L-C4-2-206	Circular	C4-2-206	C4-2-204	72.13	71.72	1	0	2.5	296.04	0.138	17.85	15.48	3.61	78.30	77.98
L_L-C4-2-206 RDWY	L_L-C4-2-206	Natural	C4-2-206	C4-2-204	77.18	76.52	1	0	10	296.04	0.223	82.055	16.186	3.18	78.30	77.98
L_L-C4-3-103 SS	L_L-C4-3-103	Circular	C4-3-103	C4-3-102	73.57	73.45	1	0	1.5	66.16	0.181	10.659	17.933	5.9	78.38	78.38
L_L-C4-3-103 RDWY	L_L-C4-3-103	Trapezoidal	C4-3-103	C4-3-102	75.82	75.6	1	50	5	66.16	0.333	26.508	15.996	1.2	78.38	78.38
L_L-C4-3-307 SS	L_L-C4-3-307	Special	C4-3-307	C4-3-306	73.08	72.55	1	0	4.41	247.67	0.214	38.549	15.457	3.77	78.57	78.44
L_L-C4-3-307 RDWY	L_L-C4-3-307	Natural	C4-3-307	C4-3-306	77.29	76.96	1	0	10	247.67	0.133	66.073	16.066	2.35	78.57	78.44
L_L-C4-2-207 SS	L_L-C4-2-207	Circular	C4-2-207	C4-2-206	72.35	72.13	1	0	2.5	172.31	0.128	17.952	15.829	3.63	78.62	78.30
L_L-C4-2-207 RDWY	L_L-C4-2-207	Natural	C4-2-207	C4-2-206	77.49	77.18	1	0	10	172.31	0.18	75.079	16.18	3.49	78.62	78.30
L_L-C4-3-308 SS	L_L-C4-3-308	Special	C4-3-308	C4-3-307	73.37	73.09	1	0	4.41	244.89	0.114	38.515	15.619	3.76	78.77	78.57
L_L-C4-3-308 RDWY	L_L-C4-3-308	Natural	C4-3-308	C4-3-307	77.83	77.29	1	0	10	244.89	0.221	54.877	16.06	2.64	78.77	78.57
L_L-C4-2-208 SS	L_L-C4-2-208	Circular	C4-2-208	C4-2-207	72.47	72.35	1	0	2.5	166.8	0.072	16.706	16.08	3.37	78.89	78.62
L_L-C4-2-208 RDWY	L_L-C4-2-208	Natural	C4-2-208	C4-2-207	77.74	77.49	1	0	10	166.8	0.15	71.799	16.18	3.29	78.89	78.62
L_L-C4-3-104 SS	L_L-C4-3-104	Circular	C4-3-104	C4-3-308	74.74	73.93	1	0	1.5	34.79	2.328	9.184	17.266	5.51	78.77	78.77
L_L-C4-3-104 RDWY	L_L-C4-3-104	Trapezoidal	C4-3-104	C4-3-308	78.23	76.87	1	100	5	34.79	3.909	19.309	17.106	0.45	78.77	78.77
L_L-C4-3-309 SS	L_L-C4-3-309	Special	C4-3-309	C4-3-308	74.3	73.89	1	0	3.75	240.35	0.171	31.058	15.656	4.3	79.16	78.77
L_L-C4-3-309 RDWY	L_L-C4-3-309	Natural	C4-3-309	C4-3-308	78.37	77.83	1	0	10	240.35	0.225	40.751	16.051	2.74	79.16	78.77
L_L-C4-2-209 SS	L_L-C4-2-209	Circular	C4-2-209	C4-2-208	73.42	72.47	1	0	2.5	422.65	0.225	15.165	15.505	3.07	79.37	78.89
L_L-C4-2-209 RDWY	L_L-C4-2-209	Natural	C4-2-209	C4-2-208	78.36	77.74	1	0	10	422.65	0.147	54.652	16.157	2.7	79.37	78.89
L_L-C4-3-310 SS	L_L-C4-3-310	Special	C4-3-310	C4-3-309	74.88	74.33	1	0	3.75	449.03	0.122	29.589	15.82	3.97	79.96	79.16
L_L-C4-3-310 RDWY	L_L-C4-3-310	Natural	C4-3-310	C4-3-309	79.34	78.37	1	0	10	449.03	0.216	22.586	16.061	2.04	79.96	79.16
L_L-C4-2-210 SS	L_L-C4-2-210	Circular	C4-2-210	C4-2-209	74.06	73.48	1	0	2.5	444.06	0.131	12.034	16.259	2.43	79.75	79.37
L_L-C4-2-210 RDWY	L_L-C4-2-210	Natural	C4-2-210	C4-2-209	78.72	78.36	1	0	10	444.06	0.081	41.967	16.171	2.22	79.75	79.37
L_L-C4-3-311 SS	L_L-C4-3-311	Circular	C4-3-311	C4-3-310	75.75	75.21	1	0	2	297.63	0.181	14.382	17.141	4.56	80.34	79.96
L_L-C4-3-311 RDWY	L_L-C4-3-311	Natural	C4-3-311	C4-3-310	79.28	79.34	1	0	10	297.63	-0.02	36.719	16.081	2.42	80.34	79.97
L-L-C4-O-201 SS	L_L-C4-O-201	Circular	C4-O-201	C4-2-210	74.55	74.37	1	0	1.5	34.87	0.516	6.319	15.505	3.54	79.75	79.75
L-L-C4-O-201 RDWY	L_L-C4-O-201	Trapezoidal	C4-O-201	C4-2-210	78.75	78.72	1	100	5	34.87	0.086	10.82	16.074	0.47	79.75	79.75
L_OS-17 BOX 1	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.61	1	7	7	50.27	0.119	445.943	16.217	-11.57	67.20	66.81
L_OS-17 BOX 2	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.57	1	7	7	50.27	0.199	446.003	16.08	-11.6	67.20	66.81
L_OS-16 CULV	L_OS-16	Rectangular	OS-16	OS-17	56.98	56.67	1	10	8	386.67	0.08	890.264	16.101	11.47	68.40	67.21
L_OS-16 RDWY	L_OS-16	Natural	OS-16	OS-17	69.94	71.19	1	0	10	386.67	-0.323	0	0	0	0.00	0.00
L_OS-15 CULV	L_OS-15	Rectangular	OS-15	OS-16	57.59	56.98	1	10	8	895.63	0.068	890.273	16.083	11.11	71.30	68.40
L_OS-15 RDWY	L_OS-15	Natural	OS-15	OS-16	72.85	69.94	1	0	10	895.63	0.325	0	0	0	0.00	0.00
W-OS-14	W-OS-14	Trapezoidal	OS-14	W-OUT	73.02	72.9	1	30	5	1000	0	0	0	0	0.00	0.00
L_OS-14 CULV	L_OS-14	Rectangular	OS-14	OS-15	57.91	57.59	1	10	8	311.31	0.103	890.371	16.083	11.1	72.44	71.30
L_OS-14 RDWY	L_OS-14	Natural	OS-14	OS-15	73.02	72.85	1	0	10	311.31	0.055	0	0	0	0.00	0.00
W-OS-13	W-OS-13	Trapezoidal	OS-13	W-OUT	73.4	72.9	1	30	5	1300	0	0	0	0	0.00	0.00
L_OS-13 CULV	L_OS-13	Rectangular	OS-13	OS-14	58.2	57.91	1	10	8	306.54	0.095	611.368	16.221	7.62	72.98	72.44
L_OS-13 RDWY	L_OS-13	Natural	OS-13	OS-14	73.4	73.02	1	0	10	306.54	0.124	0	0	0	0.00	0.00
W-OS-12	W-OS-12	Trapezoidal	OS-12	W-OUT	73.9	72.9	1	30	5	2000	0	0	0	0	0.00	0.00
L_OS-12 CULV	L_OS-12	Rectangular	OS-12	OS-13	58.91	58.2	1	10	8	440.36	0.161	611.455	16.085	7.62	73.75	72.98
L_OS-12 RDWY	L_OS-12	Natural	OS-12	OS-13	73.9	73.4	1	0	10	440.36	0.114	0	0	0	0.00	0.00
L_OS-11 CULV	L_OS-11	Rectangular	OS-11	OS-12	59.25	58.91	1	10	8	628.48	0.054	611.591	16.086	7.62	74.89	73.75
L_OS-11 RDWY	L_OS-11	Natural	OS-11	OS-12	74.57	73.9	1	0	10	628.48	0.107	3.252	16.633	0.8	74.89	73.96
L_L-C4-O-001 CULV	L_L-C4-O-001	Rectangular	C4-O-001	OS-11	59.45	59.25	1	10	8	167.67	0.119	615.675	16.219	7.66	75.15	74.89
L_L-C4-O-001 SPILL	L_L-C4-O-001	Trapezoidal	C4-O-001	OS-11	74.9	73.7	1	50	5	167.67	0.716	42.741	16.609	1.18	75.15	74.89
L_L-C4-5-508 CULV	L_L-C4-5-508	Rectangular	C4-5-508	C4-O-001	59.48	59.45	1	10	8	24.61	0	384.329	16.088	4.78	75.17	75.15
L_L-C4-5-508 SPILL	L_L-C4-5-508	Trapezoidal	C4-5-508	C4-O-001	74.5	74.4	1	50	5	24.61	0.406	30.569	16.581	0.82	75.17	75.15
L_L-C4-5-504 PIPE 1	L_L-C4-5-504	Circular	C4-5-504	C4-5-508	63.09	59.48	1	0	7	182.52	1.978	341.057	16.022	8.82	75.36	75.17
L_L-C4-5-504 PIPE 2	L_L-C4-5-504	Circular	C4-5-504	C4-5-508	65.15	63.88	1	0	3	182.52	0.696	35.792	16.021	4.99	75.36	75.17

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C4-5-504 SPILL	L_L-C4-5-504	Trapezoidal	C4-5-504	C4-5-508	75.5	74.2	1	50	5	389.73	0.334	0	0	0	75.36	75.17
C4-5-510 SS	L_L-C4-5-510	Circular	C4-5-510	C4-5-508	63.68	62.75	1	0	3	44.96	2.069	24.934	17.174	3.47	75.17	75.17
C4-5-510 RD	L_L-C4-5-510	Trapezoidal	C4-5-510	C4-5-508	74.4	74.3	1	100	5	44.96	-0.067	109.831	16.559	1.35	75.17	75.17
L_L-C4-5-501 PIPE 1	L_L-C4-5-501	Circular	C4-5-501	C4-5-504	65.62	63.09	1	0	7	222.95	1.135	294.997	15.628	12.47	75.70	75.36
L_L-C4-5-501 PIPE 2	L_L-C4-5-501	Circular	C4-5-501	C4-5-504	66.71	65.15	1	0	3	22.95	6.797	93.871	15.866	21.6	75.70	75.36
L_L-C4-5-501 SPILL	L_L-C4-5-501	Trapezoidal	C4-5-501	C4-5-504	76.5	74.8	1	50	5	22.95	7.407	0	0	0	75.70	75.36
C4-5-505 SS	L_L-C4-5-505	Circular	C4-5-505	C4-5-504	70.37	67.72	1	0	1.5	37.13	7.137	14.221	15.588	15.39	75.33	75.36
C4-5-504 RD	L_L-C4-5-505	Trapezoidal	C4-5-505	C4-5-504	74.54	75	1	100	5	37.13	-1.239	-93.871	16.567	-1.66	75.33	75.36
511ST	L_L-C4-5-511	Circular	C4-5-511	C4-5-510	69.03	63.68	1	0	2	13.33	40.135	3.32	17.175	1.04	75.17	75.17
511RD	L_L-C4-5-511	Trapezoidal	C4-5-511	C4-5-510	74.5	74.4	1	40	3	13.33	0	-0.21	16.201	0.18	75.17	75.17
512.2	512.2	Natural	C4-5-512	C4-5-515	74.5	74.25	1	0	0	220	0.367	13.93	16.544	1.19	75.20	75.15
C4-5-512 SS	L_L-C4-5-512	Circular	C4-5-512	C4-5-510	70.4	63.68	1	0	2	93.28	7.204	16.88	17.235	5.29	75.20	75.17
C4-5-512 RD	L_L-C4-5-512	Trapezoidal	C4-5-512	C4-5-510	74.5	74.4	1	100	5	93.28	0	113.499	16.55	1.62	75.20	75.17
L_L-C4-5-500 PIPE 1	L_L-C4-5-500	Circular	C4-5-500	C4-5-501	65.66	65.62	1	0	7	160.3	0.025	316.103	15.997	11.17	76.24	75.70
L_L-C4-5-500 PIPE 2	L_L-C4-5-500	Circular	C4-5-500	C4-5-501	67.83	66.71	1	0	3	160.3	0.699	47.004	15.575	7.67	76.24	75.70
L_L-C4-5-500 SPILL	L_L-C4-5-500	Trapezoidal	C4-5-500	C4-5-501	75.6	75	1	50	5	160.3	0.374	62.475	16.409	1.85	76.24	75.70
L_L-C4-5-502	L_L-C4-5-502	Circular	C4-5-502	C4-5-501	70.26	68.72	1	0	1.5	15.49	9.942	13.129	15.682	16.27	75.78	75.70
896.1	L_L-C4-5-506	Circular	C4-5-506	C4-5-505	70.38	69.98	1	0	1.5	43.25	0.925	3.614	17.242	2.02	75.33	75.33
896.1.1	L_L-C4-5-506	Trapezoidal	C4-5-506	C4-5-505	74.56	74.54	1	50	2	43.25	0	1.235	17.181	-0.21	75.33	75.33
L_L-C4-5-507.1	L_L-C4-5-507.1	Trapezoidal	C4-5-507	C4-5-512	74.55	74.5	1	100	5	150	-0.007	144.1	16.514	2.07	75.29	75.20
C4-5-507 SS	L_L-C4-5-507	Circular	C4-5-507	C4-5-505	70.18	70.04	1	0	1.5	55.54	0.252	13.368	15.617	7.72	75.29	75.33
CR-5-507 RD	L_L-C4-5-507	Trapezoidal	C4-5-507	C4-5-505	74.79	74.54	1	100	5	55.54	0.45	-94.199	16.578	-1.39	75.29	75.33
898.1	L_L-C4-5-513	Circular	C4-5-513	C4-5-512	70.53	70.4	1	0	2	23.09	0.563	13.197	17.236	4.19	75.20	75.20
898.1.1	L_L-C4-5-513	Trapezoidal	C4-5-513	C4-5-512	74.6	74.5	1	50	5	10	0	-10.047	16.436	0.59	75.20	75.20
L_OS-10	L_OS-10	Natural	OS-10	C4-5-500	69.69	65.66	1	12	5.67	39.51	10.2	369.671	16.068	5.48	76.20	76.24
L_L-C4-5-503	L_L-C4-5-503	Circular	C4-5-503	C4-5-502	70.51	70.21	1	0	1.5	23.13	1.297	12.782	17.696	9.77	75.89	75.78
L_L-C4-5-803.1	L_L-C4-5-803.1	Natural	C4-5-803	C4-5-801	75.3	74.36	1	0	0	213	0.441	-123.395	16.341	-2.85	76.48	76.76
Parker East	Parker East	Trapezoidal	C4-5-803	C5-O-903	74.5	74	1	60	5	1380	0	52.572	16.575	0.73	75.35	75.28
C4-5-803 SS	L_L-C4-5-803	Circular	C4-5-803	C4-5-507	70.33	70.01	1	0	1.5	180.62	0.199	12.79	17.824	7.18	75.35	75.29
C4-5-803 RD	L_L-C4-5-803	Trapezoidal	C4-5-803	C4-5-507	74.97	74.79	1	100	10	190	0.095	57.56	16.361	1.68	75.35	75.29
903.1	L_L-C4-5-514	Circular	C4-5-514	C4-5-513	71.15	70.53	1	0	1.5	23.27	2.664	6.041	17.237	3.41	75.20	75.20
903.1.1	L_L-C4-5-514	Trapezoidal	C4-5-514	C4-5-513	74.7	74.6	1	50	5	10	0	2.116	17.229	1.27	75.20	75.20
L_L-C4-5-512.1	L_L-C4-5-512.1	Natural	C4-5-515	C5-3-310	74.25	74	1	0	0	480	0.367	24.389	16.625	2.03	75.15	74.54
904.1	L_L-C4-5-515	Circular	C4-5-515	C4-5-513	71.16	70.58	1	0	1.5	217.7	0.266	5.841	17.241	3.28	75.15	75.20
904.1.1	L_L-C4-5-515	Trapezoidal	C4-5-515	C4-5-513	74.25	74.5	1	5	5	217.7	0	-9.382	16.544	-1.17	75.15	75.20
L_OS-9 B1	L_OS-9	Rectangular	OS-9	OS-10	69.76	69.75	1	4	5	53.63	0.019	155.1	16.035	8.22	77.33	76.20
L_OS-9 B2	L_OS-9	Rectangular	OS-9	OS-10	69.73	69.69	1	4	5	53.63	0.075	155.109	16.035	10.68	77.33	76.20
L_L-C4-5-702	L_L-C4-5-702	Circular	C4-5-702	C4-5-503	70.63	70.48	1	0	1.5	11.42	1.313	1.164	15.719	1.29	75.89	75.89
L_L-C4-5-801	L_L-C4-5-801	Circular	C4-5-801	C4-5-503	71.22	70.57	1	0	1.5	201.15	0.323	12.449	17.695	7.17	76.76	75.89
C4-5-804 SS	L_L-C4-5-804	Circular	C4-5-804	C4-5-803	70.46	70.33	1	0	1.5	83.92	0.155	8.611	18.714	4.83	75.35	75.35
C4-5-804 RD	L_L-C4-5-804	Trapezoidal	C4-5-804	C4-5-803	74.96	74.97	1	100	5	83.94	0	-11.003	16.249	-0.33	75.35	75.35
C4-5-802 SS	L_L-C4-5-802	Circular	C4-5-802	C4-5-801	71.72	71.22	1	0	1.5	20.33	2.459	8.41	17.705	4.63	76.76	76.76
C4-5-802 RD	L_L-C4-5-802	Trapezoidal	C4-5-802	C4-5-801	74.56	74.36	1	100	5	24	0.833	5.926	16.229	0.27	76.76	76.76
C4-5-805 SS	L_L-C4-5-805	Circular	C4-5-805	C4-5-804	70.51	70.46	1	0	1.5	33.47	0.149	10.358	18.713	5.81	75.35	75.35
C4-5-805 RD	L_L-C4-5-805	Trapezoidal	C4-5-805	C4-5-804	74.95	74.94	1	100	5	33.47	0.03	-10.514	16.469	-0.26	75.35	75.35
911.1	L_L-C4-5-806	Circular	C4-5-806	C4-5-805	71	70.51	1	0	2	20.86	2.349	2.977	18.72	0.94	75.35	75.35
911.1.1	L_L-C4-5-806	Trapezoidal	C4-5-806	C4-5-805	74.06	74.04	1	15	2	20.86	0.096	3.939	18.714	0.78	75.35	75.35
C4-5-807 SS	L_L-C4-5-807	Circular	C4-5-807	C4-5-805	70.81	70.51	1	0	1.5	205.04	0.146	7.845	18.808	4.41	75.22	75.35
C4-5-807 RD	L_L-C4-5-807	Natural	C4-5-807	C4-5-805	74.04	74.95	1	0	2	205.04	-0.444	-8.646	16.486	-0.69	75.22	75.35
C4-5-808 SS	L_L-C4-5-808	Circular	C4-5-808	C4-5-807	70.85	70.81	1	0	1.5	24.82	0.161	8.266	18.833	4.64	75.22	75.22
C4-5-808 RD	L_L-C4-5-808	Trapezoidal	C4-5-808	C4-5-807	74.35	74.04	1	100	5	24	1.292	8.836	18.823	0.97	75.22	75.22
L_L-C4-5-809.1	L_L-C4-5-809.1	Natural	C4-5-809	C5-2-209	74.6	74	1	0	0	328.6	0.569	14.716	16.498	2.05	75.21	74.41
C4-5-809 SS	L_L-C4-5-809	Circular	C4-5-809	C4-5-807	70.89	70.81	1	0	1.5	51.37	0.156	1.901	18.836	1.03	75.21	75.22
C4-5-809 RD	L_L-C4-5-809	Natural	C4-5-809	C4-5-807	74.49	74.04	1	0	2	51.37	0.876	-12.397	16.479	-0.7	75.21	75.22
Link1368	Link1368	Natural	Node1294	OS-9	69.35	69.73	1	0	7.59	61.2	-0.621	311.732	16.032	3.74	77.36	77.33
Link1398	Link1398	Natural	C5-O-000	XS-49	62.65	63.74	1	0	6.65	25.24	-4.319	427.251	16.371	2.78	70.40	70.38

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C5-700ST	L_L-C5-700	Rectangular	C5-700	C5-O-000	62.65	62.65	2	6	6	62.47	0	409.541	15.956	5.68	70.76	70.40
C5-700RD	L_L-C5-700	Trapezoidal	C5-700	C5-O-000	70.5	70.4	1	50	5	62.47	0	21.293	16.385	1.86	70.76	70.56
L_L-C5-3-301 SS	L_L-C5-3-301	Special	C5-3-301	C5-700	63.38	62.72	1	0	5	147.07	0.456	69.72	15.931	5.36	71.05	70.76
L_L-C5-3-301 RDWY	L_L-C5-3-301	Natural	C5-3-301	C5-700	69.68	70.14	1	0	0	147.07	-0.313	54.81	16.092	2.57	71.05	70.90
L_L-C5-600	L_L-C5-600	Rectangular	C5-600	C5-700	62.82	62.65	2	6	6	239.48	0.071	412.771	17.24	5.72	71.22	70.76
L-SBFR-DRIVEWAY	L-SBFR-DRIVEWAY	Trapezoidal	C5-7-701	XS-45	69.5	69.4	1	30	5	100	0.1	-6.26	17.446	-0.5	70.19	70.19
L_L-C5-7-701 SS	L_L-C5-7-701	Special	C5-7-701	C5-700	62.82	62.72	1	0	3.75	185.99	0.054	-40.964	15.299	-5.47	70.19	70.76
L_L-C5-7-701 RDWY	L_L-C5-7-701	Natural	C5-7-701	C5-700	68.61	70.14	1	0	0	185.99	-0.823	-42.044	16.382	-2.03	70.19	70.76
L_L-C5-3-302 SS	L_L-C5-3-302	Special	C5-3-302	C5-3-301	63.7	63.38	1	0	5	194.56	0.164	39.331	15.898	3.02	71.19	71.05
L_L-C5-3-302 RDWY	L_L-C5-3-302	Natural	C5-3-302	C5-3-301	69.61	69.68	1	0	0	194.56	-0.036	79.795	16.059	2.5	71.19	71.05
L_L-C5-2-201 SS	L_L-C5-2-201	Circular	C5-2-201	C5-600	63.36	63.22	1	0	3.5	71.99	0.194	84.358	16.505	8.69	71.72	71.22
L_L-C5-2-201 RDWY	L_L-C5-2-201	Natural	C5-2-201	C5-600	69.97	70.51	1	0	10	71.99	-0.75	109.041	16.516	3.47	71.72	71.62
L_L-C5-6-601 SS	L_L-C5-6-601 DITCH	Special	C5-6-601	C5-600	63.31	63.22	1	0	4.41	218.65	0.041	-72.259	16.761	-7.01	70.28	71.22
L_L-C5-6-601 RDWY	L_L-C5-6-601 DITCH	Natural	C5-6-601	C5-600	69.26	70.51	1	0	10	218.65	-0.572	-50.457	16.538	-3.48	70.28	71.22
L_L-C5-7-702 SS	L_L-C5-7-702	Special	C5-7-702	C5-7-701	63.11	62.41	1	0	3.75	199.71	0.351	-49.999	16.967	-6.68	69.18	70.19
L_L-C5-7-702 RDWY	L_L-C5-7-702	Natural	C5-7-702	C5-7-701	68.26	69.61	1	0	0	199.71	-0.676	-32.156	16.386	-2.7	69.18	70.19
L_L-C5-3-303 SS	L_L-C5-3-303	Special	C5-3-303	C5-3-302	63.93	63.7	1	0	5	193.19	0.119	34.657	15.911	2.66	71.30	71.19
L_L-C5-3-303 RDWY	L_L-C5-3-303	Natural	C5-3-303	C5-3-302	69.78	69.61	1	0	0	193.19	0.088	78.109	16.056	2.33	71.30	71.19
L_L-C5-2-202 SS	L_L-C5-2-202	Circular	C5-2-202	C5-2-201	63.62	63.46	1	0	3.5	185.4	0.086	30.27	19.3	3.13	71.81	71.72
L_L-C5-2-202 RDWY	L_L-C5-2-202	Natural	C5-2-202	C5-2-201	69	69.97	1	0	10	185.4	-0.523	168.183	16.514	2.9	71.81	71.72
L_L-C5-6-602 SS	L_L-C5-6-602	Special	C5-6-602	C5-6-601	63.32	63.31	1	0	3.75	195.32	0.005	-40.073	15.124	-5.37	70.02	70.28
L_L-C5-6-602 RDWY	L_L-C5-6-602	Natural	C5-6-602	C5-6-601	68.16	69.26	1	0	0	195.32	-0.563	-104.233	16.455	-3.61	70.02	70.28
L_L-C5-7-703 SS	L_L-C5-7-703	Special	C5-7-703	C5-7-702	63.29	63.11	1	0	3.75	190.42	0.095	-34.198	16.68	-4.58	68.73	69.18
L_L-C5-7-703 RDWY	L_L-C5-7-703	Natural	C5-7-703	C5-7-702	67.93	68.26	1	0	0	190.42	-0.173	-50.61	16.356	-3.37	68.73	69.18
L_L-C5-3-101	L_L-C5-3-101	Circular	C5-3-101	C5-3-303	67.81	65.17	1	0	1.5	36.78	7.178	3.808	19.206	2.21	71.30	71.30
L_L-C5-3-304 SS	L_L-C5-3-304	Special	C5-3-304	C5-3-303	64.24	63.93	1	0	5	159.76	0.194	64.684	15.748	4.98	71.56	71.30
L_L-C5-3-304 RDWY	L_L-C5-3-304	Natural	C5-3-304	C5-3-303	70.88	69.78	1	0	0	159.76	0.689	48.122	16.052	2.35	71.56	71.30
L_L-C5-2-203 SS	L_L-C5-2-203	Circular	C5-2-203	C5-2-202	64.04	63.61	1	0	3.5	204.98	0.21	14.799	16.421	1.53	71.86	71.81
L_L-C5-2-203 RDWY	L_L-C5-2-203	Natural	C5-2-203	C5-2-202	69.4	69	1	0	10	204.98	0.195	174.12	16.511	2.61	71.86	71.81
L-L-C5-6-603 SS	L_L-C5-6-603	Special	C5-6-603	C5-6-602	63.73	63.44	1	0	3.75	195.53	0.148	-19.46	14.998	-2.61	69.94	70.02
L-L-C5-6-603 RDWY	L_L-C5-6-603	Natural	C5-6-603	C5-6-602	67.62	68.16	1	0	0	195.53	-0.276	-121.839	16.427	-2.52	69.94	70.02
L_L-C5-S-2	L_L-C5-S-2	Natural	C5-7-704	C5-S-2	66.79	66.54	1	0	11	117.95	0.449	114.63	16.133	2.71	68.53	68.50
L_L-C5-7-704 SS	L_L-C5-7-704	Special	C5-7-704	C5-7-703	63.72	63.29	1	0	3.75	197.49	0.218	-31.504	17.72	-4.23	68.53	68.73
L_L-C5-7-704 RDWY	L_L-C5-7-704	Natural	C5-7-704	C5-7-703	66.79	67.93	1	0	0	197.49	-0.577	-64.822	16.289	-2.58	68.53	68.73
L_L-C5-3-305 SS	L_L-C5-3-305	Special	C5-3-305	C5-3-304	64.29	64.24	1	0	5	158.21	0.032	69.401	16.016	5.34	71.92	71.56
L_L-C5-3-305 RDWY	L_L-C5-3-305	Natural	C5-3-305	C5-3-304	71.14	70.88	1	0	0	158.21	0.164	32.151	16.051	2.71	71.92	71.56
L_L-C5-2-204 SS	L_L-C5-2-204	Circular	C5-2-204	C5-2-203	64.32	63.98	1	0	3.5	169.83	0.2	17.155	15.351	1.77	71.87	71.86
L_L-C5-2-204 RDWY	L_L-C5-2-204	Natural	C5-2-204	C5-2-203	70.22	69.4	1	0	10	169.83	0.483	176.636	16.509	3.67	71.87	71.86
L_L-C5-6-604 SS	L_L-C5-6-604	Special	C5-6-604	C5-6-603	63.91	63.66	1	0	3.75	193.26	0.129	-17.009	16.577	-2.28	69.83	69.94
L_L-C5-6-604 RDWY	L_L-C5-6-604	Natural	C5-6-604	C5-6-603	67.76	67.62	1	0	0	193.26	0.072	-141.743	16.311	-2.63	69.83	69.94
L_L-C5-3-306 SS	L_L-C5-3-306	Circular	C5-3-306	C5-3-305	64.65	64.29	1	0	3.5	365.87	0.098	49.522	16.885	5.11	72.68	71.92
L_L-C5-3-306 RDWY	L_L-C5-3-306	Natural	C5-3-306	C5-3-305	71.81	71.14	1	0	0	365.87	0.183	41.884	16.055	2.97	72.68	71.92
L_L-C5-2-205 SS	L_L-C5-2-205	Circular	C5-2-205	C5-2-204	64.67	64.27	1	0	3.5	216.71	0.185	31.015	15.521	3.21	71.89	71.87
L_L-C5-2-205 RDWY	L_L-C5-2-205	Natural	C5-2-205	C5-2-204	70.92	70.22	1	0	10	216.71	0.323	29.913	16.421	1.53	71.89	71.87
L_L-C5-6-605 SS	L_L-C5-6-605	Special	C5-6-605	C5-6-604	63.97	63.94	1	0	3.75	198.62	0.015	-20.913	16.497	-2.8	69.66	69.83
L_L-C5-6-605 RDWY	L_L-C5-6-605	Natural	C5-6-605	C5-6-604	67.77	67.76	1	0	0	198.62	0.005	-147.875	16.269	-3.14	69.66	69.83
L_L-C5-3-102 SS	L_L-C5-3-102	Circular	C5-3-102	C5-3-306	69.03	68.12	1	0	1.5	56.46	1.612	6.632	15.489	4.89	72.68	72.68
L_L-C5-3-102 RDWY	L_L-C5-3-102	Trapezoidal	C5-3-102	C5-3-306	72.22	72.16	1	100	5	56.46	0.106	7.833	16.099	0.53	72.68	72.68
L_L-C5-3-307 SS	L_L-C5-3-307	Circular	C5-3-307	C5-3-306	65.1	64.65	1	0	3.5	104.26	0.432	39.574	17.159	4.09	72.77	72.68
L_L-C5-3-307 RDWY	L_L-C5-3-307	Natural	C5-3-307	C5-3-306	71.48	71.81	1	0	0	104.26	-0.317	50.255	16.042	2.37	72.77	72.68
L_L-C5-2-206 SS	L_L-C5-2-206	Circular	C5-2-206	C5-2-205	66.03	65.57	1	0	3	175.16	0.263	34.211	15.76	4.81	72.08	71.89
L_L-C5-2-206 RDWY	L_L-C5-2-206	Natural	C5-2-206	C5-2-205	71.62	70.92	1	0	0	175.16	0.4	13.501	16.433	1.24	72.08	71.89
L_L-C5-N-5	L_L-C5-N-5	Natural	C5-6-606	C5-N-5	67.79	67.51	1	0	0	66.85	0.419	194.071	16.125	6.22	69.27	68.96
L_L-C5-6-606 SS	L_L-C5-6-606	Special	C5-6-606	C5-6-605	64.57	63.95	1	0	3.16	288.27	0.215	-15.564	16.439	-3.02	69.27	69.66
L_L-C5-6-606 RDWY	L_L-C5-6-606	Natural	C5-6-606	C5-6-605	67.51	67.79	1	0	0	288.27	-0.09	-165.715	16.149	-3.95	69.27	69.66
L_L-C5-3-103 SS	L_L-C5-3-103	Circular	C5-3-103	C5-3-102	69.04	69.03	1	0	1.5	29.9	0.033	3.874	17.178	2.79	72.68	72.68

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C5-3-105 RDWY.1	L_L-C5-3-103	Trapezoidal	C5-3-103	C5-3-102	72.52	72.49	1	40	5	29.9	0.1	2.286	16.005	0.4	72.68	72.68
L_L-C5-3-308 SS	L_L-C5-3-308	Circular	C5-3-308	C5-3-307	65.72	65.35	1	0	3	203.19	0.182	29.221	15.407	4.1	72.90	72.77
L_L-C5-3-308 RDWY	L_L-C5-3-308	Natural	C5-3-308	C5-3-307	72.1	71.48	1	0	0	203.19	0.305	48.152	16.043	2.51	72.90	72.77
L_L-C5-2-207 SS	L_L-C5-2-207	Circular	C5-2-207	C5-2-206	66.43	66.38	1	0	3	216.8	0.023	34.518	15.762	4.85	72.55	72.08
L_L-C5-2-207 RDWY	L_L-C5-2-207	Natural	C5-2-207	C5-2-206	72.34	71.62	1	0	0	216.8	0.332	3.231	16.387	0.82	72.55	72.08
L_L-C5-3-104	L_L-C5-3-104	Circular	C5-3-104	C5-3-103	71.33	69.46	1	0	1.5	33.41	5.597	3.704	15.752	7.82	72.70	72.68
L_L-C5-3-105 SS	L_L-C5-3-105	Circular	C5-3-105	C5-3-308	69.35	66.47	1	0	1.5	60.59	4.753	10.762	17.166	6.92	72.90	72.90
L_L-C5-3-105 RDWY	L_L-C5-3-105	Trapezoidal	C5-3-105	C5-3-308	72.42	72.36	1	100	5	60.59	0.099	13.397	15.895	0.82	72.90	72.90
L_L-C5-3-309 SS	L_L-C5-3-309	Circular	C5-3-309	C5-3-308	66.02	65.72	1	0	3	186.45	0.161	26.25	16.58	3.68	73.14	72.90
L_L-C5-3-309 RDWY	L_L-C5-3-309	Natural	C5-3-309	C5-3-308	72.42	72.1	1	0	0	186.45	0.172	27.898	16.569	2.34	73.14	72.90
L_L-C5-2-208 SS	L_L-C5-2-208	Circular	C5-2-208	C5-2-207	66.88	66.43	1	0	3	394.28	0.114	29.49	16.389	4.14	73.31	72.55
L_L-C5-2-208 RDWY	L_L-C5-2-208	Natural	C5-2-208	C5-2-207	73.45	72.34	1	0	0	394.28	0.282	0	0	0	0.00	0.00
L_L-C5-3-106 SS	L_L-C5-3-106	Circular	C5-3-106	C5-3-105	69.51	69.35	2	0	1.5	28.67	0.558	11.249	15.751	3.72	72.98	72.90
L_L-C5-3-106 RDWY	L_L-C5-3-106	Trapezoidal	C5-3-106	C5-3-105	73.22	73.19	1	50	5	28.67	0.105	0	0	0	0.00	0.00
L_L-C5-3-310 SS	L_L-C5-3-310	Circular	C5-3-310	C5-3-309	68.25	66.61	1	0	2.5	395.29	0.415	16.449	16.564	3.32	73.76	73.14
L_L-C5-3-310 RDWY	L_L-C5-3-310	Natural	C5-3-310	C5-3-309	72.97	72.42	1	0	0	395.29	0.139	29.98	16.571	2.4	73.76	73.14
L_L-C5-2-209 SS	L_L-C5-2-209	Circular	C5-2-209	C5-2-208	68.46	67.29	1	0	2.5	399.17	0.293	20.014	16.757	4.05	74.08	73.31
L_L-C5-2-209 RDWY	L_L-C5-2-209	Natural	C5-2-209	C5-2-208	73.54	73.45	1	0	0	399.17	0.023	5.399	16.421	1.12	74.08	73.60
L_L-XS-23	L_L-XS-23	Natural	XS-23	XS-22	53.51	52.54	1	0	8.93	89.285	1.086	592.327	16.826	3.94	64.16	64.15
L_L-XS-24	L_L-XS-24	Natural	XS-24	XS-23	53.81	53.51	1	0	9.61	276.201	0.109	589.347	16.826	3.65	64.17	64.16
L_L-XS-25	L_L-XS-25	Natural	XS-25	XS-24	55.09	53.81	1	0	9.12	243.878	0.525	596.536	16.107	4.56	64.19	64.17
L_L-XS-26	L_L-XS-26	Natural	XS-26	XS-25	57.27	55.09	1	0	6.96	255.302	0.854	616.286	16.518	4.73	64.19	64.19
L_L-XS-27	L_L-XS-27	Natural	XS-27	XS-26	56.71	57.27	1	0	6.93	99.131	-0.565	600.045	16.522	5.86	64.55	64.19
L_L-XS-28	L_L-XS-28	Natural	XS-28	XS-27	55.37	56.71	1	0	8.29	331.908	-0.404	599.92	16.641	4.81	65.31	64.55
L_L-XS-29	L_L-XS-29	Natural	XS-29	XS-28	56.52	55.37	1	0	9.19	264.58	0.435	612.874	16.54	3.23	65.34	65.31
L_L-XS-30	L_L-XS-30	Natural	XS-30	XS-29	57.68	56.52	1	0	7.69	328.717	0.353	637.726	16.415	3.59	65.62	65.34
L_L-XS-31	L_L-XS-31	Natural	XS-31	XS-30	57.41	57.68	1	0	8.3	337.631	-0.08	637.94	16.404	4.22	66.82	65.62
L_L-CULV-8	L_L-CULV-8	Natural	CULV-8	XS-31	57.99	57.41	1	0	8.3	44.397	1.306	557.678	16.438	3.06	66.87	66.82
CULVERT 4-A	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.06	55.99	1	8	7	107.82	0.037	128.777	15.158	2.3	66.88	66.87
CULVERT 4-B	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.07	56.02	1	8	7	107.82	0.074	128.774	15.158	2.3	66.88	66.87
CULVERT4-SPILL	L_L-CULV-7	Trapezoidal	CULV-7	CULV-8	65.15	65.14	1	100	8	107.82	0.668	477.101	16.391	1.17	66.88	66.87
L_L-XS-32	L_L-XS-32	Natural	XS-32	CULV-7	58.15	58.06	1	0	8.06	25.237	0.357	558.683	16.344	2.82	66.89	66.88
L_L-XS-33	L_L-XS-33	Natural	XS-33	XS-32	59.41	58.15	1	0	7.93	201.985	0.624	559.77	16.343	2.47	66.90	66.89
L_L-XS-34	L_L-XS-34	Natural	XS-34	XS-33	60.01	59.41	1	0	8	247.14	0.243	509.524	16.33	3.63	67.58	66.90
L_L-XS-35	L_L-XS-35	Natural	XS-35	XS-34	60.21	60.01	1	0	7.48	134.207	0.149	508.697	16.359	3.49	67.93	67.58
L_L-CULV-6	L_L-CULV-6	Natural	CULV-6	XS-35	60.17	60.21	1	0	7.479	12.841	-0.311	508.7	16.359	3.05	67.94	67.93
CULVERT 3-A	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.16	60.17	1	9	5	29.115	-0.034	194.772	16.327	4.32	67.97	67.94
CULVERT 3-B	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.14	60.2	1	9	5	29.115	-0.206	194.772	16.327	4.32	67.97	67.94
CULVERT3-SPILL	L_L-CULV-5	Trapezoidal	CULV-5	CULV-6	67.54	67.24	1	60	5	29.12	1.03	119.203	16.36	3.44	67.97	67.94
L_L-XS-36	L_L-XS-36	Natural	XS-36	CULV-5	60.09	60.14	1	0	8.04	21.297	-0.235	508.701	16.358	3.23	68.02	67.97
L_L-XS-37	L_L-XS-37	Natural	XS-37	XS-36	60.69	60.09	1	0	7.98	179.804	0.334	508.775	16.333	3.16	68.15	68.02
L_L-XS-38	L_L-XS-38	Natural	XS-38	XS-37	61.97	60.69	1	0	6.18	396.598	0.323	481.717	16.397	2.93	68.32	68.15
L_L-CULV-4	L_L-CULV-4	Natural	CULV-4	XS-38	61.36	61.97	1	0	6.18	43.827	-1.392	484.045	16.366	2.93	68.35	68.32
CULVER 2-A	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.5	61.37	1	9	5	26.441	0.492	242.032	16.364	5.37	68.84	68.35
CULVER 2-B	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.4	61.36	1	9	5	26.441	0	242.03	16.364	5.37	68.84	68.35
CULVER 2-SPILL	L_L-CULV-3	Trapezoidal	CULV-3	CULV-4	68.84	68.6	1	42	5	26.44	0.908	0	0	0	0.00	0.00
L_L-XS-39	L_L-XS-39	Natural	XS-39	CULV-3	61.92	61.4	1	0	7.42	15.69	3.569	484.261	16.363	3.09	68.83	68.84
L_L-XS-40	L_L-XS-40	Natural	XS-40	XS-39	62.1	61.92	1	0	7.639	97.04	0.185	484.092	16.345	3.21	68.90	68.83
L_L-XS-41	L_L-XS-41	Natural	XS-41	XS-40	62.49	62.1	1	0	7.19	106.594	0.366	465.041	16.4	3.27	68.99	68.90
L_L-CULV-2	L_L-CULV-2	Natural	CULV-2	XS-41	61.43	62.49	1	0	7.19	14.768	-7.178	464.977	16.381	2.61	68.99	68.99
CULV-1-A	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.43	1	9	5	26.255	-0.076	226.097	16.401	5.01	69.03	68.99
CULV-1-B	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.47	1	9	5	26.255	-0.229	226.093	16.401	5.01	69.03	68.99
CULV1-SPILL	L_L-CULV-1	Trapezoidal	CULV-1	CULV-2	68.9	68.64	1	40	5	26.25	0.99	12.801	16.365	1.36	69.03	68.99
L_L-XS-42	L_L-XS-42	Natural	XS-42	CULV-1	62.74	61.41	1	0	6.619	12.816	10.378	465.007	16.371	2.35	69.02	69.03
L_L-XS-43	L_L-XS-43	Natural	XS-43	XS-42	62.16	62.74	1	0	6.55	126.27	-0.459	464.966	16.349	3.41	69.35	69.02
L_L-XS-44	L_L-XS-44	Natural	XS-44	XS-43	62.58	62.16	1	0	6.43	158.7	0.261	427.504	16.607	2.76	69.42	69.35

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-XS-45	L_L-XS-45	Natural	XS-45	XS-44	62.74	62.58	1	0	6.88	314.15	0.022	426.616	16.584	3.92	70.19	69.42
L_L-XS-46	L_L-XS-46	Natural	XS-46	XS-45	62.88	62.74	1	0	7.84	47.539	0.294	427.338	16.558	2.91	70.24	70.19
L_L-XS-47	L_L-XS-47	Natural	XS-47	XS-46	63	62.88	1	0	6.07	31.361	0.383	427.312	16.555	2.25	70.26	70.24
L_L-XS-48	L_L-XS-48	Natural	XS-48	XS-47	62.15	62.98	1	0	8.57	76.883	-1.08	427.276	16.551	3.09	70.37	70.26
L_L-XS-49	L_L-XS-49	Natural	XS-49	XS-48	63.74	62.15	1	0	6.66	89.529	1.776	427.245	16.374	2.71	70.38	70.37
L_L-C5-S-3	L_L-C5-S-3	Natural	C5-S-2	C5-S-3	66.54	66.44	1	0	11	294.98	0.034	116.697	16.164	2.55	68.50	68.36
L-SBFR-WITCHER	L-SBFR-WITCHER	Trapezoidal	C5-S-2	XS-43	69	68.9	1	30	5	400	0.025	-2.585	16.365	-0.35	69.03	69.35
L_L-C5-N-6	L_L-C5-N-6	Natural	C5-N-5	C5-N-6	67.51	67.08	1	0	11	70.53	0.61	194.068	16.128	5.47	68.96	68.88
L-C5-O-903.1	L-C5-O-903.1	Trapezoidal	C5-O-903	C6-O-903	74.4	72	1	60	5	2090	0.096	149.24	16.645	2.73	75.28	72.85
L-C5-O-904 RD	L-C5-O-903	Trapezoidal	C5-O-903	C5-O-904	74.5	72	1	28	5	1740	0.115	57.379	16.433	2.59	75.28	72.47
L-C5-O-904 SS	L-C5-O-903	Rectangular	C5-O-903	C5-O-904	65.61	64.2	3	6	4	1740	0.081	340.653	18.948	4.71	75.28	72.30
L-C5-O-904.1	L-C5-O-904.1	Natural	C5-O-904	C5-2-204	71.5	70.8	1	24	0.99	385	0.519	148.655	16.429	0.75	72.30	71.87
L-C5-O-904	L-C5-O-904	Rectangular	C5-O-904	C5-MM	64.2	62.9	2	6	6	569	0.228	423.434	19.173	5.87	72.30	71.37
L-C5-O-904.2	L-C5-O-904.2	Natural	C5-O-904	C6-O-904	71.5	70	1	40	0.99	2090	0.072	71.813	16.686	0.52	72.30	70.65
L-C6-O-901	L-C6-O-901	Trapezoidal	C6-O-901	C6-O-902	76.4	75	1	30	5	2030	-0.064	88.071	17.02	0.86	77.06	76.44
L-C6-O-902	L-C6-O-902	Trapezoidal	C6-O-902	C6-O-903	76	72	1	30	5	1690	0.284	67.39	17.678	1.18	76.44	72.85
L-C6-O-903	L-C6-O-903	Natural	C6-O-903	C6-O-904	72	69.5	1	30	0.99	1731	0.058	146.564	17.091	0.68	72.85	70.65
L-C6-O-904	L-C6-O-904	Natural	C6-O-904	C6-O-905	69.5	69	1	30	0.99	560	0.179	200.303	17.189	0.8	70.65	70.12
L-C6-O-905	L-C6-O-905	Natural	C6-O-905	C6-O-905.5	69	67.5	1	30	0.99	1150	0.13	206.238	17.428	0.92	70.12	68.41
L-C6-O-902.1	L-C6-O-902.1	Trapezoidal	C6-O-902.1	C6-O-902	76.5	75	1	24	5	1570	-0.019	0	0	0	76.50	76.44
L-C5-2-201.1	L-C5-2-201.1	Natural	C5-O-905	C5-MM	71	70	1	24	0.99	540	0.093	-45.794	16.298	-0.25	71.34	71.37
L-C5-O-905	L-C5-O-905	Natural	C5-O-905	C6-O-905	71	69	1	24	0.99	1650	0.091	28.889	16.7	0.26	71.34	70.12
L-C4-O-917.2	L-C4-O-917.2	Trapezoidal	C4-O-917.1	C5-O-901	80	76	1	30	3	1210	0.331	0	0	0	80.00	77.22
L-C4-O-914.2	L-C4-O-914.2	Trapezoidal	C4-O-914.1	C5-O-901	78	76	1	80	2	1090	0.183	49.439	17.041	0.93	78.31	77.22
L-C4-O-909.2	L-C4-O-909.2	Natural	C4-O-909.1	C5-O-902	77.5	75.5	1	0	0	1310	0.153	63.051	17.901	0.53	77.98	76.30
L-C4-O-907.2	L-C4-O-907.2	Natural	C4-O-907.1	C5-O-902	77	75.5	1	115	2.5	1130	0.133	44.552	17.867	0.61	77.86	76.30
L_L-C5-N-7A	L_L-C5-N-7A	Natural	C5-N-6	C5-N-7A	67.08	66.32	1	0	11	175.57	0.433	194.058	16.134	3.77	68.88	68.84
L_L-C5-N-7	L_L-C5-N-7	Natural	C5-N-7	C5-N-7A	66.44	66.32	1	0	11	183.62	-0.065	-194.048	16.144	-3.23	68.69	68.84
L_L-C5-N-8	L_L-C5-N-8	Natural	C5-N-8	C5-N-7	66.74	66.44	1	0	11	205.22	-0.146	-194.047	16.154	-4.4	68.17	68.69
L_L-C5-N-9	L_L-C5-N-9	Natural	C5-N-8	C5-N-9	66.74	65.62	1	0	11	229.86	0.487	194.037	16.162	5.55	68.17	67.40
L_L-C5-N-10	L_L-C5-N-10	Natural	C5-N-9	C5-N-10	65.62	65.02	1	0	11	295.9	0.203	194.046	16.173	5.23	67.40	66.53
L_L-C5-S-4	L_L-C5-S-4	Natural	C5-S-3	C5-S-4	66.44	66.36	1	0	11	199.91	0.04	116.533	16.179	2.59	68.36	68.27
L-SBFR-PARKING LOT	L-SBFR-PARKING LOT	Trapezoidal	C5-S-4	XS-38	68	67.8	1	30	5	650	0.031	-2.936	16.794	-0.31	68.27	68.32
L_L-C5-S-5	L_L-C5-S-5	Natural	C5-S-5	C5-S-4	66.77	66.36	1	0	11	149.32	-0.275	-118.456	16.227	-3.35	67.98	68.27
L_L-C5-S-6	L_L-C5-S-6	Natural	C5-S-5	C5-S-6	66.77	65.83	1	0	11	279.98	0.336	118.446	16.239	4.49	67.98	67.24
L_L-C5-S-7	L_L-C5-S-7	Natural	C5-S-6	C5-S-7	65.83	64.64	1	0	11	542.54	0.219	118.444	16.259	4.48	67.24	65.80
L-C6-O-905.5	L-C6-O-905.5	Natural	C6-O-905.5	C6-O-905.7	67.5	66	1	30	0.99	680	0.221	203.763	17.587	0.92	68.41	67.18
L-C6-O-906	L-C6-O-906	Natural	C6-O-905.7	C6-O-906	66	63.5	1	30	0.99	1020	0.245	199.8	17.802	1.15	67.18	63.81
L-C5-MM	L-C5-MM	Rectangular	C5-MM	C5-600	62.9	62.82	2	6	6	113	0.071	416.476	19.184	5.78	71.37	71.22

EXISTING 50-YR

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-O7-O-500	L-O7-O-500	Natural	O7-O-000	C4-O-920	75.79	75.41	1	0	6.01	569.04	0.07	223.35	16.32	1.47	80.27	80.17
L_L-O7-500	L_L-O7-500	Circular	O7-500	O7-O-000	75.72	75.76	3	0	3.00	257.95	-0.02	31.52	16.00	1.48	80.29	80.27
L_L-O7-5-501	L_L-O7-5-501	Circular	O7-5-501	O7-500	76.72	75.72	1	0	1.50	81.47	1.23	12.26	15.85	6.88	80.69	80.29
L_L-O7-O-001	L_L-O7-O-001	Circular	O7-O-001	O7-500	75.52	75.72	3	0	3.00	44.32	-0.45	20.40	16.00	0.96	80.29	80.29
L_L-O7-5-502	L_L-O7-5-502	Circular	O7-5-502	O7-5-501	77.06	76.72	1	0	1.50	14.15	2.40	4.43	16.00	3.04	80.71	80.69
L-O7-5-502.1	L_L-O7-5-502.1	Trapezoidal	O7-5-502	O7-O-002	81.45	82.5	1	100	5.00	70.00	-1.50	0.00	0.00	0.00	0.00	0.00
L_L-O7-5-503	L_L-O7-5-503	Circular	O7-5-503	O7-5-501	77.29	76.72	1	0	1.50	91.17	0.63	8.27	15.84	4.64	80.91	80.69
L_L-O7-O-002	L_L-O7-O-002	Circular	O7-O-002	O7-O-001	76.14	75.52	1	0	2.50	20.90	2.97	20.41	16.00	4.19	80.31	80.29
L_L-O7-5-701	L_L-O7-5-701	Circular	O7-5-701	O7-5-502	77.08	77.08	1	0	1.50	24.95	0.00	1.43	16.00	1.63	80.71	80.71
L_L-O7-4-201 SS	L_L-O7-4-201	Rectangular	O7-4-201	O7-O-000	76.04	75.84	2	4	2.00	115.97	0.17	126.73	16.11	7.87	81.78	80.27
L_L-O7-4-201 RDWY	L_L-O7-4-201	Natural	O7-4-201	O7-O-000	80.48	81.02	1	0	10.00	115.97	-0.47	38.88	16.43	1.92	81.78	81.67
L_L-07-4-202 SS	L_L-O7-4-202	Rectangular	O7-4-202	O7-4-201	76.11	76.04	2	4	2.00	40.48	0.17	101.76	15.94	6.32	81.84	81.78
L_L-07-4-202 RDWY	L_L-O7-4-202	Natural	O7-4-202	O7-4-201	80.24	80.48	1	0	10.00	40.48	-0.59	114.48	16.39	3.16	81.84	81.78
L_L-O7-4-203 SS	L_L-O7-4-203	Circular	O7-4-203	O7-4-202	76.54	76.11	1	0	2.00	296.10	0.17	21.90	15.51	7.09	82.19	81.84
L_L-O7-4-203 RDWY	L_L-O7-4-203	Natural	O7-4-203	O7-4-202	80.36	80.24	1	0	10.00	296.10	0.04	144.04	16.37	3.17	82.19	81.84
L_L-O7-4-401	L_L-O7-4-401	Circular	O7-4-401	O7-4-202	76.5	76.11	1	0	2.00	48.14	0.81	9.88	16.01	3.12	81.90	81.84
L_L-O7-4-204 SS	L_L-O7-4-204	Circular	O7-4-204	O7-4-203	76.77	76.54	1	0	2.00	296.66	0.08	11.13	15.32	3.53	82.30	82.19
L_L-O7-4-204 RDWY	L_L-O7-4-204	Natural	O7-4-204	O7-4-203	80.45	80.36	1	0	10.00	296.66	0.03	97.91	16.35	1.78	82.30	82.19
L_L-O7-4-204 DITCH	L_L-O7-4-204	Natural	O7-4-204	O7-4-203	79.95	79.98	1	0	10.00	296.66	-0.01	32.82	16.34	2.32	82.30	82.19
L_L-O7-4-402 SS	L_L-O7-4-402	Circular	O7-4-402	O7-4-203	76.54	76.48	1	0	1.50	35.41	0.17	8.70	15.41	4.87	82.19	82.19
L_L-O7-4-402 RDWY	L_L-O7-4-402	Trapezoidal	O7-4-402	O7-4-203	80.36	80.33	1	100	5.00	35.41	0.09	18.24	16.25	0.69	82.19	82.19
L_L-O7-4-205	L_L-O7-4-205	Circular	O7-4-205	O7-4-204	76.84	76.77	1	0	2.00	68.46	0.10	22.09	16.25	6.95	82.92	82.30
L_L-07-4-206 SS	L_L-O7-4-206	Circular	O7-4-206	O7-4-204	76.92	76.77	1	0	1.50	194.87	0.08	7.27	20.28	4.08	82.35	82.30
L_L-07-4-206 RDWY	L_L-O7-4-206	Natural	O7-4-206	O7-4-204	80.79	80.45	1	0	10.00	194.87	0.17	73.04	16.42	1.51	82.35	82.30
L_L-07-4-206 DITCH	L_L-O7-4-206	Natural	O7-4-206	O7-4-204	80.47	79.95	1	0	10	194.87	0.267	23.96	16.437	2.2	82.35	82.30
L_L-O7-4-403 SS	L_L-O7-4-403	Circular	O7-4-403	O7-4-204	76.77	76.72	1	0	1.5	30.41	0.164	8.131	20.112	4.56	82.30	82.30
L_L-O7-4-403 RDWY	L_L-O7-4-403	Trapezoidal	O7-4-403	O7-4-204	80.48	80.45	1	100	5	30.41	0.099	18.68	16.25	0.83	82.30	82.30
L_L-O7-4-207 SS	L_L-O7-4-207	Circular	O7-4-207	O7-4-206	77.15	76.92	1	0	1.5	110.45	0.208	6.498	20.35	3.65	82.38	82.35
L_L-O7-4-207 RDWY	L_L-O7-4-207	Natural	O7-4-207	O7-4-206	80.65	80.79	1	0	10	110.45	-0.127	72.897	16.421	1.56	82.38	82.35
L_L-O7-4-207 DITCH	L_L-O7-4-207	Natural	O7-4-207	O7-4-206	80.57	80.47	1	0	10	110.45	0.091	19.315	16.422	2.04	82.38	82.35
L_L-O7-4-404 SS	L_L-O7-4-404	Circular	O7-4-404	O7-4-206	77.5	75.72	1	0	1.5	13.3	13.383	2.806	20.282	1.57	82.35	82.35
L_L-O7-4-404 RDWY	L_L-O7-4-404	Trapezoidal	O7-4-404	O7-4-206	80.78	80.77	1	100	5	13.3	0.075	5.4	16.002	0.25	82.35	82.35
L_L-07-4-208 SS	L_L-O7-4-208	Circular	O7-4-208	O7-4-207	77.19	77.15	1	0	1.5	279.63	0.014	5.615	20.832	3.15	82.47	82.38
L_L-07-4-208 RDWY	L_L-O7-4-208	Natural	O7-4-208	O7-4-207	80.92	80.65	1	0	10	279.63	0.097	71.745	16.412	1.56	82.47	82.38
L_L-07-4-208 DITCH	L_L-O7-4-208	Natural	O7-4-208	O7-4-207	80.7	80.57	1	0	10	279.63	0.046	16.791	16.417	1.83	82.47	82.38
L_L-O7-4-405 SS	L_L-O7-4-405	Circular	O7-4-405	O7-4-207	77.33	77.15	1	0	1.5	32	0.66	9.22	19.8	5.16	82.52	82.52
L_L-O7-4-405 RDWY	L_L-O7-4-405	Trapezoidal	O7-4-405	O7-4-207	81.5	81.47	1	100	5	32	0.1	4.832	16.253	0.81	82.52	82.52
L_L-O7-4-209 SS	L_L-O7-4-209	Circular	O7-4-209	O7-4-208	77.36	77.19	1	0	1.5	371.57	0.046	5.365	22.201	3.02	82.52	82.47
L_L-O7-4-209 RDWY	L_L-O7-4-209	Natural	O7-4-209	O7-4-208	80.48	80.92	1	0	10	371.57	-0.118	63.013	16.407	0.85	82.52	82.47
L_L-O7-4-209 DITCH	L_L-O7-4-209	Natural	O7-4-209	O7-4-208	80.34	80.7	1	0	10	371.57	-0.097	12.835	16.415	1.23	82.52	82.47
L_L-O7-4-406 SS	L_L-O7-4-406	Circular	O7-4-406	O7-4-208	78.02	77.19	1	0	1.5	29.6	2.804	6.522	20.941	3.66	82.47	82.47
L_L-O7-4-406 RDWY	L_L-O7-4-406	Trapezoidal	O7-4-406	O7-4-208	81	80.92	1	100	5	29.6	0.034	17.133	16.002	0.65	82.47	82.47
L_L-O7-4-210 SS	L_L-O7-4-210	Circular	O7-4-210	O7-4-209	77.4	77.36	1	0	1.5	207.43	0.005	4.628	22.276	2.6	82.54	82.52
L_L-O7-4-210 RDWY	L_L-O7-4-210	Natural	O7-4-210	O7-4-209	80.57	80.48	1	0	10	207.43	0.043	62.104	16.346	0.88	82.54	82.52
L_L-O7-4-407 SS	L_L-O7-4-407	Circular	O7-4-407	O7-4-209	77.95	77.36	1	0	1.5	64.6	0.913	6.415	15.146	3.61	82.52	82.52
L_L-O7-4-407 RDWY	L_L-O7-4-407	Trapezoidal	O7-4-407	O7-4-209	80.72	80.71	1	100	5	64.6	0.015	15.548	16.083	0.54	82.52	82.52
L_L-O7-4-211 SS	L_L-O7-4-211	Circular	O7-4-211	O7-4-210	77.43	77.4	1	0	1.5	119.28	0.05	8.733	15.599	4.88	82.59	82.54
L_L-O7-4-211 RDWY	L_L-O7-4-211	Trapezoidal	O7-4-211	O7-4-210	82.22	82.21	1	100	5	119.28	0.008	36.981	16.06	1.45	82.59	82.54
L_L-O7-4-212 SS	L_L-O7-4-212	Circular	O7-4-212	O7-4-210	77.42	77.4	1	0	1.5	233.59	0.021	-2.143	15.212	-1.26	82.54	82.54
L_L-O7-4-212 RDWY	L_L-O7-4-212	Natural	O7-4-212	O7-4-210	80.36	80.57	1	0	10	233.59	-0.09	17.302	16.317	-0.37	82.54	82.54
L_L-O7-4-408 SS	L_L-O7-4-408	Circular	O7-4-408	O7-4-210	76.95	77.4	1	0	1.5	59.27	-0.759	-2.536	15.134	-1.43	82.54	82.54
L_L-O7-4-408 RDWY	L_L-O7-4-408	Trapezoidal	O7-4-408	O7-4-210	81.22	81.16	1	100	5	59.27	0.101	10.262	16.338	0.17	82.54	82.54
L_L-O7-4-409 SS	L_L-O7-4-409	Circular	O7-4-409	O7-4-212	77.47	77.42	2	0	1.5	22.32	0.224	3.078	22.503	0.87	82.54	82.54
L_L-O7-4-409 RDWY	L_L-O7-4-409	Trapezoidal	O7-4-409	O7-4-212	80.37	80.36	1	100	5	28	0.036	18.28	16.251	0.37	82.54	82.54
L_L-O7-8-601 SS	L_L-O7-8-601	Rectangular	O7-8-601	O7-O-000	75.92	75.87	2	4	2	94.14	0.053	45.417	16.133	2.82	80.33	80.27
L_L-O7-8-601 RDWY	L_L-O7-8-601	Natural	O7-8-601	O7-O-000	80.57	81.02	1	0	10	94.14	-0.478	0	0	0	0.00	0.00

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-O7-8-602 SS	L_L-O7-8-602	Circular	O7-8-602	O7-8-601	75.99	75.92	2	0	2	94.12	0.074	39.451	15.633	6.25	80.34	80.33
L_L-O7-8-602 RDWY	L_L-O7-8-602	Natural	O7-8-602	O7-8-601	80.72	80.57	1	0	10	94.12	0.159	0	0	0	0.00	0.00
L_L-O7-8-602 DITCH	L_L-O7-8-602	Natural	O7-8-602	O7-8-601	79.09	78.72	1	0	10	94.12	0.393	31.372	16.31	3.48	80.34	80.33
L_L-O7-8-801	L_L-O7-8-801	Circular	O7-8-801	O7-8-601	76.5	75.92	1	0	1.5	26.19	2.215	1.331	15.999	2.17	80.33	80.33
L-L-O7-8-505 SS	L_L-O7-8-505	Circular	O7-8-505	O7-8-602	77.07	75.99	1	0	1.5	230.35	0.469	9.059	15.453	5.1	80.88	80.34
L-L-O7-8-505 RDWY	L_L-O7-8-505	Trapezoidal	O7-8-505	O7-8-602	83.52	83.32	1	100	5	230.35	0.087	0	0	0	0.00	0.00
L_L-O7-8-603 SS	L_L-O7-8-603	Circular	O7-8-603	O7-8-602	76.01	75.99	2	0	2	242.72	0.004	25.825	15.63	4.09	80.77	80.34
L_L-O7-8-603 RDWY	L_L-O7-8-603	Natural	O7-8-603	O7-8-602	79.81	80.72	1	0	10	242.72	-0.375	1.209	16.276	0.14	80.77	80.77
L_L-O7-8-603 DITCH	L_L-O7-8-603	Natural	O7-8-603	O7-8-602	80.22	79.09	1	0	10	242.72	0.466	5.677	16.27	1.66	80.77	80.34
L_L-O7-8-504 SS	L_L-O7-8-504	Circular	O7-8-504	O7-8-505	76.06	76.82	1	0	2	184.31	-0.412	3.15	16.255	0.99	80.91	80.88
L_L-O7-8-504 RDWY	L_L-O7-8-504	Natural	O7-8-504	O7-8-505	80.28	80.54	1	0	10	184.31	-0.141	3.955	16.262	0.57	80.91	80.88
L-O7-8-504.1	L_L-O7-8-504.1	Trapezoidal	O7-8-504	O7-5-503	80.21	80.7	1	100	5	10	-4.9	-4.04	16.251	-0.09	80.91	80.91
L-O7-8-504.2	L_L-O7-8-504.2	Natural	O7-8-504	O7-5-502	80.21	81.45	1	0	0	128	-0.969	0	0	0	0.00	0.00
L_L-O7-8-507 SS	L_L-O7-8-506	Circular	O7-8-506	O7-8-505	77.35	76.82	1	0	2	151.18	0.351	7.453	15.446	2.92	80.87	80.88
L_L-O7-8-507 RDWY	L_L-O7-8-506	Natural	O7-8-506	O7-8-505	80.34	80.54	1	0	10	151.18	-0.132	-0.892	16.291	0.35	80.87	80.88
L_L-O7-8-604 SS	L_L-O7-8-604	Circular	O7-8-604	O7-8-603	76.5	76.01	2	0	2	158.98	0.006	21.509	15.369	3.39	80.77	80.77
L_L-O7-8-604 RDWY	L_L-O7-8-604	Natural	O7-8-604	O7-8-603	79.54	79.81	1	0	10	158.98	-0.17	10.415	15.857	1.08	80.77	80.77
L_L-O7-8-604 DITCH	L_L-O7-8-604	Natural	O7-8-604	O7-8-603	81.16	80.22	1	0	10	158.98	0.591	0	0	0	0.00	0.00
L_L-O7-8-803 SS	L_L-O7-8-803	Circular	O7-8-803	O7-8-603	76.97	76.01	1	0	1	24.21	3.965	4.838	15.54	6.08	80.77	80.77
L_L-O7-8-511 RDWY.1	L_L-O7-8-803	Trapezoidal	O7-8-803	O7-8-603	79.81	79.79	1	100	5	24.21	0.083	23.812	16.252	0.91	80.77	80.77
L_L-O7-8-508 SS	L_L-O7-8-508	Circular	O7-8-508	O7-8-506	77.1	77.32	1	0	1.5	52.9	-0.416	2.156	15.43	-1.26	80.87	80.87
L_L-O7-8-508 RDWY	L_L-O7-8-508	Trapezoidal	O7-8-508	O7-8-506	80.22	80.17	1	50	10	52.9	0.095	-12.71	16.258	-0.36	80.87	80.87
L_L-O7-8-605 SS	L_L-O7-8-605	Circular	O7-8-605	O7-8-604	76.13	76.5	2	0	2	56.45	0.213	18.128	15.358	2.82	80.77	80.77
L_L-O7-8-605 RDWY	L_L-O7-8-605	Natural	O7-8-605	O7-8-604	79.14	79.54	1	0	10	56.45	-0.709	8.712	15.723	0.76	80.77	80.77
L_L-O7-8-509 SS	L_L-O7-8-509	Circular	O7-8-509	O7-8-508	77.37	77.1	1	0	1.5	50.73	0.532	1.385	15.429	1	80.87	80.87
L_L-O7-8-509 RDWY	L_L-O7-8-509	Trapezoidal	O7-8-509	O7-8-508	80.22	80.17	1	50	5	50.73	0.099	-20.263	16.256	-0.57	80.87	80.87
L_L-O7-8-510	L_L-O7-8-510	Circular	O7-8-510	O7-8-605	76.13	75.72	1	0	2	183.18	0.224	9.07	15.334	2.88	80.82	80.77
L_L-O7-8-804 SS	L_L-O7-8-804	Circular	O7-8-804	O7-8-605	76.19	76.13	1	0	2	94.31	0.064	9.831	15.359	3.12	80.77	80.77
L_L-O7-8-804 RDWY	L_L-O7-8-804	Natural	O7-8-804	O7-8-605	79.03	79.14	1	0	10	94.31	-0.117	-11.157	16.502	0.8	80.77	80.77
L_L-O7-8-511 SS	L_L-O7-8-511	Circular	O7-8-511	O7-8-510	76.47	75.72	1	0	1	21.23	3.533	3.405	15.362	4.28	80.82	80.82
L_L-O7-8-511 RDWY	L_L-O7-8-511	Trapezoidal	O7-8-511	O7-8-510	79.33	79.31	1	100	5	21.23	0.094	35.773	16.249	0.52	80.82	80.82
O7-8-511.1 RD	L_L-O7-8-511.1	Natural	O7-8-511	O7-8-509	79.8	80.05	1	0	0	98.4	-0.254	-24.222	16.265	-1.38	80.82	80.87
L_L-O7-8-512 SS	L_L-O7-8-512	Circular	O7-8-512	O7-8-510	75.88	75.72	1	0	1.5	146.6	0.109	6.113	15.336	3.44	80.81	80.82
L_L-O7-8-512 RDWY	L_L-O7-8-512	Natural	O7-8-512	O7-8-510	79.3	79.11	1	0	10	146.6	0.13	-30.846	16.261	0.85	80.81	80.82
L_L-O7-8-805 SS	L_L-O7-8-805	Circular	O7-8-805	O7-8-804	76.42	76.17	1	0	1.25	24.46	1.022	6.539	15.36	5.28	80.77	80.77
L_L-O7-8-805 RDWY	L_L-O7-8-805	Trapezoidal	O7-8-805	O7-8-804	79.3	79.28	1	100	5	24.46	0.082	21.649	16	0.74	80.77	80.77
L_L-O7-8-806 SS	L_L-O7-8-806	Circular	O7-8-806	O7-8-804	76.44	76.17	1	0	1.5	235.32	0.115	3.295	15.403	1.85	80.74	80.77
L_L-O7-8-806 RDWY	L_L-O7-8-806	Natural	O7-8-806	O7-8-804	79.57	79.03	1	0	10	235.32	0.229	-30.535	16.271	-0.87	80.74	80.77
L_L-O7-8-513	L_L-O7-8-513	Circular	O7-8-513	O7-8-512	76.81	76.4	1	0	1.5	45.64	0.898	3.063	16.002	2.95	80.84	80.81
L_L-O7-8-514 SS	L_L-O7-8-514	Circular	O7-8-514	O7-8-512	76.5	76	1	0	1.5	105.96	0.472	4.667	15.328	2.63	80.79	80.81
L_L-O7-8-514 RDWY	L_L-O7-8-514	Natural	O7-8-514	O7-8-512	79.6	79.3	1	0	10	105.96	0	-32.914	16.27	-1.05	80.79	80.81
L_L-07-8-807 SS	L_L-O7-8-807	Circular	O7-8-807	O7-8-806	76.36	76.44	1	0	1.5	98.5	-0.081	3.134	15.406	1.76	80.69	80.74
L_L-07-8-807 RDWY	L_L-O7-8-807	Natural	O7-8-807	O7-8-806	79.72	79.57	1	0	10	98.5	0.152	-30.287	16.284	-1.34	80.69	80.74
L_L-O7-O-003	L_L-O7-O-003	Circular	O7-O-003	O7-8-513	76.79	76.81	1	0	1.5	8.6	-0.233	1.387	16.002	2.86	80.84	80.84
INTERSECTION AT E. LITTLE YORK RD	INTERSECTION AT E. LITTLE YORK RD	Trapezoidal	O7-8-515	O7-8-807	80.23	80.22	1	165	10	178	0	24.232	16.253	0.61	80.70	80.69
L_L-O7-8-515 SS	L_L-O7-8-515	Circular	O7-8-515	O7-8-514	77.02	76.5	1	0	1.5	108.1	0.481	4.083	15.329	2.3	80.70	80.79
L_L-O7-8-515 RDWY	L_L-O7-8-515	Natural	O7-8-515	O7-8-514	79.85	79.6	1	0	10	108.1	0.231	-34.684	16.273	-1.64	80.70	80.79
L_L-O7-O-501	L_L-O7-O-501	Circular	O7-O-501	O7-8-514	77.22	76.62	1	0	1.5	62.09	0.966	0.511	19.826	1.7	80.79	80.79
L_L-O7-8-808	L_L-O7-8-808	Circular	O7-8-808	O7-8-807	76.72	76.52	1	0	1.5	15.18	1.318	1.527	16.001	0.86	80.70	80.69
L_L-O7-8-809 SS	L_L-O7-8-809	Circular	O7-8-809	O7-8-807	76.17	76.36	1	0	1.5	38.26	0.209	-4.243	15.963	-2.37	80.64	80.69
L_L-O7-8-809 RDWY	L_L-O7-8-809	Natural	O7-8-809	O7-8-807	79.62	79.72	1	0	10	38.26	-0.261	-53.5	16.293	-2.69	80.64	80.69
L-O7-8-809.1 RDWY	L_L-O7-8-809.1	Natural	O7-8-809	C4-2-210	79.58	78.72	1	0	0	535	0.228	63.321	16.296	2.63	80.64	80.12
L_L-O7-8-516 SS	L_L-O7-8-516	Circular	O7-8-516	O7-8-515	77.12	77.02	1	0	1.5	221.59	0.045	-2.76	15.638	-1.55	80.63	80.70
L_L-O7-8-516 RDWY	L_L-O7-8-516	Natural	O7-8-516	O7-8-515	79.18	79.85	1	0	10	221.59	-0.302	-31.245	16.334	-1.33	80.63	80.70
L-O7-8-516.1 RDWY	L_L-O7-8-516.1	Natural	O7-8-516	C4-3-311	79.81	79.28	1	0	0	297	0.178	24.211	16.354	1.27	80.63	80.59

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-O7-8-516.1 DITCH	L_L-O7-8-516.1	Trapezoidal	O7-8-516	C4-3-311	79.31	78.65	1	0	0.5	297	0.222	11.288	16.363	2.34	80.63	80.59
L_L-O7-8-802	L_L-O7-8-802	Circular	O7-8-802	O7-8-602	76.72	75.99	1	0	1.5	31.57	2.312	1.524	16.002	0.86	80.35	80.34
L_L-O7-8-507	L_L-O7-8-507	Circular	O7-8-507	O7-8-506	77.44	77.39	1	0	1.5	4.326	1.156	13.778	16.001	7.73	80.93	80.87
Link1348	Link1348	Trapezoidal	Node1273	O7-4-408	79.72	79.22	1	12	8	120	0.417	-2.27	15.142	-0.3	82.54	82.54
Link1349	Link1349	Trapezoidal	Node1275	O7-4-211	80.22	79.22	1	12	2	250	0.4	-8.867	15.533	-0.35	82.59	82.59
O7-1-101 SS	L_L-O7-1-101	Circular	O7-1-101	O7-O-004	74.57	74.47	1	0	5	106.383	0.094	257.199	16.539	13.24	79.88	78.93
O7-1-101 RD	L_L-O7-1-101	Trapezoidal	O7-1-101	O7-O-004	80.8	81	1	100	0.16	106.4	-0.188	0	0	0	0.00	0.00
O7-1-102 SS	L_L-O7-1-102	Circular	O7-1-102	O7-1-101	74.62	74.57	1	0	5	77.154	0.065	257.192	16.538	12.65	80.57	79.88
O7-1-102 RD	L_L-O7-1-102	Trapezoidal	O7-1-102	O7-1-101	81.9	80.8	1	100	5	77.2	1.425	0	0	0	0.00	0.00
O7-1-103 SS	L_L-O7-1-103	Circular	O7-1-103	O7-1-102	74.82	74.62	1	0	5	215.827	0.093	234.193	16.852	11.67	82.06	80.57
O7-1-103 RD	L_L-O7-1-103	Trapezoidal	O7-1-103	O7-1-102	81.06	81.9	1	100	5	215.8	-0.389	36.201	16.539	0.63	82.06	82.04
O7-1-104 SS	L_L-O7-1-104	Rectangular	O7-1-104	O7-1-103	74.92	74.82	1	5	3	125.639	0.08	83.347	17.272	5.53	82.06	82.06
O7-1-104 RD	L_L-O7-1-104	Trapezoidal	O7-1-104	O7-1-103	79.9	81.06	1	100	5	33	-3.515	85.616	16.462	0.76	82.06	82.06
L_L-O7-1-105	L_L-O7-1-105	Circular	O7-1-105	O7-1-104	75.76	74.92	1	0	1.5	92.051	0.913	32.181	16.004	17.56	89.58	82.06
L_L-O7-1-106	L_L-O7-1-106	Rectangular	O7-1-106	O7-1-104	75.02	74.92	1	5	3	104.544	0.096	43.055	15.562	2.86	82.07	82.06
L_L-O7-1-107	L_L-O7-1-107	Circular	O7-1-107	O7-1-106	76.67	75.02	1	0	1.5	20	8.25	5.443	15.306	7.25	82.08	82.07
L_L-O7-1-108	L_L-O7-1-108	Rectangular	O7-1-108	O7-1-106	75.07	75.02	1	5	3	67.799	0.074	40.425	15.564	2.69	82.07	82.07
L_L-O7-1-109	L_L-O7-1-109	Circular	O7-1-109	O7-1-108	75.12	75.07	1	0	1.5	9.636	0.519	21.999	17.542	12.28	82.07	82.07
L-O7-1-109.1	L_L-O7-1-109.1	Trapezoidal	O7-1-109	O7-1-104	79.8	79.9	1	100	5	169.9	-0.059	53.938	16.601	0.77	82.07	82.06
L_L-O7-1-110	L_L-O7-1-110	Rectangular	O7-1-110	O7-1-108	75.82	75.07	1	5	3	131.274	0.571	49.328	15.709	3.28	82.07	82.07
L_L-O7-1-111	L_L-O7-1-111	Circular	O7-1-111	O7-1-110	75.85	75.82	1	0	1.5	13.212	0.227	-9.295	15.931	-5.18	82.07	82.07
L-O7-1-111.1	L_L-O7-1-111.1	Natural	O7-1-111	O7-1-109	80.4	79.8	1	0	0	131.9	0.455	48.541	16.45	1.65	82.07	82.07
L_L-O7-1-501	L_L-O7-1-501	Rectangular	O7-1-501	O7-1-110	75.92	75.82	1	5	3	164.864	0.061	46.937	15.759	3.12	82.08	82.07
L_L-O7-1-502	L_L-O7-1-502	Circular	O7-1-502	O7-1-501	76.26	75.92	1	0	1.5	9.636	3.528	11.44	15.765	6.39	82.08	82.08
L-O7-1-502.1	L_L-O7-1-502.1	Natural	O7-1-502	O7-1-111	80.8	80.4	1	0	0	165	0.242	42.803	16.44	2.19	82.08	82.07
L_L-O7-1-503	L_L-O7-1-503	Rectangular	O7-1-503	O7-1-501	75.97	75.92	1	5	3	209.321	0.024	36.884	15.718	2.45	82.09	82.08
L_L-O7-1-504	L_L-O7-1-504	Circular	O7-1-504	O7-1-503	76.03	75.97	1	0	1.5	8.911	0.673	11.461	15.668	6.4	82.10	82.09
L-O7-1-504.1	L_L-O7-1-504.1	Natural	O7-1-504	O7-1-502	80.4	80.8	1	0	0	209.7	-0.191	33.284	16.448	1.4	82.10	82.08
L_L-O7-1-505	L_L-O7-1-505	Rectangular	O7-1-505	O7-1-503	76.39	75.97	1	5	3	98.099	0.428	27.273	15.734	1.81	82.09	82.09
L_L-O7-1-506	L_L-O7-1-506	Circular	O7-1-506	O7-1-505	76.55	76.39	1	0	1.5	9.265	1.727	7.517	15.899	4.2	82.10	82.09
L-O7-1-506.1	L_L-O7-1-506.1	Natural	O7-1-506	O7-1-504	80.7	80.4	1	0	0	98.1	0.306	24.691	16.449	0.92	82.10	82.10
L_L-O7-1-507	L_L-O7-1-507	Rectangular	O7-1-507	O7-1-505	76.79	76.39	1	5	3	97.161	0.412	24.671	15.652	2.17	82.09	82.09
L_L-O7-1-508	L_L-O7-1-508	Circular	O7-1-508	O7-1-507	76.83	76.79	1	0	1.5	10.444	0.383	13.041	15.688	7.3	82.10	82.09
L-O7-1-508.1	L_L-O7-1-508.1	Natural	O7-1-508	O7-1-506	80.44	80.7	1	0	0	96.5	-0.269	27.697	16.438	1.19	82.10	82.10
L_L-O7-1-509	L_L-O7-1-509	Circular	O7-1-509	O7-1-507	76.99	76.79	1	0	2	79.716	0.251	14.88	15.513	4.72	82.10	82.09
L_L-O7-1-510	L_L-O7-1-510	Circular	O7-1-510	O7-1-509	77.47	76.99	1	0	1.5	16.271	2.95	14.92	17.521	8.39	82.11	82.10
L-O7-1-510.1	L_L-O7-1-510.1	Natural	O7-1-510	O7-1-508	80.37	80.44	1	0	0	80	-0.087	27.259	16.094	1.65	82.11	82.10
L_L-O7-1-511	L_L-O7-1-511	Circular	O7-1-511	O7-1-509	76.92	76.99	1	0	1.5	158.332	0.044	6.04	17.515	3.38	82.11	82.10
L-O7-1-511.1	L_L-O7-1-511.1	Natural	O7-1-511	O7-1-510	81	80.37	1	0	0	160.3	0.393	3.793	17.088	0.38	82.11	82.11
O7-1-511.1 RD	L_L-O7-1-511.2	Trapezoidal	O7-1-511	O7-O-002	81	82.6	1	100	5	45	-3.556	0	0	0	82.11	82.11
L-C4-O-920	L-C4-O-920	Natural	C4-O-920	C4-O-919	75.41	75.2	1	0	4.7	452	0.046	213.588	16.355	1.59	80.17	80.06
L-C4-O-919	L-C4-O-919	Natural	C4-O-919	C4-O-918	75.2	73.35	1	0	3.839	482.43	0.383	202.122	16.392	0.99	80.06	80.03
L-C4-O-918	L-C4-O-918	Natural	C4-O-918	C4-O-917	73.35	74.62	1	0	6.07	311.89	-0.407	242.998	16.492	1.25	80.03	80.02
L-C4-O-917	L-C4-O-917	Natural	C4-O-917	C4-O-916	74.62	74.25	1	0	4.239	274.66	0.135	218.183	16.687	-0.13	80.02	80.02
L-C4-O-917.1	L-C4-O-917.1	Trapezoidal	C4-O-917	C4-O-917.1	78	80	1	30	3	670	-0.299	2.649	16.938	0.05	80.02	80.02
L-C4-O-916	L-C4-O-916	Natural	C4-O-916	C4-O-915	74.25	73.11	1	0	6.25	12.8	8.906	211.653	16.759	-0.52	80.02	80.02
L-C4-O-915 B1	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	72.92	1	5	3	778.4	0.101	56.274	17.05	3.73	80.02	78.59
L-XS-13-B2	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	73.24	1	5	3	778.4	0.06	56.256	17.05	3.73	80.02	78.59
L-XS-13-CHANNEL	L-C4-O-915	Trapezoidal	C4-O-915	C4-O-914	78.32	78.3	1	50	10	778.4	0.242	253.996	17.018	1.09	80.02	78.89
L-C4-O-914	L-C4-O-914	Natural	C4-O-914	C4-O-913	72.92	73.67	1	0	5.39	464.81	-0.161	348.883	16.911	3.28	78.59	78.21
L-C4-O-914.1	L-C4-O-914.1	Trapezoidal	C4-O-914	C4-O-914.1	77	78	1	80	2	424	-0.236	122.507	16.96	1.17	78.59	78.53
L-C4-O-913	L-C4-O-913	Natural	C4-O-913	C4-O-912	73.67	72.25	1	0	5.39	481.28	0.295	341.043	16.983	0.3	78.21	78.21
L-C4-O-912 B1	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.25	72.28	1	4	3	75.02	-0.04	77.337	15.932	6.66	78.21	78.19
L-XS-10.4-B2	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.3	72.27	1	4	3	75.02	0.04	77.381	15.929	6.6	78.21	78.19
L-XS-10.4-SPILL	L-C4-O-912	Natural	C4-O-912	C4-O-911	77.5	76	1	10	0.05	75.02	1.999	414.063	17.118	1.43	78.21	78.19
L-C4-O-907	L-C4-O-907	Natural	C4-O-907	C4-O-906	72.13	72.09	1	0	5.2	35.01	0.114	-92.526	16.374	2.52	78.01	78.00

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-C4-O-907.1	L-C4-O-907.1	Natural	C4-O-907	C4-O-907.1	75	77	1	115	2.5	360	-0.556	135.724	17.016	0.29	78.01	78.00
L-C4-O-911	L-C4-O-911	Natural	C4-O-911	C4-O-910	72.27	72.59	1	0	5.62	312.14	-0.103	433.672	17.038	0.48	78.19	78.19
L-C4-O-910	L-C4-O-910	Natural	C4-O-910	C4-O-909	72.59	71.69	1	0	4.539	409.86	0.22	335.274	17.121	0.27	78.19	78.18
L-C4-O-910.1	L-C4-O-910.1	Natural	C4-O-910	C5-O-902	77.5	75.5	1	0	0	1490	0.134	70.621	17.463	0.47	78.19	77.19
L-C4-O-909.1	L-C4-O-909.1	Natural	C4-O-909	C4-O-909.1	76	77.5	1	0	0	200	-0.75	174.961	17.139	0.38	78.18	78.17
L-C4-O-909 CULV	L-C4-O-909	Rectangular	C4-O-909	C4-O-908	71.69	71.64	1	2	4	45.64	0.1	46.432	28.728	5.85	78.18	78.01
L-C4-O-909 SPILL	L-C4-O-909	Trapezoidal	C4-O-909	C4-O-908	76	75.9	1	5	5	45.64	0.219	141.559	17.511	2.48	78.18	78.01
L-C4-O-906	L-C4-O-906	Natural	C4-O-906	C4-O-905	72.09	71.65	1	0	6.56	96.36	0.457	-93.427	16.375	1.76	78.00	78.00
Link1404	Link1404	Trapezoidal	C4-O-903	C4-2-203	77.5	77	1	45	3	200	0.355	-91.985	16.353	1.79	78.31	78.38
L-C4-O-903 PIPE	L-C4-O-903	Circular	C4-O-903	C4-O-902	71.3	70.97	1	0	4	43.33	0.762	128.929	20.813	10.24	78.31	78.38
L-C4-O-903 RDWY	L-C4-O-903	Trapezoidal	C4-O-903	C4-O-902	77.7	77.1	1	35	2	43.33	1.385	139.937	16.481	3.46	78.31	78.38
L-C4-O-902 PIPE	L-C4-O-902	Circular	C4-O-902	C4-O-901	70.67	70.43	1	0	4	520.37	0.046	103.286	20.822	8.28	78.38	78.35
L-C4-O-902 RDWY	L-C4-O-902	Trapezoidal	C4-O-902	C4-O-901	77	76.5	1	35	2	520.37	0.096	81.882	17.238	1.91	78.38	78.35
L-C4-O-901 PIPE	L-C4-O-901	Circular	C4-O-901	C4-O-900	70.43	70.39	1	0	4	143.16	0	109.428	20.828	10.09	78.35	78.34
L-C4-O-901 RDWY	L-C4-O-901	Trapezoidal	C4-O-901	C4-O-900	76.6	76.4	1	35	5	143.16	0.14	137.493	16.603	2.46	78.35	78.34
L-C4-O-900	L-C4-O-900	Trapezoidal	C4-O-900	C4-400	70.39	69.51	1	10	6	63	1.397	152.107	16.611	2.67	78.34	78.34
L-C4-O-908	L-C4-O-908	Natural	C4-O-908	C4-O-907	71.64	72.13	1	0	5.58	239.72	-0.204	163.932	17.542	1.43	78.01	78.01
L-C4-O-904	L-C4-O-904	Natural	C4-O-904	C4-O-903	71.4	71.3	1	0	6.56	86.1	0.116	108.559	20.803	2.39	78.30	78.31
L-C4-O-905 PIPE	L-C4-O-905	Circular	C4-O-905	C4-O-904	71.65	71.4	1	0	3	48.45	0.516	72.563	24.226	10.22	78.00	78.30
L-C4-O-905 RDWY	L-C4-O-905	Trapezoidal	C4-O-905	C4-O-904	77.4	77	1	10	1	48.45	0.826	-41.228	16.593	4.82	78.13	78.30
L-C5-O-902.1	L-C5-O-902.1	Trapezoidal	C5-O-902	C6-O-902.1	75.5	76.5	1	24	5	520	-0.192	40.86	17.497	0.88	77.19	77.15
L-C5-O-902 SS	L-C5-O-902	Rectangular	C5-O-902	C5-O-903	67.11	65.61	2	6	6	1800	0.083	269.831	18.444	4.21	77.19	75.83
L-C5-O-902 RD	L-C5-O-902	Trapezoidal	C5-O-902	C5-O-903	75.6	74	1	54	5	1800	0.083	390.504	17.62	3.3	77.19	75.83
L-C5-O-901.1	L-C5-O-901.1	Trapezoidal	C5-O-901	C6-O-901	76.5	75.5	1	80	5	2100	0.024	226.036	17.096	1.58	77.71	77.38
L-C5-O-901 SS	L-C5-O-901	Rectangular	C5-O-901	C5-O-902	68.8	67.11	1	7	6	1950	0.087	134.784	20.701	3.82	77.71	77.19
L-C5-O-901 RD	L-C5-O-901	Trapezoidal	C5-O-901	C5-O-902	77	75.5	1	54	5	1950	0.026	87.537	17.154	1.28	77.71	77.19
Link1367	Link1367	Natural	C4-O-000	Node1294	69.5	71.13	1	0	5.9	32.97	-4.944	331.32	16.394	2.62	78.26	78.26
803.1	L_L-C4-700	Rectangular	C4-700	C4-O-000	69.5	69.5	2	6	5	58.4	0	264.293	15.679	4.4	78.27	78.26
803.1.1	L_L-C4-700	Trapezoidal	C4-700	C4-O-000	76.5	76.4	1	50	5	58.4	0	274.656	16.423	2.94	78.27	78.26
L_L-C4-3-301 SS	L_L-C4-3-301	Rectangular	C4-3-301	C4-700	70.32	69.72	1	5	3	174.74	0.343	107.265	15.533	7.13	78.36	78.27
L_L-C4-3-301 RDWY	L_L-C4-3-301	Natural	C4-3-301	C4-700	76.25	76.26	1	0	10	174.74	-0.006	128.683	16.422	2.72	78.36	78.27
L_L-C4-3-301 DITCH	L_L-C4-3-301	Trapezoidal	C4-3-301	C4-700	74.69	74.47	1	0	1	174.74	0	201.28	16.383	2.2	78.36	78.27
L_L-C4-600	L_L-C4-600	Rectangular	C4-600	C4-700	69.51	69.5	2	6	5	282.94	0.004	132.155	18.334	2.65	78.27	78.27
L_L-C4-7-701 SS	L_L-C4-7-701	Circular	C4-7-701	C4-700	70.81	69.72	1	0	2	263.53	0.414	8.268	20.48	2.62	78.27	78.27
L_L-C4-7-701 RDWY	L_L-C4-7-701	Natural	C4-7-701	C4-700	74.6	76.26	1	0	10	263.53	-0.63	12.156	16.026	0.25	78.27	78.27
L_L-C4-3-302 SS	L_L-C4-3-302	Rectangular	C4-3-302	C4-3-301	71.27	70.32	1	5	3	293.71	0.323	83.043	15.429	5.52	78.46	78.36
L_L-C4-3-302 RDWY	L_L-C4-3-302	Natural	C4-3-302	C4-3-301	75.88	76.25	1	0	10	293.71	0	140.752	16.368	2.6	78.46	78.36
L_L-C4-3-302 DITCH	L_L-C4-3-302	Trapezoidal	C4-3-302	C4-3-301	75.25	74.69	1	0	1	293.71	0	137.512	16.347	1.68	78.46	78.36
L_L-C4-2-201 SS	L_L-C4-2-201	Circular	C4-2-201	C4-600	70.81	70.51	1	0	3	180.14	0.167	42.261	15.654	5.95	78.31	78.27
L_L-C4-2-201 RDWY	L_L-C4-2-201	Natural	C4-2-201	C4-600	76.27	76.44	1	0	10	180.14	-0.094	86.652	16.332	2.9	78.31	78.27
L_L-C4-400	L_L-C4-400	Rectangular	C4-400	C4-600	69.51	69.5	2	6	5	67.76	0.015	152.224	16.613	2.53	78.34	78.27
L_L-C4-6-601 SS	L_L-C4-6-601	Circular	C4-6-601	C4-600	70.84	70.51	1	0	2	231.98	0.142	-12.692	15.831	-3.99	77.89	78.27
L_L-C4-6-601 RDWY	L_L-C4-6-601	Natural	C4-6-601	C4-600	75.18	76.44	1	0	10	231.98	-0.543	-273.65	16.472	-5.02	77.89	78.27
601.1 RD	L_L-C4-6-601.1	Natural	C4-6-601	C4-5-801	75.5	74.36	1	0	0	457.5	0.249	294.509	16.474	4.06	77.89	77.68
L_L-C4-3-101 SS	L_L-C4-3-101	Circular	C4-3-101	C4-3-302	73.38	71.75	1	0	1.5	30.96	5.265	27.01	15.313	15.21	78.45	78.46
L_L-C4-3-101 RDWY	L_L-C4-3-101	Trapezoidal	C4-3-101	C4-3-302	76.26	75.25	1	100	5	30.96	3.262	95.422	16.251	2.46	78.45	78.46
L_L-C4-3-303 SS	L_L-C4-3-303	Rectangular	C4-3-303	C4-3-302	72.29	71.27	1	5	3	499.64	0.204	58.703	15.599	3.9	78.71	78.46
L_L-C4-3-303 RDWY	L_L-C4-3-303	Natural	C4-3-303	C4-3-302	77.05	75.88	1	0	10	499.64	0.234	167.661	16.341	3.46	78.71	78.46
L_L-C4-2-202 SS	L_L-C4-2-202	Circular	C4-2-202	C4-2-201	71.36	70.86	1	0	3	428.62	0.117	32.254	15.518	4.55	78.37	78.31
L_L-C4-2-202 RDWY	L_L-C4-2-202	Natural	C4-2-202	C4-2-201	76	76.27	1	0	10	428.62	-0.063	80.881	16.294	1.98	78.37	78.31
L_L-C4-3-304 SS	L_L-C4-3-304	Rectangular	C4-3-304	C4-3-303	72.18	72.29	1	5	3	151.66	0.073	53.073	15.556	3.54	78.83	78.71
L_L-C4-3-304 RDWY	L_L-C4-3-304	Natural	C4-3-304	C4-3-303	76.6	77.05	1	0	10	151.66	-0.297	156.202	16.319	3.4	78.83	78.71
L_L-C4-2-203 SS	L_L-C4-2-203	Circular	C4-2-203	C4-2-202	71.47	71.36	1	0	2.5	212.39	0.052	19.649	15.51	3.98	78.38	78.37
L_L-C4-2-203 RDWY	L_L-C4-2-203	Natural	C4-2-203	C4-2-202	76.32	76	1	0	10	212.39	0.151	73.425	17.275	1.91	78.38	78.37
L_L-C4-3-305 SS	L_L-C4-3-305	Rectangular	C4-3-305	C4-3-304	72.37	72.18	1	5	3	59.71	0.318	51.13	15.426	3.41	78.86	78.83
L_L-C4-3-305 RDWY	L_L-C4-3-305	Natural	C4-3-305	C4-3-304	76.72	76.6	1	0	10	59.71	0.201	162.798	16.314	3.1	78.86	78.83

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C4-2-204 SS	L_L-C4-2-204	Circular	C4-2-204	C4-2-203	71.72	71.47	1	0	2.5	166.67	0.15	19.666	15.481	3.98	78.48	78.38
L_L-C4-2-204 RDWY	L_L-C4-2-204	Natural	C4-2-204	C4-2-203	76.52	76.32	1	0	10	166.67	0.12	150.504	16.327	3.25	78.48	78.38
L-L-C4-3-102 SS	L_L-C4-3-102	Circular	C4-3-102	C4-3-305	73.4	73.25	1	0	1.5	44.8	0.335	21.291	15.328	11.99	78.86	78.86
L-L-C4-3-102 RDWY	L_L-C4-3-102	Trapezoidal	C4-3-102	C4-3-305	75.6	76.59	1	100	5	44.8	-2.21	53.846	16.503	0.44	78.86	78.86
L_L-C4-3-306 SS	L_L-C4-3-306	Rectangular	C4-3-306	C4-3-305	72.55	72.37	1	5	3	168.41	0.107	38.171	15.435	2.54	78.90	78.86
L_L-C4-3-306 RDWY	L_L-C4-3-306	Natural	C4-3-306	C4-3-305	76.96	76.72	1	0	10	168.41	0.143	114.192	16.289	2.38	78.90	78.86
L_L-C4-2-205	L_L-C4-2-205	Circular	C4-2-205	C4-2-204	71.78	71.49	1	0	1.5	6	4.833	12.784	16.001	7.08	78.53	78.48
L_L-C4-2-206 SS	L_L-C4-2-206	Circular	C4-2-206	C4-2-204	72.13	71.72	1	0	2.5	296.04	0.138	17.559	15.475	3.55	78.72	78.48
L_L-C4-2-206 RDWY	L_L-C4-2-206	Natural	C4-2-206	C4-2-204	77.18	76.52	1	0	10	296.04	0.223	139.235	16.326	3.58	78.72	78.48
L_L-C4-3-103 SS	L_L-C4-3-103	Circular	C4-3-103	C4-3-102	73.57	73.45	1	0	1.5	66.16	0.181	9.313	19.683	5.21	78.86	78.86
L_L-C4-3-103 RDWY	L_L-C4-3-103	Trapezoidal	C4-3-103	C4-3-102	75.82	75.6	1	50	5	66.16	0.333	37.279	16.445	1.2	78.86	78.86
L_L-C4-3-307 SS	L_L-C4-3-307	Special	C4-3-307	C4-3-306	73.08	72.55	1	0	4.41	247.67	0.214	38.067	15.445	3.72	79.02	78.90
L_L-C4-3-307 RDWY	L_L-C4-3-307	Natural	C4-3-307	C4-3-306	77.29	76.96	1	0	10	247.67	0.133	110.428	16.285	2.65	79.02	78.90
L_L-C4-2-207 SS	L_L-C4-2-207	Circular	C4-2-207	C4-2-206	72.35	72.13	1	0	2.5	172.31	0.128	17.956	15.889	3.62	79.00	78.72
L_L-C4-2-207 RDWY	L_L-C4-2-207	Natural	C4-2-207	C4-2-206	77.49	77.18	1	0	10	172.31	0.18	130.356	16.317	3.96	79.00	78.72
L_L-C4-3-308 SS	L_L-C4-3-308	Special	C4-3-308	C4-3-307	73.37	73.09	1	0	4.41	244.89	0.114	38.194	15.592	3.73	79.18	79.02
L_L-C4-3-308 RDWY	L_L-C4-3-308	Natural	C4-3-308	C4-3-307	77.83	77.29	1	0	10	244.89	0.221	98.223	16.274	3.01	79.18	79.02
L_L-C4-2-208 SS	L_L-C4-2-208	Circular	C4-2-208	C4-2-207	72.47	72.35	1	0	2.5	166.8	0.072	16.727	16.005	3.37	79.26	79.00
L_L-C4-2-208 RDWY	L_L-C4-2-208	Natural	C4-2-208	C4-2-207	77.74	77.49	1	0	10	166.8	0.15	124.153	16.314	3.78	79.26	79.00
L_L-C4-3-104 SS	L_L-C4-3-104	Circular	C4-3-104	C4-3-308	74.74	73.93	1	0	1.5	34.79	2.328	8.6	15.517	5.5	79.18	79.18
L_L-C4-3-104 RDWY	L_L-C4-3-104	Trapezoidal	C4-3-104	C4-3-308	78.23	76.87	1	100	5	34.79	3.909	25.833	18.038	0.52	79.18	79.18
L_L-C4-3-309 SS	L_L-C4-3-309	Special	C4-3-309	C4-3-308	74.3	73.89	1	0	3.75	240.35	0.171	31.008	15.625	4.28	79.47	79.18
L_L-C4-3-309 RDWY	L_L-C4-3-309	Natural	C4-3-309	C4-3-308	78.37	77.83	1	0	10	240.35	0.225	78.546	16.276	3.28	79.47	79.18
L_L-C4-2-209 SS	L_L-C4-2-209	Circular	C4-2-209	C4-2-208	73.42	72.47	1	0	2.5	422.65	0.225	15.174	15.497	3.07	79.74	79.26
L_L-C4-2-209 RDWY	L_L-C4-2-209	Natural	C4-2-209	C4-2-208	78.36	77.74	1	0	10	422.65	0.147	98.882	16.307	3.24	79.74	79.26
L_L-C4-3-310 SS	L_L-C4-3-310	Special	C4-3-310	C4-3-309	74.88	74.33	1	0	3.75	449.03	0.122	29.605	15.768	3.98	80.23	79.47
L_L-C4-3-310 RDWY	L_L-C4-3-310	Natural	C4-3-310	C4-3-309	79.34	78.37	1	0	10	449.03	0.216	50.62	16.274	2.82	80.23	79.47
L_L-C4-2-210 SS	L_L-C4-2-210	Circular	C4-2-210	C4-2-209	74.06	73.48	1	0	2.5	444.06	0.131	12.302	16.531	2.48	80.12	79.74
L_L-C4-2-210 RDWY	L_L-C4-2-210	Natural	C4-2-210	C4-2-209	78.72	78.36	1	0	10	444.06	0.081	78.063	16.316	2.7	80.12	79.74
L_L-C4-3-311 SS	L_L-C4-3-311	Circular	C4-3-311	C4-3-310	75.75	75.21	1	0	2	297.63	0.181	14.011	17.834	4.44	80.59	80.23
L_L-C4-3-311 RDWY	L_L-C4-3-311	Natural	C4-3-311	C4-3-310	79.28	79.34	1	0	10	297.63	-0.02	60.823	16.267	2.82	80.59	80.23
L-L-C4-O-201 SS	L_L-C4-O-201	Circular	C4-O-201	C4-2-210	74.55	74.37	1	0	1.5	34.87	0.516	6.682	15.496	3.74	80.12	80.12
L-L-C4-O-201 RDWY	L_L-C4-O-201	Trapezoidal	C4-O-201	C4-2-210	78.75	78.72	1	100	5	34.87	0.086	15.756	16.249	0.49	80.12	80.12
L_OS-17 BOX 1	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.61	1	7	7	50.27	0.119	445.983	15.968	-11.57	71.84	71.33
L_OS-17 BOX 2	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.57	1	7	7	50.27	0.199	446.004	15.968	-11.6	71.84	71.33
L_OS-16 CULV	L_OS-16	Rectangular	OS-16	OS-17	56.98	56.67	1	10	8	386.67	0.08	892.012	15.968	11.14	72.37	71.84
L_OS-16 RDWY	L_OS-16	Natural	OS-16	OS-17	69.94	71.19	1	0	10	386.67	-0.323	204.237	17.52	1.95	72.37	72.24
L_OS-15 CULV	L_OS-15	Rectangular	OS-15	OS-16	57.59	56.98	1	10	8	895.63	0.068	892.032	15.968	11.12	73.90	72.37
L_OS-15 RDWY	L_OS-15	Natural	OS-15	OS-16	72.85	69.94	1	0	10	895.63	0.325	164.969	17.109	2.27	73.90	72.37
W-OS-14	W-OS-14	Trapezoidal	OS-14	W-OUT	73.02	72.9	1	30	5	1000	0	110.787	17.032	2.42	74.44	73.59
L_OS-14 CULV	L_OS-14	Rectangular	OS-14	OS-15	57.91	57.59	1	10	8	311.31	0.103	892.042	15.971	11.11	74.44	73.90
L_OS-14 RDWY	L_OS-14	Natural	OS-14	OS-15	73.02	72.85	1	0	10	311.31	0.055	174.216	17.02	3.02	74.44	73.90
W-OS-13	W-OS-13	Trapezoidal	OS-13	W-OUT	73.4	72.9	1	30	5	1300	0	90.832	16.958	2.28	74.63	73.59
L_OS-13 CULV	L_OS-13	Rectangular	OS-13	OS-14	58.2	57.91	1	10	8	306.54	0.095	542.095	15.768	6.75	74.63	74.44
L_OS-13 RDWY	L_OS-13	Natural	OS-13	OS-14	73.4	73.02	1	0	10	306.54	0.124	132.911	16.897	2.17	74.63	74.44
W-OS-12	W-OS-12	Trapezoidal	OS-12	W-OUT	73.9	72.9	1	30	5	2000	0	85.048	16.869	2.21	75.09	73.59
L_OS-12 CULV	L_OS-12	Rectangular	OS-12	OS-13	58.91	58.2	1	10	8	440.36	0.161	545.632	16.109	6.79	75.09	74.63
L_OS-12 RDWY	L_OS-12	Natural	OS-12	OS-13	73.9	73.4	1	0	10	440.36	0.114	130.7	16.824	2.45	75.09	74.63
L_OS-11 CULV	L_OS-11	Rectangular	OS-11	OS-12	59.25	58.91	1	10	8	628.48	0.054	557.482	16.025	6.94	75.94	75.09
L_OS-11 RDWY	L_OS-11	Natural	OS-11	OS-12	74.57	73.9	1	0	10	628.48	0.107	170.157	16.669	2.81	75.94	75.09
L_L-C4-O-001 CULV	L_L-C4-O-001	Rectangular	C4-O-001	OS-11	59.45	59.25	1	10	8	167.67	0.119	547.564	15.824	6.81	75.98	75.94
L_L-C4-O-001 SPILL	L_L-C4-O-001	Trapezoidal	C4-O-001	OS-11	74.9	73.7	1	50	5	167.67	0.716	462.003	16.644	5.04	75.98	75.94
L_L-C4-5-508 CULV	L_L-C4-5-508	Rectangular	C4-5-508	C4-O-001	59.48	59.45	1	10	8	24.61	0	304.716	15.739	3.79	75.99	75.98
L_L-C4-5-508 SPILL	L_L-C4-5-508	Trapezoidal	C4-5-508	C4-O-001	74.5	74.4	1	50	5	24.61	0.406	92.633	16.529	1.1	75.99	75.98
L_L-C4-5-504 PIPE 1	L_L-C4-5-504	Circular	C4-5-504	C4-5-508	63.09	59.48	1	0	7	182.52	1.978	289.102	15.849	7.47	76.05	75.99
L_L-C4-5-504 PIPE 2	L_L-C4-5-504	Circular	C4-5-504	C4-5-508	65.15	63.88	1	0	3	182.52	0.696	30.51	15.84	4.25	76.05	75.99

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C4-5-504 SPILL	L_L-C4-5-504	Trapezoidal	C4-5-504	C4-5-508	75.5	74.2	1	50	5	389.73	0.334	37.621	16.524	0.63	76.05	75.99
C4-5-510 SS	L_L-C4-5-510	Circular	C4-5-510	C4-5-508	63.68	62.75	1	0	3	44.96	2.069	63.956	20.56	8.9	75.99	75.99
C4-5-510 RD	L_L-C4-5-510	Trapezoidal	C4-5-510	C4-5-508	74.4	74.3	1	100	5	44.96	-0.067	168.265	16.439	1.1	75.99	75.99
L_L-C4-5-501 PIPE 1	L_L-C4-5-501	Circular	C4-5-501	C4-5-504	65.62	63.09	1	0	7	222.95	1.135	318.498	16.341	11.46	76.56	76.05
L_L-C4-5-501 PIPE 2	L_L-C4-5-501	Circular	C4-5-501	C4-5-504	66.71	65.15	1	0	3	22.95	6.797	105.09	16.339	17.68	76.56	76.05
L_L-C4-5-501 SPILL	L_L-C4-5-501	Trapezoidal	C4-5-501	C4-5-504	76.5	74.8	1	50	5	22.95	7.407	5.655	16.512	0.17	76.56	76.05
C4-5-505 SS	L_L-C4-5-505	Circular	C4-5-505	C4-5-504	70.37	67.72	1	0	1.5	37.13	7.137	17.258	20.677	12.44	76.04	76.05
C4-5-504 RD	L_L-C4-5-505	Trapezoidal	C4-5-505	C4-5-504	74.54	75	1	100	5	37.13	-1.239	-237.78	16.514	-2.07	76.04	76.05
511ST	L_L-C4-5-511	Circular	C4-5-511	C4-5-510	69.03	63.68	1	0	2	13.33	40.135	41.849	20.428	15.54	75.99	75.99
511RD	L_L-C4-5-511	Trapezoidal	C4-5-511	C4-5-510	74.5	74.4	1	40	3	13.33	0	11.488	20.559	2.14	75.99	75.99
512.2	512.2	Natural	C4-5-512	C4-5-515	74.5	74.25	1	0	0	220	0.367	59.342	16.603	1.87	75.99	75.94
C4-5-512 SS	L_L-C4-5-512	Circular	C4-5-512	C4-5-510	70.4	63.68	1	0	2	93.28	7.204	29.629	20.665	10.39	75.99	75.99
C4-5-512 RD	L_L-C4-5-512	Trapezoidal	C4-5-512	C4-5-510	74.5	74.4	1	100	5	93.28	0	169.579	16.412	1.25	75.99	75.99
L_L-C4-5-500 PIPE 1	L_L-C4-5-500	Circular	C4-5-500	C4-5-501	65.66	65.62	1	0	7	160.3	0.025	264.803	15.817	10.13	76.90	76.56
L_L-C4-5-500 PIPE 2	L_L-C4-5-500	Circular	C4-5-500	C4-5-501	67.83	66.71	1	0	3	160.3	0.699	37.69	15.406	6.58	76.90	76.56
L_L-C4-5-500 SPILL	L_L-C4-5-500	Trapezoidal	C4-5-500	C4-5-501	75.6	75	1	50	5	160.3	0.374	190.724	16.478	2.43	76.90	76.56
L_L-C4-5-502	L_L-C4-5-502	Circular	C4-5-502	C4-5-501	70.26	68.72	1	0	1.5	15.49	9.942	11.613	20.667	14.32	76.69	76.56
896.1	L_L-C4-5-506	Circular	C4-5-506	C4-5-505	70.38	69.98	1	0	1.5	43.25	0.925	8.763	20.712	4.91	76.04	76.04
896.1.1	L_L-C4-5-506	Trapezoidal	C4-5-506	C4-5-505	74.56	74.54	1	50	2	43.25	0	-1.414	15.907	0.28	76.04	76.04
L_L-C4-5-507.1	L_L-C4-5-507.1	Trapezoidal	C4-5-507	C4-5-512	74.55	74.5	1	100	5	150	-0.007	277.292	16.486	1.95	76.02	75.99
C4-5-507 SS	L_L-C4-5-507	Circular	C4-5-507	C4-5-505	70.18	70.04	1	0	1.5	55.54	0.252	13.481	20.726	7.55	76.02	76.04
CR-5-507 RD	L_L-C4-5-507	Trapezoidal	C4-5-507	C4-5-505	74.79	74.54	1	100	5	55.54	0.45	-237.737	16.517	-1.81	76.02	76.04
898.1	L_L-C4-5-513	Circular	C4-5-513	C4-5-512	70.53	70.4	1	0	2	23.09	0.563	34.193	20.703	10.8	75.99	75.99
898.1.1	L_L-C4-5-513	Trapezoidal	C4-5-513	C4-5-512	74.6	74.5	1	50	5	10	0	-47.108	16.574	0.68	75.99	75.99
L_OS-10	L_OS-10	Natural	OS-10	C4-5-500	69.69	65.66	1	12	5.67	39.51	10.2	415.237	16.336	4.97	76.87	76.90
L_L-C4-5-503	L_L-C4-5-503	Circular	C4-5-503	C4-5-502	70.51	70.21	1	0	1.5	23.13	1.297	10.275	20.667	8.13	76.82	76.69
L_L-C4-5-803.1	L_L-C4-5-803.1	Natural	C4-5-803	C4-5-801	75.3	74.36	1	0	0	213	0.441	-306.123	16.488	-4.45	77.20	77.68
Parker East	Parker East	Trapezoidal	C4-5-803	C5-O-903	74.5	74	1	60	5	1380	0	190.011	16.593	1.5	76.02	75.83
C4-5-803 SS	L_L-C4-5-803	Circular	C4-5-803	C4-5-507	70.33	70.01	1	0	1.5	180.62	0.199	10.879	15.46	6.12	76.02	76.02
C4-5-803 RD	L_L-C4-5-803	Trapezoidal	C4-5-803	C4-5-507	74.97	74.79	1	100	10	190	0.095	42.004	15.973	1.18	76.02	76.02
903.1	L_L-C4-5-514	Circular	C4-5-514	C4-5-513	71.15	70.53	1	0	1.5	23.27	2.664	14.251	20.58	8.86	75.99	75.99
903.1.1	L_L-C4-5-514	Trapezoidal	C4-5-514	C4-5-513	74.7	74.6	1	50	5	10	0	4.652	20.57	1.75	75.99	75.99
L_L-C4-5-512.1	L_L-C4-5-512.1	Natural	C4-5-515	C5-3-310	74.25	74	1	0	0	480	0.367	108.498	16.65	3.58	75.94	75.10
904.1	L_L-C4-5-515	Circular	C4-5-515	C4-5-513	71.16	70.58	1	0	1.5	217.7	0.266	7.979	20.494	4.5	75.94	75.99
904.1.1	L_L-C4-5-515	Trapezoidal	C4-5-515	C4-5-513	74.25	74.5	1	5	5	217.7	0	-47.146	16.607	-1.69	75.94	75.99
L_OS-9 B1	L_OS-9	Rectangular	OS-9	OS-10	69.76	69.75	1	4	5	53.63	0.019	165.472	16.411	8.25	78.24	76.87
L_OS-9 B2	L_OS-9	Rectangular	OS-9	OS-10	69.73	69.69	1	4	5	53.63	0.075	165.482	16.411	10.19	78.24	76.87
L_L-C4-5-702	L_L-C4-5-702	Circular	C4-5-702	C4-5-503	70.63	70.48	1	0	1.5	11.42	1.313	-7.341	20.646	-4.13	76.82	76.82
L_L-C4-5-801	L_L-C4-5-801	Circular	C4-5-801	C4-5-503	71.22	70.57	1	0	1.5	201.15	0.323	8.337	15.579	4.69	77.68	76.82
C4-5-804 SS	L_L-C4-5-804	Circular	C4-5-804	C4-5-803	70.46	70.33	1	0	1.5	83.92	0.155	7.759	20.669	4.35	76.02	76.02
C4-5-804 RD	L_L-C4-5-804	Trapezoidal	C4-5-804	C4-5-803	74.96	74.97	1	100	5	83.94	0	-75.375	16.585	-0.69	76.02	76.02
C4-5-802 SS	L_L-C4-5-802	Circular	C4-5-802	C4-5-801	71.72	71.22	1	0	1.5	20.33	2.459	5.092	15.616	4.27	77.68	77.68
C4-5-802 RD	L_L-C4-5-802	Trapezoidal	C4-5-802	C4-5-801	74.56	74.36	1	100	5	24	0.833	6.55	16.657	0.14	77.68	77.68
C4-5-805 SS	L_L-C4-5-805	Circular	C4-5-805	C4-5-804	70.51	70.46	1	0	1.5	33.47	0.149	8.912	20.669	5	76.01	76.02
C4-5-805 RD	L_L-C4-5-805	Trapezoidal	C4-5-805	C4-5-804	74.95	74.94	1	100	5	33.47	0.03	-75.432	16.599	-0.68	76.01	76.02
911.1	L_L-C4-5-806	Circular	C4-5-806	C4-5-805	71	70.51	1	0	2	20.86	2.349	3.269	20.749	1.04	76.01	76.01
911.1.1	L_L-C4-5-806	Trapezoidal	C4-5-806	C4-5-805	74.06	74.04	1	15	2	20.86	0.096	3.565	20.737	0.91	76.01	76.01
C4-5-807 SS	L_L-C4-5-807	Circular	C4-5-807	C4-5-805	70.81	70.51	1	0	1.5	205.04	0.146	6.934	20.789	3.9	75.88	76.01
C4-5-807 RD	L_L-C4-5-807	Natural	C4-5-807	C4-5-805	74.04	74.95	1	0	2	205.04	-0.444	-73.731	16.614	-2.46	75.88	76.01
C4-5-808 SS	L_L-C4-5-808	Circular	C4-5-808	C4-5-807	70.85	70.81	1	0	1.5	24.82	0.161	5.433	15.471	3.05	75.88	75.88
C4-5-808 RD	L_L-C4-5-808	Trapezoidal	C4-5-808	C4-5-807	74.35	74.04	1	100	5	24	1.292	6.185	20.773	0.46	75.88	75.88
L_L-C4-5-809.1	L_L-C4-5-809.1	Natural	C4-5-809	C5-2-209	74.6	74	1	0	0	328.6	0.569	82.806	16.629	3.81	75.80	75.05
C4-5-809 SS	L_L-C4-5-809	Circular	C4-5-809	C4-5-807	70.89	70.81	1	0	1.5	51.37	0.156	-4.215	16.601	-2.35	75.80	75.88
C4-5-809 RD	L_L-C4-5-809	Natural	C4-5-809	C4-5-807	74.49	74.04	1	0	2	51.37	0.876	-77.552	16.622	-2.2	75.80	75.88
Link1368	Link1368	Natural	Node1294	OS-9	69.35	69.73	1	0	7.59	61.2	-0.621	331.066	16.396	3.73	78.26	78.24
Link1398	Link1398	Natural	C5-O-000	XS-49	62.65	63.74	1	0	6.65	25.24	-4.319	514.173	16.616	3.05	70.80	70.77

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C5-700ST	L_L-C5-700	Rectangular	C5-700	C5-O-000	62.65	62.65	2	6	6	62.47	0	411.302	15.818	5.7	71.15	70.80
C5-700RD	L_L-C5-700	Trapezoidal	C5-700	C5-O-000	70.5	70.4	1	50	5	62.47	0	117.613	16.626	3.53	71.15	70.93
L_L-C5-3-301 SS	L_L-C5-3-301	Special	C5-3-301	C5-700	63.38	62.72	1	0	5	147.07	0.456	91.928	16.414	7.06	71.71	71.15
L_L-C5-3-301 RDWY	L_L-C5-3-301	Natural	C5-3-301	C5-700	69.68	70.14	1	0	0	147.07	-0.313	158.882	16.506	4.02	71.71	71.50
L_L-C5-600	L_L-C5-600	Rectangular	C5-600	C5-700	62.82	62.65	2	6	6	239.48	0.071	443.898	17.249	6.15	71.66	71.15
L-SBFR-DRIVEWAY	L-SBFR-DRIVEWAY	Trapezoidal	C5-7-701	XS-45	69.5	69.4	1	30	5	100	0.1	8.724	16.517	-0.5	70.59	70.59
L_L-C5-7-701 SS	L_L-C5-7-701	Special	C5-7-701	C5-700	62.82	62.72	1	0	3.75	185.99	0.054	-40.953	15.295	-5.47	70.59	71.15
L_L-C5-7-701 RDWY	L_L-C5-7-701	Natural	C5-7-701	C5-700	68.61	70.14	1	0	0	185.99	-0.823	-127.567	16.622	-4.08	70.59	71.15
L_L-C5-3-302 SS	L_L-C5-3-302	Special	C5-3-302	C5-3-301	63.7	63.38	1	0	5	194.56	0.164	45.388	16.324	3.48	71.90	71.71
L_L-C5-3-302 RDWY	L_L-C5-3-302	Natural	C5-3-302	C5-3-301	69.61	69.68	1	0	0	194.56	-0.036	200.106	16.489	3.78	71.90	71.71
L_L-C5-2-201 SS	L_L-C5-2-201	Circular	C5-2-201	C5-600	63.36	63.22	1	0	3.5	71.99	0.194	101.066	16.646	10.41	72.37	71.66
L_L-C5-2-201 RDWY	L_L-C5-2-201	Natural	C5-2-201	C5-600	69.97	70.51	1	0	10	71.99	-0.75	254.331	16.703	5.01	72.37	72.25
L_L-C5-6-601 SS	L_L-C5-6-601 DITCH	Special	C5-6-601	C5-600	63.31	63.22	1	0	4.41	218.65	0.041	-73.316	18.275	-7.12	70.84	71.66
L_L-C5-6-601 RDWY	L_L-C5-6-601 DITCH	Natural	C5-6-601	C5-600	69.26	70.51	1	0	10	218.65	-0.572	-139.502	16.721	-5.09	70.84	71.66
L_L-C5-7-702 SS	L_L-C5-7-702	Special	C5-7-702	C5-7-701	63.11	62.41	1	0	3.75	199.71	0.351	-50.204	18.592	-6.71	69.70	70.59
L_L-C5-7-702 RDWY	L_L-C5-7-702	Natural	C5-7-702	C5-7-701	68.26	69.61	1	0	0	199.71	-0.676	-110.752	16.631	-4.73	69.70	70.59
L_L-C5-3-303 SS	L_L-C5-3-303	Special	C5-3-303	C5-3-302	63.93	63.7	1	0	5	193.19	0.119	40.147	16.397	3.08	72.04	71.90
L_L-C5-3-303 RDWY	L_L-C5-3-303	Natural	C5-3-303	C5-3-302	69.78	69.61	1	0	0	193.19	0.088	197.916	16.494	3.52	72.04	71.90
L_L-C5-2-202 SS	L_L-C5-2-202	Circular	C5-2-202	C5-2-201	63.62	63.46	1	0	3.5	185.4	0.086	27.578	16.65	2.84	72.51	72.37
L_L-C5-2-202 RDWY	L_L-C5-2-202	Natural	C5-2-202	C5-2-201	69	69.97	1	0	10	185.4	-0.523	324.165	16.703	4.11	72.51	72.37
L_L-C5-6-602 SS	L_L-C5-6-602	Special	C5-6-602	C5-6-601	63.32	63.31	1	0	3.75	195.32	0.005	-40.252	15.082	-5.39	70.58	70.84
L_L-C5-6-602 RDWY	L_L-C5-6-602	Natural	C5-6-602	C5-6-601	68.16	69.26	1	0	0	195.32	-0.563	-193.955	16.684	-4.28	70.58	70.84
L_L-C5-7-703 SS	L_L-C5-7-703	Special	C5-7-703	C5-7-702	63.29	63.11	1	0	3.75	190.42	0.095	-36.527	18.137	-4.89	69.25	69.70
L_L-C5-7-703 RDWY	L_L-C5-7-703	Natural	C5-7-703	C5-7-702	67.93	68.26	1	0	0	190.42	-0.173	-127.263	16.627	-4.42	69.25	69.70
L_L-C5-3-101	L_L-C5-3-101	Circular	C5-3-101	C5-3-303	67.81	65.17	1	0	1.5	36.78	7.178	2.656	16.001	1.48	72.05	72.04
L_L-C5-3-304 SS	L_L-C5-3-304	Special	C5-3-304	C5-3-303	64.24	63.93	1	0	5	159.76	0.194	64.832	15.697	4.99	72.18	72.04
L_L-C5-3-304 RDWY	L_L-C5-3-304	Natural	C5-3-304	C5-3-303	70.88	69.78	1	0	0	159.76	0.689	189.41	16.495	4.76	72.18	72.04
L_L-C5-2-203 SS	L_L-C5-2-203	Circular	C5-2-203	C5-2-202	64.04	63.61	1	0	3.5	204.98	0.21	18.692	16.631	1.92	72.58	72.51
L_L-C5-2-203 RDWY	L_L-C5-2-203	Natural	C5-2-203	C5-2-202	69.4	69	1	0	10	204.98	0.195	329.421	16.705	3.71	72.58	72.51
L-L-C5-6-603 SS	L_L-C5-6-603	Special	C5-6-603	C5-6-602	63.73	63.44	1	0	3.75	195.53	0.148	-19.633	14.996	-2.64	70.48	70.58
L-L-C5-6-603 RDWY	L_L-C5-6-603	Natural	C5-6-603	C5-6-602	67.62	68.16	1	0	0	195.53	-0.276	-212.503	16.669	-3.23	70.48	70.58
L_L-C5-S-2	L_L-C5-S-2	Natural	C5-7-704	C5-S-2	66.79	66.54	1	0	11	117.95	0.449	198.739	16.519	3.44	69.03	68.99
L_L-C5-7-704 SS	L_L-C5-7-704	Special	C5-7-704	C5-7-703	63.72	63.29	1	0	3.75	197.49	0.218	-32.165	19.377	-4.32	69.03	69.25
L_L-C5-7-704 RDWY	L_L-C5-7-704	Natural	C5-7-704	C5-7-703	66.79	67.93	1	0	0	197.49	-0.577	-141.629	16.625	-3.6	69.03	69.25
L_L-C5-3-305 SS	L_L-C5-3-305	Special	C5-3-305	C5-3-304	64.29	64.24	1	0	5	158.21	0.032	81.976	16.542	6.29	72.69	72.18
L_L-C5-3-305 RDWY	L_L-C5-3-305	Natural	C5-3-305	C5-3-304	71.14	70.88	1	0	0	158.21	0.164	144.49	16.52	4.75	72.69	72.18
L_L-C5-2-204 SS	L_L-C5-2-204	Circular	C5-2-204	C5-2-203	64.32	63.98	1	0	3.5	169.83	0.2	17.406	15.346	1.8	72.60	72.58
L_L-C5-2-204 RDWY	L_L-C5-2-204	Natural	C5-2-204	C5-2-203	70.22	69.4	1	0	10	169.83	0.483	333.78	16.706	4.74	72.60	72.58
L_L-C5-6-604 SS	L_L-C5-6-604	Special	C5-6-604	C5-6-603	63.91	63.66	1	0	3.75	193.26	0.129	-19.311	16.766	-2.58	70.33	70.48
L_L-C5-6-604 RDWY	L_L-C5-6-604	Natural	C5-6-604	C5-6-603	67.76	67.62	1	0	0	193.26	0.072	-238.479	16.592	-3.41	70.33	70.48
L_L-C5-3-306 SS	L_L-C5-3-306	Circular	C5-3-306	C5-3-305	64.65	64.29	1	0	3.5	365.87	0.098	51.067	18.549	5.27	73.50	72.69
L_L-C5-3-306 RDWY	L_L-C5-3-306	Natural	C5-3-306	C5-3-305	71.81	71.14	1	0	0	365.87	0.183	164.687	16.536	4.57	73.50	72.69
L_L-C5-2-205 SS	L_L-C5-2-205	Circular	C5-2-205	C5-2-204	64.67	64.27	1	0	3.5	216.71	0.185	32.126	15.542	3.32	72.62	72.60
L_L-C5-2-205 RDWY	L_L-C5-2-205	Natural	C5-2-205	C5-2-204	70.92	70.22	1	0	10	216.71	0.323	109.645	16.598	2.32	72.62	72.60
L_L-C5-6-605 SS	L_L-C5-6-605	Special	C5-6-605	C5-6-604	63.97	63.94	1	0	3.75	198.62	0.015	-23.327	16.689	-3.12	70.11	70.33
L_L-C5-6-605 RDWY	L_L-C5-6-605	Natural	C5-6-605	C5-6-604	67.77	67.76	1	0	0	198.62	0.005	-247.837	16.558	-4	70.11	70.33
L_L-C5-3-102 SS	L_L-C5-3-102	Circular	C5-3-102	C5-3-306	69.03	68.12	1	0	1.5	56.46	1.612	6.714	15.477	4.76	73.50	73.50
L_L-C5-3-102 RDWY	L_L-C5-3-102	Trapezoidal	C5-3-102	C5-3-306	72.22	72.16	1	100	5	56.46	0.106	10.372	16.323	0.55	73.50	73.50
L_L-C5-3-307 SS	L_L-C5-3-307	Circular	C5-3-307	C5-3-306	65.1	64.65	1	0	3.5	104.26	0.432	41.55	18.901	4.29	73.62	73.50
L_L-C5-3-307 RDWY	L_L-C5-3-307	Natural	C5-3-307	C5-3-306	71.48	71.81	1	0	0	104.26	-0.317	169.417	16.53	3.71	73.62	73.50
L_L-C5-2-206 SS	L_L-C5-2-206	Circular	C5-2-206	C5-2-205	66.03	65.57	1	0	3	175.16	0.263	35.634	15.679	5.01	72.73	72.62
L_L-C5-2-206 RDWY	L_L-C5-2-206	Natural	C5-2-206	C5-2-205	71.62	70.92	1	0	0	175.16	0.4	100.914	16.599	3.55	72.73	72.62
L_L-C5-N-5	L_L-C5-N-5	Natural	C5-6-606	C5-N-5	67.79	67.51	1	0	0	66.85	0.419	303.681	16.505	6.85	69.66	69.43
L_L-C5-6-606 SS	L_L-C5-6-606	Special	C5-6-606	C5-6-605	64.57	63.95	1	0	3.16	288.27	0.215	-16.688	16.614	-3.24	69.66	70.11
L_L-C5-6-606 RDWY	L_L-C5-6-606	Natural	C5-6-606	C5-6-605	67.51	67.79	1	0	0	288.27	-0.09	-270.773	16.528	-4.91	69.66	70.11
L_L-C5-3-103 SS	L_L-C5-3-103	Circular	C5-3-103	C5-3-102	69.04	69.03	1	0	1.5	29.9	0.033	4.092	15.665	2.74	73.50	73.50

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C5-3-105 RDWY.1	L_L-C5-3-103	Trapezoidal	C5-3-103	C5-3-102	72.52	72.49	1	40	5	29.9	0.1	4.618	16.236	0.46	73.50	73.50
L_L-C5-3-308 SS	L_L-C5-3-308	Circular	C5-3-308	C5-3-307	65.72	65.35	1	0	3	203.19	0.182	34.481	18.92	4.85	73.75	73.62
L_L-C5-3-308 RDWY	L_L-C5-3-308	Natural	C5-3-308	C5-3-307	72.1	71.48	1	0	0	203.19	0.305	167.036	16.542	3.83	73.75	73.62
L_L-C5-2-207 SS	L_L-C5-2-207	Circular	C5-2-207	C5-2-206	66.43	66.38	1	0	3	216.8	0.023	36.681	16.194	5.15	73.33	72.73
L_L-C5-2-207 RDWY	L_L-C5-2-207	Natural	C5-2-207	C5-2-206	72.34	71.62	1	0	0	216.8	0.332	79.735	16.587	4.12	73.33	72.73
L_L-C5-3-104	L_L-C5-3-104	Circular	C5-3-104	C5-3-103	71.33	69.46	1	0	1.5	33.41	5.597	5.023	16.002	7.64	73.56	73.50
L_L-C5-3-105 SS	L_L-C5-3-105	Circular	C5-3-105	C5-3-308	69.35	66.47	1	0	1.5	60.59	4.753	9.936	15.328	6.79	73.75	73.75
L_L-C5-3-105 RDWY	L_L-C5-3-105	Trapezoidal	C5-3-105	C5-3-308	72.42	72.36	1	100	5	60.59	0.099	23.872	18.059	0.85	73.75	73.75
L_L-C5-3-309 SS	L_L-C5-3-309	Circular	C5-3-309	C5-3-308	66.02	65.72	1	0	3	186.45	0.161	29.87	18.92	4.2	74.03	73.75
L_L-C5-3-309 RDWY	L_L-C5-3-309	Natural	C5-3-309	C5-3-308	72.42	72.1	1	0	0	186.45	0.172	141.072	16.534	3.91	74.03	73.75
L_L-C5-2-208 SS	L_L-C5-2-208	Circular	C5-2-208	C5-2-207	66.88	66.43	1	0	3	394.28	0.114	35.572	17.533	4.99	74.42	73.33
L_L-C5-2-208 RDWY	L_L-C5-2-208	Natural	C5-2-208	C5-2-207	73.45	72.34	1	0	0	394.28	0.282	71.357	16.589	4.03	74.42	73.33
L_L-C5-3-106 SS	L_L-C5-3-106	Circular	C5-3-106	C5-3-105	69.51	69.35	2	0	1.5	28.67	0.558	18.122	18.27	5.08	73.75	73.75
L_L-C5-3-106 RDWY	L_L-C5-3-106	Trapezoidal	C5-3-106	C5-3-105	73.22	73.19	1	50	5	28.67	0.105	13.57	16.352	0.96	73.75	73.75
L_L-C5-3-310 SS	L_L-C5-3-310	Circular	C5-3-310	C5-3-309	68.25	66.61	1	0	2.5	395.29	0.415	23.739	19.015	4.8	74.60	74.03
L_L-C5-3-310 RDWY	L_L-C5-3-310	Natural	C5-3-310	C5-3-309	72.97	72.42	1	0	0	395.29	0.139	134.805	16.539	3.77	74.60	74.03
L_L-C5-2-209 SS	L_L-C5-2-209	Circular	C5-2-209	C5-2-208	68.46	67.29	1	0	2.5	399.17	0.293	22.06	18.616	4.46	75.05	74.42
L_L-C5-2-209 RDWY	L_L-C5-2-209	Natural	C5-2-209	C5-2-208	73.54	73.45	1	0	0	399.17	0.023	80.743	16.598	3.15	75.05	74.42
L_L-XS-23	L_L-XS-23	Natural	XS-23	XS-22	53.51	52.54	1	0	8.93	89.285	1.086	824.795	17.082	3.18	65.05	65.02
L_L-XS-24	L_L-XS-24	Natural	XS-24	XS-23	53.81	53.51	1	0	9.61	276.201	0.109	824.269	17.083	2.65	65.07	65.05
L_L-XS-25	L_L-XS-25	Natural	XS-25	XS-24	55.09	53.81	1	0	9.12	243.878	0.525	822.335	17.081	3.35	65.08	65.07
L_L-XS-26	L_L-XS-26	Natural	XS-26	XS-25	57.27	55.09	1	0	6.96	255.302	0.854	821.132	17.102	3.83	65.07	65.08
L_L-XS-27	L_L-XS-27	Natural	XS-27	XS-26	56.71	57.27	1	0	6.93	99.131	-0.565	820.961	17.11	5.06	65.35	65.07
L_L-XS-28	L_L-XS-28	Natural	XS-28	XS-27	55.37	56.71	1	0	8.29	331.908	-0.404	820.908	17.112	4.54	66.29	65.35
L_L-XS-29	L_L-XS-29	Natural	XS-29	XS-28	56.52	55.37	1	0	9.19	264.58	0.435	821.175	17.062	3.06	66.30	66.29
L_L-XS-30	L_L-XS-30	Natural	XS-30	XS-29	57.68	56.52	1	0	7.69	328.717	0.353	827.15	16.942	3.48	66.42	66.30
L_L-XS-31	L_L-XS-31	Natural	XS-31	XS-30	57.41	57.68	1	0	8.3	337.631	-0.08	832.598	16.879	4.29	67.50	66.42
L_L-CULV-8	L_L-CULV-8	Natural	CULV-8	XS-31	57.99	57.41	1	0	8.3	44.397	1.306	715.428	16.877	3.09	67.53	67.50
CULVERT 4-A	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.06	55.99	1	8	7	107.82	0.037	124.556	15.13	2.22	67.54	67.53
CULVERT 4-B	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.07	56.02	1	8	7	107.82	0.074	124.553	15.13	2.22	67.54	67.53
CULVERT4-SPILL	L_L-CULV-7	Trapezoidal	CULV-7	CULV-8	65.15	65.14	1	100	8	107.82	0.668	662.357	16.866	1.13	67.54	67.53
L_L-XS-32	L_L-XS-32	Natural	XS-32	CULV-7	58.15	58.06	1	0	8.06	25.237	0.357	718.6	16.807	2.74	67.54	67.54
L_L-XS-33	L_L-XS-33	Natural	XS-33	XS-32	59.41	58.15	1	0	7.93	201.985	0.624	720.912	16.781	2.43	67.56	67.54
L_L-XS-34	L_L-XS-34	Natural	XS-34	XS-33	60.01	59.41	1	0	8	247.14	0.243	655.979	16.718	3.45	67.76	67.56
L_L-XS-35	L_L-XS-35	Natural	XS-35	XS-34	60.21	60.01	1	0	7.48	134.207	0.149	661.565	16.659	3.42	68.01	67.76
L_L-CULV-6	L_L-CULV-6	Natural	CULV-6	XS-35	60.17	60.21	1	0	7.479	12.841	-0.311	661.629	16.657	3	68.03	68.01
CULVERT 3-A	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.16	60.17	1	9	5	29.115	-0.034	249.691	16.644	5.53	68.08	68.03
CULVERT 3-B	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.14	60.2	1	9	5	29.115	-0.206	249.69	16.644	5.53	68.08	68.03
CULVERT3-SPILL	L_L-CULV-5	Trapezoidal	CULV-5	CULV-6	67.54	67.24	1	60	5	29.12	1.03	162.398	16.695	3.98	68.08	68.03
L_L-XS-36	L_L-XS-36	Natural	XS-36	CULV-5	60.09	60.14	1	0	8.04	21.297	-0.235	661.663	16.656	3.19	68.15	68.08
L_L-XS-37	L_L-XS-37	Natural	XS-37	XS-36	60.69	60.09	1	0	7.98	179.804	0.334	661.776	16.65	3.14	68.30	68.15
L_L-XS-38	L_L-XS-38	Natural	XS-38	XS-37	61.97	60.69	1	0	6.18	396.598	0.323	620.384	16.664	2.92	68.51	68.30
L_L-CULV-4	L_L-CULV-4	Natural	CULV-4	XS-38	61.36	61.97	1	0	6.18	43.827	-1.392	610.627	16.643	2.93	68.54	68.51
CULVER 2-A	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.5	61.37	1	9	5	26.441	0.492	274.315	16.618	6.08	69.17	68.54
CULVER 2-B	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.4	61.36	1	9	5	26.441	0	274.313	16.618	6.08	69.17	68.54
CULVER 2-SPILL	L_L-CULV-3	Trapezoidal	CULV-3	CULV-4	68.84	68.6	1	42	5	26.44	0.908	62.1	16.648	4.45	69.17	68.92
L_L-XS-39	L_L-XS-39	Natural	XS-39	CULV-3	61.92	61.4	1	0	7.42	15.69	3.569	611.073	16.637	3.1	69.16	69.17
L_L-XS-40	L_L-XS-40	Natural	XS-40	XS-39	62.1	61.92	1	0	7.639	97.04	0.185	610.751	16.624	3.22	69.22	69.16
L_L-XS-41	L_L-XS-41	Natural	XS-41	XS-40	62.49	62.1	1	0	7.19	106.594	0.366	578.853	16.642	3.28	69.30	69.22
L_L-CULV-2	L_L-CULV-2	Natural	CULV-2	XS-41	61.43	62.49	1	0	7.19	14.768	-7.178	578.914	16.632	2.62	69.31	69.30
CULV-1-A	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.43	1	9	5	26.255	-0.076	248.172	16.607	5.5	69.35	69.31
CULV-1-B	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.47	1	9	5	26.255	-0.229	248.168	16.607	5.5	69.35	69.31
CULV1-SPILL	L_L-CULV-1	Trapezoidal	CULV-1	CULV-2	68.9	68.64	1	40	5	26.25	0.99	82.647	16.641	3.58	69.35	69.31
L_L-XS-42	L_L-XS-42	Natural	XS-42	CULV-1	62.74	61.41	1	0	6.619	12.816	10.378	579.305	16.631	2.36	69.34	69.35
L_L-XS-43	L_L-XS-43	Natural	XS-43	XS-42	62.16	62.74	1	0	6.55	126.27	-0.459	579.02	16.613	3.45	69.59	69.34
L_L-XS-44	L_L-XS-44	Natural	XS-44	XS-43	62.58	62.16	1	0	6.43	158.7	0.261	522.863	16.652	2.78	69.65	69.59

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-XS-45	L_L-XS-45	Natural	XS-45	XS-44	62.74	62.58	1	0	6.88	314.15	0.022	522.776	16.636	4.42	70.59	69.65
L_L-XS-46	L_L-XS-46	Natural	XS-46	XS-45	62.88	62.74	1	0	7.84	47.539	0.294	514.14	16.629	2.91	70.63	70.59
L_L-XS-47	L_L-XS-47	Natural	XS-47	XS-46	63	62.88	1	0	6.07	31.361	0.383	514.142	16.626	2.45	70.65	70.63
L_L-XS-48	L_L-XS-48	Natural	XS-48	XS-47	62.15	62.98	1	0	8.57	76.883	-1.08	514.149	16.623	3.08	70.77	70.65
L_L-XS-49	L_L-XS-49	Natural	XS-49	XS-48	63.74	62.15	1	0	6.66	89.529	1.776	514.162	16.619	2.99	70.77	70.77
L_L-C5-S-3	L_L-C5-S-3	Natural	C5-S-2	C5-S-3	66.54	66.44	1	0	11	294.98	0.034	206.368	16.537	3.42	68.99	68.80
L-SBFR-WITCHER	L-SBFR-WITCHER	Trapezoidal	C5-S-2	XS-43	69	68.9	1	30	5	400	0.025	-7.823	16.632	-0.59	69.10	69.59
L_L-C5-N-6	L_L-C5-N-6	Natural	C5-N-5	C5-N-6	67.51	67.08	1	0	11	70.53	0.61	303.681	16.508	6.04	69.43	69.37
L-C5-O-903.1	L-C5-O-903.1	Trapezoidal	C5-O-903	C6-O-903	74.4	72	1	60	5	2090	0.096	400.503	16.753	3.77	75.83	73.90
L-C5-O-904 RD	L-C5-O-903	Trapezoidal	C5-O-903	C5-O-904	74.5	72	1	28	5	1740	0.115	166.128	16.698	3.65	75.83	72.91
L-C5-O-904 SS	L-C5-O-903	Rectangular	C5-O-903	C5-O-904	65.61	64.2	3	6	4	1740	0.081	350.705	17.83	4.84	75.83	72.76
L-C5-O-904.1	L-C5-O-904.1	Natural	C5-O-904	C5-2-204	71.5	70.8	1	24	0.99	385	0.519	221.954	16.741	0.73	72.76	72.60
L-C5-O-904	L-C5-O-904	Rectangular	C5-O-904	C5-MM	64.2	62.9	2	6	6	569	0.228	424.631	15.116	5.89	72.76	71.76
L-C5-O-904.2	L-C5-O-904.2	Natural	C5-O-904	C6-O-904	71.5	70	1	40	0.99	2090	0.072	206.739	16.803	0.74	72.76	71.85
L-C6-O-901	L-C6-O-901	Trapezoidal	C6-O-901	C6-O-902	76.4	75	1	30	5	2030	-0.064	219.739	17.384	0.99	77.38	76.79
L-C6-O-902	L-C6-O-902	Trapezoidal	C6-O-902	C6-O-903	76	72	1	30	5	1690	0.284	245.075	17.794	1.04	76.79	73.90
L-C6-O-903	L-C6-O-903	Natural	C6-O-903	C6-O-904	72	69.5	1	30	0.99	1731	0.058	606.184	17.781	1.26	73.90	71.85
L-C6-O-904	L-C6-O-904	Natural	C6-O-904	C6-O-905	69.5	69	1	30	0.99	560	0.179	719.497	17.92	1.35	71.85	71.28
L-C6-O-905	L-C6-O-905	Natural	C6-O-905	C6-O-905.5	69	67.5	1	30	0.99	1150	0.13	769.135	18.049	1.58	71.28	69.42
L-C6-O-902.1	L-C6-O-902.1	Trapezoidal	C6-O-902.1	C6-O-902	76.5	75	1	24	5	1570	-0.019	39.848	17.656	0.9	77.15	76.79
L-C5-2-201.1	L-C5-2-201.1	Natural	C5-O-905	C5-MM	71	70	1	24	0.99	540	0.093	-114.202	16.48	-0.44	71.68	71.76
L-C5-O-905	L-C5-O-905	Natural	C5-O-905	C6-O-905	71	69	1	24	0.99	1650	0.091	93.204	16.898	0.41	71.68	71.28
L-C4-O-917.2	L-C4-O-917.2	Trapezoidal	C4-O-917.1	C5-O-901	80	76	1	30	3	1210	0.331	0.099	17.009	0.05	80.02	77.71
L-C4-O-914.2	L-C4-O-914.2	Trapezoidal	C4-O-914.1	C5-O-901	78	76	1	80	2	1090	0.183	122.1	17.037	1.23	78.53	77.71
L-C4-O-909.2	L-C4-O-909.2	Natural	C4-O-909.1	C5-O-902	77.5	75.5	1	0	0	1310	0.153	161.792	17.481	0.49	78.17	77.19
L-C4-O-907.2	L-C4-O-907.2	Natural	C4-O-907.1	C5-O-902	77	75.5	1	115	2.5	1130	0.133	114.914	17.377	0.63	78.00	77.19
L_L-C5-N-7A	L_L-C5-N-7A	Natural	C5-N-6	C5-N-7A	67.08	66.32	1	0	11	175.57	0.433	303.682	16.513	4.55	69.37	69.33
L_L-C5-N-7	L_L-C5-N-7	Natural	C5-N-7	C5-N-7A	66.44	66.32	1	0	11	183.62	-0.065	-303.681	16.52	-4.07	69.14	69.33
L_L-C5-N-8	L_L-C5-N-8	Natural	C5-N-8	C5-N-7	66.74	66.44	1	0	11	205.22	-0.146	-303.686	16.527	-5.37	68.53	69.14
L_L-C5-N-9	L_L-C5-N-9	Natural	C5-N-8	C5-N-9	66.74	65.62	1	0	11	229.86	0.487	303.676	16.533	6.49	68.53	67.82
L_L-C5-N-10	L_L-C5-N-10	Natural	C5-N-9	C5-N-10	65.62	65.02	1	0	11	295.9	0.203	303.697	16.543	6.13	67.82	66.92
L_L-C5-S-4	L_L-C5-S-4	Natural	C5-S-3	C5-S-4	66.44	66.36	1	0	11	199.91	0.04	206.301	16.549	3.55	68.80	68.67
L-SBFR-PARKING LOT	L-SBFR-PARKING LOT	Trapezoidal	C5-S-4	XS-38	68	67.8	1	30	5	650	0.031	10.108	16.556	0.4	68.67	68.51
L_L-C5-S-5	L_L-C5-S-5	Natural	C5-S-5	C5-S-4	66.77	66.36	1	0	11	149.32	-0.275	-196.085	16.577	-4.22	68.31	68.67
L_L-C5-S-6	L_L-C5-S-6	Natural	C5-S-5	C5-S-6	66.77	65.83	1	0	11	279.98	0.336	196.076	16.585	5.36	68.31	67.60
L_L-C5-S-7	L_L-C5-S-7	Natural	C5-S-6	C5-S-7	65.83	64.64	1	0	11	542.54	0.219	196.091	16.601	5.31	67.60	66.15
L-C6-O-905.5	L-C6-O-905.5	Natural	C6-O-905.5	C6-O-905.7	67.5	66	1	30	0.99	680	0.221	766.356	18.154	1.58	69.42	68.34
L-C6-O-906	L-C6-O-906	Natural	C6-O-905.7	C6-O-906	66	63.5	1	30	0.99	1020	0.245	763.646	18.259	2.07	68.34	64.25
L-C5-MM	L-C5-MM	Rectangular	C5-MM	C5-600	62.9	62.82	2	6	6	113	0.071	412.618	19.477	5.72	71.76	71.66

EXISTING 100-YR

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-O7-O-500	L-O7-O-500	Natural	O7-O-000	C4-O-920	75.79	75.41	1	0	6.01	569.04	0.07	252.09	16.40	1.53	80.47	80.35
L_L-O7-500	L_L-O7-500	Circular	O7-500	O7-O-000	75.72	75.76	3	0	3.00	257.95	-0.02	33.90	16.00	1.60	80.50	80.47
L_L-O7-5-501	L_L-O7-5-501	Circular	O7-5-501	O7-500	76.72	75.72	1	0	1.50	81.47	1.23	12.50	15.82	7.02	80.88	80.50
L_L-O7-O-001	L_L-O7-O-001	Circular	O7-O-001	O7-500	75.52	75.72	3	0	3.00	44.32	-0.45	22.70	16.00	1.07	80.50	80.50
L_L-O7-5-502	L_L-O7-5-502	Circular	O7-5-502	O7-5-501	77.06	76.72	1	0	1.50	14.15	2.40	4.90	16.00	3.05	80.90	80.88
L-O7-5-502.1	L_L-O7-5-502.1	Trapezoidal	O7-5-502	O7-O-002	81.45	82.5	1	100	5.00	70.00	-1.50	0.00	0.00	0.00	0.00	0.00
L_L-O7-5-503	L_L-O7-5-503	Circular	O7-5-503	O7-5-501	77.29	76.72	1	0	1.50	91.17	0.63	8.34	15.82	4.68	81.03	80.88
L_L-O7-O-002	L_L-O7-O-002	Circular	O7-O-002	O7-O-001	76.14	75.52	1	0	2.50	20.90	2.97	22.70	16.00	4.61	80.53	80.50
L_L-O7-5-701	L_L-O7-5-701	Circular	O7-5-701	O7-5-502	77.08	77.08	1	0	1.50	24.95	0.00	1.59	16.00	1.63	80.91	80.90
L_L-O7-4-201 SS	L_L-O7-4-201	Rectangular	O7-4-201	O7-O-000	76.04	75.84	2	4	2.00	115.97	0.17	127.06	16.08	7.89	81.99	80.47
L_L-O7-4-201 RDWY	L_L-O7-4-201	Natural	O7-4-201	O7-O-000	80.48	81.02	1	0	10.00	115.97	-0.47	63.16	16.53	2.35	81.99	81.86
L_L-07-4-202 SS	L_L-O7-4-202	Rectangular	O7-4-202	O7-4-201	76.11	76.04	2	4	2.00	40.48	0.17	101.53	15.92	6.30	82.04	81.99
L_L-07-4-202 RDWY	L_L-O7-4-202	Natural	O7-4-202	O7-4-201	80.24	80.48	1	0	10.00	40.48	-0.59	141.12	16.49	3.16	82.04	81.99
L_L-O7-4-203 SS	L_L-O7-4-203	Circular	O7-4-203	O7-4-202	76.54	76.11	1	0	2.00	296.10	0.17	21.88	15.52	7.08	82.34	82.04
L_L-O7-4-203 RDWY	L_L-O7-4-203	Natural	O7-4-203	O7-4-202	80.36	80.24	1	0	10.00	296.10	0.04	166.40	16.48	3.17	82.34	82.04
L_L-O7-4-401	L_L-O7-4-401	Circular	O7-4-401	O7-4-202	76.5	76.11	1	0	2.00	48.14	0.81	11.33	16.25	3.56	82.12	82.04
L_L-O7-4-204 SS	L_L-O7-4-204	Circular	O7-4-204	O7-4-203	76.77	76.54	1	0	2.00	296.66	0.08	11.20	15.33	3.55	82.45	82.34
L_L-O7-4-204 RDWY	L_L-O7-4-204	Natural	O7-4-204	O7-4-203	80.45	80.36	1	0	10.00	296.66	0.03	113.63	16.46	1.84	82.45	82.34
L_L-O7-4-204 DITCH	L_L-O7-4-204	Natural	O7-4-204	O7-4-203	79.95	79.98	1	0	10.00	296.66	-0.01	36.06	16.45	2.34	82.45	82.34
L_L-O7-4-402 SS	L_L-O7-4-402	Circular	O7-4-402	O7-4-203	76.54	76.48	1	0	1.50	35.41	0.17	8.64	15.41	4.84	82.34	82.34
L_L-O7-4-402 RDWY	L_L-O7-4-402	Trapezoidal	O7-4-402	O7-4-203	80.36	80.33	1	100	5.00	35.41	0.09	20.70	16.25	0.69	82.34	82.34
L_L-O7-4-205	L_L-O7-4-205	Circular	O7-4-205	O7-4-204	76.84	76.77	1	0	2.00	68.46	0.10	25.44	16.25	7.99	83.23	82.45
L_L-07-4-206 SS	L_L-O7-4-206	Circular	O7-4-206	O7-4-204	76.92	76.77	1	0	1.50	194.87	0.08	7.05	20.63	3.96	82.49	82.45
L_L-07-4-206 RDWY	L_L-O7-4-206	Natural	O7-4-206	O7-4-204	80.79	80.45	1	0	10.00	194.87	0.17	85.36	16.55	1.57	82.49	82.45
L_L-07-4-206 DITCH	L_L-O7-4-206	Natural	O7-4-206	O7-4-204	80.47	79.95	1	0	10	194.87	0.267	25.867	16.583	2.21	82.49	82.45
L_L-O7-4-403 SS	L_L-O7-4-403	Circular	O7-4-403	O7-4-204	76.77	76.72	1	0	1.5	30.41	0.164	8.087	20.573	4.54	82.45	82.45
L_L-O7-4-403 RDWY	L_L-O7-4-403	Trapezoidal	O7-4-403	O7-4-204	80.48	80.45	1	100	5	30.41	0.099	21.571	16.251	0.77	82.45	82.45
L_L-O7-4-207 SS	L_L-O7-4-207	Circular	O7-4-207	O7-4-206	77.15	76.92	1	0	1.5	110.45	0.208	6.32	20.799	3.55	82.52	82.49
L_L-O7-4-207 RDWY	L_L-O7-4-207	Natural	O7-4-207	O7-4-206	80.65	80.79	1	0	10	110.45	-0.127	84.806	16.559	1.61	82.52	82.49
L_L-O7-4-207 DITCH	L_L-O7-4-207	Natural	O7-4-207	O7-4-206	80.57	80.47	1	0	10	110.45	0.091	21.142	16.563	2.06	82.52	82.49
L_L-O7-4-404 SS	L_L-O7-4-404	Circular	O7-4-404	O7-4-206	77.5	75.72	1	0	1.5	13.3	13.383	1.782	15.376	1	82.49	82.49
L_L-O7-4-404 RDWY	L_L-O7-4-404	Trapezoidal	O7-4-404	O7-4-206	80.78	80.77	1	100	5	13.3	0.075	6.019	16.164	0.1	82.49	82.49
L_L-07-4-208 SS	L_L-O7-4-208	Circular	O7-4-208	O7-4-207	77.19	77.15	1	0	1.5	279.63	0.014	5.623	21.427	3.16	82.60	82.52
L_L-07-4-208 RDWY	L_L-O7-4-208	Natural	O7-4-208	O7-4-207	80.92	80.65	1	0	10	279.63	0.097	83.441	16.547	1.61	82.60	82.52
L_L-07-4-208 DITCH	L_L-O7-4-208	Natural	O7-4-208	O7-4-207	80.7	80.57	1	0	10	279.63	0.046	18.374	16.558	1.85	82.60	82.52
L_L-O7-4-405 SS	L_L-O7-4-405	Circular	O7-4-405	O7-4-207	77.33	77.15	1	0	1.5	32	0.66	9.22	19.8	5.16	82.52	82.52
L_L-O7-4-405 RDWY	L_L-O7-4-405	Trapezoidal	O7-4-405	O7-4-207	81.5	81.47	1	100	5	32	0.1	4.832	16.253	0.81	82.52	82.52
L_L-O7-4-209 SS	L_L-O7-4-209	Circular	O7-4-209	O7-4-208	77.36	77.19	1	0	1.5	371.57	0.046	5.242	22.784	2.95	82.65	82.60
L_L-O7-4-209 RDWY	L_L-O7-4-209	Natural	O7-4-209	O7-4-208	80.48	80.92	1	0	10	371.57	-0.118	73.635	16.53	0.88	82.65	82.60
L_L-O7-4-209 DITCH	L_L-O7-4-209	Natural	O7-4-209	O7-4-208	80.34	80.7	1	0	10	371.57	-0.097	14.069	16.539	1.26	82.65	82.60
L_L-O7-4-406 SS	L_L-O7-4-406	Circular	O7-4-406	O7-4-208	78.02	77.19	1	0	1.5	29.6	2.804	5.566	21.426	3.13	82.60	82.60
L_L-O7-4-406 RDWY	L_L-O7-4-406	Trapezoidal	O7-4-406	O7-4-208	81	80.92	1	100	5	29.6	0.034	18.82	16.108	0.8	82.60	82.60
L_L-O7-4-210 SS	L_L-O7-4-210	Circular	O7-4-210	O7-4-209	77.4	77.36	1	0	1.5	207.43	0.005	5.035	22.872	2.83	82.67	82.65
L_L-O7-4-210 RDWY	L_L-O7-4-210	Natural	O7-4-210	O7-4-209	80.57	80.48	1	0	10	207.43	0.043	71.315	16.51	0.89	82.67	82.65
L_L-O7-4-407 SS	L_L-O7-4-407	Circular	O7-4-407	O7-4-209	77.95	77.36	1	0	1.5	64.6	0.913	6.346	15.155	3.57	82.65	82.65
L_L-O7-4-407 RDWY	L_L-O7-4-407	Trapezoidal	O7-4-407	O7-4-209	80.72	80.71	1	100	5	64.6	0.015	17.693	16.152	0.55	82.65	82.65
L_L-O7-4-211 SS	L_L-O7-4-211	Circular	O7-4-211	O7-4-210	77.43	77.4	1	0	1.5	119.28	0.05	8.753	15.604	4.89	82.69	82.67
L_L-O7-4-211 RDWY	L_L-O7-4-211	Trapezoidal	O7-4-211	O7-4-210	82.22	82.21	1	100	5	119.28	0.008	41.561	16.251	1.5	82.69	82.67
L_L-O7-4-212 SS	L_L-O7-4-212	Circular	O7-4-212	O7-4-210	77.42	77.4	1	0	1.5	233.59	0.021	-2.144	15.22	-1.26	82.67	82.67
L_L-O7-4-212 RDWY	L_L-O7-4-212	Natural	O7-4-212	O7-4-210	80.36	80.57	1	0	10	233.59	-0.09	19.842	16.513	-0.37	82.67	82.67
L_L-O7-4-408 SS	L_L-O7-4-408	Circular	O7-4-408	O7-4-210	76.95	77.4	1	0	1.5	59.27	-0.759	2.843	22.869	1.6	82.67	82.67
L_L-O7-4-408 RDWY	L_L-O7-4-408	Trapezoidal	O7-4-408	O7-4-210	81.22	81.16	1	100	5	59.27	0.101	11.685	16.499	0.16	82.67	82.67
L_L-O7-4-409 SS	L_L-O7-4-409	Circular	O7-4-409	O7-4-212	77.47	77.42	2	0	1.5	22.32	0.224	2.993	23.099	0.84	82.67	82.67
L_L-O7-4-409 RDWY	L_L-O7-4-409	Trapezoidal	O7-4-409	O7-4-212	80.37	80.36	1	100	5	28	0.036	20.252	16.249	0.12	82.67	82.67
L_L-O7-8-601 SS	L_L-O7-8-601	Rectangular	O7-8-601	O7-O-000	75.92	75.87	2	4	2	94.14	0.053	49.233	16.204	3.06	80.55	80.47
L_L-O7-8-601 RDWY	L_L-O7-8-601	Natural	O7-8-601	O7-O-000	80.57	81.02	1	0	10	94.14	-0.478	0	0	0	0.00	0.00

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-O7-8-602 SS	L_L-O7-8-602	Circular	O7-8-602	O7-8-601	75.99	75.92	2	0	2	94.12	0.074	39.401	15.633	6.24	80.56	80.55
L_L-O7-8-602 RDWY	L_L-O7-8-602	Natural	O7-8-602	O7-8-601	80.72	80.57	1	0	10	94.12	0.159	0	0	0	0.00	0.00
L_L-O7-8-602 DITCH	L_L-O7-8-602	Natural	O7-8-602	O7-8-601	79.09	78.72	1	0	10	94.12	0.393	38.341	16.337	3.61	80.56	80.55
L_L-O7-8-801	L_L-O7-8-801	Circular	O7-8-801	O7-8-601	76.5	75.92	1	0	1.5	26.19	2.215	1.477	16.203	2.27	80.55	80.55
L-L-O7-8-505 SS	L_L-O7-8-505	Circular	O7-8-505	O7-8-602	77.07	75.99	1	0	1.5	230.35	0.469	9.069	15.456	5.11	80.99	80.56
L-L-O7-8-505 RDWY	L_L-O7-8-505	Trapezoidal	O7-8-505	O7-8-602	83.52	83.32	1	100	5	230.35	0.087	0	0	0	0.00	0.00
L_L-O7-8-603 SS	L_L-O7-8-603	Circular	O7-8-603	O7-8-602	76.01	75.99	2	0	2	242.72	0.004	25.779	15.631	4.08	80.87	80.56
L_L-O7-8-603 RDWY	L_L-O7-8-603	Natural	O7-8-603	O7-8-602	79.81	80.72	1	0	10	242.72	-0.375	3.499	16.345	0.33	80.87	80.86
L_L-O7-8-603 DITCH	L_L-O7-8-603	Natural	O7-8-603	O7-8-602	80.22	79.09	1	0	10	242.72	0.466	8.601	16.341	2	80.87	80.56
L_L-O7-8-504 SS	L_L-O7-8-504	Circular	O7-8-504	O7-8-505	76.06	76.82	1	0	2	184.31	-0.412	3.429	16.164	1.08	81.03	80.99
L_L-O7-8-504 RDWY	L_L-O7-8-504	Natural	O7-8-504	O7-8-505	80.28	80.54	1	0	10	184.31	-0.141	6.63	16.301	0.7	81.03	80.99
L-O7-8-504.1	L_L-O7-8-504.1	Trapezoidal	O7-8-504	O7-5-503	80.21	80.7	1	100	5	10	-4.9	-6.341	16.254	-0.11	81.03	81.03
L-O7-8-504.2	L_L-O7-8-504.2	Natural	O7-8-504	O7-5-502	80.21	81.45	1	0	0	128	-0.969	0	0	0	0.00	0.00
L_L-O7-8-507 SS	L_L-O7-8-506	Circular	O7-8-506	O7-8-505	77.35	76.82	1	0	2	151.18	0.351	7.456	15.45	2.93	80.98	80.99
L_L-O7-8-507 RDWY	L_L-O7-8-506	Natural	O7-8-506	O7-8-505	80.34	80.54	1	0	10	151.18	-0.132	-2.866	16.373	-0.4	80.98	80.99
L_L-O7-8-604 SS	L_L-O7-8-604	Circular	O7-8-604	O7-8-603	76.5	76.01	2	0	2	158.98	0.006	21.528	15.373	3.39	80.87	80.87
L_L-O7-8-604 RDWY	L_L-O7-8-604	Natural	O7-8-604	O7-8-603	79.54	79.81	1	0	10	158.98	-0.17	10.899	15.858	1.09	80.87	80.87
L_L-O7-8-604 DITCH	L_L-O7-8-604	Natural	O7-8-604	O7-8-603	81.16	80.22	1	0	10	158.98	0.591	0	0	0	0.00	0.00
L_L-O7-8-803 SS	L_L-O7-8-803	Circular	O7-8-803	O7-8-603	76.97	76.01	1	0	1	24.21	3.965	4.841	15.543	6.08	80.87	80.87
L_L-O7-8-511 RDWY.1	L_L-O7-8-803	Trapezoidal	O7-8-803	O7-8-603	79.81	79.79	1	100	5	24.21	0.083	26.345	16.253	0.91	80.87	80.87
L_L-O7-8-508 SS	L_L-O7-8-508	Circular	O7-8-508	O7-8-506	77.1	77.32	1	0	1.5	52.9	-0.416	2.157	15.433	-1.24	80.98	80.98
L_L-O7-8-508 RDWY	L_L-O7-8-508	Trapezoidal	O7-8-508	O7-8-506	80.22	80.17	1	50	10	52.9	0.095	-17.995	16.296	-0.43	80.98	80.98
L_L-O7-8-605 SS	L_L-O7-8-605	Circular	O7-8-605	O7-8-604	76.13	76.5	2	0	2	56.45	0.213	18.146	15.362	2.82	80.87	80.87
L_L-O7-8-605 RDWY	L_L-O7-8-605	Natural	O7-8-605	O7-8-604	79.14	79.54	1	0	10	56.45	-0.709	-9.225	16.522	0.76	80.87	80.87
L_L-O7-8-509 SS	L_L-O7-8-509	Circular	O7-8-509	O7-8-508	77.37	77.1	1	0	1.5	50.73	0.532	1.393	15.433	1	80.98	80.98
L_L-O7-8-509 RDWY	L_L-O7-8-509	Trapezoidal	O7-8-509	O7-8-508	80.22	80.17	1	50	5	50.73	0.099	-26.397	16.293	-0.63	80.98	80.98
L_L-O7-8-510	L_L-O7-8-510	Circular	O7-8-510	O7-8-605	76.13	75.72	1	0	2	183.18	0.224	9.061	15.339	2.88	80.93	80.87
L_L-O7-8-804 SS	L_L-O7-8-804	Circular	O7-8-804	O7-8-605	76.19	76.13	1	0	2	94.31	0.064	9.863	15.362	3.13	80.87	80.87
L_L-O7-8-804 RDWY	L_L-O7-8-804	Natural	O7-8-804	O7-8-605	79.03	79.14	1	0	10	94.31	-0.117	-13.918	16.519	0.8	80.87	80.87
L_L-O7-8-511 SS	L_L-O7-8-511	Circular	O7-8-511	O7-8-510	76.47	75.72	1	0	1	21.23	3.533	3.4	15.366	4.27	80.93	80.93
L_L-O7-8-511 RDWY	L_L-O7-8-511	Trapezoidal	O7-8-511	O7-8-510	79.33	79.31	1	100	5	21.23	0.094	44.276	16.281	0.52	80.93	80.93
O7-8-511.1 RD	L_L-O7-8-511.1	Natural	O7-8-511	O7-8-509	79.8	80.05	1	0	0	98.4	-0.254	-30.914	16.299	-1.5	80.93	80.98
L_L-O7-8-512 SS	L_L-O7-8-512	Circular	O7-8-512	O7-8-510	75.88	75.72	1	0	1.5	146.6	0.109	6.107	15.341	3.43	80.92	80.93
L_L-O7-8-512 RDWY	L_L-O7-8-512	Natural	O7-8-512	O7-8-510	79.3	79.11	1	0	10	146.6	0.13	-38.832	16.292	-0.91	80.92	80.93
L_L-O7-8-805 SS	L_L-O7-8-805	Circular	O7-8-805	O7-8-804	76.42	76.17	1	0	1.25	24.46	1.022	6.55	15.363	5.29	80.87	80.87
L_L-O7-8-805 RDWY	L_L-O7-8-805	Trapezoidal	O7-8-805	O7-8-804	79.3	79.28	1	100	5	24.46	0.082	23.99	16.029	0.74	80.87	80.87
L_L-O7-8-806 SS	L_L-O7-8-806	Circular	O7-8-806	O7-8-804	76.44	76.17	1	0	1.5	235.32	0.115	3.304	15.406	1.86	80.84	80.87
L_L-O7-8-806 RDWY	L_L-O7-8-806	Natural	O7-8-806	O7-8-804	79.57	79.03	1	0	10	235.32	0.229	-35.962	16.281	-0.95	80.84	80.87
L_L-O7-8-513	L_L-O7-8-513	Circular	O7-8-513	O7-8-512	76.81	76.4	1	0	1.5	45.64	0.898	3.363	16.002	2.92	80.96	80.92
L_L-O7-8-514 SS	L_L-O7-8-514	Circular	O7-8-514	O7-8-512	76.5	76	1	0	1.5	105.96	0.472	4.657	15.332	2.62	80.89	80.92
L_L-O7-8-514 RDWY	L_L-O7-8-514	Natural	O7-8-514	O7-8-512	79.6	79.3	1	0	10	105.96	0	-41.261	16.304	-1.2	80.89	80.92
L_L-07-8-807 SS	L_L-O7-8-807	Circular	O7-8-807	O7-8-806	76.36	76.44	1	0	1.5	98.5	-0.081	3.14	15.409	1.76	80.79	80.84
L_L-07-8-807 RDWY	L_L-O7-8-807	Natural	O7-8-807	O7-8-806	79.72	79.57	1	0	10	98.5	0.152	-35.758	16.291	-1.41	80.79	80.84
L_L-O7-O-003	L_L-O7-O-003	Circular	O7-O-003	O7-8-513	76.79	76.81	1	0	1.5	8.6	-0.233	1.56	16.252	2.82	80.96	80.96
INTERSECTION AT E.	INTERSECTION AT E.	Trapezoidal	O7-8-515	O7-8-807	80.23	80.22	1	165	10	178	0	29.537	16.297	0.62	80.80	80.79
L_L-O7-8-515 SS	L_L-O7-8-515	Circular	O7-8-515	O7-8-514	77.02	76.5	1	0	1.5	108.1	0.481	4.084	15.333	2.3	80.80	80.89
L_L-O7-8-515 RDWY	L_L-O7-8-515	Natural	O7-8-515	O7-8-514	79.85	79.6	1	0	10	108.1	0.231	-43.525	16.312	-1.8	80.80	80.89
L_L-O7-O-501	L_L-O7-O-501	Circular	O7-O-501	O7-8-514	77.22	76.62	1	0	1.5	62.09	0.966	-0.492	15.326	1.72	80.89	80.89
L_L-O7-8-808	L_L-O7-8-808	Circular	O7-8-808	O7-8-807	76.72	76.52	1	0	1.5	15.18	1.318	1.708	16.001	0.96	80.80	80.79
L_L-O7-8-809 SS	L_L-O7-8-809	Circular	O7-8-809	O7-8-807	76.17	76.36	1	0	1.5	38.26	0.209	-4.249	15.942	-2.38	80.74	80.79
L_L-O7-8-809 RDWY	L_L-O7-8-809	Natural	O7-8-809	O7-8-807	79.62	79.72	1	0	10	38.26	-0.261	-64.454	16.343	-2.81	80.74	80.79
L-O7-8-809.1 RDWY	L_L-O7-8-809.1	Natural	O7-8-809	C4-2-210	79.58	78.72	1	0	0	535	0.228	75.27	16.341	2.75	80.74	80.26
L_L-O7-8-516 SS	L_L-O7-8-516	Circular	O7-8-516	O7-8-515	77.12	77.02	1	0	1.5	221.59	0.045	-2.762	15.64	-1.55	80.73	80.80
L_L-O7-8-516 RDWY	L_L-O7-8-516	Natural	O7-8-516	O7-8-515	79.18	79.85	1	0	10	221.59	-0.302	-37.256	16.385	-1.4	80.73	80.80
L-O7-8-516.1 RDWY	L_L-O7-8-516.1	Natural	O7-8-516	C4-3-311	79.81	79.28	1	0	0	297	0.178	28.746	16.404	1.32	80.73	80.69
L-O7-8-516.1 DITCH	L_L-O7-8-516.1	Trapezoidal	O7-8-516	C4-3-311	79.31	78.65	1	0	0.5	297	0.222	13.017	16.412	2.35	80.73	80.69

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-O7-8-802	L_L-O7-8-802	Circular	O7-8-802	O7-8-602	76.72	75.99	1	0	1.5	31.57	2.312	1.717	16.251	0.96	80.56	80.56
L_L-O7-8-507	L_L-O7-8-507	Circular	O7-8-507	O7-8-506	77.44	77.39	1	0	1.5	4.326	1.156	15.188	16.001	8.52	81.06	80.98
Link1348	Link1348	Trapezoidal	Node1273	O7-4-408	79.72	79.22	1	12	8	120	0.417	-2.282	15.149	-0.3	82.67	82.67
Link1349	Link1349	Trapezoidal	Node1275	O7-4-211	80.22	79.22	1	12	2	250	0.4	-8.983	15.538	-0.35	82.69	82.69
O7-1-101 SS	L_L-O7-1-101	Circular	O7-1-101	O7-O-004	74.57	74.47	1	0	5	106.383	0.094	304.787	16.551	15.34	80.44	79.14
O7-1-101 RD	L_L-O7-1-101	Trapezoidal	O7-1-101	O7-O-004	80.8	81	1	100	0.16	106.4	-0.188	0	0	0	0.00	0.00
O7-1-102 SS	L_L-O7-1-102	Circular	O7-1-102	O7-1-101	74.62	74.57	1	0	5	77.154	0.065	304.782	16.551	15.19	81.45	80.44
O7-1-102 RD	L_L-O7-1-102	Trapezoidal	O7-1-102	O7-1-101	81.9	80.8	1	100	5	77.2	1.425	0	0	0	0.00	0.00
O7-1-103 SS	L_L-O7-1-103	Circular	O7-1-103	O7-1-102	74.82	74.62	1	0	5	215.827	0.093	234.371	17.192	11.68	82.36	81.45
O7-1-103 RD	L_L-O7-1-103	Trapezoidal	O7-1-103	O7-1-102	81.06	81.9	1	100	5	215.8	-0.389	135.203	16.553	1.55	82.36	82.28
O7-1-104 SS	L_L-O7-1-104	Rectangular	O7-1-104	O7-1-103	74.92	74.82	1	5	3	125.639	0.08	81.786	17.59	5.43	82.36	82.36
O7-1-104 RD	L_L-O7-1-104	Trapezoidal	O7-1-104	O7-1-103	79.9	81.06	1	100	5	33	-3.515	110.323	16.457	0.75	82.36	82.36
L_L-O7-1-105	L_L-O7-1-105	Circular	O7-1-105	O7-1-104	75.76	74.92	1	0	1.5	92.051	0.913	36.928	16.252	19.97	92.50	82.36
L_L-O7-1-106	L_L-O7-1-106	Rectangular	O7-1-106	O7-1-104	75.02	74.92	1	5	3	104.544	0.096	42.416	15.556	2.82	82.36	82.36
L_L-O7-1-107	L_L-O7-1-107	Circular	O7-1-107	O7-1-106	76.67	75.02	1	0	1.5	20	8.25	5.262	15.312	7.24	82.38	82.36
L_L-O7-1-108	L_L-O7-1-108	Rectangular	O7-1-108	O7-1-106	75.07	75.02	1	5	3	67.799	0.074	39.71	15.556	2.64	82.36	82.36
L_L-O7-1-109	L_L-O7-1-109	Circular	O7-1-109	O7-1-108	75.12	75.07	1	0	1.5	9.636	0.519	21.455	17.87	11.98	82.36	82.36
L-O7-1-109.1	L_L-O7-1-109.1	Trapezoidal	O7-1-109	O7-1-104	79.8	79.9	1	100	5	169.9	-0.059	69.974	16.455	0.74	82.36	82.36
L_L-O7-1-110	L_L-O7-1-110	Rectangular	O7-1-110	O7-1-108	75.82	75.07	1	5	3	131.274	0.571	48.922	15.696	3.25	82.36	82.36
L_L-O7-1-111	L_L-O7-1-111	Circular	O7-1-111	O7-1-110	75.85	75.82	1	0	1.5	13.212	0.227	-9.361	15.901	-5.21	82.36	82.36
L-O7-1-111.1	L_L-O7-1-111.1	Natural	O7-1-111	O7-1-109	80.4	79.8	1	0	0	131.9	0.455	64.728	16.424	1.71	82.36	82.36
L_L-O7-1-501	L_L-O7-1-501	Rectangular	O7-1-501	O7-1-110	75.92	75.82	1	5	3	164.864	0.061	46.609	15.746	3.1	82.37	82.36
L_L-O7-1-502	L_L-O7-1-502	Circular	O7-1-502	O7-1-501	76.26	75.92	1	0	1.5	9.636	3.528	11.347	15.749	6.33	82.37	82.37
L-O7-1-502.1	L_L-O7-1-502.1	Natural	O7-1-502	O7-1-111	80.8	80.4	1	0	0	165	0.242	58.19	16.433	2.26	82.37	82.36
L_L-O7-1-503	L_L-O7-1-503	Rectangular	O7-1-503	O7-1-501	75.97	75.92	1	5	3	209.321	0.024	36.61	15.705	2.43	82.38	82.37
L_L-O7-1-504	L_L-O7-1-504	Circular	O7-1-504	O7-1-503	76.03	75.97	1	0	1.5	8.911	0.673	11.418	15.658	6.38	82.39	82.38
L-O7-1-504.1	L_L-O7-1-504.1	Natural	O7-1-504	O7-1-502	80.4	80.8	1	0	0	209.7	-0.191	45.796	16.44	1.46	82.39	82.37
L_L-O7-1-505	L_L-O7-1-505	Rectangular	O7-1-505	O7-1-503	76.39	75.97	1	5	3	98.099	0.428	27.084	15.722	1.8	82.38	82.38
L_L-O7-1-506	L_L-O7-1-506	Circular	O7-1-506	O7-1-505	76.55	76.39	1	0	1.5	9.265	1.727	7.552	15.876	4.21	82.39	82.38
L-O7-1-506.1	L_L-O7-1-506.1	Natural	O7-1-506	O7-1-504	80.7	80.4	1	0	0	98.1	0.306	33.626	16.445	0.94	82.39	82.39
L_L-O7-1-507	L_L-O7-1-507	Rectangular	O7-1-507	O7-1-505	76.79	76.39	1	5	3	97.161	0.412	24.491	15.643	2.15	82.38	82.38
L_L-O7-1-508	L_L-O7-1-508	Circular	O7-1-508	O7-1-507	76.83	76.79	1	0	1.5	10.444	0.383	12.923	15.677	7.24	82.39	82.38
L-O7-1-508.1	L_L-O7-1-508.1	Natural	O7-1-508	O7-1-506	80.44	80.7	1	0	0	96.5	-0.269	36.416	16.434	1.21	82.39	82.39
L_L-O7-1-509	L_L-O7-1-509	Circular	O7-1-509	O7-1-507	76.99	76.79	1	0	2	79.716	0.251	14.796	15.511	4.69	82.39	82.38
L_L-O7-1-510	L_L-O7-1-510	Circular	O7-1-510	O7-1-509	77.47	76.99	1	0	1.5	16.271	2.95	16	17.851	9	82.39	82.39
L-O7-1-510.1	L_L-O7-1-510.1	Natural	O7-1-510	O7-1-508	80.37	80.44	1	0	0	80	-0.087	32.463	16.429	1.65	82.39	82.39
L_L-O7-1-511	L_L-O7-1-511	Circular	O7-1-511	O7-1-509	76.92	76.99	1	0	1.5	158.332	0.044	6.184	17.844	3.47	82.39	82.39
L-O7-1-511.1	L_L-O7-1-511.1	Natural	O7-1-511	O7-1-510	81	80.37	1	0	0	160.3	0.393	-4.453	16.227	0.46	82.39	82.39
O7-1-511.1 RD	L_L-O7-1-511.2	Trapezoidal	O7-1-511	O7-O-002	81	82.6	1	100	5	45	-3.556	0	0	0	82.39	82.39
L-C4-O-920	L-C4-O-920	Natural	C4-O-920	C4-O-919	75.41	75.2	1	0	4.7	452	0.046	244.153	16.455	1.6	80.35	80.21
L-C4-O-919	L-C4-O-919	Natural	C4-O-919	C4-O-918	75.2	73.35	1	0	3.839	482.43	0.383	233.88	16.496	1.06	80.21	80.18
L-C4-O-918	L-C4-O-918	Natural	C4-O-918	C4-O-917	73.35	74.62	1	0	6.07	311.89	-0.407	288.092	16.582	1.22	80.18	80.16
L-C4-O-917	L-C4-O-917	Natural	C4-O-917	C4-O-916	74.62	74.25	1	0	4.239	274.66	0.135	261.591	16.599	-0.14	80.16	80.16
L-C4-O-917.1	L-C4-O-917.1	Trapezoidal	C4-O-917	C4-O-917.1	78	80	1	30	3	670	-0.299	10.142	16.669	0.17	80.16	80.16
L-C4-O-916	L-C4-O-916	Natural	C4-O-916	C4-O-915	74.25	73.11	1	0	6.25	12.8	8.906	254.857	16.738	-0.53	80.16	80.16
L-C4-O-915 B1	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	72.92	1	5	3	778.4	0.101	57.014	16.987	3.78	80.16	78.71
L-XS-13-B2	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	73.24	1	5	3	778.4	0.06	56.996	16.987	3.78	80.16	78.71
L-XS-13-CHANNEL	L-C4-O-915	Trapezoidal	C4-O-915	C4-O-914	78.32	78.3	1	50	10	778.4	0.242	318.791	17.052	1.17	80.16	78.98
L-C4-O-914	L-C4-O-914	Natural	C4-O-914	C4-O-913	72.92	73.67	1	0	5.39	464.81	-0.161	403.056	16.935	3.29	78.71	78.30
L-C4-O-914.1	L-C4-O-914.1	Trapezoidal	C4-O-914	C4-O-914.1	77	78	1	80	2	424	-0.236	161.731	17.176	1.4	78.71	78.63
L-C4-O-913	L-C4-O-913	Natural	C4-O-913	C4-O-912	73.67	72.25	1	0	5.39	481.28	0.295	394.036	17.012	0.31	78.30	78.30
L-C4-O-912 B1	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.25	72.28	1	4	3	75.02	-0.04	77.809	15.91	6.72	78.30	78.28
L-XS-10.4-B2	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.3	72.27	1	4	3	75.02	0.04	77.858	15.907	6.65	78.30	78.28
L-XS-10.4-SPILL	L-C4-O-912	Natural	C4-O-912	C4-O-911	77.5	76	1	10	0.05	75.02	1.999	490.15	17.013	1.62	78.30	78.28
L-C4-O-907	L-C4-O-907	Natural	C4-O-907	C4-O-906	72.13	72.09	1	0	5.2	35.01	0.114	-118.732	16.504	2.52	78.14	78.14
L-C4-O-907.1	L-C4-O-907.1	Natural	C4-O-907	C4-O-907.1	75	77	1	115	2.5	360	-0.556	183.615	17.07	0.36	78.14	78.12

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-C4-O-911	L-C4-O-911	Natural	C4-O-911	C4-O-910	72.27	72.59	1	0	5.62	312.14	-0.103	508.088	17.018	0.48	78.28	78.27
L-C4-O-910	L-C4-O-910	Natural	C4-O-910	C4-O-909	72.59	71.69	1	0	4.539	409.86	0.22	381.288	17.02	0.27	78.27	78.27
L-C4-O-910.1	L-C4-O-910.1	Natural	C4-O-910	C5-O-902	77.5	75.5	1	0	0	1490	0.134	95.94	17.421	0.47	78.27	77.53
L-C4-O-909.1	L-C4-O-909.1	Natural	C4-O-909	C4-O-909.1	76	77.5	1	0	0	200	-0.75	220.001	17.202	0.42	78.27	78.26
L-C4-O-909 CULV	L-C4-O-909	Rectangular	C4-O-909	C4-O-908	71.69	71.64	1	2	4	45.64	0.1	46.445	29.634	-6.22	78.27	78.14
L-C4-O-909 SPILL	L-C4-O-909	Trapezoidal	C4-O-909	C4-O-908	76	75.9	1	5	5	45.64	0.219	154.204	17.682	2.56	78.27	78.14
L-C4-O-906	L-C4-O-906	Natural	C4-O-906	C4-O-905	72.09	71.65	1	0	6.56	96.36	0.457	-119.409	16.502	-1.78	78.14	78.14
Link1404	Link1404	Trapezoidal	C4-O-903	C4-2-203	77.5	77	1	45	3	200	0.355	-115.405	16.368	1.88	78.58	78.63
L-C4-O-903 PIPE	L-C4-O-903	Circular	C4-O-903	C4-O-902	71.3	70.97	1	0	4	43.33	0.762	92.526	21.111	7.34	78.58	78.65
L-C4-O-903 RDWY	L-C4-O-903	Trapezoidal	C4-O-903	C4-O-902	77.7	77.1	1	35	2	43.33	1.385	157.03	16.318	3.61	78.58	78.65
L-C4-O-902 PIPE	L-C4-O-902	Circular	C4-O-902	C4-O-901	70.67	70.43	1	0	4	520.37	0.046	91.096	22.188	7.43	78.65	78.63
L-C4-O-902 RDWY	L-C4-O-902	Trapezoidal	C4-O-902	C4-O-901	77	76.5	1	35	2	520.37	0.096	97.991	17.476	1.93	78.65	78.63
L-C4-O-901 PIPE	L-C4-O-901	Circular	C4-O-901	C4-O-900	70.43	70.39	1	0	4	143.16	0	105.689	19.687	9.77	78.63	78.62
L-C4-O-901 RDWY	L-C4-O-901	Trapezoidal	C4-O-901	C4-O-900	76.6	76.4	1	35	5	143.16	0.14	158.369	16.903	2.51	78.63	78.62
L-C4-O-900	L-C4-O-900	Trapezoidal	C4-O-900	C4-400	70.39	69.51	1	10	6	63	1.397	173.336	16.911	2.58	78.62	78.63
L-C4-O-908	L-C4-O-908	Natural	C4-O-908	C4-O-907	71.64	72.13	1	0	5.58	239.72	-0.204	178.961	17.678	-1.47	78.14	78.14
L-C4-O-904	L-C4-O-904	Natural	C4-O-904	C4-O-903	71.4	71.3	1	0	6.56	86.1	0.116	-120.654	16.513	2.38	78.57	78.58
L-C4-O-905 PIPE	L-C4-O-905	Circular	C4-O-905	C4-O-904	71.65	71.4	1	0	3	48.45	0.516	72.426	25.07	10.2	78.14	78.57
L-C4-O-905 RDWY	L-C4-O-905	Trapezoidal	C4-O-905	C4-O-904	77.4	77	1	10	1	48.45	0.826	-68.342	16.564	4.74	78.39	78.57
L-C5-O-902.1	L-C5-O-902.1	Trapezoidal	C5-O-902	C6-O-902.1	75.5	76.5	1	24	5	520	-0.192	82.187	17.497	1.3	77.53	77.46
L-C5-O-902 SS	L-C5-O-902	Rectangular	C5-O-902	C5-O-903	67.11	65.61	2	6	6	1800	0.083	271.774	18.205	4.22	77.53	76.10
L-C5-O-902 RD	L-C5-O-902	Trapezoidal	C5-O-902	C5-O-903	75.6	74	1	54	5	1800	0.083	554.901	17.593	3.77	77.53	76.10
L-C5-O-901.1	L-C5-O-901.1	Trapezoidal	C5-O-901	C6-O-901	76.5	75.5	1	80	5	2100	0.024	292.68	17.326	1.82	77.90	77.49
L-C5-O-901 SS	L-C5-O-901	Rectangular	C5-O-901	C5-O-902	68.8	67.11	1	7	6	1950	0.087	128.52	15.575	3.87	77.90	77.53
L-C5-O-901 RD	L-C5-O-901	Trapezoidal	C5-O-901	C5-O-902	77	75.5	1	54	5	1950	0.026	131.397	17.336	1.45	77.90	77.53
Link1367	Link1367	Natural	C4-O-000	Node1294	69.5	71.13	1	0	5.9	32.97	-4.944	348.718	16.531	2.58	78.56	78.56
803.1	L_L-C4-700	Rectangular	C4-700	C4-O-000	69.5	69.5	2	6	5	58.4	0	238.966	15.704	3.97	78.57	78.56
803.1.1	L_L-C4-700	Trapezoidal	C4-700	C4-O-000	76.5	76.4	1	50	5	58.4	0	303.793	16.529	2.85	78.57	78.56
L_L-C4-3-301 SS	L_L-C4-3-301	Rectangular	C4-3-301	C4-700	70.32	69.72	1	5	3	174.74	0.343	95.145	15.426	6.33	78.64	78.57
L_L-C4-3-301 RDWY	L_L-C4-3-301	Natural	C4-3-301	C4-700	76.25	76.26	1	0	10	174.74	-0.006	155.281	16.521	2.65	78.64	78.57
L_L-C4-3-301 DITCH	L_L-C4-3-301	Trapezoidal	C4-3-301	C4-700	74.69	74.47	1	0	1	174.74	0	229.85	16.503	1.92	78.64	78.57
L_L-C4-600	L_L-C4-600	Rectangular	C4-600	C4-700	69.51	69.5	2	6	5	282.94	0.004	133.564	18.814	2.65	78.54	78.57
L_L-C4-7-701 SS	L_L-C4-7-701	Circular	C4-7-701	C4-700	70.81	69.72	1	0	2	263.53	0.414	6.113	15.442	1.93	78.57	78.57
L_L-C4-7-701 RDWY	L_L-C4-7-701	Natural	C4-7-701	C4-700	74.6	76.26	1	0	10	263.53	-0.63	14.599	16.264	0.23	78.57	78.57
L_L-C4-3-302 SS	L_L-C4-3-302	Rectangular	C4-3-302	C4-3-301	71.27	70.32	1	5	3	293.71	0.323	80.19	15.416	5.33	78.73	78.64
L_L-C4-3-302 RDWY	L_L-C4-3-302	Natural	C4-3-302	C4-3-301	75.88	76.25	1	0	10	293.71	0	163.444	16.488	2.54	78.73	78.64
L_L-C4-3-302 DITCH	L_L-C4-3-302	Trapezoidal	C4-3-302	C4-3-301	75.25	74.69	1	0	1	293.71	0	159.804	16.478	1.45	78.73	78.64
L_L-C4-2-201 SS	L_L-C4-2-201	Circular	C4-2-201	C4-600	70.81	70.51	1	0	3	180.14	0.167	33.769	15.474	4.76	78.57	78.54
L_L-C4-2-201 RDWY	L_L-C4-2-201	Natural	C4-2-201	C4-600	76.27	76.44	1	0	10	180.14	-0.094	95.812	16.541	2.73	78.57	78.54
L_L-C4-400	L_L-C4-400	Rectangular	C4-400	C4-600	69.51	69.5	2	6	5	67.76	0.015	173.529	16.914	2.88	78.63	78.54
L_L-C4-6-601 SS	L_L-C4-6-601	Circular	C4-6-601	C4-600	70.84	70.51	1	0	2	231.98	0.142	-12.593	15.777	-3.96	78.17	78.54
L_L-C4-6-601 RDWY	L_L-C4-6-601	Natural	C4-6-601	C4-600	75.18	76.44	1	0	10	231.98	-0.543	-337.461	16.546	-5.36	78.17	78.54
601.1 RD	L_L-C4-6-601.1	Natural	C4-6-601	C4-5-801	75.5	74.36	1	0	0	457.5	0.249	360.738	16.546	4.45	78.17	77.94
L_L-C4-3-101 SS	L_L-C4-3-101	Circular	C4-3-101	C4-3-302	73.38	71.75	1	0	1.5	30.96	5.265	27.047	15.314	15.23	78.73	78.73
L_L-C4-3-101 RDWY	L_L-C4-3-101	Trapezoidal	C4-3-101	C4-3-302	76.26	75.25	1	100	5	30.96	3.262	109.12	16.5	2.38	78.73	78.73
L_L-C4-3-303 SS	L_L-C4-3-303	Rectangular	C4-3-303	C4-3-302	72.29	71.27	1	5	3	499.64	0.204	55.522	15.59	3.69	78.94	78.73
L_L-C4-3-303 RDWY	L_L-C4-3-303	Natural	C4-3-303	C4-3-302	77.05	75.88	1	0	10	499.64	0.234	198.098	16.427	3.55	78.94	78.73
L_L-C4-2-202 SS	L_L-C4-2-202	Circular	C4-2-202	C4-2-201	71.36	70.86	1	0	3	428.62	0.117	28.194	15.467	3.98	78.62	78.57
L_L-C4-2-202 RDWY	L_L-C4-2-202	Natural	C4-2-202	C4-2-201	76	76.27	1	0	10	428.62	-0.063	87.426	16.573	1.94	78.62	78.57
L_L-C4-3-304 SS	L_L-C4-3-304	Rectangular	C4-3-304	C4-3-303	72.18	72.29	1	5	3	151.66	0.073	51.294	15.506	3.51	79.06	78.94
L_L-C4-3-304 RDWY	L_L-C4-3-304	Natural	C4-3-304	C4-3-303	76.6	77.05	1	0	10	151.66	-0.297	185.429	16.404	3.5	79.06	78.94
L_L-C4-2-203 SS	L_L-C4-2-203	Circular	C4-2-203	C4-2-202	71.47	71.36	1	0	2.5	212.39	0.052	18.092	15.486	3.66	78.63	78.62
L_L-C4-2-203 RDWY	L_L-C4-2-203	Natural	C4-2-203	C4-2-202	76.32	76	1	0	10	212.39	0.151	77.614	17.492	1.88	78.63	78.62
L_L-C4-3-305 SS	L_L-C4-3-305	Rectangular	C4-3-305	C4-3-304	72.37	72.18	1	5	3	59.71	0.318	50.445	15.428	3.39	79.08	79.06
L_L-C4-3-305 RDWY	L_L-C4-3-305	Natural	C4-3-305	C4-3-304	76.72	76.6	1	0	10	59.71	0.201	190.436	16.399	3.2	79.08	79.06
L_L-C4-2-204 SS	L_L-C4-2-204	Circular	C4-2-204	C4-2-203	71.72	71.47	1	0	2.5	166.67	0.15	18.572	15.493	3.76	78.71	78.63

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C4-2-204 RDWY	L_L-C4-2-204	Natural	C4-2-204	C4-2-203	76.52	76.32	1	0	10	166.67	0.12	175.727	16.38	3.31	78.71	78.63
L-L-C4-3-102 SS	L_L-C4-3-102	Circular	C4-3-102	C4-3-305	73.4	73.25	1	0	1.5	44.8	0.335	21.281	15.331	11.98	79.08	79.08
L-L-C4-3-102 RDWY	L_L-C4-3-102	Trapezoidal	C4-3-102	C4-3-305	75.6	76.59	1	100	5	44.8	-2.21	61.583	16.581	0.45	79.08	79.08
L_L-C4-3-306 SS	L_L-C4-3-306	Rectangular	C4-3-306	C4-3-305	72.55	72.37	1	5	3	168.41	0.107	37.657	15.438	2.5	79.12	79.08
L_L-C4-3-306 RDWY	L_L-C4-3-306	Natural	C4-3-306	C4-3-305	76.96	76.72	1	0	10	168.41	0.143	134.936	16.368	2.48	79.12	79.08
L_L-C4-2-205	L_L-C4-2-205	Circular	C4-2-205	C4-2-204	71.78	71.49	1	0	1.5	6	4.833	13.955	16.001	7.73	78.78	78.71
L_L-C4-2-206 SS	L_L-C4-2-206	Circular	C4-2-206	C4-2-204	72.13	71.72	1	0	2.5	296.04	0.138	17.206	15.486	3.48	78.91	78.71
L_L-C4-2-206 RDWY	L_L-C4-2-206	Natural	C4-2-206	C4-2-204	77.18	76.52	1	0	10	296.04	0.223	163.299	16.388	3.66	78.91	78.71
L_L-C4-3-103 SS	L_L-C4-3-103	Circular	C4-3-103	C4-3-102	73.57	73.45	1	0	1.5	66.16	0.181	8.336	14.903	4.71	79.08	79.08
L_L-C4-3-103 RDWY	L_L-C4-3-103	Trapezoidal	C4-3-103	C4-3-102	75.82	75.6	1	50	5	66.16	0.333	42.625	16.506	1.21	79.08	79.08
L_L-C4-3-307 SS	L_L-C4-3-307	Special	C4-3-307	C4-3-306	73.08	72.55	1	0	4.41	247.67	0.214	37.745	15.447	3.69	79.22	79.12
L_L-C4-3-307 RDWY	L_L-C4-3-307	Natural	C4-3-307	C4-3-306	77.29	76.96	1	0	10	247.67	0.133	130.819	16.356	2.75	79.22	79.12
L_L-C4-2-207 SS	L_L-C4-2-207	Circular	C4-2-207	C4-2-206	72.35	72.13	1	0	2.5	172.31	0.128	17.818	15.87	3.6	79.15	78.91
L_L-C4-2-207 RDWY	L_L-C4-2-207	Natural	C4-2-207	C4-2-206	77.49	77.18	1	0	10	172.31	0.18	153.9	16.384	4.07	79.15	78.91
L_L-C4-3-308 SS	L_L-C4-3-308	Special	C4-3-308	C4-3-307	73.37	73.09	1	0	4.41	244.89	0.114	37.761	15.591	3.69	79.36	79.22
L_L-C4-3-308 RDWY	L_L-C4-3-308	Natural	C4-3-308	C4-3-307	77.83	77.29	1	0	10	244.89	0.221	118.034	16.343	3.11	79.36	79.22
L_L-C4-2-208 SS	L_L-C4-2-208	Circular	C4-2-208	C4-2-207	72.47	72.35	1	0	2.5	166.8	0.072	16.691	16.014	3.37	79.40	79.15
L_L-C4-2-208 RDWY	L_L-C4-2-208	Natural	C4-2-208	C4-2-207	77.74	77.49	1	0	10	166.8	0.15	146.253	16.382	3.94	79.40	79.15
L_L-C4-3-104 SS	L_L-C4-3-104	Circular	C4-3-104	C4-3-308	74.74	73.93	1	0	1.5	34.79	2.328	8.813	18.549	5.49	79.36	79.36
L_L-C4-3-104 RDWY	L_L-C4-3-104	Trapezoidal	C4-3-104	C4-3-308	78.23	76.87	1	100	5	34.79	3.909	31.394	18.419	0.62	79.36	79.36
L_L-C4-3-309 SS	L_L-C4-3-309	Special	C4-3-309	C4-3-308	74.3	73.89	1	0	3.75	240.35	0.171	30.885	15.623	4.27	79.61	79.36
L_L-C4-3-309 RDWY	L_L-C4-3-309	Natural	C4-3-309	C4-3-308	78.37	77.83	1	0	10	240.35	0.225	95.537	16.346	3.39	79.61	79.36
L_L-C4-2-209 SS	L_L-C4-2-209	Circular	C4-2-209	C4-2-208	73.42	72.47	1	0	2.5	422.65	0.225	15.187	15.499	3.07	79.87	79.40
L_L-C4-2-209 RDWY	L_L-C4-2-209	Natural	C4-2-209	C4-2-208	78.36	77.74	1	0	10	422.65	0.147	117.546	16.361	3.39	79.87	79.40
L_L-C4-3-310 SS	L_L-C4-3-310	Special	C4-3-310	C4-3-309	74.88	74.33	1	0	3.75	449.03	0.122	29.593	15.766	3.97	80.34	79.61
L_L-C4-3-310 RDWY	L_L-C4-3-310	Natural	C4-3-310	C4-3-309	79.34	78.37	1	0	10	449.03	0.216	63.982	16.339	3.03	80.34	79.61
L_L-C4-2-210 SS	L_L-C4-2-210	Circular	C4-2-210	C4-2-209	74.06	73.48	1	0	2.5	444.06	0.131	12.266	16.516	2.48	80.26	79.87
L_L-C4-2-210 RDWY	L_L-C4-2-210	Natural	C4-2-210	C4-2-209	78.72	78.36	1	0	10	444.06	0.081	93.136	16.378	2.83	80.26	79.87
L_L-C4-3-311 SS	L_L-C4-3-311	Circular	C4-3-311	C4-3-310	75.75	75.21	1	0	2	297.63	0.181	13.917	15.42	4.41	80.69	80.34
L_L-C4-3-311 RDWY	L_L-C4-3-311	Natural	C4-3-311	C4-3-310	79.28	79.34	1	0	10	297.63	-0.02	71.936	16.337	2.95	80.69	80.34
L-L-C4-O-201 SS	L_L-C4-O-201	Circular	C4-O-201	C4-2-210	74.55	74.37	1	0	1.5	34.87	0.516	6.924	18.422	3.88	80.26	80.26
L-L-C4-O-201 RDWY	L_L-C4-O-201	Trapezoidal	C4-O-201	C4-2-210	78.75	78.72	1	100	5	34.87	0.086	17.514	16.254	0.44	80.26	80.26
L_OS-17 BOX 1	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.61	1	7	7	50.27	0.119	391.696	15.676	-11.57	73.46	72.86
L_OS-17 BOX 2	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.57	1	7	7	50.27	0.199	391.716	15.676	-11.6	73.46	72.86
L_OS-16 CULV	L_OS-16	Rectangular	OS-16	OS-17	56.98	56.67	1	10	8	386.67	0.08	783.429	15.676	9.77	73.57	73.46
L_OS-16 RDWY	L_OS-16	Natural	OS-16	OS-17	69.94	71.19	1	0	10	386.67	-0.323	524.904	17.104	2.79	73.57	73.46
L_OS-15 CULV	L_OS-15	Rectangular	OS-15	OS-16	57.59	56.98	1	10	8	895.63	0.068	783.456	15.674	9.76	74.32	73.57
L_OS-15 RDWY	L_OS-15	Natural	OS-15	OS-16	72.85	69.94	1	0	10	895.63	0.325	360.457	17.07	2.32	74.32	73.57
W-OS-14	W-OS-14	Trapezoidal	OS-14	W-OUT	73.02	72.9	1	30	5	1000	0	168.036	17.028	2.82	74.73	73.79
L_OS-14 CULV	L_OS-14	Rectangular	OS-14	OS-15	57.91	57.59	1	10	8	311.31	0.103	783.46	15.673	9.75	74.73	74.32
L_OS-14 RDWY	L_OS-14	Natural	OS-14	OS-15	73.02	72.85	1	0	10	311.31	0.055	268.537	17.005	3.17	74.73	74.32
W-OS-13	W-OS-13	Trapezoidal	OS-13	W-OUT	73.4	72.9	1	30	5	1300	0	133.305	16.982	2.59	74.86	73.79
L_OS-13 CULV	L_OS-13	Rectangular	OS-13	OS-14	58.2	57.91	1	10	8	306.54	0.095	451.7	15.702	5.62	74.86	74.73
L_OS-13 RDWY	L_OS-13	Natural	OS-13	OS-14	73.4	73.02	1	0	10	306.54	0.124	179.323	16.898	2.19	74.86	74.73
W-OS-12	W-OS-12	Trapezoidal	OS-12	W-OUT	73.9	72.9	1	30	5	2000	0	119.623	16.899	2.46	75.28	73.79
L_OS-12 CULV	L_OS-12	Rectangular	OS-12	OS-13	58.91	58.2	1	10	8	440.36	0.161	460.795	15.963	5.73	75.28	74.86
L_OS-12 RDWY	L_OS-12	Natural	OS-12	OS-13	73.9	73.4	1	0	10	440.36	0.114	188.471	16.863	2.66	75.28	74.86
L_OS-11 CULV	L_OS-11	Rectangular	OS-11	OS-12	59.25	58.91	1	10	8	628.48	0.054	511.845	16.174	6.37	76.13	75.28
L_OS-11 RDWY	L_OS-11	Natural	OS-11	OS-12	74.57	73.9	1	0	10	628.48	0.107	235.839	16.737	3.11	76.13	75.28
L_L-C4-O-001 CULV	L_L-C4-O-001	Rectangular	C4-O-001	OS-11	59.45	59.25	1	10	8	167.67	0.119	478.084	15.771	5.95	76.16	76.13
L_L-C4-O-001 SPILL	L_L-C4-O-001	Trapezoidal	C4-O-001	OS-11	74.9	73.7	1	50	5	167.67	0.716	559.067	16.714	5.42	76.16	76.13
L_L-C4-5-508 CULV	L_L-C4-5-508	Rectangular	C4-5-508	C4-O-001	59.48	59.45	1	10	8	24.61	0	255.662	16.403	3.18	76.16	76.16
L_L-C4-5-508 SPILL	L_L-C4-5-508	Trapezoidal	C4-5-508	C4-O-001	74.5	74.4	1	50	5	24.61	0.406	111.291	16.572	1.16	76.16	76.16
L_L-C4-5-504 PIPE 1	L_L-C4-5-504	Circular	C4-5-504	C4-5-508	63.09	59.48	1	0	7	182.52	1.978	229.029	15.689	6.06	76.22	76.16
L_L-C4-5-504 PIPE 2	L_L-C4-5-504	Circular	C4-5-504	C4-5-508	65.15	63.88	1	0	3	182.52	0.696	24.144	15.688	3.36	76.22	76.16
L_L-C4-5-504 SPILL	L_L-C4-5-504	Trapezoidal	C4-5-504	C4-5-508	75.5	74.2	1	50	5	389.73	0.334	45.632	16.555	0.65	76.22	76.16

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C4-5-510 SS	L_L-C4-5-510	Circular	C4-5-510	C4-5-508	63.68	62.75	1	0	3	44.96	2.069	100.26	22.604	13.99	76.16	76.16
C4-5-510 RD	L_L-C4-5-510	Trapezoidal	C4-5-510	C4-5-508	74.4	74.3	1	100	5	44.96	-0.067	181.961	16.568	0.96	76.16	76.16
L_L-C4-5-501 PIPE 1	L_L-C4-5-501	Circular	C4-5-501	C4-5-504	65.62	63.09	1	0	7	222.95	1.135	322.785	16.233	11.11	76.71	76.22
L_L-C4-5-501 PIPE 2	L_L-C4-5-501	Circular	C4-5-501	C4-5-504	66.71	65.15	1	0	3	22.95	6.797	106.532	16.222	14.84	76.71	76.22
L_L-C4-5-501 SPILL	L_L-C4-5-501	Trapezoidal	C4-5-501	C4-5-504	76.5	74.8	1	50	5	22.95	7.407	44.282	16.558	1.07	76.71	76.22
C4-5-505 SS	L_L-C4-5-505	Circular	C4-5-505	C4-5-504	70.37	67.72	1	0	1.5	37.13	7.137	18.06	22.629	10.16	76.21	76.22
C4-5-504 RD	L_L-C4-5-505	Trapezoidal	C4-5-505	C4-5-504	74.54	75	1	100	5	37.13	-1.239	-271.816	16.512	-2.11	76.21	76.22
511ST	L_L-C4-5-511	Circular	C4-5-511	C4-5-510	69.03	63.68	1	0	2	13.33	40.135	57.02	23	19.16	76.16	76.16
511RD	L_L-C4-5-511	Trapezoidal	C4-5-511	C4-5-510	74.5	74.4	1	40	3	13.33	0	12.804	22.266	2.23	76.16	76.16
512.2	512.2	Natural	C4-5-512	C4-5-515	74.5	74.25	1	0	0	220	0.367	73.662	16.673	1.85	76.17	76.11
C4-5-512 SS	L_L-C4-5-512	Circular	C4-5-512	C4-5-510	70.4	63.68	1	0	2	93.28	7.204	38.047	22.871	12.43	76.17	76.16
C4-5-512 RD	L_L-C4-5-512	Trapezoidal	C4-5-512	C4-5-510	74.5	74.4	1	100	5	93.28	0	182.189	16.55	1.02	76.17	76.16
L_L-C4-5-500 PIPE 1	L_L-C4-5-500	Circular	C4-5-500	C4-5-501	65.66	65.62	1	0	7	160.3	0.025	238.61	15.782	7.83	77.05	76.71
L_L-C4-5-500 PIPE 2	L_L-C4-5-500	Circular	C4-5-500	C4-5-501	67.83	66.71	1	0	3	160.3	0.699	32.147	15.78	4.71	77.05	76.71
L_L-C4-5-500 SPILL	L_L-C4-5-500	Trapezoidal	C4-5-500	C4-5-501	75.6	75	1	50	5	160.3	0.374	225.159	16.506	2.55	77.05	76.71
L_L-C4-5-502	L_L-C4-5-502	Circular	C4-5-502	C4-5-501	70.26	68.72	1	0	1.5	15.49	9.942	17.997	22.724	11.03	76.87	76.71
896.1	L_L-C4-5-506	Circular	C4-5-506	C4-5-505	70.38	69.98	1	0	1.5	43.25	0.925	16.419	22.545	9.2	76.21	76.21
896.1.1	L_L-C4-5-506	Trapezoidal	C4-5-506	C4-5-505	74.56	74.54	1	50	2	43.25	0	-1.675	15.712	0.44	76.21	76.21
L_L-C4-5-507.1	L_L-C4-5-507.1	Trapezoidal	C4-5-507	C4-5-512	74.55	74.5	1	100	5	150	-0.007	317.547	16.565	1.83	76.19	76.17
C4-5-507 SS	L_L-C4-5-507	Circular	C4-5-507	C4-5-505	70.18	70.04	1	0	1.5	55.54	0.252	16.483	22.969	9.24	76.19	76.21
CR-5-507 RD	L_L-C4-5-507	Trapezoidal	C4-5-507	C4-5-505	74.79	74.54	1	100	5	55.54	0.45	-271.99	16.516	-1.84	76.19	76.21
898.1	L_L-C4-5-513	Circular	C4-5-513	C4-5-512	70.53	70.4	1	0	2	23.09	0.563	38.907	22.872	13.6	76.17	76.17
898.1.1	L_L-C4-5-513	Trapezoidal	C4-5-513	C4-5-512	74.6	74.5	1	50	5	10	0	-59.63	16.661	1.21	76.17	76.17
L_OS-10	L_OS-10	Natural	OS-10	C4-5-500	69.69	65.66	1	12	5.67	39.51	10.2	444.937	16.499	3.65	77.01	77.05
L_L-C4-5-503	L_L-C4-5-503	Circular	C4-5-503	C4-5-502	70.51	70.21	1	0	1.5	23.13	1.297	-16.585	22.817	9.46	77.01	76.87
L_L-C4-5-803.1	L_L-C4-5-803.1	Natural	C4-5-803	C4-5-801	75.3	74.36	1	0	0	213	0.441	-375.271	16.557	-4.93	77.41	77.94
Parker East	Parker East	Trapezoidal	C4-5-803	C5-O-903	74.5	74	1	60	5	1380	0	232.606	16.595	1.64	76.19	76.10
C4-5-803 SS	L_L-C4-5-803	Circular	C4-5-803	C4-5-507	70.33	70.01	1	0	1.5	180.62	0.199	9.076	22.267	5.09	76.19	76.19
C4-5-803 RD	L_L-C4-5-803	Trapezoidal	C4-5-803	C4-5-507	74.97	74.79	1	100	10	190	0.095	67.275	17.681	0.99	76.19	76.19
903.1	L_L-C4-5-514	Circular	C4-5-514	C4-5-513	71.15	70.53	1	0	1.5	23.27	2.664	15.267	22.542	9.43	76.17	76.17
903.1.1	L_L-C4-5-514	Trapezoidal	C4-5-514	C4-5-513	74.7	74.6	1	50	5	10	0	11.283	22.866	2.56	76.17	76.17
L_L-C4-5-512.1	L_L-C4-5-512.1	Natural	C4-5-515	C5-3-310	74.25	74	1	0	0	480	0.367	135.772	16.715	3.87	76.11	75.24
904.1	L_L-C4-5-515	Circular	C4-5-515	C4-5-513	71.16	70.58	1	0	1.5	217.7	0.266	9.897	22.881	5.71	76.11	76.17
904.1.1	L_L-C4-5-515	Trapezoidal	C4-5-515	C4-5-513	74.25	74.5	1	5	5	217.7	0	-59.897	16.676	-1.52	76.11	76.17
L_OS-9 B1	L_OS-9	Rectangular	OS-9	OS-10	69.76	69.75	1	4	5	53.63	0.019	174.349	16.543	8.69	78.54	77.01
L_OS-9 B2	L_OS-9	Rectangular	OS-9	OS-10	69.73	69.69	1	4	5	53.63	0.075	174.359	16.543	8.86	78.54	77.01
L_L-C4-5-702	L_L-C4-5-702	Circular	C4-5-702	C4-5-503	70.63	70.48	1	0	1.5	11.42	1.313	-11.136	22.997	-6.25	77.02	77.01
L_L-C4-5-801	L_L-C4-5-801	Circular	C4-5-801	C4-5-503	71.22	70.57	1	0	1.5	201.15	0.323	7.285	16.625	4.04	77.94	77.01
C4-5-804 SS	L_L-C4-5-804	Circular	C4-5-804	C4-5-803	70.46	70.33	1	0	1.5	83.92	0.155	-11.58	22.972	-6.49	76.19	76.19
C4-5-804 RD	L_L-C4-5-804	Trapezoidal	C4-5-804	C4-5-803	74.96	74.97	1	100	5	83.94	0	-95.576	16.65	-0.75	76.19	76.19
C4-5-802 SS	L_L-C4-5-802	Circular	C4-5-802	C4-5-801	71.72	71.22	1	0	1.5	20.33	2.459	4.253	15.517	4.23	77.94	77.94
C4-5-802 RD	L_L-C4-5-802	Trapezoidal	C4-5-802	C4-5-801	74.56	74.36	1	100	5	24	0.833	7.736	16.574	0.64	77.94	77.94
C4-5-805 SS	L_L-C4-5-805	Circular	C4-5-805	C4-5-804	70.51	70.46	1	0	1.5	33.47	0.149	-11.105	22.97	-6.24	76.19	76.19
C4-5-805 RD	L_L-C4-5-805	Trapezoidal	C4-5-805	C4-5-804	74.95	74.94	1	100	5	33.47	0.03	-95.677	16.673	-0.73	76.19	76.19
911.1	L_L-C4-5-806	Circular	C4-5-806	C4-5-805	71	70.51	1	0	2	20.86	2.349	-10.155	22.971	-3.24	76.19	76.19
911.1.1	L_L-C4-5-806	Trapezoidal	C4-5-806	C4-5-805	74.06	74.04	1	15	2	20.86	0.096	5.052	23.004	1.37	76.19	76.19
C4-5-807 SS	L_L-C4-5-807	Circular	C4-5-807	C4-5-805	70.81	70.51	1	0	1.5	205.04	0.146	5.792	23.017	3.25	76.04	76.19
C4-5-807 RD	L_L-C4-5-807	Natural	C4-5-807	C4-5-805	74.04	74.95	1	0	2	205.04	-0.444	-93.973	16.687	-2.7	76.04	76.19
C4-5-808 SS	L_L-C4-5-808	Circular	C4-5-808	C4-5-807	70.85	70.81	1	0	1.5	24.82	0.161	5.972	22.485	3.35	76.04	76.04
C4-5-808 RD	L_L-C4-5-808	Trapezoidal	C4-5-808	C4-5-807	74.35	74.04	1	100	5	24	1.292	13.56	22.463	1.23	76.04	76.04
L_L-C4-5-809.1	L_L-C4-5-809.1	Natural	C4-5-809	C5-2-209	74.6	74	1	0	0	328.6	0.569	104.663	16.686	4.01	75.94	75.22
C4-5-809 SS	L_L-C4-5-809	Circular	C4-5-809	C4-5-807	70.89	70.81	1	0	1.5	51.37	0.156	-4.516	16.641	-2.52	75.94	76.04
C4-5-809 RD	L_L-C4-5-809	Natural	C4-5-809	C4-5-807	74.49	74.04	1	0	2	51.37	0.876	-98.874	16.686	-2.48	75.94	76.04
Link1368	Link1368	Natural	Node1294	OS-9	69.35	69.73	1	0	7.59	61.2	-0.621	348.695	16.537	3.63	78.56	78.54
Link1398	Link1398	Natural	C5-O-000	XS-49	62.65	63.74	1	0	6.65	25.24	-4.319	548.578	16.626	3.16	70.94	70.91
C5-700ST	L_L-C5-700	Rectangular	C5-700	C5-O-000	62.65	62.65	2	6	6	62.47	0	411.528	15.814	5.71	71.27	70.94

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C5-700RD	L_L-C5-700	Trapezoidal	C5-700	C5-O-000	70.5	70.4	1	50	5	62.47	0	161.723	16.64	3.94	71.27	71.05
L_L-C5-3-301 SS	L_L-C5-3-301	Special	C5-3-301	C5-700	63.38	62.72	1	0	5	147.07	0.456	100.247	16.354	7.69	71.95	71.27
L_L-C5-3-301 RDWY	L_L-C5-3-301	Natural	C5-3-301	C5-700	69.68	70.14	1	0	0	147.07	-0.313	208.894	16.569	4.51	71.95	71.72
L_L-C5-600	L_L-C5-600	Rectangular	C5-600	C5-700	62.82	62.65	2	6	6	239.48	0.071	461.022	18.074	6.39	71.80	71.27
L-SBFR-DRIVEWAY	L-SBFR-DRIVEWAY	Trapezoidal	C5-7-701	XS-45	69.5	69.4	1	30	5	100	0.1	9.815	16.384	-0.5	70.72	70.72
L_L-C5-7-701 SS	L_L-C5-7-701	Special	C5-7-701	C5-700	62.82	62.72	1	0	3.75	185.99	0.054	-40.939	15.296	-5.47	70.72	71.27
L_L-C5-7-701 RDWY	L_L-C5-7-701	Natural	C5-7-701	C5-700	68.61	70.14	1	0	0	185.99	-0.823	-158.699	16.636	-4.53	70.72	71.27
L_L-C5-3-302 SS	L_L-C5-3-302	Special	C5-3-302	C5-3-301	63.7	63.38	1	0	5	194.56	0.164	46.929	16.511	3.6	72.15	71.95
L_L-C5-3-302 RDWY	L_L-C5-3-302	Natural	C5-3-302	C5-3-301	69.61	69.68	1	0	0	194.56	-0.036	255.315	16.56	4.22	72.15	71.95
L_L-C5-2-201 SS	L_L-C5-2-201	Circular	C5-2-201	C5-600	63.36	63.22	1	0	3.5	71.99	0.194	104.292	16.721	10.73	72.56	71.80
L_L-C5-2-201 RDWY	L_L-C5-2-201	Natural	C5-2-201	C5-600	69.97	70.51	1	0	10	71.99	-0.75	308.102	16.765	5.46	72.56	72.42
L_L-C5-6-601 SS	L_L-C5-6-601 DITCH	Special	C5-6-601	C5-600	63.31	63.22	1	0	4.41	218.65	0.041	-73.584	18.767	-7.14	71.05	71.80
L_L-C5-6-601 RDWY	L_L-C5-6-601 DITCH	Natural	C5-6-601	C5-600	69.26	70.51	1	0	10	218.65	-0.572	-176.038	16.778	-5.48	71.05	71.80
L_L-C5-7-702 SS	L_L-C5-7-702	Special	C5-7-702	C5-7-701	63.11	62.41	1	0	3.75	199.71	0.351	-50.217	19.213	-6.71	69.88	70.72
L_L-C5-7-702 RDWY	L_L-C5-7-702	Natural	C5-7-702	C5-7-701	68.26	69.61	1	0	0	199.71	-0.676	-142.065	16.648	-5.09	69.88	70.72
L_L-C5-3-303 SS	L_L-C5-3-303	Special	C5-3-303	C5-3-302	63.93	63.7	1	0	5	193.19	0.119	41.878	16.54	3.21	72.31	72.15
L_L-C5-3-303 RDWY	L_L-C5-3-303	Natural	C5-3-303	C5-3-302	69.78	69.61	1	0	0	193.19	0.088	251.71	16.561	3.92	72.31	72.15
L_L-C5-2-202 SS	L_L-C5-2-202	Circular	C5-2-202	C5-2-201	63.62	63.46	1	0	3.5	185.4	0.086	28.868	16.712	2.97	72.71	72.56
L_L-C5-2-202 RDWY	L_L-C5-2-202	Natural	C5-2-202	C5-2-201	69	69.97	1	0	10	185.4	-0.523	379.124	16.77	4.47	72.71	72.56
L_L-C5-6-602 SS	L_L-C5-6-602	Special	C5-6-602	C5-6-601	63.32	63.31	1	0	3.75	195.32	0.005	-40.428	15.075	-5.42	70.80	71.05
L_L-C5-6-602 RDWY	L_L-C5-6-602	Natural	C5-6-602	C5-6-601	68.16	69.26	1	0	0	195.32	-0.563	-231.697	16.727	-4.5	70.80	71.05
L_L-C5-7-703 SS	L_L-C5-7-703	Special	C5-7-703	C5-7-702	63.29	63.11	1	0	3.75	190.42	0.095	-36.436	18.692	-4.88	69.46	69.88
L_L-C5-7-703 RDWY	L_L-C5-7-703	Natural	C5-7-703	C5-7-702	67.93	68.26	1	0	0	190.42	-0.173	-159.347	16.642	-4.63	69.46	69.88
L_L-C5-3-101	L_L-C5-3-101	Circular	C5-3-101	C5-3-303	67.81	65.17	1	0	1.5	36.78	7.178	-3.864	21.442	-2.15	72.32	72.31
L_L-C5-3-304 SS	L_L-C5-3-304	Special	C5-3-304	C5-3-303	64.24	63.93	1	0	5	159.76	0.194	64.778	15.696	4.98	72.40	72.31
L_L-C5-3-304 RDWY	L_L-C5-3-304	Natural	C5-3-304	C5-3-303	70.88	69.78	1	0	0	159.76	0.689	251.318	16.559	5.36	72.40	72.31
L_L-C5-2-203 SS	L_L-C5-2-203	Circular	C5-2-203	C5-2-202	64.04	63.61	1	0	3.5	204.98	0.21	19.825	16.705	2.04	72.78	72.71
L_L-C5-2-203 RDWY	L_L-C5-2-203	Natural	C5-2-203	C5-2-202	69.4	69	1	0	10	204.98	0.195	383.774	16.772	4.04	72.78	72.71
L-L-C5-6-603 SS	L_L-C5-6-603	Special	C5-6-603	C5-6-602	63.73	63.44	1	0	3.75	195.53	0.148	-19.985	15.016	-2.68	70.70	70.80
L-L-C5-6-603 RDWY	L_L-C5-6-603	Natural	C5-6-603	C5-6-602	67.62	68.16	1	0	0	195.53	-0.276	-251.25	16.704	-3.47	70.70	70.80
L_L-C5-S-2	L_L-C5-S-2	Natural	C5-7-704	C5-S-2	66.79	66.54	1	0	11	117.95	0.449	238.969	16.556	3.72	69.23	69.19
L_L-C5-7-704 SS	L_L-C5-7-704	Special	C5-7-704	C5-7-703	63.72	63.29	1	0	3.75	197.49	0.218	-32.239	19.995	-4.33	69.23	69.46
L_L-C5-7-704 RDWY	L_L-C5-7-704	Natural	C5-7-704	C5-7-703	66.79	67.93	1	0	0	197.49	-0.577	-173.791	16.641	-3.82	69.23	69.46
L_L-C5-3-305 SS	L_L-C5-3-305	Special	C5-3-305	C5-3-304	64.29	64.24	1	0	5	158.21	0.032	83.501	16.567	6.41	72.92	72.40
L_L-C5-3-305 RDWY	L_L-C5-3-305	Natural	C5-3-305	C5-3-304	71.14	70.88	1	0	0	158.21	0.164	196.131	16.565	5.24	72.92	72.42
L_L-C5-2-204 SS	L_L-C5-2-204	Circular	C5-2-204	C5-2-203	64.32	63.98	1	0	3.5	169.83	0.2	17.365	15.349	1.8	72.81	72.78
L_L-C5-2-204 RDWY	L_L-C5-2-204	Natural	C5-2-204	C5-2-203	70.22	69.4	1	0	10	169.83	0.483	388.052	16.774	5.05	72.81	72.78
L_L-C5-6-604 SS	L_L-C5-6-604	Special	C5-6-604	C5-6-603	63.91	63.66	1	0	3.75	193.26	0.129	-19.996	16.826	-2.67	70.54	70.70
L_L-C5-6-604 RDWY	L_L-C5-6-604	Natural	C5-6-604	C5-6-603	67.76	67.62	1	0	0	193.26	0.072	-282.437	16.637	-3.69	70.54	70.70
L_L-C5-3-306 SS	L_L-C5-3-306	Circular	C5-3-306	C5-3-305	64.65	64.29	1	0	3.5	365.87	0.098	51.059	19.124	5.27	73.72	72.92
L_L-C5-3-306 RDWY	L_L-C5-3-306	Natural	C5-3-306	C5-3-305	71.81	71.14	1	0	0	365.87	0.183	215.087	16.567	4.99	73.72	72.92
L_L-C5-2-205 SS	L_L-C5-2-205	Circular	C5-2-205	C5-2-204	64.67	64.27	1	0	3.5	216.71	0.185	32.322	15.557	3.34	72.83	72.81
L_L-C5-2-205 RDWY	L_L-C5-2-205	Natural	C5-2-205	C5-2-204	70.92	70.22	1	0	10	216.71	0.323	140.677	16.615	2.63	72.83	72.81
L_L-C5-6-605 SS	L_L-C5-6-605	Special	C5-6-605	C5-6-604	63.97	63.94	1	0	3.75	198.62	0.015	-24.023	16.8	-3.21	70.31	70.54
L_L-C5-6-605 RDWY	L_L-C5-6-605	Natural	C5-6-605	C5-6-604	67.77	67.76	1	0	0	198.62	0.005	-294.832	16.606	-4.32	70.31	70.54
L_L-C5-3-102 SS	L_L-C5-3-102	Circular	C5-3-102	C5-3-306	69.03	68.12	1	0	1.5	56.46	1.612	6.677	15.484	4.7	73.72	73.72
L_L-C5-3-102 RDWY	L_L-C5-3-102	Trapezoidal	C5-3-102	C5-3-306	72.22	72.16	1	100	5	56.46	0.106	12.246	16.417	0.55	73.72	73.72
L_L-C5-3-307 SS	L_L-C5-3-307	Circular	C5-3-307	C5-3-306	65.1	64.65	1	0	3.5	104.26	0.432	41.625	19.488	4.3	73.84	73.72
L_L-C5-3-307 RDWY	L_L-C5-3-307	Natural	C5-3-307	C5-3-306	71.48	71.81	1	0	0	104.26	-0.317	216.058	16.554	4.11	73.84	73.72
L_L-C5-2-206 SS	L_L-C5-2-206	Circular	C5-2-206	C5-2-205	66.03	65.57	1	0	3	175.16	0.263	35.858	15.666	5.04	72.94	72.83
L_L-C5-2-206 RDWY	L_L-C5-2-206	Natural	C5-2-206	C5-2-205	71.62	70.92	1	0	0	175.16	0.4	132.053	16.619	3.83	72.94	72.83
L_L-C5-N-5	L_L-C5-N-5	Natural	C5-6-606	C5-N-5	67.79	67.51	1	0	0	66.85	0.419	358.223	16.556	7.12	69.85	69.63
L_L-C5-6-606 SS	L_L-C5-6-606	Special	C5-6-606	C5-6-605	64.57	63.95	1	0	3.16	288.27	0.215	-16.964	16.641	-3.29	69.85	70.31
L_L-C5-6-606 RDWY	L_L-C5-6-606	Natural	C5-6-606	C5-6-605	67.51	67.79	1	0	0	288.27	-0.09	-321.84	16.572	-5.27	69.85	70.31
L_L-C5-3-103 SS	L_L-C5-3-103	Circular	C5-3-103	C5-3-102	69.04	69.03	1	0	1.5	29.9	0.033	4.147	15.665	2.65	73.72	73.72
L_L-C5-3-105 RDWY.1	L_L-C5-3-103	Trapezoidal	C5-3-103	C5-3-102	72.52	72.49	1	40	5	29.9	0.1	5.437	16.305	0.45	73.72	73.72

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-C5-3-308 SS	L_L-C5-3-308	Circular	C5-3-308	C5-3-307	65.72	65.35	1	0	3	203.19	0.182	34.877	19.536	4.9	73.98	73.84
L_L-C5-3-308 RDWY	L_L-C5-3-308	Natural	C5-3-308	C5-3-307	72.1	71.48	1	0	0	203.19	0.305	210.527	16.558	4.16	73.98	73.84
L_L-C5-2-207 SS	L_L-C5-2-207	Circular	C5-2-207	C5-2-206	66.43	66.38	1	0	3	216.8	0.023	37.228	16.045	5.23	73.51	72.94
L_L-C5-2-207 RDWY	L_L-C5-2-207	Natural	C5-2-207	C5-2-206	72.34	71.62	1	0	0	216.8	0.332	110.444	16.608	4.48	73.51	72.94
L_L-C5-3-104	L_L-C5-3-104	Circular	C5-3-104	C5-3-103	71.33	69.46	1	0	1.5	33.41	5.597	5.707	16.251	7.56	73.81	73.72
L_L-C5-3-105 SS	L_L-C5-3-105	Circular	C5-3-105	C5-3-308	69.35	66.47	1	0	1.5	60.59	4.753	9.863	15.334	6.75	73.98	73.98
L_L-C5-3-105 RDWY	L_L-C5-3-105	Trapezoidal	C5-3-105	C5-3-308	72.42	72.36	1	100	5	60.59	0.099	21.306	16.492	0.84	73.98	73.98
L_L-C5-3-309 SS	L_L-C5-3-309	Circular	C5-3-309	C5-3-308	66.02	65.72	1	0	3	186.45	0.161	32.153	19.536	4.52	74.24	73.98
L_L-C5-3-309 RDWY	L_L-C5-3-309	Natural	C5-3-309	C5-3-308	72.42	72.1	1	0	0	186.45	0.172	181.445	16.545	4.23	74.24	73.98
L_L-C5-2-208 SS	L_L-C5-2-208	Circular	C5-2-208	C5-2-207	66.88	66.43	1	0	3	394.28	0.114	35.659	17.841	5	74.59	73.51
L_L-C5-2-208 RDWY	L_L-C5-2-208	Natural	C5-2-208	C5-2-207	73.45	72.34	1	0	0	394.28	0.282	99.319	16.609	4.41	74.59	73.51
L_L-C5-3-106 SS	L_L-C5-3-106	Circular	C5-3-106	C5-3-105	69.51	69.35	2	0	1.5	28.67	0.558	14.82	18.588	4.15	73.98	73.98
L_L-C5-3-106 RDWY	L_L-C5-3-106	Trapezoidal	C5-3-106	C5-3-105	73.22	73.19	1	50	5	28.67	0.105	16.5	16.501	0.96	73.98	73.98
L_L-C5-3-310 SS	L_L-C5-3-310	Circular	C5-3-310	C5-3-309	68.25	66.61	1	0	2.5	395.29	0.415	23.927	19.668	4.84	74.79	74.24
L_L-C5-3-310 RDWY	L_L-C5-3-310	Natural	C5-3-310	C5-3-309	72.97	72.42	1	0	0	395.29	0.139	170.97	16.561	4.06	74.79	74.24
L_L-C5-2-209 SS	L_L-C5-2-209	Circular	C5-2-209	C5-2-208	68.46	67.29	1	0	2.5	399.17	0.293	22.119	19.215	4.47	75.22	74.59
L_L-C5-2-209 RDWY	L_L-C5-2-209	Natural	C5-2-209	C5-2-208	73.54	73.45	1	0	0	399.17	0.023	105.788	16.622	3.44	75.22	74.59
L_L-XS-23	L_L-XS-23	Natural	XS-23	XS-22	53.51	52.54	1	0	8.93	89.285	1.086	914.15	17.316	3.36	65.82	65.80
L_L-XS-24	L_L-XS-24	Natural	XS-24	XS-23	53.81	53.51	1	0	9.61	276.201	0.109	912.273	17.317	1.05	65.82	65.82
L_L-XS-25	L_L-XS-25	Natural	XS-25	XS-24	55.09	53.81	1	0	9.12	243.878	0.525	910.319	17.08	1.04	65.82	65.82
L_L-XS-26	L_L-XS-26	Natural	XS-26	XS-25	57.27	55.09	1	0	6.96	255.302	0.854	910.727	17.151	1.29	65.82	65.82
L_L-XS-27	L_L-XS-27	Natural	XS-27	XS-26	56.71	57.27	1	0	6.93	99.131	-0.565	911.178	17.152	4.04	65.91	65.82
L_L-XS-28	L_L-XS-28	Natural	XS-28	XS-27	55.37	56.71	1	0	8.29	331.908	-0.404	911.317	17.147	4.69	66.61	65.91
L_L-XS-29	L_L-XS-29	Natural	XS-29	XS-28	56.52	55.37	1	0	9.19	264.58	0.435	912.198	17.119	1.27	66.63	66.61
L_L-XS-30	L_L-XS-30	Natural	XS-30	XS-29	57.68	56.52	1	0	7.69	328.717	0.353	916.574	17.009	2.67	66.72	66.63
L_L-XS-31	L_L-XS-31	Natural	XS-31	XS-30	57.41	57.68	1	0	8.3	337.631	-0.08	921.13	16.953	4.07	67.72	66.72
L_L-CULV-8	L_L-CULV-8	Natural	CULV-8	XS-31	57.99	57.41	1	0	8.3	44.397	1.306	785.987	16.931	3.15	67.75	67.72
CULVERT 4-A	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.06	55.99	1	8	7	107.82	0.037	112.723	15.063	2.01	67.76	67.75
CULVERT 4-B	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.07	56.02	1	8	7	107.82	0.074	112.72	15.063	2.01	67.76	67.75
CULVERT4-SPILL	L_L-CULV-7	Trapezoidal	CULV-7	CULV-8	65.15	65.14	1	100	8	107.82	0.668	738.217	16.921	1.01	67.76	67.75
L_L-XS-32	L_L-XS-32	Natural	XS-32	CULV-7	58.15	58.06	1	0	8.06	25.237	0.357	789.693	16.874	2.48	67.76	67.76
L_L-XS-33	L_L-XS-33	Natural	XS-33	XS-32	59.41	58.15	1	0	7.93	201.985	0.624	792.037	16.834	2.24	67.78	67.76
L_L-XS-34	L_L-XS-34	Natural	XS-34	XS-33	60.01	59.41	1	0	8	247.14	0.243	714.978	16.78	3.38	67.93	67.78
L_L-XS-35	L_L-XS-35	Natural	XS-35	XS-34	60.21	60.01	1	0	7.48	134.207	0.149	720.79	16.731	3.35	68.08	67.93
L_L-CULV-6	L_L-CULV-6	Natural	CULV-6	XS-35	60.17	60.21	1	0	7.479	12.841	-0.311	721.224	16.727	2.93	68.10	68.08
CULVERT 3-A	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.16	60.17	1	9	5	29.115	-0.034	265.773	16.619	5.89	68.15	68.10
CULVERT 3-B	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.14	60.2	1	9	5	29.115	-0.206	265.772	16.619	5.89	68.15	68.10
CULVERT3-SPILL	L_L-CULV-5	Trapezoidal	CULV-5	CULV-6	67.54	67.24	1	60	5	29.12	1.03	194.617	16.874	4.29	68.15	68.10
L_L-XS-36	L_L-XS-36	Natural	XS-36	CULV-5	60.09	60.14	1	0	8.04	21.297	-0.235	721.454	16.725	2.99	68.22	68.15
L_L-XS-37	L_L-XS-37	Natural	XS-37	XS-36	60.69	60.09	1	0	7.98	179.804	0.334	722.214	16.716	3.01	68.37	68.22
L_L-XS-38	L_L-XS-38	Natural	XS-38	XS-37	61.97	60.69	1	0	6.18	396.598	0.323	673.975	16.708	2.79	68.59	68.37
L_L-CULV-4	L_L-CULV-4	Natural	CULV-4	XS-38	61.36	61.97	1	0	6.18	43.827	-1.392	658.655	16.687	2.85	68.62	68.59
CULVER 2-A	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.5	61.37	1	9	5	26.441	0.492	279.907	16.591	6.2	69.27	68.62
CULVER 2-B	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.4	61.36	1	9	5	26.441	0	279.905	16.591	6.2	69.27	68.62
CULVER 2-SPILL	L_L-CULV-3	Trapezoidal	CULV-3	CULV-4	68.84	68.6	1	42	5	26.44	0.908	99.716	16.718	5.28	69.27	69.03
L_L-XS-39	L_L-XS-39	Natural	XS-39	CULV-3	61.92	61.4	1	0	7.42	15.69	3.569	659.092	16.679	3.01	69.27	69.27
L_L-XS-40	L_L-XS-40	Natural	XS-40	XS-39	62.1	61.92	1	0	7.639	97.04	0.185	659.008	16.669	3.14	69.33	69.27
L_L-XS-41	L_L-XS-41	Natural	XS-41	XS-40	62.49	62.1	1	0	7.19	106.594	0.366	620.015	16.676	3.22	69.41	69.33
L_L-CULV-2	L_L-CULV-2	Natural	CULV-2	XS-41	61.43	62.49	1	0	7.19	14.768	-7.178	620.227	16.66	2.58	69.41	69.41
CULV-1-A	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.43	1	9	5	26.255	-0.076	254.243	16.6	5.63	69.46	69.41
CULV-1-B	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.47	1	9	5	26.255	-0.229	254.238	16.6	5.63	69.46	69.41
CULV1-SPILL	L_L-CULV-1	Trapezoidal	CULV-1	CULV-2	68.9	68.64	1	40	5	26.25	0.99	112.358	16.706	4.03	69.46	69.41
L_L-XS-42	L_L-XS-42	Natural	XS-42	CULV-1	62.74	61.41	1	0	6.619	12.816	10.378	620.632	16.657	2.35	69.45	69.46
L_L-XS-43	L_L-XS-43	Natural	XS-43	XS-42	62.16	62.74	1	0	6.55	126.27	-0.459	620.534	16.648	3.47	69.68	69.45
L_L-XS-44	L_L-XS-44	Natural	XS-44	XS-43	62.58	62.16	1	0	6.43	158.7	0.261	557.598	16.661	2.78	69.73	69.68
L_L-XS-45	L_L-XS-45	Natural	XS-45	XS-44	62.74	62.58	1	0	6.88	314.15	0.022	557.798	16.644	4.59	70.72	69.73

Table 2 - EXISTING NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_L-XS-46	L_L-XS-46	Natural	XS-46	XS-45	62.88	62.74	1	0	7.84	47.539	0.294	548.506	16.639	2.98	70.77	70.72
L_L-XS-47	L_L-XS-47	Natural	XS-47	XS-46	63	62.88	1	0	6.07	31.361	0.383	548.515	16.636	2.54	70.79	70.77
L_L-XS-48	L_L-XS-48	Natural	XS-48	XS-47	62.15	62.98	1	0	8.57	76.883	-1.08	548.532	16.633	3.16	70.90	70.79
L_L-XS-49	L_L-XS-49	Natural	XS-49	XS-48	63.74	62.15	1	0	6.66	89.529	1.776	548.559	16.628	3.09	70.91	70.90
L_L-C5-S-3	L_L-C5-S-3	Natural	C5-S-2	C5-S-3	66.54	66.44	1	0	11	294.98	0.034	252.346	16.588	3.8	69.19	68.99
L-SBFR-WITCHER	L-SBFR-WITCHER	Trapezoidal	C5-S-2	XS-43	69	68.9	1	30	5	400	0.025	-13.781	16.662	-0.74	69.19	69.68
L_L-C5-N-6	L_L-C5-N-6	Natural	C5-N-5	C5-N-6	67.51	67.08	1	0	11	70.53	0.61	358.225	16.558	6.32	69.63	69.58
L-C5-O-903.1	L-C5-O-903.1	Trapezoidal	C5-O-903	C6-O-903	74.4	72	1	60	5	2090	0.096	544.405	17.299	4.02	76.10	74.30
L-C5-O-904 RD	L-C5-O-903	Trapezoidal	C5-O-903	C5-O-904	74.5	72	1	28	5	1740	0.115	240.388	17.311	4.09	76.10	73.14
L-C5-O-904 SS	L-C5-O-903	Rectangular	C5-O-903	C5-O-904	65.61	64.2	3	6	4	1740	0.081	351.776	17.796	4.85	76.10	72.94
L-C5-O-904.1	L-C5-O-904.1	Natural	C5-O-904	C5-2-204	71.5	70.8	1	24	0.99	385	0.519	254.581	17.13	0.72	72.94	72.81
L-C5-O-904	L-C5-O-904	Rectangular	C5-O-904	C5-MM	64.2	62.9	2	6	6	569	0.228	425.465	15.114	5.9	72.94	71.89
L-C5-O-904.2	L-C5-O-904.2	Natural	C5-O-904	C6-O-904	71.5	70	1	40	0.99	2090	0.072	263.502	16.775	0.81	72.94	72.33
L-C6-O-901	L-C6-O-901	Trapezoidal	C6-O-901	C6-O-902	76.4	75	1	30	5	2030	-0.064	286.525	17.534	1.08	77.49	76.92
L-C6-O-902	L-C6-O-902	Trapezoidal	C6-O-902	C6-O-903	76	72	1	30	5	1690	0.284	353.215	17.835	1.07	76.92	74.30
L-C6-O-903	L-C6-O-903	Natural	C6-O-903	C6-O-904	72	69.5	1	30	0.99	1731	0.058	841.27	17.878	1.44	74.30	72.33
L-C6-O-904	L-C6-O-904	Natural	C6-O-904	C6-O-905	69.5	69	1	30	0.99	560	0.179	1010.423	17.986	1.57	72.33	71.71
L-C6-O-905	L-C6-O-905	Natural	C6-O-905	C6-O-905.5	69	67.5	1	30	0.99	1150	0.13	1056.625	18.051	1.79	71.71	69.84
L-C6-O-902.1	L-C6-O-902.1	Trapezoidal	C6-O-902.1	C6-O-902	76.5	75	1	24	5	1570	-0.019	80.962	17.626	1.48	77.46	76.92
L-C5-2-201.1	L-C5-2-201.1	Natural	C5-O-905	C5-MM	71	70	1	24	0.99	540	0.093	-139.89	16.513	-0.5	71.79	71.89
L-C5-O-905	L-C5-O-905	Natural	C5-O-905	C6-O-905	71	69	1	24	0.99	1650	0.091	120.722	16.974	0.44	71.79	71.71
L-C4-O-917.2	L-C4-O-917.2	Trapezoidal	C4-O-917.1	C5-O-901	80	76	1	30	3	1210	0.331	2.93	17.059	0.07	80.16	77.90
L-C4-O-914.2	L-C4-O-914.2	Trapezoidal	C4-O-914.1	C5-O-901	78	76	1	80	2	1090	0.183	161.171	17.233	1.42	78.63	77.90
L-C4-O-909.2	L-C4-O-909.2	Natural	C4-O-909.1	C5-O-902	77.5	75.5	1	0	0	1310	0.153	213.407	17.435	0.49	78.26	77.53
L-C4-O-907.2	L-C4-O-907.2	Natural	C4-O-907.1	C5-O-902	77	75.5	1	115	2.5	1130	0.133	172.108	17.301	0.63	78.12	77.53
L_L-C5-N-7A	L_L-C5-N-7A	Natural	C5-N-6	C5-N-7A	67.08	66.32	1	0	11	175.57	0.433	358.23	16.563	4.9	69.58	69.54
L_L-C5-N-7	L_L-C5-N-7	Natural	C5-N-7	C5-N-7A	66.44	66.32	1	0	11	183.62	-0.065	-358.237	16.57	-4.44	69.32	69.54
L_L-C5-N-8	L_L-C5-N-8	Natural	C5-N-8	C5-N-7	66.74	66.44	1	0	11	205.22	-0.146	-358.244	16.575	-5.79	68.68	69.32
L_L-C5-N-9	L_L-C5-N-9	Natural	C5-N-8	C5-N-9	66.74	65.62	1	0	11	229.86	0.487	358.232	16.581	6.91	68.68	68.00
L_L-C5-N-10	L_L-C5-N-10	Natural	C5-N-9	C5-N-10	65.62	65.02	1	0	11	295.9	0.203	358.273	16.589	6.52	68.00	67.08
L_L-C5-S-4	L_L-C5-S-4	Natural	C5-S-3	C5-S-4	66.44	66.36	1	0	11	199.91	0.04	252.279	16.598	3.97	68.99	68.83
L-SBFR-PARKING LOT	L-SBFR-PARKING LOT	Trapezoidal	C5-S-4	XS-38	68	67.8	1	30	5	650	0.031	16.899	16.603	0.55	68.83	68.59
L_L-C5-S-5	L_L-C5-S-5	Natural	C5-S-5	C5-S-4	66.77	66.36	1	0	11	149.32	-0.275	-235.264	16.624	-4.6	68.45	68.83
L_L-C5-S-6	L_L-C5-S-6	Natural	C5-S-5	C5-S-6	66.77	65.83	1	0	11	279.98	0.336	235.254	16.631	5.75	68.45	67.74
L_L-C5-S-7	L_L-C5-S-7	Natural	C5-S-6	C5-S-7	65.83	64.64	1	0	11	542.54	0.219	235.277	16.646	5.67	67.74	66.31
L-C6-O-905.5	L-C6-O-905.5	Natural	C6-O-905.5	C6-O-905.7	67.5	66	1	30	0.99	680	0.221	1052.487	18.157	1.8	69.84	68.75
L-C6-O-906	L-C6-O-906	Natural	C6-O-905.7	C6-O-906	66	63.5	1	30	0.99	1020	0.245	1050.005	18.252	2.38	68.75	64.42
L-C5-MM	L-C5-MM	Rectangular	C5-MM	C5-600	62.9	62.82	2	6	6	113	0.071	412.121	20.083	5.71	71.89	71.80

TABLE 3

TABLE 3 - PROPOSED WITH MITIGATION HYDROLOGY

I-45

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
	IMP%>>>	100	0	18	55																							
	C>>>>	0.9	0.35	0.45	0.65																							
PROPOSED CONDITIONS:																												
I-45																												
O7-1-103	1.11	0.81	0.30	0.00	0.00	72.97	0.75	150.00	0.00	200.00	6.00	10.000	O7-1-103	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	10.63	9.48	8.37	6.92	5.83	4.42
O7-1-305	0.51	0.37	0.14	0.00	0.00	72.55	0.75	150.00	0.00	200.00	6.00	10.000	O7-1-305	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.87	4.34	3.83	3.17	2.67	2.02
O7-2-201	0.26	0.26	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-2-201	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.98	2.66	2.35	1.94	1.64	1.24
O7-2-202	0.50	0.49	0.01	0.00	0.00	98.00	0.89	50.00	0.00	300.00	5.11	10.000	O7-2-202	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.67	5.05	4.46	3.69	3.11	2.35
O7-2-203	0.38	0.34	0.04	0.00	0.00	89.47	0.84	50.00	0.00	200.00	3.78	10.000	O7-2-203	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.08	3.64	3.21	2.65	2.24	1.69
O7-2-204	0.39	0.35	0.04	0.00	0.00	89.74	0.84	50.00	0.00	200.00	3.78	10.000	O7-2-204	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.19	3.74	3.30	2.73	2.30	1.74
O7-3-301	0.30	0.30	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-3-301	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.44	3.07	2.71	2.24	1.89	1.43
O7-3-302	0.48	0.47	0.01	0.00	0.00	97.92	0.89	50.00	0.00	300.00	5.11	10.000	O7-3-302	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.44	4.85	4.28	3.54	2.98	2.26
O7-3-303	0.33	0.31	0.02	0.00	0.00	93.94	0.87	50.00	0.00	200.00	3.78	10.000	O7-3-303	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.65	3.25	2.87	2.37	2.00	1.51
O7-3-304	0.33	0.32	0.01	0.00	0.00	96.97	0.88	50.00	0.00	200.00	3.78	10.000	O7-3-304	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.72	3.31	2.93	2.42	2.04	1.54
O7-4-205	0.48	0.43	0.05	0.00	0.00	89.58	0.84	50.00	0.00	200.00	3.78	10.000	O7-4-205	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.16	4.60	4.06	3.35	2.83	2.14
O7-4-402	0.38	0.15	0.23	0.00	0.00	39.47	0.57	50.00	0.00	200.00	3.78	10.000	O7-4-402	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.75	2.45	2.16	1.79	1.51	1.14
O7-4-403	0.82	0.65	0.17	0.00	0.00	79.27	0.79	150.00	0.00	200.00	6.00	10.000	O7-4-403	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.21	7.33	6.47	5.34	4.51	3.41
O7-4-404	0.88	0.67	0.21	0.00	0.00	76.14	0.77	150.00	0.00	200.00	6.00	10.000	O7-4-404	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.62	7.69	6.79	5.61	4.73	3.58
O7-4-405	0.90	0.67	0.23	0.00	0.00	74.44	0.76	150.00	0.00	200.00	6.00	10.000	O7-4-405	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.71	7.77	6.86	5.67	4.78	3.62
O7-4-406	1.64	1.24	0.40	0.00	0.00	75.61	0.77	150.00	0.00	300.00	7.33	10.000	O7-4-406	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	16.01	14.28	12.61	10.42	8.79	6.65
O7-5-500.1	0.27	0.16	0.11	0.00	0.00	59.26	0.68	50.00	0.00	200.00	3.78	10.000	O7-5-500.1	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.33	2.08	1.83	1.51	1.28	0.97
O7-5-501	0.32	0.16	0.16	0.00	0.00	50.00	0.63	50.00	0.00	200.00	3.78	10.000	O7-5-501	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.55	2.27	2.01	1.66	1.40	1.06
O7-5-502	0.36	0.16	0.20	0.00	0.00	44.44	0.59	50.00	0.00	200.00	3.78	10.000	O7-5-502	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.73	2.43	2.15	1.77	1.50	1.13
O7-5-503	0.69	0.52	0.17	0.00	0.00	75.36	0.76	100.00	0.00	300.00	6.22	10.000	O7-5-503	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.72	6.00	5.30	4.37	3.69	2.79
O7-5-504	0.37	0.28	0.09	0.00	0.00	75.68	0.77	100.00	0.00	100.00	3.56	10.000	O7-5-504	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.61	3.22	2.85	2.35	1.98	1.50
O7-5-505	0.64	0.53	0.11	0.00	0.00	82.81	0.81	100.00	0.00	300.00	6.22	10.000	O7-5-505	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.57	5.86	5.18	4.28	3.61	2.73
O7-5-706	0.59	0.46	0.13	0.00	0.00	77.97	0.78	150.00	0.00	200.00	6.00	10.000	O7-5-706	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.86	5.22	4.61	3.81	3.21	2.43
O7-5-707	0.53	0.43	0.10	0.00	0.00	81.13	0.80	150.00	0.00	200.00	6.00	10.000	O7-5-707	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.38	4.80	4.24	3.50	2.95	2.24
O7-5-708	0.50	0.40	0.10	0.00	0.00	80.00	0.79	150.00	0.00	200.00	6.00	10.000	O7-5-708	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.03	4.49	3.97	3.28	2.76	2.09
O7-5-709	0.55	0.55	0.00	0.00	0.00	100.00	0.90	150.00	0.00	200.00	6.00	10.000	O7-5-709	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.31	5.63	4.97	4.11	3.46	2.62
O7-6-600	0.11	0.11	0.00	0.00	0.00	100.00	0.90	50.00	0.00	100.00	2.44	10.000	O7-6-600	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.26	1.13	0.99	0.82	0.69	0.52
O7-6-601	0.29	0.29	0.00	0.00	0.00	100.00	0.90	50.00	0.00	300.00	5.11	10.000	O7-6-601	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.33	2.97	2.62	2.16	1.83	1.38
O7-6-602	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-6-602	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.29	2.05	1.81	1.49	1.26	0.95
O7-6-603	0.19	0.19	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-6-603	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.18	1.94	1.72	1.42	1.20	0.91
O7-6-604	0.22	0.22	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-6-604	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.52	2.25	1.99	1.64	1.38	1.05
O7-7-700.1	0.78	0.56	0.22	0.00	0.00	71.79	0.74	150.00	0.00	200.00	6.00	10.000	O7-7-700.1	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	7.40	6.61	5.83	4.82	4.06	3.08
O7-7-700.2	0.14	0.14	0.00	0.00	0.00	100.00	0.90	50.00	0.00	100.00	2.44	10.000	O7-7-700.2	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.61	1.43	1.26	1.04	0.88	0.67
O7-7-701	0.41	0.41	0.00	0.00	0.00	100.00	0.90	50.00	0.00	300.00	5.11	10.000	O7-7-701	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.70	4.20	3.70	3.06	2.58	1.95
O7-7-702	0.27	0.27	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-7-702	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.10	2.76	2.44	2.02	1.70	1.29
O7-7-703	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-7-703	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.87	2.56	2.26	1.87	1.57	1.19
O7-7-704	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	O7-7-704	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.87	2.56	2.26	1.87	1.57	1.19
O7-8-605	0.47	0.41	0.06	0.00	0.00	87.23	0.83	150.00	0.00	200.00	6.00	10.000	O7-8-605	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.97	4.43	3.92	3.23	2.73	2.07
O7-8-606	0.45	0.41	0.04	0.00	0.00	91.11	0.85	150.00	0.00	200.00	6.00	10.000	O7-8-606	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.88	4.36	3.84	3.18	2.68	2.03
O7-8-607	0.41	0.40	0.01	0.00	0.00	97.56	0.89	150.00	0.00	200.00	6.00	10.000	O7-8-607	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.63	4.13	3.65	3.01	2.54	1.93
O7-8-608	0.40	0.40	0.00	0.00	0.00	100.00	0.90	150.00	0.00	200.00	6.00	10.000	O7-8-608	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.59	4.09	3.61	2.99	2.52	1.91
O7-8-609	0.53	0.53	0.00	0.00	0.00	100.00	0.90	150.00	0.00	200.00	6.00	10.000	O7-8-609	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.08	5.42	4.79	3.96	3.34	2.53
O7-8-801	0.34	0.12	0.22	0.00	0.00	35.29	0.54	100.00	0.00	150.00	4.22	10.000	O7-8-801	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.36	2.10	1.86	1.53	1.29	0.98
O7-8-802	0.54	0.19	0.35	0.00	0.00	35.19	0.54	100.00	0.00	150.00	4.22	10.000	O7-8-802	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.74	3.34	2.95	2.43	2.05	1.55
O7-8-803	0.49	0.18	0.31	0.00	0.00	36.73	0.55	150.00	0.00	200.00	6.00	10.000	O7-8-803	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.45	3.08	2.72	2.24	1.89	1.43
O7-8-804	1.02	0.33	0.69	0.00	0.00	32.35	0.53	150.00	0.00	200.00	6.00	10.000	O7-8-804	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	6.86	6.12	5.41	4.47	3.77	2.85
O7-8-805	0.58	0.43	0.15	0.00	0.00	74.14	0.76	150.00	0.00	400.00	8.67	10.000	O7-8-805	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	5.60	5.00	4.41	3.64	3.07	2.33
O7-O-401	0.14	0.14	0.00	0.00	0.00	100.00	0.90	50.00	0.00	50.00	1.78	10.000	O7-O-401	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.61	1.43	1.26	1.04	0.88	0.67
O7-O-402	0.32	0.00	0.00	0.32	0.00	18.00	0.45	50.00	0.00	100.00	2.44	10.000	O7-O-402	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	1.84	1.64	1.45	1.19	1.01	0.76
O7-O-403	0.82	0.00	0.00	0.82	0.00	18.00	0.45	150.00	0.00	200.00	6.00	10.000	O7-O-403	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	4.70	4.20	3.70	3.06	2.58	1.95
O7-O-404	0.66	0.08	0.52	0.06	0.00	13.76	0.43	150.00	0.00	200.00	6.00	10.000	O7-O-404	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.58	3.20	2.82	2.33	1.97	1.49
O7-O-501	0.22	0.22	0.00	0.00	0.00	100.00	0.90	50.00	0.00	50.00	1.78	10.000	O7-O-501	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.52	2.25	1.99	1.64	1.38	1.05
O7-O-502	0.29	0.29	0.00	0.00	0.00	100.00	0.90	50.00	0.00	50.00	1.78	10.000	O7-O-502	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.33	2.97	2.62	2.16	1.83	1.38
O7-O-801	1.28	1.28	0.00	0.00	0.00	100.00	0.90	100.00	0.00	400.00	7.56	10.000	O7-O-801	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	14.68	13.10	11.56	9.55	8.06	6.10
O7-O-802	2.75	2.75	0.00	0.00	0.00	100.00	0.90	200.00	0.00	300.00	8.44	10.000	O7-O-802	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	31.54	28.14	24.85	20.53	17.31	13.11
O7-O-803	0.22	0.22	0.00	0.00	0.00	100.00	0.90	50.00	0.00	50.00	1.78	10.000	O7-O-803	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	2.52	2.25	1.99	1.64	1.38	1.05
O7-O-902	6.68	6.68	0.00	0.00	0.00	100.00	0.90	100.00	0.00	575.00	9.89	10.000	O7-O-902	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	76.62	68.36	60.35	49.86	42.05	31.84
C5-1-101	0.79	0.59	0.20	0.00	0.00	74.68	0.76	150.00	0.00	200.00	6.00	10.000	C5-1-101	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	7.66	6.83	6.03	4.98	4.20	3.18
C5-1-103	1.65	1.26	0.39	0.00	0.00	76.36	0.77	150.00	0.00	400.00	8.67	10.000	C5-1-103	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	16.19	14.45	12.75	10.54	8.89	6.73
C5-1-104	0.81	0.64	0.17	0.00	0.00	79.01	0.78	150.00	0.00	200.00	6.00	10.000	C5-1-104	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.10	7.23	6.38	5.27	4.45	3.37
C5-1-106	0.84	0.62	0.22	0.00	0.00	73.81	0.76	150.00	0.00	200.00	6.00	10.000	C5-1-106	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.09	7.22	6.37	5.27	4.44	3.36
C5-1-107	0.85	0.62	0.23	0.00	0.00	72.94	0.75	150.00	0.00	200.00	6.00	10.000	C5-1-107	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.14	7.26	6.41	5.30	4.47	3.38
C5-1-108	0.88	0.62	0.26	0.00	0.00	70.45	0.74	150.00	0.00	200.00	6.00	10.000	C5-1-108	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	8.27	7.38	6.52	5.38	4.54	3.44
C5-1-109	0.46	0.22	0.24	0.00	0.00	47.83	0.61	100.00	0.00	200.00	4.89	10.000	C5-1-109	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.59	3.21	2.83	2.34	1.97	1.49
C5-1-111	0.47	0.21	0.26	0.00	0.00	44.68	0.60	100.00	0.00	200.00	4.89	10.000	C5-1-111	0.75	3.00	1.25	12.75	11.37	10.04	8.29	6.99	5.30	3.57	3.18	2.81	2.32	1.96	1.48

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
C5-1-112	0.49	0.21	0.28	0.00	0.00	42.86	0.59	100.00	0.00	200.00	4.89	10.000	**C5-1-112**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.66*	*3.26*	*2.88*	*2.38*	*2.01*	*1.52*
C5-1-113	1.09	0.44	0.65	0.00	0.00	40.37	0.57	100.00	0.00	400.00	7.56	10.000	**C5-1-113**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.95*	*7.09*	*6.26*	*5.17*	*4.36*	*3.30*
C5-1-114	0.57	0.21	0.36	0.00	0.00	36.84	0.55	100.00	0.00	200.00	4.89	10.000	**C5-1-114**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.01*	*3.58*	*3.16*	*2.61*	*2.20*	*1.67*
C5-1-115	0.66	0.35	0.31	0.00	0.00	53.03	0.64	100.00	0.00	200.00	4.89	10.000	**C5-1-115**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.40*	*4.82*	*4.25*	*3.51*	*2.96*	*2.24*
C5-1-305	0.24	0.24	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-305**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.75*	*2.46*	*2.17*	*1.79*	*1.51*	*1.14*
C5-1-306	0.26	0.26	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-306**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.98*	*2.66*	*2.35*	*1.94*	*1.64*	*1.24*
C5-1-307	0.25	0.17	0.08	0.00	0.00	68.00	0.72	50.00	0.00	200.00	3.78	10.000	**C5-1-307**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.31*	*2.06*	*1.82*	*1.50*	*1.27*	*0.96*
C5-1-308	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-308**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C5-1-309	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-309**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C5-1-310	0.24	0.24	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-310**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.75*	*2.46*	*2.17*	*1.79*	*1.51*	*1.14*
C5-1-311	0.22	0.22	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-311**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.52*	*2.25*	*1.99*	*1.64*	*1.38*	*1.05*
C5-1-312	0.21	0.21	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-312**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.41*	*2.15*	*1.90*	*1.57*	*1.32*	*1.00*
C5-1-313	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-313**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-1-314	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-314**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-1-315	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-1-315**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-1-316	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-1-316**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-1-317	0.40	0.39	0.01	0.00	0.00	97.50	0.89	100.00	0.00	200.00	4.89	10.000	**C5-1-317**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.52*	*4.03*	*3.56*	*2.94*	*2.48*	*1.88*
C5-1-318	0.40	0.39	0.01	0.00	0.00	97.50	0.89	100.00	0.00	200.00	4.89	10.000	**C5-1-318**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.52*	*4.03*	*3.56*	*2.94*	*2.48*	*1.88*
C5-1-319	0.40	0.39	0.01	0.00	0.00	97.50	0.89	100.00	0.00	200.00	4.89	10.000	**C5-1-319**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.52*	*4.03*	*3.56*	*2.94*	*2.48*	*1.88*
C5-1-320	0.40	0.39	0.01	0.00	0.00	97.50	0.89	100.00	0.00	200.00	4.89	10.000	**C5-1-320**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.52*	*4.03*	*3.56*	*2.94*	*2.48*	*1.88*
C5-1-321	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-1-321**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-1-322	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-1-322**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-2-201	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-2-201**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C5-2-202	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-2-202**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C5-2-203	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-2-203**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C5-3-301	0.31	0.31	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-3-301**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.56*	*3.17*	*2.80*	*2.31*	*1.95*	*1.48*
C5-3-302	0.31	0.31	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-3-302**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.56*	*3.17*	*2.80*	*2.31*	*1.95*	*1.48*
C5-3-303	0.31	0.31	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-3-303**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.56*	*3.17*	*2.80*	*2.31*	*1.95*	*1.48*
C5-4-205	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-205**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-206	0.23	0.23	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-206**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.64*	*2.35*	*2.08*	*1.72*	*1.45*	*1.10*
C5-4-207	0.22	0.22	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-207**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.52*	*2.25*	*1.99*	*1.64*	*1.38*	*1.05*
C5-4-208	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-208**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-209	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-209**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-210	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-210**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-211	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-211**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-212	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-212**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-213	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-213**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-214	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-214**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-215	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-4-215**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C5-4-216	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-216**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-217	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-217**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-218	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-218**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-219	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-219**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-220	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-220**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-221	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-221**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-222	0.39	0.39	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C5-4-222**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C5-4-401	1.07	0.73	0.34	0.00	0.00	68.22	0.73	150.00	0.00	200.00	6.00	10.000	**C5-4-401**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*9.89*	*8.82*	*7.79*	*6.44*	*5.43*	*4.11*
C5-4-402	0.85	0.58	0.27	0.00	0.00	68.24	0.73	150.00	0.00	200.00	6.00	10.000	**C5-4-402**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.86*	*7.01*	*6.19*	*5.11*	*4.31*	*3.27*
C5-4-403	0.85	0.61	0.24	0.00	0.00	71.76	0.74	150.00	0.00	200.00	6.00	10.000	**C5-4-403**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.07*	*7.20*	*6.35*	*5.25*	*4.43*	*3.35*
C5-4-404	0.88	0.65	0.23	0.00	0.00	73.86	0.76	150.00	0.00	200.00	6.00	10.000	**C5-4-404**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.48*	*7.57*	*6.68*	*5.52*	*4.65*	*3.53*
C5-4-405	0.88	0.63	0.25	0.00	0.00	71.59	0.74	150.00	0.00	200.00	6.00	10.000	**C5-4-405**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.34*	*7.44*	*6.57*	*5.43*	*4.58*	*3.47*
C5-4-406	0.89	0.60	0.29	0.00	0.00	67.42	0.72	150.00	0.00	200.00	6.00	10.000	**C5-4-406**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.18*	*7.29*	*6.44*	*5.32*	*4.49*	*3.40*
C5-4-407	0.76	0.47	0.29	0.00	0.00	61.84	0.69	150.00	0.00	200.00	6.00	10.000	**C5-4-407**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.68*	*5.96*	*5.27*	*4.35*	*3.67*	*2.78*
C5-4-408	0.51	0.23	0.28	0.00	0.00	45.10	0.60	100.00	0.00	200.00	4.89	10.000	**C5-4-408**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.89*	*3.47*	*3.06*	*2.53*	*2.13*	*1.62*
C5-4-409	0.51	0.21	0.30	0.00	0.00	41.18	0.58	100.00	0.00	200.00	4.89	10.000	**C5-4-409**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.75*	*3.34*	*2.95*	*2.44*	*2.06*	*1.56*
C5-4-411	0.92	0.43	0.49	0.00	0.00	46.74	0.61	100.00	0.00	200.00	4.89	10.000	**C5-4-411**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.12*	*6.35*	*5.61*	*4.63*	*3.91*	*2.96*
C5-4-413	0.46	0.34	0.12	0.00	0.00	73.91	0.76	100.00	0.00	200.00	4.89	10.000	**C5-4-413**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.44*	*3.96*	*3.49*	*2.89*	*2.43*	*1.84*
C5-4-414	0.46	0.38	0.08	0.00	0.00	82.61	0.80	100.00	0.00	200.00	4.89	10.000	**C5-4-414**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.72*	*4.21*	*3.71*	*3.07*	*2.59*	*1.96*
C5-4-415	0.48	0.38	0.10	0.00	0.00	79.17	0.79	100.00	0.00	200.00	4.89	10.000	**C5-4-415**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.80*	*4.29*	*3.78*	*3.13*	*2.64*	*2.00*
C5-6-601	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-6-601**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C5-7-701	0.31	0.31	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C5-7-701**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.56*	*3.17*	*2.80*	*2.31*	*1.95*	*1.48*
C5-8-801	0.64	0.41	0.23	0.00	0.00	64.06	0.70	150.00	0.00	200.00	6.00	10.000	**C5-8-801**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.73*	*5.11*	*4.51*	*3.73*	*3.14*	*2.38*
C5-O-003	0.81	0.65	0.16	0.00	0.00	80.25	0.79	150.00	0.00	200.00	6.00	10.000	**C5-O-003**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.17*	*7.29*	*6.43*	*5.32*	*4.48*	*3.40*
C5-O-004	0.79	0.55	0.24	0.00	0.00	69.62	0.73	150.00	0.00	200.00	6.00	10.000	**C5-O-004**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.38*	*6.58*	*5.81*	*4.80*	*4.05*	*3.07*
C5-O-101	1.13	0.02	0.02	1.09	0.00	19.13	0.46	150.00	0.00	300.00	7.33	10.000	**C5-O-101**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.57*	*5.86*	*5.18*	*4.28*	*3.61*	*2.73*
C5-O-102	1.17	0.00	0.00	1.17	0.00	18.00	0.45	150.00	0.00	300.00	7.33	10.000	**C5-O-102**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.71*	*5.99*	*5.29*	*4.37*	*3.68*	*2.79*
C5-O-103	1.13	0.01	0.03	1.09	0.00	18.25	0.45	150.00	0.00	300.00	7.33	10.000	**C5-O-103**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.50*	*5.80*	*5.12*	*4.23*	*3.57*	*2.70*
C5-O-104	0.91	0.00	0.00	0.91	0.00	18.00	0.45	150.00	0.00	300.00	7.33	10.000	**C5-O-104**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.22*	*4.66*	*4.11*	*3.40*	*2.86*	*2.17*
C5-O-105	0.45	0.00	0.00	0.45	0.00	18.00	0.45	100.00	0.00	100.00	3.56	10.000	**C5-O-105**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.58*	*2.30*	*2.03*	*1.68*	*1.42*	*1.07*
C5-O-106	0.11	0.00	0.00	0.11	0.00	18.00	0.45	50.00	0.00	50.00	1.78	10.000	**C5-O-106**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.63*	*0.56*	*0.50*	*0.41*	*0.35*	*0.26*
C5-O-401	0.22	0.00	0.00	0.22	0.00	18.00	0.45	50.00	0.00	50.00	1.78	10.000	**C5-O-401**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.26*	*1.13*	*0.99*	*0.82*	*0.69*	*0.52*
C5-O-402	0.34	0.06	0.04	0.24	0.00	30.35	0.52	50.00	0.00	200.00	3.78	10.000	**C5-O-402**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.24*	*2.00*	*1.77*	*1.46*	*1.23*	*0.93*

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
C5-O-403	0.32	0.07	0.03	0.22	0.00	34.25	0.54	50.00	0.00	200.00	3.78	10.000	**C5-O-403**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.20*	*1.96*	*1.73*	*1.43*	*1.21*	*0.91*
C5-O-404	0.31	0.00	0.00	0.31	0.00	18.00	0.45	50.00	0.00	200.00	3.78	10.000	**C5-O-404**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.78*	*1.59*	*1.40*	*1.16*	*0.98*	*0.74*
C5-O-405	0.30	0.03	0.06	0.21	0.00	22.60	0.48	50.00	0.00	200.00	3.78	10.000	**C5-O-405**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.82*	*1.62*	*1.43*	*1.18*	*1.00*	*0.75*
C5-O-406	0.29	0.07	0.01	0.21	0.00	37.17	0.56	50.00	0.00	200.00	3.78	10.000	**C5-O-406**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.05*	*1.83*	*1.62*	*1.34*	*1.13*	*0.85*
C5-O-407	0.29	0.00	0.00	0.29	0.00	18.00	0.45	50.00	0.00	200.00	3.78	10.000	**C5-O-407**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.66*	*1.48*	*1.31*	*1.08*	*0.91*	*0.69*
C5-O-408	0.75	0.06	0.02	0.67	0.00	24.08	0.48	50.00	0.00	200.00	3.78	10.000	**C5-O-408**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.62*	*4.12*	*3.64*	*3.01*	*2.54*	*1.92*
C5-O-409	0.55	0.00	0.00	0.55	0.00	18.00	0.45	100.00	0.00	200.00	4.89	10.000	**C5-O-409**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.15*	*2.81*	*2.48*	*2.05*	*1.73*	*1.31*
C5-O-410	0.66	0.00	0.00	0.66	0.00	18.00	0.45	100.00	0.00	200.00	4.89	10.000	**C5-O-410**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.79*	*3.38*	*2.98*	*2.46*	*2.08*	*1.57*
C5-O-411	0.04	0.00	0.00	0.04	0.00	18.00	0.45	50.00	0.00	50.00	1.78	10.000	**C5-O-411**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.23*	*0.20*	*0.18*	*0.15*	*0.13*	*0.10*
C4-1-101	0.31	0.21	0.10	0.00	0.00	67.74	0.72	200.00	0.00	50.00	5.11	10.000	**C4-1-101**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.85*	*2.55*	*2.25*	*1.86*	*1.57*	*1.19*
C4-1-102	1.36	0.87	0.49	0.00	0.00	63.97	0.70	200.00	0.00	400.00	9.78	10.000	**C4-1-102**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*12.17*	*10.85*	*9.58*	*7.92*	*6.68*	*5.06*
C4-1-103	1.36	0.89	0.47	0.00	0.00	65.44	0.71	200.00	0.00	400.00	9.78	10.000	**C4-1-103**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*12.31*	*10.98*	*9.69*	*8.01*	*6.75*	*5.11*
C4-1-104	1.21	0.89	0.32	0.00	0.00	73.55	0.75	200.00	0.00	400.00	9.78	10.000	**C4-1-104**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.64*	*10.38*	*9.17*	*7.57*	*6.39*	*4.84*
C4-1-105	0.29	0.22	0.07	0.00	0.00	75.86	0.77	200.00	0.00	50.00	5.11	10.000	**C4-1-105**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.84*	*2.53*	*2.23*	*1.85*	*1.56*	*1.18*
C4-1-106	0.77	0.56	0.21	0.00	0.00	72.73	0.75	200.00	0.00	150.00	6.44	10.000	**C4-1-106**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.36*	*6.57*	*5.80*	*4.79*	*4.04*	*3.06*
C4-1-107	0.90	0.67	0.23	0.00	0.00	74.44	0.76	200.00	0.00	200.00	7.11	10.000	**C4-1-107**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.71*	*7.77*	*6.86*	*5.67*	*4.78*	*3.62*
C4-1-108	1.36	1.00	0.36	0.00	0.00	73.53	0.75	200.00	0.00	400.00	9.78	10.000	**C4-1-108**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*13.08*	*11.67*	*10.30*	*8.51*	*7.18*	*5.43*
C4-1-109	0.41	0.18	0.23	0.00	0.00	43.90	0.59	100.00	0.00	200.00	4.89	10.000	**C4-1-109**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.09*	*2.76*	*2.43*	*2.01*	*1.70*	*1.28*
C4-1-110	0.50	0.43	0.07	0.00	0.00	86.00	0.82	100.00	0.00	200.00	4.89	10.000	**C4-1-110**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.24*	*4.68*	*4.13*	*3.41*	*2.88*	*2.18*
C4-1-111	0.51	0.21	0.30	0.00	0.00	41.18	0.58	100.00	0.00	200.00	4.89	10.000	**C4-1-111**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.75*	*3.34*	*2.95*	*2.44*	*2.06*	*1.56*
C4-1-112	0.49	0.21	0.28	0.00	0.00	42.86	0.59	100.00	0.00	200.00	4.89	10.000	**C4-1-112**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.66*	*3.26*	*2.88*	*2.38*	*2.01*	*1.52*
C4-1-113	0.48	0.21	0.27	0.00	0.00	43.75	0.59	100.00	0.00	200.00	4.89	10.000	**C4-1-113**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.61*	*3.22*	*2.85*	*2.35*	*1.98*	*1.50*
C4-1-114	0.48	0.21	0.27	0.00	0.00	43.75	0.59	100.00	0.00	200.00	4.89	10.000	**C4-1-114**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.61*	*3.22*	*2.85*	*2.35*	*1.98*	*1.50*
C4-1-115	0.39	0.19	0.20	0.00	0.00	48.72	0.62	100.00	0.00	200.00	4.89	10.000	**C4-1-115**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.07*	*2.74*	*2.42*	*2.00*	*1.69*	*1.28*
C4-1-308	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-308**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-1-309	0.13	0.13	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-309**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.49*	*1.33*	*1.17*	*0.97*	*0.82*	*0.62*
C4-1-310	0.17	0.17	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-310**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.95*	*1.74*	*1.54*	*1.27*	*1.07*	*0.81*
C4-1-311	0.17	0.17	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-311**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.95*	*1.74*	*1.54*	*1.27*	*1.07*	*0.81*
C4-1-312	0.38	0.38	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-312**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.36*	*3.89*	*3.43*	*2.84*	*2.39*	*1.81*
C4-1-313	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-313**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-1-314	0.40	0.40	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-314**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.59*	*4.09*	*3.61*	*2.99*	*2.52*	*1.91*
C4-1-315	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-315**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-1-316	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-316**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-1-317	0.22	0.22	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-317**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.52*	*2.25*	*1.99*	*1.64*	*1.38*	*1.05*
C4-1-318	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-318**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-1-319	0.25	0.25	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-319**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.87*	*2.56*	*2.26*	*1.87*	*1.57*	*1.19*
C4-1-320	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-320**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-1-321	0.28	0.28	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-321**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.21*	*2.87*	*2.53*	*2.09*	*1.76*	*1.33*
C4-1-322	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-322**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-1-323	0.31	0.31	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-323**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.56*	*3.17*	*2.80*	*2.31*	*1.95*	*1.48*
C4-1-324	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-1-324**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-2-201	0.19	0.19	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-2-201**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.18*	*1.94*	*1.72*	*1.42*	*1.20*	*0.91*
C4-2-202	0.15	0.15	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-2-202**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.72*	*1.54*	*1.36*	*1.12*	*0.94*	*0.72*
C4-2-203	0.15	0.15	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-2-203**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.72*	*1.54*	*1.36*	*1.12*	*0.94*	*0.72*
C4-2-204	0.16	0.16	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-2-204**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.84*	*1.64*	*1.45*	*1.19*	*1.01*	*0.76*
C4-2-205	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-2-205**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-2-206	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-2-206**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-3-301	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-301**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-3-302	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-302**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-3-303	0.13	0.13	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-303**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.49*	*1.33*	*1.17*	*0.97*	*0.82*	*0.62*
C4-3-304	0.17	0.17	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-304**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.95*	*1.74*	*1.54*	*1.27*	*1.07*	*0.81*
C4-3-305	0.16	0.16	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-305**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.84*	*1.64*	*1.45*	*1.19*	*1.01*	*0.76*
C4-3-306	0.16	0.16	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-306**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.84*	*1.64*	*1.45*	*1.19*	*1.01*	*0.76*
C4-3-307	0.16	0.16	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-3-307**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.84*	*1.64*	*1.45*	*1.19*	*1.01*	*0.76*
C4-4-207	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-207**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-208	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-208**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-209	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-209**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-210	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-210**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-211	0.19	0.19	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-211**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.18*	*1.94*	*1.72*	*1.42*	*1.20*	*0.91*
C4-4-212	0.42	0.42	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-212**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.82*	*4.30*	*3.79*	*3.13*	*2.64*	*2.00*
C4-4-213	0.40	0.40	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-213**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.59*	*4.09*	*3.61*	*2.99*	*2.52*	*1.91*
C4-4-214	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-214**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-215	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-215**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-216	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-216**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-4-217	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-217**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-218	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-218**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-4-219	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-219**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-4-220	0.39	0.39	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-220**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.47*	*3.99*	*3.52*	*2.91*	*2.46*	*1.86*
C4-4-221	0.19	0.19	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-221**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.18*	*1.94*	*1.72*	*1.42*	*1.20*	*0.91*
C4-4-222	0.32	0.32	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-4-222**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.67*	*3.27*	*2.89*	*2.39*	*2.01*	*1.53*
C4-4-401	0.86	0.66	0.20	0.00	0.00	76.74	0.77	200.00	0.00	200.00	7.11	10.000	**C4-4-401**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.46*	*7.55*	*6.67*	*5.51*	*4.64*	*3.52*
C4-4-402	0.86	0.64	0.22	0.00	0.00	74.42	0.76	200.00	0.00	200.00	7.11	10.000	**C4-4-402**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.32*	*7.43*	*6.56*	*5.42*	*4.57*	*3.46*

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
C4-4-403	1.36	0.94	0.42	0.00	0.00	69.12	0.73	200.00	0.00	400.00	9.78	10.000	**C4-4-403**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*12.66*	*11.29*	*9.97*	*8.24*	*6.95*	*5.26*
C4-4-404	1.27	0.88	0.39	0.00	0.00	69.29	0.73	200.00	0.00	400.00	9.78	10.000	**C4-4-404**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.83*	*10.56*	*9.32*	*7.70*	*6.49*	*4.92*
C4-4-405	1.28	0.86	0.42	0.00	0.00	67.19	0.72	200.00	0.00	400.00	9.78	10.000	**C4-4-405**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.74*	*10.47*	*9.25*	*7.64*	*6.44*	*4.88*
C4-4-406	0.39	0.27	0.12	0.00	0.00	69.23	0.73	200.00	0.00	50.00	5.11	10.000	**C4-4-406**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.63*	*3.24*	*2.86*	*2.36*	*1.99*	*1.51*
C4-4-407	0.57	0.39	0.18	0.00	0.00	68.42	0.73	200.00	0.00	100.00	5.78	10.000	**C4-4-407**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.28*	*4.71*	*4.16*	*3.43*	*2.90*	*2.19*
C4-4-408	0.57	0.40	0.17	0.00	0.00	70.18	0.74	200.00	0.00	100.00	5.78	10.000	**C4-4-408**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.35*	*4.77*	*4.21*	*3.48*	*2.93*	*2.22*
C4-4-409	1.36	1.01	0.35	0.00	0.00	74.26	0.76	200.00	0.00	400.00	9.78	10.000	**C4-4-409**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*13.15*	*11.73*	*10.36*	*8.55*	*7.21*	*5.46*
C4-4-410	0.74	0.55	0.19	0.00	0.00	74.32	0.76	200.00	0.00	200.00	7.11	10.000	**C4-4-410**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.16*	*6.38*	*5.64*	*4.66*	*3.93*	*2.97*
C4-4-411	0.44	0.21	0.23	0.00	0.00	47.73	0.61	100.00	0.00	200.00	4.89	10.000	**C4-4-411**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.43*	*3.06*	*2.71*	*2.24*	*1.89*	*1.43*
C4-4-412	0.50	0.22	0.28	0.00	0.00	44.00	0.59	100.00	0.00	200.00	4.89	10.000	**C4-4-412**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.77*	*3.37*	*2.97*	*2.45*	*2.07*	*1.57*
C4-4-413	0.51	0.24	0.27	0.00	0.00	47.06	0.61	100.00	0.00	200.00	4.89	10.000	**C4-4-413**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.96*	*3.53*	*3.12*	*2.58*	*2.17*	*1.64*
C4-4-414	0.51	0.38	0.13	0.00	0.00	74.51	0.76	100.00	0.00	200.00	4.89	10.000	**C4-4-414**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.94*	*4.41*	*3.89*	*3.21*	*2.71*	*2.05*
C4-4-415	0.43	0.33	0.10	0.00	0.00	76.74	0.77	100.00	0.00	200.00	4.89	10.000	**C4-4-415**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.23*	*3.78*	*3.33*	*2.75*	*2.32*	*1.76*
C4-4-416	0.26	0.22	0.04	0.00	0.00	84.62	0.82	100.00	0.00	100.00	3.56	10.000	**C4-4-416**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.70*	*2.41*	*2.13*	*1.76*	*1.48*	*1.12*
C4-4-417	0.10	0.08	0.02	0.00	0.00	80.00	0.79	50.00	0.00	50.00	1.78	10.000	**C4-4-417**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.01*	*0.90*	*0.79*	*0.66*	*0.55*	*0.42*
C4-5-500	0.40	0.25	0.15	0.00	0.00	62.50	0.69	100.00	0.00	200.00	4.89	10.000	**C4-5-500**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.54*	*3.16*	*2.79*	*2.30*	*1.94*	*1.47*
C4-5-708	0.46	0.45	0.01	0.00	0.00	97.83	0.89	100.00	0.00	200.00	4.89	10.000	**C4-5-708**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.21*	*4.65*	*4.10*	*3.39*	*2.86*	*2.16*
C4-5-709	0.50	0.46	0.04	0.00	0.00	92.00	0.86	100.00	0.00	200.00	4.89	10.000	**C4-5-709**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.45*	*4.87*	*4.30*	*3.55*	*2.99*	*2.27*
C4-5-710	0.55	0.46	0.09	0.00	0.00	83.64	0.81	100.00	0.00	200.00	4.89	10.000	**C4-5-710**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.68*	*5.07*	*4.47*	*3.69*	*3.12*	*2.36*
C4-6-601	0.19	0.19	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-601**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.18*	*1.94*	*1.72*	*1.42*	*1.20*	*0.91*
C4-6-602	0.11	0.11	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-602**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.26*	*1.13*	*0.99*	*0.82*	*0.69*	*0.52*
C4-6-603	0.15	0.15	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-603**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.72*	*1.54*	*1.36*	*1.12*	*0.94*	*0.72*
C4-6-604	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-604**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-6-605	0.15	0.15	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-605**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.72*	*1.54*	*1.36*	*1.12*	*0.94*	*0.72*
C4-6-606	0.15	0.15	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-606**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.72*	*1.54*	*1.36*	*1.12*	*0.94*	*0.72*
C4-6-607	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-6-607**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-7-701	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-701**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-7-702	0.12	0.12	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-702**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.38*	*1.23*	*1.08*	*0.90*	*0.76*	*0.57*
C4-7-703	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-703**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-7-704	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-704**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-7-705	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-705**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-7-706	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-706**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-7-707	0.43	0.43	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-7-707**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.93*	*4.40*	*3.89*	*3.21*	*2.71*	*2.05*
C4-8-608	0.40	0.39	0.01	0.00	0.00	97.50	0.89	100.00	0.00	200.00	4.89	10.000	**C4-8-608**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.52*	*4.03*	*3.56*	*2.94*	*2.48*	*1.88*
C4-8-609	0.30	0.29	0.01	0.00	0.00	96.67	0.88	100.00	0.00	200.00	4.89	10.000	**C4-8-609**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.37*	*3.01*	*2.66*	*2.19*	*1.85*	*1.40*
C4-8-610	0.30	0.30	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-8-610**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.44*	*3.07*	*2.71*	*2.24*	*1.89*	*1.43*
C4-8-611	0.45	0.44	0.01	0.00	0.00	97.78	0.89	100.00	0.00	200.00	4.89	10.000	**C4-8-611**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.09*	*4.54*	*4.01*	*3.31*	*2.79*	*2.12*
C4-8-622	0.30	0.29	0.01	0.00	0.00	96.67	0.88	100.00	0.00	200.00	4.89	10.000	**C4-8-622**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.37*	*3.01*	*2.66*	*2.19*	*1.85*	*1.40*
C4-8-800	0.49	0.39	0.10	0.00	0.00	79.59	0.79	200.00	0.00	100.00	5.78	10.000	**C4-8-800**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.92*	*4.39*	*3.88*	*3.20*	*2.70*	*2.04*
C4-8-801	0.16	0.07	0.09	0.00	0.00	43.75	0.59	50.00	0.00	50.00	1.78	10.000	**C4-8-801**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.20*	*1.07*	*0.95*	*0.78*	*0.66*	*0.50*
C4-8-802	0.32	0.16	0.16	0.00	0.00	50.00	0.63	100.00	0.00	200.00	4.89	10.000	**C4-8-802**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.55*	*2.27*	*2.01*	*1.66*	*1.40*	*1.06*
C4-8-803	0.37	0.16	0.21	0.00	0.00	43.24	0.59	100.00	0.00	200.00	4.89	10.000	**C4-8-803**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.77*	*2.47*	*2.18*	*1.80*	*1.52*	*1.15*
C4-8-804	0.38	0.18	0.20	0.00	0.00	47.37	0.61	100.00	0.00	200.00	4.89	10.000	**C4-8-804**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.96*	*2.64*	*2.33*	*1.92*	*1.62*	*1.23*
C4-8-805	0.67	0.30	0.37	0.00	0.00	44.78	0.60	100.00	0.00	200.00	4.89	10.000	**C4-8-805**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.09*	*4.54*	*4.01*	*3.31*	*2.79*	*2.12*
C4-D-101	1.05	0.72	0.33	0.00	0.00	68.57	0.73	200.00	0.00	200.00	7.11	10.000	**C4-D-101**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*9.73*	*8.68*	*7.66*	*6.33*	*5.34*	*4.04*
C4-D-102	0.57	0.39	0.18	0.00	0.00	68.42	0.73	200.00	0.00	100.00	5.78	10.000	**C4-D-102**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.28*	*4.71*	*4.16*	*3.43*	*2.90*	*2.19*
C4-D-103	0.35	0.17	0.18	0.00	0.00	48.57	0.62	100.00	0.00	200.00	4.89	10.000	**C4-D-103**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.75*	*2.46*	*2.17*	*1.79*	*1.51*	*1.14*
C4-D-104	0.45	0.39	0.06	0.00	0.00	86.67	0.83	100.00	0.00	200.00	4.89	10.000	**C4-D-104**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.74*	*4.23*	*3.73*	*3.09*	*2.60*	*1.97*
C4-D-105	0.49	0.41	0.08	0.00	0.00	83.67	0.81	100.00	0.00	200.00	4.89	10.000	**C4-D-105**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.06*	*4.51*	*3.99*	*3.29*	*2.78*	*2.10*
C4-O-105	6.52	0.04	0.10	6.38	0.00	18.23	0.45	369.00	457.00	487.00	17.23	17.232	**C4-O-105**	0.75	3.00	1.25	*10.55*	*9.34*	*8.20*	*6.73*	*5.65*	*4.25*	*31.03*	*27.48*	*24.14*	*19.80*	*16.61*	*12.50*
C4-O-106	1.94	0.00	0.00	1.94	0.00	18.00	0.45	50.00	0.00	250.00	4.44	10.000	**C4-O-106**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.13*	*9.93*	*8.76*	*7.24*	*6.11*	*4.62*
C4-O-107	1.97	0.00	0.01	1.96	0.00	17.91	0.45	50.00	0.00	250.00	4.44	10.000	**C4-O-107**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.29*	*10.07*	*8.89*	*7.34*	*6.19*	*4.69*
C4-O-108	1.26	0.00	0.01	1.25	0.00	17.86	0.45	50.00	0.00	250.00	4.44	10.000	**C4-O-108**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.21*	*6.44*	*5.68*	*4.69*	*3.96*	*3.00*
C4-O-109	0.04	0.00	0.00	0.04	0.00	18.00	0.45	50.00	0.00	50.00	1.78	10.000	**C4-O-109**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.23*	*0.20*	*0.18*	*0.15*	*0.13*	*0.10*
C4-O-111	0.13	0.00	0.00	0.13	0.00	18.00	0.45	50.00	0.00	200.00	3.78	10.000	**C4-O-111**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.75*	*0.67*	*0.59*	*0.49*	*0.41*	*0.31*
C4-O-112	0.12	0.00	0.00	0.12	0.00	18.00	0.45	50.00	0.00	200.00	3.78	10.000	**C4-O-112**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.69*	*0.61*	*0.54*	*0.45*	*0.38*	*0.29*
C4-O-114	0.04	0.00	0.00	0.04	0.00	18.00	0.45	50.00	0.00	50.00	1.78	10.000	**C4-O-114**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.23*	*0.20*	*0.18*	*0.15*	*0.13*	*0.10*
C4-O-115	0.09	0.00	0.00	0.09	0.00	18.00	0.45	50.00	0.00	50.00	1.78	10.000	**C4-O-115**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.52*	*0.46*	*0.41*	*0.34*	*0.28*	*0.21*
C4-O-401	0.06	0.05	0.01	0.00	0.00	83.33	0.81	50.00	0.00	50.00	1.78	10.000	**C4-O-401**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*0.62*	*0.55*	*0.49*	*0.40*	*0.34*	*0.26*
C4-O-402	0.21	0.21	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-O-402**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.41*	*2.15*	*1.90*	*1.57*	*1.32*	*1.00*
C4-O-403	0.66	0.66	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-403**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.57*	*6.75*	*5.96*	*4.93*	*4.15*	*3.15*
C4-O-404	0.78	0.78	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-404**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.95*	*7.98*	*7.05*	*5.82*	*4.91*	*3.72*
C4-O-405	0.65	0.65	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-405**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.46*	*6.65*	*5.87*	*4.85*	*4.09*	*3.10*
C4-O-406	0.40	0.40	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-406**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.59*	*4.09*	*3.61*	*2.99*	*2.52*	*1.91*
C4-O-407	0.30	0.30	0.00	0.00	0.00	100.00	0.90	50.00	0.00	50.00	1.78	10.000	**C4-O-407**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.44*	*3.07*	*2.71*	*2.24*	*1.89*	*1.43*
C4-O-409	1.60	1.60	0.00	0.00	0.00	100.00	0.90	300.00	0.00	200.00	9.33	10.000	**C4-O-409**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*18.35*	*16.37*	*14.46*	*11.94*	*10.07*	*7.63*
C4-O-410	0.94	0.94	0.00	0.00	0.00	100.00	0.90	300.00	0.00	200.00	9.33	10.000	**C4-O-410**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.78*	*9.62*	*8.49*	*7.02*	*5.92*	*4.48*
C4-O-411	0.42	0.42	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-411**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.82*	*4.30*	*3.79*	*3.13*	*2.64*	*2.00*
C4-O-412	0.20	0.20	0.00	0.00	0.00	100.00	0.90	50.00	0.00	200.00	3.78	10.000	**C4-O-412**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.29*	*2.05*	*1.81*	*1.49*	*1.26*	*0.95*
C4-O-413	0.43	0.43	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-413**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.93*	*4.40*	*3.89*	*3.21*	*2.71*	*2.05*
C4-O-414	0.58	0.58	0.00	0.00	0.00	100.00	0.90	200.00	0.00	200.00	7.11	10.000	**C4-O-414**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*6.65*	*5.94*	*5.24*	*4.33*	*3.65*	*2.76*
C4-O-415	0.32	0.32	0.00	0.00	0.00	100.00	0.90	100.00	0.00	200.00	4.89	10.000	**C4-O-415**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*3.67*	*3.27*	*2.89*	*2.39*	*2.01*	*1.53*

Small Watershed Method Hydrologic Calculations

COMP POINT NAME	TOTAL DRAINAGE AREA (AC)	PAVED AREA (AC)	GRASSED AREA (AC)	RESIDENTIAL DEV. (AC)	COMMERCIAL DEV. (AC)	INC. % IMPERV.	WGH'T RUNOFF COEFF C	OVERLAND LENGTH (FT)	STRM. SWR LENGTH (FT)	CHAN. LENGTH (FT)	TIME OF CONCEN. CALC. TC	TIME OF CONCEN. USED TC	COMP POINT NAME	OVERLAND VELOCITY (FPS)	STRM. SWR VELOCITY (FT)	CHAN. VELOCITY (FT)	RAINFALL INTENSITY IN/HR						RUNOFF IN CFS					
																	100-YR i IN/HR	50-YR i IN/HR	25-YR i IN/HR	10-YR i IN/HR	5-YR i IN/HR	2-YR i IN/HR	100-YR Q CFS	50-YR Q CFS	25-YR Q CFS	10-YR Q CFS	5-YR Q CFS	2-YR Q CFS
C4-O-501	5.83	2.56	0.00	3.27	0.00	54.01	0.65	455.00	0.00	875.00	21.78	21.778	**C4-O-501**	0.75	3.00	1.25	*9.57*	*8.45*	*7.40*	*6.05*	*5.06*	*3.80*	*36.14*	*31.89*	*27.94*	*22.84*	*19.11*	*14.33*
C4-O-502	2.57	2.57	0.00	0.00	0.00	100.00	0.90	50.00	0.00	250.00	4.44	10.000	**C4-O-502**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*29.48*	*26.30*	*23.22*	*19.18*	*16.18*	*12.25*
C4-O-801	0.19	0.00	0.06	0.13	0.00	12.32	0.42	300.00	0.00	100.00	8.00	10.000	**C4-O-801**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.01*	*0.90*	*0.80*	*0.66*	*0.56*	*0.42*
C4-O-802	0.36	0.06	0.04	0.26	0.00	29.67	0.51	300.00	0.00	100.00	8.00	10.000	**C4-O-802**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.36*	*2.10*	*1.86*	*1.53*	*1.29*	*0.98*
C4-O-803	0.40	0.01	0.01	0.38	0.00	19.60	0.46	300.00	0.00	100.00	8.00	10.000	**C4-O-803**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.34*	*2.09*	*1.84*	*1.52*	*1.28*	*0.97*
C4-O-804	0.40	0.03	0.02	0.35	0.00	23.25	0.48	300.00	0.00	100.00	8.00	10.000	**C4-O-804**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.44*	*2.18*	*1.92*	*1.59*	*1.34*	*1.01*
C4-O-805	0.37	0.03	0.02	0.32	0.00	23.68	0.48	300.00	0.00	100.00	8.00	10.000	**C4-O-805**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*2.27*	*2.02*	*1.79*	*1.48*	*1.25*	*0.94*
OFF-14	5.28	4.91	0.37	0.00	0.00	92.99	0.86	105.00	0.00	701.00	11.68	11.680	**OFF-14**	0.75	3.00	1.25	*12.14*	*10.81*	*9.53*	*7.86*	*6.62*	*5.00*	*55.21*	*49.16*	*43.34*	*35.74*	*30.10*	*22.76*
OFF-5	0.18	0.09	0.09	0.00	0.00	50.00	0.63	13.00	0.00	305.00	4.36	10.000	**OFF-5**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*1.43*	*1.28*	*1.13*	*0.93*	*0.79*	*0.60*
OFF-6	0.63	0.38	0.25	0.00	0.00	60.32	0.68	86.00	0.00	111.00	3.39	10.000	**OFF-6**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*5.47*	*4.88*	*4.31*	*3.56*	*3.00*	*2.27*
OFF-7	0.74	0.57	0.17	0.00	0.00	77.03	0.77	87.00	0.00	214.00	4.79	10.000	**OFF-7**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*7.30*	*6.51*	*5.75*	*4.75*	*4.00*	*3.03*
OFF-8	29.56	23.09	6.07	0.40	0.00	78.36	0.78	427.00	0.00	1672.00	31.78	31.782	**OFF-8**	0.75	3.00	1.25	*8.03*	*7.05*	*6.15*	*4.99*	*4.16*	*3.10*	*185.45*	*162.71*	*141.91*	*115.27*	*96.03*	*71.53*
OFF-9	1.52	1.42	0.10	0.00	0.00	93.42	0.86	93.00	0.00	515.00	8.93	10.000	**OFF-9**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*16.73*	*14.93*	*13.18*	*10.89*	*9.18*	*6.95*
OS-10	6.33	6.33	0.00	0.00	0.00	100.00	0.90	186.00	0.00	1028.00	17.84	17.840	**OS-10**	0.75	3.00	1.25	*10.40*	*9.21*	*8.08*	*6.63*	*5.56*	*4.18*	*59.27*	*52.46*	*46.06*	*37.76*	*31.67*	*23.83*
OS-14	144.90	4.99	1.28	138.63	0.00	20.66	0.46	442.00	2783.00	1755.00	48.68	48.683	**OS-14**	0.75	3.00	1.25	*6.43*	*5.61*	*4.86*	*3.92*	*3.25*	*2.40*	*433.04*	*377.49*	*327.42*	*263.96*	*218.58*	*161.29*
XS-31	47.44	1.18	0.08	46.18	0.00	20.01	0.46	1055.00	0.00	2258.00	53.55	53.551	**XS-31**	0.75	3.00	1.25	*6.10*	*5.31*	*4.60*	*3.70*	*3.06*	*2.25*	*133.45*	*116.17*	*100.63*	*80.98*	*66.96*	*49.30*
XS-43	7.97	0.02	0.01	7.94	0.00	18.18	0.45	803.00	0.00	506.00	24.59	24.591	**XS-43**	0.75	3.00	1.25	*9.07*	*7.99*	*6.99*	*5.70*	*4.77*	*3.57*	*32.60*	*28.72*	*25.12*	*20.49*	*17.13*	*12.82*
C4-O-001	114.90	47.84	0.98	66.08	0.00	51.99	0.64	311.00	1882.00	3709.00	66.82	66.820	**C4-O-001**	0.75	3.00	1.25	*5.38*	*4.67*	*4.03*	*3.23*	*2.66*	*1.95*	*393.31*	*341.23*	*294.70*	*236.18*	*194.61*	*142.48*
C4-O-901	15.96	2.52	0.35	13.09	0.00	30.55	0.52	571.00	0.00	763.00	22.86	22.862	**C4-O-901**	0.75	3.00	1.25	*9.37*	*8.26*	*7.24*	*5.91*	*4.94*	*3.70*	*77.60*	*68.43*	*59.91*	*48.93*	*40.93*	*30.67*
C4-O-903	27.90	4.98	0.00	22.92	0.00	32.64	0.53	1151.00	0.00	1288.00	42.75	42.751	**C4-O-903**	0.75	3.00	1.25	*6.90*	*6.03*	*5.24*	*4.23*	*3.51*	*2.60*	*102.10*	*89.17*	*77.48*	*62.61*	*51.94*	*38.45*
C4-O-912	29.27	10.96	0.00	18.31	0.00	48.70	0.62	1158.00	0.00	916.00	37.95	37.947	**C4-O-912**	0.75	3.00	1.25	*7.35*	*6.43*	*5.59*	*4.53*	*3.76*	*2.79*	*132.98*	*116.36*	*101.26*	*82.00*	*68.15*	*50.57*
C4-O-914	25.88	16.63	0.45	8.80	0.00	70.38	0.74	754.00	0.00	1138.00	31.93	31.929	**C4-O-914**	0.75	3.00	1.25	*8.02*	*7.03*	*6.13*	*4.98*	*4.15*	*3.09*	*152.97*	*134.20*	*117.03*	*95.06*	*79.19*	*58.98*
C4-O-915	60.98	13.94	0.11	46.93	0.00	36.71	0.55	2014.00	0.00	1060.00	58.89	58.889	**C4-O-915**	0.75	3.00	1.25	*5.78*	*5.03*	*4.35*	*3.49*	*2.88*	*2.12*	*194.92*	*169.43*	*146.58*	*117.75*	*97.22*	*71.41*
C4-O-918	10.93	7.83	0.00	3.10	0.00	76.74	0.77	143.00	0.00	1498.00	23.15	23.151	**C4-O-918**	0.75	3.00	1.25	*9.32*	*8.22*	*7.19*	*5.87*	*4.91*	*3.68*	*78.67*	*69.36*	*60.72*	*49.58*	*41.47*	*31.07*
C5-O-901	100.94	14.74	0.00	86.20	0.00	29.97	0.52	321.00	1225.00	2007.00	40.70	40.699	**C5-O-901**	0.75	3.00	1.25	*7.08*	*6.19*	*5.38*	*4.35*	*3.61*	*2.68*	*368.67*	*322.25*	*280.17*	*226.60*	*188.13*	*139.40*
C5-O-902	84.01	10.95	0.00	73.06	0.00	28.69	0.51	472.00	2294.00	0.00	23.23	23.233	**C5-O-902**	0.75	3.00	1.25	*9.30*	*8.20*	*7.18*	*5.86*	*4.90*	*3.67*	*397.60*	*350.50*	*306.84*	*250.54*	*209.55*	*156.98*
C5-O-903	69.66	11.82	0.30	57.54	0.00	31.84	0.53	132.00	1233.00	1431.00	28.86	28.863	**C5-O-903**	0.75	3.00	1.25	*8.42*	*7.40*	*6.46*	*5.25*	*4.38*	*3.27*	*308.40*	*270.97*	*236.61*	*192.51*	*160.58*	*119.83*
C5-O-904	73.85	23.29	0.35	50.21	0.00	43.77	0.59	354.00	1683.00	882.00	28.98	28.977	**C5-O-904**	0.75	3.00	1.25	*8.40*	*7.38*	*6.45*	*5.24*	*4.37*	*3.26*	*366.99*	*322.44*	*281.53*	*229.04*	*191.04*	*142.55*
C6-O-601	1.84	1.84	0.00	0.00	0.00	100.00	0.90	398.00	0.00	167.00	11.07	11.071	**C6-O-601**	0.75	3.00	1.25	*12.35*	*11.00*	*9.71*	*8.01*	*6.75*	*5.11*	*20.45*	*18.22*	*16.07*	*13.26*	*11.18*	*8.46*
C6-O-602	0.89	0.89	0.00	0.00	0.00	100.00	0.90	299.00	0.00	73.00	7.62	10.000	**C6-O-602**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.21*	*9.11*	*8.04*	*6.64*	*5.60*	*4.24*
C6-O-603	3.41	3.27	0.00	0.14	0.00	96.63	0.88	362.00	0.00	239.00	11.23	11.231	**C6-O-603**	0.75	3.00	1.25	*12.29*	*10.95*	*9.66*	*7.97*	*6.71*	*5.08*	*36.96*	*32.92*	*29.03*	*23.95*	*20.18*	*15.27*
C6-O-604	1.47	1.45	0.00	0.02	0.00	98.88	0.89	109.00	0.00	445.00	8.36	10.000	**C6-O-604**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*16.75*	*14.94*	*13.19*	*10.90*	*9.19*	*6.96*
C6-O-605	1.87	1.69	0.03	0.15	0.00	91.82	0.86	319.00	0.00	284.00	10.88	10.876	**C6-O-605**	0.75	3.00	1.25	*12.42*	*11.07*	*9.77*	*8.06*	*6.79*	*5.14*	*19.86*	*17.70*	*15.61*	*12.89*	*10.86*	*8.22*
C6-O-606	1.21	0.67	0.26	0.28	0.00	59.54	0.68	74.00	0.00	741.00	11.52	11.524	**C6-O-606**	0.75	3.00	1.25	*12.19*	*10.86*	*9.57*	*7.90*	*6.65*	*5.03*	*10.00*	*8.90*	*7.85*	*6.47*	*5.45*	*4.12*
CV-1A	2.08	1.48	0.60	0.00	0.00	71.15	0.74	100.00	0.00	200.00	4.89	10.000	**CV-1A**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*19.65*	*17.53*	*15.48*	*12.79*	*10.79*	*8.17*
CV-1B	0.76	0.72	0.04	0.00	0.00	94.74	0.87	100.00	0.00	200.00	4.89	10.000	**CV-1B**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*8.44*	*7.53*	*6.65*	*5.49*	*4.63*	*3.51*
CV-3	1.10	0.88	0.22	0.00	0.00	80.00	0.79	100.00	0.00	200.00	4.89	10.000	**CV-3**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.08*	*9.88*	*8.72*	*7.21*	*6.08*	*4.60*
CV-4	1.96	1.33	0.63	0.00	0.00	67.86	0.72	100.00	0.00	200.00	4.89	10.000	**CV-4**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*18.07*	*16.12*	*14.23*	*11.76*	*9.91*	*7.51*
CV-5	3.39	1.27	2.12	0.00	0.00	37.46	0.56	100.00	0.00	200.00	4.89	10.000	**CV-5**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*24.02*	*21.43*	*18.92*	*15.63*	*13.18*	*9.98*
CV-6	2.61	1.68	0.93	0.00	0.00	64.37	0.70	100.00	0.00	200.00	4.89	10.000	**CV-6**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*23.42*	*20.89*	*18.45*	*15.24*	*12.85*	*9.73*
C5-N-1	1.24	0.88	0.36	0.00	0.00	70.97	0.74	200.00	0.00	200.00	7.11	10.000	**C5-N-1**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.70*	*10.44*	*9.22*	*7.61*	*6.42*	*4.86*
C5-N-2	1.73	1.27	0.46	0.00	0.00	73.41	0.75	200.00	0.00	400.00	9.78	10.000	**C5-N-2**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*16.62*	*14.83*	*13.09*	*10.81*	*9.12*	*6.91*
C5-N-3	1.07	0.83	0.24	0.00	0.00	77.57	0.78	200.00	0.00	200.00	7.11	10.000	**C5-N-3**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.59*	*9.45*	*8.34*	*6.89*	*5.81*	*4.40*
C5-N-4	1.10	0.86	0.24	0.00	0.00	78.18	0.78	200.00	0.00	200.00	7.11	10.000	**C5-N-4**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.94*	*9.76*	*8.61*	*7.12*	*6.00*	*4.54*
C5-N-5	1.65	1.33	0.32	0.00	0.00	80.61	0.79	200.00	0.00	200.00	7.11	10.000	**C5-N-5**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*16.68*	*14.88*	*13.14*	*10.86*	*9.16*	*6.93*
C5-N-6	1.41	1.09	0.32	0.00	0.00	77.30	0.78	200.00	0.00	200.00	7.11	10.000	**C5-N-6**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*13.93*	*12.43*	*10.97*	*9.06*	*7.65*	*5.79*
C5-O-001	1.73	1.35	0.38	0.00	0.00	78.03	0.78	200.00	0.00	400.00	9.78	10.000	**C5-O-001**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*17.18*	*15.33*	*13.53*	*11.18*	*9.43*	*7.14*
C5-S-1	1.07	0.83	0.24	0.00	0.00	77.57	0.78	200.00	0.00	200.00	7.11	10.000	**C5-S-1**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*10.59*	*9.45*	*8.34*	*6.89*	*5.81*	*4.40*
C5-S-2	1.10	0.87	0.23	0.00	0.00	79.09	0.79	200.00	0.00	200.00	7.11	10.000	**C5-S-2**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*11.01*	*9.82*	*8.67*	*7.16*	*6.04*	*4.57*
C5-S-3	1.65	1.29	0.36	0.00	0.00	78.18	0.78	200.00	0.00	200.00	7.11	10.000	**C5-S-3**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*16.40*	*14.63*	*12.92*	*10.67*	*9.00*	*6.82*
C5-S-4	1.42	1.15	0.27	0.00	0.00	80.99	0.80	200.00	0.00	400.00	9.78	10.000	**C5-S-4**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*14.40*	*12.84*	*11.34*	*9.37*	*7.90*	*5.98*
XS-40	6.34	0.04	0.00	6.30	0.00	18.52	0.45	396.00	0.00	495.00	15.40	15.400	**XS-40**	0.75	3.00	1.25	*11.01*	*9.77*	*8.59*	*7.06*	*5.93*	*4.47*	*31.62*	*28.05*	*24.66*	*20.26*	*17.02*	*12.83*
XS-37	4.02	0.04	0.00	3.98	0.00	18.82	0.45	660.00	0.00	479.00	21.05	21.053	**XS-37**	0.75	3.00	1.25	*9.71*	*8.58*	*7.52*	*6.15*	*5.15*	*3.86*	*17.75*	*15.67*	*13.73*	*11.23*	*9.40*	*7.05*
XS-33	17.72	2.75	0.93	14.04	0.00	29.78	0.51	759.00	0.00	721.00	26.48	26.480	**XS-33**	0.75	3.00	1.25	*8.77*	*7.71*	*6.74*	*5.49*	*4.59*	*3.43*	*79.94*	*70.33*	*61.48*	*50.09*	*41.83*	*31.26*
C5-DET-3	5.42	0.00	0.00	5.42	0.00	18.00	0.45	438.00	68.00	431.00	15.86	15.858	**C5-DET-3**	0.75	3.00	1.25	*10.89*	*9.66*	*8.49*	*6.97*	*5.86*	*4.41*	*26.57*	*23.56*	*20.71*	*17.00*	*14.28*	*10.76*
C5-DET-2	3.81	2.80	1.01	0.00	0.00	73.49	0.75	129.00	73.00	437.00	9.10	10.000	**C5-DET-2**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*36.62*	*32.67*	*28.85*	*23.83*	*20.10*	*15.22*
C5-DET-1	0.83	0.00	0.00	0.83	0.00	18.00	0.45	275.00	51.00	32.00	6.82	10.000	**C5-DET-1**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*4.76*	*4.25*	*3.75*	*3.10*	*2.61*	*1.98*
C4-DET-2	2.82	2.82	0.00	0.00	0.00	100.00	0.90	185.00	140.00	270.00	8.49	10.000	**C4-DET-2**	0.75	3.00	1.25	*12.75*	*11.37*	*10.04*	*8.29*	*6.99*	*5.30*	*32.35*	*28.86*	*25.48*	*21.05*	*17.75*	*13.44*
C4-DET-1	6.19	6.11	0.00	0.08	0.00	98.94	0.89	179.00	91.00	730.00	14.22	14.217	**C4-DET-1**	0.75	3.00	1.25	*11.34*	*10.07*	*8.86*	*7.29*	*6.13*	*4.62*	*62.79*	*55.75*	*49.06*	*40.35*	*33.93*	*25.60*
TOTAL	1098.42	356.76	44.73	696.93	0.00	43.90	0.59																					

TABLE 4

TABLE 4 - PROPOSED WITH MITIGATION CROSS DRAINAGE HYDRAULIC RESULTS									
OUTFALL	NODE	NODE LOCATION	10-YR WSEL	100-YR WSEL	ALLOWABLE HEADWATER			MEETS DRAINAGE CRITERIA	
					MAINLANE	SBFR	NBFR	10-YR	100-YR
O7	O7-O-900	U/S; SBFR, ML	79.57	80.60	91.53	82.45	81.33	YES	YES
C4	C4-O-900	U/S; NBFR, ML	73.23	78.07	82.59	78.55	77.40	YES	YES
C5	C5-O-100	U/S; NBFR, ML	71.08	71.85	73.15	71.60	71.90	YES	YES

PROPOSED 10-YR

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
O7-1-101 SS	L_L-O7-1-101	Circular	OFF-8.1	O7-O-004	74.57	74.47	1	0	5.00	106.38	0.09	121.69	16.26	8.67	78.11	77.62
O7-1-101 RD	L_L-O7-1-101	Trapezoidal	OFF-8.1	O7-O-004	80.8	81	1	100	0.16	106.40	-0.19	0.00	0.00	0.00	0.00	0.00
O7-1-102 SS	L_L-O7-1-102	Circular	OFF-7.1	OFF-8.1	74.62	74.57	1	0	5.00	77.15	0.07	121.67	16.26	7.89	78.39	78.11
O7-1-102 RD	L_L-O7-1-102	Trapezoidal	OFF-7.1	OFF-8.1	81.9	80.8	1	100	5.00	77.20	1.43	0.00	0.00	0.00	0.00	0.00
O7-1-103 SS	L_L-O7-1-103	Circular	OFF-8	OFF-7.1	74.82	74.62	1	0	5.00	215.83	0.09	121.67	16.25	7.27	78.98	78.39
O7-1-103 RD	L_L-O7-1-103	Trapezoidal	OFF-8	OFF-7.1	81.06	81.9	1	100	5.00	215.80	-0.39	0.00	0.00	0.00	0.00	0.00
O7-1-104 SS	L_L-O7-1-104	Rectangular	OFF-6	OFF-8	74.92	74.82	1	5	3.00	125.64	0.08	8.80	15.75	-0.79	78.98	78.98
O7-1-104 RD	L_L-O7-1-104	Trapezoidal	OFF-6	OFF-8	79.9	81.06	1	100	5.00	33.00	-3.52	0.00	0.00	0.00	0.00	0.00
L_L-O7-1-105	L_L-O7-1-105	Circular	OFF-7	OFF-6	75.76	74.92	1	0	1.50	92.05	0.91	4.66	16.00	2.62	79.08	78.98
L_L-O7-1-106	L_L-O7-1-106	Rectangular	OFF-6.1	OFF-6	75.02	74.92	1	5	3.00	104.54	0.10	1.08	15.42	-0.63	78.98	78.98
L_L-O7-1-107	L_L-O7-1-107	Circular	OFF-5	OFF-6.1	76.67	75.02	1	0	1.50	20.00	8.25	3.22	15.47	3.00	78.99	78.98
L-C4-O-920	L-C4-O-920	Natural	C4-O-920	C4-O-919	75.41	75.2	1	0	4.70	452.00	0.05	112.96	16.14	1.43	79.51	79.48
L-C4-O-919	L-C4-O-919	Natural	C4-O-919	C4-O-918	75.2	73.35	1	0	3.84	482.43	0.38	99.10	16.13	0.73	79.48	79.47
L-C4-O-918	L-C4-O-918	Natural	C4-O-918	C4-O-917	73.35	74.62	1	0	6.07	311.89	-0.41	128.27	16.09	1.13	79.47	79.46
L-C4-O-917	L-C4-O-917	Natural	C4-O-917	C4-O-916	74.62	74.25	1	0	4.24	274.66	0.14	97.46	16.55	-0.13	79.46	79.46
L-C4-O-917.1	L-C4-O-917.1	Trapezoidal	C4-O-917	C4-O-917.1	78	80	1	30	3.00	670.00	-0.30	0.00	0.00	0.00	79.46	80.00
L-C4-O-916	L-C4-O-916	Natural	C4-O-916	C4-O-915	74.25	73.11	1	0	6.25	12.80	8.91	90.66	16.90	-0.49	79.46	79.46
L-C4-O-915 B1	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	72.92	1	5	3.00	778.40	0.10	51.51	16.98	3.42	79.46	78.27
L-XS-13-B2	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	73.24	1	5	3.00	778.40	0.06	51.49	16.98	3.42	79.46	78.27
L-XS-13-CHANNEL	L-C4-O-915	Trapezoidal	C4-O-915	C4-O-914	78.32	78.3	1	50	10.00	778.40	0.00	84.06	17.05	0.73	79.46	78.61
L-C4-O-914	L-C4-O-914	Natural	C4-O-914	C4-O-913	72.92	73.67	1	0	5.39	464.81	-0.16	204.22	16.86	3.20	78.27	77.94
L-C4-O-914.1	L-C4-O-914.1	Trapezoidal	C4-O-914	C4-O-914.1	77	78	1	80	2.00	424.00	-0.24	36.26	17.07	0.49	78.27	78.26
L-C4-O-913	L-C4-O-913	Natural	C4-O-913	C4-O-912	73.67	72.25	1	0	5.39	481.28	0.30	195.58	17.10	0.30	77.94	77.94
L-C4-O-912 B1	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.25	72.28	1	4	3.00	75.02	-0.04	78.24	16.06	6.70	77.94	77.93
L-XS-10.4-B2	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.3	72.27	1	4	3	75.02	0.04	78.221	16.052	6.63	77.94	77.93
L-XS-10.4-SPILL	L-C4-O-912	Natural	C4-O-912	C4-O-911	77.5	76	1	10	0.05	75.02	1.999	172.182	17.634	0.82	77.94	77.93
L-C4-O-907	L-C4-O-907	Natural	C4-O-907	C4-O-906	72.13	72.09	1	0	5.2	35.01	0.114	79.692	20.164	2.52	77.81	77.81
L-C4-O-907.1	L-C4-O-907.1	Natural	C4-O-907	C4-O-907.1	75	77	1	115	2.5	360	-0.556	45.749	17.789	-0.12	77.81	77.81
L-C4-O-911	L-C4-O-911	Natural	C4-O-911	C4-O-910	72.27	72.59	1	0	5.62	312.14	-0.103	240.521	17.08	0.46	77.93	77.93
L-C4-O-910	L-C4-O-910	Natural	C4-O-910	C4-O-909	72.59	71.69	1	0	4.539	409.86	0.22	207.968	17.075	0.26	77.93	77.93
L-C4-O-910.1	L-C4-O-910.1	Natural	C4-O-910	C5-O-902	77.5	75.5	1	0	0	1490	0.134	15.267	17.966	0.46	77.93	76.26
L-C4-O-909.1	L-C4-O-909.1	Natural	C4-O-909	C4-O-909.1	76	77.5	1	0	0	200	-0.75	64.46	17.086	0.22	77.93	77.93
L-C4-O-909 CULV	L-C4-O-909	Rectangular	C4-O-909	C4-O-908	71.69	71.64	1	2	4	45.64	0.11	46.421	27.216	5.85	77.93	77.82
L-C4-O-909 SPILL	L-C4-O-909	Trapezoidal	C4-O-909	C4-O-908	76	75.9	1	5	5	45.64	0.219	99.928	17.455	2.96	77.93	77.82
L-C4-O-906	L-C4-O-906	Natural	C4-O-906	C4-O-905	72.09	71.65	1	0	6.56	96.36	0.457	79.736	20.168	1.76	77.81	77.79
L_C4-O-903.1	L_C4-O-903.1	Trapezoidal	C4-O-903	C4-4-404	77.5	77	1	45	3	200	0.207	0	0	0	0.00	0.00
L-C4-O-903 PIPE	L-C4-O-903	Circular	C4-O-903	C4-O-902	71.3	70.97	1	0	4	43.33	0.762	94.726	18.505	7.52	76.68	76.50
L-C4-O-903 RDWY	L-C4-O-903	Trapezoidal	C4-O-903	C4-O-902	77.7	77.1	1	35	2	43.33	1.385	0	0	0	0.00	0.00
L-C4-O-902 PIPE	L-C4-O-902	Circular	C4-O-902	C4-O-901	70.67	70.43	1	0	4	520.37	0.046	94.737	18.506	7.57	76.50	74.49
L-C4-O-902 RDWY	L-C4-O-902	Trapezoidal	C4-O-902	C4-O-901	77	76.5	1	35	2	520.37	0.096	0	0	0	0.00	0.00
L-C4-O-901 PIPE	L-C4-O-901	Circular	C4-O-901	C4-O-900	70.43	70.39	1	0	4	143.16	0.028	109.649	16.372	9.32	74.49	73.55
L-C4-O-901 RDWY	L-C4-O-901	Trapezoidal	C4-O-901	C4-O-900	76.6	76.4	1	35	5	143.16	0.14	0	0	0	0.00	0.00
L_C4-O-900	L_C4-O-900	Rectangular	C4-O-900	C4-8-800	62.94	62.845	1	10	8	86.7	0.11	109.64	16.371	3.73	73.24	73.24
L-C4-O-908	L-C4-O-908	Natural	C4-O-908	C4-O-907	71.64	72.13	1	0	5.58	239.72	-0.204	115.922	17.787	1.43	77.82	77.81
L-C4-O-904	L-C4-O-904	Natural	C4-O-904	C4-O-903	71.4	71.3	1	0	6.56	86.1	0.116	79.857	20.175	2.37	76.69	76.68
L-C4-O-905 PIPE	L-C4-O-905	Circular	C4-O-905	C4-O-904	71.65	71.4	1	0	3	48.45	0.516	71.999	22.785	10.14	77.79	76.69
L-C4-O-905 RDWY	L-C4-O-905	Trapezoidal	C4-O-905	C4-O-904	77.4	77	1	10	1	48.45	0.826	19.89	18.829	4.4	77.79	77.39
L-C5-O-902.1	L-C5-O-902.1	Trapezoidal	C5-O-902	C6-O-902.1	75.5	76.5	1	24	5	520	-0.192	0	0	0	76.26	76.50
L-C5-O-902 SS	L-C5-O-902	Rectangular	C5-O-902	C5-O-903	67.11	65.61	2	6	6	1800	0.083	300.286	18.387	4.45	76.26	75.14
L-C5-O-902 RD	L-C5-O-902	Trapezoidal	C5-O-902	C5-O-903	75.6	74	1	54	5	1800	0.083	83.928	16.454	1.51	76.26	75.14
L-C5-O-901.1	L-C5-O-901.1	Trapezoidal	C5-O-901	C6-O-901	76.5	75.5	1	80	5	2100	0.024	89.039	16.437	0.96	77.18	77.03
L-C5-O-901 SS	L-C5-O-901	Rectangular	C5-O-901	C5-O-902	68.8	67.11	1	7	6	1950	0.087	174.545	18.416	4.15	77.18	76.26
L-C5-O-901 RD	L-C5-O-901	Trapezoidal	C5-O-901	C5-O-902	77	75.5	1	54	5	1950	0.026	8.512	16.771	0.34	77.18	76.26
L_OS-17 BOX 1	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.61	1	7	7	50.27	0.119	371.035	16.251	-11.57	67.15	66.81
L_OS-17 BOX 2	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.57	1	7	7	50.27	0.199	371.054	16.251	-11.6	67.15	66.81
L_OS-16 CULV	L_OS-16	Rectangular	OS-16	OS-17	56.98	56.67	1	10	8	386.67	0.08	742.77	16.253	9.49	67.93	67.15

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_OS-16 RDWY	L_OS-16	Natural	OS-16	OS-17	69.94	71.19	1	0	10	386.67	-0.323	0	0	0	0.00	0.00
L_OS-15 CULV	L_OS-15	Rectangular	OS-15	OS-16	57.59	56.98	1	10	8	895.63	0.068	742.647	16.247	9.27	69.99	67.93
L_OS-15 RDWY	L_OS-15	Natural	OS-15	OS-16	72.85	69.94	1	0	10	895.63	0.325	0	0	0	0.00	0.00
W-OS-14	W-OS-14	Trapezoidal	OS-14	W-OUT	73.02	72.9	1	30	5	1000	0	0	0	0	0.00	0.00
L_OS-14 CULV	L_OS-14	Rectangular	OS-14	OS-15	57.91	57.59	1	10	8	311.31	0.103	742.711	16.247	9.27	70.73	69.99
L_OS-14 RDWY	L_OS-14	Natural	OS-14	OS-15	73.02	72.85	1	0	10	311.31	0.055	0	0	0	0.00	0.00
W-OS-13	W-OS-13	Trapezoidal	OS-13	W-OUT	73.4	72.9	1	30	5	1300	0	0	0	0	0.00	0.00
L_OS-13 CULV	L_OS-13	Rectangular	OS-13	OS-14	58.2	57.91	1	10	8	306.54	0.095	487.167	16.26	6.08	71.10	70.73
L_OS-13 RDWY	L_OS-13	Natural	OS-13	OS-14	73.4	73.02	1	0	10	306.54	0.124	0	0	0	0.00	0.00
W-OS-12	W-OS-12	Trapezoidal	OS-12	W-OUT	73.9	72.9	1	30	5	2000	0	0	0	0	0.00	0.00
L_OS-12 CULV	L_OS-12	Rectangular	OS-12	OS-13	58.91	58.2	1	10	8	440.36	0.161	487.178	16.261	6.08	71.63	71.10
L_OS-12 RDWY	L_OS-12	Natural	OS-12	OS-13	73.9	73.4	1	0	10	440.36	0.114	0	0	0	0.00	0.00
L_L-XS-23	L_L-XS-23	Natural	XS-23	XS-22	53.51	52.54	1	0	8.93	89.285	1.086	571.732	17.341	2.79	64.16	64.15
L_L-XS-24	L_L-XS-24	Natural	XS-24	XS-23	53.81	53.51	1	0	9.61	276.201	0.109	570.298	17.337	2.68	64.18	64.16
L_L-XS-25	L_L-XS-25	Natural	XS-25	XS-24	55.09	53.81	1	0	9.12	243.878	0.525	568.168	17.116	3.76	64.19	64.18
L_L-XS-26	L_L-XS-26	Natural	XS-26	XS-25	57.27	55.09	1	0	6.96	255.302	0.854	568.862	17.128	3.97	64.20	64.19
L_L-XS-27	L_L-XS-27	Natural	XS-27	XS-26	56.71	57.27	1	0	6.93	99.131	-0.565	569.232	17.134	4.99	64.42	64.20
L_L-XS-28	L_L-XS-28	Natural	XS-28	XS-27	55.37	56.71	1	0	8.29	331.908	-0.404	569.274	17.133	4.31	65.15	64.42
L_L-XS-29	L_L-XS-29	Natural	XS-29	XS-28	56.52	55.37	1	0	9.19	264.58	0.435	572.085	16.941	3.13	65.19	65.15
L_L-XS-30	L_L-XS-30	Natural	XS-30	XS-29	57.68	56.52	1	0	7.69	328.717	0.353	588.779	16.732	3.48	65.55	65.19
L_L-XS-31	L_L-XS-31	Natural	XS-31	XS-30	57.41	57.68	1	0	8.3	337.631	-0.08	588.856	16.716	4.14	66.70	65.55
L_L-CULV-8	L_L-CULV-8	Natural	CULV-8	XS-31	57.99	57.41	1	0	8.3	44.397	1.306	515.634	16.776	2.96	66.75	66.70
CULVERT 4-A	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.06	55.99	1	8	7	107.82	0.065	128.027	15.558	2.28	66.76	66.75
CULVERT 4-B	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.07	56.02	1	8	7	107.82	0.046	128.02	15.558	2.28	66.76	66.75
CULVERT4-SPILL	L_L-CULV-7	Trapezoidal	CULV-7	CULV-8	65.15	65.14	1	100	8	107.82	0.009	365.954	16.747	0.89	66.76	66.75
L_L-XS-32	L_L-XS-32	Natural	XS-32	CULV-7	58.15	58.06	1	0	8.06	25.237	0.357	515.355	16.706	2.8	66.77	66.76
L_L-XS-33	L_L-XS-33	Natural	XS-33	XS-32	59.41	58.15	1	0	7.93	201.985	0.624	517.292	16.584	2.23	66.79	66.77
L_L-XS-34	L_L-XS-34	Natural	XS-34	XS-33	60.01	59.41	1	0	8	247.14	0.243	484.26	16.579	3.85	67.58	66.79
L_L-XS-35	L_L-XS-35	Natural	XS-35	XS-34	60.21	60.01	1	0	7.48	134.207	0.149	482.945	16.545	3.83	67.91	67.58
L_L-CULV-6	L_L-CULV-6	Natural	CULV-6	XS-35	60.17	60.21	1	0	7.479	12.841	-0.311	482.889	16.543	3.32	67.92	67.91
CULVERT 3-A	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.16	60.17	1	9	5	29.115	-0.034	195.948	15.818	4.35	67.95	67.92
CULVERT 3-B	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.14	60.2	1	9	5	29.115	-0.206	195.948	15.818	4.35	67.95	67.92
CULVERT3-SPILL	L_L-CULV-5	Trapezoidal	CULV-5	CULV-6	67.54	67.24	1	60	5	29.12	1.03	109.524	16.445	3.31	67.95	67.92
L_L-XS-36	L_L-XS-36	Natural	XS-36	CULV-5	60.09	60.14	1	0	8.04	21.297	-0.235	482.861	16.542	3.41	67.99	67.95
L_L-XS-37	L_L-XS-37	Natural	XS-37	XS-36	60.69	60.09	1	0	7.98	179.804	0.095	482.776	16.538	3.38	68.11	67.99
L_L-XS-38	L_L-XS-38	Natural	XS-38	XS-37	61.97	60.69	1	0	6.18	396.598	0.323	38.365	18.939	2.02	68.12	68.11
L_L-CULV-4	L_L-CULV-4	Natural	CULV-4	XS-38	61.36	61.97	1	0	6.18	43.827	-1.392	29.267	15.834	1.58	68.12	68.12
CULVER 2-A	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.5	61.37	1	9	5	26.441	0.492	15.884	15.836	0.59	68.12	68.12
CULVER 2-B	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.4	61.36	1	9	5	26.441	0	15.883	15.836	0.6	68.12	68.12
CULVER 2-SPILL	L_L-CULV-3	Trapezoidal	CULV-3	CULV-4	68.84	68.6	1	42	5	26.44	0.908	0	0	0	0.00	0.00
L_L-XS-39	L_L-XS-39	Natural	XS-39	CULV-3	61.92	61.4	1	0	7.42	15.69	3.314	32.521	15.837	2.1	68.12	68.12
L_L-XS-40	L_L-XS-40	Natural	XS-40	XS-39	62.1	61.92	1	0	7.639	97.04	0.103	35.283	15.84	1.45	68.12	68.12
L_L-XS-41	L_L-XS-41	Natural	XS-41	XS-40	62.49	62.1	1	0	7.19	106.594	0.366	19.534	15.843	0.97	68.12	68.12
L_L-CULV-2	L_L-CULV-2	Natural	CULV-2	XS-41	61.43	62.49	1	0	7.19	14.768	-7.178	19.992	15.844	0.7	68.12	68.12
CULV-1-A	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.43	1	9	5	26.255	-0.076	10.164	15.844	0.55	68.12	68.12
CULV-1-B	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.47	1	9	5	26.255	-0.229	10.138	15.844	0.39	68.12	68.12
CULV1-SPILL	L_L-CULV-1	Trapezoidal	CULV-1	CULV-2	68.9	68.64	1	40	5	26.25	0.99	0	0	0	0.00	0.00
L_L-XS-42	L_L-XS-42	Natural	XS-42	CULV-1	62.74	61.41	1	0	6.619	12.816	10.378	20.574	15.845	3.45	68.12	68.12
L_L-XS-43	L_L-XS-43	Natural	XS-43	XS-42	62.16	62.74	1	0	6.55	126.27	-0.459	20.894	15.846	0.89	68.12	68.12
L-C5-O-903.1	L-C5-O-903.1	Trapezoidal	C5-O-903	C6-O-903	74.4	72	1	60	5	2090	0.096	109.746	16.621	2.45	75.14	72.72
L-C5-O-904 RD	L-C5-O-903	Trapezoidal	C5-O-903	C5-O-904	74.5	72	1	28	5	1740	0.115	40.467	16.49	2.3	75.14	72.38
L-C5-O-904 SS	L-C5-O-903	Rectangular	C5-O-903	C5-O-904	65.61	64.2	3	6	4	1740	0.081	407.733	15.248	5.64	75.14	72.13
L-C5-O-904.2	L-C5-O-904.2	Natural	C5-O-904	C6-O-904	71.5	69.5	1	40	1	2090	0.072	72.744	16.464	0.53	72.13	70.50
L-C5-O-904	L-C5-O-904	Rectangular	C5-O-904	C5-O-100	64.2	62.9	2	6	6	569	0.228	574.12	15.524	9.35	72.13	71.08
L-C5-O-904.1	L-C5-O-904.1	Natural	C5-O-904	C5-4-404	71.5	70.8	1	24	1	385	0.348	100.271	16.464	0.62	72.13	71.78
L-C6-O-901	L-C6-O-901	Trapezoidal	C6-O-901	C6-O-902	76.4	75	1	30	5	2030	0.069	79.548	16.973	0.86	77.03	76.41

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-C6-O-902	L-C6-O-902	Trapezoidal	C6-O-902	C6-O-903	76	72	1	30	5	1690	0.284	56.947	17.633	1.29	76.41	72.72
L-C6-O-903	L-C6-O-903	Natural	C6-O-903	C6-O-904	72	69.5	1	30	1	1731	0.058	111.961	17.221	0.61	72.72	70.50
L-C6-O-904	L-C6-O-904	Natural	C6-O-904	C6-O-905	69.5	69	1	30	1	560	0.179	153.52	17.168	0.76	70.50	69.93
L-C6-O-905	L-C6-O-905	Natural	C6-O-905	C6-O-905.5	69	67.5	1	30	1	1150	0.13	145.356	17.576	0.8	69.93	68.24
L-C6-O-902.1	L-C6-O-902.1	Trapezoidal	C6-O-902.1	C6-O-902	76.5	75	1	24	5	1570	-0.019	0	0	0	76.50	76.41
L-C5-O-905	L-C5-O-905	Natural	C5-O-905	C6-O-905	71	69	1	24	0.99	1650	0.091	2.339	16.628	0.04	71.08	69.93
L-C5-O-100.1	L-C5-O-100.1	Natural	C5-O-905	C5-O-100	71	70	1	24	0.99	540	-0.093	-14.425	16.442	-0.11	71.08	71.08
L-C4-O-917.2	L-C4-O-917.2	Trapezoidal	C4-O-917.1	C5-O-901	80	76	1	30	3	1210	0.331	0	0	0	80.00	77.18
L-C4-O-914.2	L-C4-O-914.2	Trapezoidal	C4-O-914.1	C5-O-901	78	76	1	80	2	1090	0.183	35.847	17.146	1.13	78.26	77.18
L-C4-O-909.2	L-C4-O-909.2	Natural	C4-O-909.1	C5-O-902	77.5	75.5	1	0	0	1310	0.153	33.619	17.969	0.46	77.93	76.26
L-C4-O-907.2	L-C4-O-907.2	Natural	C4-O-907.1	C5-O-902	77	75.5	1	115	2.5	1130	0.133	30.956	18.874	0.59	77.81	76.26
L-O7-O-500	L-O7-O-500	Natural	O7-O-000	C4-O-920	75.76	75.41	1	0	0	569.04	0.062	123.994	16.041	1.22	79.53	79.51
L_O7-8-800	L_O7-8-800	Rectangular	O7-8-800	O7-O-000	75.796	75.76	1	6	4	36.498	0.1	73.297	16.025	3.88	79.54	79.53
L_O7-6-600	L_O7-6-600	Rectangular	O7-6-600	O7-8-800	75.979	75.796	1	6	4	182.117	0.1	22.507	16.502	1.06	79.54	79.54
L_O7-8-801 SS	L_O7-8-801	Rectangular	O7-8-801	O7-8-800	75.887	75.796	1	7	3	90.483	0.1	56.813	16.023	2.7	79.54	79.54
L_O7-8-801 RDWY	L_O7-8-801	Natural	O7-8-801	O7-8-800	82.34	82.65	1	0	10	90.483	-0.343	0	0	0	0.00	0.00
L_O7-6-601	L_O7-6-601	Circular	O7-6-601	O7-6-600	81.421	77	1	0	2	221.039	2	6.552	15.768	6.77	82.04	79.54
L_O7-7-700	L_O7-7-700	Rectangular	O7-7-700	O7-6-600	76.098	75.979	1	6	4	119.059	0.1	19.516	16.512	0.95	79.55	79.54
L_O7-8-605	L_O7-8-605	Circular	O7-8-605	O7-8-801	75.958	75.887	1	0	2	70.641	0.1	3.104	16.006	0.98	79.54	79.54
L_O7-8-802 SS	L_O7-8-802	Rectangular	O7-8-802	O7-8-801	76.087	75.887	1	7	3	199.785	0.1	52.523	16.027	2.54	79.56	79.54
L_O7-8-802 RDWY	L_O7-8-802	Natural	O7-8-802	O7-8-801	81.64	82.34	1	0	10	199.785	-0.35	0	0	0	0.00	0.00
L_O7-6-602	L_O7-6-602	Circular	O7-6-602	O7-6-601	95.212	91.2	1	0	2	200.616	2	4.446	15.767	7.16	95.72	91.70
L_O7-O-900	L_O7-O-900	Rectangular	O7-O-900	O7-7-700	76.36	76.098	1	6	4	262.225	0.1	19.71	16.519	1.36	79.56	79.55
L_O7-O-901	L_O7-O-901	Rectangular	O7-O-900	O7-3-300	76.36	76.101	1	6	4	258.803	0.1	20.782	16.509	1.31	79.56	79.55
L_O7-8-606	L_O7-8-606	Circular	O7-8-606	O7-8-802	76.163	76.087	1	0	2	75.784	0.1	3.037	15.775	0.96	79.56	79.56
L_O7-8-803 SS	L_O7-8-803	Rectangular	O7-8-803	O7-8-802	76.287	76.087	1	7	3	200.002	0.1	47.767	16.032	2.4	79.57	79.56
L_O7-8-803 RDWY	L_O7-8-803	Natural	O7-8-803	O7-8-802	80.94	81.64	1	0	10	200.002	-0.35	0	0	0	0.00	0.00
L_O7-6-603	L_O7-6-603	Circular	O7-6-603	O7-6-602	99.223	95.212	1	0	2	200.537	2	2.991	15.761	5.56	99.64	95.72
L_O7-5-5001	L_O7-5-5001	Circular	O7-5-500.1	O7-O-902	76.83	76.7	1	6	3	68	0.191	-12.68	17.421	2.66	79.64	79.67
L_O7-8-607	L_O7-8-607	Circular	O7-8-607	O7-8-803	76.37	76.287	1	0	2	82.953	0.1	2.918	15.754	0.9	79.57	79.57
L_O7-8-804 SS	L_O7-8-804	Rectangular	O7-8-804	O7-8-803	76.457	76.287	1	6	3	170.384	0.1	34.587	16	2.16	79.58	79.57
L_O7-8-804 RDWY	L_O7-8-804	Natural	O7-8-804	O7-8-803	80.46	80.94	1	0	10	170.384	-0.282	0	0	0	0.00	0.00
L_O7-O-801	L_O7-O-801	Circular	O7-O-801	O7-8-803	76.336	76.287	1	0	2.5	49.534	0.1	9.324	16.002	1.81	79.57	79.57
L_O7-6-604	L_O7-6-604	Circular	O7-6-604	O7-6-603	103.234	99.223	1	0	2	200.537	2	1.606	15.758	4.26	103.54	99.64
L_O7-5-501.2 SS	L_O7-5-501.2	Circular	O7-5-501.2	O7-5-500.1	76.87	76.83	1	6	3	38.339	0.104	-12.923	17.327	2.18	79.63	79.64
L_O7-5-501.2 RDWY	L_O7-5-501.2	Natural	O7-5-501.2	O7-5-500.1	82.75	82.88	1	0	10	38.339	-0.339	0	0	0	0.00	0.00
L_O7-8-608	L_O7-8-608	Circular	O7-8-608	O7-8-804	76.543	76.457	1	0	2	85.512	0.1	2.899	15.753	1	79.58	79.58
L_O7-8-805 SS	L_O7-8-805	Circular	O7-8-805	O7-8-804	76.687	76.457	1	0	2.5	230.067	0.1	8.594	15.767	2.12	79.59	79.58
L_O7-8-805 RDWY	L_O7-8-805	Natural	O7-8-805	O7-8-804	81.16	80.46	1	0	10	230.067	0.304	0	0	0	0.00	0.00
L_O7-O-802	L_O7-O-802	Rectangular	O7-O-802	O7-8-804	76.508	76.457	1	3	3	50.424	0.1	20.047	16.001	2.4	79.58	79.58
L_O7-5-501 SS	L_O7-5-501	Circular	O7-5-501	O7-5-501.2	77.03	76.87	1	4	2	161.661	0.099	-15.894	16.774	-5.79	78.47	79.63
L_O7-5-501 RDWY	L_O7-5-501	Natural	O7-5-501	O7-5-501.2	82.18	82.75	1	0	10	161.661	-0.353	0	0	0	0.00	0.00
L_O7-7-700.1	L_O7-7-700.1	Circular	O7-7-700.1	O7-5-501.2	77.293	77.248	1	0	2.5	45.153	0.1	13.858	15.774	5.06	79.63	79.63
L_O7-8-609	L_O7-8-609	Circular	O7-8-609	O7-8-805	76.772	76.687	1	0	2	85.146	0.1	3.844	15.755	1.3	79.59	79.59
L_O7-O-803	L_O7-O-803	Circular	O7-O-803	O7-8-805	76.717	76.687	1	0	2	29.854	0.1	1.599	15.759	0.79	79.59	79.59
L_O7-O-501	L_O7-O-501	Circular	O7-O-501	O7-5-501	77.06	77.03	1	0	2	26.6	0.113	1.61	15.755	2.74	77.58	77.47
L_O7-5-502.1 SS	L_O7-5-502.1	Circular	O7-5-502.1	O7-5-501	74.05	74.14	1	4	3	34.178	-0.263	-17.133	16.612	-4.28	75.89	75.94
L_O7-5-502.1 RDWY	L_O7-5-502.1	Natural	O7-5-502.1	O7-5-501	82.06	82.18	1	0	10	34.178	-0.351	0	0	0	0.00	0.00
L_O7-7-700.2	L_O7-7-700.2	Circular	O7-7-700.2	O7-7-700.1	77.436	77.293	1	0	2.5	142.877	0.1	9.59	15.77	3.18	79.63	79.63
L_O7-5-502 SS	L_O7-5-502	Circular	O7-5-502	O7-5-502.1	73.47	74.05	1	4	3	194.251	-0.3	-19.217	16.387	-4.38	75.54	75.89
L_O7-5-502 RDWY	L_O7-5-502	Natural	O7-5-502	O7-5-502.1	81.28	82.06	1	0	10	194.251	-0.402	0	0	0	0.00	0.00
L_O7-5-706	L_O7-5-706	Circular	O7-5-706	O7-5-502.1	74.1	74.05	1	0	2	52.916	0.094	3.727	16.001	1.32	75.90	75.89
L_O7-7-701	L_O7-7-701	Circular	O7-7-701	O7-7-700.2	91.959	88	1	0	2	197.939	2	8.606	15.766	8.64	92.67	88.71
L_O7-5-503 SS	L_O7-5-503	Circular	O7-5-503	O7-5-502	72.87	73.47	1	4	3	197.826	-0.303	-24.812	16.055	-4.82	75.02	75.54
L_O7-5-503 RDWY	L_O7-5-503	Natural	O7-5-503	O7-5-502	80.68	81.28	1	0	10	197.826	-0.303	0	0	0	0.00	0.00
L_O7-5-707	L_O7-5-707	Circular	O7-5-707	O7-5-502	73.53	73.47	1	0	2	69.478	0.086	3.39	16.001	1.08	75.55	75.54

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_O7-O-502	L_O7-O-502	Circular	O7-O-502	O7-5-502	73.53	73.47	1	0	2	33.06	0.181	2.101	15.751	0.7	75.54	75.54
L_O7-7-702	L_O7-7-702	Circular	O7-7-702	O7-7-701	95.942	91.959	1	0	2	199.154	2	5.611	15.762	6.59	96.51	92.67
L_O7-5-504 SS	L_O7-5-504	Circular	O7-5-504	O7-5-503	72.65	72.87	1	3	3	73.341	-0.3	-32.114	16.027	-6.06	74.70	75.02
L_O7-5-504 RDWY	L_O7-5-504	Natural	O7-5-504	O7-5-503	80.89	80.68	1	0	10	73.341	0.286	0	0	0	0.00	0.00
L_O7-5-708	L_O7-5-708	Circular	O7-5-708	O7-5-503	72.96	72.87	1	0	2	89.518	0.101	3.18	16.001	0.99	75.04	75.02
L_O7-7-703	L_O7-7-703	Circular	O7-7-703	O7-7-702	99.928	95.942	1	0	2	199.287	2	3.649	15.76	5.83	100.38	96.51
Link1543	Link1543	Circular	O7-5-505	C4-1-115	72.2	70	1	0	4	408	0.539	41.987	16.023	7.59	73.96	73.78
L_O7-5-505 SS	L_O7-5-505	Circular	O7-5-505	O7-5-504	72.2	72.65	1	0	3	150.793	-0.298	-34.392	16.027	-7.22	73.96	74.70
L_O7-5-505 RDWY	L_O7-5-505	Natural	O7-5-505	O7-5-504	81.12	80.89	1	0	10	150.793	0.153	0	0	0	0.00	0.00
L_O7-7-704	L_O7-7-704	Circular	O7-7-704	O7-7-703	103.914	99.928	1	0	2	199.34	2	1.826	15.757	4.3	104.24	100.38
L_O7-5-709	L_O7-5-709	Circular	O7-5-709	O7-5-505	72.31	72.2	1	0	2	112.069	0.098	4.011	15.776	1.48	73.98	73.96
L_O7-4-4000	L_O7-4-4000	Rectangular	O7-4-400	O7-O-000	75.8	75.76	1	6	4	39.627	0.101	57.79	16.022	3.25	79.54	79.53
L_O7-2-200	L_O7-2-200	Rectangular	O7-2-200	O7-4-400	75.981	75.8	1	6	4	181.398	0.1	25.558	16.394	1.25	79.54	79.54
L_O7-4-401 SS	L_O7-4-401	Rectangular	O7-4-401	O7-4-400	76.038	75.8	1	5	3	238.84	0.1	36.249	16.02	2.74	79.55	79.54
L_O7-4-401 RDWY	L_O7-4-401	Natural	O7-4-401	O7-4-400	82.55	81.33	1	0	10	238.84	0.511	0	0	0	0.00	0.00
L_O7-2-201	L_O7-2-201	Circular	O7-2-201	O7-2-200	77.17	77	1	0	2.5	169.892	0.1	10.198	15.79	3.72	79.55	79.54
L_O7-3-300	L_O7-3-300	Rectangular	O7-3-300	O7-2-200	76.101	75.981	1	6	4	120.082	0.1	20.619	16.516	1.01	79.55	79.54
L_O7-4-205	L_O7-4-205	Circular	O7-4-205	O7-4-401	76.095	76.038	1	0	2	56.855	0.1	3.21	15.768	1.02	79.55	79.55
L_O7-4-402 SS	L_O7-4-402	Rectangular	O7-4-402	O7-4-401	76.1	76.038	1	5	3	61.465	0.1	33.195	16.017	2.6	79.56	79.55
L_O7-4-402 RDWY	L_O7-4-402	Natural	O7-4-402	O7-4-401	82.34	82.55	1	0	10	61.465	-0.342	0	0	0	0.00	0.00
L_O7-2-202	L_O7-2-202	Circular	O7-2-202	O7-2-201	77.366	77.17	1	0	2.5	195.939	0.1	8.499	15.794	2.73	79.55	79.55
L_O7-4-403 SS	L_O7-4-403	Rectangular	O7-4-403	O7-4-402	76.2	76.1	1	5	3	99.893	0.1	31.068	16.002	2.44	79.56	79.56
L_O7-4-403 RDWY	L_O7-4-403	Natural	O7-4-403	O7-4-402	82.11	82.34	1	0	10	99.893	-0.23	0	0	0	0.00	0.00
L_O7-O-401	L_O7-O-401	Circular	O7-O-401	O7-4-402	76.129	76.1	1	0	2	28.568	0.1	1.01	15.762	-0.38	79.56	79.56
L_O7-2-203	L_O7-2-203	Circular	O7-2-203	O7-2-202	77.47	77.366	1	0	2	104.007	0.1	5.032	15.79	2	79.56	79.55
L_O7-1-100	L_O7-1-100	Circular	O7-1-103	O7-O-902	77.69	77.63	1	4	3	60	0.1	19.604	16.002	5.25	79.68	79.67
L_O7-4-404 SS	L_O7-4-404	Rectangular	O7-4-404	O7-4-403	76.248	76.2	1	4	3	47.949	0.1	25.039	15.986	2.49	79.57	79.56
L_O7-4-404 RDWY	L_O7-4-404	Natural	O7-4-404	O7-4-403	82.17	82.11	1	0	10	47.949	0.125	0	0	0	0.00	0.00
L_O7-O-402	L_O7-O-402	Circular	O7-O-402	O7-4-403	76.232	76.2	1	0	2	31.712	0.1	1.17	15.751	1.14	79.56	79.56
L_O7-2-204	L_O7-2-204	Circular	O7-2-204	O7-2-203	77.668	77.47	1	0	2	197.851	0.1	2.563	15.782	1.11	79.56	79.56
L_O7-1-305.1	L_O7-1-305.1	Circular	O7-1-305.1	O7-1-103	77.728	77.69	1	0	3	38.371	0.1	13.025	15.814	3.19	79.68	79.68
L_O7-4-405 SS	L_O7-4-405	Circular	O7-4-405	O7-4-404	76.647	76.248	1	0	3	399.559	0.1	17.133	15.992	2.77	79.60	79.57
L_O7-4-405 RDWY	L_O7-4-405	Natural	O7-4-405	O7-4-404	82.15	82.17	1	0	10	399.559	-0.005	0	0	0	0.00	0.00
L_O7-O-403	L_O7-O-403	Circular	O7-O-403	O7-4-404	76.277	76.248	1	0	2	29.559	0.1	3.018	15.745	2.56	79.57	79.57
L_O7-1-305	L_O7-1-305	Circular	O7-1-305	O7-1-305.1	77.805	77.728	1	0	2	76.77	0.1	3.141	16.002	1.13	79.68	79.68
L_O7-3-301.1	L_O7-3-301.1	Circular	O7-3-301.1	O7-1-305.1	77.868	77.728	1	0	2.5	139.331	0.1	10.124	15.799	2.89	79.68	79.68
L_O7-4-406 SS	L_O7-4-406	Circular	O7-4-406	O7-4-405	76.757	76.647	1	0	3	109.882	0.1	11.919	15.994	2.21	79.61	79.60
L_O7-4-406 RDWY	L_O7-4-406	Natural	O7-4-406	O7-4-405	81.88	82.12	1	0	10	109.882	-0.218	0	0	0	0.00	0.00
L_O7-3-301	L_O7-3-301	Circular	O7-3-301	O7-3-301.1	77.941	77.868	1	0	2	72.936	0.1	2.168	15.767	1.03	79.68	79.68
L_O7-3-302	L_O7-3-302	Circular	O7-3-302	O7-3-301.1	77.991	77.868	1	0	2.5	123.39	0.1	7.987	15.794	2.33	79.69	79.68
L_O7-O-404	L_O7-O-404	Circular	O7-O-404	O7-4-406	76.799	76.757	1	0	2	41.76	0.1	2.29	15.502	2.19	79.61	79.61
L_O7-3-303	L_O7-3-303	Circular	O7-3-303	O7-3-302	78.095	77.991	1	0	2	104.095	0.1	4.589	15.804	1.71	79.69	79.69
L_O7-3-304	L_O7-3-304	Circular	O7-3-304	O7-3-303	78.297	78.095	1	0	2	202.087	0.1	2.322	15.798	0.94	79.69	79.69
C4-D-108 SS	L_C4-D-108	Rectangular	C4-D-108	OS-12	60.53	58.91	1	10	8	633.4	0.256	487.405	16.262	6.08	72.39	71.63
C4-D-108 RD	L_C4-D-108	Natural	C4-D-108	OS-12	74.42	73.9	1	0	0	633.4	0.082	0	0	0	0.00	0.00
L_C4-D-107.1	L_C4-D-107.1	Trapezoidal	C4-O-001	C5-1-115	74.7	74.24	1	22	5	150	0.907	0	0	0	0.00	0.00
C4-D-107 SS	L_C4-D-107	Rectangular	C4-O-001	C4-D-108	60.711	60.53	1	10	8	181.21	0.1	487.354	16.26	6.08	72.61	72.39
C4-D-107 RD	L_C4-D-107	Trapezoidal	C4-O-001	C4-D-108	74.65	74.42	1	30	3	181.1	0.127	0	0	0	0.00	0.00
C4-D-106 SS	L_C4-D-106	Rectangular	C4-D-106	C4-O-001	60.86	60.71	1	10	8	157.47	0.095	278.809	17.746	3.48	72.66	72.61
C4-D-106 RD	L_C4-D-106	Trapezoidal	C4-D-106	C4-O-001	75.2	74.65	1	100	3	157.467	0.349	0	0	0	0.00	0.00
L_C4-D-105 SS	L_C4-D-105	Circular	C4-D-105	C4-D-106	65.11	65	1	10	2.5	111.86	0.098	9.85	15.884	3.2	72.67	72.66
L_C4-D-105 RD	L_C4-D-105	Natural	C4-D-105	C4-D-106	75.45	75.2	1	0	0	111.861	0.223	0	0	0	0.00	0.00
L_C4-D-104 SS	L_C4-D-104	Circular	C4-D-104	C4-D-105	65.8	65.61	1	10	2	200.36	0.095	6.441	15.887	3.07	72.67	72.67
L_C4-D-104 RD	L_C4-D-104	Natural	C4-D-104	C4-D-105	76.15	75.45	1	0	0	200.355	0.349	0	0	0	0.00	0.00
L_C4-D-103	L_C4-D-103	Rectangular	C4-D-103	C4-DET-2	62	61.8	1	10	8	203.17	0.098	321.7	16.062	4.37	73.06	73.00
RD-103	RD-103	Natural	C4-D-103	C4-D-104	77.09	76.15	1	0	5	200	0	0	0	0	0.00	0.00

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-5-708	L_C4-5-708	Circular	C4-5-708	C4-D-104	65.95	65.8	1	0	2	77.53	0.193	3.456	15.887	1.56	72.67	72.67
L_C4-D-102 SS	L_C4-D-102	Rectangular	C4-D-102	C4-D-103	62.2	62	1	10	8	200	0.1	280.387	16.063	3.99	73.12	73.06
L_C4-D-102 RD	L_C4-D-102	Natural	C4-D-102	C4-D-103	77.79	77.09	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-5-709	L_C4-5-709	Circular	C4-5-709	C4-D-103	62.05	62	1	0	2	54.94	0.091	3.569	16	1.11	73.06	73.06
L_C4-1-103 SS	L_C4-1-103	Rectangular	C4-D-101	C4-D-102	62.32	62.2	1	10	8	125	0.096	258.045	16.061	3.82	73.16	73.12
L_C4-1-103 RD	L_C4-1-103	Natural	C4-D-101	C4-D-102	78.22	77.79	1	0	0	125	0.344	0	0	0	0.00	0.00
L_C4-5-710	L_C4-5-710	Circular	C4-5-710	C4-D-102	62.24	62.2	1	0	2	44.22	0.068	3.712	16.082	1.16	73.12	73.12
L_C4-O-502	L_C4-O-502	Circular	C4-O-502	C4-D-102	62.22	62.2	1	0	3	26	0.077	18.846	15.751	2.65	73.12	73.12
L_C4-O-501	L_C4-O-501	Circular	C4-O-501	C4-D-101	62.34	62.32	1	0	4	26	0.077	22.742	15.998	1.8	73.16	73.16
L_C4-5-500 SS	L_C4-5-500	Rectangular	C4-5-500	C4-D-101	62.42	62.33	1	10	8	94	0.096	232.698	18.082	3.8	73.18	73.16
L_C4-5-500 RD	L_C4-5-500	Natural	C4-5-500	C4-D-101	78.55	78.22	1	0	0	94	0.351	0	0	0	0.00	0.00
L_C4-1-104 SS	L_C4-1-104	Rectangular	C4-1-101	C4-1-101.1	65.4	65.34	1	5	3	29	0.194	25.116	16.005	3.35	73.19	73.18
L_C4-1-104 RD	L_C4-1-104	Natural	C4-1-101	C4-1-101.1	78.79	78.76	1	0	5	29	0.103	0	0	0	0.00	0.00
L_C4-1-3055	L_C4-1-3055	Rectangular	C4-7-700	C4-5-500	62.58	62.42	1	10	8	170.01	0.094	311.223	16.061	4.77	73.20	73.18
L_C4-1-105 SS	L_C4-1-105	Rectangular	C4-1-102	C4-1-101	65.99	65.4	1	5	3	300	0.197	23.304	16.004	2.81	73.19	73.19
L_C4-1-105 RD	L_C4-1-105	Natural	C4-1-102	C4-1-101	77.74	78.79	1	0	0	300	-0.35	0	0	0	0.00	0.00
L_C4-O-103	L_C4-O-103	Circular	C4-O-101	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.175	15.505	-0.34	73.35	73.35
L_C4-1-305	L_C4-1-305	Circular	C4-7-701	C4-7-700	77.18	75	1	0	2	92	2.37	11.275	15.769	9.89	77.96	75.78
L_C4-1-306	L_C4-1-306	Circular	C4-3-301	C4-7-700	75.1	75	1	0	2	108	0.093	8.308	15.867	4.22	76.45	76.03
L_C4-4-2025	L_C4-4-2025	Rectangular	C4-6-600	C4-7-700	62.67	62.58	1	10	8	86	0.105	293.691	16.061	4.54	73.21	73.20
L_C4-1-106 SS	L_C4-1-106	Circular	C4-1-103	C4-1-102	66.74	66.49	1	6	2.5	131	0.191	15.445	16.005	4.64	73.21	73.19
L_C4-1-106 RD	L_C4-1-106	Natural	C4-1-103	C4-1-102	77.4	77.74	1	0	0	131	-0.26	0	0	0	0.00	0.00
L_C4-O-104	L_C4-O-104	Circular	C4-O-102	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.175	15.505	-0.34	73.35	73.35
L_C4-1-304	L_C4-1-304	Circular	C4-7-702	C4-7-701	80.17	77.18	1	0	2	125	2.392	9.821	15.768	9.11	80.90	77.96
L_C4-1-307	L_C4-1-307	Circular	C4-3-302	C4-3-301	75.3	75.1	1	0	2	200	0.1	6.902	15.868	2.96	76.73	76.45
L_C4-4-202	L_C4-4-202	Circular	C4-6-601	C4-6-600	76.2	75	1	0	2	52.92	2.268	11.226	15.769	9.72	76.99	75.79
L_C4-4-203	L_C4-4-203	Circular	C4-2-201	C4-6-600	75.13	75	1	0	2	138	0.094	7.443	15.852	3.96	76.44	75.97
L_C4-8-800	L_C4-8-800	Rectangular	C4-8-800	C4-6-600	62.83	62.67	1	10	8	170.01	0.094	277.068	16.061	4.32	73.24	73.21
L_C4-1-107 SS	L_C4-1-107	Circular	C4-1-104	C4-1-103	67.57	67.24	1	5	2	169	0.195	7.481	16.006	3.76	73.22	73.21
L_C4-1-107 RD	L_C4-1-107	Natural	C4-1-104	C4-1-103	77.87	77.4	1	0	0	169	0.278	0	0	0	0.00	0.00
L_C4-O-105	L_C4-O-105	Circular	C4-O-103	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.175	15.505	-0.34	73.35	73.35
L_C4-1-302	L_C4-1-302	Circular	C4-7-703	C4-7-702	81.93	80.17	1	0	2	75	2.5	8.947	15.767	9	82.62	80.90
L_C4-1-308	L_C4-1-308	Circular	C4-3-303	C4-3-302	75.49	75.3	1	0	2	200	0.095	5.496	15.868	2.31	76.89	76.73
L_C4-4-201	L_C4-4-201	Circular	C4-6-602	C4-6-601	78.8	76.2	1	0	2	109.08	2.384	9.843	15.769	9.06	79.53	76.99
L_C4-4-204	L_C4-4-204	Circular	C4-2-202	C4-2-201	75.32	75.13	1	0	2	191	0.099	6.099	15.849	2.74	76.68	76.44
L_C4-4-401 SS	L_C4-4-401	Rectangular	C4-4-401	C4-8-800	65.36	65.22	1	7	5	140	0.1	147.271	16.062	5.68	73.24	73.24
L_C4-4-401 RD	L_C4-4-401	Natural	C4-4-401	C4-8-800	76.91	77.4	1	0	0	140	-0.35	0	0	0	0.00	0.00
L_C4-8-801 SS	L_C4-8-801	Circular	C4-8-801	C4-8-800	66.38	66.22	1	0	3.5	160	0.1	22.929	15.655	5.06	73.24	73.24
L_C4-8-801 RD	L_C4-8-801	Natural	C4-8-801	C4-8-800	77.96	77.4	1	0	0	160	0.35	0	0	0	0.00	0.00
L_C4-1-108	L_C4-1-108	Rectangular	C4-1-105	C4-DET-1	66.07	65.83	1	8	5	242.38	0.099	143.095	15.843	7.12	73.37	73.35
L_C4-O-106	L_C4-O-106	Circular	C4-O-104	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.175	15.505	-0.34	73.35	73.35
L_C4-5-701	L_C4-5-701	Circular	C4-7-704	C4-7-703	84.32	81.93	1	0	2	125	1.912	7.495	15.766	7.98	84.99	82.62
L_C4-1-309	L_C4-1-309	Circular	C4-3-304	C4-3-303	75.62	75.49	1	0	2	131	0.099	4.58	15.862	1.99	76.97	76.89
L_C4-8-602	L_C4-8-602	Circular	C4-6-603	C4-6-602	82.55	78.8	1	0	2	155	2.419	9.048	15.768	9.1	83.24	79.53
L_C4-4-205	L_C4-4-205	Circular	C4-2-203	C4-2-202	75.46	75.32	1	0	2	150	0.093	5.036	15.843	2.25	76.79	76.68
L_C4-4-402 SS	L_C4-4-402	Rectangular	C4-4-402	C4-4-401	65.54	65.36	1	7	5	191	0.094	141.83	16.059	5.2	73.25	73.24
L_C4-4-402 RD	L_C4-4-402	Natural	C4-4-402	C4-4-401	76.24	76.91	1	0	0	191	-0.351	0	0	0	0.00	0.00
L_C4-O-401	L_C4-O-401	Circular	C4-O-401	C4-4-401	65.38	65.36	1	0	2	28	0.071	1.101	15.995	0.5	73.24	73.24
L_C4-8-601	L_C4-8-601	Circular	C4-8-611	C4-8-801	66.44	66.38	1	0	2	68.87	0.087	3.201	15.748	1.01	73.24	73.24
L_C4-8-802	L_C4-8-802	Circular	C4-O-801	C4-8-801	66.4	66.38	1	0	2	28	0.1	0.649	15.502	1.09	73.24	73.24
L_C4-8-803 SS	L_C4-8-803	Circular	C4-8-802	C4-8-801	66.58	66.38	1	0	3.5	205	0.098	19.226	15.712	3.66	73.25	73.24
L_C4-8-803 RD	L_C4-8-803	Natural	C4-8-802	C4-8-801	77.74	77.96	1	0	0	205	-0.107	0	0	0	0.00	0.00
L-C4-1-105.5 SS	L-C4-1-105.5	Circular	C4-1-106	C4-1-105.5	66.3	66.19	1	0	5	117	0.094	124.578	15.864	9.52	73.41	73.38
L-C4-1-105.5 RDWY	L-C4-1-105.5	Natural	C4-1-106	C4-1-105.5	78.44	78.84	1	0	11	117	0	0	0	0	0.00	0.00
L_C4-O-107	L_C4-O-107	Circular	C4-O-105	C4-1-105	66.09	66.07	1	0	2	26	0.077	19.793	15.751	6.97	73.40	73.37
L_C4-5-703	L_C4-5-703	Circular	C4-7-705	C4-7-704	88.22	84.32	1	0	2	200	1.95	6.043	15.765	7.18	88.81	84.99

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-1-310	L_C4-1-310	Circular	C4-3-305	C4-3-304	75.78	75.62	1	0	2	169	0.095	3.383	15.863	1.57	77.03	76.97
L_C4-8-603	L_C4-8-603	Circular	C4-6-604	C4-6-603	83.45	82.55	1	0	2	50	1.8	7.956	15.766	8.16	84.15	83.24
L_C4-4-206	L_C4-4-206	Circular	C4-2-204	C4-2-203	75.61	75.46	1	0	2	150	0.1	3.972	15.842	1.85	76.87	76.79
L_C4-4-403 SS	L_C4-4-403	Rectangular	C4-4-403	C4-4-402	65.69	65.54	1	6	5	150	0.1	135.538	16.058	5.58	73.27	73.25
L_C4-4-403 RD	L_C4-4-403	Natural	C4-4-403	C4-4-402	75.03	76.24	1	0	0	150	-0.807	0	0	0	0.00	0.00
L_C4-O-402	L_C4-O-402	Circular	C4-O-402	C4-4-402	65.56	65.54	1	0	2	28	0.071	3.84	16.074	1.21	73.25	73.25
L_C4-8-604	L_C4-8-604	Circular	C4-8-610	C4-8-802	66.65	66.58	1	0	2	79.56	0.088	2.144	15.751	0.67	73.25	73.25
L_C4-8-804 SS	L_C4-8-804	Circular	C4-8-803	C4-8-802	66.72	66.58	1	0	3	150	0.1	14.567	15.723	3.07	73.25	73.25
L_C4-8-804 RD	L_C4-8-804	Natural	C4-8-803	C4-8-802	77.21	77.74	1	0	0	150	-0.353	0	0	0	0.00	0.00
L_C4-O-801	L_C4-O-801	Circular	C4-O-802	C4-8-802	66.6	66.58	1	0	2	28	0.071	1.505	15.754	0.48	73.25	73.25
L_C4-1-110 SS	L_C4-1-110	Circular	C4-1-107	C4-1-106	66.49	66.3	1	0	5	200	0.095	107.725	15.898	7.11	73.45	73.41
L_C4-1-110 RD	L_C4-1-110	Natural	C4-1-107	C4-1-106	77.74	78.44	1	0	0	200	-0.35	0	0	0	0.00	0.00
L_C4-1-313	L_C4-1-313	Circular	C4-1-308	C4-1-106	69.47	69.3	1	0	2	170	0.1	6.211	15.829	3.64	73.41	73.41
L_C4-O-108	L_C4-O-108	Circular	C4-O-106	C4-1-106	66.32	66.3	1	0	3	26	0.077	7.168	15.748	1.61	73.41	73.41
L_C4-5-705	L_C4-5-705	Circular	C4-7-706	C4-7-705	92.12	88.22	1	0	2	199.58	1.954	4.591	15.762	6.53	92.64	88.81
L_C4-1-311	L_C4-1-311	Circular	C4-3-306	C4-3-305	75.95	75.78	1	0	2	167	0.102	2.256	15.852	1.18	77.06	77.03
L_C4-8-606	L_C4-8-606	Circular	C4-6-605	C4-6-604	86.35	83.45	1	0	2	150	1.933	6.501	15.766	7.26	86.97	84.15
L_C4-4-207	L_C4-4-207	Circular	C4-2-205	C4-2-204	75.77	75.61	1	0	2	163	0.098	2.837	15.834	1.45	76.92	76.87
L_C4-4-404 SS	L_C4-4-404	Rectangular	C4-4-404	C4-4-403	65.83	65.69	1	6	5	150	0.093	123.669	16.059	4.94	73.28	73.27
L_C4-4-404 RD	L_C4-4-404	Natural	C4-4-404	C4-4-403	76.24	75.03	1	0	0	150	0.807	0	0	0	0.00	0.00
L_C4-O-403	L_C4-O-403	Circular	C4-O-403	C4-4-403	65.72	65.69	1	0	2	28	0.107	5.631	15.994	1.98	73.27	73.27
L_C4-8-605	L_C4-8-605	Circular	C4-8-622	C4-8-803	66.8	66.72	1	0	2	83.26	0.096	2.074	15.759	0.66	73.25	73.25
L_C4-8-805 SS	L_C4-8-805	Circular	C4-8-804	C4-8-803	66.87	66.72	1	0	2.5	150	0.1	9.694	15.734	2.41	73.26	73.25
L_C4-8-805 RD	L_C4-8-805	Natural	C4-8-804	C4-8-803	76.69	77.21	1	0	0	150	-0.347	0	0	0	0.00	0.00
L_C4-O-802	L_C4-O-802	Circular	C4-O-803	C4-8-803	66.74	66.72	1	0	2	28	0.071	1.488	15.722	0.91	73.25	73.25
L_C4-1-111 SS	L_C4-1-111	Circular	C4-1-108	C4-1-107	66.62	66.49	1	0	4.5	130	0.1	95.929	15.901	6.54	73.49	73.45
L_C4-1-111 RD	L_C4-1-111	Natural	C4-1-108	C4-1-107	77.4	77.74	1	0	0	130	-0.262	0	0	0	0.00	0.00
L_C4-O-109	L_C4-O-109	Circular	C4-O-107	C4-1-107	66.61	66.49	1	0	3	26	0.462	7.267	15.75	1.92	73.45	73.45
L_C4-1-314	L_C4-1-314	Circular	C4-1-309	C4-1-308	75.2	75	1	0	2	200	0.1	4.786	15.828	3.26	76.29	75.77
L_C4-5-704	L_C4-5-704	Circular	C4-7-707	C4-7-706	92.21	92.12	1	0	2	94.57	0.095	3.141	15.758	3.32	93.02	92.64
L_C4-1-312	L_C4-1-312	Circular	C4-3-307	C4-3-306	76.11	75.95	1	0	2	167	0.096	1.131	15.833	0.86	77.08	77.06
L_C4-8-608	L_C4-8-608	Circular	C4-6-606	C4-6-605	89.25	86.35	1	0	2	150	1.933	5.408	15.763	7.04	89.81	86.97
L_C4-4-208	L_C4-4-208	Circular	C4-2-206	C4-2-205	75.96	75.77	1	0	2	200	0.095	1.421	15.813	0.92	76.94	76.92
L_C4-4-405 SS	L_C4-4-405	Rectangular	C4-4-405	C4-4-404	66.11	65.83	1	6	5	281	0.1	111.553	16.058	4.48	73.29	73.28
L_C4-4-405 RD	L_C4-4-405	Natural	C4-4-405	C4-4-404	77.22	76.24	1	0	0	281	0.349	0	0	0	0.00	0.00
L_C4-O-404	L_C4-O-404	Circular	C4-O-404	C4-4-404	68.85	68.83	1	0	2	28	0.071	6.184	16.08	4.1	73.28	73.28
L_C4-8-607	L_C4-8-607	Circular	C4-8-609	C4-8-804	66.94	66.87	1	0	2	84.29	0.083	2.074	15.764	0.66	73.26	73.26
L_C4-8-806.1	L_C4-8-806.1	Trapezoidal	C4-8-805	C4-8-806	76.16	75.61	1	60	5	170	0.324	0	0	0	0.00	0.00
L_C4-8-806 SS	L_C4-8-806	Circular	C4-8-805	C4-8-804	67.01	66.87	1	0	2	150	0.093	4.522	15.775	1.48	73.27	73.26
L_C4-8-806 RD	L_C4-8-806	Natural	C4-8-805	C4-8-804	76.16	76.69	1	0	0	150	-0.353	0	0	0	0.00	0.00
L_C4-O-803	L_C4-O-803	Circular	C4-O-804	C4-8-804	66.89	66.87	1	0	2	28	0.071	1.558	15.526	0.95	73.26	73.26
L_C4-1-112 SS	L_C4-1-112	Circular	C4-1-109	C4-1-108	66.78	66.62	1	0	4.5	170	0.094	83.703	15.897	5.53	73.53	73.49
L_C4-1-112 RD	L_C4-1-112	Natural	C4-1-109	C4-1-108	77.88	77.4	1	0	0	170	0.282	0	0	0	0.00	0.00
L_C4-O-110	L_C4-O-110	Circular	C4-O-108	C4-1-108	66.64	66.62	1	0	2	26	0.077	4.65	15.749	1.78	73.49	73.49
L_C4-1-315	L_C4-1-315	Circular	C4-1-310	C4-1-309	75.33	75.2	1	0	2	130	0.1	3.859	15.815	2.22	76.41	76.29
L_C4-8-610	L_C4-8-610	Circular	C4-6-607	C4-6-606	92.16	89.25	1	0	2	150.41	1.935	4.314	15.761	6.51	92.66	89.81
406-SS	L_C4-4-406	Rectangular	C4-4-406	C4-4-405	66.38	66.11	1	5	5	282	0.094	100.139	16.059	4.81	73.32	73.29
406-RD	L_C4-4-406	Natural	C4-4-406	C4-4-405	78.21	77.21	1	0	5	282	0	0	0	0	0.00	0.00
L_C4-O-405	L_C4-O-405	Circular	C4-O-405	C4-4-405	66.13	66.11	1	0	2	28	0.071	6.455	16.004	2.35	73.29	73.29
L_C4-O-804	L_C4-O-804	Circular	C4-O-805	C4-8-805	67.03	67.01	1	0	2	28	0.071	1.445	15.535	1.14	73.27	73.27
L_C4-1-113 SS	L_C4-1-113	Circular	C4-1-110	C4-1-109	66.95	66.78	1	0	4.5	175	0.097	79.165	15.9	5.14	73.58	73.53
L_C4-1-113 RD	L_C4-1-113	Natural	C4-1-110	C4-1-109	78.49	77.88	1	0	0	175	0.349	0	0	0	0.00	0.00
L_C4-1-316	L_C4-1-316	Circular	C4-1-312	C4-1-109	66.85	66.78	1	0	2	70.64	0.099	2.768	15.751	0.88	73.53	73.53
L_C4-O-111	L_C4-O-111	Circular	C4-O-109	C4-1-109	66.8	66.78	1	0	2	26	0.077	0.143	15.775	0.43	73.53	73.53
L_C4-1-317	L_C4-1-317	Circular	C4-1-311	C4-1-310	75.49	75.32	1	0	2	170	0.1	2.647	15.809	1.62	76.48	76.41
L_C4-8-609	L_C4-8-609	Circular	C4-8-608	C4-6-607	92.24	92.16	1	0	2	85.72	0.093	2.861	15.758	3.22	93.01	92.66

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-4-209	L_C4-4-209	Circular	C4-4-207	C4-4-406	69.59	69.42	1	5	2	170	0.1	7.143	15.808	3.83	73.33	73.32
L_C4-4-407 SS	L_C4-4-407	Rectangular	C4-4-407	C4-4-406	66.81	66.6	1	5	5	212	0.099	88.955	16.059	4.4	73.34	73.32
L_C4-4-407 RD	L_C4-4-407	Natural	C4-4-407	C4-4-406	77.26	78.21	1	0	0	212	-0.448	0	0	0	0.00	0.00
L_C4-O-406	L_C4-O-406	Circular	C4-O-406	C4-4-406	66.62	66.6	1	0	2	28	0.071	3.161	16.07	1.71	73.32	73.32
L_C4-1-114 SS	L_C4-1-114	Circular	C4-1-111	C4-1-110	67.15	66.95	1	0	4.5	200	0.1	73.338	15.905	4.71	73.63	73.58
L_C4-1-114 RD	L_C4-1-114	Natural	C4-1-111	C4-1-110	79.19	78.49	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-1-318	L_C4-1-318	Circular	C4-1-314	C4-1-110	67.03	66.95	1	0	2	79.67	0.1	2.907	15.751	0.92	73.58	73.58
L_C4-1-319	L_C4-1-319	Circular	C4-1-313	C4-1-311	75.66	75.49	1	0	2	175	0.097	1.434	15.791	1.03	76.51	76.48
L_C4-4-210	L_C4-4-210	Circular	C4-4-208	C4-4-207	75.28	74.5	1	0	2	200	0.39	5.708	15.801	4.32	76.18	75.34
L_C4-4-408 SS	L_C4-4-408	Circular	C4-4-408	C4-4-407	66.93	66.81	1	0	5	125	0.096	83.379	16.061	4.91	73.35	73.34
L_C4-4-408 RD	L_C4-4-408	Natural	C4-4-408	C4-4-407	77.64	77.26	1	0	0	125	0.304	0	0	0	0.00	0.00
L_C4-O-407	L_C4-O-407	Circular	C4-O-407	C4-4-407	66.83	66.81	1	0	2	28	0.071	2.17	15.751	1.49	73.34	73.34
L_C4-1-115 SS	L_C4-1-115	Circular	C4-1-112	C4-1-111	67.34	67.15	1	0	4.5	200	0.095	59.52	15.925	3.79	73.67	73.63
L_C4-1-115 RD	L_C4-1-115	Natural	C4-1-112	C4-1-111	79.89	79.19	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-1-320	L_C4-1-320	Circular	C4-1-316	C4-1-111	67.38	67.15	1	0	2	84.19	0.273	12.01	15.771	3.8	73.63	73.63
L_C4-O-112	L_C4-O-112	Circular	C4-O-111	C4-1-111	67.17	67.15	1	0	2	26	0.077	0.467	15.772	0.81	73.63	73.63
L_C4-4-211	L_C4-4-211	Circular	C4-4-209	C4-4-208	76.06	75.28	1	0	2	200	0.39	4.27	15.785	3.52	76.81	76.18
L_C4-4-409 SS	L_C4-4-409	Circular	C4-4-409	C4-4-408	67.07	66.93	1	0	5	150	0.093	79.654	16.047	4.74	73.36	73.35
L_C4-4-409 RD	L_C4-4-409	Natural	C4-4-409	C4-4-408	77.23	77.64	1	0	0	150	-0.273	0	0	0	0.00	0.00
L_C4-1-116 SS	L_C4-1-116	Circular	C4-1-113	C4-1-112	67.54	67.34	1	0	4.5	199.83	0.1	54.878	16.031	3.5	73.71	73.67
L_C4-1-116 RD	L_C4-1-116	Natural	C4-1-113	C4-1-112	80.59	79.89	1	0	0	199.828	0.35	0	0	0	0.00	0.00
L_C4-1-322	L_C4-1-322	Circular	C4-1-318	C4-1-112	67.42	67.34	1	0	2	85.54	0.094	2.833	15.751	0.9	73.67	73.67
L_C4-O-113	L_C4-O-113	Circular	C4-O-112	C4-1-112	67.36	67.34	1	0	2	26	0.077	0.428	15.774	0.86	73.67	73.67
L_C4-1-321	L_C4-1-321	Circular	C4-1-315	C4-1-316	85.24	85	1	0	2	85.46	0.281	9.188	15.77	4.83	86.48	86.08
L_C4-4-212	L_C4-4-212	Circular	C4-4-210	C4-4-209	76.84	76.06	1	0	2	200	0.39	2.829	15.775	3.04	77.45	76.81
L_C4-4-410 SS	L_C4-4-410	Circular	C4-4-410	C4-4-409	67.22	67.07	1	0	4.5	150	0.1	60.294	16.049	4.17	73.37	73.36
L_C4-4-410 RD	L_C4-4-410	Natural	C4-4-410	C4-4-409	77.64	77.23	1	0	0	150	0.273	0	0	0	0.00	0.00
L_C4-O-408	L_C4-O-408	Circular	C4-O-409	C4-4-409	67.1	67.07	1	0	3	28	0.107	11.638	16.001	1.64	73.36	73.36
L_C4-1-117 SS	L_C4-1-117	Circular	C4-1-114	C4-1-113	67.73	67.54	1	0	4.5	200.53	0.095	50.505	16.029	3.23	73.75	73.71
L_C4-1-117 RD	L_C4-1-117	Natural	C4-1-114	C4-1-113	81.29	80.59	1	0	0	200.528	0.349	0	0	0	0.00	0.00
L_C4-1-324	L_C4-1-324	Circular	C4-1-320	C4-1-113	67.61	67.54	1	0	2	77	0.091	2.832	15.751	0.9	73.71	73.71
L_C4-1-323	L_C4-1-323	Circular	C4-1-317	C4-1-315	89.14	85.24	1	0	2	200.02	1.95	7.73	15.765	5.41	89.81	86.48
L_C4-4-214	L_C4-4-214	Circular	C4-4-211	C4-4-210	77.62	76.84	1	0	2	200	0.39	1.384	15.764	2.2	78.04	77.45
L_C4-4-411 SS	L_C4-4-411	Circular	C4-4-411	C4-4-410	67.38	67.22	1	0	4.5	163	0.098	50.397	15.849	3.61	73.38	73.37
L_C4-4-411 RD	L_C4-4-411	Natural	C4-4-411	C4-4-410	78.21	77.64	1	0	0	163	0.35	0	0	0	0.00	0.00
L_C4-O-409	L_C4-O-409	Circular	C4-O-410	C4-4-410	67.25	67.22	1	0	2	28	0.107	6.871	16.079	2.16	73.37	73.37
L_C4-1-118 SS	L_C4-1-118	Circular	C4-1-115	C4-1-114	67.93	67.73	1	0	4.5	199.88	0.1	45.937	16.028	2.96	73.78	73.75
L_C4-1-118 RD	L_C4-1-118	Natural	C4-1-115	C4-1-114	81.99	81.29	1	0	0	199.878	0.35	0	0	0	0.00	0.00
L_C4-1-326	L_C4-1-326	Circular	C4-1-322	C4-1-114	67.8	67.73	1	0	2	76.26	0.092	2.833	15.749	0.9	73.75	73.75
L_C4-O-114	L_C4-O-114	Circular	C4-O-114	C4-1-114	67.75	67.73	1	0	2	26.02	0.077	0.141	15.762	0.6	73.75	73.75
L_C4-1-325	L_C4-1-325	Circular	C4-1-319	C4-1-317	93.04	89.14	1	0	2	200.08	1.949	6.129	15.762	7.19	93.64	89.81
L_C4-4-213	L_C4-4-213	Circular	C4-4-212	C4-4-411	67.44	67.38	1	0	2	68.26	0.088	3.057	15.752	0.97	73.38	73.38
L_C4-4-412 SS	L_C4-4-412	Circular	C4-4-412	C4-4-411	67.56	67.38	1	0	4	192	0.094	42.605	15.856	3.53	73.39	73.38
L_C4-4-412 RD	L_C4-4-412	Natural	C4-4-412	C4-4-411	78.88	78.21	1	0	0	192	0.349	0	0	0	0.00	0.00
L_C4-O-410	L_C4-O-410	Circular	C4-O-411	C4-4-411	67.4	67.38	1	0	2	28	0.071	3.053	15.75	0.97	73.38	73.38
L_C4-1-328	L_C4-1-328	Circular	C4-1-324	C4-1-115	68	67.93	1	0	2	80.01	0.087	2.849	15.757	0.9	73.78	73.78
L_C4-O-115	L_C4-O-115	Circular	C4-O-115	C4-1-115	67.95	67.93	1	0	2	26.02	0.077	0.33	15.756	1.05	73.78	73.78
L_C4-1-327	L_C4-1-327	Circular	C4-1-321	C4-1-319	96.95	93.04	1	0	2	200.09	1.954	4.308	15.759	6.23	97.45	93.64
L_C4-4-215	L_C4-4-215	Circular	C4-4-213	C4-4-412	69.62	69.4	1	0	2	78.94	0.279	10.024	15.769	4.71	73.40	73.39
L_C4-4-413 SS	L_C4-4-413	Circular	C4-4-413	C4-4-412	67.76	67.56	1	0	3.5	200	0.1	29.412	15.955	3.04	73.41	73.39
L_C4-4-413 RD	L_C4-4-413	Natural	C4-4-413	C4-4-412	79.58	78.88	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-O-411	L_C4-O-411	Circular	C4-O-412	C4-4-412	67.59	67.56	1	0	2	28	0.107	1.452	16.081	-0.62	73.39	73.39
L_C4-1-329	L_C4-1-329	Circular	C4-1-323	C4-1-321	100.85	96.95	1	0	2	200.09	1.949	2.265	15.757	4.63	101.21	97.45
L_C4-4-216	L_C4-4-216	Circular	C4-4-214	C4-4-213	85.65	83.5	1	0	2	91.06	2.361	7.203	15.765	8.72	86.27	84.12
L_C4-4-217	L_C4-4-217	Circular	C4-4-216	C4-4-413	67.84	67.76	1	0	2	83.99	0.095	2.827	15.754	0.9	73.45	73.41
L_C4-4-414 SS	L_C4-4-414	Circular	C4-4-414	C4-4-413	67.95	67.76	1	0	3.5	200.11	0.095	21.586	15.956	2.24	73.54	73.41

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-4-414 RD	L_C4-4-414	Natural	C4-4-414	C4-4-413	80.14	79.58	1	0	0	200.114	0.28	0	0	0	0.00	0.00
L_C4-O-412	L_C4-O-412	Circular	C4-O-413	C4-4-413	67.78	67.76	1	0	2	28	0.071	3.12	15.751	0.99	73.42	73.41
L_C4-4-218	L_C4-4-218	Circular	C4-4-215	C4-4-214	90.53	85.65	1	0	2	200	2.44	5.748	15.765	7.62	91.08	86.27
L_C4-4-219	L_C4-4-219	Circular	C4-4-218	C4-4-414	68.04	67.95	1	0	2	91.04	0.099	2.827	15.75	1.03	73.57	73.54
L_C4-4-415 SS	L_C4-4-415	Circular	C4-4-415	C4-4-414	68.15	67.95	1	0	3	200.07	0.1	12.132	15.78	1.7	73.65	73.54
L_C4-4-415 RD	L_C4-4-415	Natural	C4-4-415	C4-4-414	80.74	80.14	1	0	0	200.069	0.3	0	0	0	0.00	0.00
L_C4-O-413	L_C4-O-413	Circular	C4-O-414	C4-4-414	67.97	67.95	1	0	2	21.25	0.094	4.302	16.051	1.35	73.55	73.54
L_C4-4-220	L_C4-4-220	Circular	C4-4-217	C4-4-215	95.4	90.53	1	0	2	200	2.435	4.295	15.763	6.89	95.87	91.08
L_C4-4-221	L_C4-4-221	Circular	C4-4-220	C4-4-415	68.24	68.15	1	0	2	96.29	0.093	2.83	15.752	0.96	73.71	73.65
L_C4-4-416 SS	L_C4-4-416	Circular	C4-4-416	C4-4-415	68.34	68.15	1	0	2	192	0.099	4.844	16.042	1.53	73.71	73.65
L_C4-4-416 RD	L_C4-4-416	Natural	C4-4-416	C4-4-415	81.42	80.74	1	0	0	192	0.354	0	0	0	0.00	0.00
L_C4-O-414	L_C4-O-414	Circular	C4-O-415	C4-4-415	68.16	68.15	1	0	2	16	0.063	2.314	15.756	1.17	73.66	73.65
L_C4-4-222	L_C4-4-222	Circular	C4-4-219	C4-4-217	99.3	95.4	1	0	2	200	1.95	2.841	15.761	5.63	99.71	95.87
L_C4-4-223	L_C4-4-223	Circular	C4-4-222	C4-4-416	68.43	68.34	1	0	2	96.62	0.093	2.317	15.758	0.98	73.74	73.71
L_C4-4-417	L_C4-4-417	Circular	C4-4-417	C4-4-416	68.35	68.34	1	0	2	16	0.063	0.804	16.043	0.37	73.71	73.71
L_C4-4-224	L_C4-4-224	Circular	C4-4-221	C4-4-219	103.2	99.3	1	0	2	200	1.95	1.386	15.758	3.89	103.49	99.71
L_L-C5-O-000	L_L-C5-O-000	Natural	C5-O-000	XS-43	61.59	62.16	1	0	10.6	158.7	0.101	3.147	21.086	-0.47	68.12	68.12
L_L-C2	L_L-C2	Trapezoidal	C5-O-001	C5-O-000	70.41	70	1	50	5	50	0.095	0	0	0	0.00	0.00
C3 SS	L_L-C3	Rectangular	C5-O-002	C5-O-001	61.8	61.64	2	11	6	157.427	0.102	626.645	15.61	5.6	70.21	70.09
C3 RDWY	L_L-C3	Natural	C5-O-002	C5-O-001	69.36	69.91	1	0	11	158	-0.348	7.8	16.672	0.59	70.21	70.18
C4 SS	L_L-C4	Rectangular	C5-O-003	C5-O-002	61.96	61.8	2	11	6	157	0.102	717.004	15.61	6.37	70.35	70.21
C4 RDWY	L_L-C4	Natural	C5-O-003	C5-O-002	69.91	69.36	1	0	11	157	0.35	9.601	16.615	0.78	70.35	70.21
C5 SS	L_L-C5	Rectangular	C5-O-003.1	C5-O-003	62.09	61.96	2	11	6	129.94	0.1	713.289	15.611	6.32	70.46	70.35
C5 RDWY	L_L-C5	Natural	C5-O-003.1	C5-O-003	69.45	69.91	1	0	11	130	-0.354	21.088	16.594	1.05	70.46	70.40
C6-SS	L_L-C6	Rectangular	C5-O-004	C5-O-003.1	62.28	62.09	2	11	6	198.722	0.096	713.486	15.611	6.28	70.63	70.46
C6-RD	L_L-C6	Natural	C5-O-004	C5-O-003.1	70.15	69.45	1	0	0	198.722	0.352	11.956	16.529	0.71	70.63	70.46
C10-SS	L_L-C10	Rectangular	C5-1-100	C5-O-004	62.42	62.28	2	11	6	139.381	0.1	710.283	15.611	6.24	70.75	70.63
C10-RD	L_L-C10	Natural	C5-1-100	C5-O-004	69.66	70.15	1	0	0	139.381	-0.352	25.398	16.492	1.1	70.75	70.68
L_L-C12	L_L-C12	Rectangular	C5-3-300	C5-1-100	62.6	62.42	2	11	6	172.005	0.105	654.712	15.61	6.04	70.87	70.75
C17-SS	L_L-C17	Rectangular	C5-1-101	C5-1-100	62.83	62.768	1	7	4	61.896	0.1	102.625	15.8	3.65	70.75	70.75
C17-RD	L_L-C17	Natural	C5-1-101	C5-1-100	69.88	69.66	1	0	0	61.896	0.355	26.558	16.256	1.56	70.75	70.75
L_L-C9	L_L-C9	Circular	C5-7-701	C5-3-300	65.08	65	1	0	2	80	0.1	5.607	15.568	1.77	70.88	70.87
L_L-C11	L_L-C11	Rectangular	C5-2-200	C5-3-300	62.68	62.6	2	11	6	82	0.098	646.852	15.611	6.04	70.93	70.87
L_L-C18	L_L-C18	Circular	C5-3-301	C5-3-300	65.12	65	1	0	2	120	0.1	7.145	15.642	2.26	70.89	70.87
C20-SS	L_L-C20	Rectangular	C5-1-103	C5-1-101	63.045	62.83	1	7	4	215.05	0.1	98.151	15.85	3.49	70.82	70.75
C20-RD	L_L-C20	Natural	C5-1-103	C5-1-101	70.63	69.88	1	0	0	215.05	0.349	2.702	16.363	0.23	70.82	70.75
L_L-C8	L_L-C8	Circular	C5-6-601	C5-2-200	65.08	65	1	0	2	80	0.1	-4.576	18.251	-1.44	70.97	70.93
L_L-C14	L_L-C14	Rectangular	C5-4-400	C5-2-200	62.85	62.68	2	11	6	172.004	0.099	641.469	15.601	6.03	71.06	70.93
L_L-C16	L_L-C16	Circular	C5-2-201	C5-2-200	65.057	65	1	0	2	56.733	0.1	6.396	15.646	2.02	70.94	70.93
L_L-C22	L_L-C22	Circular	C5-3-302	C5-3-301	65.32	65.12	1	0	2	200	0.1	5.093	15.644	1.61	70.91	70.89
C25-SS	L_L-C25	Rectangular	C5-1-104	C5-1-103	63.245	63.045	1	6	4	199.95	0.1	93.119	15.764	3.86	70.95	70.82
C25-RD	L_L-C25	Natural	C5-1-104	C5-1-103	71.33	70.63	1	0	0	199.95	0.35	0	0	0	0.00	0.00
C7-SS	L_L-C7	Circular	C5-8-801	C5-4-400	63.37	63.194	1	0	2	88	0.2	12.664	15.801	3.96	71.06	71.06
C7-RD	L_L-C7	Natural	C5-8-801	C5-4-400	70.63	70.28	1	0	0	88	0.398	5.236	16.113	0.98	71.06	71.06
L_L-C13	L_L-C13	Rectangular	C5-O-100	C5-4-400	62.9	62.85	2	11	6	50	0.1	564.58	15.513	5.96	71.08	71.06
C15-SS	L_L-C15	Rectangular	C5-4-401	C5-4-400	63.244	63.194	1	7	4	50	0.1	116.071	16.276	4.13	71.12	71.06
C15-RD	L_L-C15	Natural	C5-4-401	C5-4-400	70.08	70.28	1	0	0	50	-0.4	47.588	16.434	1.8	71.12	71.06
L_L-C21	L_L-C21	Circular	C5-2-202	C5-2-201	65.32	65.057	1	0	2	263.267	0.1	4.364	15.644	1.38	70.95	70.94
L_L-C26	L_L-C26	Circular	C5-3-303	C5-3-302	65.52	65.32	1	0	2	200.202	0.1	3.214	15.586	1.02	70.91	70.91
C28-SS	L_L-C28	Rectangular	C5-1-105	C5-1-104	63.395	63.245	1	6	4	150	0.1	88.342	15.764	3.67	71.05	70.95
C28-RD	L_L-C28	Natural	C5-1-105	C5-1-104	71.86	71.33	1	0	0	150	0.353	0	0	0	0.00	0.00
C19-SS	L_L-C19	Rectangular	C5-4-402	C5-4-401	63.358	63.244	1	7	4	114	0.1	87.714	15.654	3.12	71.17	71.12
C19-RD	L_L-C19	Natural	C5-4-402	C5-4-401	69.51	70.08	1	0	0	114	-0.5	86.256	16.423	1.59	71.17	71.12
L_L-C27	L_L-C27	Circular	C5-2-203	C5-2-202	65.52	65.32	1	0	2	200.202	0.1	2.497	15.585	0.79	70.95	70.95
L_L-C29	L_L-C29	Circular	C5-1-305	C5-1-105	66.131	64.5	1	0	2.5	163.059	1	20.808	15.776	4.21	71.37	71.05
C33-SS	L_L-C33	Rectangular	C5-1-106	C5-1-105	63.445	63.395	1	5	4	50	0.1	67.626	15.764	3.37	71.10	71.05

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (10-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C33-RD	L_L-C33	Natural	C5-1-106	C5-1-105	72.03	71.86	1	0	0	50	0.34	0	0	0	0.00	0.00
C23-SS	L_L-C23	Rectangular	C5-4-403	C5-4-402	63.57	63.358	1	7	4	218	0.1	88.531	15.756	3.15	71.26	71.17
C23-RD	L_L-C23	Natural	C5-4-403	C5-4-402	70.27	69.51	1	0	0	218	0.349	87.261	16.429	1.79	71.26	71.17
L_L-C35	L_L-C35	Circular	C5-1-306	C5-1-305	66.495	66.131	1	0	2.5	60.671	0.6	19.056	15.77	4.96	71.48	71.37
C38-SS	L_L-C38	Rectangular	C5-1-107	C5-1-106	63.645	63.445	1	5	4	200	0.1	62.863	15.764	3.13	71.23	71.10
C38-RD	L_L-C38	Natural	C5-1-107	C5-1-106	72.73	72.03	1	0	0	200	0.35	0	0	0	0.00	0.00
L_L-C24	L_L-C24	Circular	C5-O-401	C5-4-403	64.61	64.57	1	0	2	30.489	0.1	-5.152	18.449	-1.63	71.26	71.26
C31-SS	L_L-C31	Rectangular	C5-4-404	C5-4-403	63.829	63.57	1	6	4	253.276	0.1	122.565	16.341	5.08	71.78	71.26
C31-RD	L_L-C31	Natural	C5-4-404	C5-4-403	71.16	70.27	1	0	0	253.276	0.351	29.192	16.395	1.46	71.78	71.26
L_L-C40	L_L-C40	Circular	C5-1-307	C5-1-306	67.695	66.495	1	0	2	200	0.6	17.169	15.772	5.46	72.42	71.48
C41-SS	L_L-C41	Rectangular	C5-1-108.1	C5-1-107	63.695	63.645	1	5	4	50	0.1	58.029	15.754	2.89	71.26	71.23
C41-RD	L_L-C41	Natural	C5-1-108.1	C5-1-107	72.91	72.73	1	0	0	50	0.36	0	0	0	0.00	0.00
L_L-C30	L_L-C30	Circular	C5-4-205	C5-4-404	65.738	64.759	1	0	2.5	163.13	0.6	19.077	15.777	3.85	71.89	71.78
L_L-C32	L_L-C32	Circular	C5-O-402	C5-4-404	63.864	63.829	1	0	2	34.368	0.1	3.205	17.266	1.01	71.78	71.78
C36-SS	L_L-C36	Rectangular	C5-4-405	C5-4-404	63.958	63.829	1	6	4	128.724	0.1	62.396	15.762	2.59	71.80	71.78
C36-RD	L_L-C36	Natural	C5-4-405	C5-4-404	71.61	71.16	1	0	0	128.724	0.35	2.805	16.372	0.42	71.80	71.78
L_L-C48	L_L-C48	Circular	C5-1-308	C5-1-307	68.895	67.695	1	0	2	200	0.6	15.696	15.774	5.61	73.30	72.42
L_L-C42	L_L-C42	Circular	C5-O-101	C5-1-108.1	63.728	63.695	1	0	2	32.637	0.1	5.299	15.569	2.12	71.26	71.26
C45-SS	L_L-C45	Rectangular	C5-1-108	C5-1-108.1	63.845	63.695	1	5	4	150	0.1	53.871	15.754	2.68	71.33	71.26
C45-RD	L_L-C45	Natural	C5-1-108	C5-1-108.1	73.43	72.91	1	0	0	150	0.347	0	0	0	0.00	0.00
L_L-C34	L_L-C34	Circular	C5-4-206	C5-4-205	66.102	65.738	1	0	2.5	60.671	0.6	17.64	15.778	3.57	71.93	71.89
L_L-C37	L_L-C37	Circular	C5-O-403	C5-4-405	63.994	63.958	1	0	2	35.748	0.1	2.503	17.266	0.9	71.80	71.80
C43-SS	L_L-C43	Rectangular	C5-4-406	C5-4-405	64.161	63.958	1	5	4	203.128	0.1	56.116	15.762	2.8	71.85	71.80
C43-RD	L_L-C43	Natural	C5-4-406	C5-4-405	72.32	71.61	1	0	0	203.128	0.35	0	0	0	0.00	0.00
L_L-C56	L_L-C56	Circular	C5-1-309	C5-1-308	70.095	68.895	1	0	2	200	0.6	13.882	15.771	5.58	74.02	73.30
L_L-C46	L_L-C46	Circular	C5-O-102	C5-1-108	63.877	63.845	1	0	2	32.313	0.1	5.016	15.57	2.31	71.34	71.33
C49-SS	L_L-C49	Rectangular	C5-1-109	C5-1-108	64.045	63.845	1	5	4	200	0.1	44.748	15.756	2.23	71.40	71.33
C49-RD	L_L-C49	Natural	C5-1-109	C5-1-108	74.13	73.43	1	0	0	200	0.35	0	0	0	0.00	0.00
L_L-C39	L_L-C39	Circular	C5-4-207	C5-4-206	67.302	66.102	1	0	2	200	0.6	15.987	15.779	5.04	72.66	71.93
L_L-C44	L_L-C44	Circular	C5-O-404	C5-4-406	64.195	64.161	1	0	2	34.253	0.1	-2.015	18.453	1.47	71.85	71.85
C52-SS	L_L-C52	Rectangular	C5-4-407	C5-4-406	64.476	64.161	1	5	4	314.931	0.1	50.292	15.761	2.51	71.92	71.85
C52-RD	L_L-C52	Natural	C5-4-407	C5-4-406	73.43	72.32	1	0	0	314.931	0.352	0	0	0	0.00	0.00
L_L-C62	L_L-C62	Circular	C5-1-310	C5-1-309	74.095	70.095	1	0	2	200	2	12.06	15.774	6.69	75.03	74.02
L_L-C50	L_L-C50	Circular	C5-O-103	C5-1-109	64.094	64.045	1	0	2	49.217	0.1	4.815	15.572	2.48	71.41	71.40
L_L-C55	L_L-C55	Circular	C5-1-316	C5-1-109	64.134	64.045	1	0	2	89.171	0.1	3.11	15.572	0.98	71.42	71.40
C63-SS	L_L-C63	Circular	C5-1-110	C5-1-109	64.26	64.045	1	0	4	215	0.1	35.462	15.758	2.81	71.50	71.40
C63-RD	L_L-C63	Natural	C5-1-110	C5-1-109	74.71	74.13	1	0	0	215	0.27	0	0	0	0.00	0.00
L_L-C47	L_L-C47	Circular	C5-4-208	C5-4-207	68.502	67.302	1	0	2	200	0.6	14.402	15.78	5.18	73.34	72.66
L_L-C51	L_L-C51	Circular	C5-O-405	C5-4-407	64.516	64.476	1	0	2	39.806	0.1	1.382	15.59	1.6	71.92	71.92
L_L-C54	L_L-C54	Circular	C5-4-216	C5-4-407	64.564	64.476	1	0	2	88.255	0.1	2.848	15.753	0.89	71.93	71.92
C58-SS	L_L-C58	Rectangular	C5-4-408	C5-4-407	64.68	64.476	1	5	4	204.259	0.1	42.002	15.762	2.09	71.96	71.92
C58-RD	L_L-C58	Natural	C5-4-408	C5-4-407	74.14	73.43	1	0	0	204.259	0.348	0	0	0	0.00	0.00
L_L-C71	L_L-C71	Circular	C5-1-311	C5-1-310	78.105	74.095	1	0	2	200.542	2	10.322	15.771	8.52	78.89	75.03
L_L-C61	L_L-C61	Circular	C5-1-317	C5-1-110	64.348	64.26	1	0	2	88.002	0.1	2.899	15.769	0.91	71.51	71.50
C66-SS	L_L-C66	Circular	C5-1-111	C5-1-110	64.445	64.26	1	0	4	185.175	0.1	32.638	15.758	2.59	71.58	71.50
C66-RD	L_L-C66	Natural	C5-1-111	C5-1-110	74.13	74.71	1	0	0	185.175	-0.313	0	0	0	0.00	0.00
L_L-C53	L_L-C53	Circular	C5-4-209	C5-4-208	69.702	68.502	1	0	2	200	0.6	12.965	15.781	5.44	73.89	73.34
L_L-C57	L_L-C57	Circular	C5-O-406	C5-4-408	64.716	64.68	1	0	2	36.09	0.1	1.437	15.611	0.71	71.96	71.96
L_L-C60	L_L-C60	Circular	C5-4-217	C5-4-408	64.768	64.68	1	0	2	88.034	0.1	2.843	15.757	0.89	71.96	71.96
C64-SS	L_L-C64	Rectangular	C5-4-408.1	C5-4-408	64.758	64.68	1	4	4	77.682	0.1	35.387	15.762	2.2	71.97	71.96
C64-RD	L_L-C64	Natural	C5-4-408.1	C5-4-408	74.3	74.14	1	0	0	77.682	0.206	0	0	0	0.00	0.00

PROPOSED 50-YR

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
O7-1-101 SS	L_L-O7-1-101	Circular	OFF-8.1	O7-O-004	74.57	74.47	1	0	5.00	106.38	0.09	171.80	16.51	10.18	78.81	78.23
O7-1-101 RD	L_L-O7-1-101	Trapezoidal	OFF-8.1	O7-O-004	80.8	81	1	100	0.16	106.40	-0.19	0.00	0.00	0.00	0.00	0.00
O7-1-102 SS	L_L-O7-1-102	Circular	OFF-7.1	OFF-8.1	74.62	74.57	1	0	5.00	77.15	0.07	171.79	16.51	9.38	79.18	78.81
O7-1-102 RD	L_L-O7-1-102	Trapezoidal	OFF-7.1	OFF-8.1	81.9	80.8	1	100	5.00	77.20	1.43	0.00	0.00	0.00	0.00	0.00
O7-1-103 SS	L_L-O7-1-103	Circular	OFF-8	OFF-7.1	74.82	74.62	1	0	5.00	215.83	0.09	171.77	16.51	8.79	80.12	79.18
O7-1-103 RD	L_L-O7-1-103	Trapezoidal	OFF-8	OFF-7.1	81.06	81.9	1	100	5.00	215.80	-0.39	0.00	0.00	0.00	0.00	0.00
O7-1-104 SS	L_L-O7-1-104	Rectangular	OFF-6	OFF-8	74.92	74.82	1	5	3.00	125.64	0.08	12.46	16.00	0.83	80.12	80.12
O7-1-104 RD	L_L-O7-1-104	Trapezoidal	OFF-6	OFF-8	79.9	81.06	1	100	5.00	33.00	-3.52	0.00	0.00	0.00	80.12	80.12
L_L-O7-1-105	L_L-O7-1-105	Circular	OFF-7	OFF-6	75.76	74.92	1	0	1.50	92.05	0.91	6.33	16.01	3.54	80.31	80.12
L_L-O7-1-106	L_L-O7-1-106	Rectangular	OFF-6.1	OFF-6	75.02	74.92	1	5	3.00	104.54	0.10	1.35	16.24	-0.64	80.12	80.12
L_L-O7-1-107	L_L-O7-1-107	Circular	OFF-5	OFF-6.1	76.67	75.02	1	0	1.50	20.00	8.25	3.27	15.44	2.92	80.12	80.12
L-C4-O-920	L-C4-O-920	Natural	C4-O-920	C4-O-919	75.41	75.2	1	0	4.70	452.00	0.05	179.01	16.46	1.37	80.08	79.99
L-C4-O-919	L-C4-O-919	Natural	C4-O-919	C4-O-918	75.2	73.35	1	0	3.84	482.43	0.38	169.18	16.51	0.83	79.99	79.97
L-C4-O-918	L-C4-O-918	Natural	C4-O-918	C4-O-917	73.35	74.62	1	0	6.07	311.89	-0.41	212.01	16.56	1.12	79.97	79.96
L-C4-O-917	L-C4-O-917	Natural	C4-O-917	C4-O-916	74.62	74.25	1	0	4.24	274.66	0.14	188.18	16.76	-0.13	79.96	79.96
L-C4-O-917.1	L-C4-O-917.1	Trapezoidal	C4-O-917	C4-O-917.1	78	80	1	30	3.00	670.00	-0.30	0.00	0.00	0.00	79.96	80.00
L-C4-O-916	L-C4-O-916	Natural	C4-O-916	C4-O-915	74.25	73.11	1	0	6.25	12.80	8.91	183.23	16.86	-0.51	79.96	79.96
L-C4-O-915 B1	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	72.92	1	5	3.00	778.40	0.10	55.81	17.23	3.70	79.96	78.56
L-XS-13-B2	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	73.24	1	5	3.00	778.40	0.06	55.79	17.23	3.70	79.96	78.56
L-XS-13-CHANNEL	L-C4-O-915	Trapezoidal	C4-O-915	C4-O-914	78.32	78.3	1	50	10.00	778.40	0.00	230.26	17.14	1.05	79.96	78.86
L-C4-O-914	L-C4-O-914	Natural	C4-O-914	C4-O-913	72.92	73.67	1	0	5.39	464.81	-0.16	329.08	16.97	3.25	78.56	78.18
L-C4-O-914.1	L-C4-O-914.1	Trapezoidal	C4-O-914	C4-O-914.1	77	78	1	80	2.00	424.00	-0.24	111.65	17.05	1.10	78.56	78.51
L-C4-O-913	L-C4-O-913	Natural	C4-O-913	C4-O-912	73.67	72.25	1	0	5.39	481.28	0.30	323.08	17.06	0.30	78.18	78.17
L-C4-O-912 B1	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.25	72.28	1	4	3.00	75.02	-0.04	81.50	15.95	7.06	78.17	78.16
L-XS-10.4-B2	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.3	72.27	1	4	3	75.02	0.04	81.528	15.953	6.86	78.17	78.16
L-XS-10.4-SPILL	L-C4-O-912	Natural	C4-O-912	C4-O-911	77.5	76	1	10	0.05	75.02	1.999	388.154	17.29	1.38	78.17	78.16
L-C4-O-907	L-C4-O-907	Natural	C4-O-907	C4-O-906	72.13	72.09	1	0	5.2	35.01	0.114	78.453	21.992	2.52	77.97	77.97
L-C4-O-907.1	L-C4-O-907.1	Natural	C4-O-907	C4-O-907.1	75	77	1	115	2.5	360	-0.556	104.458	17.541	0.25	77.97	77.96
L-C4-O-911	L-C4-O-911	Natural	C4-O-911	C4-O-910	72.27	72.59	1	0	5.62	312.14	-0.103	413.578	17.108	0.47	78.16	78.15
L-C4-O-910	L-C4-O-910	Natural	C4-O-910	C4-O-909	72.59	71.69	1	0	4.539	409.86	0.22	328.679	17.276	0.26	78.15	78.15
L-C4-O-910.1	L-C4-O-910.1	Natural	C4-O-910	C5-O-902	77.5	75.5	1	0	0	1490	0.134	62.267	17.659	0.48	78.15	77.07
L-C4-O-909.1	L-C4-O-909.1	Natural	C4-O-909	C4-O-909.1	76	77.5	1	0	0	200	-0.75	152.959	17.296	0.37	78.15	78.14
L-C4-O-909 CULV	L-C4-O-909	Rectangular	C4-O-909	C4-O-908	71.69	71.64	1	2	4	45.64	0.11	46.446	29.215	5.85	78.15	77.98
L-C4-O-909 SPILL	L-C4-O-909	Trapezoidal	C4-O-909	C4-O-908	76	75.9	1	5	5	45.64	0.219	142.146	17.326	2.86	78.15	77.98
L-C4-O-906	L-C4-O-906	Natural	C4-O-906	C4-O-905	72.09	71.65	1	0	6.56	96.36	0.457	78.496	21.995	1.76	77.97	77.96
L_C4-O-903.1	L_C4-O-903.1	Trapezoidal	C4-O-903	C4-4-404	77.5	77	1	45	3	200	0.207	31.881	17.39	2.16	77.81	77.39
L-C4-O-903 PIPE	L-C4-O-903	Circular	C4-O-903	C4-O-902	71.3	70.97	1	0	4	43.33	0.762	115.72	20.486	9.18	77.81	77.67
L-C4-O-903 RDWY	L-C4-O-903	Trapezoidal	C4-O-903	C4-O-902	77.7	77.1	1	35	2	43.33	1.385	11.008	17.539	0.87	77.81	77.67
L-C4-O-902 PIPE	L-C4-O-902	Circular	C4-O-902	C4-O-901	70.67	70.43	1	0	4	520.37	0.046	100.447	20.512	7.95	77.67	77.40
L-C4-O-902 RDWY	L-C4-O-902	Trapezoidal	C4-O-902	C4-O-901	77	76.5	1	35	2	520.37	0.096	58.819	17.386	2	77.67	77.40
L-C4-O-901 PIPE	L-C4-O-901	Circular	C4-O-901	C4-O-900	70.43	70.39	1	0	4	143.16	0.028	121.72	15.962	10	77.40	77.28
L-C4-O-901 RDWY	L-C4-O-901	Trapezoidal	C4-O-901	C4-O-900	76.6	76.4	1	35	5	143.16	0.14	89.565	17.295	2.73	77.40	77.28
L_C4-O-900	L_C4-O-900	Rectangular	C4-O-900	C4-8-800	62.94	62.845	1	10	8	86.7	0.11	137.46	17.403	3.52	77.28	77.27
L-C4-O-908	L-C4-O-908	Natural	C4-O-908	C4-O-907	71.64	72.13	1	0	5.58	239.72	-0.204	161.016	17.451	1.43	77.98	77.97
L-C4-O-904	L-C4-O-904	Natural	C4-O-904	C4-O-903	71.4	71.3	1	0	6.56	86.1	0.116	91.002	20.503	2.37	77.82	77.81
L-C4-O-905 PIPE	L-C4-O-905	Circular	C4-O-905	C4-O-904	71.65	71.4	1	0	3	48.45	0.516	71.591	24.599	10.09	77.96	77.82
L-C4-O-905 RDWY	L-C4-O-905	Trapezoidal	C4-O-905	C4-O-904	77.4	77	1	10	1	48.45	0.826	35.488	17.811	4.82	77.96	77.82
L-C5-O-902.1	L-C5-O-902.1	Trapezoidal	C5-O-902	C6-O-902.1	75.5	76.5	1	24	5	520	-0.192	29.452	17.668	0.72	77.07	77.04
L-C5-O-902 SS	L-C5-O-902	Rectangular	C5-O-902	C5-O-903	67.11	65.61	2	6	6	1800	0.083	321.211	20.576	4.49	77.07	75.66
L-C5-O-902 RD	L-C5-O-902	Trapezoidal	C5-O-902	C5-O-903	75.6	74	1	54	5	1800	0.083	338.722	17.792	3.14	77.07	75.66
L-C5-O-901.1	L-C5-O-901.1	Trapezoidal	C5-O-901	C6-O-901	76.5	75.5	1	80	5	2100	0.024	214.81	17.067	1.53	77.67	77.36
L-C5-O-901 SS	L-C5-O-901	Rectangular	C5-O-901	C5-O-902	68.8	67.11	1	7	6	1950	0.087	160.536	20.611	3.92	77.67	77.07
L-C5-O-901 RD	L-C5-O-901	Trapezoidal	C5-O-901	C5-O-902	77	75.5	1	54	5	1950	0.026	80.273	17.128	1.28	77.67	77.07
L_OS-17 BOX 1	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.61	1	7	7	50.27	0.119	420.676	16.172	-11.57	71.80	71.33
L_OS-17 BOX 2	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.57	1	7	7	50.27	0.199	420.697	16.172	-11.6	71.80	71.33
L_OS-16 CULV	L_OS-16	Rectangular	OS-16	OS-17	56.98	56.67	1	10	8	386.67	0.08	841.422	16.172	10.5	72.31	71.80

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_OS-16 RDWY	L_OS-16	Natural	OS-16	OS-17	69.94	71.19	1	0	10	386.67	-0.323	183.877	17.53	1.84	72.31	72.18
L_OS-15 CULV	L_OS-15	Rectangular	OS-15	OS-16	57.59	56.98	1	10	8	895.63	0.068	841.487	16.171	10.49	73.79	72.31
L_OS-15 RDWY	L_OS-15	Natural	OS-15	OS-16	72.85	69.94	1	0	10	895.63	0.325	132.433	17.29	1.54	73.79	72.31
W-OS-14	W-OS-14	Trapezoidal	OS-14	W-OUT	73.02	72.9	1	30	5	1000	0	90.24	17.179	2.23	74.31	73.51
L_OS-14 CULV	L_OS-14	Rectangular	OS-14	OS-15	57.91	57.59	1	10	8	311.31	0.103	841.548	16.17	10.48	74.31	73.79
L_OS-14 RDWY	L_OS-14	Natural	OS-14	OS-15	73.02	72.85	1	0	10	311.31	0.055	138.316	17.172	2.75	74.31	73.79
W-OS-13	W-OS-13	Trapezoidal	OS-13	W-OUT	73.4	72.9	1	30	5	1300	0	73.107	17.205	2.1	74.50	73.51
L_OS-13 CULV	L_OS-13	Rectangular	OS-13	OS-14	58.2	57.91	1	10	8	306.54	0.095	475.871	16.127	5.92	74.50	74.31
L_OS-13 RDWY	L_OS-13	Natural	OS-13	OS-14	73.4	73.02	1	0	10	306.54	0.124	104.976	17.233	1.96	74.50	74.31
W-OS-12	W-OS-12	Trapezoidal	OS-12	W-OUT	73.9	72.9	1	30	5	2000	0	64.739	17.223	2	74.92	73.51
L_OS-12 CULV	L_OS-12	Rectangular	OS-12	OS-13	58.91	58.2	1	10	8	440.36	0.161	484.572	16.249	6.03	74.92	74.50
L_OS-12 RDWY	L_OS-12	Natural	OS-12	OS-13	73.9	73.4	1	0	10	440.36	0.114	97.03	17.231	2.17	74.92	74.50
L_L-XS-23	L_L-XS-23	Natural	XS-23	XS-22	53.51	52.54	1	0	8.93	89.285	1.086	744.433	17.35	2.87	65.05	65.02
L_L-XS-24	L_L-XS-24	Natural	XS-24	XS-23	53.81	53.51	1	0	9.61	276.201	0.109	743.243	17.346	1.71	65.06	65.05
L_L-XS-25	L_L-XS-25	Natural	XS-25	XS-24	55.09	53.81	1	0	9.12	243.878	0.525	740.811	17.347	2.44	65.07	65.06
L_L-XS-26	L_L-XS-26	Natural	XS-26	XS-25	57.27	55.09	1	0	6.96	255.302	0.854	738.61	17.387	2.1	65.07	65.07
L_L-XS-27	L_L-XS-27	Natural	XS-27	XS-26	56.71	57.27	1	0	6.93	99.131	-0.565	737.61	17.392	4.1	65.31	65.07
L_L-XS-28	L_L-XS-28	Natural	XS-28	XS-27	55.37	56.71	1	0	8.29	331.908	-0.404	737.498	17.392	4.19	66.12	65.31
L_L-XS-29	L_L-XS-29	Natural	XS-29	XS-28	56.52	55.37	1	0	9.19	264.58	0.435	737.3	17.351	2.63	66.14	66.12
L_L-XS-30	L_L-XS-30	Natural	XS-30	XS-29	57.68	56.52	1	0	7.69	328.717	0.353	738.745	17.258	3.28	66.25	66.14
L_L-XS-31	L_L-XS-31	Natural	XS-31	XS-30	57.41	57.68	1	0	8.3	337.631	-0.08	740.364	17.181	4.07	67.31	66.25
L_L-CULV-8	L_L-CULV-8	Natural	CULV-8	XS-31	57.99	57.41	1	0	8.3	44.397	1.306	629.151	17.289	2.91	67.34	67.31
CULVERT 4-A	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.06	55.99	1	8	7	107.82	0.065	128.876	22.946	2.3	67.34	67.34
CULVERT 4-B	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.07	56.02	1	8	7	107.82	0.046	128.869	22.946	2.3	67.34	67.34
CULVERT4-SPILL	L_L-CULV-7	Trapezoidal	CULV-7	CULV-8	65.15	65.14	1	100	8	107.82	0.009	523.013	17.27	0.84	67.34	67.34
L_L-XS-32	L_L-XS-32	Natural	XS-32	CULV-7	58.15	58.06	1	0	8.06	25.237	0.357	629.062	17.211	2.83	67.35	67.34
L_L-XS-33	L_L-XS-33	Natural	XS-33	XS-32	59.41	58.15	1	0	7.93	201.985	0.624	629.928	17.098	1.96	67.36	67.35
L_L-XS-34	L_L-XS-34	Natural	XS-34	XS-33	60.01	59.41	1	0	8	247.14	0.243	578.634	17.227	3.72	67.62	67.36
L_L-XS-35	L_L-XS-35	Natural	XS-35	XS-34	60.21	60.01	1	0	7.48	134.207	0.149	579.309	17.01	3.73	67.97	67.62
L_L-CULV-6	L_L-CULV-6	Natural	CULV-6	XS-35	60.17	60.21	1	0	7.479	12.841	-0.311	579.285	17.009	3.25	67.98	67.97
CULVERT 3-A	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.16	60.17	1	9	5	29.115	-0.034	220.832	17.029	4.89	68.02	67.98
CULVERT 3-B	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.14	60.2	1	9	5	29.115	-0.206	220.831	17.029	4.89	68.02	67.98
CULVERT3-SPILL	L_L-CULV-5	Trapezoidal	CULV-5	CULV-6	67.54	67.24	1	60	5	29.12	1.03	137.712	16.923	3.69	68.02	67.98
L_L-XS-36	L_L-XS-36	Natural	XS-36	CULV-5	60.09	60.14	1	0	8.04	21.297	-0.235	579.272	17.008	3.34	68.07	68.02
L_L-XS-37	L_L-XS-37	Natural	XS-37	XS-36	60.69	60.09	1	0	7.98	179.804	0.095	579.23	17.001	3.32	68.21	68.07
L_L-XS-38	L_L-XS-38	Natural	XS-38	XS-37	61.97	60.69	1	0	6.18	396.598	0.323	99.15	17.202	2	68.22	68.21
L_L-CULV-4	L_L-CULV-4	Natural	CULV-4	XS-38	61.36	61.97	1	0	6.18	43.827	-1.392	99.045	17.188	1.58	68.22	68.22
CULVER 2-A	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.5	61.37	1	9	5	26.441	0.492	49.521	17.187	1.1	68.24	68.22
CULVER 2-B	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.4	61.36	1	9	5	26.441	0	49.52	17.187	1.1	68.24	68.22
CULVER 2-SPILL	L_L-CULV-3	Trapezoidal	CULV-3	CULV-4	68.84	68.6	1	42	5	26.44	0.908	0	0	0	0.00	0.00
L_L-XS-39	L_L-XS-39	Natural	XS-39	CULV-3	61.92	61.4	1	0	7.42	15.69	3.314	99.041	17.186	2.08	68.24	68.24
L_L-XS-40	L_L-XS-40	Natural	XS-40	XS-39	62.1	61.92	1	0	7.639	97.04	0.103	99.016	17.183	1.46	68.25	68.24
L_L-XS-41	L_L-XS-41	Natural	XS-41	XS-40	62.49	62.1	1	0	7.19	106.594	0.366	82.471	17.187	0.99	68.27	68.25
L_L-CULV-2	L_L-CULV-2	Natural	CULV-2	XS-41	61.43	62.49	1	0	7.19	14.768	-7.178	82.441	17.18	0.72	68.27	68.27
CULV-1-A	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.43	1	9	5	26.255	-0.076	41.22	17.181	0.91	68.27	68.27
CULV-1-B	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.47	1	9	5	26.255	-0.229	41.22	17.181	0.91	68.27	68.27
CULV1-SPILL	L_L-CULV-1	Trapezoidal	CULV-1	CULV-2	68.9	68.64	1	40	5	26.25	0.99	0	0	0	0.00	0.00
L_L-XS-42	L_L-XS-42	Natural	XS-42	CULV-1	62.74	61.41	1	0	6.619	12.816	10.378	82.459	17.18	3.43	68.27	68.27
L_L-XS-43	L_L-XS-43	Natural	XS-43	XS-42	62.16	62.74	1	0	6.55	126.27	-0.459	82.429	17.178	0.91	68.29	68.27
L-C5-O-903.1	L-C5-O-903.1	Trapezoidal	C5-O-903	C6-O-903	74.4	72	1	60	5	2090	0.096	322.846	17.604	3.39	75.66	73.75
L-C5-O-904 RD	L-C5-O-903	Trapezoidal	C5-O-903	C5-O-904	74.5	72	1	28	5	1740	0.115	127.363	17.614	3.36	75.66	72.78
L-C5-O-904 SS	L-C5-O-903	Rectangular	C5-O-903	C5-O-904	65.61	64.2	3	6	4	1740	0.081	408.378	15.214	5.65	75.66	72.56
L-C5-O-904.2	L-C5-O-904.2	Natural	C5-O-904	C6-O-904	71.5	69.5	1	40	1	2090	0.072	175.87	16.762	0.69	72.56	71.67
L-C5-O-904	L-C5-O-904	Rectangular	C5-O-904	C5-O-100	64.2	62.9	2	6	6	569	0.228	591.1	15.524	9.4	72.56	71.63
L-C5-O-904.1	L-C5-O-904.1	Natural	C5-O-904	C5-4-404	71.5	70.8	1	24	1	385	0.348	196.884	16.813	0.7	72.56	72.33
L-C6-O-901	L-C6-O-901	Trapezoidal	C6-O-901	C6-O-902	76.4	75	1	30	5	2030	0.069	208.197	17.363	0.99	77.36	76.76

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-C6-O-902	L-C6-O-902	Trapezoidal	C6-O-902	C6-O-903	76	72	1	30	5	1690	0.284	221.915	17.844	1.11	76.76	73.75
L-C6-O-903	L-C6-O-903	Natural	C6-O-903	C6-O-904	72	69.5	1	30	1	1731	0.058	526.932	17.968	1.19	73.75	71.67
L-C6-O-904	L-C6-O-904	Natural	C6-O-904	C6-O-905	69.5	69	1	30	1	560	0.179	628.193	18.118	1.28	71.67	71.10
L-C6-O-905	L-C6-O-905	Natural	C6-O-905	C6-O-905.5	69	67.5	1	30	1	1150	0.13	660.141	18.246	1.48	71.10	69.26
L-C6-O-902.1	L-C6-O-902.1	Trapezoidal	C6-O-902.1	C6-O-902	76.5	75	1	24	5	1570	-0.019	28.625	17.828	0.69	77.04	76.76
L-C5-O-905	L-C5-O-905	Natural	C5-O-905	C6-O-905	71	69	1	24	0.99	1650	0.091	68.693	17.043	0.33	71.57	71.10
L-C5-O-100.1	L-C5-O-100.1	Natural	C5-O-905	C5-O-100	71	70	1	24	0.99	540	-0.093	-91.258	16.449	-0.41	71.57	71.63
L-C4-O-917.2	L-C4-O-917.2	Trapezoidal	C4-O-917.1	C5-O-901	80	76	1	30	3	1210	0.331	0	0	0	80.00	77.67
L-C4-O-914.2	L-C4-O-914.2	Trapezoidal	C4-O-914.1	C5-O-901	78	76	1	80	2	1090	0.183	111.361	17.116	1.15	78.51	77.67
L-C4-O-909.2	L-C4-O-909.2	Natural	C4-O-909.1	C5-O-902	77.5	75.5	1	0	0	1310	0.153	144.395	17.671	0.5	78.14	77.07
L-C4-O-907.2	L-C4-O-907.2	Natural	C4-O-907.1	C5-O-902	77	75.5	1	115	2.5	1130	0.133	101.233	17.86	0.63	77.96	77.07
L-O7-O-500	L-O7-O-500	Natural	O7-O-000	C4-O-920	75.76	75.41	1	0	0	569.04	0.062	187.992	16.404	1.27	80.15	80.08
L_O7-8-800	L_O7-8-800	Rectangular	O7-8-800	O7-O-000	75.796	75.76	1	6	4	36.498	0.1	106.375	16.379	4.43	80.21	80.15
L_O7-6-600	L_O7-6-600	Rectangular	O7-6-600	O7-8-800	75.979	75.796	1	6	4	182.117	0.1	40.449	16.844	1.68	80.24	80.21
L_O7-8-801 SS	L_O7-8-801	Rectangular	O7-8-801	O7-8-800	75.887	75.796	1	7	3	90.483	0.1	80.87	16.213	3.84	80.24	80.21
L_O7-8-801 RDWY	L_O7-8-801	Natural	O7-8-801	O7-8-800	82.34	82.65	1	0	10	90.483	-0.343	0	0	0	0.00	0.00
L_O7-6-601	L_O7-6-601	Circular	O7-6-601	O7-6-600	81.421	77	1	0	2	221.039	2	9.177	16.009	6.88	82.15	80.24
L_O7-7-700	L_O7-7-700	Rectangular	O7-7-700	O7-6-600	76.098	75.979	1	6	4	119.059	0.1	36.827	17.002	1.53	80.26	80.24
L_O7-8-605	L_O7-8-605	Circular	O7-8-605	O7-8-801	75.958	75.887	1	0	2	70.641	0.1	4.399	16.001	1.39	80.25	80.24
L_O7-8-802 SS	L_O7-8-802	Rectangular	O7-8-802	O7-8-801	76.087	75.887	1	7	3	199.785	0.1	74.781	16.214	3.55	80.36	80.24
L_O7-8-802 RDWY	L_O7-8-802	Natural	O7-8-802	O7-8-801	81.64	82.34	1	0	10	199.785	-0.35	0	0	0	0.00	0.00
L_O7-6-602	L_O7-6-602	Circular	O7-6-602	O7-6-601	95.212	91.2	1	0	2	200.616	2	6.224	16.01	7.88	95.81	91.80
L_O7-O-900	L_O7-O-900	Rectangular	O7-O-900	O7-7-700	76.36	76.098	1	6	4	262.225	0.1	36.812	17.009	1.55	80.30	80.26
L_O7-O-901	L_O7-O-901	Rectangular	O7-O-900	O7-3-300	76.36	76.101	1	6	4	258.803	0.1	37.151	16.967	1.56	80.30	80.25
L_O7-8-606	L_O7-8-606	Circular	O7-8-606	O7-8-802	76.163	76.087	1	0	2	75.784	0.1	4.346	16.003	1.38	80.37	80.36
L_O7-8-803 SS	L_O7-8-803	Rectangular	O7-8-803	O7-8-802	76.287	76.087	1	7	3	200.002	0.1	67.714	16.251	3.22	80.49	80.36
L_O7-8-803 RDWY	L_O7-8-803	Natural	O7-8-803	O7-8-802	80.94	81.64	1	0	10	200.002	-0.35	0	0	0	0.00	0.00
L_O7-6-603	L_O7-6-603	Circular	O7-6-603	O7-6-602	99.223	95.212	1	0	2	200.537	2	4.181	16.004	6.12	99.71	95.81
L_O7-5-5001	L_O7-5-5001	Circular	O7-5-500.1	O7-O-902	76.83	76.7	1	6	3	68	0.191	-17.793	18.058	2.76	80.77	80.79
L_O7-8-607	L_O7-8-607	Circular	O7-8-607	O7-8-803	76.37	76.287	1	0	2	82.953	0.1	4.126	16.005	1.31	80.50	80.49
L_O7-8-804 SS	L_O7-8-804	Rectangular	O7-8-804	O7-8-803	76.457	76.287	1	6	3	170.384	0.1	48.371	16.214	2.68	80.58	80.49
L_O7-8-804 RDWY	L_O7-8-804	Natural	O7-8-804	O7-8-803	80.46	80.94	1	0	10	170.384	-0.282	0	0	0	0.00	0.00
L_O7-O-801	L_O7-O-801	Circular	O7-O-801	O7-8-803	76.336	76.287	1	0	2.5	49.534	0.1	13.083	16.248	2.65	80.53	80.49
L_O7-6-604	L_O7-6-604	Circular	O7-6-604	O7-6-603	103.234	99.223	1	0	2	200.537	2	2.246	16.003	4.7	103.59	99.71
L_O7-5-501.2 SS	L_O7-5-501.2	Circular	O7-5-501.2	O7-5-500.1	76.87	76.83	1	6	3	38.339	0.104	-18.105	18.058	-2.47	80.76	80.77
L_O7-5-501.2 RDWY	L_O7-5-501.2	Natural	O7-5-501.2	O7-5-500.1	82.75	82.88	1	0	10	38.339	-0.339	0	0	0	0.00	0.00
L_O7-8-608	L_O7-8-608	Circular	O7-8-608	O7-8-804	76.543	76.457	1	0	2	85.512	0.1	4.186	15.894	1.33	80.60	80.58
L_O7-8-805 SS	L_O7-8-805	Circular	O7-8-805	O7-8-804	76.687	76.457	1	0	2.5	230.067	0.1	12.475	16.007	2.54	80.71	80.58
L_O7-8-805 RDWY	L_O7-8-805	Natural	O7-8-805	O7-8-804	81.16	80.46	1	0	10	230.067	0.304	0	0	0	0.00	0.00
L_O7-O-802	L_O7-O-802	Rectangular	O7-O-802	O7-8-804	76.508	76.457	1	3	3	50.424	0.1	28.128	16.251	3.12	80.64	80.58
L_O7-5-501 SS	L_O7-5-501	Circular	O7-5-501	O7-5-501.2	77.03	76.87	1	4	2	161.661	0.099	-20.18	18.031	-6.69	80.18	80.76
L_O7-5-501 RDWY	L_O7-5-501	Natural	O7-5-501	O7-5-501.2	82.18	82.75	1	0	10	161.661	-0.353	0	0	0	0.00	0.00
L_O7-7-700.1	L_O7-7-700.1	Circular	O7-7-700.1	O7-5-501.2	77.293	77.248	1	0	2.5	45.153	0.1	20.263	16.019	5.43	80.78	80.76
L_O7-8-609	L_O7-8-609	Circular	O7-8-609	O7-8-805	76.772	76.687	1	0	2	85.146	0.1	5.411	16.002	1.71	80.74	80.71
L_O7-O-803	L_O7-O-803	Circular	O7-O-803	O7-8-805	76.717	76.687	1	0	2	29.854	0.1	2.401	15.899	0.8	80.71	80.71
L_O7-O-501	L_O7-O-501	Circular	O7-O-501	O7-5-501	77.06	77.03	1	0	2	26.6	0.113	2.331	16.008	3.04	80.18	80.18
L_O7-5-502.1 SS	L_O7-5-502.1	Circular	O7-5-502.1	O7-5-501	74.05	74.14	1	4	3	34.178	-0.263	-20.813	18.02	-3.91	80.16	80.18
L_O7-5-502.1 RDWY	L_O7-5-502.1	Natural	O7-5-502.1	O7-5-501	82.06	82.18	1	0	10	34.178	-0.351	0	0	0	0.00	0.00
L_O7-7-700.2	L_O7-7-700.2	Circular	O7-7-700.2	O7-7-700.1	77.436	77.293	1	0	2.5	142.877	0.1	13.863	16.018	3.48	80.80	80.78
L_O7-5-502 SS	L_O7-5-502	Circular	O7-5-502	O7-5-502.1	73.47	74.05	1	4	3	194.251	-0.3	-21.491	18.019	-3.93	79.97	80.16
L_O7-5-502 RDWY	L_O7-5-502	Natural	O7-5-502	O7-5-502.1	81.28	82.06	1	0	10	194.251	-0.402	0	0	0	0.00	0.00
L_O7-5-706	L_O7-5-706	Circular	O7-5-706	O7-5-502.1	74.1	74.05	1	0	2	52.916	0.094	5.277	15.988	1.67	80.17	80.16
L_O7-7-701	L_O7-7-701	Circular	O7-7-701	O7-7-700.2	91.959	88	1	0	2	197.939	2	12.04	16.009	9.46	92.81	88.85
L_O7-5-503 SS	L_O7-5-503	Circular	O7-5-503	O7-5-502	72.87	73.47	1	4	3	197.826	-0.303	-30.099	16.006	-4.71	79.64	79.97
L_O7-5-503 RDWY	L_O7-5-503	Natural	O7-5-503	O7-5-502	80.68	81.28	1	0	10	197.826	-0.303	0	0	0	0.00	0.00
L_O7-5-707	L_O7-5-707	Circular	O7-5-707	O7-5-502	73.53	73.47	1	0	2	69.478	0.086	4.783	16.012	1.51	79.98	79.97

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_O7-O-502	L_O7-O-502	Circular	O7-O-502	O7-5-502	73.53	73.47	1	0	2	33.06	0.181	3.003	16.01	0.95	79.97	79.97
L_O7-7-702	L_O7-7-702	Circular	O7-7-702	O7-7-701	95.942	91.959	1	0	2	199.154	2	7.86	16.005	7.23	96.62	92.81
L_O7-5-504 SS	L_O7-5-504	Circular	O7-5-504	O7-5-503	72.65	72.87	1	3	3	73.341	-0.3	-40.298	16.008	-6.22	79.43	79.64
L_O7-5-504 RDWY	L_O7-5-504	Natural	O7-5-504	O7-5-503	80.89	80.68	1	0	10	73.341	0.286	0	0	0	0.00	0.00
L_O7-5-708	L_O7-5-708	Circular	O7-5-708	O7-5-503	72.96	72.87	1	0	2	89.518	0.101	4.462	16.014	1.41	79.65	79.64
L_O7-7-703	L_O7-7-703	Circular	O7-7-703	O7-7-702	99.928	95.942	1	0	2	199.287	2	5.109	16.004	6.41	100.47	96.62
Link1543	Link1543	Circular	O7-5-505	C4-1-115	72.2	70	1	0	4	408	0.539	54.804	16.009	7.45	79.09	78.81
L_O7-5-505 SS	L_O7-5-505	Circular	O7-5-505	O7-5-504	72.2	72.65	1	0	3	150.793	-0.298	-43.435	16.008	-7.35	79.09	79.43
L_O7-5-505 RDWY	L_O7-5-505	Natural	O7-5-505	O7-5-504	81.12	80.89	1	0	10	150.793	0.153	0	0	0	0.00	0.00
L_O7-7-704	L_O7-7-704	Circular	O7-7-704	O7-7-703	103.914	99.928	1	0	2	199.34	2	2.556	16.003	4.74	104.30	100.47
L_O7-5-709	L_O7-5-709	Circular	O7-5-709	O7-5-505	72.31	72.2	1	0	2	112.069	0.098	5.642	16.015	1.78	79.10	79.09
L_O7-4-4000	L_O7-4-4000	Rectangular	O7-4-400	O7-O-000	75.8	75.76	1	6	4	39.627	0.101	86.201	16.412	3.59	80.18	80.15
L_O7-2-200	L_O7-2-200	Rectangular	O7-2-200	O7-4-400	75.981	75.8	1	6	4	181.398	0.1	43.739	16.602	1.82	80.23	80.18
L_O7-4-401 SS	L_O7-4-401	Rectangular	O7-4-401	O7-4-400	76.038	75.8	1	5	3	238.84	0.1	53.302	16.014	3.55	80.31	80.18
L_O7-4-401 RDWY	L_O7-4-401	Natural	O7-4-401	O7-4-400	82.55	81.33	1	0	10	238.84	0.511	0	0	0	0.00	0.00
L_O7-2-201	L_O7-2-201	Circular	O7-2-201	O7-2-200	77.17	77	1	0	2.5	169.892	0.1	14.543	16.018	3.81	80.27	80.23
L_O7-3-300	L_O7-3-300	Rectangular	O7-3-300	O7-2-200	76.101	75.981	1	6	4	120.082	0.1	37.175	16.975	1.55	80.25	80.23
L_O7-4-205	L_O7-4-205	Circular	O7-4-205	O7-4-401	76.095	76.038	1	0	2	56.855	0.1	4.569	16.002	1.45	80.32	80.31
L_O7-4-402 SS	L_O7-4-402	Rectangular	O7-4-402	O7-4-401	76.1	76.038	1	5	3	61.465	0.1	48.762	16.014	3.25	80.35	80.31
L_O7-4-402 RDWY	L_O7-4-402	Natural	O7-4-402	O7-4-401	82.34	82.55	1	0	10	61.465	-0.342	0	0	0	0.00	0.00
L_O7-2-202	L_O7-2-202	Circular	O7-2-202	O7-2-201	77.366	77.17	1	0	2.5	195.939	0.1	12.095	16.017	2.87	80.32	80.27
L_O7-4-403 SS	L_O7-4-403	Rectangular	O7-4-403	O7-4-402	76.2	76.1	1	5	3	99.893	0.1	44.922	16.014	2.99	80.42	80.35
L_O7-4-403 RDWY	L_O7-4-403	Natural	O7-4-403	O7-4-402	82.11	82.34	1	0	10	99.893	-0.23	0	0	0	0.00	0.00
L_O7-O-401	L_O7-O-401	Circular	O7-O-401	O7-4-402	76.129	76.1	1	0	2	28.568	0.1	1.54	15.861	0.49	80.36	80.35
L_O7-2-203	L_O7-2-203	Circular	O7-2-203	O7-2-202	77.47	77.366	1	0	2	104.007	0.1	7.212	16.014	2.24	80.37	80.32
L_O7-1-100	L_O7-1-100	Circular	O7-1-103	O7-O-902	77.69	77.63	1	4	3	60	0.1	27.628	16.017	5.97	80.80	80.79
L_O7-4-404 SS	L_O7-4-404	Rectangular	O7-4-404	O7-4-403	76.248	76.2	1	4	3	47.949	0.1	36.127	16.014	3.01	80.46	80.42
L_O7-4-404 RDWY	L_O7-4-404	Natural	O7-4-404	O7-4-403	82.17	82.11	1	0	10	47.949	0.125	0	0	0	0.00	0.00
L_O7-O-402	L_O7-O-402	Circular	O7-O-402	O7-4-403	76.232	76.2	1	0	2	31.712	0.1	1.838	15.863	1.11	80.43	80.42
L_O7-2-204	L_O7-2-204	Circular	O7-2-204	O7-2-203	77.668	77.47	1	0	2	197.851	0.1	3.667	16.012	1.15	80.39	80.37
L_O7-1-305.1	L_O7-1-305.1	Circular	O7-1-305.1	O7-1-103	77.728	77.69	1	0	3	38.371	0.1	18.517	16.018	3.67	80.81	80.80
L_O7-4-405 SS	L_O7-4-405	Circular	O7-4-405	O7-4-404	76.647	76.248	1	0	3	399.559	0.1	24.533	16.012	3.45	80.89	80.46
L_O7-4-405 RDWY	L_O7-4-405	Natural	O7-4-405	O7-4-404	82.15	82.17	1	0	10	399.559	-0.005	0	0	0	0.00	0.00
L_O7-O-403	L_O7-O-403	Circular	O7-O-403	O7-4-404	76.277	76.248	1	0	2	29.559	0.1	4.183	16.003	2.51	80.48	80.46
L_O7-1-305	L_O7-1-305	Circular	O7-1-305	O7-1-305.1	77.805	77.728	1	0	2	76.77	0.1	4.243	16.251	1.33	80.81	80.81
L_O7-3-301.1	L_O7-3-301.1	Circular	O7-3-301.1	O7-1-305.1	77.868	77.728	1	0	2.5	139.331	0.1	14.36	16.02	3.35	80.83	80.81
L_O7-4-406 SS	L_O7-4-406	Circular	O7-4-406	O7-4-405	76.757	76.647	1	0	3	109.882	0.1	17.01	16.009	2.4	80.96	80.89
L_O7-4-406 RDWY	L_O7-4-406	Natural	O7-4-406	O7-4-405	81.88	82.12	1	0	10	109.882	-0.218	0	0	0	0.00	0.00
L_O7-3-301	L_O7-3-301	Circular	O7-3-301	O7-3-301.1	77.941	77.868	1	0	2	72.936	0.1	3.059	16.002	1.02	80.83	80.83
L_O7-3-302	L_O7-3-302	Circular	O7-3-302	O7-3-301.1	77.991	77.868	1	0	2.5	123.39	0.1	11.321	16.017	2.64	80.84	80.83
L_O7-O-404	L_O7-O-404	Circular	O7-O-404	O7-4-406	76.799	76.757	1	0	2	41.76	0.1	3.156	16.009	2.18	80.97	80.96
L_O7-3-303	L_O7-3-303	Circular	O7-3-303	O7-3-302	78.095	77.991	1	0	2	104.095	0.1	6.516	16.016	2.07	80.85	80.84
L_O7-3-304	L_O7-3-304	Circular	O7-3-304	O7-3-303	78.297	78.095	1	0	2	202.087	0.1	3.288	16.014	1.07	80.85	80.85
C4-D-108 SS	L_C4-D-108	Rectangular	C4-D-108	OS-12	60.53	58.91	1	10	8	633.4	0.256	503.893	16.264	6.27	75.66	74.92
C4-D-108 RD	L_C4-D-108	Natural	C4-D-108	OS-12	74.42	73.9	1	0	0	633.4	0.082	116.426	17.206	2.33	75.66	74.92
L_C4-D-107.1	L_C4-D-107.1	Trapezoidal	C4-O-001	C5-1-115	74.7	74.24	1	22	5	150	0.907	141.476	16.545	2.77	75.85	75.83
C4-D-107 SS	L_C4-D-107	Rectangular	C4-O-001	C4-D-108	60.711	60.53	1	10	8	181.21	0.1	492.752	16.212	6.14	75.85	75.66
C4-D-107 RD	L_C4-D-107	Trapezoidal	C4-O-001	C4-D-108	74.65	74.42	1	30	3	181.1	0.127	143.774	17.177	3.39	75.85	75.66
C4-D-106 SS	L_C4-D-106	Rectangular	C4-D-106	C4-O-001	60.86	60.71	1	10	8	157.47	0.095	278.438	16.288	3.47	75.87	75.85
C4-D-106 RD	L_C4-D-106	Trapezoidal	C4-D-106	C4-O-001	75.2	74.65	1	100	3	157.467	0.349	199.941	17.274	2.02	75.87	75.85
L_C4-D-105 SS	L_C4-D-105	Circular	C4-D-105	C4-D-106	65.11	65	1	10	2.5	111.86	0.098	13.178	16.004	2.64	75.87	75.87
L_C4-D-105 RD	L_C4-D-105	Natural	C4-D-105	C4-D-106	75.45	75.2	1	0	0	111.861	0.223	2.384	16.858	0.44	75.87	75.87
L_C4-D-104 SS	L_C4-D-104	Circular	C4-D-104	C4-D-105	65.8	65.61	1	10	2	200.36	0.095	8.757	16.004	2.74	75.90	75.87
L_C4-D-104 RD	L_C4-D-104	Natural	C4-D-104	C4-D-105	76.15	75.45	1	0	0	200.355	0.349	0	0	0	0.00	0.00
L_C4-D-103	L_C4-D-103	Rectangular	C4-D-103	C4-DET-2	62	61.8	1	10	8	203.17	0.098	388.517	17.175	4.84	76.87	76.70
RD-103	RD-103	Natural	C4-D-103	C4-D-104	77.09	76.15	1	0	5	200	0	0	0	0	0.00	0.00

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-5-708	L_C4-5-708	Circular	C4-5-708	C4-D-104	65.95	65.8	1	0	2	77.53	0.193	4.605	16.002	1.44	75.96	75.90
L_C4-D-102 SS	L_C4-D-102	Rectangular	C4-D-102	C4-D-103	62.2	62	1	10	8	200	0.1	364.57	17.293	4.54	77.02	76.87
L_C4-D-102 RD	L_C4-D-102	Natural	C4-D-102	C4-D-103	77.79	77.09	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-5-709	L_C4-5-709	Circular	C4-5-709	C4-D-103	62.05	62	1	0	2	54.94	0.091	5.197	15.793	1.62	76.88	76.87
L_C4-1-103 SS	L_C4-1-103	Rectangular	C4-D-101	C4-D-102	62.32	62.2	1	10	8	125	0.096	355.796	17.294	4.43	77.11	77.02
L_C4-1-103 RD	L_C4-1-103	Natural	C4-D-101	C4-D-102	78.22	77.79	1	0	0	125	0.344	0	0	0	0.00	0.00
L_C4-5-710	L_C4-5-710	Circular	C4-5-710	C4-D-102	62.24	62.2	1	0	2	44.22	0.068	6.495	15.793	2.03	77.03	77.02
L_C4-O-502	L_C4-O-502	Circular	C4-O-502	C4-D-102	62.22	62.2	1	0	3	26	0.077	26.244	16.001	3.65	77.02	77.02
L_C4-O-501	L_C4-O-501	Circular	C4-O-501	C4-D-101	62.34	62.32	1	0	4	26	0.077	31.878	16.25	2.5	77.11	77.11
L_C4-5-500 SS	L_C4-5-500	Rectangular	C4-5-500	C4-D-101	62.42	62.33	1	10	8	94	0.096	335.63	17.327	4.18	77.17	77.11
L_C4-5-500 RD	L_C4-5-500	Natural	C4-5-500	C4-D-101	78.55	78.22	1	0	0	94	0.351	0	0	0	0.00	0.00
L_C4-1-104 SS	L_C4-1-104	Rectangular	C4-1-101	C4-1-101.1	65.4	65.34	1	5	3	29	0.194	34.355	16.247	2.32	77.18	77.18
L_C4-1-104 RD	L_C4-1-104	Natural	C4-1-101	C4-1-101.1	78.79	78.76	1	0	5	29	0.103	0	0	0	0.00	0.00
L_C4-1-3055	L_C4-1-3055	Rectangular	C4-7-700	C4-5-500	62.58	62.42	1	10	8	170.01	0.094	414.823	15.986	5.17	77.23	77.17
L_C4-1-105 SS	L_C4-1-105	Rectangular	C4-1-102	C4-1-101	65.99	65.4	1	5	3	300	0.197	31.849	16.247	2.1	77.21	77.18
L_C4-1-105 RD	L_C4-1-105	Natural	C4-1-102	C4-1-101	77.74	78.79	1	0	0	300	-0.35	0	0	0	0.00	0.00
L_C4-O-103	L_C4-O-103	Circular	C4-O-101	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.174	15.442	-0.35	77.63	77.63
L_C4-1-305	L_C4-1-305	Circular	C4-7-701	C4-7-700	77.18	75	1	0	2	92	2.37	15.828	16.009	10.82	78.13	77.23
L_C4-1-306	L_C4-1-306	Circular	C4-3-301	C4-7-700	75.1	75	1	0	2	108	0.093	11.732	16.047	4.85	77.26	77.23
L_C4-4-2025	L_C4-4-2025	Rectangular	C4-6-600	C4-7-700	62.67	62.58	1	10	8	86	0.105	387.727	15.986	4.84	77.25	77.23
L_C4-1-106 SS	L_C4-1-106	Circular	C4-1-103	C4-1-102	66.74	66.49	1	6	2.5	131	0.191	21.063	16.246	4.21	77.26	77.21
L_C4-1-106 RD	L_C4-1-106	Natural	C4-1-103	C4-1-102	77.4	77.74	1	0	0	131	-0.26	0	0	0	0.00	0.00
L_C4-O-104	L_C4-O-104	Circular	C4-O-102	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.174	15.442	-0.35	77.63	77.63
L_C4-1-304	L_C4-1-304	Circular	C4-7-702	C4-7-701	80.17	77.18	1	0	2	125	2.392	13.781	16.008	9.97	81.04	78.13
L_C4-1-307	L_C4-1-307	Circular	C4-3-302	C4-3-301	75.3	75.1	1	0	2	200	0.1	9.743	16.052	3.4	77.25	77.26
L_C4-4-202	L_C4-4-202	Circular	C4-6-601	C4-6-600	76.2	75	1	0	2	52.92	2.268	15.735	16.01	10.63	77.60	77.25
L_C4-4-203	L_C4-4-203	Circular	C4-2-201	C4-6-600	75.13	75	1	0	2	138	0.094	10.492	16.044	4.52	77.26	77.25
L_C4-8-800	L_C4-8-800	Rectangular	C4-8-800	C4-6-600	62.83	62.67	1	10	8	170.01	0.094	361.957	15.985	4.52	77.27	77.25
L_C4-1-107 SS	L_C4-1-107	Circular	C4-1-104	C4-1-103	67.57	67.24	1	5	2	169	0.195	10.161	16.246	3.56	77.30	77.26
L_C4-1-107 RD	L_C4-1-107	Natural	C4-1-104	C4-1-103	77.87	77.4	1	0	0	169	0.278	0	0	0	0.00	0.00
L_C4-O-105	L_C4-O-105	Circular	C4-O-103	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.174	15.442	-0.35	77.63	77.63
L_C4-1-302	L_C4-1-302	Circular	C4-7-703	C4-7-702	81.93	80.17	1	0	2	75	2.5	12.557	16.008	9.86	82.76	81.04
L_C4-1-308	L_C4-1-308	Circular	C4-3-303	C4-3-302	75.49	75.3	1	0	2	200	0.095	7.758	16.06	2.6	77.31	77.25
L_C4-4-201	L_C4-4-201	Circular	C4-6-602	C4-6-601	78.8	76.2	1	0	2	109.08	2.384	13.802	16.009	9.92	79.67	77.60
L_C4-4-204	L_C4-4-204	Circular	C4-2-202	C4-2-201	75.32	75.13	1	0	2	191	0.099	8.603	16.043	3.12	77.27	77.26
L_C4-4-401 SS	L_C4-4-401	Rectangular	C4-4-401	C4-8-800	65.36	65.22	1	7	5	140	0.1	203.833	15.986	5.8	77.34	77.27
L_C4-4-401 RD	L_C4-4-401	Natural	C4-4-401	C4-8-800	76.91	77.4	1	0	0	140	-0.35	0	0	0	0.00	0.00
L_C4-8-801 SS	L_C4-8-801	Circular	C4-8-801	C4-8-800	66.38	66.22	1	0	3.5	160	0.1	35.175	16	4.99	77.26	77.27
L_C4-8-801 RD	L_C4-8-801	Natural	C4-8-801	C4-8-800	77.96	77.4	1	0	0	160	0.35	0	0	0	0.00	0.00
L_C4-1-108	L_C4-1-108	Rectangular	C4-1-105	C4-DET-1	66.07	65.83	1	8	5	242.38	0.099	210.087	16.018	7.22	77.69	77.63
L_C4-O-106	L_C4-O-106	Circular	C4-O-104	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.174	15.442	-0.35	77.63	77.63
L_C4-5-701	L_C4-5-701	Circular	C4-7-704	C4-7-703	84.32	81.93	1	0	2	125	1.912	10.517	16.008	8.75	85.12	82.76
L_C4-1-309	L_C4-1-309	Circular	C4-3-304	C4-3-303	75.62	75.49	1	0	2	131	0.099	6.467	16.059	2.18	77.40	77.31
L_C4-8-602	L_C4-8-602	Circular	C4-6-603	C4-6-602	82.55	78.8	1	0	2	155	2.419	12.68	16.009	9.97	83.38	79.67
L_C4-4-205	L_C4-4-205	Circular	C4-2-203	C4-2-202	75.46	75.32	1	0	2	150	0.093	7.108	16.04	2.51	77.27	77.27
L_C4-4-402 SS	L_C4-4-402	Rectangular	C4-4-402	C4-4-401	65.54	65.36	1	7	5	191	0.094	196.137	15.985	5.58	77.40	77.34
L_C4-4-402 RD	L_C4-4-402	Natural	C4-4-402	C4-4-401	76.24	76.91	1	0	0	191	-0.351	15.433	17.207	0.63	77.40	77.37
L_C4-O-401	L_C4-O-401	Circular	C4-O-401	C4-4-401	65.38	65.36	1	0	2	28	0.071	3.715	15.791	1.17	77.34	77.34
L_C4-8-601	L_C4-8-601	Circular	C4-8-611	C4-8-801	66.44	66.38	1	0	2	68.87	0.087	5.352	15.793	1.69	77.26	77.26
L_C4-8-802	L_C4-8-802	Circular	C4-O-801	C4-8-801	66.4	66.38	1	0	2	28	0.1	1.965	15.791	1.05	77.26	77.26
L_C4-8-803 SS	L_C4-8-803	Circular	C4-8-802	C4-8-801	66.58	66.38	1	0	3.5	205	0.098	29.103	15.807	3.63	77.24	77.26
L_C4-8-803 RD	L_C4-8-803	Natural	C4-8-802	C4-8-801	77.74	77.96	1	0	0	205	-0.107	0	0	0	0.00	0.00
L-C4-1-105.5 SS	L-C4-1-105.5	Circular	C4-1-106	C4-1-105.5	66.3	66.19	1	0	5	117	0.094	180.864	16.016	9.46	77.78	77.71
L-C4-1-105.5 RDWY	L-C4-1-105.5	Natural	C4-1-106	C4-1-105.5	78.44	78.84	1	0	11	117	0	0	0	0	0.00	0.00
L_C4-O-107	L_C4-O-107	Circular	C4-O-105	C4-1-105	66.09	66.07	1	0	2	26	0.077	27.353	16.251	8.59	77.81	77.69
L_C4-5-703	L_C4-5-703	Circular	C4-7-705	C4-7-704	88.22	84.32	1	0	2	200	1.95	8.477	16.008	7.89	88.93	85.12

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-1-310	L_C4-1-310	Circular	C4-3-305	C4-3-304	75.78	75.62	1	0	2	169	0.095	4.782	16.06	1.67	77.47	77.40
L_C4-8-603	L_C4-8-603	Circular	C4-6-604	C4-6-603	83.45	82.55	1	0	2	50	1.8	11.159	16.007	8.96	84.29	83.38
L_C4-4-206	L_C4-4-206	Circular	C4-2-204	C4-2-203	75.61	75.46	1	0	2	150	0.1	5.612	16.039	2.02	77.27	77.27
L_C4-4-403 SS	L_C4-4-403	Rectangular	C4-4-403	C4-4-402	65.69	65.54	1	6	5	150	0.1	187.068	15.984	6.21	77.41	77.40
L_C4-4-403 RD	L_C4-4-403	Natural	C4-4-403	C4-4-402	75.03	76.24	1	0	0	150	-0.807	86.877	16.512	1.31	77.41	77.40
L_C4-O-402	L_C4-O-402	Circular	C4-O-402	C4-4-402	65.56	65.54	1	0	2	28	0.071	3.519	15.769	1.12	77.40	77.40
L_C4-8-604	L_C4-8-604	Circular	C4-8-610	C4-8-802	66.65	66.58	1	0	2	79.56	0.088	3.484	15.795	1.1	77.24	77.24
L_C4-8-804 SS	L_C4-8-804	Circular	C4-8-803	C4-8-802	66.72	66.58	1	0	3	150	0.1	21.931	15.807	3.12	77.18	77.24
L_C4-8-804 RD	L_C4-8-804	Natural	C4-8-803	C4-8-802	77.21	77.74	1	0	0	150	-0.353	0	0	0	0.00	0.00
L_C4-O-801	L_C4-O-801	Circular	C4-O-802	C4-8-802	66.6	66.58	1	0	2	28	0.071	2.361	15.796	0.74	77.24	77.24
L_C4-1-110 SS	L_C4-1-110	Circular	C4-1-107	C4-1-106	66.49	66.3	1	0	5	200	0.095	155.941	16.017	7.89	77.89	77.78
L_C4-1-110 RD	L_C4-1-110	Natural	C4-1-107	C4-1-106	77.74	78.44	1	0	0	200	-0.35	0	0	0	0.00	0.00
L_C4-1-313	L_C4-1-313	Circular	C4-1-308	C4-1-106	69.47	69.3	1	0	2	170	0.1	9.63	15.964	3.9	77.79	77.78
L_C4-O-108	L_C4-O-108	Circular	C4-O-106	C4-1-106	66.32	66.3	1	0	3	26	0.077	10.036	16.003	1.59	77.78	77.78
L_C4-5-705	L_C4-5-705	Circular	C4-7-706	C4-7-705	92.12	88.22	1	0	2	199.58	1.954	6.438	16.007	7.18	92.73	88.93
L_C4-1-311	L_C4-1-311	Circular	C4-3-306	C4-3-305	75.95	75.78	1	0	2	167	0.102	3.187	16.056	1.19	77.50	77.47
L_C4-8-606	L_C4-8-606	Circular	C4-6-605	C4-6-604	86.35	83.45	1	0	2	150	1.933	9.114	16.008	7.97	87.09	84.29
L_C4-4-207	L_C4-4-207	Circular	C4-2-205	C4-2-204	75.77	75.61	1	0	2	163	0.098	4.008	16.037	1.52	77.29	77.27
L_C4-4-404 SS	L_C4-4-404	Rectangular	C4-4-404	C4-4-403	65.83	65.69	1	6	5	150	0.093	171.646	16.001	5.7	77.39	77.41
L_C4-4-404 RD	L_C4-4-404	Natural	C4-4-404	C4-4-403	76.24	75.03	1	0	0	150	0.807	133.914	17.123	1.98	77.39	77.41
L_C4-O-403	L_C4-O-403	Circular	C4-O-403	C4-4-403	65.72	65.69	1	0	2	28	0.107	7.186	15.771	2.26	77.41	77.41
L_C4-8-605	L_C4-8-605	Circular	C4-8-622	C4-8-803	66.8	66.72	1	0	2	83.26	0.096	3.216	15.797	1.01	77.18	77.18
L_C4-8-805 SS	L_C4-8-805	Circular	C4-8-804	C4-8-803	66.87	66.72	1	0	2.5	150	0.1	-15.957	17.228	-3.19	76.96	77.18
L_C4-8-805 RD	L_C4-8-805	Natural	C4-8-804	C4-8-803	76.69	77.21	1	0	0	150	-0.347	0	0	0	0.00	0.00
L_C4-O-802	L_C4-O-802	Circular	C4-O-803	C4-8-803	66.74	66.72	1	0	2	28	0.071	2.485	15.806	0.86	77.18	77.18
L_C4-1-111 SS	L_C4-1-111	Circular	C4-1-108	C4-1-107	66.62	66.49	1	0	4.5	130	0.1	138.41	16.018	8.67	77.98	77.89
L_C4-1-111 RD	L_C4-1-111	Natural	C4-1-108	C4-1-107	77.4	77.74	1	0	0	130	-0.262	5.338	17.172	0.81	77.98	77.90
L_C4-O-109	L_C4-O-109	Circular	C4-O-107	C4-1-107	66.61	66.49	1	0	3	26	0.462	10.118	15.985	1.89	77.89	77.89
L_C4-1-314	L_C4-1-314	Circular	C4-1-309	C4-1-308	75.2	75	1	0	2	200	0.1	6.754	16.037	3.69	77.80	77.79
L_C4-5-704	L_C4-5-704	Circular	C4-7-707	C4-7-706	92.21	92.12	1	0	2	94.57	0.095	4.398	16.005	3.76	93.15	92.73
L_C4-1-312	L_C4-1-312	Circular	C4-3-307	C4-3-306	76.11	75.95	1	0	2	167	0.096	1.592	16.039	0.87	77.51	77.50
L_C4-8-608	L_C4-8-608	Circular	C4-6-606	C4-6-605	89.25	86.35	1	0	2	150	1.933	7.593	16.007	7.75	89.92	87.09
L_C4-4-208	L_C4-4-208	Circular	C4-2-206	C4-2-205	75.96	75.77	1	0	2	200	0.095	2.008	16.013	0.93	77.31	77.29
L_C4-4-405 SS	L_C4-4-405	Rectangular	C4-4-405	C4-4-404	66.11	65.83	1	6	5	281	0.1	153.694	16.002	5.1	77.42	77.39
L_C4-4-405 RD	L_C4-4-405	Natural	C4-4-405	C4-4-404	77.22	76.24	1	0	0	281	0.349	2.815	17.178	0.17	77.42	77.39
L_C4-O-404	L_C4-O-404	Circular	C4-O-404	C4-4-404	68.85	68.83	1	0	2	28	0.071	10.56	15.771	4.17	77.39	77.39
L_C4-8-607	L_C4-8-607	Circular	C4-8-609	C4-8-804	66.94	66.87	1	0	2	84.29	0.083	3.298	15.807	1.04	76.96	76.96
L_C4-8-806.1	L_C4-8-806.1	Trapezoidal	C4-8-805	C4-8-806	76.16	75.61	1	60	5	170	0.324	21.923	17.122	1.9	76.38	75.75
L_C4-8-806 SS	L_C4-8-806	Circular	C4-8-805	C4-8-804	67.01	66.87	1	0	2	150	0.093	-14.358	17.183	-4.46	76.38	76.96
L_C4-8-806 RD	L_C4-8-806	Natural	C4-8-805	C4-8-804	76.16	76.69	1	0	0	150	-0.353	-4.467	17.164	-1.5	76.38	76.96
L_C4-O-803	L_C4-O-803	Circular	C4-O-804	C4-8-804	66.89	66.87	1	0	2	28	0.071	2.56	15.807	0.94	76.96	76.96
L_C4-1-112 SS	L_C4-1-112	Circular	C4-1-109	C4-1-108	66.78	66.62	1	0	4.5	170	0.094	120.772	16.015	7.56	78.09	77.98
L_C4-1-112 RD	L_C4-1-112	Natural	C4-1-109	C4-1-108	77.88	77.4	1	0	0	170	0.282	2.886	17.102	0.57	78.09	77.98
L_C4-O-110	L_C4-O-110	Circular	C4-O-108	C4-1-108	66.64	66.62	1	0	2	26	0.077	6.539	15.967	2.05	77.99	77.98
L_C4-1-315	L_C4-1-315	Circular	C4-1-310	C4-1-309	75.33	75.2	1	0	2	130	0.1	5.454	16.025	2.51	77.80	77.80
L_C4-8-610	L_C4-8-610	Circular	C4-6-607	C4-6-606	92.16	89.25	1	0	2	150.41	1.935	6.07	16.006	7.17	92.76	89.92
406-SS	L_C4-4-406	Rectangular	C4-4-406	C4-4-405	66.38	66.11	1	5	5	282	0.094	137.352	16.001	5.47	77.85	77.42
406-RD	L_C4-4-406	Natural	C4-4-406	C4-4-405	78.21	77.21	1	0	5	282	0	0	0	0	0.00	0.00
L_C4-O-405	L_C4-O-405	Circular	C4-O-405	C4-4-405	66.13	66.11	1	0	2	28	0.071	10.463	15.774	3.29	77.42	77.42
L_C4-O-804	L_C4-O-804	Circular	C4-O-805	C4-8-805	67.03	67.01	1	0	2	28	0.071	2.703	15.802	1.13	76.38	76.38
L_C4-1-113 SS	L_C4-1-113	Circular	C4-1-110	C4-1-109	66.95	66.78	1	0	4.5	175	0.097	114.076	16.015	7.14	78.27	78.09
L_C4-1-113 RD	L_C4-1-113	Natural	C4-1-110	C4-1-109	78.49	77.88	1	0	0	175	0.349	0	0	0	0.00	0.00
L_C4-1-316	L_C4-1-316	Circular	C4-1-312	C4-1-109	66.85	66.78	1	0	2	70.64	0.099	4.048	15.968	1.27	78.09	78.09
L_C4-O-111	L_C4-O-111	Circular	C4-O-109	C4-1-109	66.8	66.78	1	0	2	26	0.077	0.291	15.967	0.45	78.09	78.09
L_C4-1-317	L_C4-1-317	Circular	C4-1-311	C4-1-310	75.49	75.32	1	0	2	170	0.1	3.744	16.022	1.78	77.80	77.80
L_C4-8-609	L_C4-8-609	Circular	C4-8-608	C4-6-607	92.24	92.16	1	0	2	85.72	0.093	4.029	16.005	3.66	93.14	92.76

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-4-209	L_C4-4-209	Circular	C4-4-207	C4-4-406	69.59	69.42	1	5	2	170	0.1	10.846	15.798	3.89	78.02	77.85
L_C4-4-407 SS	L_C4-4-407	Rectangular	C4-4-407	C4-4-406	66.81	66.6	1	5	5	212	0.099	121.935	15.99	4.85	78.14	77.85
L_C4-4-407 RD	L_C4-4-407	Natural	C4-4-407	C4-4-406	77.26	78.21	1	0	0	212	-0.448	0	0	0	0.00	0.00
L_C4-O-406	L_C4-O-406	Circular	C4-O-406	C4-4-406	66.62	66.6	1	0	2	28	0.071	7.201	15.778	2.27	77.85	77.85
L_C4-1-114 SS	L_C4-1-114	Circular	C4-1-111	C4-1-110	67.15	66.95	1	0	4.5	200	0.1	105.393	16.016	6.59	78.42	78.27
L_C4-1-114 RD	L_C4-1-114	Natural	C4-1-111	C4-1-110	79.19	78.49	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-1-318	L_C4-1-318	Circular	C4-1-314	C4-1-110	67.03	66.95	1	0	2	79.67	0.1	4.18	15.969	1.31	78.27	78.27
L_C4-1-319	L_C4-1-319	Circular	C4-1-313	C4-1-311	75.66	75.49	1	0	2	175	0.097	2.03	16.01	1.09	77.80	77.80
L_C4-4-210	L_C4-4-210	Circular	C4-4-208	C4-4-207	75.28	74.5	1	0	2	200	0.39	7.816	15.924	4.67	78.15	78.02
L_C4-4-408 SS	L_C4-4-408	Circular	C4-4-408	C4-4-407	66.93	66.81	1	0	5	125	0.096	114.551	15.988	5.8	78.25	78.14
L_C4-4-408 RD	L_C4-4-408	Natural	C4-4-408	C4-4-407	77.64	77.26	1	0	0	125	0.304	25.327	16.393	1.48	78.25	78.14
L_C4-O-407	L_C4-O-407	Circular	C4-O-407	C4-4-407	66.83	66.81	1	0	2	28	0.071	4.022	15.781	1.51	78.14	78.14
L_C4-1-115 SS	L_C4-1-115	Circular	C4-1-112	C4-1-111	67.34	67.15	1	0	4.5	200	0.095	84.509	16.016	5.28	78.54	78.42
L_C4-1-115 RD	L_C4-1-115	Natural	C4-1-112	C4-1-111	79.89	79.19	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-1-320	L_C4-1-320	Circular	C4-1-316	C4-1-111	67.38	67.15	1	0	2	84.19	0.273	16.85	16.016	5.25	78.49	78.42
L_C4-O-112	L_C4-O-112	Circular	C4-O-111	C4-1-111	67.17	67.15	1	0	2	26	0.077	0.718	15.97	0.76	78.43	78.42
L_C4-4-211	L_C4-4-211	Circular	C4-4-209	C4-4-208	76.06	75.28	1	0	2	200	0.39	5.922	15.987	3.85	78.22	78.15
L_C4-4-409 SS	L_C4-4-409	Circular	C4-4-409	C4-4-408	67.07	66.93	1	0	5	150	0.093	110.14	15.988	5.57	78.34	78.25
L_C4-4-409 RD	L_C4-4-409	Natural	C4-4-409	C4-4-408	77.23	77.64	1	0	0	150	-0.273	32.81	16.348	1.31	78.34	78.25
L_C4-1-116 SS	L_C4-1-116	Circular	C4-1-113	C4-1-112	67.54	67.34	1	0	4.5	199.83	0.1	76.56	16.015	4.79	78.65	78.54
L_C4-1-116 RD	L_C4-1-116	Natural	C4-1-113	C4-1-112	80.59	79.89	1	0	0	199.828	0.35	0	0	0	0.00	0.00
L_C4-1-322	L_C4-1-322	Circular	C4-1-318	C4-1-112	67.42	67.34	1	0	2	85.54	0.094	4.053	15.971	1.27	78.55	78.54
L_C4-O-113	L_C4-O-113	Circular	C4-O-112	C4-1-112	67.36	67.34	1	0	2	26	0.077	0.675	16.016	0.84	78.54	78.54
L_C4-1-321	L_C4-1-321	Circular	C4-1-315	C4-1-316	85.24	85	1	0	2	85.46	0.281	12.85	16.012	5.45	86.75	86.29
L_C4-4-212	L_C4-4-212	Circular	C4-4-210	C4-4-209	76.84	76.06	1	0	2	200	0.39	3.967	16.011	3.32	78.24	78.22
L_C4-4-410 SS	L_C4-4-410	Circular	C4-4-410	C4-4-409	67.22	67.07	1	0	4.5	150	0.1	87.06	15.994	5.43	78.39	78.34
L_C4-4-410 RD	L_C4-4-410	Natural	C4-4-410	C4-4-409	77.64	77.23	1	0	0	150	0.273	33.316	16.351	1.37	78.39	78.34
L_C4-O-408	L_C4-O-408	Circular	C4-O-409	C4-4-409	67.1	67.07	1	0	3	28	0.107	16.365	16.251	2.28	78.35	78.34
L_C4-1-117 SS	L_C4-1-117	Circular	C4-1-114	C4-1-113	67.73	67.54	1	0	4.5	200.53	0.095	69.396	16.013	4.34	78.74	78.65
L_C4-1-117 RD	L_C4-1-117	Natural	C4-1-114	C4-1-113	81.29	80.59	1	0	0	200.528	0.349	0	0	0	0.00	0.00
L_C4-1-324	L_C4-1-324	Circular	C4-1-320	C4-1-113	67.61	67.54	1	0	2	77	0.091	4.006	16.014	1.25	78.65	78.65
L_C4-1-323	L_C4-1-323	Circular	C4-1-317	C4-1-315	89.14	85.24	1	0	2	200.02	1.95	10.807	16.007	6.03	89.95	86.75
L_C4-4-214	L_C4-4-214	Circular	C4-4-211	C4-4-210	77.62	76.84	1	0	2	200	0.39	1.934	16.005	2.42	78.25	78.24
L_C4-4-411 SS	L_C4-4-411	Circular	C4-4-411	C4-4-410	67.38	67.22	1	0	4.5	163	0.098	73.602	16.005	4.59	78.51	78.39
L_C4-4-411 RD	L_C4-4-411	Natural	C4-4-411	C4-4-410	78.21	77.64	1	0	0	163	0.35	5.901	16.333	0.58	78.51	78.39
L_C4-O-409	L_C4-O-409	Circular	C4-O-410	C4-4-410	67.25	67.22	1	0	2	28	0.107	9.607	16.251	2.97	78.44	78.39
L_C4-1-118 SS	L_C4-1-118	Circular	C4-1-115	C4-1-114	67.93	67.73	1	0	4.5	199.88	0.1	62.03	16.012	3.88	78.81	78.74
L_C4-1-118 RD	L_C4-1-118	Natural	C4-1-115	C4-1-114	81.99	81.29	1	0	0	199.878	0.35	0	0	0	0.00	0.00
L_C4-1-326	L_C4-1-326	Circular	C4-1-322	C4-1-114	67.8	67.73	1	0	2	76.26	0.092	4.006	16.019	1.25	78.74	78.74
L_C4-O-114	L_C4-O-114	Circular	C4-O-114	C4-1-114	67.75	67.73	1	0	2	26.02	0.077	0.252	16.017	0.63	78.74	78.74
L_C4-1-325	L_C4-1-325	Circular	C4-1-319	C4-1-317	93.04	89.14	1	0	2	200.08	1.949	8.568	16.006	7.89	93.75	89.95
L_C4-4-213	L_C4-4-213	Circular	C4-4-212	C4-4-411	67.44	67.38	1	0	2	68.26	0.088	6.446	15.79	2.02	78.53	78.51
L_C4-4-412 SS	L_C4-4-412	Circular	C4-4-412	C4-4-411	67.56	67.38	1	0	4	192	0.094	62.079	16.005	4.89	78.77	78.51
L_C4-4-412 RD	L_C4-4-412	Natural	C4-4-412	C4-4-411	78.88	78.21	1	0	0	192	0.349	0	0	0	0.00	0.00
L_C4-O-410	L_C4-O-410	Circular	C4-O-411	C4-4-411	67.4	67.38	1	0	2	28	0.071	4.747	15.788	1.49	78.52	78.51
L_C4-1-328	L_C4-1-328	Circular	C4-1-324	C4-1-115	68	67.93	1	0	2	80.01	0.087	4.017	16.012	1.25	78.82	78.81
L_C4-O-115	L_C4-O-115	Circular	C4-O-115	C4-1-115	67.95	67.93	1	0	2	26.02	0.077	0.517	16.019	1.04	78.82	78.81
L_C4-1-327	L_C4-1-327	Circular	C4-1-321	C4-1-319	96.95	93.04	1	0	2	200.09	1.954	6.018	16.004	6.85	97.54	93.75
L_C4-4-215	L_C4-4-215	Circular	C4-4-213	C4-4-412	69.62	69.4	1	0	2	78.94	0.279	14.191	16.005	4.83	78.98	78.77
L_C4-4-413 SS	L_C4-4-413	Circular	C4-4-413	C4-4-412	67.76	67.56	1	0	3.5	200	0.1	42.599	16.006	4.37	79.07	78.77
L_C4-4-413 RD	L_C4-4-413	Natural	C4-4-413	C4-4-412	79.58	78.88	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-O-411	L_C4-O-411	Circular	C4-O-412	C4-4-412	67.59	67.56	1	0	2	28	0.107	2.329	15.79	0.73	78.77	78.77
L_C4-1-329	L_C4-1-329	Circular	C4-1-323	C4-1-321	100.85	96.95	1	0	2	200.09	1.949	3.165	16.003	5.1	101.28	97.54
L_C4-4-216	L_C4-4-216	Circular	C4-4-214	C4-4-213	85.65	83.5	1	0	2	91.06	2.361	10.112	16.008	9.59	86.39	84.24
L_C4-4-217	L_C4-4-217	Circular	C4-4-216	C4-4-413	67.84	67.76	1	0	2	83.99	0.095	4.147	15.793	1.3	79.08	79.07
L_C4-4-414 SS	L_C4-4-414	Circular	C4-4-414	C4-4-413	67.95	67.76	1	0	3.5	200.11	0.095	30.856	15.815	3.18	79.23	79.07

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-4-414 RD	L_C4-4-414	Natural	C4-4-414	C4-4-413	80.14	79.58	1	0	0	200.114	0.28	0	0	0	0.00	0.00
L_C4-O-412	L_C4-O-412	Circular	C4-O-413	C4-4-413	67.78	67.76	1	0	2	28	0.071	4.398	15.82	1.38	79.07	79.07
L_C4-4-218	L_C4-4-218	Circular	C4-4-215	C4-4-214	90.53	85.65	1	0	2	200	2.44	8.065	16.006	8.39	91.18	86.39
L_C4-4-219	L_C4-4-219	Circular	C4-4-218	C4-4-414	68.04	67.95	1	0	2	91.04	0.099	4.197	15.817	1.31	79.25	79.23
L_C4-4-415 SS	L_C4-4-415	Circular	C4-4-415	C4-4-414	68.15	67.95	1	0	3	200.07	0.1	19.709	15.814	2.76	79.33	79.23
L_C4-4-415 RD	L_C4-4-415	Natural	C4-4-415	C4-4-414	80.74	80.14	1	0	0	200.069	0.3	0	0	0	0.00	0.00
L_C4-O-413	L_C4-O-413	Circular	C4-O-414	C4-4-414	67.97	67.95	1	0	2	21.25	0.094	5.93	16.251	1.83	79.24	79.23
L_C4-4-220	L_C4-4-220	Circular	C4-4-217	C4-4-215	95.4	90.53	1	0	2	200	2.435	6.024	16.006	7.59	95.96	91.18
L_C4-4-221	L_C4-4-221	Circular	C4-4-220	C4-4-415	68.24	68.15	1	0	2	96.29	0.093	4.829	15.806	1.51	79.35	79.33
L_C4-4-416 SS	L_C4-4-416	Circular	C4-4-416	C4-4-415	68.34	68.15	1	0	2	192	0.099	9.277	15.812	2.9	79.46	79.33
L_C4-4-416 RD	L_C4-4-416	Natural	C4-4-416	C4-4-415	81.42	80.74	1	0	0	192	0.354	0	0	0	0.00	0.00
L_C4-O-414	L_C4-O-414	Circular	C4-O-415	C4-4-415	68.16	68.15	1	0	2	16	0.063	3.909	15.814	1.22	79.34	79.33
L_C4-4-222	L_C4-4-222	Circular	C4-4-219	C4-4-217	99.3	95.4	1	0	2	200	1.95	3.981	16.004	6.21	99.78	95.96
L_C4-4-223	L_C4-4-223	Circular	C4-4-222	C4-4-416	68.43	68.34	1	0	2	96.62	0.093	4.212	15.812	1.31	79.47	79.46
L_C4-4-417	L_C4-4-417	Circular	C4-4-417	C4-4-416	68.35	68.34	1	0	2	16	0.063	1.84	15.812	0.57	79.46	79.46
L_C4-4-224	L_C4-4-224	Circular	C4-4-221	C4-4-219	103.2	99.3	1	0	2	200	1.95	1.937	16.003	4.29	103.54	99.78
L_L-C5-O-000	L_L-C5-O-000	Natural	C5-O-000	XS-43	61.59	62.16	1	0	10.6	158.7	0.101	60.827	17.188	0.77	68.29	68.29
L_L-C2	L_L-C2	Trapezoidal	C5-O-001	C5-O-000	70.41	70	1	50	5	50	0.095	60.803	17.184	3.9	70.71	70.29
C3 SS	L_L-C3	Rectangular	C5-O-002	C5-O-001	61.8	61.64	2	11	6	157.427	0.102	628.473	17.154	5.64	70.86	70.71
C3 RDWY	L_L-C3	Natural	C5-O-002	C5-O-001	69.36	69.91	1	0	11	158	-0.348	75.371	17.181	1.72	70.86	70.75
C4 SS	L_L-C4	Rectangular	C5-O-003	C5-O-002	61.96	61.8	2	11	6	157	0.102	709.238	15.591	6.42	70.99	70.86
C4 RDWY	L_L-C4	Natural	C5-O-003	C5-O-002	69.91	69.36	1	0	11	157	0.35	114.555	17.169	2.44	70.99	70.86
C5 SS	L_L-C5	Rectangular	C5-O-003.1	C5-O-003	62.09	61.96	2	11	6	129.94	0.1	710.112	15.591	6.37	71.09	70.99
C5 RDWY	L_L-C5	Natural	C5-O-003.1	C5-O-003	69.45	69.91	1	0	11	130	-0.354	132.497	17.002	2.46	71.09	70.99
C6-SS	L_L-C6	Rectangular	C5-O-004	C5-O-003.1	62.28	62.09	2	11	6	198.722	0.096	710.807	15.591	6.34	71.24	71.09
C6-RD	L_L-C6	Natural	C5-O-004	C5-O-003.1	70.15	69.45	1	0	0	198.722	0.352	118.858	17.151	2.31	71.24	71.09
C10-SS	L_L-C10	Rectangular	C5-1-100	C5-O-004	62.42	62.28	2	11	6	139.381	0.1	708.14	15.591	6.3	71.35	71.24
C10-RD	L_L-C10	Natural	C5-1-100	C5-O-004	69.66	70.15	1	0	0	139.381	-0.352	120.929	16.94	2.12	71.35	71.24
L_L-C12	L_L-C12	Rectangular	C5-3-300	C5-1-100	62.6	62.42	2	11	6	172.005	0.105	667.977	15.554	6.07	71.46	71.35
C17-SS	L_L-C17	Rectangular	C5-1-101	C5-1-100	62.83	62.768	1	7	4	61.896	0.1	115.111	15.781	4.09	71.37	71.35
C17-RD	L_L-C17	Natural	C5-1-101	C5-1-100	69.88	69.66	1	0	0	61.896	0.355	133.922	16.988	1.99	71.37	71.35
L_L-C9	L_L-C9	Circular	C5-7-701	C5-3-300	65.08	65	1	0	2	80	0.1	5.896	15.56	1.86	71.46	71.46
L_L-C11	L_L-C11	Rectangular	C5-2-200	C5-3-300	62.68	62.6	2	11	6	82	0.098	653.793	15.554	6.06	71.51	71.46
L_L-C18	L_L-C18	Circular	C5-3-301	C5-3-300	65.12	65	1	0	2	120	0.1	9.747	15.554	3.08	71.49	71.46
C20-SS	L_L-C20	Rectangular	C5-1-103	C5-1-101	63.045	62.83	1	7	4	215.05	0.1	126.071	15.871	4.48	71.59	71.37
C20-RD	L_L-C20	Natural	C5-1-103	C5-1-101	70.63	69.88	1	0	0	215.05	0.349	79.661	16.984	1.86	71.59	71.37
L_L-C8	L_L-C8	Circular	C5-6-601	C5-2-200	65.08	65	1	0	2	80	0.1	5.634	15.56	1.78	71.51	71.51
L_L-C14	L_L-C14	Rectangular	C5-4-400	C5-2-200	62.85	62.68	2	11	6	172.004	0.099	651.364	15.541	6.05	71.62	71.51
L_L-C16	L_L-C16	Circular	C5-2-201	C5-2-200	65.057	65	1	0	2	56.733	0.1	9.167	15.553	2.9	71.52	71.51
L_L-C22	L_L-C22	Circular	C5-3-302	C5-3-301	65.32	65.12	1	0	2	200	0.1	6.485	15.553	2.05	71.51	71.49
C25-SS	L_L-C25	Rectangular	C5-1-104	C5-1-103	63.245	63.045	1	6	4	199.95	0.1	131.33	17.061	5.44	72.07	71.59
C25-RD	L_L-C25	Natural	C5-1-104	C5-1-103	71.33	70.63	1	0	0	199.95	0.35	45.295	17.006	2.06	72.07	71.59
C7-SS	L_L-C7	Circular	C5-8-801	C5-4-400	63.37	63.194	1	0	2	88	0.2	12.781	15.549	4.01	71.55	71.62
C7-RD	L_L-C7	Natural	C5-8-801	C5-4-400	70.63	70.28	1	0	0	88	0.398	-54.912	16.964	-1.38	71.55	71.62
L_L-C13	L_L-C13	Rectangular	C5-O-100	C5-4-400	62.9	62.85	2	11	6	50	0.1	579.09	15.498	6.04	71.63	71.62
C15-SS	L_L-C15	Rectangular	C5-4-401	C5-4-400	63.244	63.194	1	7	4	50	0.1	137.879	16.077	4.9	71.68	71.62
C15-RD	L_L-C15	Natural	C5-4-401	C5-4-400	70.08	70.28	1	0	0	50	-0.4	164.756	16.668	2.79	71.68	71.62
L_L-C21	L_L-C21	Circular	C5-2-202	C5-2-201	65.32	65.057	1	0	2	263.267	0.1	5.835	15.554	1.84	71.54	71.52
L_L-C26	L_L-C26	Circular	C5-3-303	C5-3-302	65.52	65.32	1	0	2	200.202	0.1	4.33	15.552	1.37	71.52	71.51
C28-SS	L_L-C28	Rectangular	C5-1-105	C5-1-104	63.395	63.245	1	6	4	150	0.1	142.982	17.08	5.92	72.49	72.07
C28-RD	L_L-C28	Natural	C5-1-105	C5-1-104	71.86	71.33	1	0	0	150	0.353	30.73	17.022	2.1	72.49	72.07
C19-SS	L_L-C19	Rectangular	C5-4-402	C5-4-401	63.358	63.244	1	7	4	114	0.1	96.531	15.588	3.44	71.74	71.68
C19-RD	L_L-C19	Natural	C5-4-402	C5-4-401	69.51	70.08	1	0	0	114	-0.5	201.716	16.637	2.27	71.74	71.68
L_L-C27	L_L-C27	Circular	C5-2-203	C5-2-202	65.52	65.32	1	0	2	200.202	0.1	3.524	15.552	1.11	71.54	71.54
L_L-C29	L_L-C29	Circular	C5-1-305	C5-1-105	66.131	64.5	1	0	2.5	163.059	1	28.684	16.023	5.78	72.65	72.49
C33-SS	L_L-C33	Rectangular	C5-1-106	C5-1-105	63.445	63.395	1	5	4	50	0.1	134.135	17.591	6.66	72.68	72.49

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (50-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C33-RD	L_L-C33	Natural	C5-1-106	C5-1-105	72.03	71.86	1	0	0	50	0.34	32.98	17.049	2.56	72.68	72.49
C23-SS	L_L-C23	Rectangular	C5-4-403	C5-4-402	63.57	63.358	1	7	4	218	0.1	94.422	15.677	3.36	71.81	71.74
C23-RD	L_L-C23	Natural	C5-4-403	C5-4-402	70.27	69.51	1	0	0	218	0.349	211.012	16.64	2.53	71.81	71.74
L_L-C35	L_L-C35	Circular	C5-1-306	C5-1-305	66.495	66.131	1	0	2.5	60.671	0.6	26.278	16.026	5.3	72.89	72.65
C38-SS	L_L-C38	Rectangular	C5-1-107	C5-1-106	63.645	63.445	1	5	4	200	0.1	129.604	17.744	6.44	73.39	72.68
C38-RD	L_L-C38	Natural	C5-1-107	C5-1-106	72.73	72.03	1	0	0	200	0.35	34.58	17.08	2.56	73.39	72.68
L_L-C24	L_L-C24	Circular	C5-O-401	C5-4-403	64.61	64.57	1	0	2	30.489	0.1	-8.919	20.605	-2.82	71.81	71.81
C31-SS	L_L-C31	Rectangular	C5-4-404	C5-4-403	63.829	63.57	1	6	4	253.276	0.1	134.345	16.115	5.57	72.33	71.81
C31-RD	L_L-C31	Natural	C5-4-404	C5-4-403	71.16	70.27	1	0	0	253.276	0.351	146.274	16.635	2.85	72.33	71.81
L_L-C40	L_L-C40	Circular	C5-1-307	C5-1-306	67.695	66.495	1	0	2	200	0.6	23.674	16.034	7.42	75.01	72.89
C41-SS	L_L-C41	Rectangular	C5-1-108.1	C5-1-107	63.695	63.645	1	5	4	50	0.1	127.277	17.739	6.32	73.56	73.39
C41-RD	L_L-C41	Natural	C5-1-108.1	C5-1-107	72.91	72.73	1	0	0	50	0.36	34.211	17.092	2.53	73.56	73.39
L_L-C30	L_L-C30	Circular	C5-4-205	C5-4-404	65.738	64.759	1	0	2.5	163.13	0.6	26.571	16.014	5.35	72.75	72.33
L_L-C32	L_L-C32	Circular	C5-O-402	C5-4-404	63.864	63.829	1	0	2	34.368	0.1	3.963	19.237	1.24	72.33	72.33
C36-SS	L_L-C36	Rectangular	C5-4-405	C5-4-404	63.958	63.829	1	6	4	128.724	0.1	80.098	15.863	3.32	72.35	72.33
C36-RD	L_L-C36	Natural	C5-4-405	C5-4-404	71.61	71.16	1	0	0	128.724	0.35	29.132	16.321	1.27	72.35	72.33
L_L-C48	L_L-C48	Circular	C5-1-308	C5-1-307	68.895	67.695	1	0	2	200	0.6	21.68	16.036	6.78	76.79	75.01
L_L-C42	L_L-C42	Circular	C5-O-101	C5-1-108.1	63.728	63.695	1	0	2	32.637	0.1	6.013	15.683	2.09	73.56	73.56
C45-SS	L_L-C45	Rectangular	C5-1-108	C5-1-108.1	63.845	63.695	1	5	4	150	0.1	125.389	17.732	6.22	74.06	73.56
C45-RD	L_L-C45	Natural	C5-1-108	C5-1-108.1	73.43	72.91	1	0	0	150	0.347	31.632	17.098	2.44	74.06	73.56
L_L-C34	L_L-C34	Circular	C5-4-206	C5-4-205	66.102	65.738	1	0	2.5	60.671	0.6	24.557	16.023	4.95	72.92	72.75
L_L-C37	L_L-C37	Circular	C5-O-403	C5-4-405	63.994	63.958	1	0	2	35.748	0.1	3.233	19.237	1.01	72.35	72.35
C43-SS	L_L-C43	Rectangular	C5-4-406	C5-4-405	64.161	63.958	1	5	4	203.128	0.1	78.498	16.004	3.9	72.50	72.35
C43-RD	L_L-C43	Natural	C5-4-406	C5-4-405	72.32	71.61	1	0	0	203.128	0.35	2.544	16.295	0.32	72.50	72.35
L_L-C56	L_L-C56	Circular	C5-1-309	C5-1-308	70.095	68.895	1	0	2	200	0.6	19.182	16.039	5.99	78.17	76.79
L_L-C46	L_L-C46	Circular	C5-O-102	C5-1-108	63.877	63.845	1	0	2	32.313	0.1	5.975	16.005	2.27	74.07	74.06
C49-SS	L_L-C49	Rectangular	C5-1-109	C5-1-108	64.045	63.845	1	5	4	200	0.1	123.993	17.666	6.15	74.72	74.06
C49-RD	L_L-C49	Natural	C5-1-109	C5-1-108	74.13	73.43	1	0	0	200	0.35	26.483	17.111	2.27	74.72	74.06
L_L-C39	L_L-C39	Circular	C5-4-207	C5-4-206	67.302	66.102	1	0	2	200	0.6	22.251	16.026	6.97	74.76	72.92
L_L-C44	L_L-C44	Circular	C5-O-404	C5-4-406	64.195	64.161	1	0	2	34.253	0.1	2.221	20.606	1.45	72.50	72.50
C52-SS	L_L-C52	Rectangular	C5-4-407	C5-4-406	64.476	64.161	1	5	4	314.931	0.1	70.172	16.013	3.49	72.78	72.50
C52-RD	L_L-C52	Natural	C5-4-407	C5-4-406	73.43	72.32	1	0	0	314.931	0.352	0	0	0	0.00	0.00
L_L-C62	L_L-C62	Circular	C5-1-310	C5-1-309	74.095	70.095	1	0	2	200	2	16.685	16.041	6.76	79.22	78.17
L_L-C50	L_L-C50	Circular	C5-O-103	C5-1-109	64.094	64.045	1	0	2	49.217	0.1	5.786	16.004	2.45	74.73	74.72
L_L-C55	L_L-C55	Circular	C5-1-316	C5-1-109	64.134	64.045	1	0	2	89.171	0.1	3.981	16.002	1.24	74.72	74.72
C63-SS	L_L-C63	Circular	C5-1-110	C5-1-109	64.26	64.045	1	0	4	215	0.1	107.377	18.241	8.46	75.58	74.72
C63-RD	L_L-C63	Natural	C5-1-110	C5-1-109	74.71	74.13	1	0	0	215	0.27	52.318	17.158	2.68	75.58	74.81
L_L-C47	L_L-C47	Circular	C5-4-208	C5-4-207	68.502	67.302	1	0	2	200	0.6	20.046	16.028	6.27	76.27	74.76
L_L-C51	L_L-C51	Circular	C5-O-405	C5-4-407	64.516	64.476	1	0	2	39.806	0.1	1.721	15.56	1.55	72.78	72.78
L_L-C54	L_L-C54	Circular	C5-4-216	C5-4-407	64.564	64.476	1	0	2	88.255	0.1	3.988	16.002	1.25	72.80	72.78
C58-SS	L_L-C58	Rectangular	C5-4-408	C5-4-407	64.68	64.476	1	5	4	204.259	0.1	58.704	16.014	2.92	72.91	72.78
C58-RD	L_L-C58	Natural	C5-4-408	C5-4-407	74.14	73.43	1	0	0	204.259	0.348	0	0	0	0.00	0.00
L_L-C71	L_L-C71	Circular	C5-1-311	C5-1-310	78.105	74.095	1	0	2	200.542	2	14.296	16.044	8.52	79.92	79.22
L_L-C61	L_L-C61	Circular	C5-1-317	C5-1-110	64.348	64.26	1	0	2	88.002	0.1	4.021	16.004	1.25	75.58	75.58
C66-SS	L_L-C66	Circular	C5-1-111	C5-1-110	64.445	64.26	1	0	4	185.175	0.1	95.309	18.681	7.51	75.77	75.58
C66-RD	L_L-C66	Natural	C5-1-111	C5-1-110	74.13	74.71	1	0	0	185.175	-0.313	96.889	17.185	1.92	75.77	75.63
L_L-C53	L_L-C53	Circular	C5-4-209	C5-4-208	69.702	68.502	1	0	2	200	0.6	18.039	16.031	5.64	77.50	76.27
L_L-C57	L_L-C57	Circular	C5-O-406	C5-4-408	64.716	64.68	1	0	2	36.09	0.1	1.83	16.004	0.74	72.91	72.91
L_L-C60	L_L-C60	Circular	C5-4-217	C5-4-408	64.768	64.68	1	0	2	88.034	0.1	3.986	16.003	1.24	72.93	72.91
C64-SS	L_L-C64	Rectangular	C5-4-408.1	C5-4-408	64.758	64.68	1	4	4	77.682	0.1	49.564	16.014	3.08	72.97	72.91
C64-RD	L_L-C64	Natural	C5-4-408.1	C5-4-408	74.3	74.14	1	0	0	77.682	0.206	0	0	0	0.00	0.00

PROPOSED 100-YR

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
O7-1-101 SS	L_L-O7-1-101	Circular	OFF-8.1	O7-O-004	74.57	74.47	1	0	5.00	106.38	0.09	194.41	16.55	10.91	79.09	78.45
O7-1-101 RD	L_L-O7-1-101	Trapezoidal	OFF-8.1	O7-O-004	80.8	81	1	100	0.16	106.40	-0.19	0.00	0.00	0.00	0.00	0.00
O7-1-102 SS	L_L-O7-1-102	Circular	OFF-7.1	OFF-8.1	74.62	74.57	1	0	5.00	77.15	0.07	194.41	16.55	10.16	79.53	79.09
O7-1-102 RD	L_L-O7-1-102	Trapezoidal	OFF-7.1	OFF-8.1	81.9	80.8	1	100	5.00	77.20	1.43	0.00	0.00	0.00	0.00	0.00
O7-1-103 SS	L_L-O7-1-103	Circular	OFF-8	OFF-7.1	74.82	74.62	1	0	5.00	215.83	0.09	194.41	16.55	9.68	80.67	79.53
O7-1-103 RD	L_L-O7-1-103	Trapezoidal	OFF-8	OFF-7.1	81.06	81.9	1	100	5.00	215.80	-0.39	0.00	0.00	0.00	0.00	0.00
O7-1-104 SS	L_L-O7-1-104	Rectangular	OFF-6	OFF-8	74.92	74.82	1	5	3.00	125.64	0.08	13.78	16.12	0.92	80.68	80.67
O7-1-104 RD	L_L-O7-1-104	Trapezoidal	OFF-6	OFF-8	79.9	81.06	1	100	5.00	33.00	-3.52	0.00	0.00	0.00	80.68	80.67
L_L-O7-1-105	L_L-O7-1-105	Circular	OFF-7	OFF-6	75.76	74.92	1	0	1.50	92.05	0.91	7.27	16.25	4.05	80.98	80.68
L_L-O7-1-106	L_L-O7-1-106	Rectangular	OFF-6.1	OFF-6	75.02	74.92	1	5	3.00	104.54	0.10	1.53	16.12	-0.64	80.68	80.68
L_L-O7-1-107	L_L-O7-1-107	Circular	OFF-5	OFF-6.1	76.67	75.02	1	0	1.50	20.00	8.25	2.92	15.40	2.82	80.68	80.68
L-C4-O-920	L-C4-O-920	Natural	C4-O-920	C4-O-919	75.41	75.2	1	0	4.70	452.00	0.05	221.14	16.52	1.46	80.28	80.17
L-C4-O-919	L-C4-O-919	Natural	C4-O-919	C4-O-918	75.2	73.35	1	0	3.84	482.43	0.38	212.00	16.55	0.96	80.17	80.14
L-C4-O-918	L-C4-O-918	Natural	C4-O-918	C4-O-917	73.35	74.62	1	0	6.07	311.89	-0.41	264.70	16.60	1.10	80.14	80.12
L-C4-O-917	L-C4-O-917	Natural	C4-O-917	C4-O-916	74.62	74.25	1	0	4.24	274.66	0.14	240.93	16.69	-0.14	80.12	80.12
L-C4-O-917.1	L-C4-O-917.1	Trapezoidal	C4-O-917	C4-O-917.1	78	80	1	30	3.00	670.00	-0.30	8.40	16.77	0.15	80.12	80.12
L-C4-O-916	L-C4-O-916	Natural	C4-O-916	C4-O-915	74.25	73.11	1	0	6.25	12.80	8.91	233.21	16.86	-0.52	80.12	80.12
L-C4-O-915 B1	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	72.92	1	5	3.00	778.40	0.10	56.81	17.16	3.77	80.12	78.68
L-XS-13-B2	L-C4-O-915	Rectangular	C4-O-915	C4-O-914	73.71	73.24	1	5	3.00	778.40	0.06	56.79	17.16	3.77	80.12	78.68
L-XS-13-CHANNEL	L-C4-O-915	Trapezoidal	C4-O-915	C4-O-914	78.32	78.3	1	50	10.00	778.40	0.00	301.50	17.15	1.15	80.12	78.95
L-C4-O-914	L-C4-O-914	Natural	C4-O-914	C4-O-913	72.92	73.67	1	0	5.39	464.81	-0.16	390.00	16.99	3.26	78.68	78.28
L-C4-O-914.1	L-C4-O-914.1	Trapezoidal	C4-O-914	C4-O-914.1	77	78	1	80	2.00	424.00	-0.24	150.68	17.29	1.34	78.68	78.60
L-C4-O-913	L-C4-O-913	Natural	C4-O-913	C4-O-912	73.67	72.25	1	0	5.39	481.28	0.30	382.47	17.05	0.31	78.28	78.27
L-C4-O-912 B1	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.25	72.28	1	4	3.00	75.02	-0.04	81.98	15.88	7.13	78.27	78.25
L-XS-10.4-B2	L-C4-O-912	Rectangular	C4-O-912	C4-O-911	72.3	72.27	1	4	3	75.02	0.04	81.647	15.926	6.86	78.27	78.25
L-XS-10.4-SPILL	L-C4-O-912	Natural	C4-O-912	C4-O-911	77.5	76	1	10	0.05	75.02	1.999	476.194	17.133	1.58	78.27	78.25
L-C4-O-907	L-C4-O-907	Natural	C4-O-907	C4-O-906	72.13	72.09	1	0	5.2	35.01	0.114	78.263	22.566	2.52	78.08	78.08
L-C4-O-907.1	L-C4-O-907.1	Natural	C4-O-907	C4-O-907.1	75	77	1	115	2.5	360	-0.556	162.107	17.173	0.33	78.08	78.07
L-C4-O-911	L-C4-O-911	Natural	C4-O-911	C4-O-910	72.27	72.59	1	0	5.62	312.14	-0.103	495.37	17.104	0.47	78.25	78.25
L-C4-O-910	L-C4-O-910	Natural	C4-O-910	C4-O-909	72.59	71.69	1	0	4.539	409.86	0.22	380.752	17.142	0.27	78.25	78.25
L-C4-O-910.1	L-C4-O-910.1	Natural	C4-O-910	C5-O-902	77.5	75.5	1	0	0	1490	0.134	88.065	17.534	0.48	78.25	77.44
L-C4-O-909.1	L-C4-O-909.1	Natural	C4-O-909	C4-O-909.1	76	77.5	1	0	0	200	-0.75	206.336	17.161	0.41	78.25	78.23
L-C4-O-909 CULV	L-C4-O-909	Rectangular	C4-O-909	C4-O-908	71.69	71.64	1	2	4	45.64	0.11	46.452	30.094	5.86	78.25	78.08
L-C4-O-909 SPILL	L-C4-O-909	Trapezoidal	C4-O-909	C4-O-908	76	75.9	1	5	5	45.64	0.219	153.306	17.685	2.79	78.25	78.08
L-C4-O-906	L-C4-O-906	Natural	C4-O-906	C4-O-905	72.09	71.65	1	0	6.56	96.36	0.457	78.308	22.569	1.76	78.08	78.07
L_C4-O-903.1	L_C4-O-903.1	Trapezoidal	C4-O-903	C4-4-404	77.5	77	1	45	3	200	0.207	54.014	17.877	2.21	78.12	78.13
L-C4-O-903 PIPE	L-C4-O-903	Circular	C4-O-903	C4-O-902	71.3	70.97	1	0	4	43.33	0.762	105.965	21.682	8.41	78.12	78.13
L-C4-O-903 RDWY	L-C4-O-903	Trapezoidal	C4-O-903	C4-O-902	77.7	77.1	1	35	2	43.33	1.385	96.254	16.946	3.23	78.12	78.13
L-C4-O-902 PIPE	L-C4-O-902	Circular	C4-O-902	C4-O-901	70.67	70.43	1	0	4	520.37	0.046	95.456	21.644	7.47	78.13	78.09
L-C4-O-902 RDWY	L-C4-O-902	Trapezoidal	C4-O-902	C4-O-901	77	76.5	1	35	2	520.37	0.096	75.709	17.414	2	78.13	78.09
L-C4-O-901 PIPE	L-C4-O-901	Circular	C4-O-901	C4-O-900	70.43	70.39	1	0	4	143.16	0.028	115.29	15.776	9.63	78.09	78.07
L-C4-O-901 RDWY	L-C4-O-901	Trapezoidal	C4-O-901	C4-O-900	76.6	76.4	1	35	5	143.16	0.14	124.316	17.428	2.68	78.09	78.07
L_C4-O-900	L_C4-O-900	Rectangular	C4-O-900	C4-8-800	62.94	62.845	1	10	8	86.7	0.11	142.998	17.439	3.21	78.07	78.06
L-C4-O-908	L-C4-O-908	Natural	C4-O-908	C4-O-907	71.64	72.13	1	0	5.58	239.72	-0.204	177.132	17.699	1.43	78.08	78.08
L-C4-O-904	L-C4-O-904	Natural	C4-O-904	C4-O-903	71.4	71.3	1	0	6.56	86.1	0.116	87.687	21.673	2.37	78.11	78.12
L-C4-O-905 PIPE	L-C4-O-905	Circular	C4-O-905	C4-O-904	71.65	71.4	1	0	3	48.45	0.516	71.427	25.417	10.06	78.07	78.11
L-C4-O-905 RDWY	L-C4-O-905	Trapezoidal	C4-O-905	C4-O-904	77.4	77	1	10	1	48.45	0.826	42.103	17.785	4.76	78.07	78.11
L-C5-O-902.1	L-C5-O-902.1	Trapezoidal	C5-O-902	C6-O-902.1	75.5	76.5	1	24	5	520	-0.192	68.751	17.626	1.18	77.44	77.37
L-C5-O-902 SS	L-C5-O-902	Rectangular	C5-O-902	C5-O-903	67.11	65.61	2	6	6	1800	0.083	319.948	21.256	4.49	77.44	75.95
L-C5-O-902 RD	L-C5-O-902	Trapezoidal	C5-O-902	C5-O-903	75.6	74	1	54	5	1800	0.083	505.336	17.712	3.69	77.44	75.95
L-C5-O-901.1	L-C5-O-901.1	Trapezoidal	C5-O-901	C6-O-901	76.5	75.5	1	80	5	2100	0.024	279.315	17.351	1.77	77.86	77.48
L-C5-O-901 SS	L-C5-O-901	Rectangular	C5-O-901	C5-O-902	68.8	67.11	1	7	6	1950	0.087	167.944	21.292	3.99	77.86	77.44
L-C5-O-901 RD	L-C5-O-901	Trapezoidal	C5-O-901	C5-O-902	77	75.5	1	54	5	1950	0.026	122.901	17.372	1.47	77.86	77.44
L_OS-17 BOX 1	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.61	1	7	7	50.27	0.119	370.181	15.923	-11.57	73.38	72.86
L_OS-17 BOX 2	L_OS-17	Rectangular	OS-17	OS-18	56.67	56.57	1	7	7	50.27	0.199	370.2	15.923	-11.6	73.38	72.86
L_OS-16 CULV	L_OS-16	Rectangular	OS-16	OS-17	56.98	56.67	1	10	8	386.67	0.08	740.406	15.923	9.23	73.49	73.38

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_OS-16 RDWY	L_OS-16	Natural	OS-16	OS-17	69.94	71.19	1	0	10	386.67	-0.323	485.277	17.136	2.59	73.49	73.38
L_OS-15 CULV	L_OS-15	Rectangular	OS-15	OS-16	57.59	56.98	1	10	8	895.63	0.068	740.456	15.924	9.22	74.24	73.49
L_OS-15 RDWY	L_OS-15	Natural	OS-15	OS-16	72.85	69.94	1	0	10	895.63	0.325	314.728	17.097	2.12	74.24	73.49
W-OS-14	W-OS-14	Trapezoidal	OS-14	W-OUT	73.02	72.9	1	30	5	1000	0	147.47	17.093	2.68	74.63	73.72
L_OS-14 CULV	L_OS-14	Rectangular	OS-14	OS-15	57.91	57.59	1	10	8	311.31	0.103	739.155	15.916	9.2	74.63	74.24
L_OS-14 RDWY	L_OS-14	Natural	OS-14	OS-15	73.02	72.85	1	0	10	311.31	0.055	231.031	17.083	2.93	74.63	74.24
W-OS-13	W-OS-13	Trapezoidal	OS-13	W-OUT	73.4	72.9	1	30	5	1300	0	114.803	17.106	2.45	74.76	73.72
L_OS-13 CULV	L_OS-13	Rectangular	OS-13	OS-14	58.2	57.91	1	10	8	306.54	0.095	393.981	15.898	4.9	74.76	74.63
L_OS-13 RDWY	L_OS-13	Natural	OS-13	OS-14	73.4	73.02	1	0	10	306.54	0.124	149.833	17.132	1.99	74.76	74.63
W-OS-12	W-OS-12	Trapezoidal	OS-12	W-OUT	73.9	72.9	1	30	5	2000	0	98.674	17.101	2.28	75.14	73.72
L_OS-12 CULV	L_OS-12	Rectangular	OS-12	OS-13	58.91	58.2	1	10	8	440.36	0.161	427.644	16.052	5.32	75.14	74.76
L_OS-12 RDWY	L_OS-12	Natural	OS-12	OS-13	73.9	73.4	1	0	10	440.36	0.114	146.641	17.096	2.37	75.14	74.76
L_L-XS-23	L_L-XS-23	Natural	XS-23	XS-22	53.51	52.54	1	0	8.93	89.285	1.086	857.276	17.492	3.15	65.82	65.80
L_L-XS-24	L_L-XS-24	Natural	XS-24	XS-23	53.81	53.51	1	0	9.61	276.201	0.109	856.088	17.487	1.74	65.82	65.82
L_L-XS-25	L_L-XS-25	Natural	XS-25	XS-24	55.09	53.81	1	0	9.12	243.878	0.525	853.868	17.481	1.62	65.82	65.82
L_L-XS-26	L_L-XS-26	Natural	XS-26	XS-25	57.27	55.09	1	0	6.96	255.302	0.854	851.852	17.471	1.92	65.83	65.82
L_L-XS-27	L_L-XS-27	Natural	XS-27	XS-26	56.71	57.27	1	0	6.93	99.131	-0.565	850.838	17.451	3.79	65.92	65.83
L_L-XS-28	L_L-XS-28	Natural	XS-28	XS-27	55.37	56.71	1	0	8.29	331.908	-0.404	850.743	17.45	4.45	66.50	65.92
L_L-XS-29	L_L-XS-29	Natural	XS-29	XS-28	56.52	55.37	1	0	9.19	264.58	0.435	850.624	17.405	1.49	66.52	66.50
L_L-XS-30	L_L-XS-30	Natural	XS-30	XS-29	57.68	56.52	1	0	7.69	328.717	0.353	851.794	17.335	1.9	66.61	66.52
L_L-XS-31	L_L-XS-31	Natural	XS-31	XS-30	57.41	57.68	1	0	8.3	337.631	-0.08	853.414	17.285	3.86	67.59	66.61
L_L-CULV-8	L_L-CULV-8	Natural	CULV-8	XS-31	57.99	57.41	1	0	8.3	44.397	1.306	722.038	17.314	2.99	67.62	67.59
CULVERT 4-A	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.06	55.99	1	8	7	107.82	0.065	109.721	23.768	1.96	67.63	67.62
CULVERT 4-B	L_L-CULV-7	Rectangular	CULV-7	CULV-8	56.07	56.02	1	8	7	107.82	0.046	109.715	23.768	1.96	67.63	67.62
CULVERT4-SPILL	L_L-CULV-7	Trapezoidal	CULV-7	CULV-8	65.15	65.14	1	100	8	107.82	0.009	625.755	17.309	0.81	67.63	67.62
L_L-XS-32	L_L-XS-32	Natural	XS-32	CULV-7	58.15	58.06	1	0	8.06	25.237	0.357	722.736	17.242	2.41	67.63	67.63
L_L-XS-33	L_L-XS-33	Natural	XS-33	XS-32	59.41	58.15	1	0	7.93	201.985	0.624	724.363	17.199	1.88	67.64	67.63
L_L-XS-34	L_L-XS-34	Natural	XS-34	XS-33	60.01	59.41	1	0	8	247.14	0.243	661.511	17.208	3.58	67.82	67.64
L_L-XS-35	L_L-XS-35	Natural	XS-35	XS-34	60.21	60.01	1	0	7.48	134.207	0.149	663.316	17.161	3.61	68.02	67.82
L_L-CULV-6	L_L-CULV-6	Natural	CULV-6	XS-35	60.17	60.21	1	0	7.479	12.841	-0.311	663.403	17.158	3.15	68.04	68.02
CULVERT 3-A	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.16	60.17	1	9	5	29.115	-0.034	248.377	16.978	5.5	68.09	68.04
CULVERT 3-B	L_L-CULV-5	Rectangular	CULV-5	CULV-6	60.14	60.2	1	9	5	29.115	-0.206	248.376	16.978	5.5	68.09	68.04
CULVERT3-SPILL	L_L-CULV-5	Trapezoidal	CULV-5	CULV-6	67.54	67.24	1	60	5	29.12	1.03	166.953	17.205	4.02	68.09	68.04
L_L-XS-36	L_L-XS-36	Natural	XS-36	CULV-5	60.09	60.14	1	0	8.04	21.297	-0.235	663.448	17.156	3.17	68.16	68.09
L_L-XS-37	L_L-XS-37	Natural	XS-37	XS-36	60.69	60.09	1	0	7.98	179.804	0.095	663.615	17.147	3.22	68.31	68.16
L_L-XS-38	L_L-XS-38	Natural	XS-38	XS-37	61.97	60.69	1	0	6.18	396.598	0.323	176.848	17.134	1.74	68.33	68.31
L_L-CULV-4	L_L-CULV-4	Natural	CULV-4	XS-38	61.36	61.97	1	0	6.18	43.827	-1.392	177.276	17.119	1.53	68.33	68.33
CULVER 2-A	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.5	61.37	1	9	5	26.441	0.492	88.666	17.118	1.97	68.40	68.33
CULVER 2-B	L_L-CULV-3	Rectangular	CULV-3	CULV-4	61.4	61.36	1	9	5	26.441	0	88.664	17.118	1.97	68.40	68.33
CULVER 2-SPILL	L_L-CULV-3	Trapezoidal	CULV-3	CULV-4	68.84	68.6	1	42	5	26.44	0.908	0	0	0	0.00	0.00
L_L-XS-39	L_L-XS-39	Natural	XS-39	CULV-3	61.92	61.4	1	0	7.42	15.69	3.314	177.352	17.117	2.08	68.40	68.40
L_L-XS-40	L_L-XS-40	Natural	XS-40	XS-39	62.1	61.92	1	0	7.639	97.04	0.103	177.498	17.111	1.42	68.42	68.40
L_L-XS-41	L_L-XS-41	Natural	XS-41	XS-40	62.49	62.1	1	0	7.19	106.594	0.366	154.831	17.109	0.98	68.45	68.42
L_L-CULV-2	L_L-CULV-2	Natural	CULV-2	XS-41	61.43	62.49	1	0	7.19	14.768	-7.178	154.982	17.103	0.73	68.45	68.45
CULV-1-A	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.43	1	9	5	26.255	-0.076	77.504	17.102	1.72	68.45	68.45
CULV-1-B	L_L-CULV-1	Rectangular	CULV-1	CULV-2	61.41	61.47	1	9	5	26.255	-0.229	77.502	17.102	1.72	68.45	68.45
CULV1-SPILL	L_L-CULV-1	Trapezoidal	CULV-1	CULV-2	68.9	68.64	1	40	5	26.25	0.99	0	0	0	0.00	0.00
L_L-XS-42	L_L-XS-42	Natural	XS-42	CULV-1	62.74	61.41	1	0	6.619	12.816	10.378	155.071	17.101	3.44	68.45	68.45
L_L-XS-43	L_L-XS-43	Natural	XS-43	XS-42	62.16	62.74	1	0	6.55	126.27	-0.459	155.063	17.101	1.17	68.52	68.45
L-C5-O-903.1	L-C5-O-903.1	Trapezoidal	C5-O-903	C6-O-903	74.4	72	1	60	5	2090	0.096	461.289	17.577	3.7	75.95	74.16
L-C5-O-904 RD	L-C5-O-903	Trapezoidal	C5-O-903	C5-O-904	74.5	72	1	28	5	1740	0.115	196.881	17.587	3.85	75.95	73.01
L-C5-O-904 SS	L-C5-O-903	Rectangular	C5-O-903	C5-O-904	65.61	64.2	3	6	4	1740	0.081	409.479	15.197	5.67	75.95	72.75
L-C5-O-904.2	L-C5-O-904.2	Natural	C5-O-904	C6-O-904	71.5	69.5	1	40	1	2090	0.072	236.429	16.957	0.75	72.75	72.20
L-C5-O-904	L-C5-O-904	Rectangular	C5-O-904	C5-O-100	64.2	62.9	2	6	6	569	0.228	591.893	15.501	9.42	72.75	71.85
L-C5-O-904.1	L-C5-O-904.1	Natural	C5-O-904	C5-4-404	71.5	70.8	1	24	1	385	0.348	238.222	17.027	0.72	72.75	72.55
L-C6-O-901	L-C6-O-901	Trapezoidal	C6-O-901	C6-O-902	76.4	75	1	30	5	2030	0.069	274.385	17.566	1.07	77.48	76.89

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L-C6-O-902	L-C6-O-902	Trapezoidal	C6-O-902	C6-O-903	76	72	1	30	5	1690	0.284	329.15	17.903	1.13	76.89	74.16
L-C6-O-903	L-C6-O-903	Natural	C6-O-903	C6-O-904	72	69.5	1	30	1	1731	0.058	758.568	18.03	1.37	74.16	72.20
L-C6-O-904	L-C6-O-904	Natural	C6-O-904	C6-O-905	69.5	69	1	30	1	560	0.179	923.736	18.205	1.5	72.20	71.61
L-C6-O-905	L-C6-O-905	Natural	C6-O-905	C6-O-905.5	69	67.5	1	30	1	1150	0.13	983.339	18.244	1.74	71.61	69.74
L-C6-O-902.1	L-C6-O-902.1	Trapezoidal	C6-O-902.1	C6-O-902	76.5	75	1	24	5	1570	-0.019	67.79	17.746	1.3	77.37	76.89
L-C5-O-905	L-C5-O-905	Natural	C5-O-905	C6-O-905	71	69	1	24	0.99	1650	0.091	111.503	17.154	0.42	71.76	71.61
L-C5-O-100.1	L-C5-O-100.1	Natural	C5-O-905	C5-O-100	71	70	1	24	0.99	540	-0.093	-132.073	16.503	-0.5	71.76	71.85
L-C4-O-917.2	L-C4-O-917.2	Trapezoidal	C4-O-917.1	C5-O-901	80	76	1	30	3	1210	0.331	1.894	17.149	0.04	80.12	77.86
L-C4-O-914.2	L-C4-O-914.2	Trapezoidal	C4-O-914.1	C5-O-901	78	76	1	80	2	1090	0.183	150.31	17.338	1.35	78.60	77.86
L-C4-O-909.2	L-C4-O-909.2	Natural	C4-O-909.1	C5-O-902	77.5	75.5	1	0	0	1310	0.153	197.454	17.549	0.5	78.23	77.44
L-C4-O-907.2	L-C4-O-907.2	Natural	C4-O-907.1	C5-O-902	77	75.5	1	115	2.5	1130	0.133	144.886	17.351	0.63	78.07	77.44
L-O7-O-500	L-O7-O-500	Natural	O7-O-000	C4-O-920	75.76	75.41	1	0	0	569.04	0.062	229.201	16.468	1.4	80.38	80.28
L_O7-8-800	L_O7-8-800	Rectangular	O7-8-800	O7-O-000	75.796	75.76	1	6	4	36.498	0.1	128.138	16.455	5.34	80.44	80.38
L_O7-6-600	L_O7-6-600	Rectangular	O7-6-600	O7-8-800	75.979	75.796	1	6	4	182.117	0.1	48.928	16.852	2.04	80.50	80.44
L_O7-8-801 SS	L_O7-8-801	Rectangular	O7-8-801	O7-8-800	75.887	75.796	1	7	3	90.483	0.1	90.846	16.253	4.32	80.54	80.44
L_O7-8-801 RDWY	L_O7-8-801	Natural	O7-8-801	O7-8-800	82.34	82.65	1	0	10	90.483	-0.343	0	0	0	0.00	0.00
L_O7-6-601	L_O7-6-601	Circular	O7-6-601	O7-6-600	81.421	77	1	0	2	221.039	2	10.205	16.015	6.9	82.20	80.50
L_O7-7-700	L_O7-7-700	Rectangular	O7-7-700	O7-6-600	76.098	75.979	1	6	4	119.059	0.1	44.547	17.184	1.86	80.53	80.50
L_O7-8-605	L_O7-8-605	Circular	O7-8-605	O7-8-801	75.958	75.887	1	0	2	70.641	0.1	4.949	16.177	1.56	80.56	80.54
L_O7-8-802 SS	L_O7-8-802	Rectangular	O7-8-802	O7-8-801	76.087	75.887	1	7	3	199.785	0.1	83.687	16.261	3.98	80.77	80.54
L_O7-8-802 RDWY	L_O7-8-802	Natural	O7-8-802	O7-8-801	81.64	82.34	1	0	10	199.785	-0.35	0	0	0	0.00	0.00
L_O7-6-602	L_O7-6-602	Circular	O7-6-602	O7-6-601	95.212	91.2	1	0	2	200.616	2	6.918	16.014	8.13	95.84	91.83
L_O7-O-900	L_O7-O-900	Rectangular	O7-O-900	O7-7-700	76.36	76.098	1	6	4	262.225	0.1	44.546	17.183	1.86	80.60	80.53
L_O7-O-901	L_O7-O-901	Rectangular	O7-O-900	O7-3-300	76.36	76.101	1	6	4	258.803	0.1	44.86	17.233	1.87	80.60	80.53
L_O7-8-606	L_O7-8-606	Circular	O7-8-606	O7-8-802	76.163	76.087	1	0	2	75.784	0.1	4.78	16.178	1.51	80.80	80.77
L_O7-8-803 SS	L_O7-8-803	Rectangular	O7-8-803	O7-8-802	76.287	76.087	1	7	3	200.002	0.1	75.353	16.265	3.58	80.97	80.77
L_O7-8-803 RDWY	L_O7-8-803	Natural	O7-8-803	O7-8-802	80.94	81.64	1	0	10	200.002	-0.35	0	0	0	0.00	0.00
L_O7-6-603	L_O7-6-603	Circular	O7-6-603	O7-6-602	99.223	95.212	1	0	2	200.537	2	4.651	16.009	6.32	99.74	95.84
L_O7-5-5001	L_O7-5-5001	Circular	O7-5-500.1	O7-O-902	76.83	76.7	1	6	3	68	0.191	31.334	16.253	4.25	81.43	81.44
L_O7-8-607	L_O7-8-607	Circular	O7-8-607	O7-8-803	76.37	76.287	1	0	2	82.953	0.1	4.58	16.005	1.45	80.99	80.97
L_O7-8-804 SS	L_O7-8-804	Rectangular	O7-8-804	O7-8-803	76.457	76.287	1	6	3	170.384	0.1	53.512	16.174	2.97	81.08	80.97
L_O7-8-804 RDWY	L_O7-8-804	Natural	O7-8-804	O7-8-803	80.46	80.94	1	0	10	170.384	-0.282	2.827	16.514	0.41	81.08	81.05
L_O7-O-801	L_O7-O-801	Circular	O7-O-801	O7-8-803	76.336	76.287	1	0	2.5	49.534	0.1	14.555	16.252	2.95	81.05	80.97
L_O7-6-604	L_O7-6-604	Circular	O7-6-604	O7-6-603	103.234	99.223	1	0	2	200.537	2	2.496	16.006	4.84	103.61	99.74
L_O7-5-501.2 SS	L_O7-5-501.2	Circular	O7-5-501.2	O7-5-500.1	76.87	76.83	1	6	3	38.339	0.104	29.104	16.252	3.98	81.43	81.43
L_O7-5-501.2 RDWY	L_O7-5-501.2	Natural	O7-5-501.2	O7-5-500.1	82.75	82.88	1	0	10	38.339	-0.339	0	0	0	0.00	0.00
L_O7-8-608	L_O7-8-608	Circular	O7-8-608	O7-8-804	76.543	76.457	1	0	2	85.512	0.1	4.55	16.003	1.44	81.10	81.08
L_O7-8-805 SS	L_O7-8-805	Circular	O7-8-805	O7-8-804	76.687	76.457	1	0	2.5	230.067	0.1	13.672	16.008	2.78	81.23	81.08
L_O7-8-805 RDWY	L_O7-8-805	Natural	O7-8-805	O7-8-804	81.16	80.46	1	0	10	230.067	0.304	0.386	16.47	0.07	81.23	81.08
L_O7-O-802	L_O7-O-802	Rectangular	O7-O-802	O7-8-804	76.508	76.457	1	3	3	50.424	0.1	31.279	16.251	3.47	81.16	81.08
L_O7-5-501 SS	L_O7-5-501	Circular	O7-5-501	O7-5-501.2	77.03	76.87	1	4	2	161.661	0.099	-19.804	18.825	-6.56	81.08	81.43
L_O7-5-501 RDWY	L_O7-5-501	Natural	O7-5-501	O7-5-501.2	82.18	82.75	1	0	10	161.661	-0.353	0	0	0	0.00	0.00
L_O7-7-700.1	L_O7-7-700.1	Circular	O7-7-700.1	O7-5-501.2	77.293	77.248	1	0	2.5	45.153	0.1	21.533	16.017	5.52	81.45	81.43
L_O7-8-609	L_O7-8-609	Circular	O7-8-609	O7-8-805	76.772	76.687	1	0	2	85.146	0.1	6.03	16.008	1.91	81.26	81.23
L_O7-O-803	L_O7-O-803	Circular	O7-O-803	O7-8-805	76.717	76.687	1	0	2	29.854	0.1	2.61	15.881	0.83	81.23	81.23
L_O7-O-501	L_O7-O-501	Circular	O7-O-501	O7-5-501	77.06	77.03	1	0	2	26.6	0.113	2.495	16.008	3.05	81.08	81.08
L_O7-5-502.1 SS	L_O7-5-502.1	Circular	O7-5-502.1	O7-5-501	74.05	74.14	1	4	3	34.178	-0.263	-20.269	18.827	-3.81	81.07	81.08
L_O7-5-502.1 RDWY	L_O7-5-502.1	Natural	O7-5-502.1	O7-5-501	82.06	82.18	1	0	10	34.178	-0.351	0	0	0	0.00	0.00
L_O7-7-700.2	L_O7-7-700.2	Circular	O7-7-700.2	O7-7-700.1	77.436	77.293	1	0	2.5	142.877	0.1	14.887	16.017	3.56	81.47	81.45
L_O7-5-502 SS	L_O7-5-502	Circular	O7-5-502	O7-5-502.1	73.47	74.05	1	4	3	194.251	-0.3	-20.698	18.827	-3.74	80.97	81.07
L_O7-5-502 RDWY	L_O7-5-502	Natural	O7-5-502	O7-5-502.1	81.28	82.06	1	0	10	194.251	-0.402	0	0	0	0.00	0.00
L_O7-5-706	L_O7-5-706	Circular	O7-5-706	O7-5-502.1	74.1	74.05	1	0	2	52.916	0.094	5.821	16.25	1.83	81.09	81.07
L_O7-7-701	L_O7-7-701	Circular	O7-7-701	O7-7-700.2	91.959	88	1	0	2	197.939	2	13.387	16.014	9.73	92.86	88.90
L_O7-5-503 SS	L_O7-5-503	Circular	O7-5-503	O7-5-502	72.87	73.47	1	4	3	197.826	-0.303	-27.265	15.89	-4.6	80.74	80.97
L_O7-5-503 RDWY	L_O7-5-503	Natural	O7-5-503	O7-5-502	80.68	81.28	1	0	10	197.826	-0.303	0	0	0	0.00	0.00
L_O7-5-707	L_O7-5-707	Circular	O7-5-707	O7-5-502	73.53	73.47	1	0	2	69.478	0.086	5.315	16.251	1.66	80.99	80.97

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_O7-O-502	L_O7-O-502	Circular	O7-O-502	O7-5-502	73.53	73.47	1	0	2	33.06	0.181	3.295	16.005	1.04	80.97	80.97
L_O7-7-702	L_O7-7-702	Circular	O7-7-702	O7-7-701	95.942	91.959	1	0	2	199.154	2	8.732	16.01	7.44	96.66	92.86
L_O7-5-504 SS	L_O7-5-504	Circular	O7-5-504	O7-5-503	72.65	72.87	1	3	3	73.341	-0.3	-36.804	15.893	-6.04	80.56	80.74
L_O7-5-504 RDWY	L_O7-5-504	Natural	O7-5-504	O7-5-503	80.89	80.68	1	0	10	73.341	0.286	0	0	0	0.00	0.00
L_O7-5-708	L_O7-5-708	Circular	O7-5-708	O7-5-503	72.96	72.87	1	0	2	89.518	0.101	4.988	16.254	1.56	80.76	80.74
L_O7-7-703	L_O7-7-703	Circular	O7-7-703	O7-7-702	99.928	95.942	1	0	2	199.287	2	5.67	16.008	6.6	100.50	96.66
Link1543	Link1543	Circular	O7-5-505	C4-1-115	72.2	70	1	0	4	408	0.539	51.061	15.896	7.35	80.22	79.90
L_O7-5-505 SS	L_O7-5-505	Circular	O7-5-505	O7-5-504	72.2	72.65	1	0	3	150.793	-0.298	-39.732	15.893	-7.12	80.22	80.56
L_O7-5-505 RDWY	L_O7-5-505	Natural	O7-5-505	O7-5-504	81.12	80.89	1	0	10	150.793	0.153	0	0	0	0.00	0.00
L_O7-7-704	L_O7-7-704	Circular	O7-7-704	O7-7-703	103.914	99.928	1	0	2	199.34	2	2.836	16.006	4.89	104.32	100.50
L_O7-5-709	L_O7-5-709	Circular	O7-5-709	O7-5-505	72.31	72.2	1	0	2	112.069	0.098	6.241	16.006	1.96	80.27	80.22
L_O7-4-4000	L_O7-4-4000	Rectangular	O7-4-400	O7-O-000	75.8	75.76	1	6	4	39.627	0.101	105.279	16.456	4.38	80.43	80.38
L_O7-2-200	L_O7-2-200	Rectangular	O7-2-200	O7-4-400	75.981	75.8	1	6	4	181.398	0.1	52.784	16.699	2.2	80.49	80.43
L_O7-4-401 SS	L_O7-4-401	Rectangular	O7-4-401	O7-4-400	76.038	75.8	1	5	3	238.84	0.1	60.589	16.253	4.03	80.69	80.43
L_O7-4-401 RDWY	L_O7-4-401	Natural	O7-4-401	O7-4-400	82.55	81.33	1	0	10	238.84	0.511	0	0	0	0.00	0.00
L_O7-2-201	L_O7-2-201	Circular	O7-2-201	O7-2-200	77.17	77	1	0	2.5	169.892	0.1	16.182	16.069	3.83	80.60	80.49
L_O7-3-300	L_O7-3-300	Rectangular	O7-3-300	O7-2-200	76.101	75.981	1	6	4	120.082	0.1	44.857	17.231	1.87	80.53	80.49
L_O7-4-205	L_O7-4-205	Circular	O7-4-205	O7-4-401	76.095	76.038	1	0	2	56.855	0.1	4.994	16.189	1.58	80.71	80.69
L_O7-4-402 SS	L_O7-4-402	Rectangular	O7-4-402	O7-4-401	76.1	76.038	1	5	3	61.465	0.1	55.609	16.254	3.7	80.76	80.69
L_O7-4-402 RDWY	L_O7-4-402	Natural	O7-4-402	O7-4-401	82.34	82.55	1	0	10	61.465	-0.342	0	0	0	0.00	0.00
L_O7-2-202	L_O7-2-202	Circular	O7-2-202	O7-2-201	77.366	77.17	1	0	2.5	195.939	0.1	13.449	16.069	2.9	80.71	80.60
L_O7-4-403 SS	L_O7-4-403	Rectangular	O7-4-403	O7-4-402	76.2	76.1	1	5	3	99.893	0.1	51.449	16.254	3.42	80.86	80.76
L_O7-4-403 RDWY	L_O7-4-403	Natural	O7-4-403	O7-4-402	82.11	82.34	1	0	10	99.893	-0.23	0	0	0	0.00	0.00
L_O7-O-401	L_O7-O-401	Circular	O7-O-401	O7-4-402	76.129	76.1	1	0	2	28.568	0.1	1.6	15.845	0.51	80.76	80.76
L_O7-2-203	L_O7-2-203	Circular	O7-2-203	O7-2-202	77.47	77.366	1	0	2	104.007	0.1	8.027	16.246	2.55	80.80	80.71
L_O7-1-100	L_O7-1-100	Circular	O7-1-103	O7-O-902	77.69	77.63	1	4	3	60	0.1	30.314	16.249	6.17	81.47	81.44
L_O7-4-404 SS	L_O7-4-404	Rectangular	O7-4-404	O7-4-403	76.248	76.2	1	4	3	47.949	0.1	41.468	16.253	3.45	80.91	80.86
L_O7-4-404 RDWY	L_O7-4-404	Natural	O7-4-404	O7-4-403	82.17	82.11	1	0	10	47.949	0.125	0	0	0	0.00	0.00
L_O7-O-402	L_O7-O-402	Circular	O7-O-402	O7-4-403	76.232	76.2	1	0	2	31.712	0.1	1.859	15.846	1.11	80.86	80.86
L_O7-2-204	L_O7-2-204	Circular	O7-2-204	O7-2-203	77.668	77.47	1	0	2	197.851	0.1	4.092	16.246	1.3	80.85	80.80
L_O7-1-305.1	L_O7-1-305.1	Circular	O7-1-305.1	O7-1-103	77.728	77.69	1	0	3	38.371	0.1	20.284	16.016	3.83	81.47	81.47
L_O7-4-405 SS	L_O7-4-405	Circular	O7-4-405	O7-4-404	76.647	76.248	1	0	3	399.559	0.1	28.177	16.254	3.97	81.49	80.91
L_O7-4-405 RDWY	L_O7-4-405	Natural	O7-4-405	O7-4-404	82.15	82.17	1	0	10	399.559	-0.005	0	0	0	0.00	0.00
L_O7-O-403	L_O7-O-403	Circular	O7-O-403	O7-4-404	76.277	76.248	1	0	2	29.559	0.1	4.699	16.257	2.48	80.93	80.91
L_O7-1-305	L_O7-1-305	Circular	O7-1-305	O7-1-305.1	77.805	77.728	1	0	2	76.77	0.1	4.863	16.252	1.54	81.48	81.47
L_O7-3-301.1	L_O7-3-301.1	Circular	O7-3-301.1	O7-1-305.1	77.868	77.728	1	0	2.5	139.331	0.1	15.909	16.019	3.54	81.50	81.47
L_O7-4-406 SS	L_O7-4-406	Circular	O7-4-406	O7-4-405	76.757	76.647	1	0	3	109.882	0.1	19.482	16.254	2.75	81.57	81.49
L_O7-4-406 RDWY	L_O7-4-406	Natural	O7-4-406	O7-4-405	81.88	82.12	1	0	10	109.882	-0.218	0	0	0	0.00	0.00
L_O7-3-301	L_O7-3-301	Circular	O7-3-301	O7-3-301.1	77.941	77.868	1	0	2	72.936	0.1	3.399	16.003	1.05	81.50	81.50
L_O7-3-302	L_O7-3-302	Circular	O7-3-302	O7-3-301.1	77.991	77.868	1	0	2.5	123.39	0.1	12.552	16.021	2.78	81.51	81.50
L_O7-O-404	L_O7-O-404	Circular	O7-O-404	O7-4-406	76.799	76.757	1	0	2	41.76	0.1	3.566	16.008	2.16	81.58	81.57
L_O7-3-303	L_O7-3-303	Circular	O7-3-303	O7-3-302	78.095	77.991	1	0	2	104.095	0.1	7.218	16.024	2.22	81.53	81.51
L_O7-3-304	L_O7-3-304	Circular	O7-3-304	O7-3-303	78.297	78.095	1	0	2	202.087	0.1	3.651	16.02	1.14	81.53	81.53
C4-D-108 SS	L_C4-D-108	Rectangular	C4-D-108	OS-12	60.53	58.91	1	10	8	633.4	0.256	475.018	16.401	5.91	75.89	75.14
C4-D-108 RD	L_C4-D-108	Natural	C4-D-108	OS-12	74.42	73.9	1	0	0	633.4	0.082	181.363	17.041	2.69	75.89	75.14
L_C4-D-107.1	L_C4-D-107.1	Trapezoidal	C4-O-001	C5-1-115	74.7	74.24	1	22	5	150	0.907	164.98	17.036	2.86	76.08	76.07
C4-D-107 SS	L_C4-D-107	Rectangular	C4-O-001	C4-D-108	60.711	60.53	1	10	8	181.21	0.1	461.651	15.979	5.75	76.08	75.89
C4-D-107 RD	L_C4-D-107	Trapezoidal	C4-O-001	C4-D-108	74.65	74.42	1	30	3	181.1	0.127	198.941	17.009	3.84	76.08	75.89
C4-D-106 SS	L_C4-D-106	Rectangular	C4-D-106	C4-O-001	60.86	60.71	1	10	8	157.47	0.095	268.138	19.326	3.34	76.10	76.08
C4-D-106 RD	L_C4-D-106	Trapezoidal	C4-D-106	C4-O-001	75.2	74.65	1	100	3	157.467	0.349	280.192	17.023	2.2	76.10	76.08
L_C4-D-105 SS	L_C4-D-105	Circular	C4-D-105	C4-D-106	65.11	65	1	10	2.5	111.86	0.098	14.531	16.005	2.9	76.12	76.10
L_C4-D-105 RD	L_C4-D-105	Natural	C4-D-105	C4-D-106	75.45	75.2	1	0	0	111.861	0.223	12.928	16.919	0.81	76.12	76.10
L_C4-D-104 SS	L_C4-D-104	Circular	C4-D-104	C4-D-105	65.8	65.61	1	10	2	200.36	0.095	9.713	16.006	3.02	76.46	76.12
L_C4-D-104 RD	L_C4-D-104	Natural	C4-D-104	C4-D-105	76.15	75.45	1	0	0	200.355	0.349	6.087	16.919	0.73	76.46	76.12
L_C4-D-103	L_C4-D-103	Rectangular	C4-D-103	C4-DET-2	62	61.8	1	10	8	203.17	0.098	468.9	16.701	5.83	77.53	77.30
RD-103	RD-103	Natural	C4-D-103	C4-D-104	77.09	76.15	1	0	5	200	0	11.166	16.933	2.36	77.53	76.56

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-5-708	L_C4-5-708	Circular	C4-5-708	C4-D-104	65.95	65.8	1	0	2	77.53	0.193	5.146	16.006	1.6	76.46	76.46
L_C4-D-102 SS	L_C4-D-102	Rectangular	C4-D-102	C4-D-103	62.2	62	1	10	8	200	0.1	431.128	16.946	5.36	77.73	77.53
L_C4-D-102 RD	L_C4-D-102	Natural	C4-D-102	C4-D-103	77.79	77.09	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-5-709	L_C4-5-709	Circular	C4-5-709	C4-D-103	62.05	62	1	0	2	54.94	0.091	5.327	16.013	1.63	77.54	77.53
L_C4-1-103 SS	L_C4-1-103	Rectangular	C4-D-101	C4-D-102	62.32	62.2	1	10	8	125	0.096	420.317	17.461	5.23	77.85	77.73
L_C4-1-103 RD	L_C4-1-103	Natural	C4-D-101	C4-D-102	78.22	77.79	1	0	0	125	0.344	0	0	0	0.00	0.00
L_C4-5-710	L_C4-5-710	Circular	C4-5-710	C4-D-102	62.24	62.2	1	0	2	44.22	0.068	5.592	16.252	1.71	77.74	77.73
L_C4-O-502	L_C4-O-502	Circular	C4-O-502	C4-D-102	62.22	62.2	1	0	3	26	0.077	29.219	16.001	4.04	77.74	77.73
L_C4-O-501	L_C4-O-501	Circular	C4-O-501	C4-D-101	62.34	62.32	1	0	4	26	0.077	35.773	16.499	2.8	77.86	77.85
L_C4-5-500 SS	L_C4-5-500	Rectangular	C4-5-500	C4-D-101	62.42	62.33	1	10	8	94	0.096	396.649	17.468	4.94	77.92	77.85
L_C4-5-500 RD	L_C4-5-500	Natural	C4-5-500	C4-D-101	78.55	78.22	1	0	0	94	0.351	0	0	0	0.00	0.00
L_C4-1-104 SS	L_C4-1-104	Rectangular	C4-1-101	C4-1-101.1	65.4	65.34	1	5	3	29	0.194	38.727	16.252	2.55	77.95	77.94
L_C4-1-104 RD	L_C4-1-104	Natural	C4-1-101	C4-1-101.1	78.79	78.76	1	0	5	29	0.103	0	0	0	0.00	0.00
L_C4-1-3055	L_C4-1-3055	Rectangular	C4-7-700	C4-5-500	62.58	62.42	1	10	8	170.01	0.094	380.288	15.863	4.74	77.98	77.92
L_C4-1-105 SS	L_C4-1-105	Rectangular	C4-1-102	C4-1-101	65.99	65.4	1	5	3	300	0.197	35.889	16.251	2.36	78.02	77.95
L_C4-1-105 RD	L_C4-1-105	Natural	C4-1-102	C4-1-101	77.74	78.79	1	0	0	300	-0.35	0	0	0	0.00	0.00
L_C4-O-103	L_C4-O-103	Circular	C4-O-101	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.119	15.219	-0.32	78.74	78.74
L_C4-1-305	L_C4-1-305	Circular	C4-7-701	C4-7-700	77.18	75	1	0	2	92	2.37	17.555	16.016	11.1	78.19	77.98
L_C4-1-306	L_C4-1-306	Circular	C4-3-301	C4-7-700	75.1	75	1	0	2	108	0.093	12.961	16.081	5.07	78.05	77.98
L_C4-4-2025	L_C4-4-2025	Rectangular	C4-6-600	C4-7-700	62.67	62.58	1	10	8	86	0.105	353.547	15.863	4.41	78.01	77.98
L_C4-1-106 SS	L_C4-1-106	Circular	C4-1-103	C4-1-102	66.74	66.49	1	6	2.5	131	0.191	23.819	16.249	4.75	78.07	78.02
L_C4-1-106 RD	L_C4-1-106	Natural	C4-1-103	C4-1-102	77.4	77.74	1	0	0	131	-0.26	7.07	16.822	0.85	78.07	78.02
L_C4-O-104	L_C4-O-104	Circular	C4-O-102	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.119	15.219	-0.32	78.74	78.74
L_C4-1-304	L_C4-1-304	Circular	C4-7-702	C4-7-701	80.17	77.18	1	0	2	125	2.392	15.291	16.016	10.24	81.10	78.19
L_C4-1-307	L_C4-1-307	Circular	C4-3-302	C4-3-301	75.3	75.1	1	0	2	200	0.1	10.76	16.087	3.57	78.16	78.05
L_C4-4-202	L_C4-4-202	Circular	C4-6-601	C4-6-600	76.2	75	1	0	2	52.92	2.268	17.508	16.018	10.91	78.05	78.01
L_C4-4-203	L_C4-4-203	Circular	C4-2-201	C4-6-600	75.13	75	1	0	2	138	0.094	11.67	16.055	4.73	78.08	78.01
L_C4-8-800	L_C4-8-800	Rectangular	C4-8-800	C4-6-600	62.83	62.67	1	10	8	170.01	0.094	328.682	15.818	4.1	78.06	78.01
L_C4-1-107 SS	L_C4-1-107	Circular	C4-1-104	C4-1-103	67.57	67.24	1	5	2	169	0.195	11.624	16.251	3.61	78.11	78.07
L_C4-1-107 RD	L_C4-1-107	Natural	C4-1-104	C4-1-103	77.87	77.4	1	0	0	169	0.278	3.545	16.838	0.62	78.11	78.07
L_C4-O-105	L_C4-O-105	Circular	C4-O-103	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.119	15.219	-0.32	78.74	78.74
L_C4-1-302	L_C4-1-302	Circular	C4-7-703	C4-7-702	81.93	80.17	1	0	2	75	2.5	13.937	16.014	10.14	82.81	81.10
L_C4-1-308	L_C4-1-308	Circular	C4-3-303	C4-3-302	75.49	75.3	1	0	2	200	0.095	8.561	16.093	2.71	78.23	78.16
L_C4-4-201	L_C4-4-201	Circular	C4-6-602	C4-6-601	78.8	76.2	1	0	2	109.08	2.384	15.342	16.016	10.19	79.73	78.05
L_C4-4-204	L_C4-4-204	Circular	C4-2-202	C4-2-201	75.32	75.13	1	0	2	191	0.099	9.565	16.062	3.26	78.16	78.08
L_C4-4-401 SS	L_C4-4-401	Rectangular	C4-4-401	C4-8-800	65.36	65.22	1	7	5	140	0.1	181.63	15.858	5.17	78.11	78.06
L_C4-4-401 RD	L_C4-4-401	Natural	C4-4-401	C4-8-800	76.91	77.4	1	0	0	140	-0.35	30.569	16.881	1.1	78.11	78.06
L_C4-8-801 SS	L_C4-8-801	Circular	C4-8-801	C4-8-800	66.38	66.22	1	0	3.5	160	0.1	36.357	15.913	3.74	78.01	78.06
L_C4-8-801 RD	L_C4-8-801	Natural	C4-8-801	C4-8-800	77.96	77.4	1	0	0	160	0.35	-2.663	16.926	-0.33	78.04	78.06
L_C4-1-108	L_C4-1-108	Rectangular	C4-1-105	C4-DET-1	66.07	65.83	1	8	5	242.38	0.099	215.711	16.009	5.38	78.83	78.74
L_C4-O-106	L_C4-O-106	Circular	C4-O-104	C4-DET-1	63.05	63	1	0	4	50	0.1	-0.119	15.219	-0.32	78.74	78.74
L_C4-5-701	L_C4-5-701	Circular	C4-7-704	C4-7-703	84.32	81.93	1	0	2	125	1.912	11.675	16.014	9	85.17	82.81
L_C4-1-309	L_C4-1-309	Circular	C4-3-304	C4-3-303	75.62	75.49	1	0	2	131	0.099	7.14	16.098	2.24	78.26	78.23
L_C4-8-602	L_C4-8-602	Circular	C4-6-603	C4-6-602	82.55	78.8	1	0	2	155	2.419	14.098	16.015	10.25	83.43	79.73
L_C4-4-205	L_C4-4-205	Circular	C4-2-203	C4-2-202	75.46	75.32	1	0	2	150	0.093	7.899	16.066	2.61	78.20	78.16
L_C4-4-402 SS	L_C4-4-402	Rectangular	C4-4-402	C4-4-401	65.54	65.36	1	7	5	191	0.094	174.514	15.857	4.96	78.13	78.11
L_C4-4-402 RD	L_C4-4-402	Natural	C4-4-402	C4-4-401	76.24	76.91	1	0	0	191	-0.351	67.046	16.536	1.47	78.13	78.11
L_C4-O-401	L_C4-O-401	Circular	C4-O-401	C4-4-401	65.38	65.36	1	0	2	28	0.071	1.927	15.616	0.61	78.11	78.11
L_C4-8-601	L_C4-8-601	Circular	C4-8-611	C4-8-801	66.44	66.38	1	0	2	68.87	0.087	5.023	16.013	1.56	78.02	78.01
L_C4-8-802	L_C4-8-802	Circular	C4-O-801	C4-8-801	66.4	66.38	1	0	2	28	0.1	1.333	15.616	1.05	78.01	78.01
L_C4-8-803 SS	L_C4-8-803	Circular	C4-8-802	C4-8-801	66.58	66.38	1	0	3.5	205	0.098	29.632	15.911	3.05	77.90	78.01
L_C4-8-803 RD	L_C4-8-803	Natural	C4-8-802	C4-8-801	77.74	77.96	1	0	0	205	-0.107	-0.184	16.912	-0.15	77.90	78.01
L-C4-1-105.5 SS	L-C4-1-105.5	Circular	C4-1-106	C4-1-105.5	66.3	66.19	1	0	5	117	0.094	183.925	16.008	9.33	78.99	78.86
L-C4-1-105.5 RDWY	L-C4-1-105.5	Natural	C4-1-106	C4-1-105.5	78.44	78.84	1	0	11	117	0	3.049	17.278	0.61	78.99	78.94
L_C4-O-107	L_C4-O-107	Circular	C4-O-105	C4-1-105	66.09	66.07	1	0	2	26	0.077	30.905	16.561	9.57	79.06	78.83
L_C4-5-703	L_C4-5-703	Circular	C4-7-705	C4-7-704	88.22	84.32	1	0	2	200	1.95	9.413	16.012	8.12	88.97	85.17

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-1-310	L_C4-1-310	Circular	C4-3-305	C4-3-304	75.78	75.62	1	0	2	169	0.095	5.275	16.1	1.67	78.29	78.26
L_C4-8-603	L_C4-8-603	Circular	C4-6-604	C4-6-603	83.45	82.55	1	0	2	50	1.8	12.395	16.014	9.21	84.34	83.43
L_C4-4-206	L_C4-4-206	Circular	C4-2-204	C4-2-203	75.61	75.46	1	0	2	150	0.1	6.229	16.071	2.08	78.23	78.20
L_C4-4-403 SS	L_C4-4-403	Rectangular	C4-4-403	C4-4-402	65.69	65.54	1	6	5	150	0.1	166.071	15.856	5.51	78.14	78.13
L_C4-4-403 RD	L_C4-4-403	Natural	C4-4-403	C4-4-402	75.03	76.24	1	0	0	150	-0.807	122.132	16.342	1.41	78.14	78.13
L_C4-O-402	L_C4-O-402	Circular	C4-O-402	C4-4-402	65.56	65.54	1	0	2	28	0.071	3.756	15.685	1.18	78.13	78.13
L_C4-8-604	L_C4-8-604	Circular	C4-8-610	C4-8-802	66.65	66.58	1	0	2	79.56	0.088	3.404	15.999	1.06	77.90	77.90
L_C4-8-804 SS	L_C4-8-804	Circular	C4-8-803	C4-8-802	66.72	66.58	1	0	3	150	0.1	-26.665	16.957	-3.71	77.67	77.90
L_C4-8-804 RD	L_C4-8-804	Natural	C4-8-803	C4-8-802	77.21	77.74	1	0	0	150	-0.353	-2.101	16.904	-0.59	77.67	77.90
L_C4-O-801	L_C4-O-801	Circular	C4-O-802	C4-8-802	66.6	66.58	1	0	2	28	0.071	2.351	16.255	0.73	77.90	77.90
L_C4-1-110 SS	L_C4-1-110	Circular	C4-1-107	C4-1-106	66.49	66.3	1	0	5	200	0.095	156.904	16.007	7.96	79.05	78.99
L_C4-1-110 RD	L_C4-1-110	Natural	C4-1-107	C4-1-106	77.74	78.44	1	0	0	200	-0.35	30.601	17.214	0.96	79.05	79.00
L_C4-1-313	L_C4-1-313	Circular	C4-1-308	C4-1-106	69.47	69.3	1	0	2	170	0.1	9.701	16.052	3.6	79.01	78.99
L_C4-O-108	L_C4-O-108	Circular	C4-O-106	C4-1-106	66.32	66.3	1	0	3	26	0.077	11.1	16.251	1.57	78.99	78.99
L_C4-5-705	L_C4-5-705	Circular	C4-7-706	C4-7-705	92.12	88.22	1	0	2	199.58	1.954	7.152	16.01	7.4	92.77	88.97
L_C4-1-311	L_C4-1-311	Circular	C4-3-306	C4-3-305	75.95	75.78	1	0	2	167	0.102	3.518	16.106	1.18	78.30	78.29
L_C4-8-606	L_C4-8-606	Circular	C4-6-605	C4-6-604	86.35	83.45	1	0	2	150	1.933	10.131	16.013	8.2	87.13	84.34
L_C4-4-207	L_C4-4-207	Circular	C4-2-205	C4-2-204	75.77	75.61	1	0	2	163	0.098	4.448	16.075	1.54	78.24	78.23
L_C4-4-404 SS	L_C4-4-404	Rectangular	C4-4-404	C4-4-403	65.83	65.69	1	6	5	150	0.093	157.296	15.889	5.22	78.13	78.14
L_C4-4-404 RD	L_C4-4-404	Natural	C4-4-404	C4-4-403	76.24	75.03	1	0	0	150	0.807	202.289	16.373	2.22	78.13	78.14
L_C4-O-403	L_C4-O-403	Circular	C4-O-403	C4-4-403	65.72	65.69	1	0	2	28	0.107	7.503	16.004	2.32	78.14	78.14
L_C4-8-605	L_C4-8-605	Circular	C4-8-622	C4-8-803	66.8	66.72	1	0	2	83.26	0.096	3.321	16.018	1.03	77.67	77.67
L_C4-8-805 SS	L_C4-8-805	Circular	C4-8-804	C4-8-803	66.87	66.72	1	0	2.5	150	0.1	-21.751	16.919	-4.34	77.27	77.67
L_C4-8-805 RD	L_C4-8-805	Natural	C4-8-804	C4-8-803	76.69	77.21	1	0	0	150	-0.347	-11.801	16.889	-1.56	77.27	77.67
L_C4-O-802	L_C4-O-802	Circular	C4-O-803	C4-8-803	66.74	66.72	1	0	2	28	0.071	2.326	16.231	0.87	77.67	77.67
L_C4-1-111 SS	L_C4-1-111	Circular	C4-1-108	C4-1-107	66.62	66.49	1	0	4.5	130	0.1	138.006	16.006	8.62	79.07	79.05
L_C4-1-111 RD	L_C4-1-111	Natural	C4-1-108	C4-1-107	77.4	77.74	1	0	0	130	-0.262	57.15	16.902	1.6	79.07	79.05
L_C4-O-109	L_C4-O-109	Circular	C4-O-107	C4-1-107	66.61	66.49	1	0	3	26	0.462	11.259	16.251	1.88	79.06	79.05
L_C4-1-314	L_C4-1-314	Circular	C4-1-309	C4-1-308	75.2	75	1	0	2	200	0.1	7.507	16.061	3.83	79.03	79.01
L_C4-5-704	L_C4-5-704	Circular	C4-7-707	C4-7-706	92.21	92.12	1	0	2	94.57	0.095	4.892	16.007	3.92	93.20	92.77
L_C4-1-312	L_C4-1-312	Circular	C4-3-307	C4-3-306	76.11	75.95	1	0	2	167	0.096	1.762	16.105	0.87	78.31	78.30
L_C4-8-608	L_C4-8-608	Circular	C4-6-606	C4-6-605	89.25	86.35	1	0	2	150	1.933	8.428	16.011	7.97	89.96	87.13
L_C4-4-208	L_C4-4-208	Circular	C4-2-206	C4-2-205	75.96	75.77	1	0	2	200	0.095	2.225	16.073	0.93	78.25	78.24
L_C4-4-405 SS	L_C4-4-405	Rectangular	C4-4-405	C4-4-404	66.11	65.83	1	6	5	281	0.1	143.556	16.129	4.75	78.16	78.13
L_C4-4-405 RD	L_C4-4-405	Natural	C4-4-405	C4-4-404	77.22	76.24	1	0	0	281	0.349	65.462	16.782	1.28	78.16	78.13
L_C4-O-404	L_C4-O-404	Circular	C4-O-404	C4-4-404	68.85	68.83	1	0	2	28	0.071	8.858	16.001	3.62	78.13	78.13
L_C4-8-607	L_C4-8-607	Circular	C4-8-609	C4-8-804	66.94	66.87	1	0	2	84.29	0.083	3.324	16.02	1.03	77.27	77.27
L_C4-8-806.1	L_C4-8-806.1	Trapezoidal	C4-8-805	C4-8-806	76.16	75.61	1	60	5	170	0.324	44.014	16.856	2.47	76.48	75.94
L_C4-8-806 SS	L_C4-8-806	Circular	C4-8-805	C4-8-804	67.01	66.87	1	0	2	150	0.093	-16.929	17.144	-5.26	76.48	77.27
L_C4-8-806 RD	L_C4-8-806	Natural	C4-8-805	C4-8-804	76.16	76.69	1	0	0	150	-0.353	-21.978	16.873	-2.5	76.67	77.27
L_C4-O-803	L_C4-O-803	Circular	C4-O-804	C4-8-804	66.89	66.87	1	0	2	28	0.071	2.509	15.922	0.92	77.27	77.27
L_C4-1-112 SS	L_C4-1-112	Circular	C4-1-109	C4-1-108	66.78	66.62	1	0	4.5	170	0.094	119.093	16.005	7.44	79.08	79.07
L_C4-1-112 RD	L_C4-1-112	Natural	C4-1-109	C4-1-108	77.88	77.4	1	0	0	170	0.282	51.818	16.839	1.61	79.08	79.07
L_C4-O-110	L_C4-O-110	Circular	C4-O-108	C4-1-108	66.64	66.62	1	0	2	26	0.077	7.196	16.251	2.23	79.08	79.07
L_C4-1-315	L_C4-1-315	Circular	C4-1-310	C4-1-309	75.33	75.2	1	0	2	130	0.1	6.048	16.051	2.6	79.03	79.03
L_C4-8-610	L_C4-8-610	Circular	C4-6-607	C4-6-606	92.16	89.25	1	0	2	150.41	1.935	6.725	16.009	7.38	92.79	89.96
406-SS	L_C4-4-406	Rectangular	C4-4-406	C4-4-405	66.38	66.11	1	5	5	282	0.094	137.708	16.357	5.47	78.58	78.16
406-RD	L_C4-4-406	Natural	C4-4-406	C4-4-405	78.21	77.21	1	0	5	282	0	6.734	16.522	0.69	78.58	78.16
L_C4-O-405	L_C4-O-405	Circular	C4-O-405	C4-4-405	66.13	66.11	1	0	2	28	0.071	7.378	16.002	2.28	78.16	78.16
L_C4-O-804	L_C4-O-804	Circular	C4-O-805	C4-8-805	67.03	67.01	1	0	2	28	0.071	2.899	19.57	1.13	76.48	76.48
L_C4-1-113 SS	L_C4-1-113	Circular	C4-1-110	C4-1-109	66.95	66.78	1	0	4.5	175	0.097	111.825	16.003	6.98	79.12	79.08
L_C4-1-113 RD	L_C4-1-113	Natural	C4-1-110	C4-1-109	78.49	77.88	1	0	0	175	0.349	28.845	17.096	1.12	79.12	79.08
L_C4-1-316	L_C4-1-316	Circular	C4-1-312	C4-1-109	66.85	66.78	1	0	2	70.64	0.099	4.292	16.006	1.33	79.08	79.08
L_C4-O-111	L_C4-O-111	Circular	C4-O-109	C4-1-109	66.8	66.78	1	0	2	26	0.077	0.275	15.908	0.46	79.08	79.08
L_C4-1-317	L_C4-1-317	Circular	C4-1-311	C4-1-310	75.49	75.32	1	0	2	170	0.1	4.146	16.046	1.84	79.04	79.03
L_C4-8-609	L_C4-8-609	Circular	C4-8-608	C4-6-607	92.24	92.16	1	0	2	85.72	0.093	4.462	16.007	3.8	93.18	92.79

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-4-209	L_C4-4-209	Circular	C4-4-207	C4-4-406	69.59	69.42	1	5	2	170	0.1	10.531	16.094	3.43	78.81	78.58
L_C4-4-407 SS	L_C4-4-407	Rectangular	C4-4-407	C4-4-406	66.81	66.6	1	5	5	212	0.099	111.287	15.844	4.43	78.80	78.58
L_C4-4-407 RD	L_C4-4-407	Natural	C4-4-407	C4-4-406	77.26	78.21	1	0	0	212	-0.448	31.041	16.479	0.78	78.80	78.77
L_C4-O-406	L_C4-O-406	Circular	C4-O-406	C4-4-406	66.62	66.6	1	0	2	28	0.071	4.534	16.001	1.5	78.59	78.58
L_C4-1-114 SS	L_C4-1-114	Circular	C4-1-111	C4-1-110	67.15	66.95	1	0	4.5	200	0.1	102.846	15.901	6.43	79.31	79.12
L_C4-1-114 RD	L_C4-1-114	Natural	C4-1-111	C4-1-110	79.19	78.49	1	0	0	200	0.35	1.272	16.945	0.23	79.31	79.12
L_C4-1-318	L_C4-1-318	Circular	C4-1-314	C4-1-110	67.03	66.95	1	0	2	79.67	0.1	4.514	16.003	1.4	79.12	79.12
L_C4-1-319	L_C4-1-319	Circular	C4-1-313	C4-1-311	75.66	75.49	1	0	2	175	0.097	2.244	16.035	1.11	79.04	79.04
L_C4-4-210	L_C4-4-210	Circular	C4-4-208	C4-4-207	75.28	74.5	1	0	2	200	0.39	8.346	16.147	4.56	79.02	78.81
L_C4-4-408 SS	L_C4-4-408	Circular	C4-4-408	C4-4-407	66.93	66.81	1	0	5	125	0.096	104.536	15.844	5.29	78.83	78.80
L_C4-4-408 RD	L_C4-4-408	Natural	C4-4-408	C4-4-407	77.64	77.26	1	0	0	125	0.304	78.374	16.408	1.61	78.83	78.80
L_C4-O-407	L_C4-O-407	Circular	C4-O-407	C4-4-407	66.83	66.81	1	0	2	28	0.071	4.028	15.639	1.53	78.81	78.80
L_C4-1-115 SS	L_C4-1-115	Circular	C4-1-112	C4-1-111	67.34	67.15	1	0	4.5	200	0.095	81.429	15.901	5.09	79.50	79.31
L_C4-1-115 RD	L_C4-1-115	Natural	C4-1-112	C4-1-111	79.89	79.19	1	0	0	200	0.35	0	0	0	0.00	0.00
L_C4-1-320	L_C4-1-320	Circular	C4-1-316	C4-1-111	67.38	67.15	1	0	2	84.19	0.273	18.687	16.015	5.79	79.55	79.31
L_C4-O-112	L_C4-O-112	Circular	C4-O-111	C4-1-111	67.17	67.15	1	0	2	26	0.077	0.736	16.264	0.75	79.31	79.31
L_C4-4-211	L_C4-4-211	Circular	C4-4-209	C4-4-208	76.06	75.28	1	0	2	200	0.39	6.18	16.192	3.81	79.14	79.02
L_C4-4-409 SS	L_C4-4-409	Circular	C4-4-409	C4-4-408	67.07	66.93	1	0	5	150	0.093	100.629	15.844	5.09	78.87	78.83
L_C4-4-409 RD	L_C4-4-409	Natural	C4-4-409	C4-4-408	77.23	77.64	1	0	0	150	-0.273	71.766	16.393	1.39	78.87	78.83
L_C4-1-116 SS	L_C4-1-116	Circular	C4-1-113	C4-1-112	67.54	67.34	1	0	4.5	199.83	0.1	73.098	15.9	4.57	79.65	79.50
L_C4-1-116 RD	L_C4-1-116	Natural	C4-1-113	C4-1-112	80.59	79.89	1	0	0	199.828	0.35	0	0	0	0.00	0.00
L_C4-1-322	L_C4-1-322	Circular	C4-1-318	C4-1-112	67.42	67.34	1	0	2	85.54	0.094	4.416	16.011	1.37	79.51	79.50
L_C4-O-113	L_C4-O-113	Circular	C4-O-112	C4-1-112	67.36	67.34	1	0	2	26	0.077	0.698	16.701	0.82	79.51	79.50
L_C4-1-321	L_C4-1-321	Circular	C4-1-315	C4-1-316	85.24	85	1	0	2	85.46	0.281	14.289	16.017	5.69	86.85	86.36
L_C4-4-212	L_C4-4-212	Circular	C4-4-210	C4-4-209	76.84	76.06	1	0	2	200	0.39	4.04	16.193	3.31	79.19	79.14
L_C4-4-410 SS	L_C4-4-410	Circular	C4-4-410	C4-4-409	67.22	67.07	1	0	4.5	150	0.1	81.542	15.857	5.08	78.89	78.87
L_C4-4-410 RD	L_C4-4-410	Natural	C4-4-410	C4-4-409	77.64	77.23	1	0	0	150	0.273	64.633	16.359	1.48	78.89	78.87
L_C4-O-408	L_C4-O-408	Circular	C4-O-409	C4-4-409	67.1	67.07	1	0	3	28	0.107	18.198	16.251	2.53	78.89	78.87
L_C4-1-117 SS	L_C4-1-117	Circular	C4-1-114	C4-1-113	67.73	67.54	1	0	4.5	200.53	0.095	65.827	15.899	4.11	79.79	79.65
L_C4-1-117 RD	L_C4-1-117	Natural	C4-1-114	C4-1-113	81.29	80.59	1	0	0	200.528	0.349	0	0	0	0.00	0.00
L_C4-1-324	L_C4-1-324	Circular	C4-1-320	C4-1-113	67.61	67.54	1	0	2	77	0.091	4.415	16.012	1.37	79.66	79.65
L_C4-1-323	L_C4-1-323	Circular	C4-1-317	C4-1-315	89.14	85.24	1	0	2	200.02	1.95	12.021	16.012	6.25	90.00	86.85
L_C4-4-214	L_C4-4-214	Circular	C4-4-211	C4-4-210	77.62	76.84	1	0	2	200	0.39	2.09	15.966	2.43	79.20	79.19
L_C4-4-411 SS	L_C4-4-411	Circular	C4-4-411	C4-4-410	67.38	67.22	1	0	4.5	163	0.098	73.556	15.906	4.58	78.93	78.89
L_C4-4-411 RD	L_C4-4-411	Natural	C4-4-411	C4-4-410	78.21	77.64	1	0	0	163	0.35	36.546	16.37	1.3	78.93	78.89
L_C4-O-409	L_C4-O-409	Circular	C4-O-410	C4-4-410	67.25	67.22	1	0	2	28	0.107	10.688	16.251	3.3	78.94	78.89
L_C4-1-118 SS	L_C4-1-118	Circular	C4-1-115	C4-1-114	67.93	67.73	1	0	4.5	199.88	0.1	58.359	15.897	3.64	79.90	79.79
L_C4-1-118 RD	L_C4-1-118	Natural	C4-1-115	C4-1-114	81.99	81.29	1	0	0	199.878	0.35	0	0	0	0.00	0.00
L_C4-1-326	L_C4-1-326	Circular	C4-1-322	C4-1-114	67.8	67.73	1	0	2	76.26	0.092	4.417	16.008	1.37	79.80	79.79
L_C4-O-114	L_C4-O-114	Circular	C4-O-114	C4-1-114	67.75	67.73	1	0	2	26.02	0.077	0.289	15.9	0.57	79.79	79.79
L_C4-1-325	L_C4-1-325	Circular	C4-1-319	C4-1-317	93.04	89.14	1	0	2	200.08	1.949	9.53	16.01	8.12	93.79	90.00
L_C4-4-213	L_C4-4-213	Circular	C4-4-212	C4-4-411	67.44	67.38	1	0	2	68.26	0.088	5.372	15.634	1.69	78.95	78.93
L_C4-4-412 SS	L_C4-4-412	Circular	C4-4-412	C4-4-411	67.56	67.38	1	0	4	192	0.094	66.983	16.005	5.27	79.20	78.93
L_C4-4-412 RD	L_C4-4-412	Natural	C4-4-412	C4-4-411	78.88	78.21	1	0	0	192	0.349	6.517	16.348	0.77	79.20	78.93
L_C4-O-410	L_C4-O-410	Circular	C4-O-411	C4-4-411	67.4	67.38	1	0	2	28	0.071	5.322	15.633	1.67	78.94	78.93
L_C4-1-328	L_C4-1-328	Circular	C4-1-324	C4-1-115	68	67.93	1	0	2	80.01	0.087	4.418	16.012	1.37	79.91	79.90
L_C4-O-115	L_C4-O-115	Circular	C4-O-115	C4-1-115	67.95	67.93	1	0	2	26.02	0.077	0.555	15.9	1.03	79.90	79.90
L_C4-1-327	L_C4-1-327	Circular	C4-1-321	C4-1-319	96.95	93.04	1	0	2	200.09	1.954	6.698	16.008	7.06	97.58	93.79
L_C4-4-215	L_C4-4-215	Circular	C4-4-213	C4-4-412	69.62	69.4	1	0	2	78.94	0.279	15.746	16.009	4.89	79.51	79.20
L_C4-4-413 SS	L_C4-4-413	Circular	C4-4-413	C4-4-412	67.76	67.56	1	0	3.5	200	0.1	46.99	16.203	4.81	79.61	79.20
L_C4-4-413 RD	L_C4-4-413	Natural	C4-4-413	C4-4-412	79.58	78.88	1	0	0	200	0.35	0.129	16.256	0.07	79.61	79.20
L_C4-O-411	L_C4-O-411	Circular	C4-O-412	C4-4-412	67.59	67.56	1	0	2	28	0.107	2.263	16.001	0.7	79.20	79.20
L_C4-1-329	L_C4-1-329	Circular	C4-1-323	C4-1-321	100.85	96.95	1	0	2	200.09	1.949	3.525	16.005	5.26	101.30	97.58
L_C4-4-216	L_C4-4-216	Circular	C4-4-214	C4-4-213	85.65	83.5	1	0	2	91.06	2.361	11.216	16.012	9.86	86.43	84.28
L_C4-4-217	L_C4-4-217	Circular	C4-4-216	C4-4-413	67.84	67.76	1	0	2	83.99	0.095	4.432	16.001	1.37	79.64	79.61
L_C4-4-414 SS	L_C4-4-414	Circular	C4-4-414	C4-4-413	67.95	67.76	1	0	3.5	200.11	0.095	34.47	16.252	3.53	79.84	79.61

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
L_C4-4-414 RD	L_C4-4-414	Natural	C4-4-414	C4-4-413	80.14	79.58	1	0	0	200.114	0.28	0	0	0	0.00	0.00
L_C4-O-412	L_C4-O-412	Circular	C4-O-413	C4-4-413	67.78	67.76	1	0	2	28	0.071	4.881	16.003	1.51	79.62	79.61
L_C4-4-218	L_C4-4-218	Circular	C4-4-215	C4-4-214	90.53	85.65	1	0	2	200	2.44	8.948	16.012	8.63	91.22	86.43
L_C4-4-219	L_C4-4-219	Circular	C4-4-218	C4-4-414	68.04	67.95	1	0	2	91.04	0.099	4.435	16.006	1.37	79.87	79.84
L_C4-4-415 SS	L_C4-4-415	Circular	C4-4-415	C4-4-414	68.15	67.95	1	0	3	200.07	0.1	19.174	16.009	2.66	79.99	79.84
L_C4-4-415 RD	L_C4-4-415	Natural	C4-4-415	C4-4-414	80.74	80.14	1	0	0	200.069	0.3	0	0	0	0.00	0.00
L_C4-O-413	L_C4-O-413	Circular	C4-O-414	C4-4-414	67.97	67.95	1	0	2	21.25	0.094	6.601	16.251	2.04	79.86	79.84
L_C4-4-220	L_C4-4-220	Circular	C4-4-217	C4-4-215	95.4	90.53	1	0	2	200	2.435	6.685	16.01	7.82	95.99	91.22
L_C4-4-221	L_C4-4-221	Circular	C4-4-220	C4-4-415	68.24	68.15	1	0	2	96.29	0.093	4.438	16.006	1.37	80.02	79.99
L_C4-4-416 SS	L_C4-4-416	Circular	C4-4-416	C4-4-415	68.34	68.15	1	0	2	192	0.099	7.184	16.01	2.23	80.17	79.99
L_C4-4-416 RD	L_C4-4-416	Natural	C4-4-416	C4-4-415	81.42	80.74	1	0	0	192	0.354	0	0	0	0.00	0.00
L_C4-O-414	L_C4-O-414	Circular	C4-O-415	C4-4-415	68.16	68.15	1	0	2	16	0.063	3.637	16.005	1.16	79.99	79.99
L_C4-4-222	L_C4-4-222	Circular	C4-4-219	C4-4-217	99.3	95.4	1	0	2	200	1.95	4.421	16.009	6.39	99.81	95.99
L_C4-4-223	L_C4-4-223	Circular	C4-4-222	C4-4-416	68.43	68.34	1	0	2	96.62	0.093	3.638	16.011	1.12	80.19	80.17
L_C4-4-417	L_C4-4-417	Circular	C4-4-417	C4-4-416	68.35	68.34	1	0	2	16	0.063	1.301	15.646	0.41	80.17	80.17
L_C4-4-224	L_C4-4-224	Circular	C4-4-221	C4-4-219	103.2	99.3	1	0	2	200	1.95	2.157	16.006	4.42	103.55	99.81
L_L-C5-O-000	L_L-C5-O-000	Natural	C5-O-000	XS-43	61.59	62.16	1	0	10.6	158.7	0.101	126.309	17.098	1.5	68.53	68.52
L_L-C2	L_L-C2	Trapezoidal	C5-O-001	C5-O-000	70.41	70	1	50	5	50	0.095	126.281	17.1	5.08	70.87	70.45
C3 SS	L_L-C3	Rectangular	C5-O-002	C5-O-001	61.8	61.64	2	11	6	157.427	0.102	671.232	17.116	5.5	71.04	70.87
C3 RDWY	L_L-C3	Natural	C5-O-002	C5-O-001	69.36	69.91	1	0	11	158	-0.348	119.59	17.106	2.24	71.04	70.89
C4 SS	L_L-C4	Rectangular	C5-O-003	C5-O-002	61.96	61.8	2	11	6	157	0.102	716.926	15.842	6.29	71.18	71.04
C4 RDWY	L_L-C4	Natural	C5-O-003	C5-O-002	69.91	69.36	1	0	11	157	0.35	168.491	17.102	2.86	71.18	71.04
C5 SS	L_L-C5	Rectangular	C5-O-003.1	C5-O-003	62.09	61.96	2	11	6	129.94	0.1	706.904	15.842	6.24	71.29	71.18
C5 RDWY	L_L-C5	Natural	C5-O-003.1	C5-O-003	69.45	69.91	1	0	11	130	-0.354	192.487	17.096	2.89	71.29	71.18
C6-SS	L_L-C6	Rectangular	C5-O-004	C5-O-003.1	62.28	62.09	2	11	6	198.722	0.096	701.054	15.752	6.19	71.45	71.29
C6-RD	L_L-C6	Natural	C5-O-004	C5-O-003.1	70.15	69.45	1	0	0	198.722	0.352	188.561	16.984	2.93	71.45	71.29
C10-SS	L_L-C10	Rectangular	C5-1-100	C5-O-004	62.42	62.28	2	11	6	139.381	0.1	695.797	15.571	6.16	71.57	71.45
C10-RD	L_L-C10	Natural	C5-1-100	C5-O-004	69.66	70.15	1	0	0	139.381	-0.352	174.974	16.951	2.48	71.57	71.45
L_L-C12	L_L-C12	Rectangular	C5-3-300	C5-1-100	62.6	62.42	2	11	6	172.005	0.105	659.098	15.53	6.07	71.68	71.57
C17-SS	L_L-C17	Rectangular	C5-1-101	C5-1-100	62.83	62.768	1	7	4	61.896	0.1	117.828	15.766	4.19	71.59	71.57
C17-RD	L_L-C17	Natural	C5-1-101	C5-1-100	69.88	69.66	1	0	0	61.896	0.355	199.61	16.896	2.46	71.59	71.57
L_L-C9	L_L-C9	Circular	C5-7-701	C5-3-300	65.08	65	1	0	2	80	0.1	5.961	15.564	1.88	71.68	71.68
L_L-C11	L_L-C11	Rectangular	C5-2-200	C5-3-300	62.68	62.6	2	11	6	82	0.098	650.741	15.53	6.07	71.73	71.68
L_L-C18	L_L-C18	Circular	C5-3-301	C5-3-300	65.12	65	1	0	2	120	0.1	10.572	16.005	3.32	71.73	71.68
C20-SS	L_L-C20	Rectangular	C5-1-103	C5-1-101	63.045	62.83	1	7	4	215.05	0.1	128.754	15.892	4.58	71.81	71.59
C20-RD	L_L-C20	Natural	C5-1-103	C5-1-101	70.63	69.88	1	0	0	215.05	0.349	149.985	16.909	2.63	71.81	71.59
L_L-C8	L_L-C8	Circular	C5-6-601	C5-2-200	65.08	65	1	0	2	80	0.1	5.948	15.564	1.88	71.73	71.73
L_L-C14	L_L-C14	Rectangular	C5-4-400	C5-2-200	62.85	62.68	2	11	6	172.004	0.099	645.577	15.539	6.05	71.84	71.73
L_L-C16	L_L-C16	Circular	C5-2-201	C5-2-200	65.057	65	1	0	2	56.733	0.1	8.495	16.003	2.67	71.74	71.73
L_L-C22	L_L-C22	Circular	C5-3-302	C5-3-301	65.32	65.12	1	0	2	200	0.1	7.053	16.005	2.22	71.81	71.73
C25-SS	L_L-C25	Rectangular	C5-1-104	C5-1-103	63.245	63.045	1	6	4	199.95	0.1	141.522	16.552	5.86	72.36	71.81
C25-RD	L_L-C25	Natural	C5-1-104	C5-1-103	71.33	70.63	1	0	0	199.95	0.35	102.618	16.894	2.81	72.36	71.81
C7-SS	L_L-C7	Circular	C5-8-801	C5-4-400	63.37	63.194	1	0	2	88	0.2	12.28	15.703	3.84	71.72	71.84
C7-RD	L_L-C7	Natural	C5-8-801	C5-4-400	70.63	70.28	1	0	0	88	0.398	-102.028	17.104	-1.96	71.72	71.84
L_L-C13	L_L-C13	Rectangular	C5-O-100	C5-4-400	62.9	62.85	2	11	6	50	0.1	579.712	15.502	6.07	71.85	71.84
C15-SS	L_L-C15	Rectangular	C5-4-401	C5-4-400	63.244	63.194	1	7	4	50	0.1	140.906	16.088	5.01	71.91	71.84
C15-RD	L_L-C15	Natural	C5-4-401	C5-4-400	70.08	70.28	1	0	0	50	-0.4	243.447	16.899	3.24	71.91	71.84
L_L-C21	L_L-C21	Circular	C5-2-202	C5-2-201	65.32	65.057	1	0	2	263.267	0.1	5.667	16.005	1.78	71.77	71.74
L_L-C26	L_L-C26	Circular	C5-3-303	C5-3-302	65.52	65.32	1	0	2	200.202	0.1	4.214	15.529	1.33	71.83	71.81
C28-SS	L_L-C28	Rectangular	C5-1-105	C5-1-104	63.395	63.245	1	6	4	150	0.1	152.132	16.876	6.3	72.84	72.36
C28-RD	L_L-C28	Natural	C5-1-105	C5-1-104	71.86	71.33	1	0	0	150	0.353	87.175	16.892	2.89	72.84	72.36
C19-SS	L_L-C19	Rectangular	C5-4-402	C5-4-401	63.358	63.244	1	7	4	114	0.1	94.223	15.57	3.35	71.98	71.91
C19-RD	L_L-C19	Natural	C5-4-402	C5-4-401	69.51	70.08	1	0	0	114	-0.5	278.207	16.897	2.64	71.98	71.91
L_L-C27	L_L-C27	Circular	C5-2-203	C5-2-202	65.52	65.32	1	0	2	200.202	0.1	3.366	15.528	1.06	71.78	71.77
L_L-C29	L_L-C29	Circular	C5-1-305	C5-1-105	66.131	64.5	1	0	2.5	163.059	1	32.226	16.03	6.49	73.35	72.84
C33-SS	L_L-C33	Rectangular	C5-1-106	C5-1-105	63.445	63.395	1	5	4	50	0.1	135.782	17.832	6.74	73.03	72.84

Table 4 - PROPOSED NHHIP SEGMENT 1 I-45 SWMM Hydraulic Summary (100-YEAR)																
Name	Link Name	Shape	Upstream Node Name	Downstream Node Name	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Number of Barrels	Bottom Width ft	Diameter (Height) ft	Length ft	Conduit Slope	Max Flow cfs	Time to Peak hr	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
C33-RD	L_L-C33	Natural	C5-1-106	C5-1-105	72.03	71.86	1	0	0	50	0.34	92.418	16.913	3.15	73.03	72.84
C23-SS	L_L-C23	Rectangular	C5-4-403	C5-4-402	63.57	63.358	1	7	4	218	0.1	93.567	15.648	3.33	72.06	71.98
C23-RD	L_L-C23	Natural	C5-4-403	C5-4-402	70.27	69.51	1	0	0	218	0.349	290.051	16.902	2.9	72.06	71.98
L_L-C35	L_L-C35	Circular	C5-1-306	C5-1-305	66.495	66.131	1	0	2.5	60.671	0.6	29.526	16.032	5.95	73.57	73.35
C38-SS	L_L-C38	Rectangular	C5-1-107	C5-1-106	63.645	63.445	1	5	4	200	0.1	129.738	18.468	6.44	73.73	73.03
C38-RD	L_L-C38	Natural	C5-1-107	C5-1-106	72.73	72.03	1	0	0	200	0.35	93.765	16.943	3.13	73.73	73.03
L_L-C24	L_L-C24	Circular	C5-O-401	C5-4-403	64.61	64.57	1	0	2	30.489	0.1	-6.373	21.282	-2.01	72.06	72.06
C31-SS	L_L-C31	Rectangular	C5-4-404	C5-4-403	63.829	63.57	1	6	4	253.276	0.1	135.695	16.049	5.62	72.55	72.06
C31-RD	L_L-C31	Natural	C5-4-404	C5-4-403	71.16	70.27	1	0	0	253.276	0.351	231.347	16.908	3.48	72.55	72.06
L_L-C40	L_L-C40	Circular	C5-1-307	C5-1-306	67.695	66.495	1	0	2	200	0.6	26.6	16.034	8.32	76.05	73.57
C41-SS	L_L-C41	Rectangular	C5-1-108.1	C5-1-107	63.695	63.645	1	5	4	50	0.1	127.658	18.49	6.34	73.90	73.73
C41-RD	L_L-C41	Natural	C5-1-108.1	C5-1-107	72.91	72.73	1	0	0	50	0.36	91.58	16.968	3.09	73.90	73.73
L_L-C30	L_L-C30	Circular	C5-4-205	C5-4-404	65.738	64.759	1	0	2.5	163.13	0.6	29.788	16.017	6	73.08	72.55
L_L-C32	L_L-C32	Circular	C5-O-402	C5-4-404	63.864	63.829	1	0	2	34.368	0.1	3.748	19.941	1.18	72.55	72.55
C36-SS	L_L-C36	Rectangular	C5-4-405	C5-4-404	63.958	63.829	1	6	4	128.724	0.1	82.797	15.848	3.43	72.57	72.55
C36-RD	L_L-C36	Natural	C5-4-405	C5-4-404	71.61	71.16	1	0	0	128.724	0.35	52.809	16.902	1.41	72.57	72.55
L_L-C48	L_L-C48	Circular	C5-1-308	C5-1-307	68.895	67.695	1	0	2	200	0.6	24.328	16.034	7.58	78.26	76.05
L_L-C42	L_L-C42	Circular	C5-O-101	C5-1-108.1	63.728	63.695	1	0	2	32.637	0.1	6.539	16.25	2.07	73.91	73.90
C45-SS	L_L-C45	Rectangular	C5-1-108	C5-1-108.1	63.845	63.695	1	5	4	150	0.1	125.764	18.489	6.24	74.41	73.90
C45-RD	L_L-C45	Natural	C5-1-108	C5-1-108.1	73.43	72.91	1	0	0	150	0.347	86.586	16.977	3	74.41	73.90
L_L-C34	L_L-C34	Circular	C5-4-206	C5-4-205	66.102	65.738	1	0	2.5	60.671	0.6	27.531	16.016	5.54	73.33	73.08
L_L-C37	L_L-C37	Circular	C5-O-403	C5-4-405	63.994	63.958	1	0	2	35.748	0.1	2.891	19.941	0.91	72.58	72.57
C43-SS	L_L-C43	Rectangular	C5-4-406	C5-4-405	64.161	63.958	1	5	4	203.128	0.1	82.194	15.995	4.09	72.81	72.57
C43-RD	L_L-C43	Natural	C5-4-406	C5-4-405	72.32	71.61	1	0	0	203.128	0.35	13.314	17.591	0.89	72.81	72.57
L_L-C56	L_L-C56	Circular	C5-1-309	C5-1-308	70.095	68.895	1	0	2	200	0.6	21.52	16.035	6.69	79.99	78.26
L_L-C46	L_L-C46	Circular	C5-O-102	C5-1-108	63.877	63.845	1	0	2	32.313	0.1	6.688	16.246	2.25	74.42	74.41
C49-SS	L_L-C49	Rectangular	C5-1-109	C5-1-108	64.045	63.845	1	5	4	200	0.1	124.492	18.445	6.18	75.07	74.41
C49-RD	L_L-C49	Natural	C5-1-109	C5-1-108	74.13	73.43	1	0	0	200	0.35	78.559	17.009	2.86	75.07	74.41
L_L-C39	L_L-C39	Circular	C5-4-207	C5-4-206	67.302	66.102	1	0	2	200	0.6	24.925	16.016	7.79	75.56	73.33
L_L-C44	L_L-C44	Circular	C5-O-404	C5-4-406	64.195	64.161	1	0	2	34.253	0.1	1.982	19.942	1.41	72.81	72.81
C52-SS	L_L-C52	Rectangular	C5-4-407	C5-4-406	64.476	64.161	1	5	4	314.931	0.1	90.471	17.706	4.5	73.37	72.81
C52-RD	L_L-C52	Natural	C5-4-407	C5-4-406	73.43	72.32	1	0	0	314.931	0.352	0	0	0	0.00	0.00
L_L-C62	L_L-C62	Circular	C5-1-310	C5-1-309	74.095	70.095	1	0	2	200	2	18.711	16.036	6.7	81.29	79.99
L_L-C50	L_L-C50	Circular	C5-O-103	C5-1-109	64.094	64.045	1	0	2	49.217	0.1	6.497	16.241	2.43	75.09	75.07
L_L-C55	L_L-C55	Circular	C5-1-316	C5-1-109	64.134	64.045	1	0	2	89.171	0.1	4.447	16.005	1.38	75.07	75.07
C63-SS	L_L-C63	Circular	C5-1-110	C5-1-109	64.26	64.045	1	0	4	215	0.1	107.801	18.964	8.49	75.84	75.07
C63-RD	L_L-C63	Natural	C5-1-110	C5-1-109	74.71	74.13	1	0	0	215	0.27	106.858	17.048	3.17	75.84	75.10
L_L-C47	L_L-C47	Circular	C5-4-208	C5-4-207	68.502	67.302	1	0	2	200	0.6	22.442	16.022	7	77.44	75.56
L_L-C51	L_L-C51	Circular	C5-O-405	C5-4-407	64.516	64.476	1	0	2	39.806	0.1	1.93	15.555	1.53	73.37	73.37
L_L-C54	L_L-C54	Circular	C5-4-216	C5-4-407	64.564	64.476	1	0	2	88.255	0.1	4.436	16.004	1.38	73.37	73.37
C58-SS	L_L-C58	Rectangular	C5-4-408	C5-4-407	64.68	64.476	1	5	4	204.259	0.1	87.439	17.726	4.34	73.71	73.37
C58-RD	L_L-C58	Natural	C5-4-408	C5-4-407	74.14	73.43	1	0	0	204.259	0.348	0	0	0	0.00	0.00
L_L-C71	L_L-C71	Circular	C5-1-311	C5-1-310	78.105	74.095	1	0	2	200.542	2	16.009	16.036	8.53	82.27	81.29
L_L-C61	L_L-C61	Circular	C5-1-317	C5-1-110	64.348	64.26	1	0	2	88.002	0.1	4.461	16.003	1.39	75.85	75.84
C66-SS	L_L-C66	Circular	C5-1-111	C5-1-110	64.445	64.26	1	0	4	185.175	0.1	95.724	19.427	7.55	76.00	75.84
C66-RD	L_L-C66	Natural	C5-1-111	C5-1-110	74.13	74.71	1	0	0	185.175	-0.313	149.667	17.042	2.32	76.00	75.84
L_L-C53	L_L-C53	Circular	C5-4-209	C5-4-208	69.702	68.502	1	0	2	200	0.6	20.194	16.024	6.29	78.96	77.44
L_L-C57	L_L-C57	Circular	C5-O-406	C5-4-408	64.716	64.68	1	0	2	36.09	0.1	2.023	16.065	0.73	73.71	73.71
L_L-C60	L_L-C60	Circular	C5-4-217	C5-4-408	64.768	64.68	1	0	2	88.034	0.1	4.434	16.001	1.38	73.71	73.71
C64-SS	L_L-C64	Rectangular	C5-4-408.1	C5-4-408	64.758	64.68	1	4	4	77.682	0.1	84.774	17.744	5.26	73.93	73.71
C64-RD	L_L-C64	Natural	C5-4-408.1	C5-4-408	74.3	74.14	1	0	0	77.682	0.206	0	0	0	0.00	0.00

EXHIBITS

EXHIBIT 1

DATE SAVED: 3/24/2021

Texas Department of Transportation

Houston, Texas
CSJ: 0500-03-446

I-45 North Houston Highway Improvement Project (NHHIP) Segment 1

EXHIBIT 1: PROJECT LIMITS

June 2021

Legend

- FEMA Streams

FEMA Flood Zones

- Zone A (100-YR)
- Zone AE (100-YR)
- Zone X (500-YR)
- Floodway

N

0 500 1,000 2,000

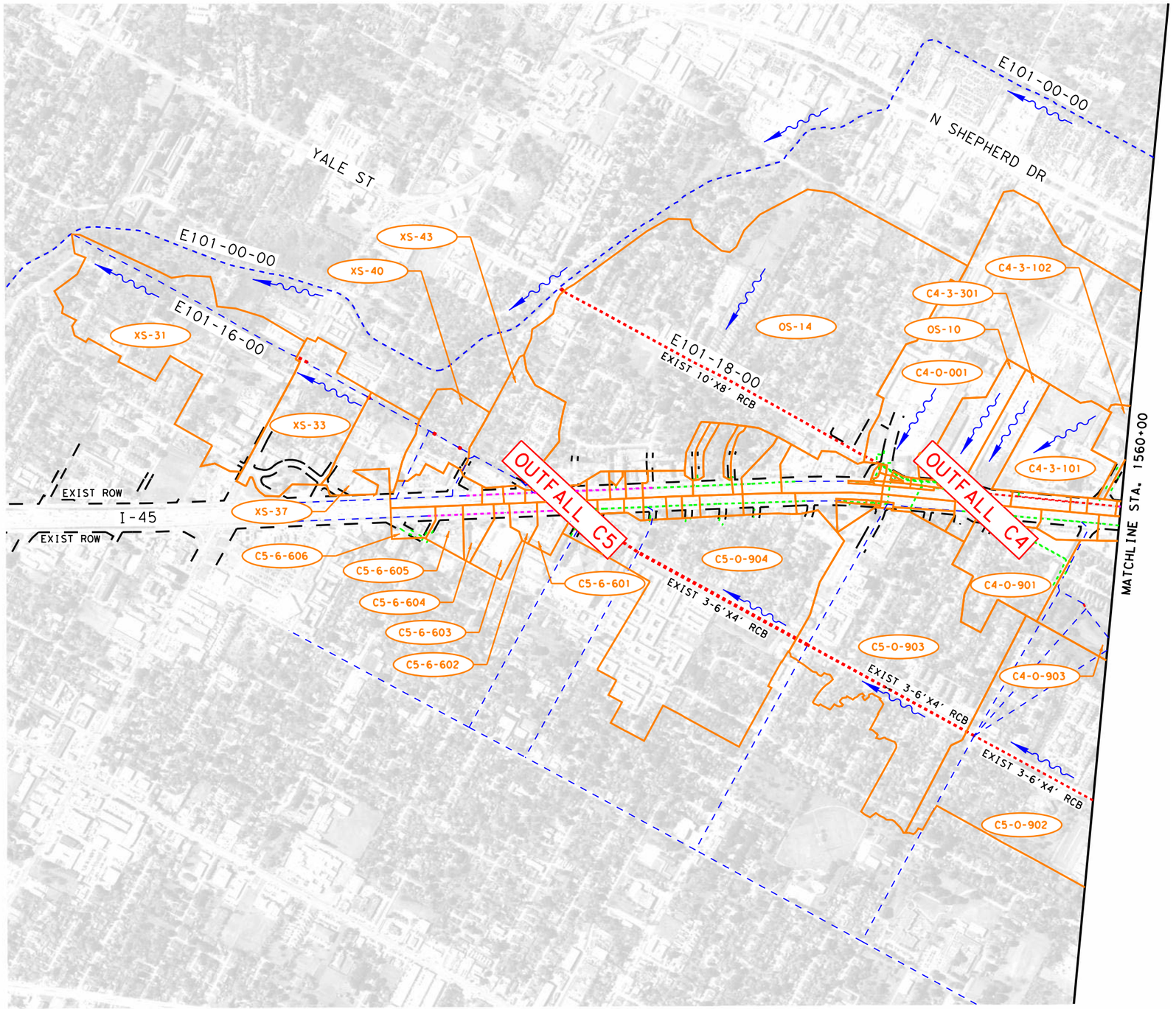
1 inch = 2,000 feet

tnp

TXD 20022

Document Path: P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\GIS\Report\EXHIBIT 1 - Project Vicinity.mxd

EXHIBIT 2



0 500 1000
SCALE: 1" = 1000'

LEGEND

- FLOW DIRECTION
- XX-X-XXX — DRAINAGE AREA LABEL
- EXIST RCP
- EXIST RCB
- EXIST SWMM LINK

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

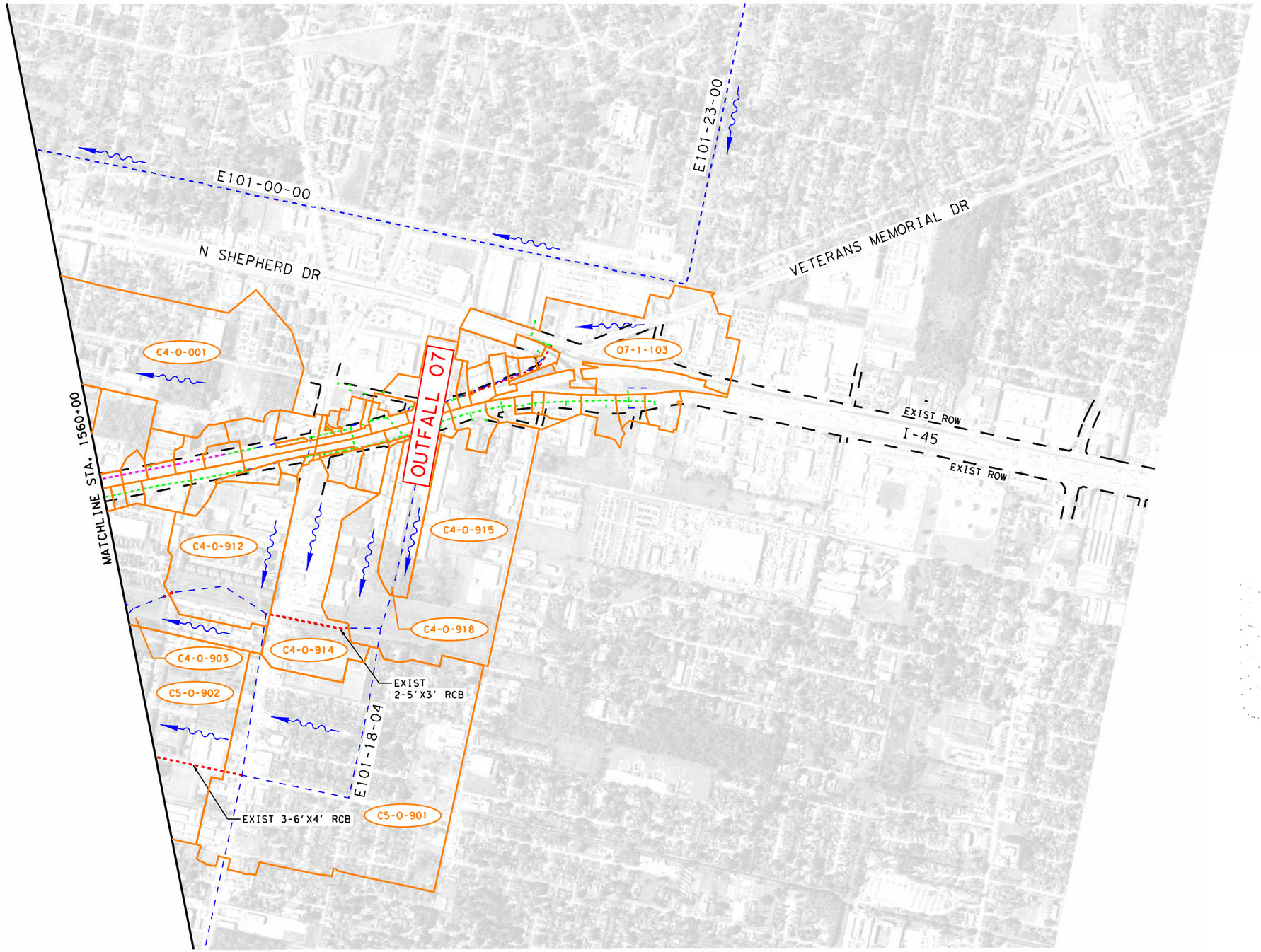
tnp

I-45
EXHIBIT 2
EXISTING OVERALL DRAINAGE AREA MAP
PROJECT START TO STA 1560+00

SHEET 1 OF 2

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_EXIST_ODA_01.dgn
7/21/2021 10:58:00 AM



0 500 1000

SCALE: 1" = 1000'

LEGEND

- FLOW DIRECTION
- XX-X-XXX — DRAINAGE AREA LABEL
- EXIST RCP
- EXIST RCB
- EXIST SWMM LINK

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

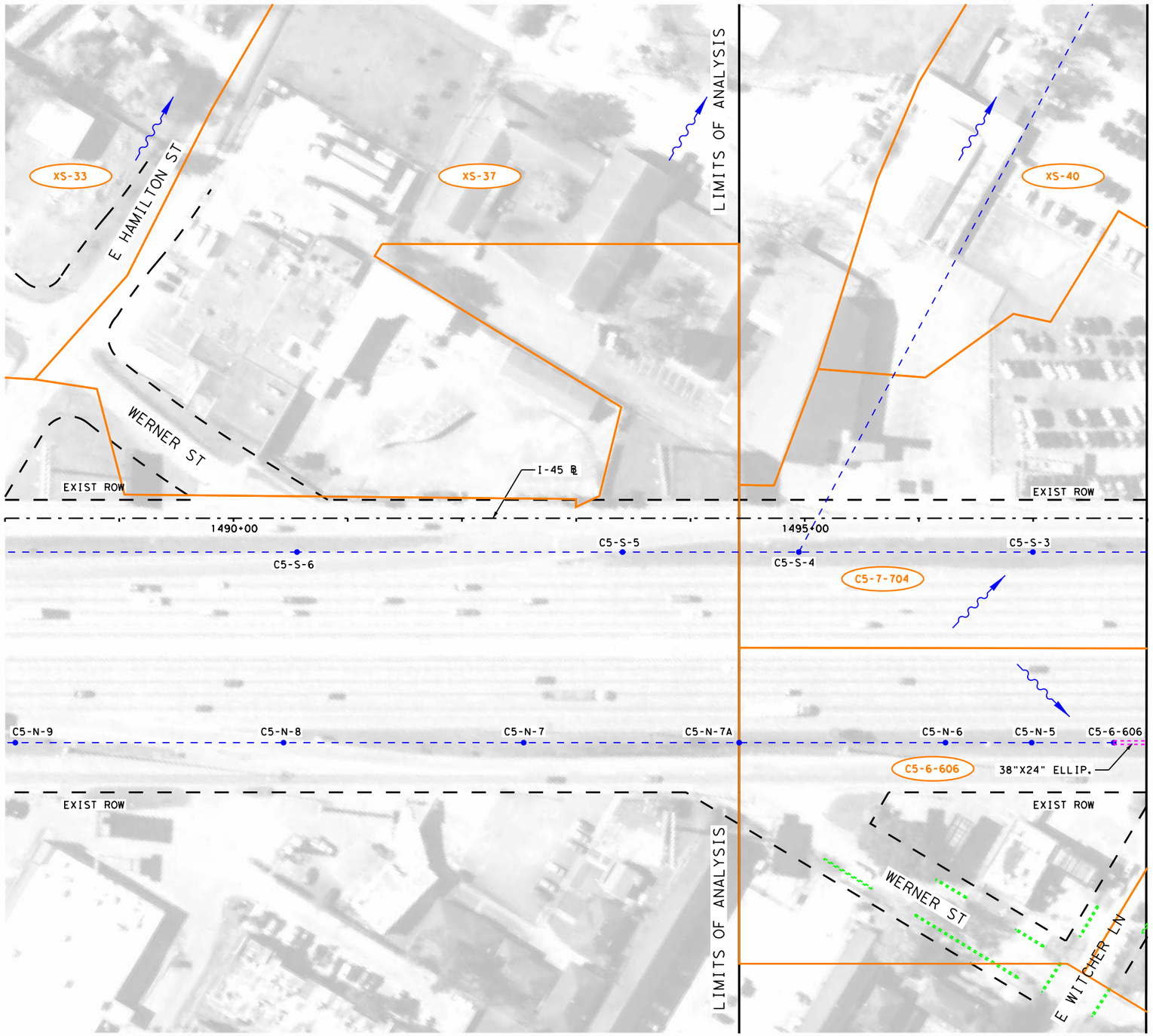
I-45
EXHIBIT 2
EXISTING OVERALL DRAINAGE AREA MAP
STA 1560+00 TO PROJECT END

SHEET 2 OF 2

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_ODA_02.dgn
7/21/2021 10:58:43 AM

EXHIBIT 3



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

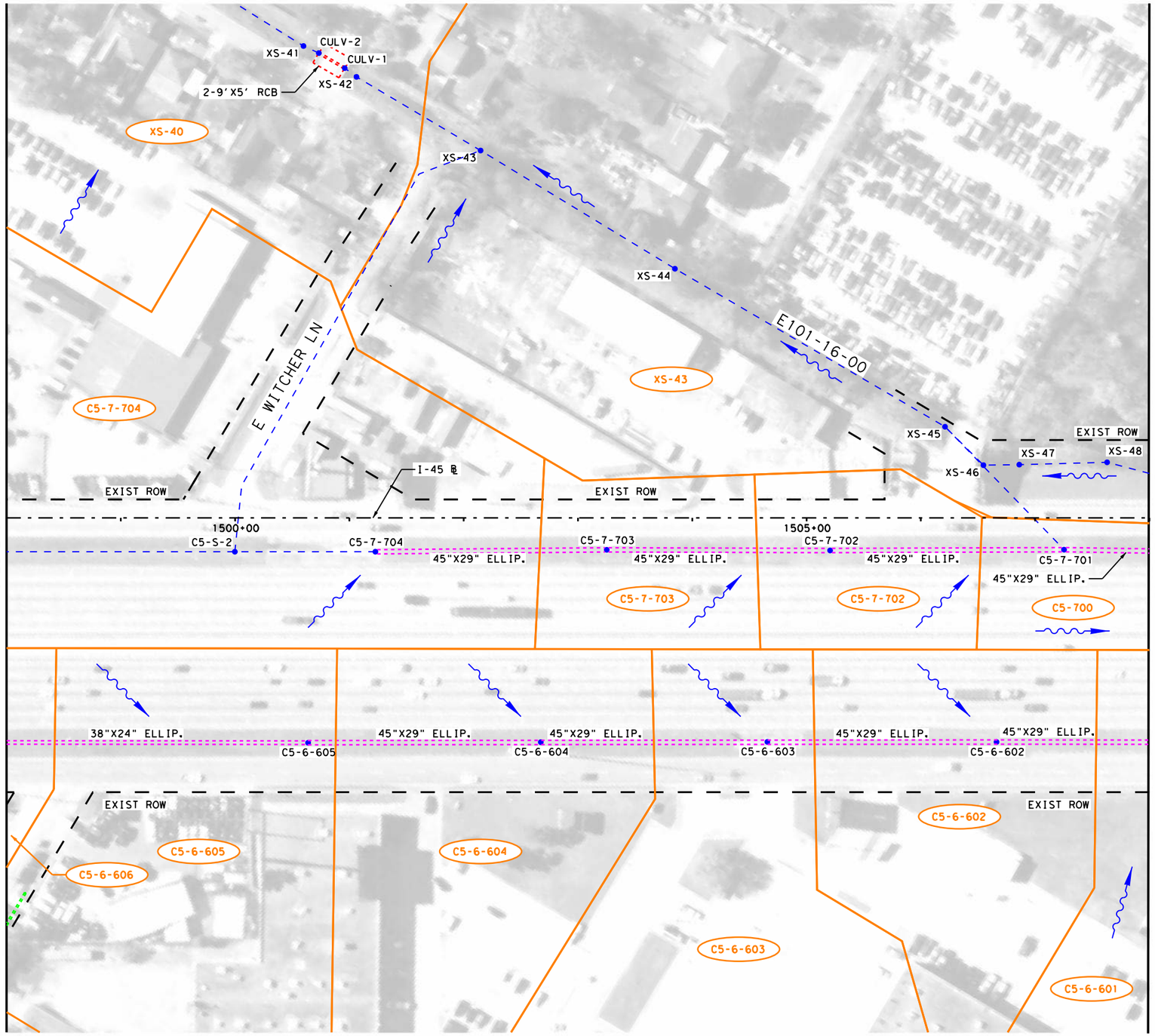
Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
PROJECT START TO STA 1498+00
SHEET 1 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_01.dgn
7/21/2021 10:59:25 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

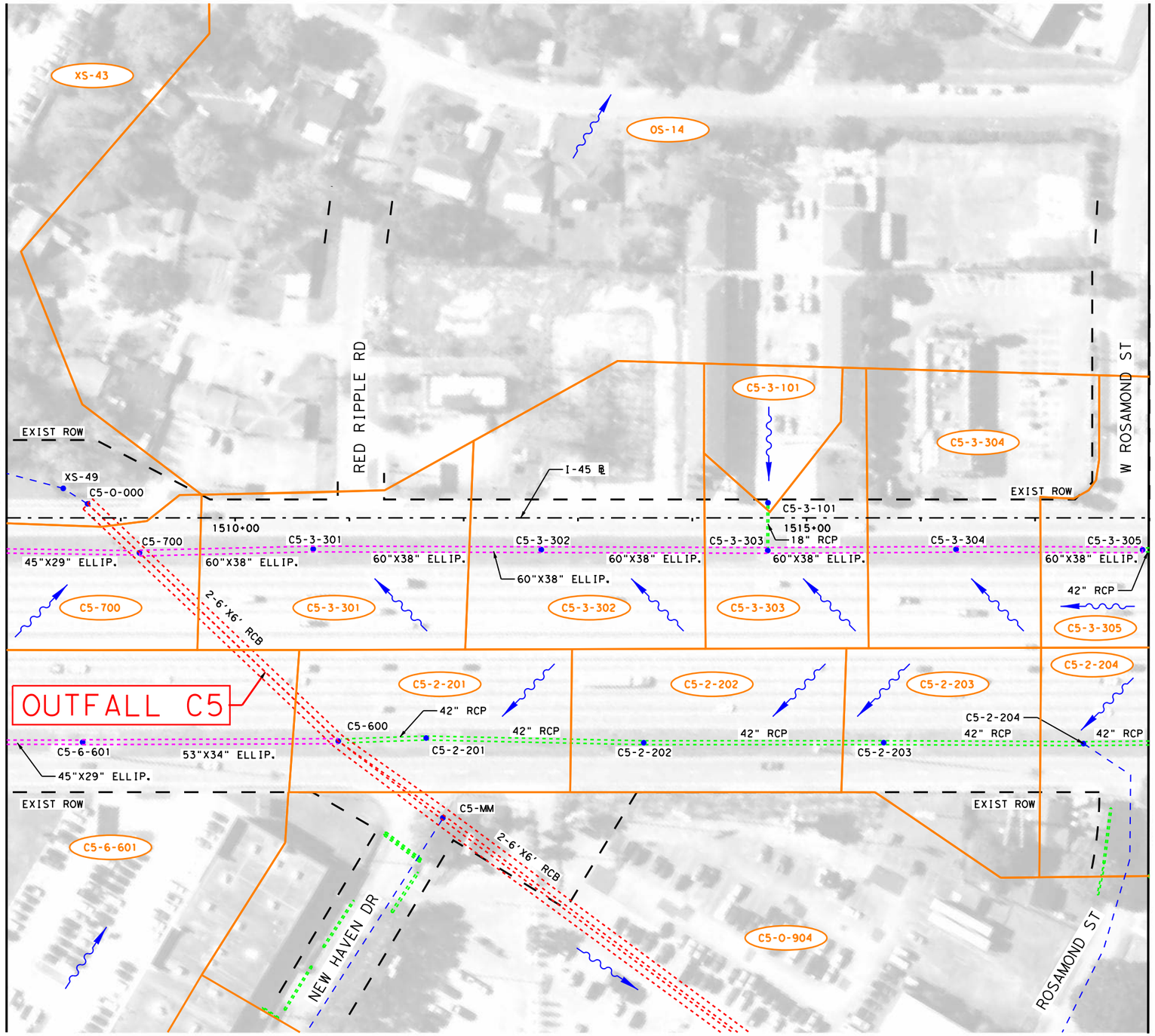
Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1498+00 TO STA 1508+00
SHEET 2 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_02.dgn
7/21/2021 10:59:32 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

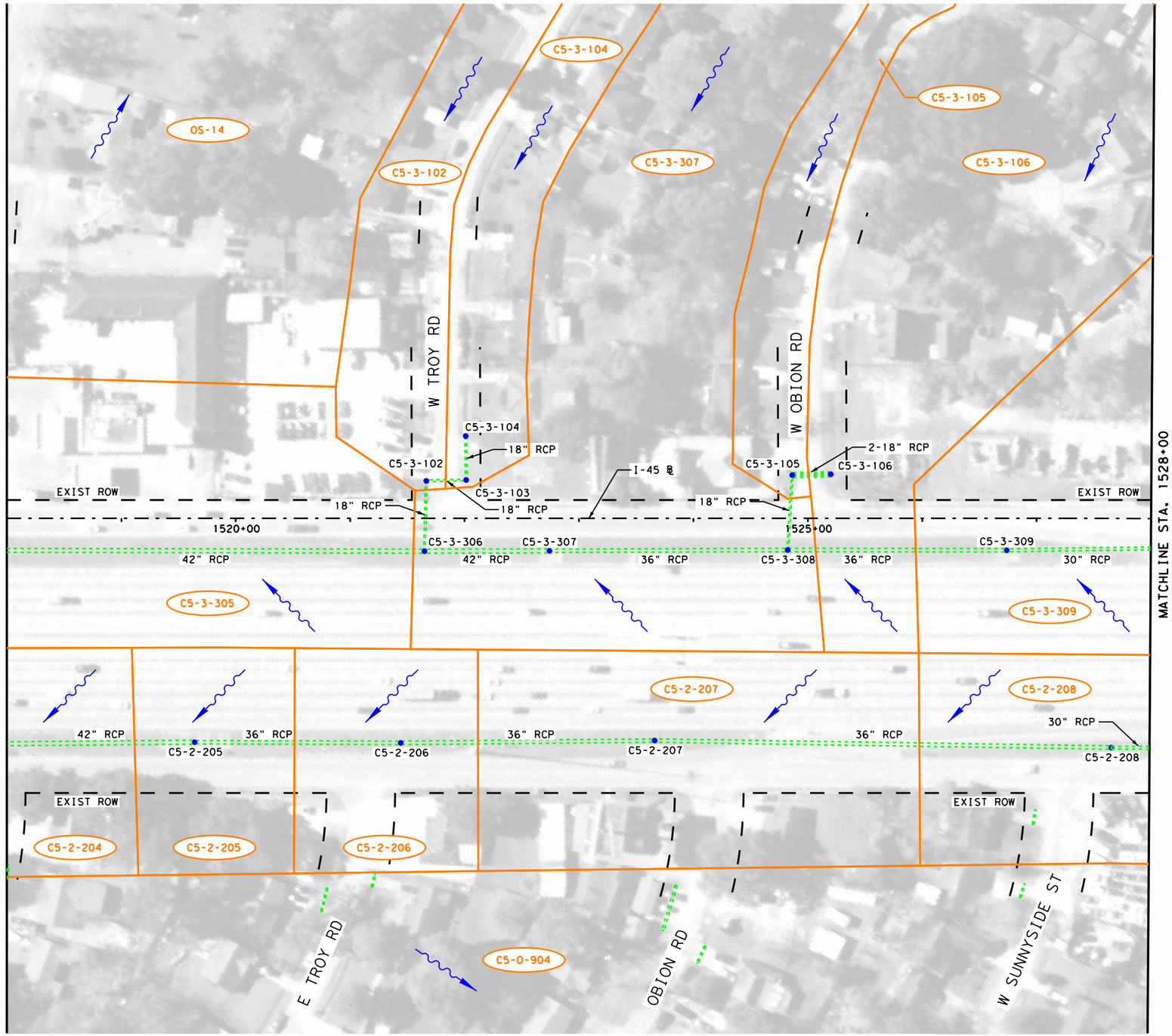
I-45

EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1508+00 TO STA 1518+00

SHEET 3 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_03.dgn
7/21/2021 10:59:39 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

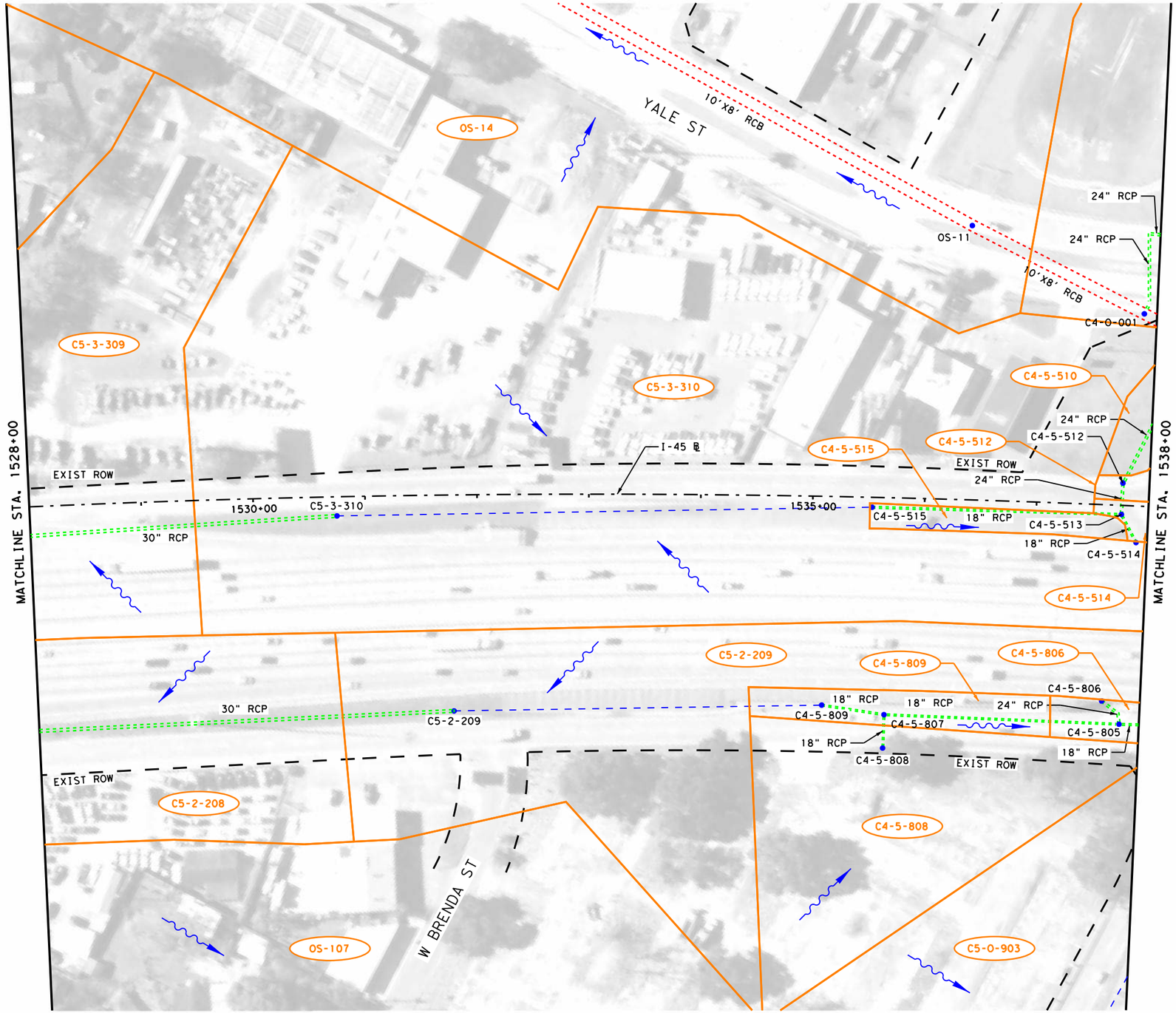
I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1518+00 TO STA 1528+00

SHEET 4 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)	I-45

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_04.dgn
7/21/2021 10:59:47 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

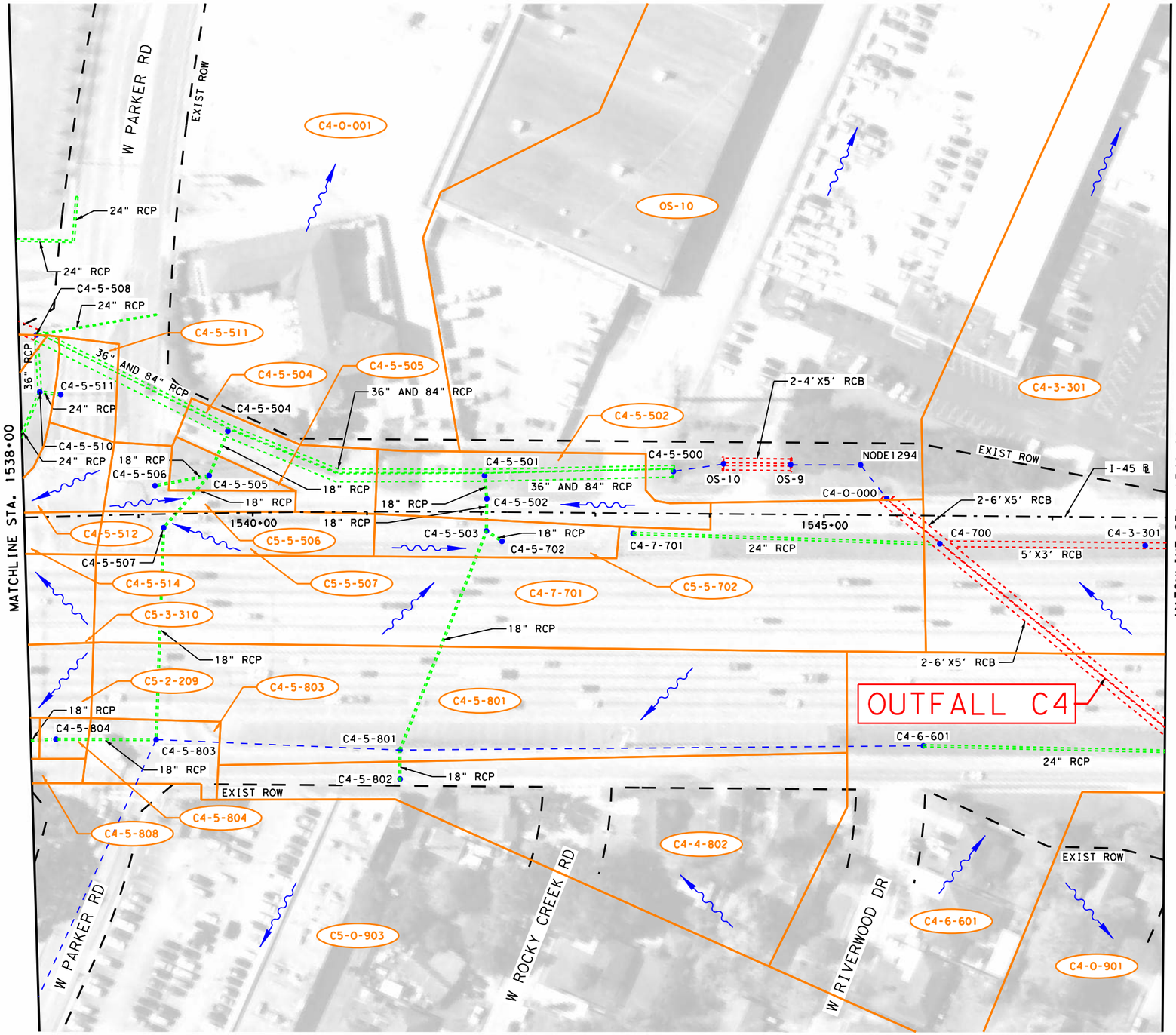
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1528+00 TO STA 1538+00

SHEET 5 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_EXIST_DA_05.dgn
7/21/2021 10:59:54 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

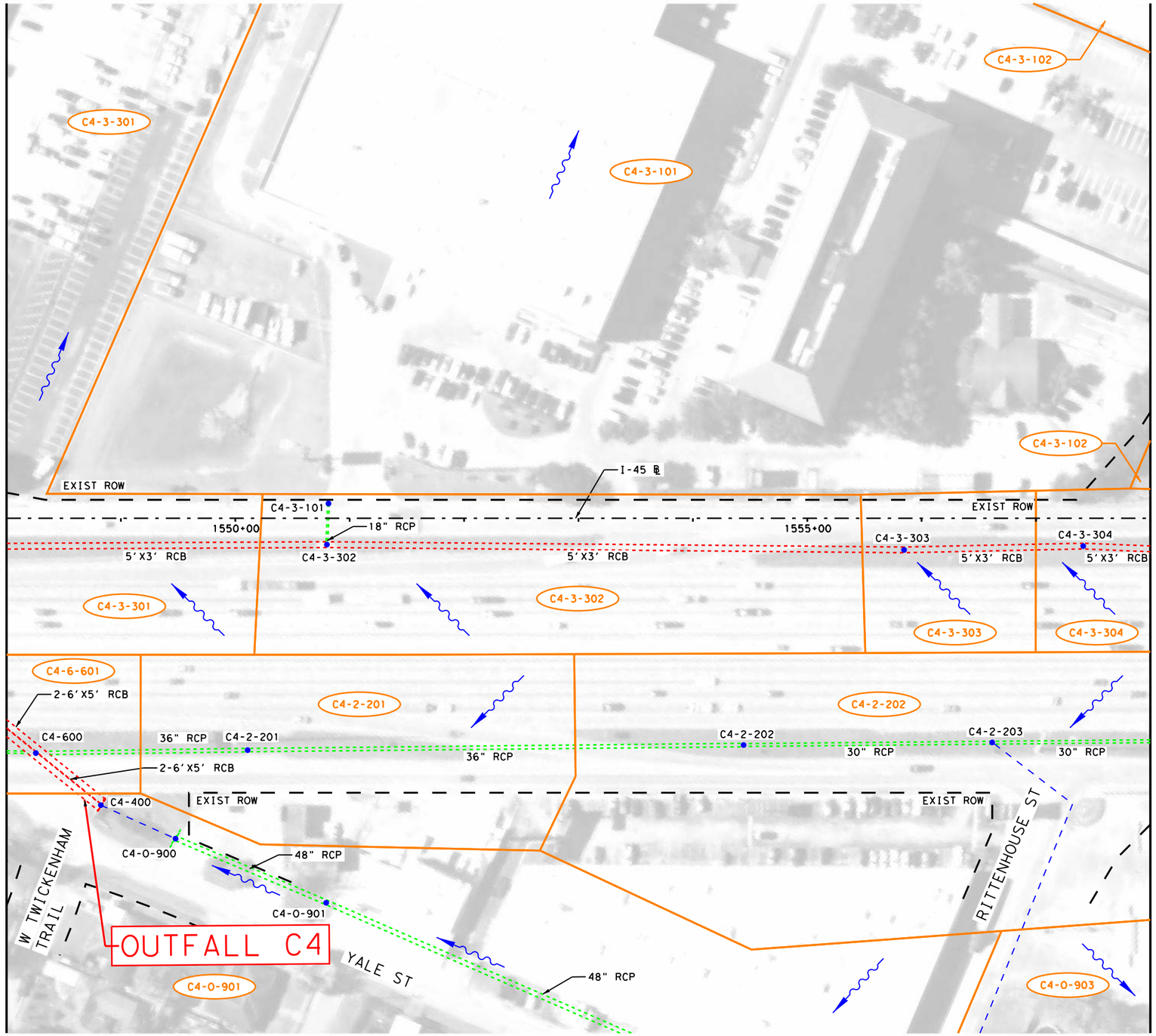
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1538+00 TO STA 1548+00

SHEET 6 OF 14

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 2022\CADD\SHEETS\I-45_EXIST_DA_06.dgn
7/21/2021 11:00:02 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

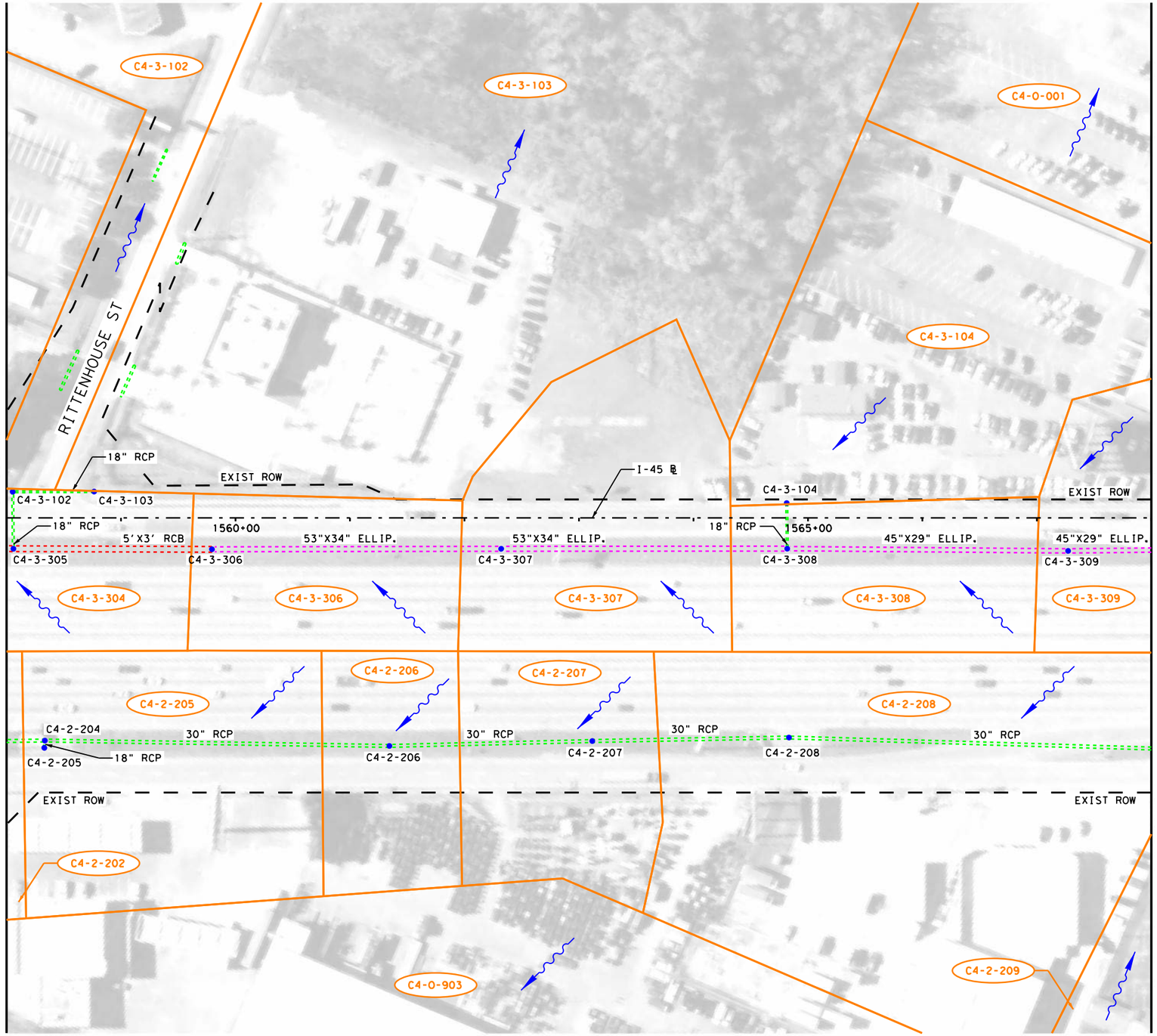
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1548+00 TO STA 1558+00

SHEET 7 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_07.dgn
7/21/2021 11:00:11 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

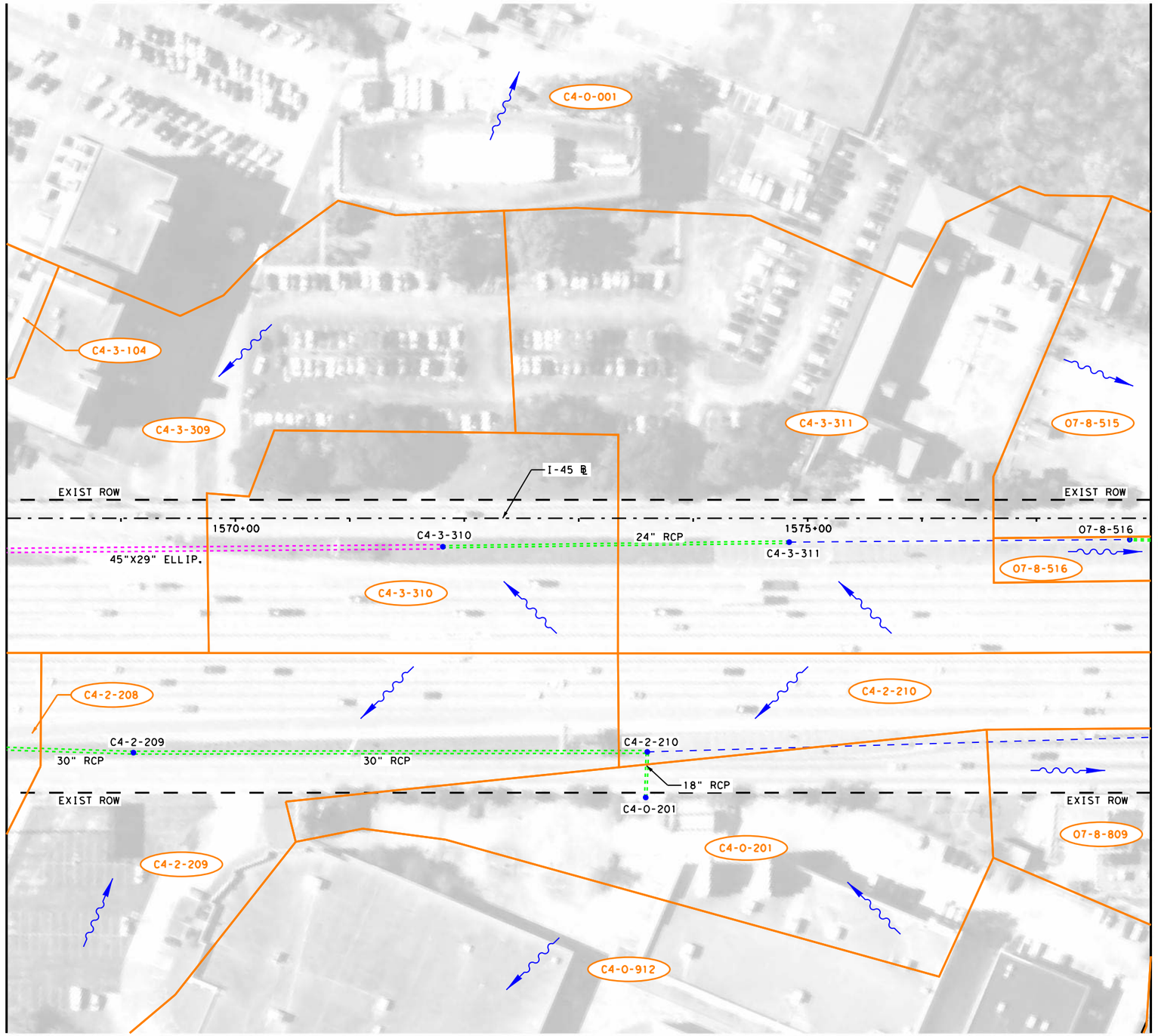
Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1558+00 TO STA 1568+00
SHEET 8 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_08.dgn
7/21/2021 11:00:19 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

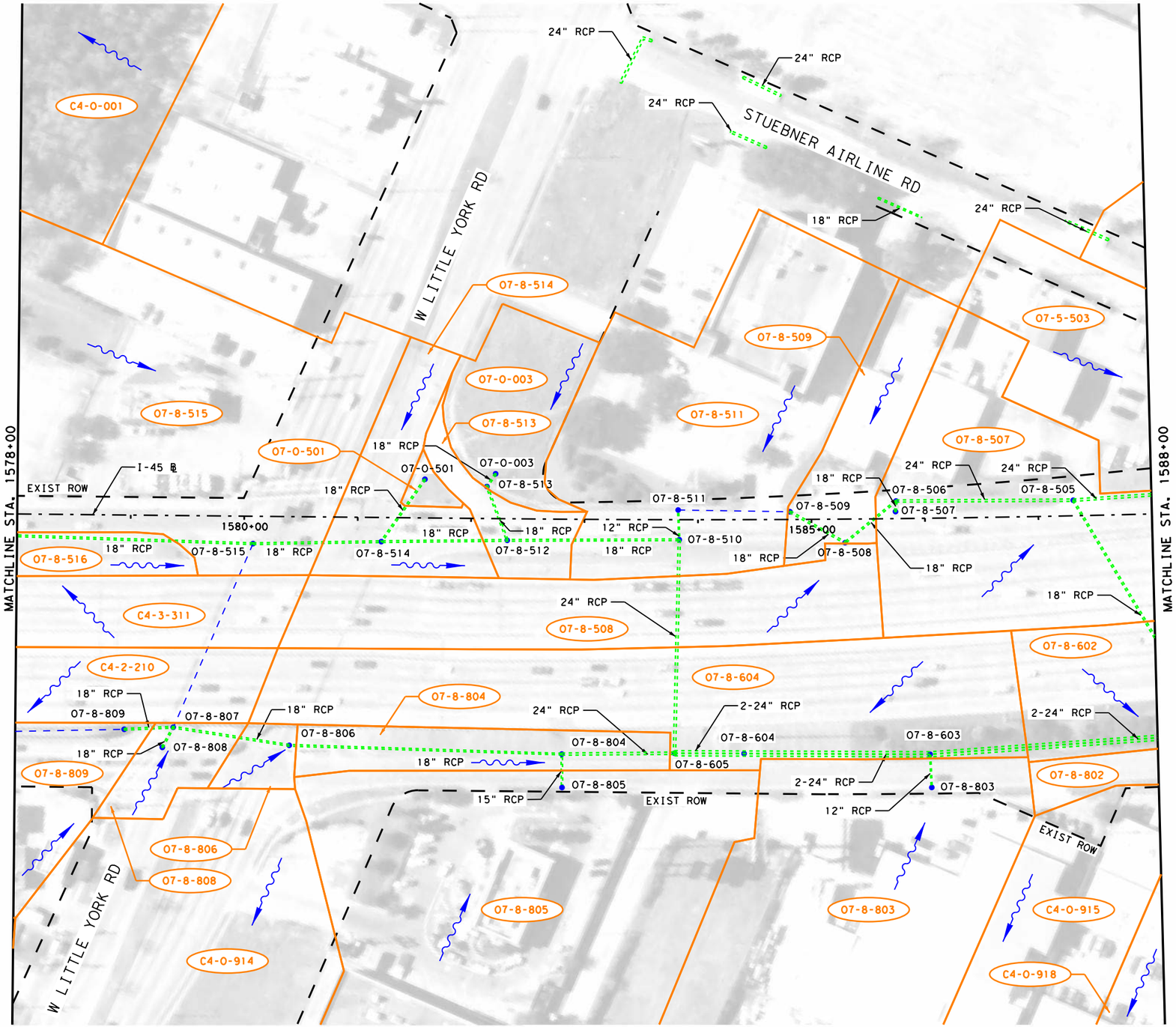
I-45

EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1568+00 TO STA 1578+00

SHEET 9 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_09.dgn
7/21/2021 11:00:27 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

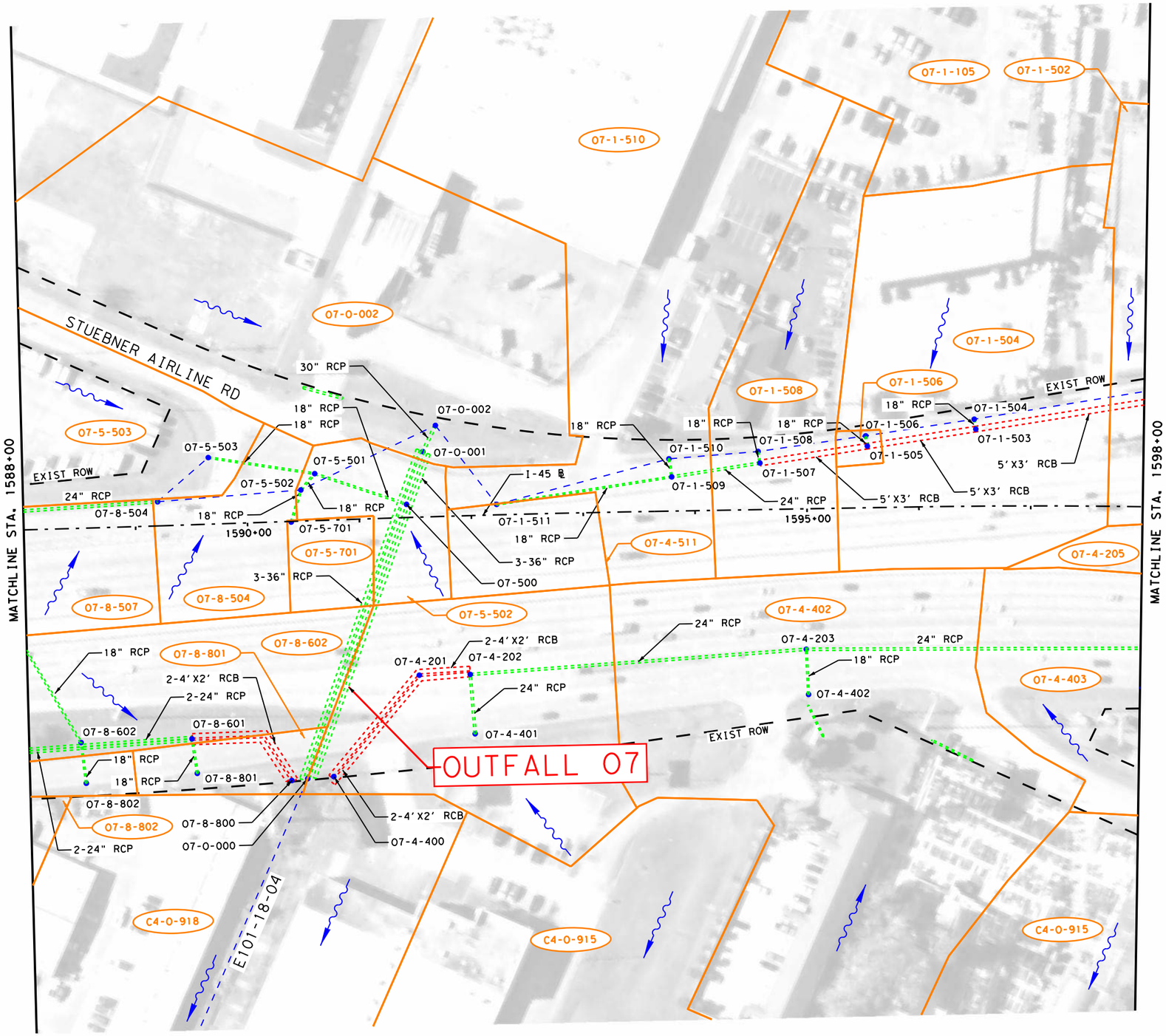
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1578+00 TO STA 1588+00

SHEET 10 OF 14

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_10.dgn
7/21/2021 11:00:34 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES
2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

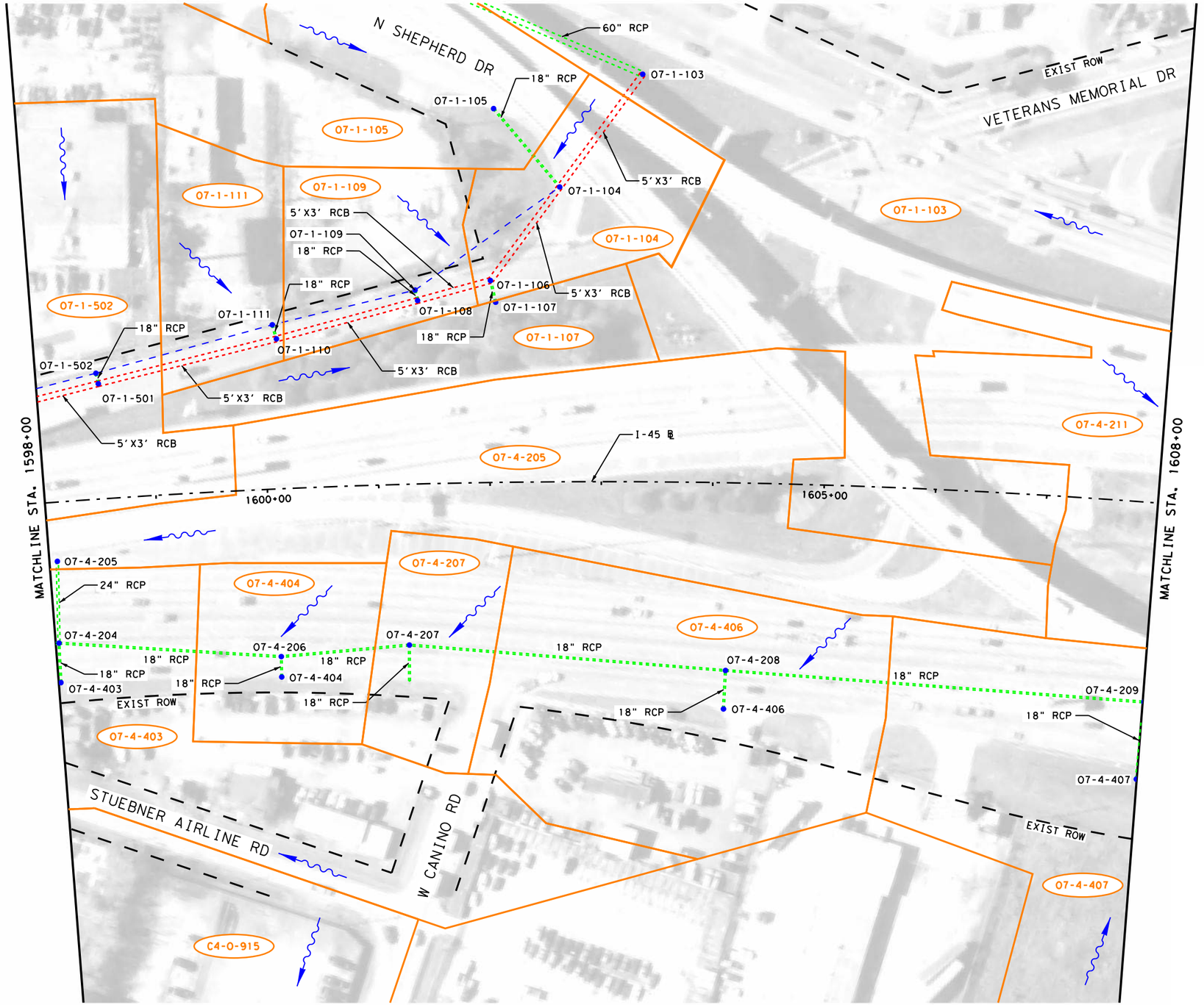
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1588+00 TO STA 1598+00

SHEET 11 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_11.dgn
7/21/2021 11:00:43 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

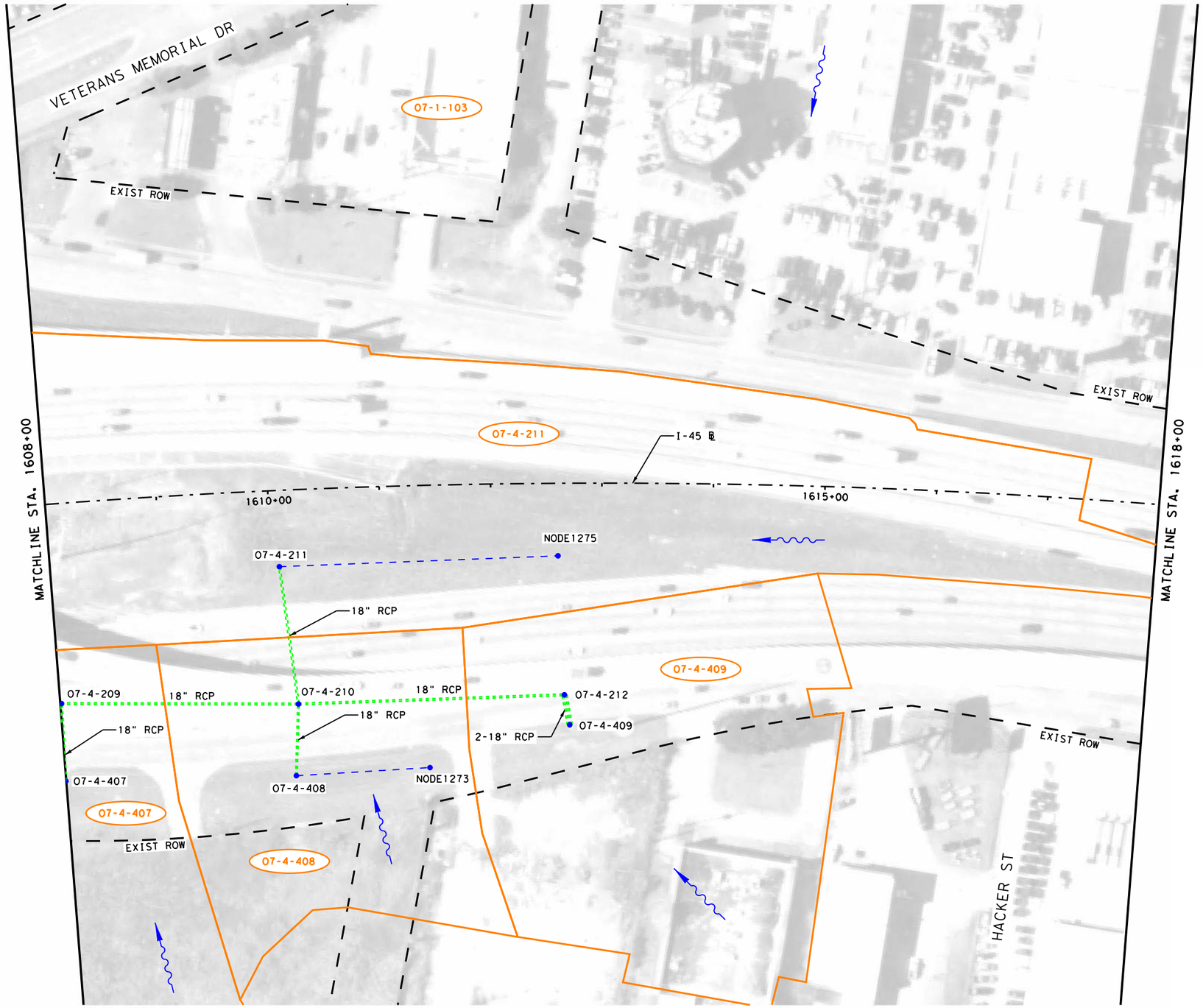
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1598+00 TO STA 1608+00

SHEET 12 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_12.dgn
7/21/2021 11:00:51 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1608+00 TO STA 1618+00

SHEET 13 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_DA_13.dgn
7/21/2021 11:01:00 AM

0 50 100

SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE
- XX-X-XXX — DRAINAGE AREA LABEL

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

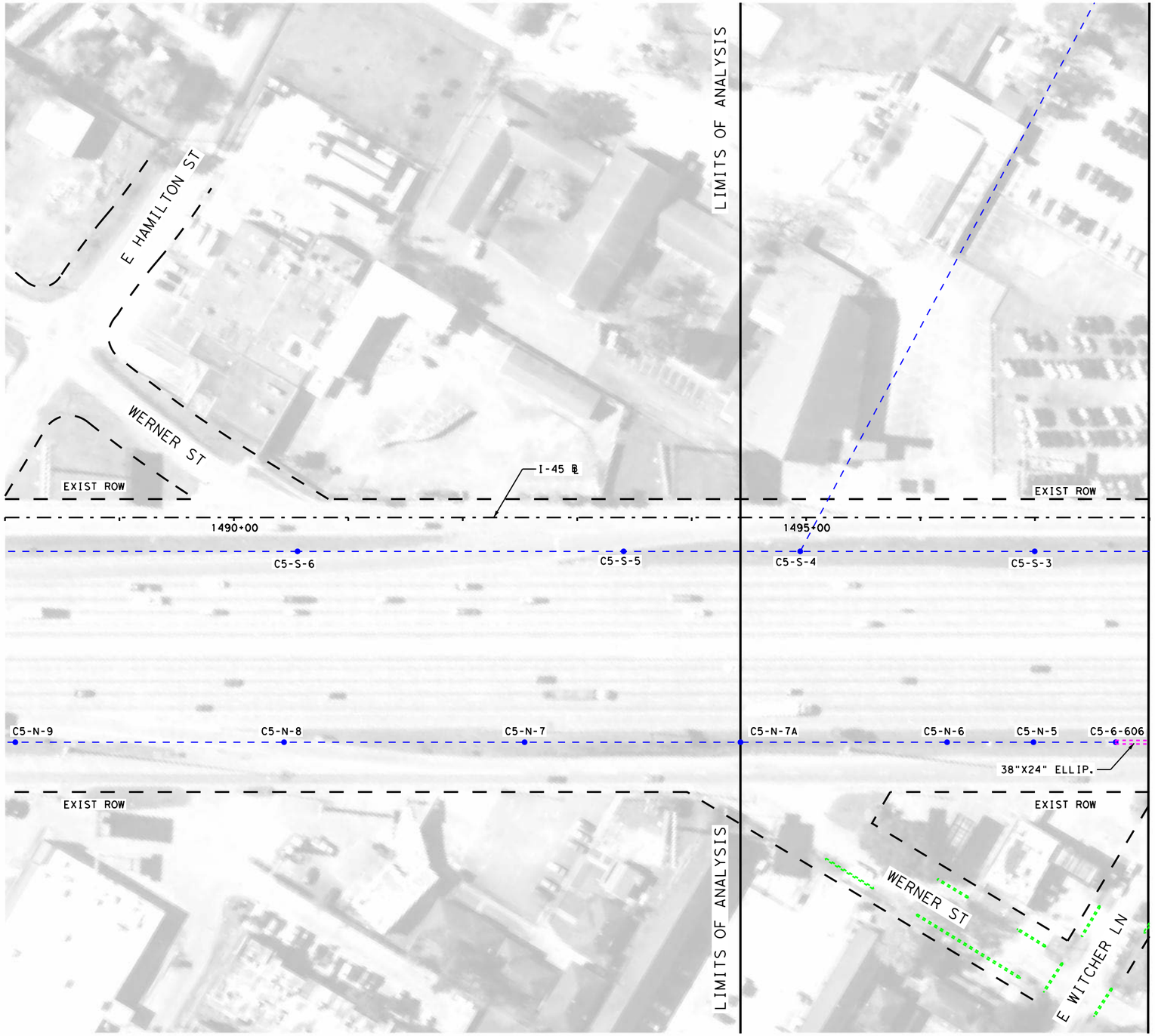
I-45
EXHIBIT 3
EXISTING DRAINAGE AREA MAP
STA 1618+00 TO PROJECT END

SHEET 14 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT\HOU\I4 I-45N TXD 2022\CADD\SHEETS\I-45_EXIST_DA_14.dgn
7/21/2021 11:01:07 AM

EXHIBIT 4



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

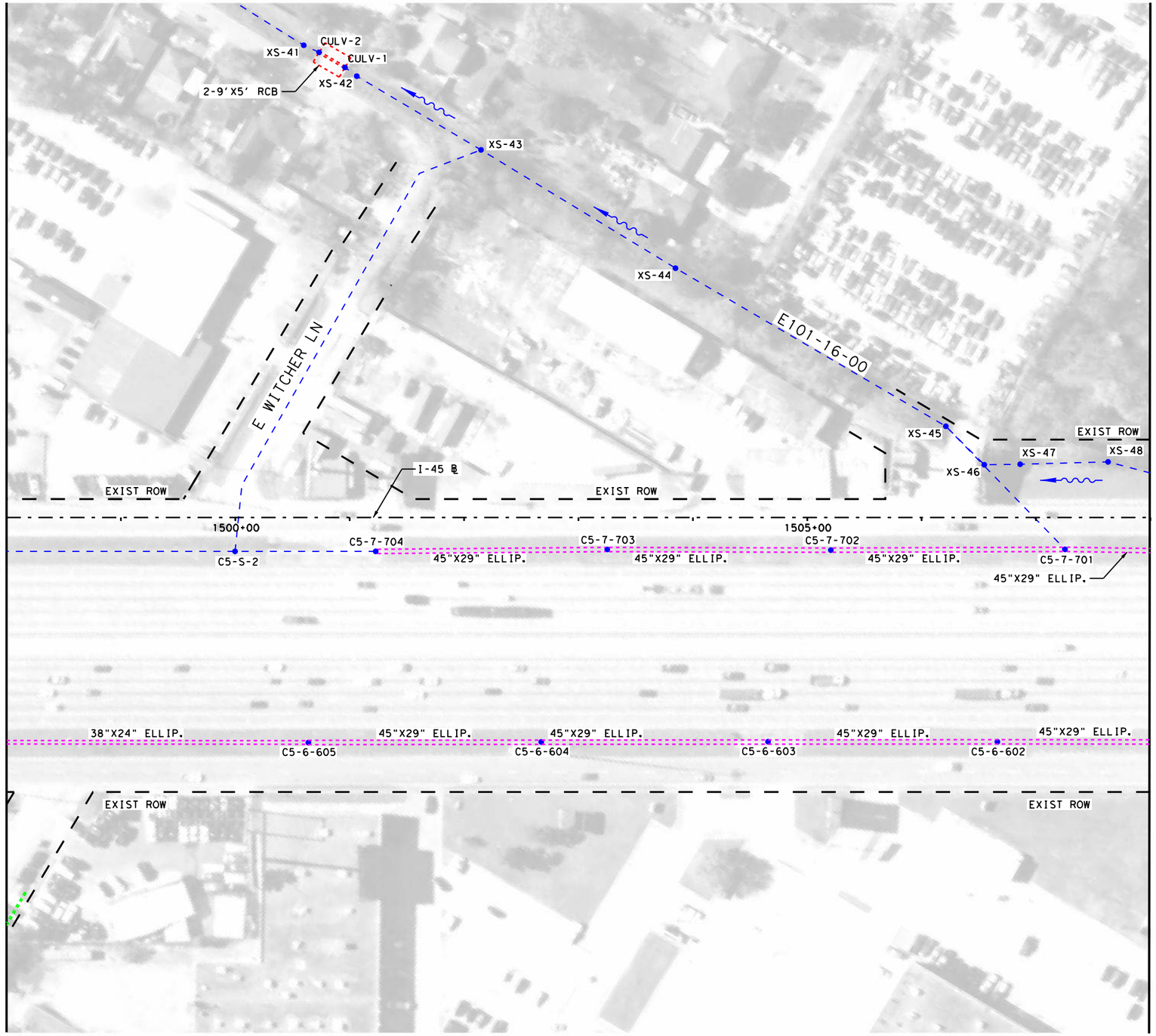
tnp

I-45
EXHIBIT 4
EXISTING SWMM LAYOUT
PROJECT START TO STA 1498+00

SHEET 1 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_01.dgn
7/21/2021 11:01:16 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 4

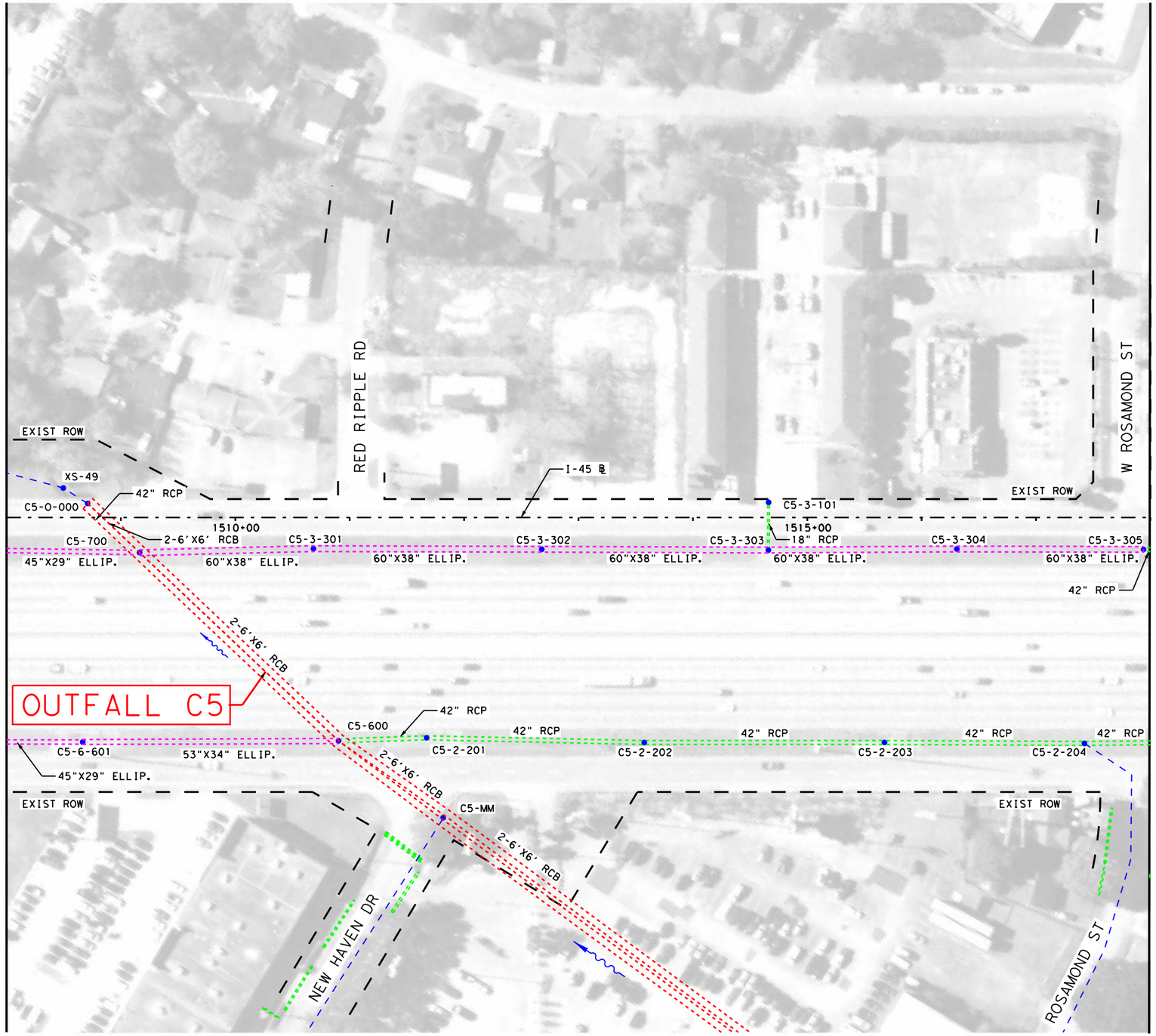
EXISTING SWMM LAYOUT

STA 1498+00 TO STA 1508+00

SHEET 2 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_02.dgn
7/21/2021 11:01:24 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

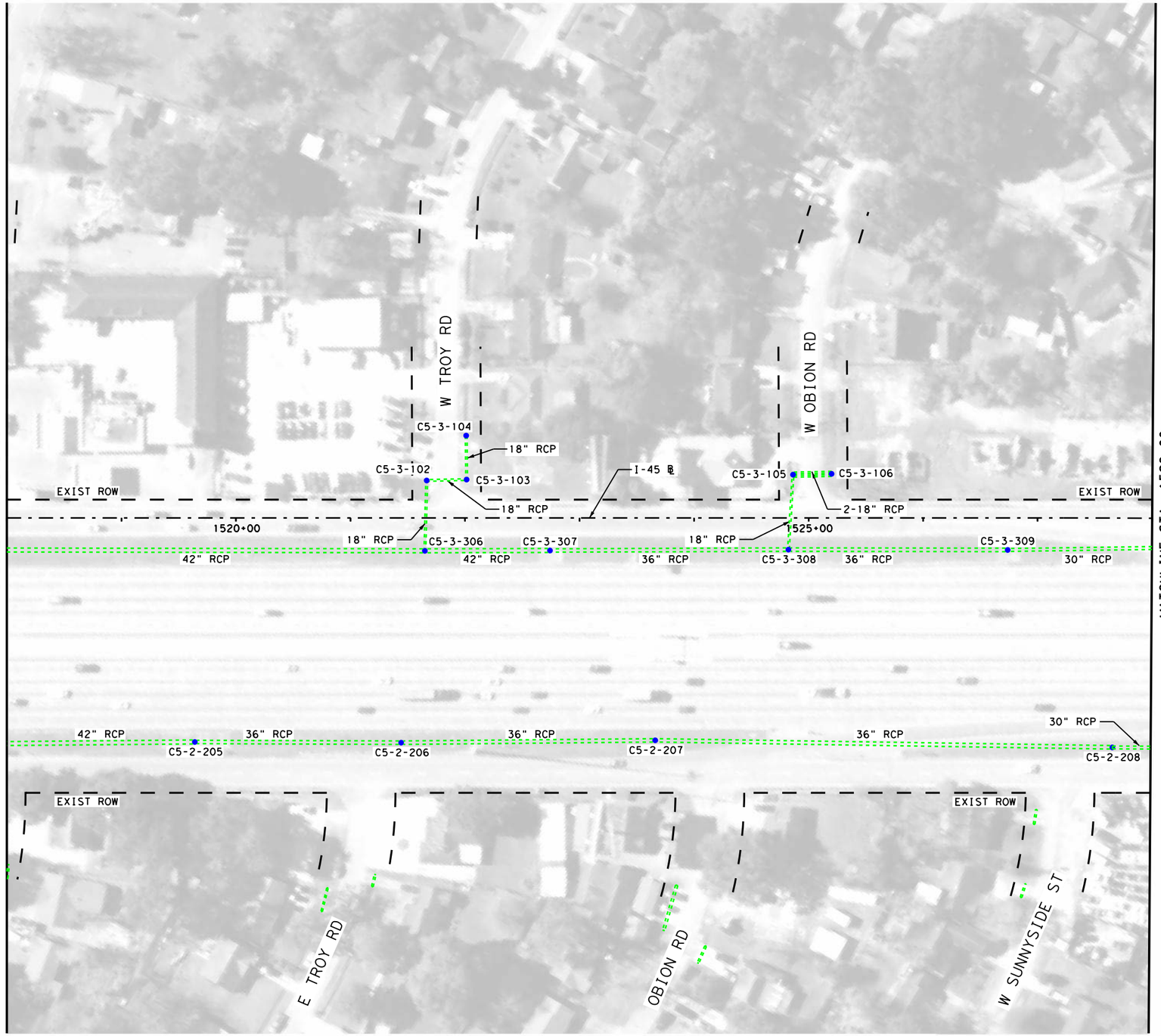
I-45

EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1508+00 TO STA 1518+00

SHEET 3 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_03.dgn
7/21/2021 11:01:32 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

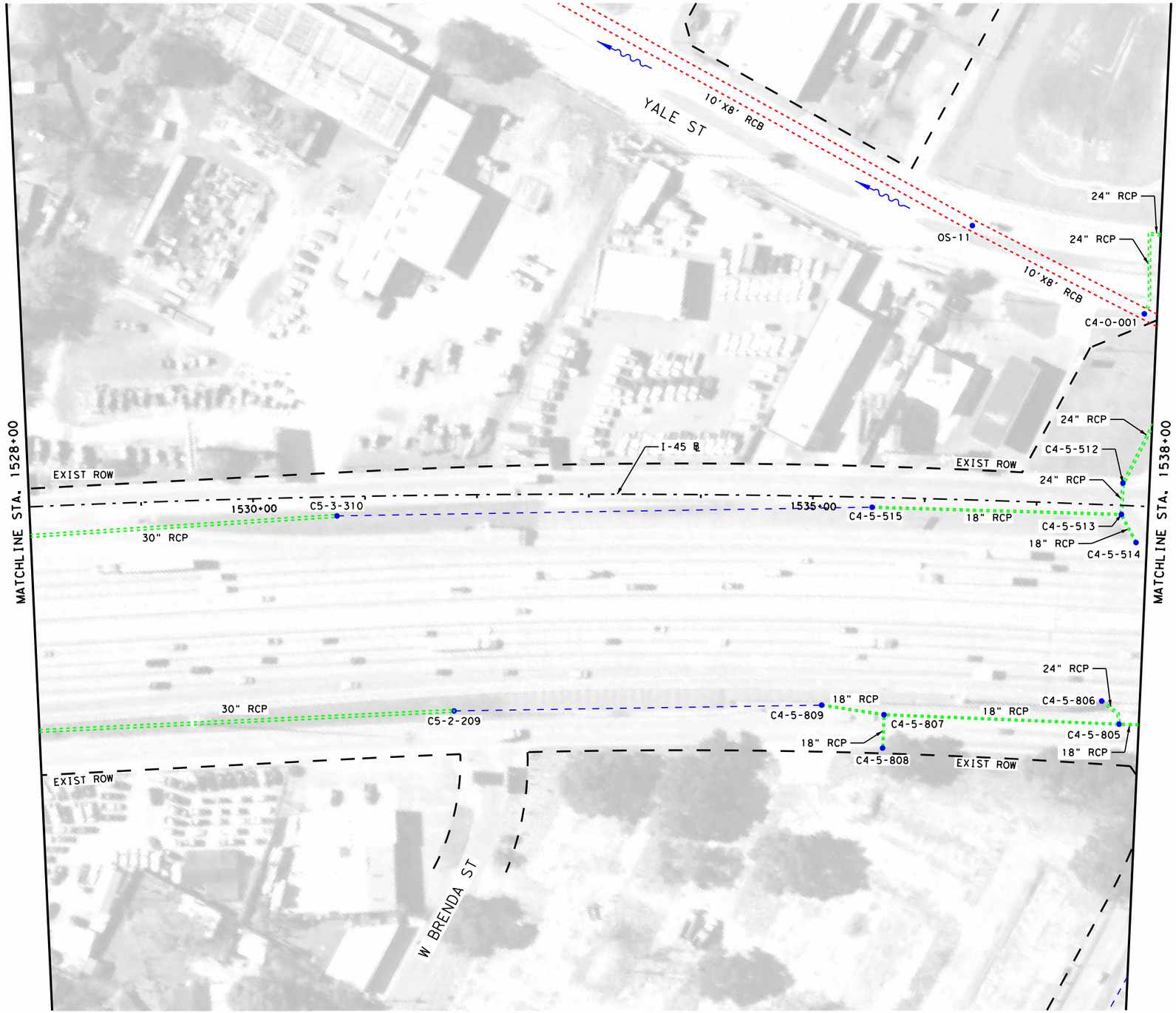
tnp

I-45
EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1518+00 TO STA 1528+00

SHEET 4 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_04.dgn
7/21/2021 11:01:41 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

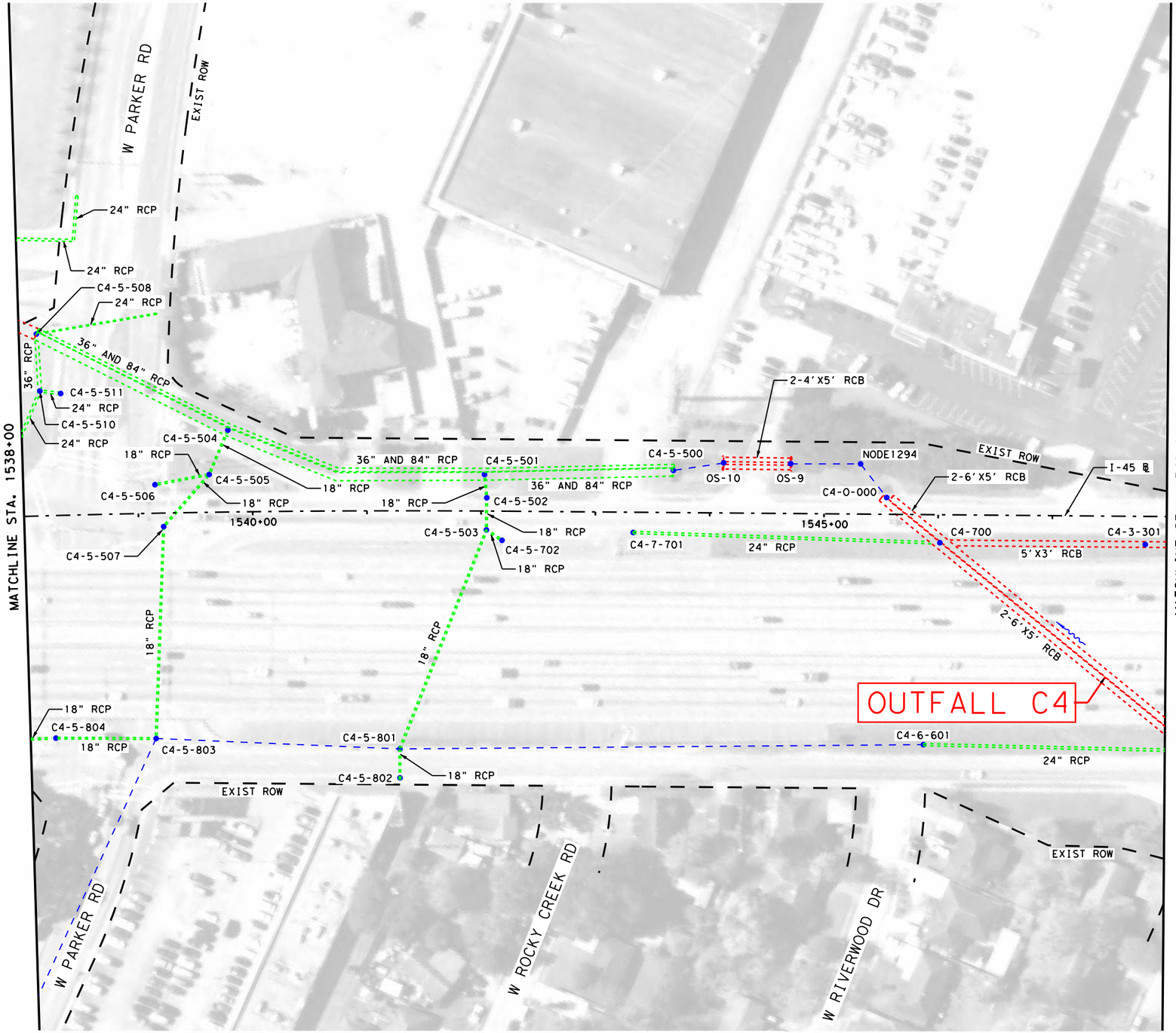
tnp

I-45
EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1528+00 TO STA 1538+00

SHEET 5 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4_I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_05.dgn
7/21/2021 11:01:50 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

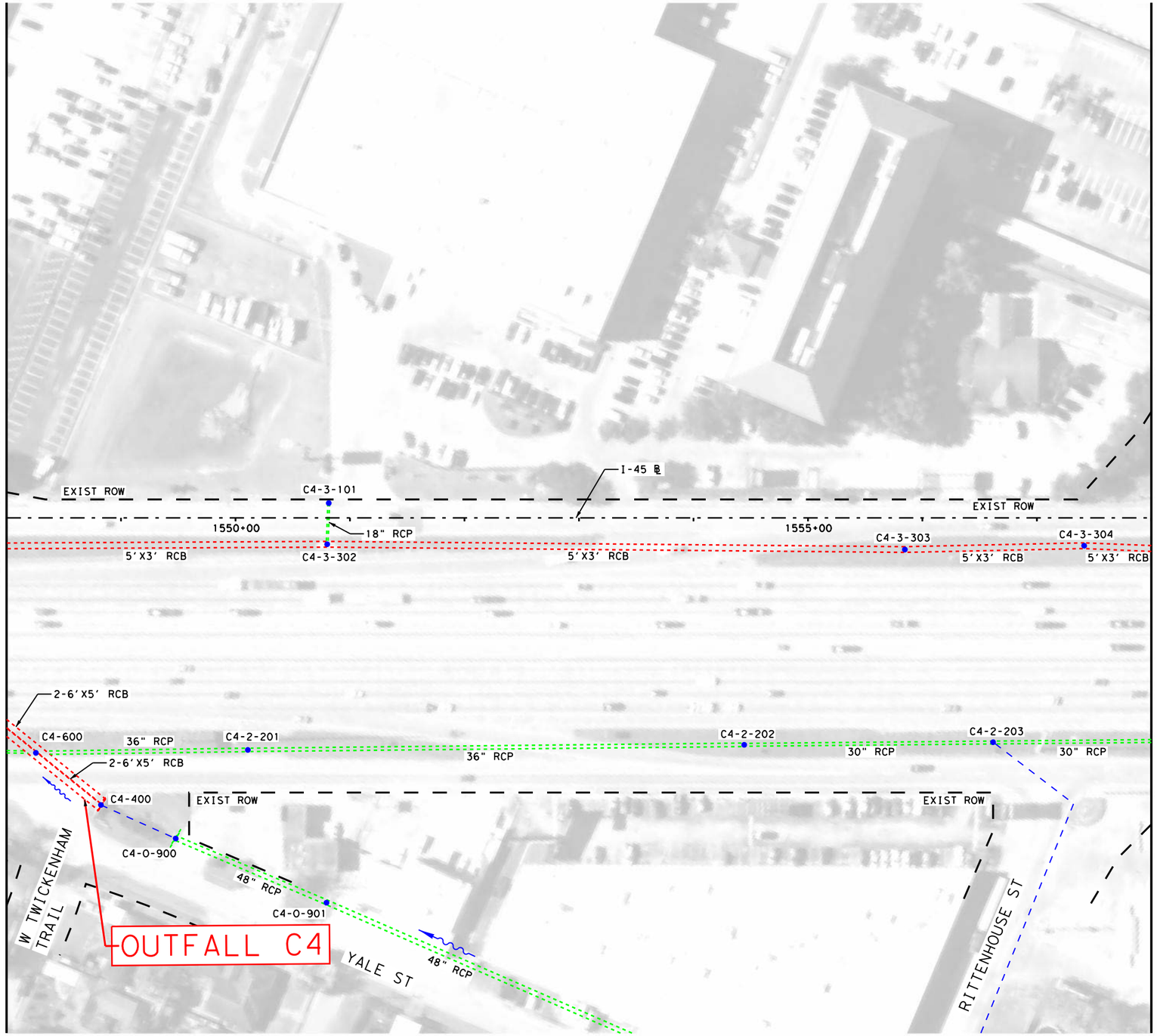
tnp

I-45
EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1538+00 TO STA 1548+00

SHEET 6 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_06.dgn
7/21/2021 11:01:57 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 4

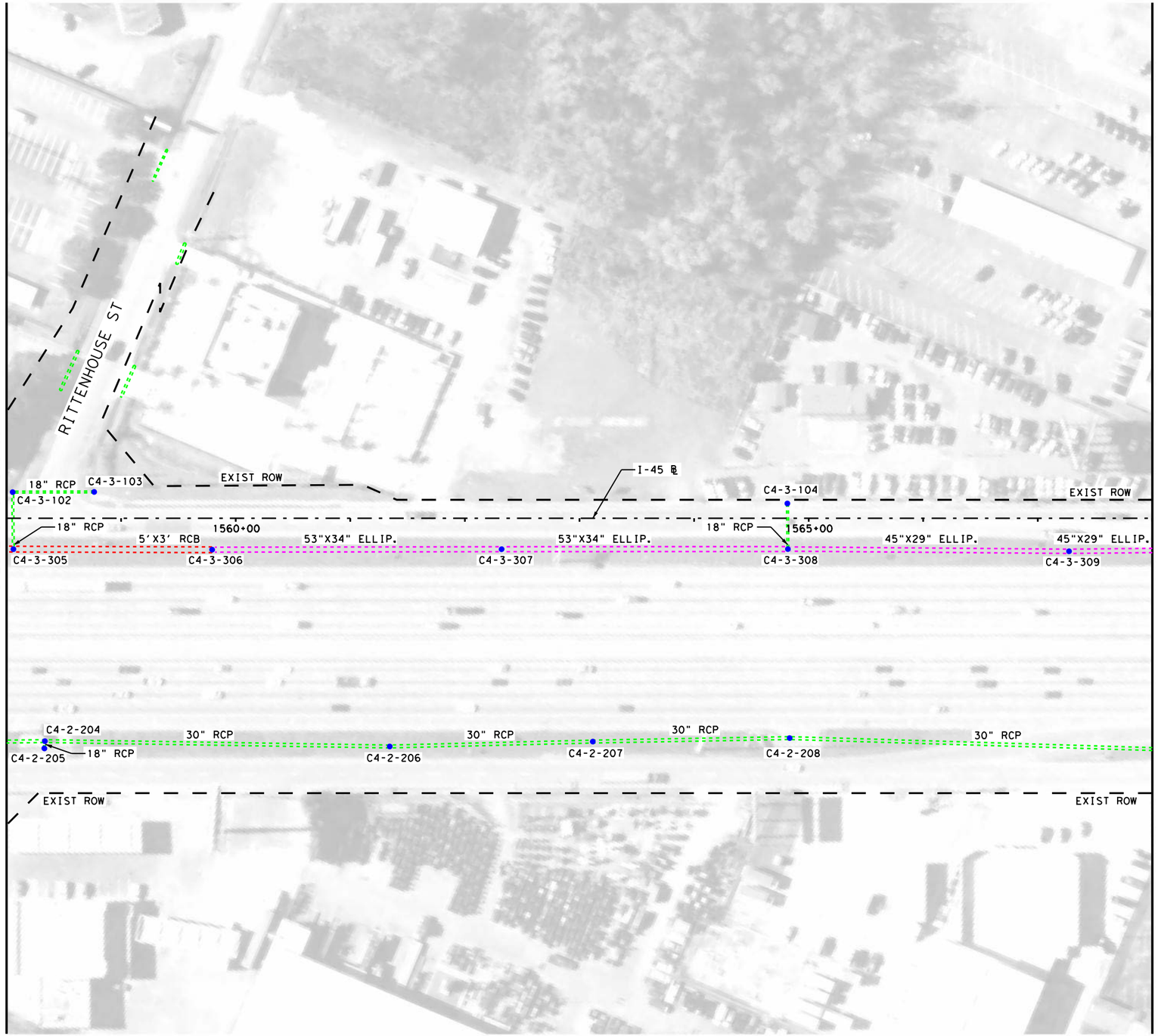
EXISTING SWMM LAYOUT

STA 1548+00 TO STA 1558+00

SHEET 7 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_07.dgn
7/21/2021 11:02:05 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

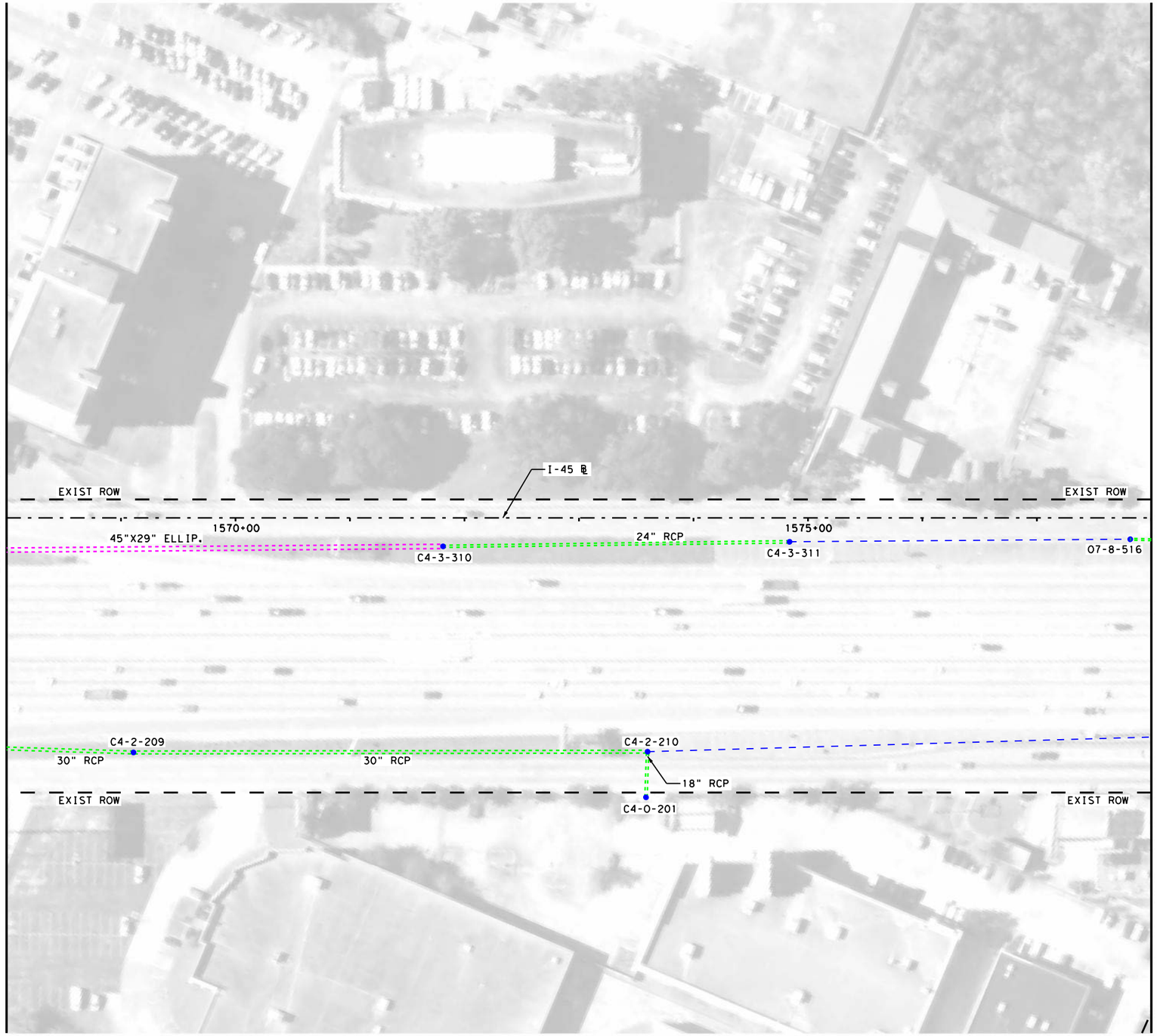
I-45

EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1558+00 TO STA 1568+00

SHEET 8 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_08.dgn
7/21/2021 11:02:13 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

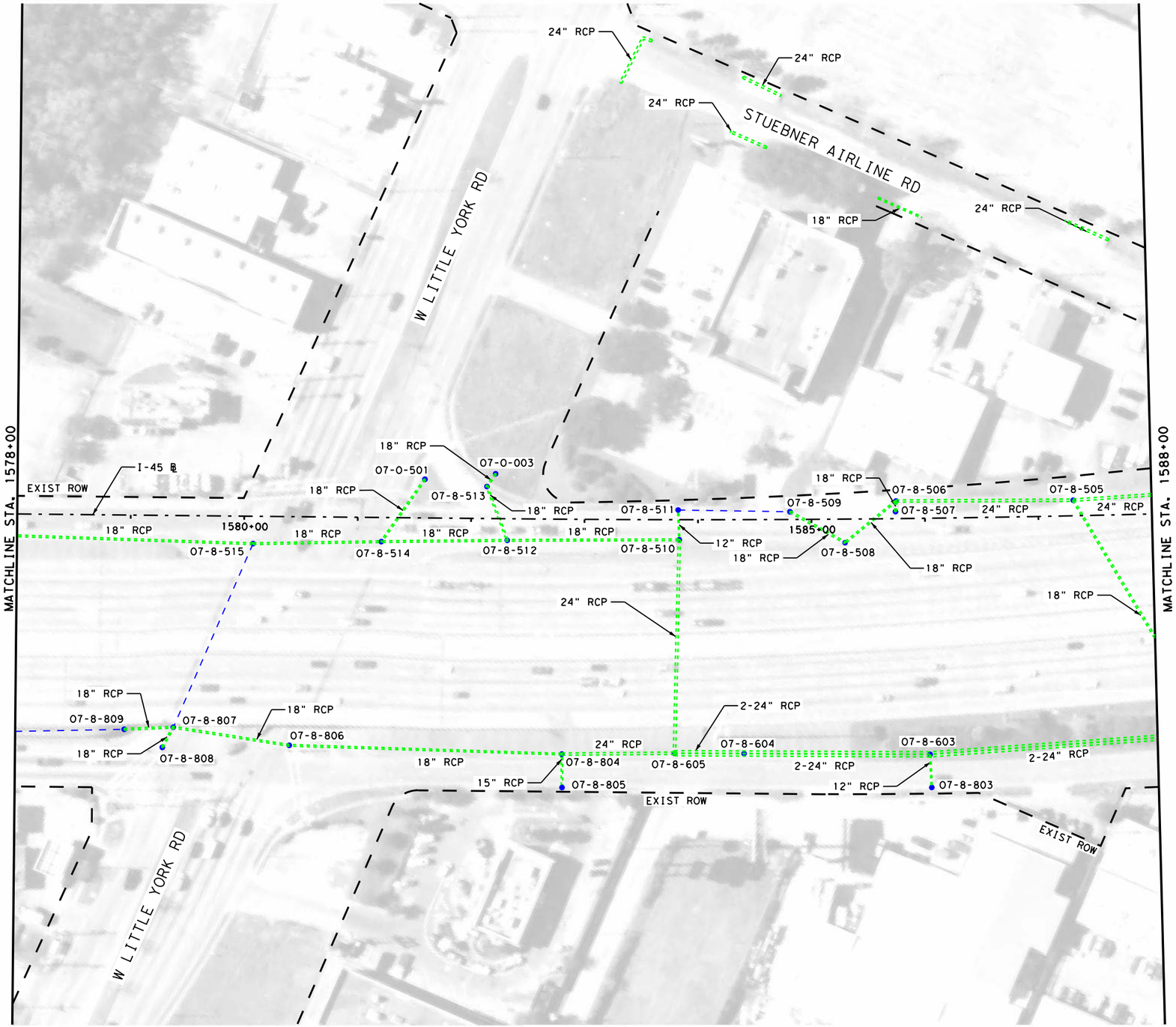
I-45

EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1568+00 TO STA 1578+00

SHEET 9 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_09.dgn
7/21/2021 11:02:20 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 4

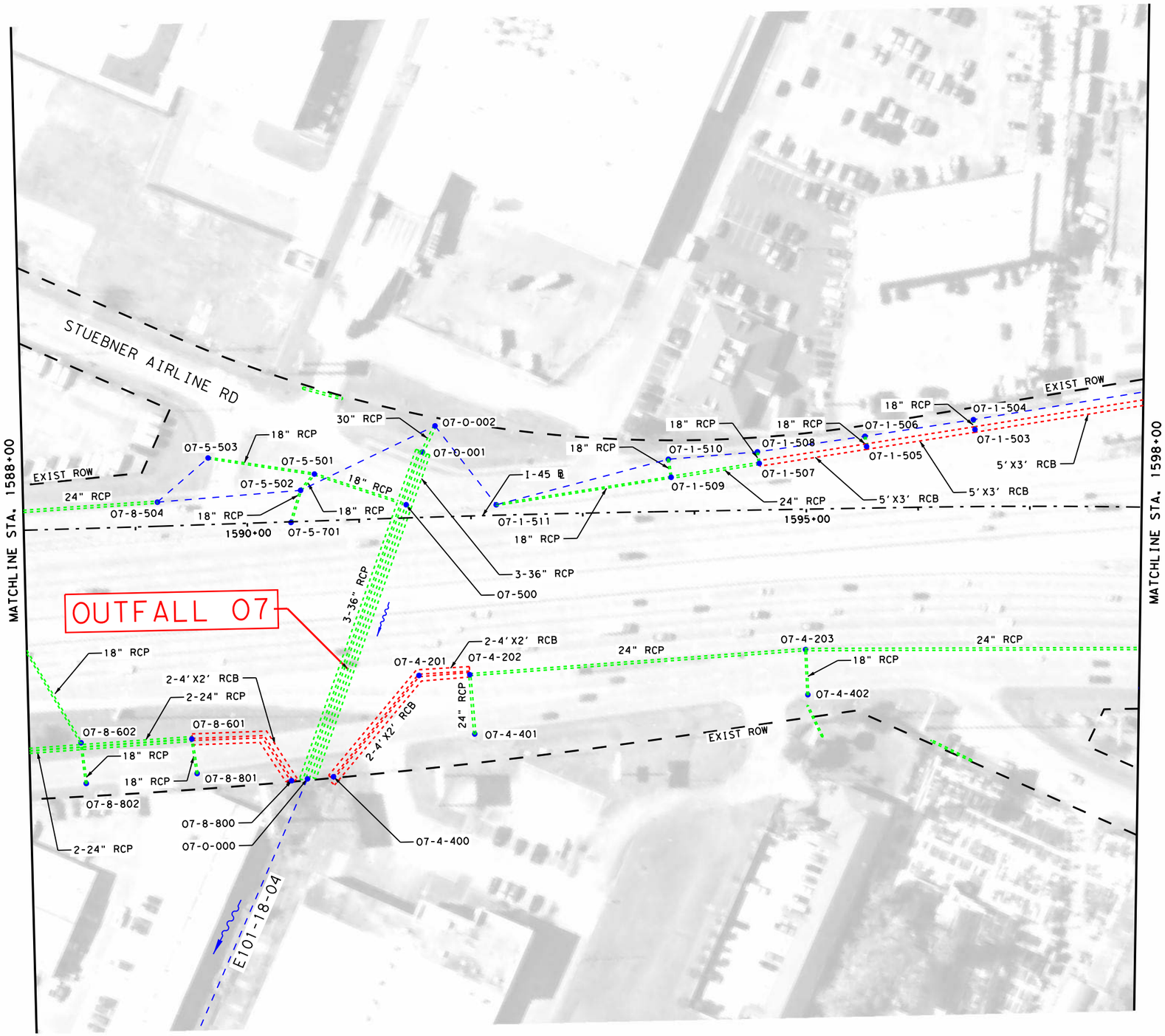
EXISTING SWMM LAYOUT

STA 1578+00 TO STA 1588+00

SHEET 10 OF 13

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_10.dgn
7/21/2021 11:02:28 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 4

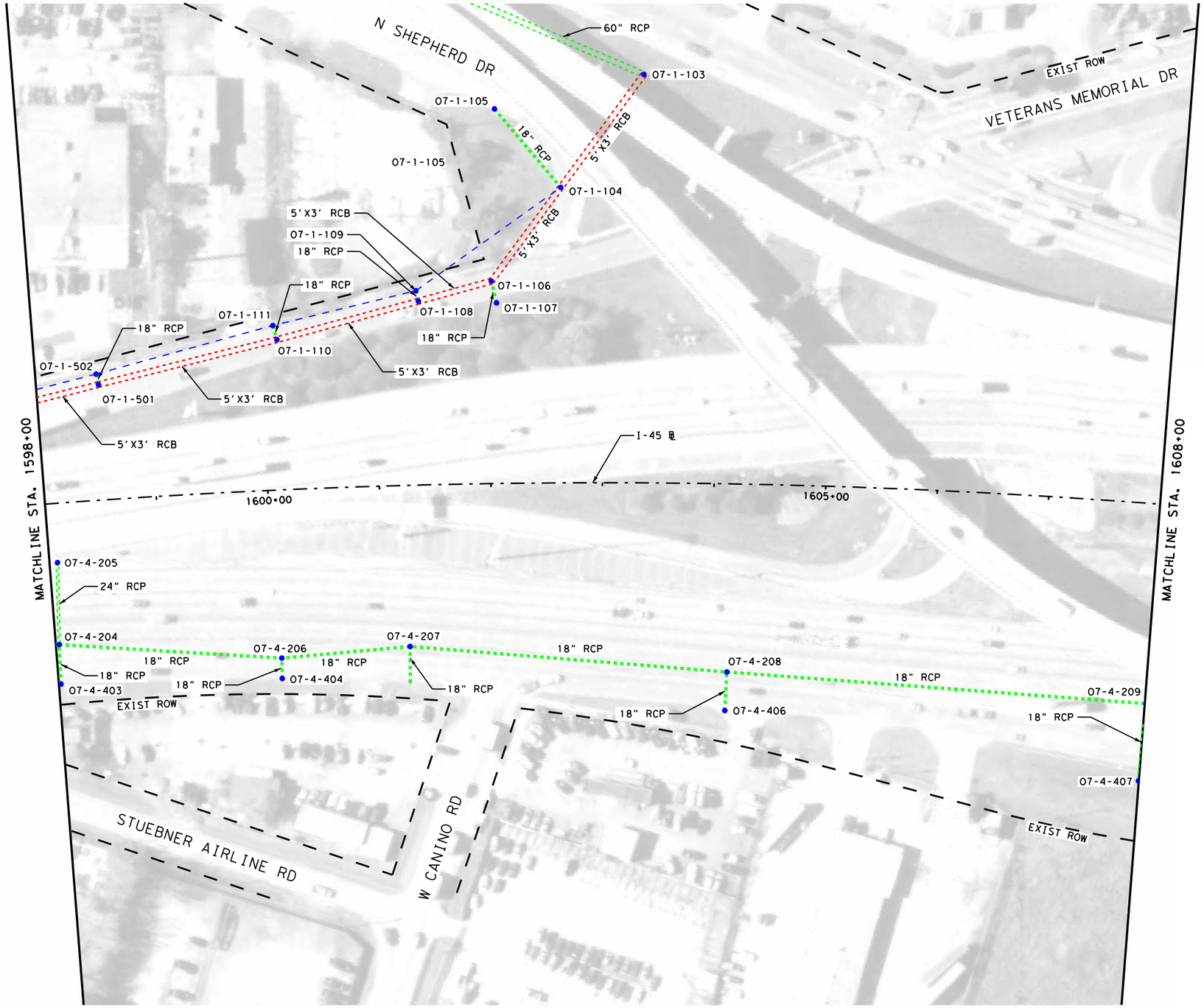
EXISTING SWMM LAYOUT

STA 1588+00 TO STA 1598+00

SHEET 11 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_11.dgn
7/21/2021 11:02:36 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

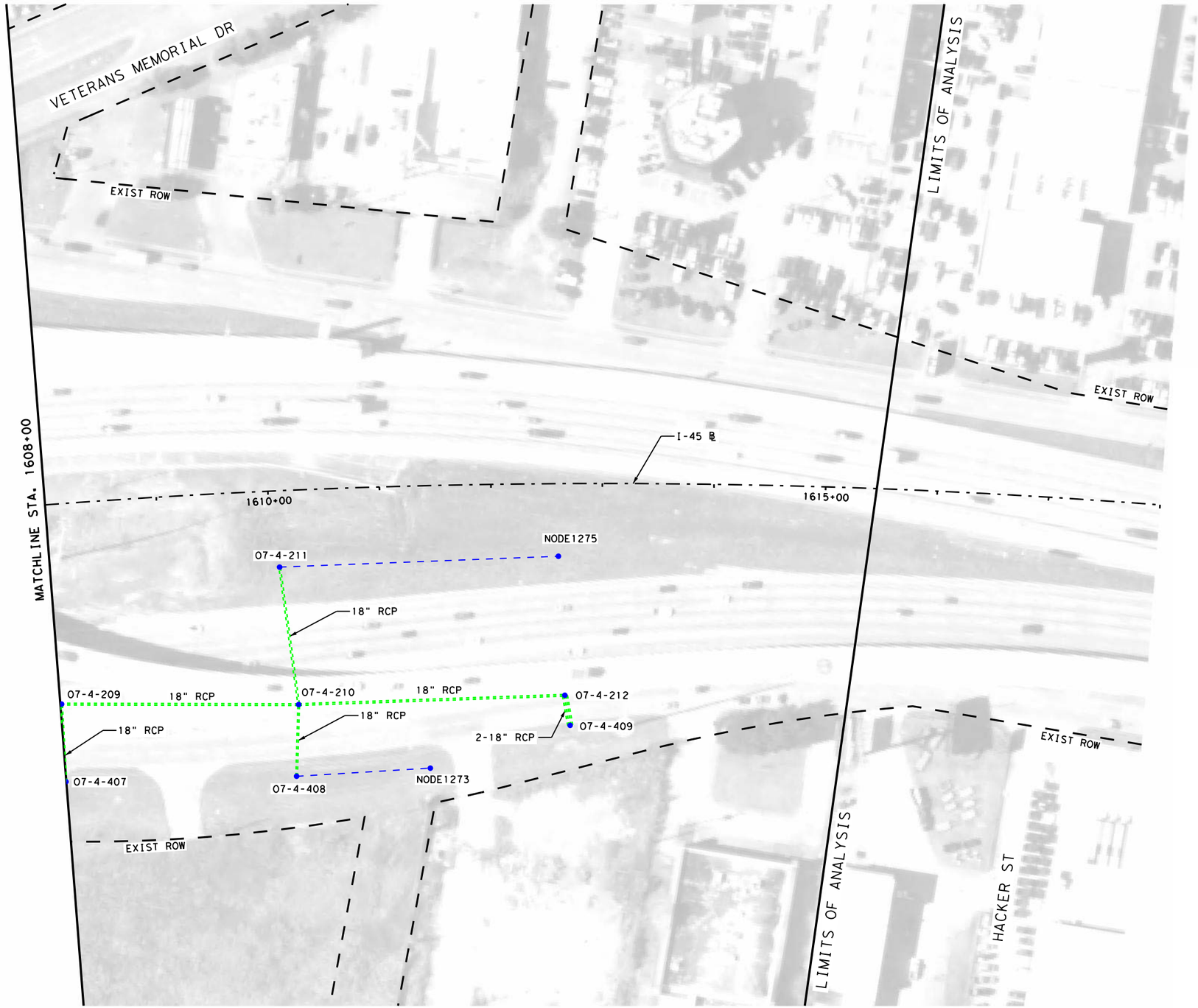
tnp

I-45
EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1598+00 TO STA 1608+00

SHEET 12 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\A4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_12.dgn
7/21/2021 11:02:44 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 5: EXISTING OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

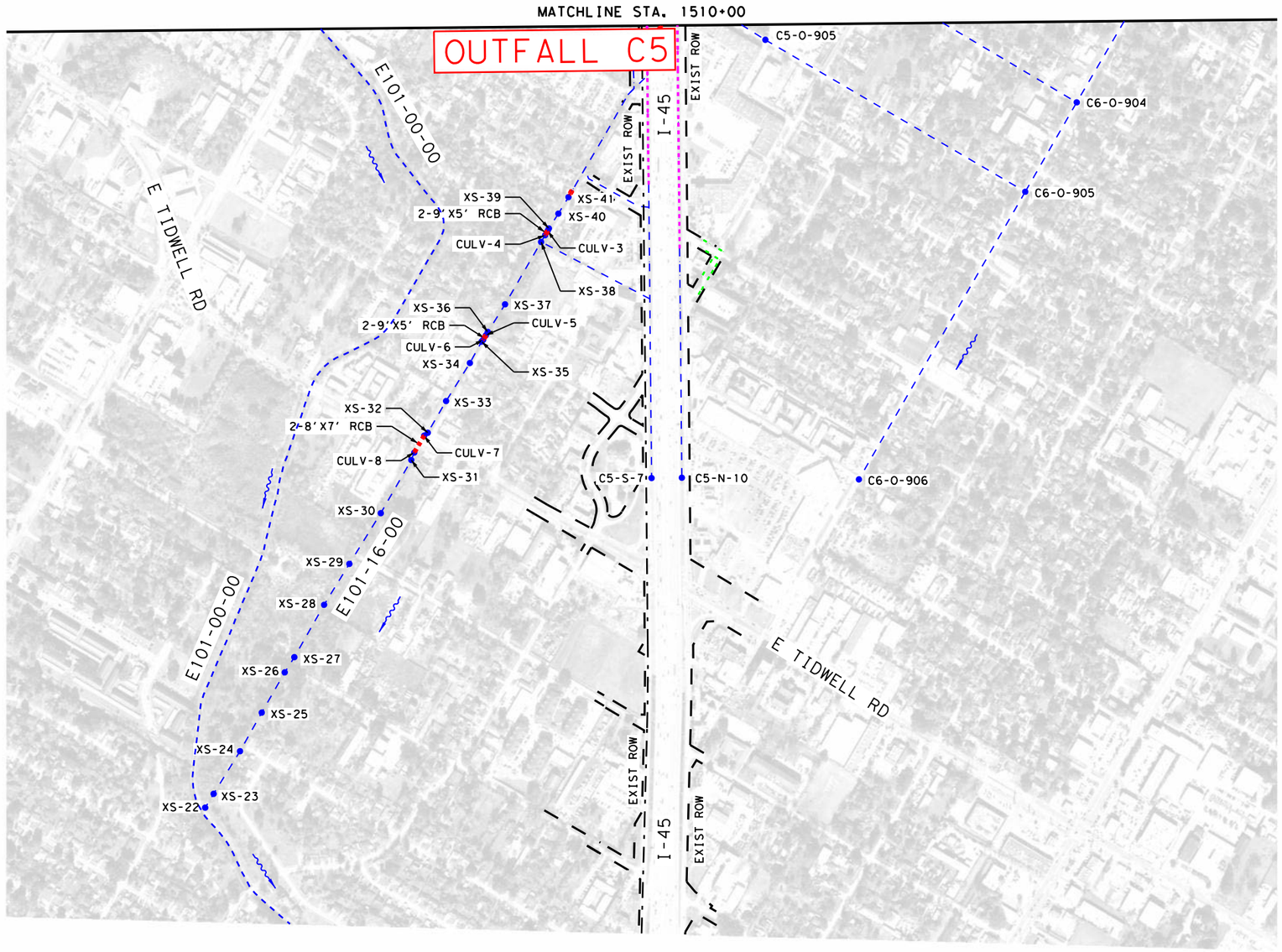
I-45
EXHIBIT 4
EXISTING SWMM LAYOUT
STA 1608+00 TO PROJECT END

SHEET 13 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_LAYOUT_13.dgn
7/21/2021 11:02:52 AM

EXHIBIT 5



0 350 700

SCALE: 1" = 700'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 4: EXISTING SWMM LAYOUT FOR ONSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

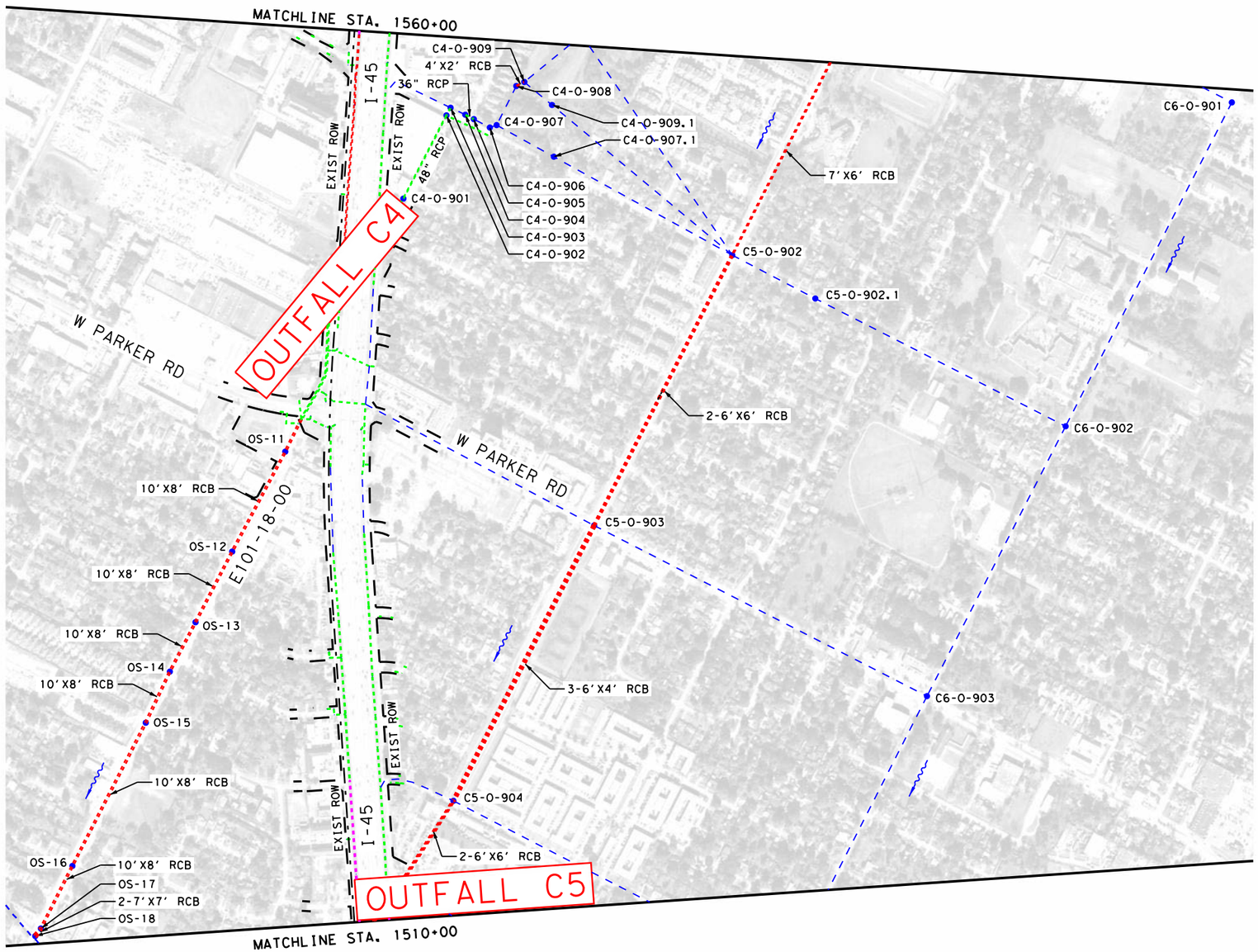
I-45

EXHIBIT 5
EXISTING OFFSITE SWMM LAYOUT
PROJECT START TO STA 1510+00

SHEET 1 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_OFFSITE_LAYOUT_01.dgn
7/21/2021 11:02:59 AM



0 350 700

SCALE: 1" = 700'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 4: EXISTING SWMM LAYOUT FOR ONSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 5

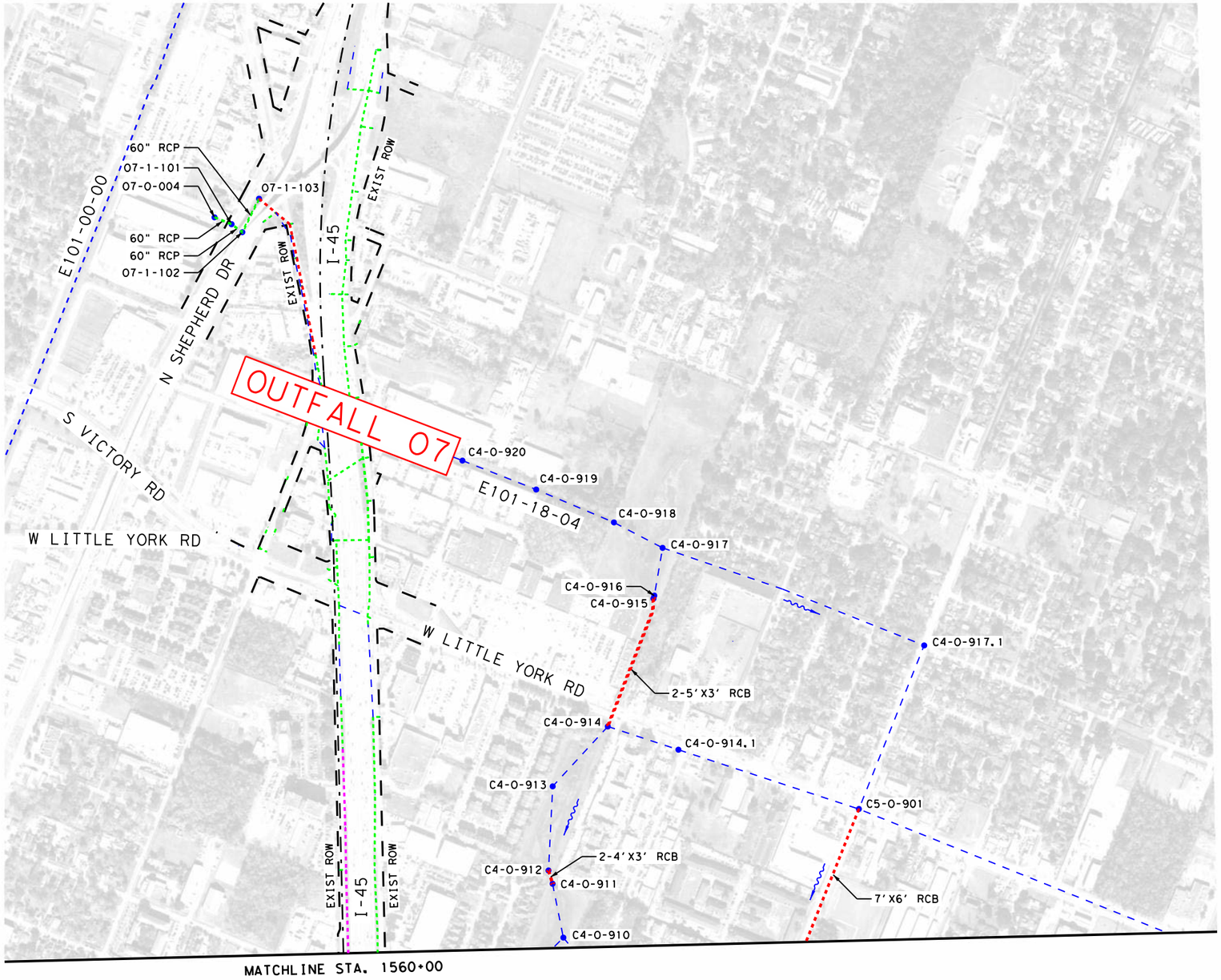
EXISTING OFFSITE SWMM LAYOUT

STA 1510+00 TO STA 1560+00

SHEET 2 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_OFFSITE_LAYOUT_02.dgn
7/21/2021 11:03:06 AM



0 350 700

SCALE: 1" = 700'

LEGEND

- SWMM NODE
- EXIST SWMM LINK
- EXIST RCP
- EXIST RCB
- EXIST ELLIP. PIPE

NOTES:

1. SEE EXHIBIT 4: EXISTING SWMM LAYOUT FOR ONSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 5

EXISTING OFFSITE SWMM LAYOUT

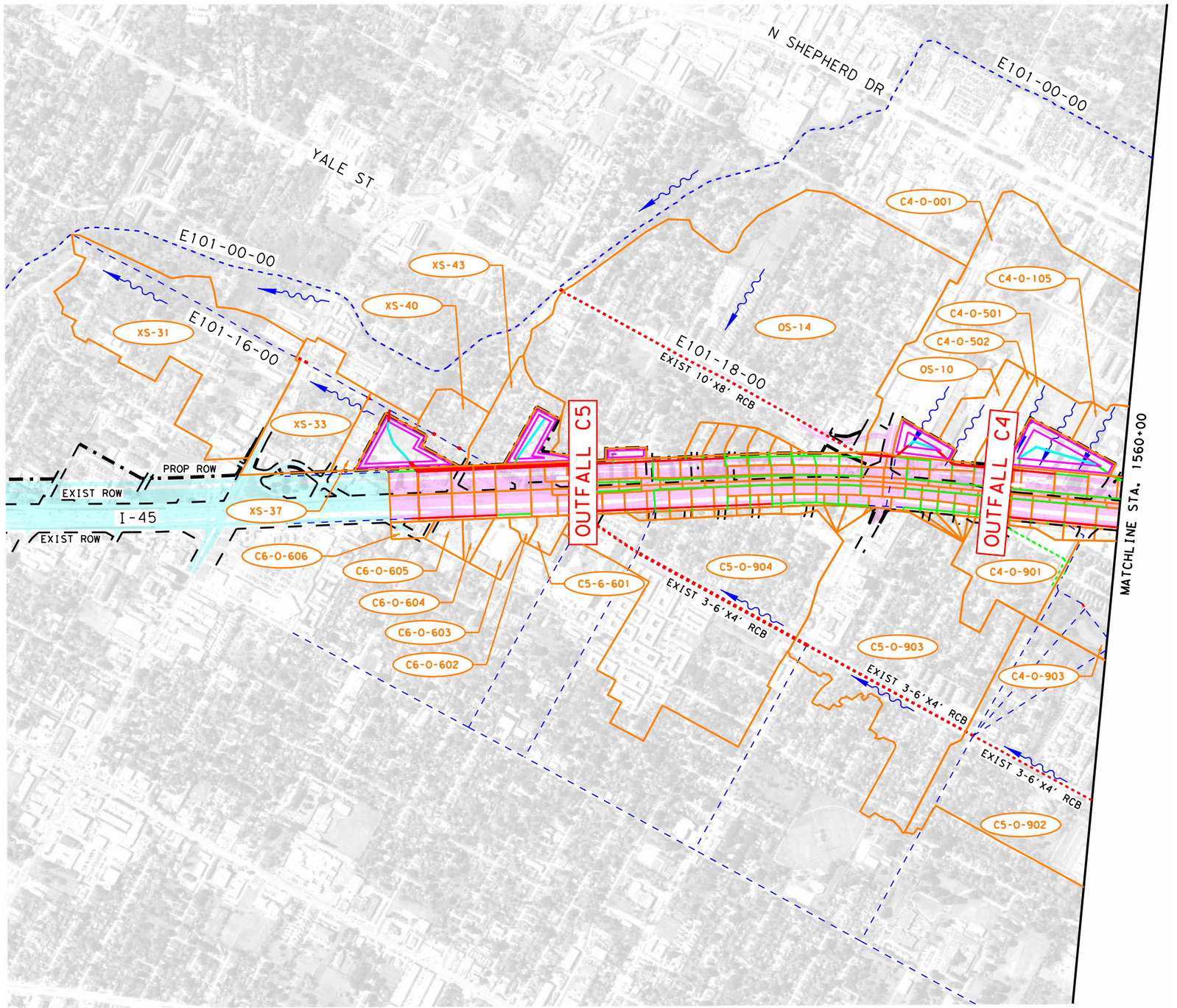
STA 1560+00 TO PROJECT END

SHEET 3 OF 3

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 20022\CADD\SHEETS\I-45_EXIST_OFFSITE_LAYOUT_03.dgn
7/21/2021 11:03:13 AM

EXHIBIT 6



0 500 1000
SCALE: 1" = 1000'

LEGEND

- FLOW DIRECTION
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

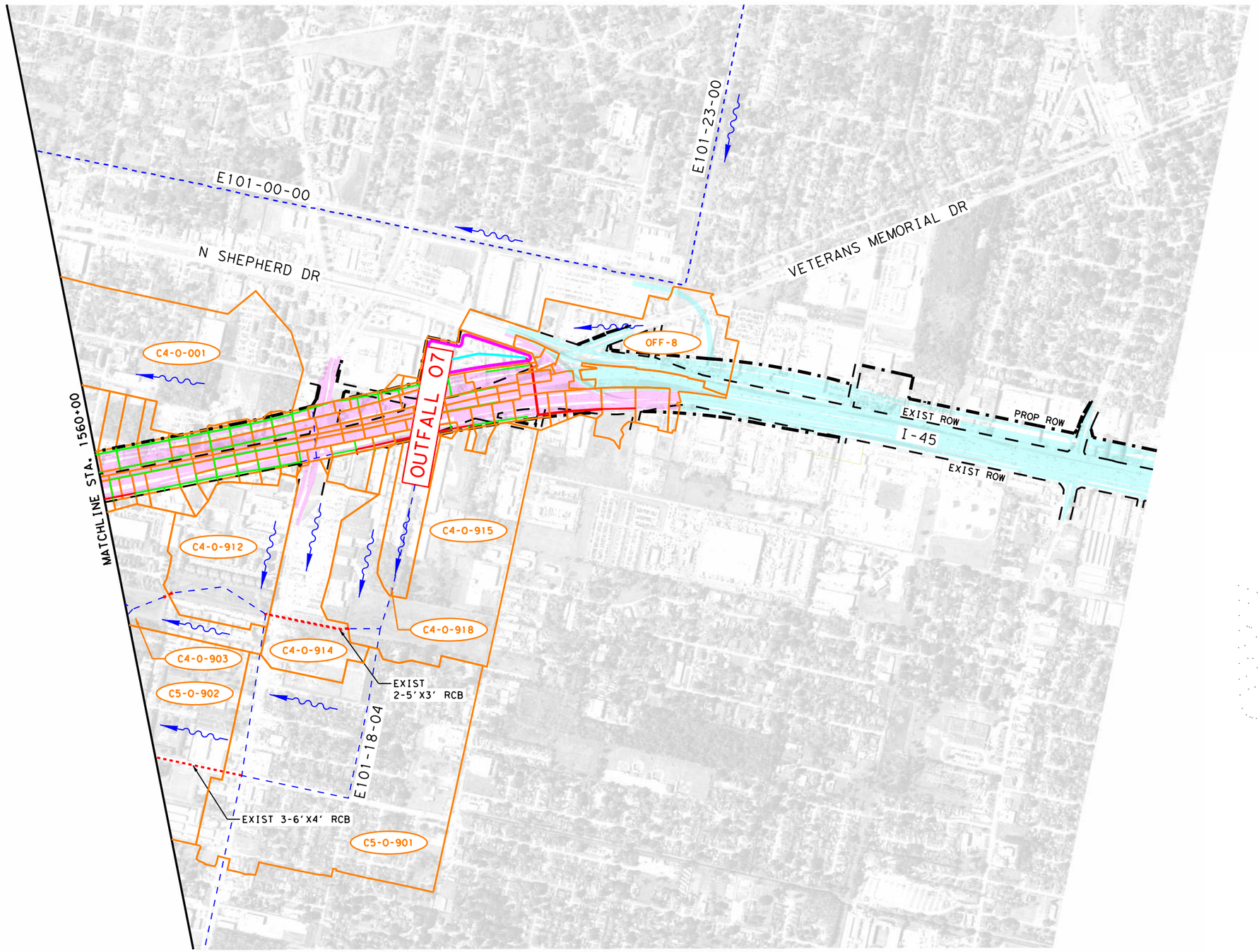
tnp

I-45
EXHIBIT 6
PROPOSED OVERALL DRAINAGE AREA MAP
PROJECT START TO STA 1560+00

SHEET 1 OF 2

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT19HOU\04 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_ODA_01.dgn
7/21/2021 11:03:22 AM



0 500 1000

SCALE: 1" = 1000'

LEGEND

- FLOW DIRECTION
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 6

PROPOSED OVERALL DRAINAGE AREA MAP

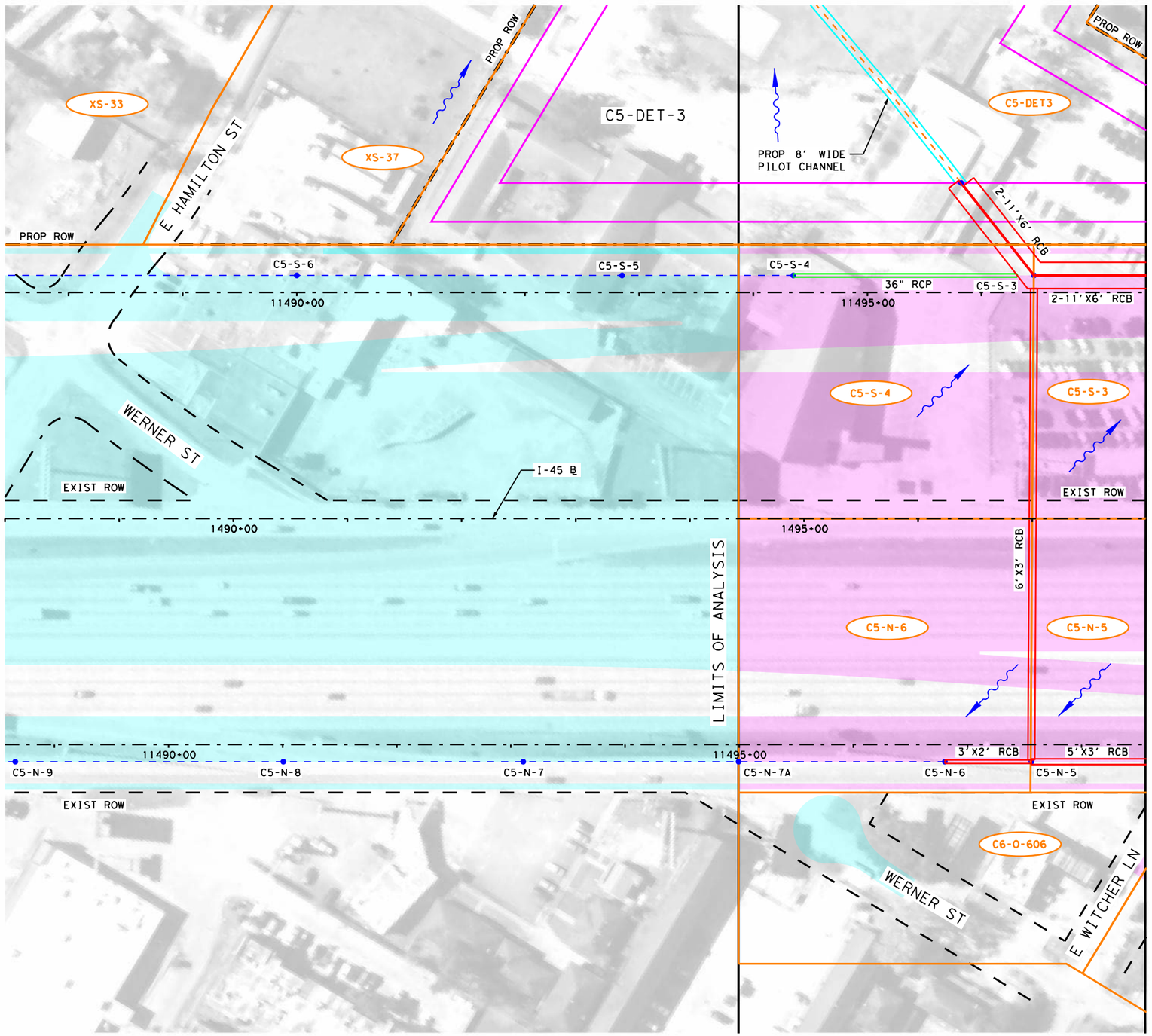
STA 1560+00 TO PROJECT END

SHEET 2 OF 2

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_ODA_02.dgn
7/21/2021 11:03:30 AM

EXHIBIT 7



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

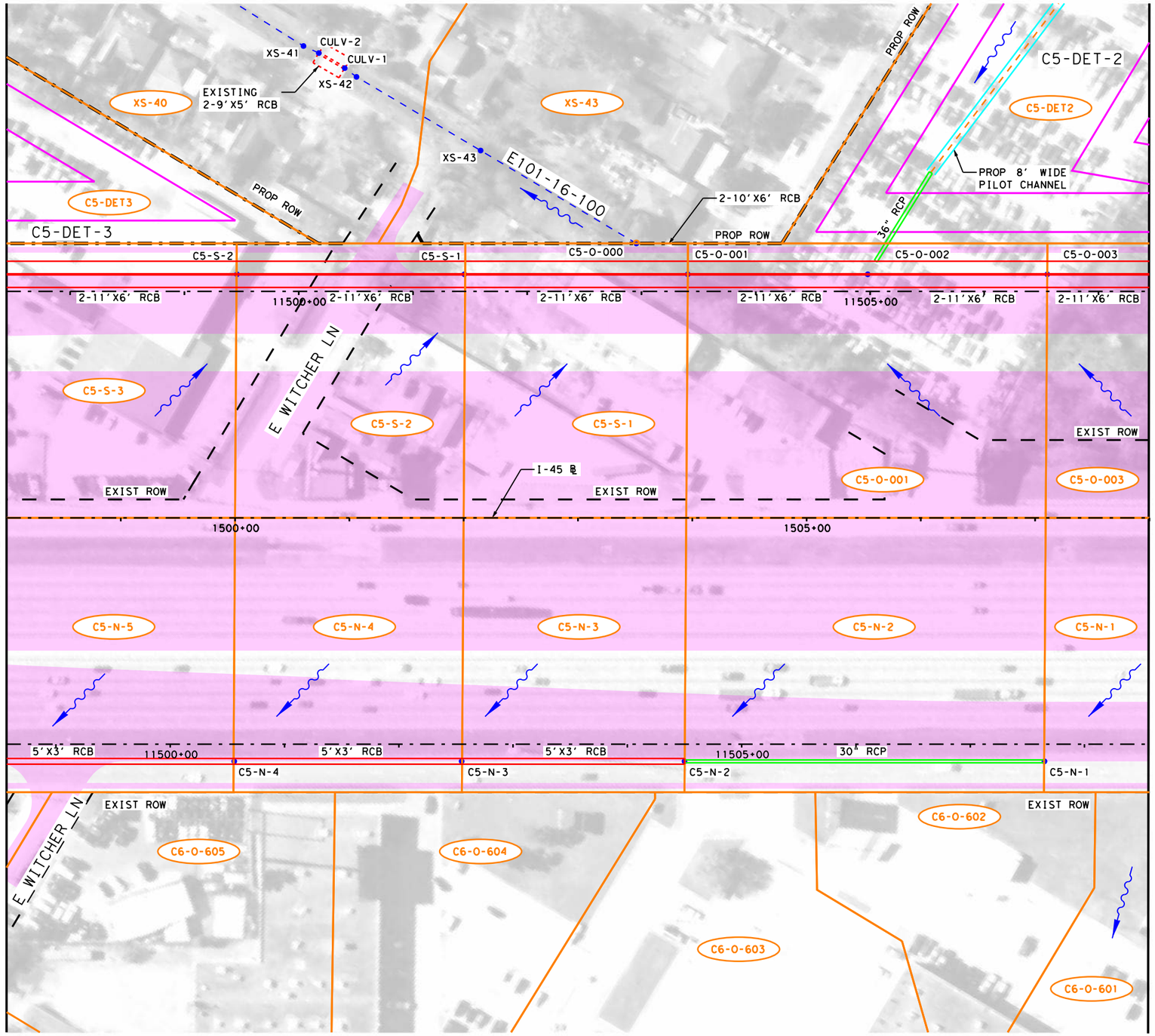
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
PROJECT START TO STA 1498+00

SHEET 1 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_DA_01.dgn
7/21/2021 11:03:39 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

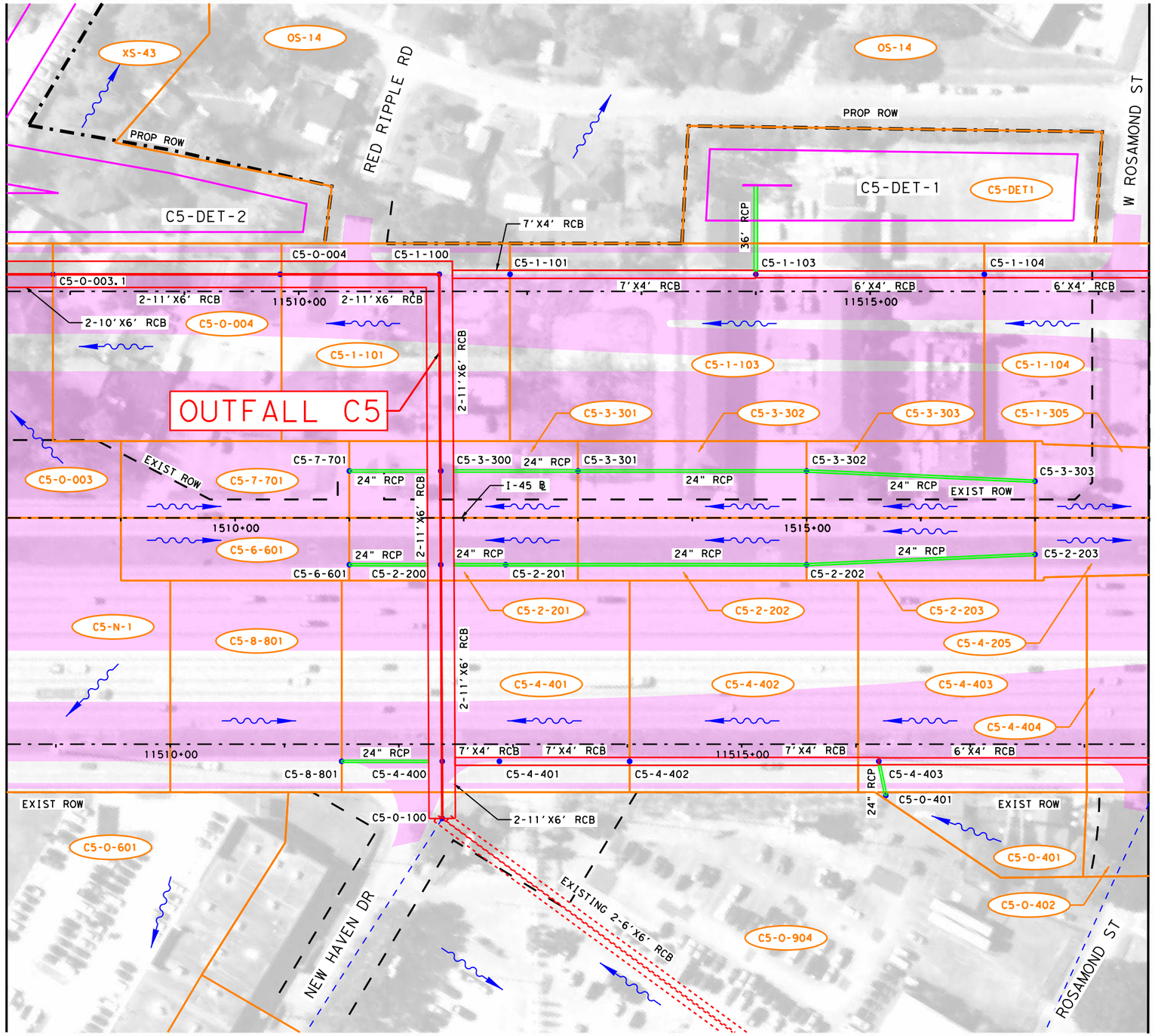
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1498+00 TO STA 1508+00

SHEET 2 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_DA_02.dgn
7/21/2021 11:03:46 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

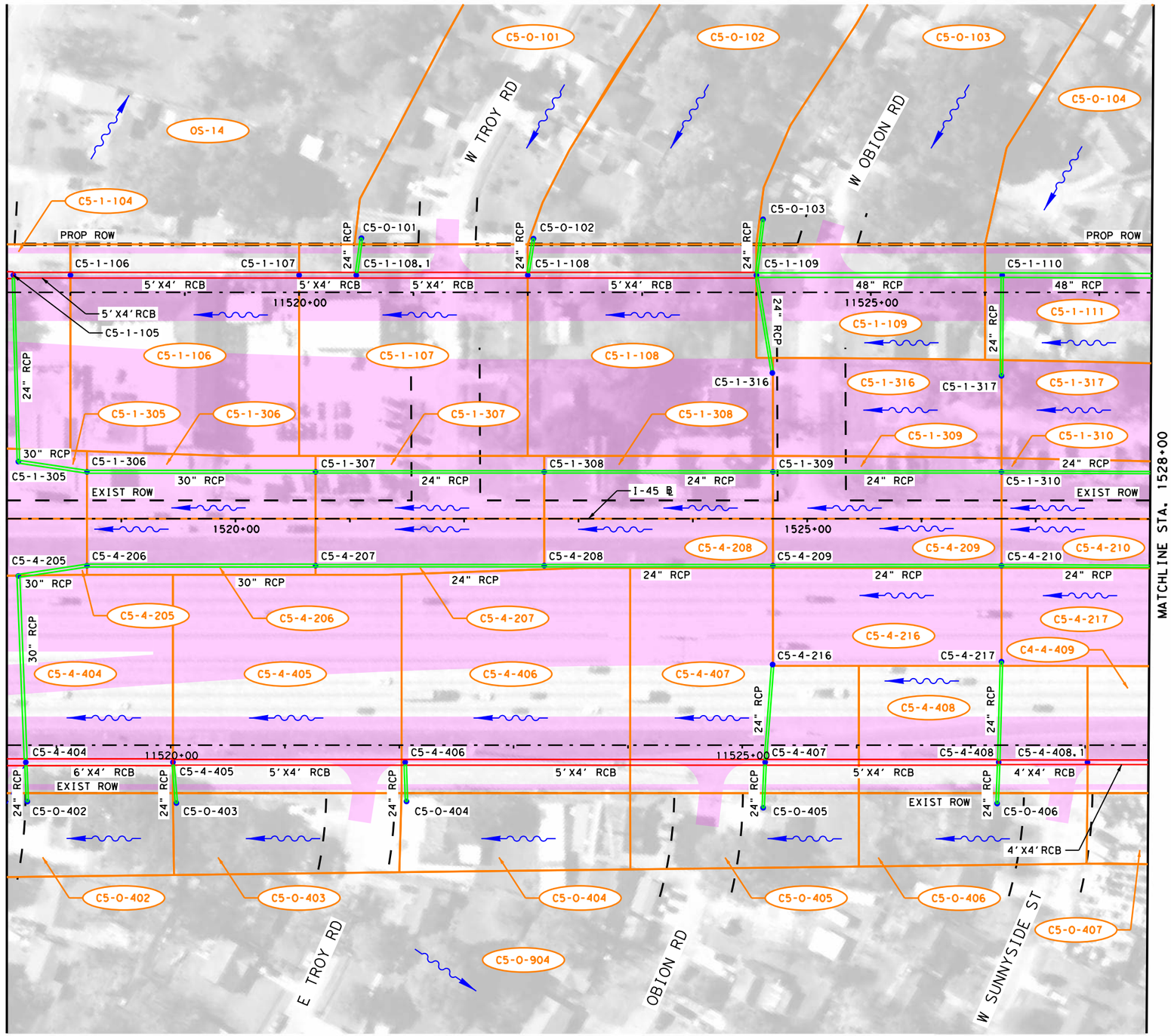
I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1508+00 TO STA 1518+00

SHEET 3 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)	I-45

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_03.dgn
7/21/2021 11:03:54 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

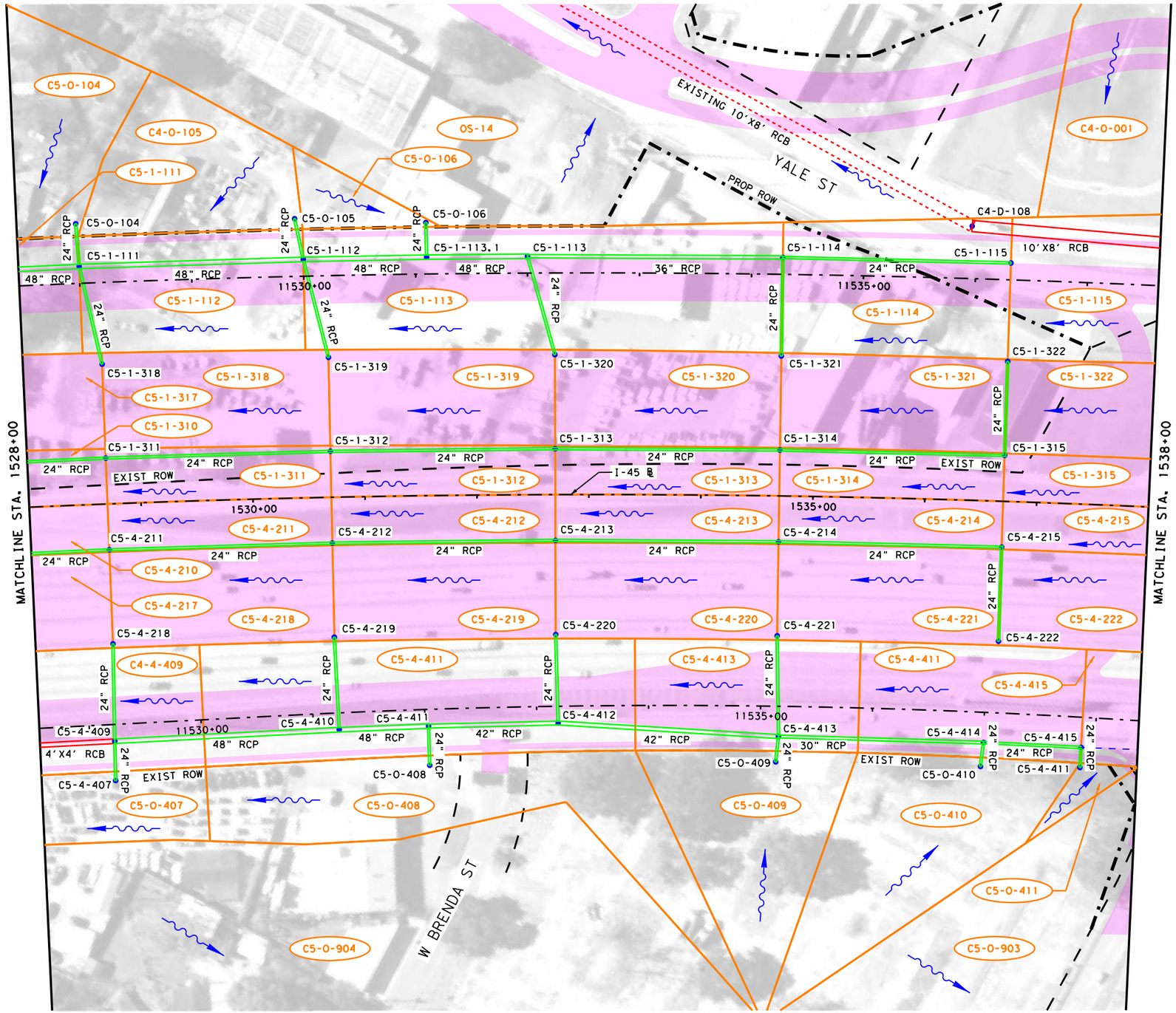
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1518+00 TO STA 1528+00

SHEET 4 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_04.dgn
7/21/2021 11:04:02 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

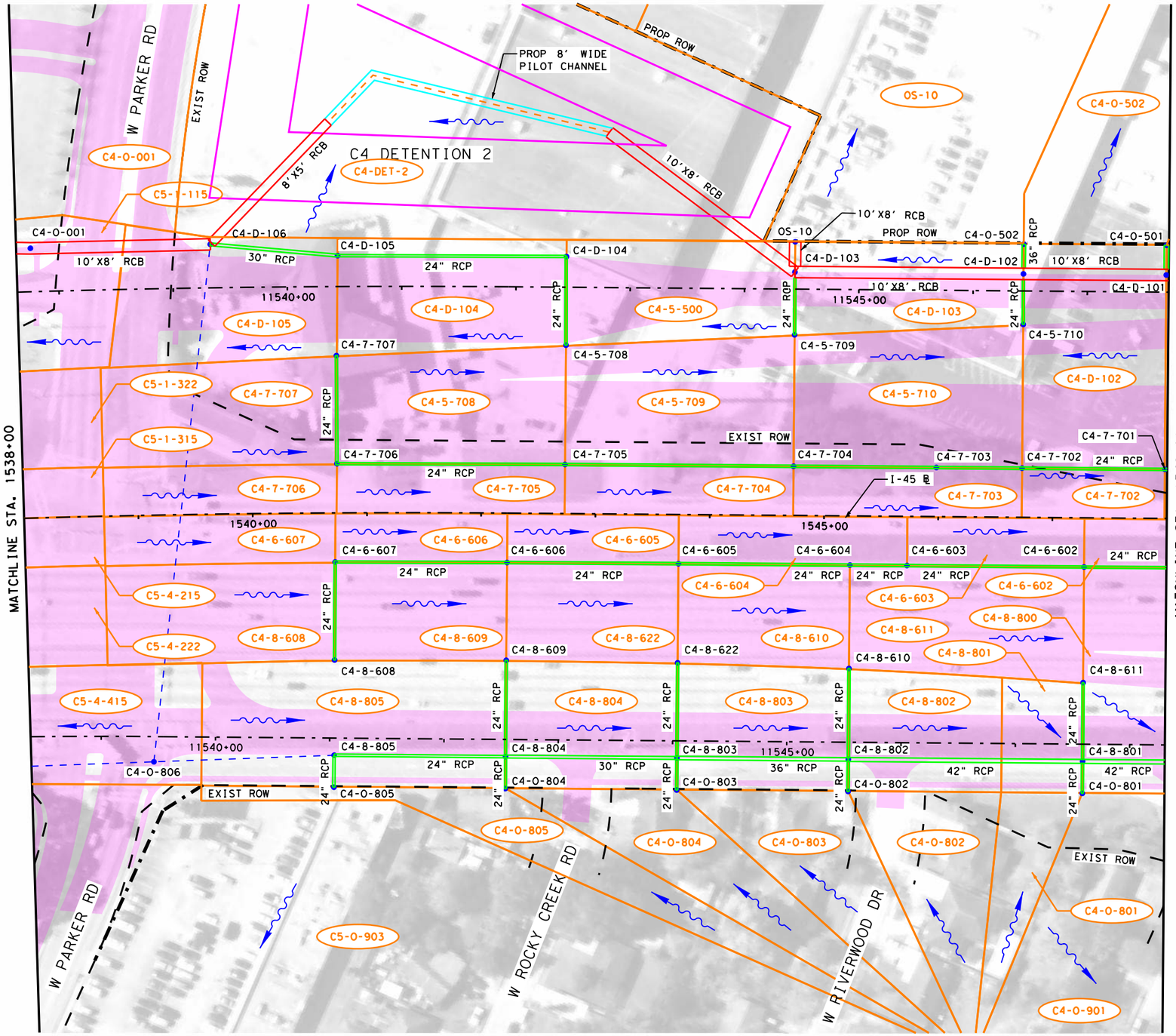
I-45

EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1528+00 TO STA 1538+00

SHEET 5 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_05.dgn
7/21/2021 11:04:10 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

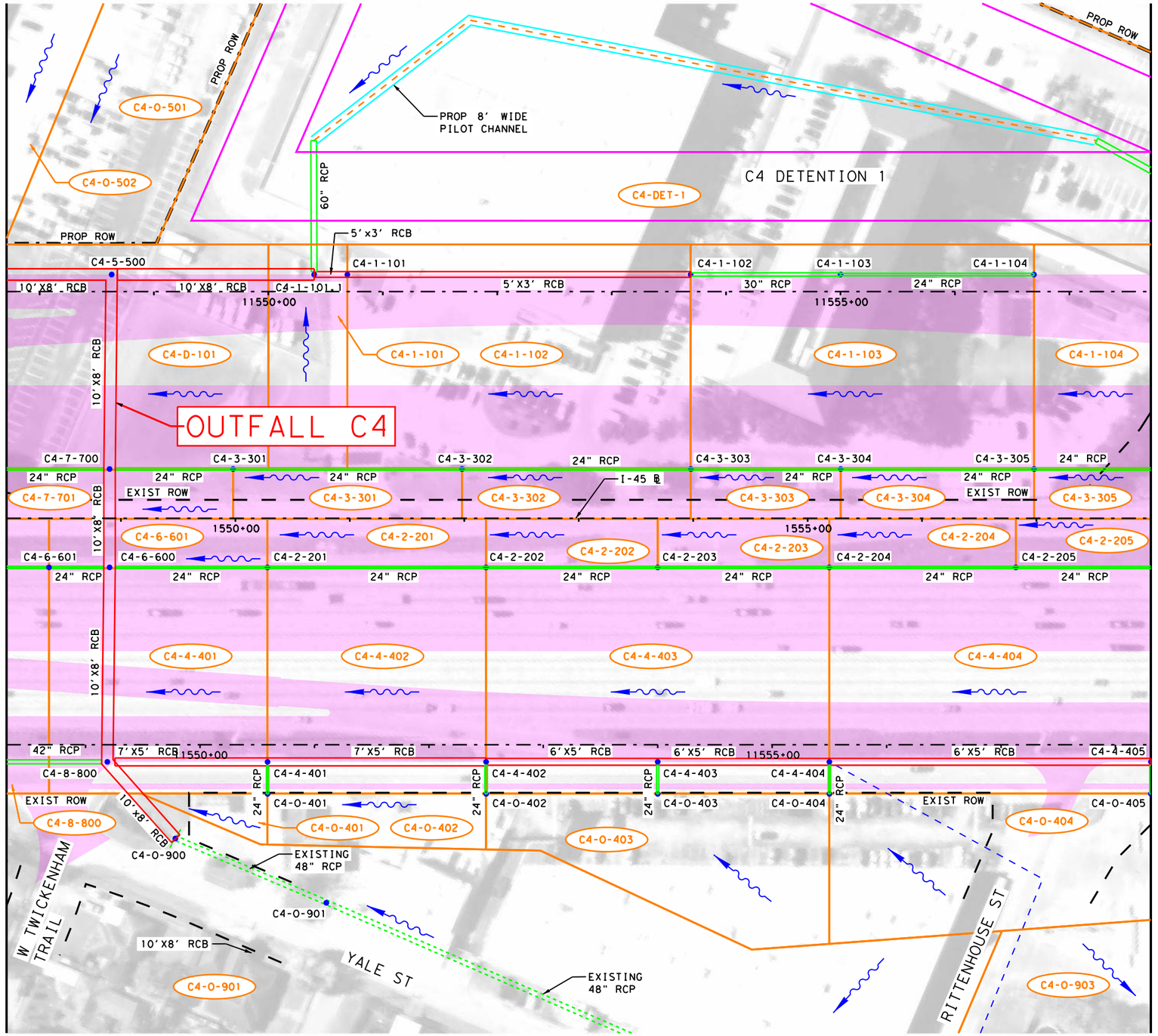
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1538+00 TO STA 1548+00

SHEET 6 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19H0U\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_06.dgn
7/21/2021 11:04:18 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 7

PROPOSED DRAINAGE AREA MAP

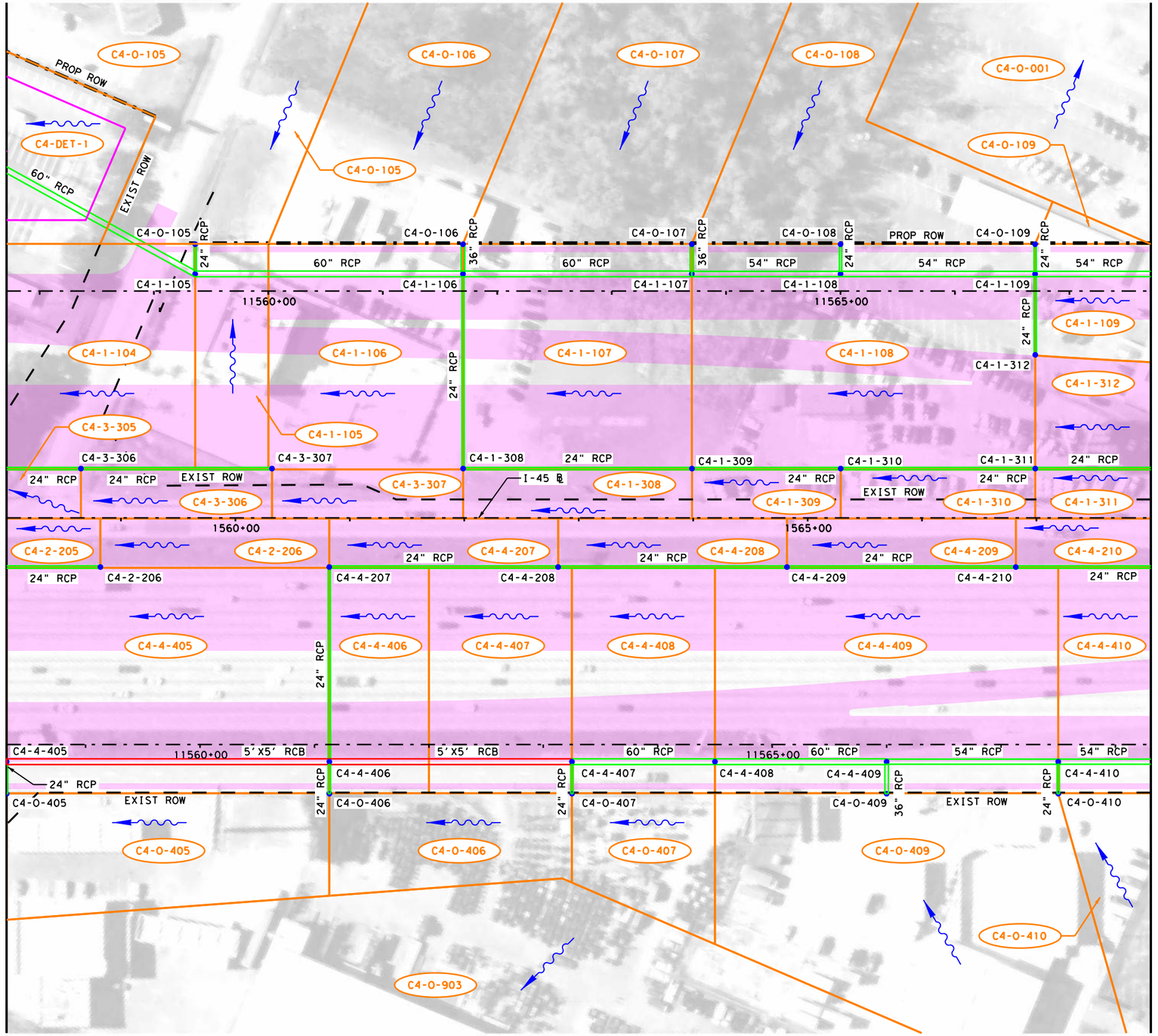
STA 1548+00 TO STA 1558+00

SHEET 7 OF 14

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)	I-45

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_07.dgn
7/21/2021 11:04:34 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

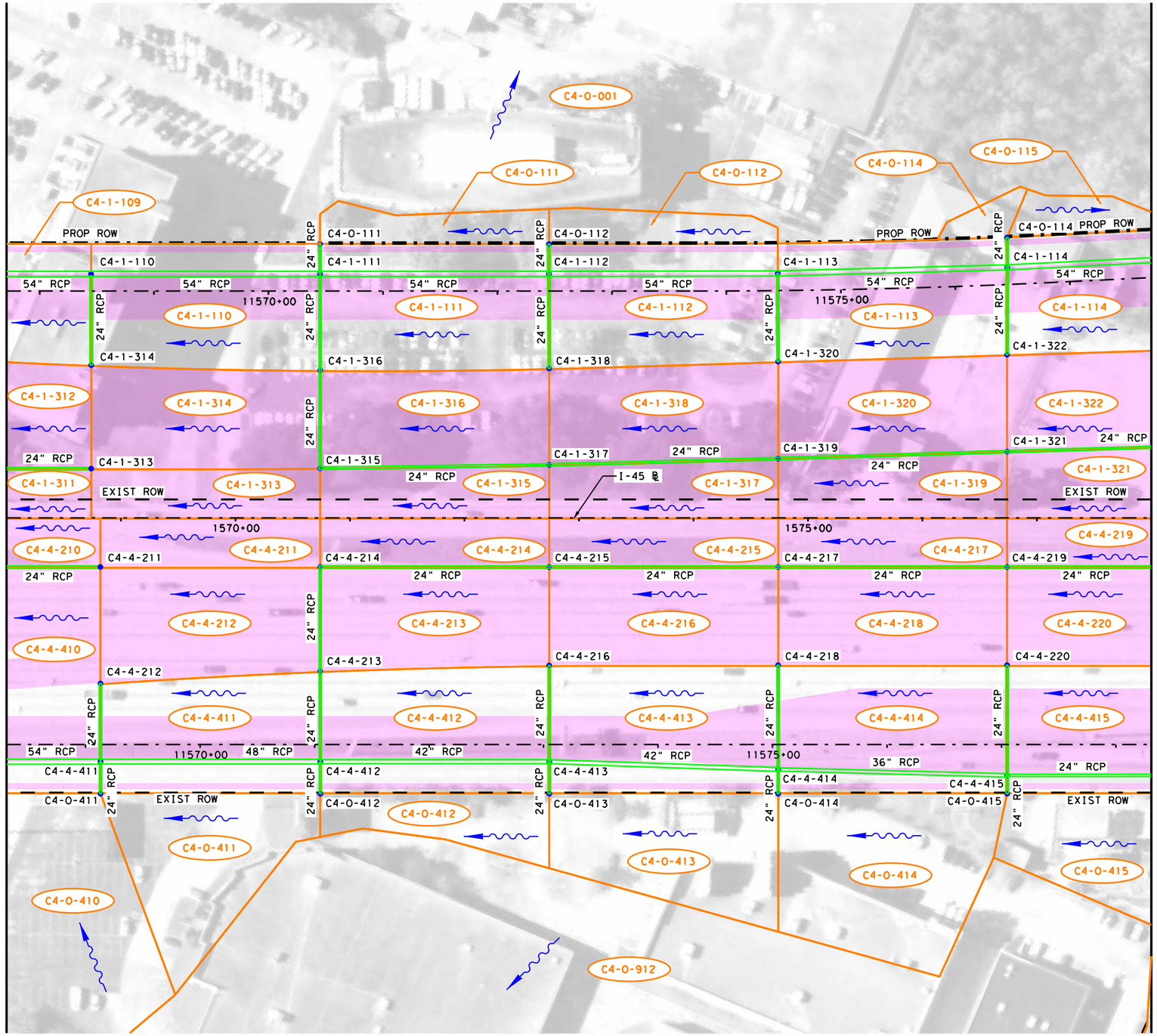
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1558+00 TO STA 1568+00

SHEET 8 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_08.dgn
7/21/2021 11:04:42 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

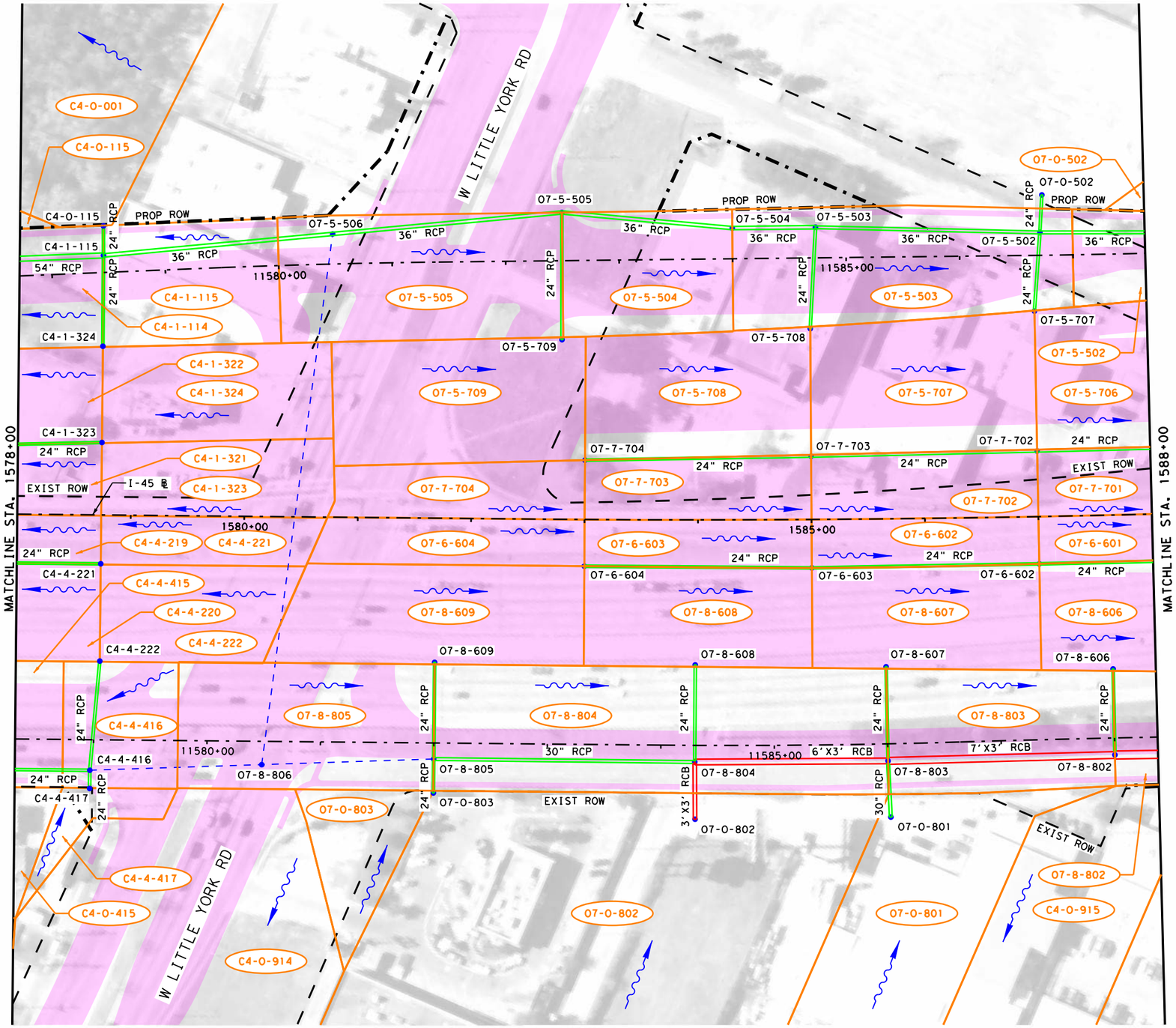
I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1568+00 TO STA 1578+00

SHEET 9 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)	I-45

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_09.dgn
7/21/2021 11:04:50 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

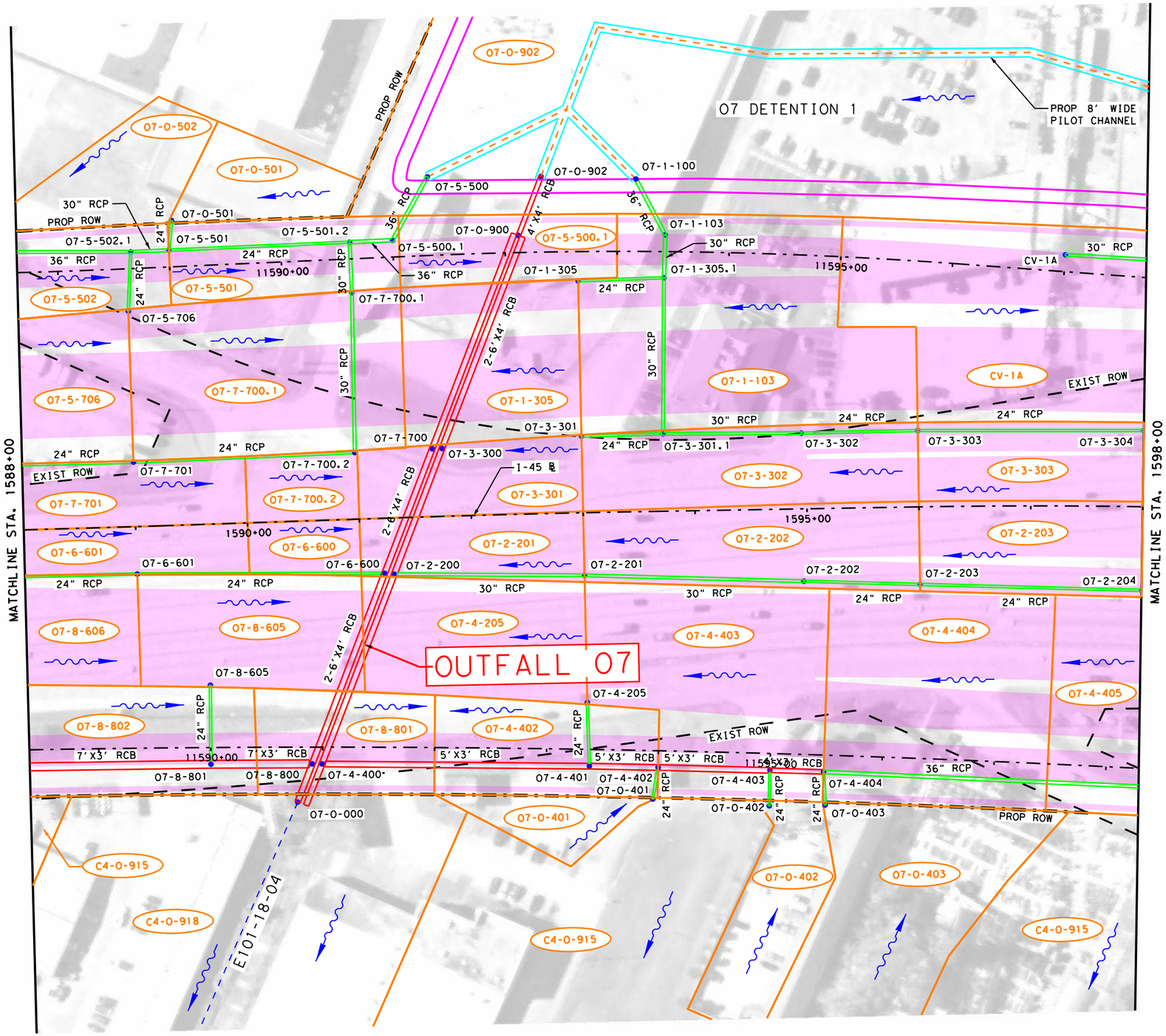
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1578+00 TO STA 1588+00

SHEET 10 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_10.dgn
7/21/2021 11:04:58 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

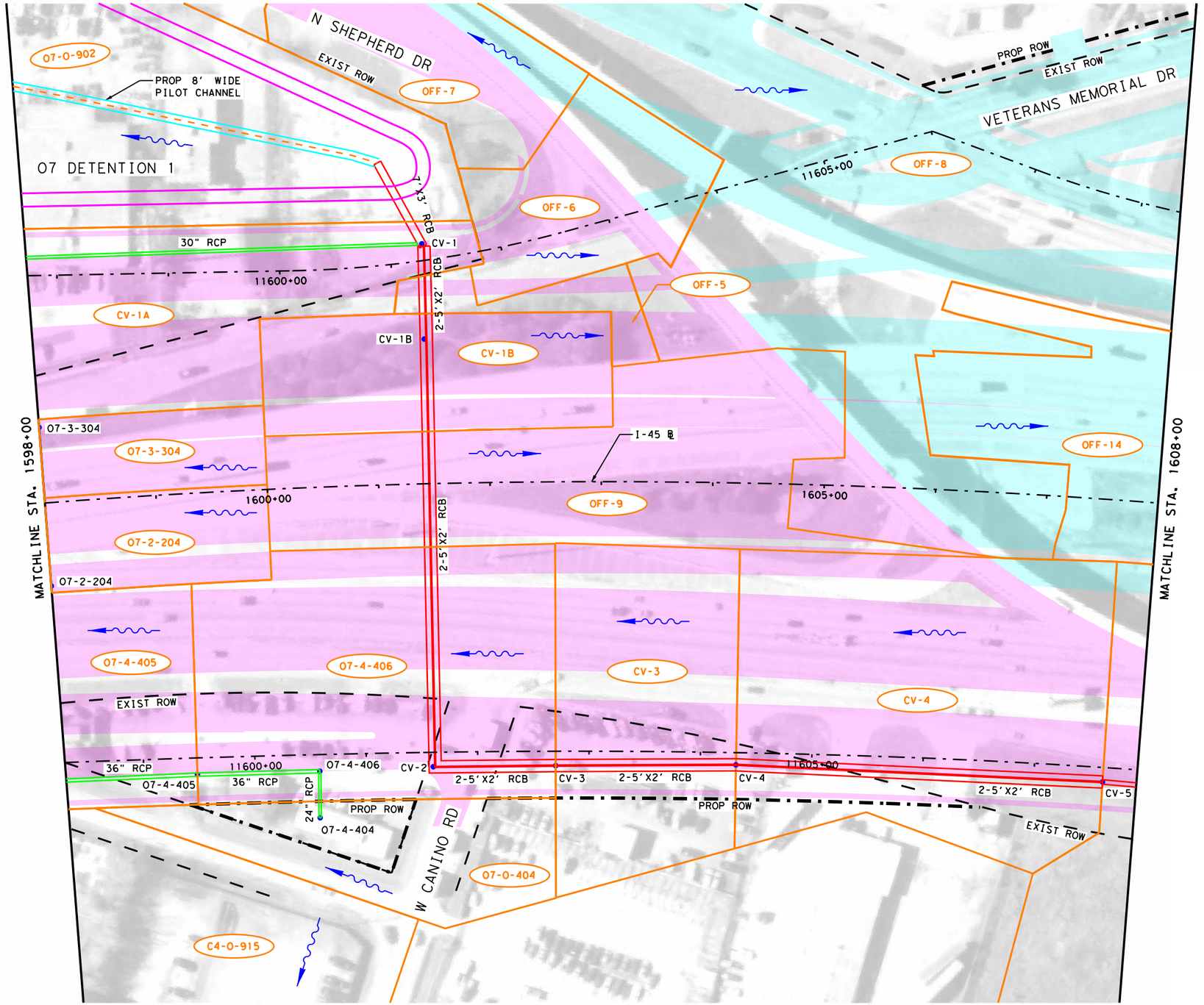
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1588+00 TO STA 1598+00

SHEET 11 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_11.dgn
7/21/2021 11:05:06 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

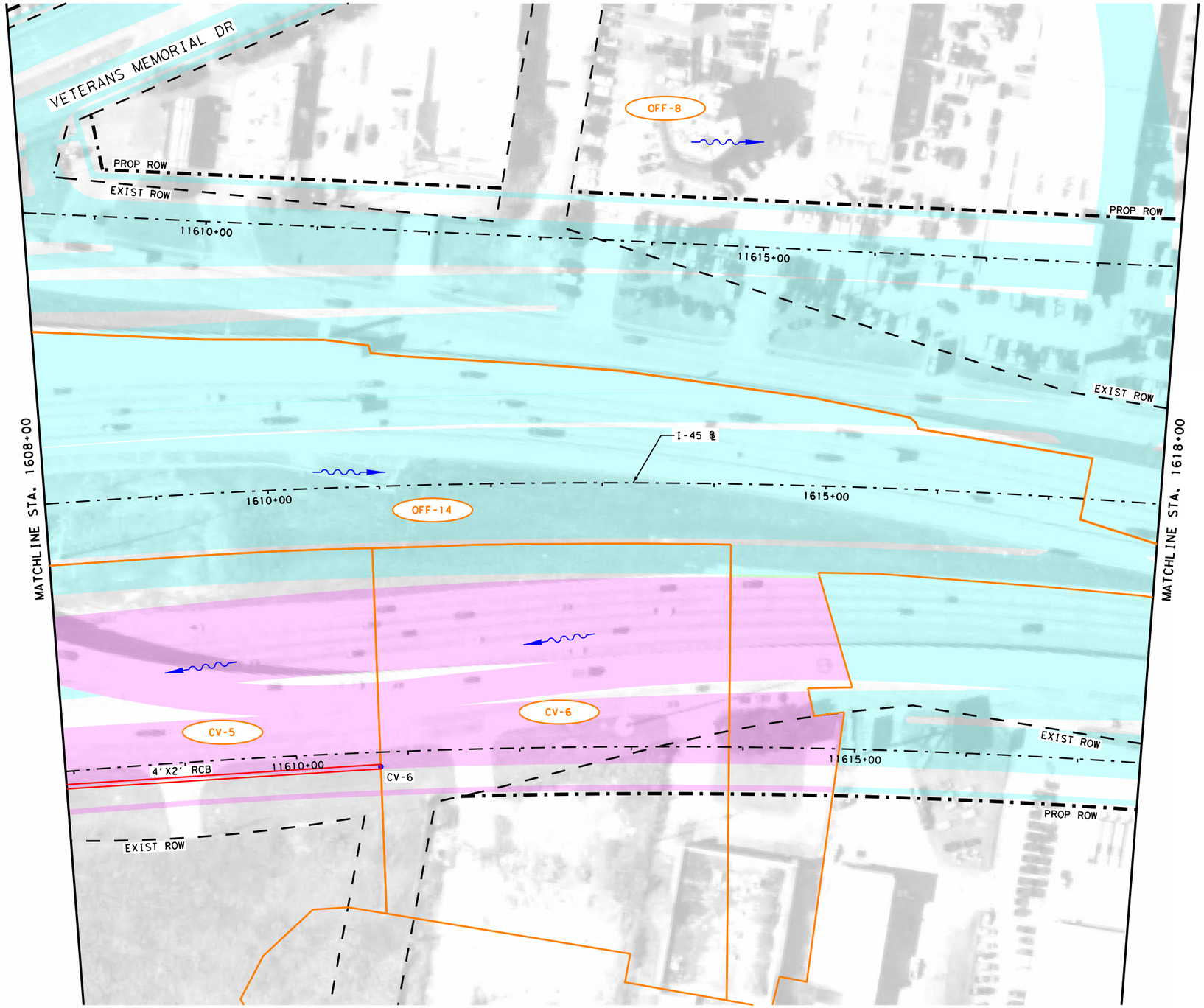
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1598+00 TO STA 1608+00

SHEET 12 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOUN4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_12.dgn
7/21/2021 11:05:16 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES
2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

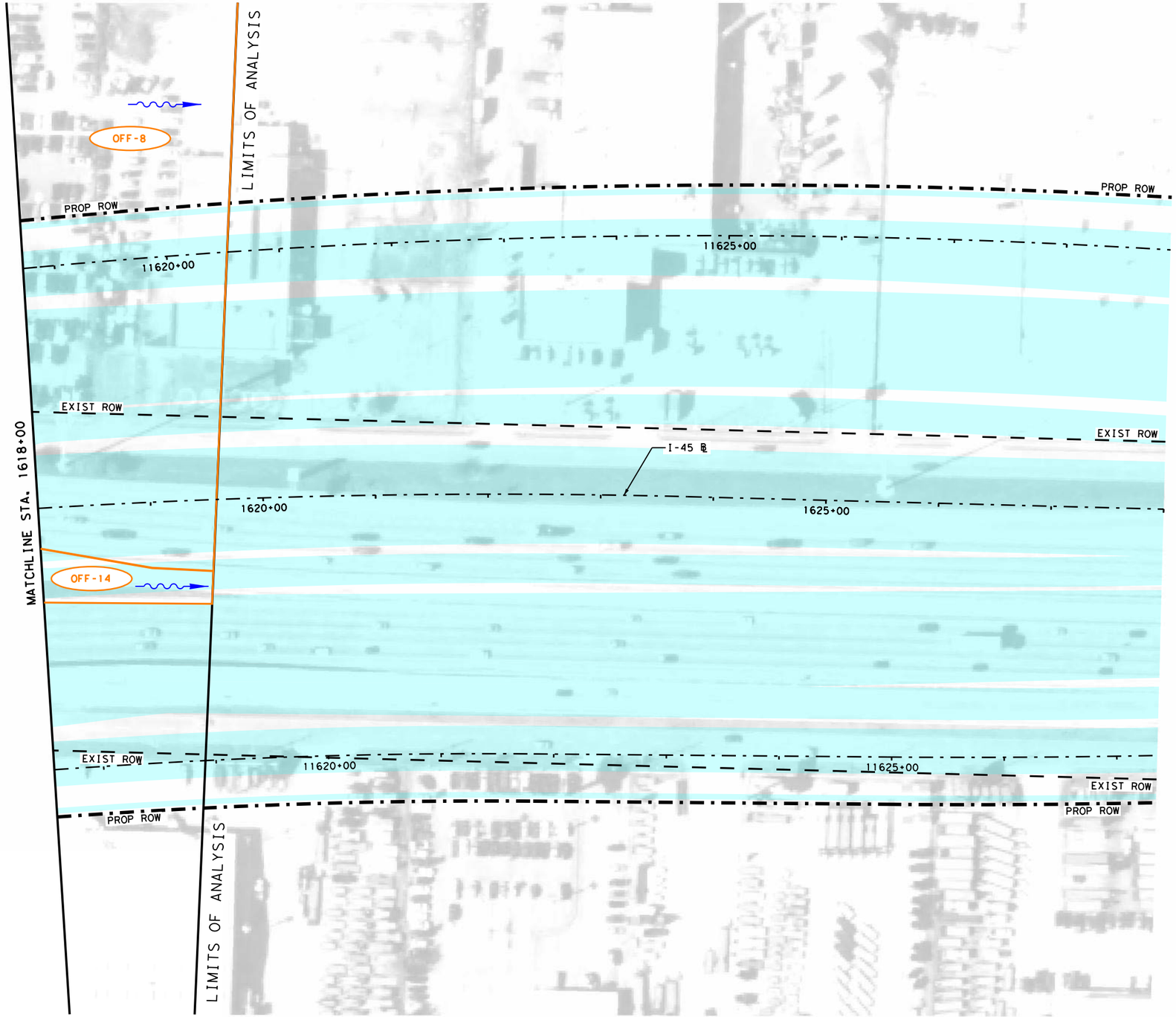
tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1608+00 TO STA 1618+00

SHEET 13 OF 14

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_DA_13.dgn
7/21/2021 11:05:24 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- FLOW DIRECTION
- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- XX-X-XXX — DRAINAGE AREA LABEL
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES

2. 10-YR COEFFICIENTS:
   E=0.7458
   B=84.1543
   D=12.3545

   50-YR COEFFICIENTS:
   E=0.7091
   B=103.8089
   D=12.6173

   100-YR COEFFICIENTS:
   E=0.6963
   B=113.6760
   D=13.1642

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45
EXHIBIT 7
PROPOSED DRAINAGE AREA MAP
STA 1618+00 TO PROJECT END

SHEET 14 OF 14

	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
DESIGNED:		TEXAS	(SEE TITLE SHEET)		I-45	
CHECKED:						
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_DA_14.dgn
7/21/2021 11:05:31 AM

EXHIBIT 8

DATE SAVED: 6/10/2021

Texas Department of Transportation

Houston, Texas
CSJ: 0500-03-446

I-45 North Houston Highway Improvement Project (NHHIP)
Segment 1

EXHIBIT 8: PROPOSED DETENTION BASIN LOCATIONS

June 2021

Legend

Layer

- C4
- C5
- O7
- OFFSITE
- PROPOSED PONDS
- HCFCD/FEMA Streams

N

0 500 1,000 2,000

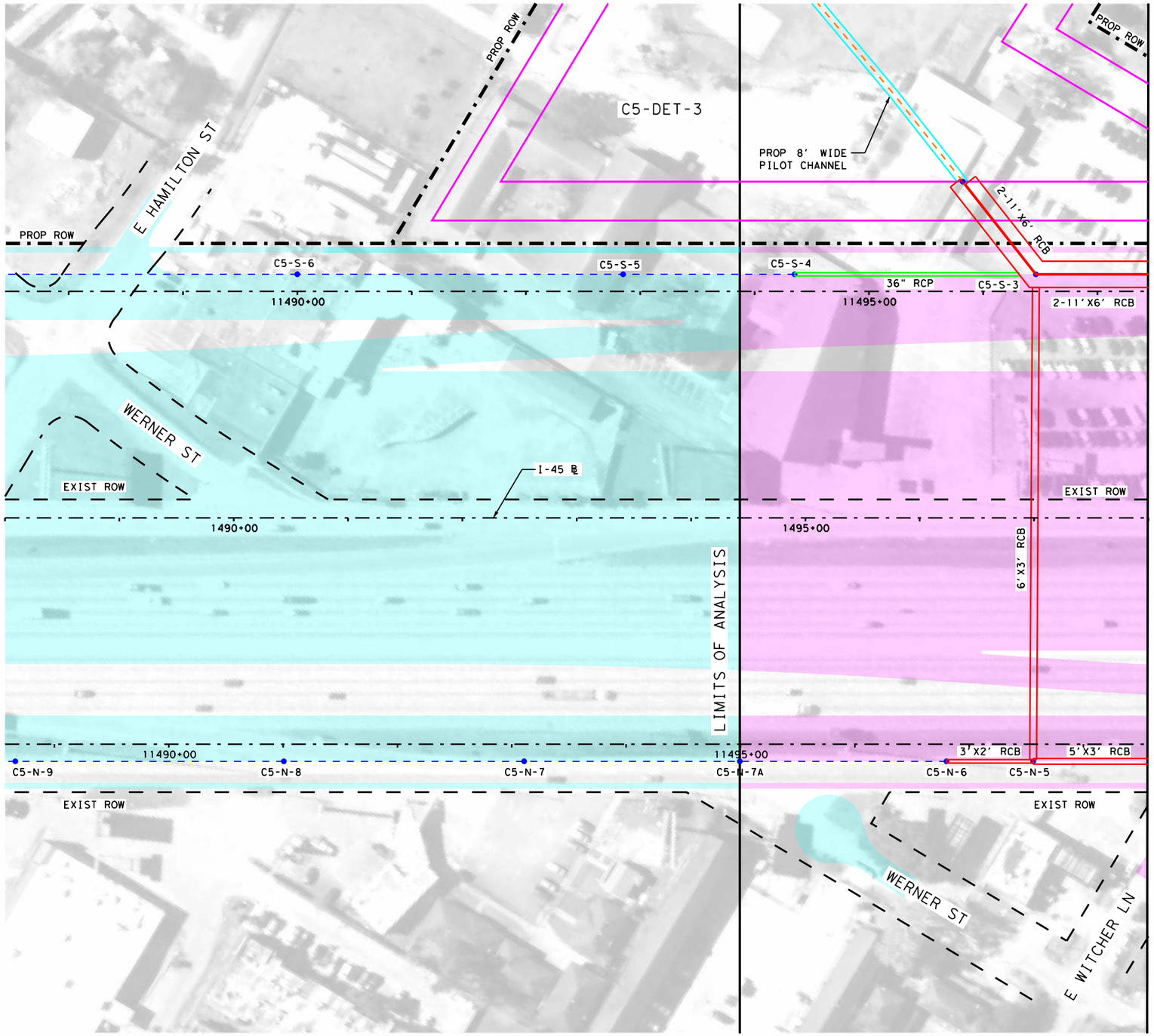
1 inch = 2,000 feet

tnp

TXD 20022

Document Path: P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\GIS\Report\exhibit 8.mxd

EXHIBIT 9



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

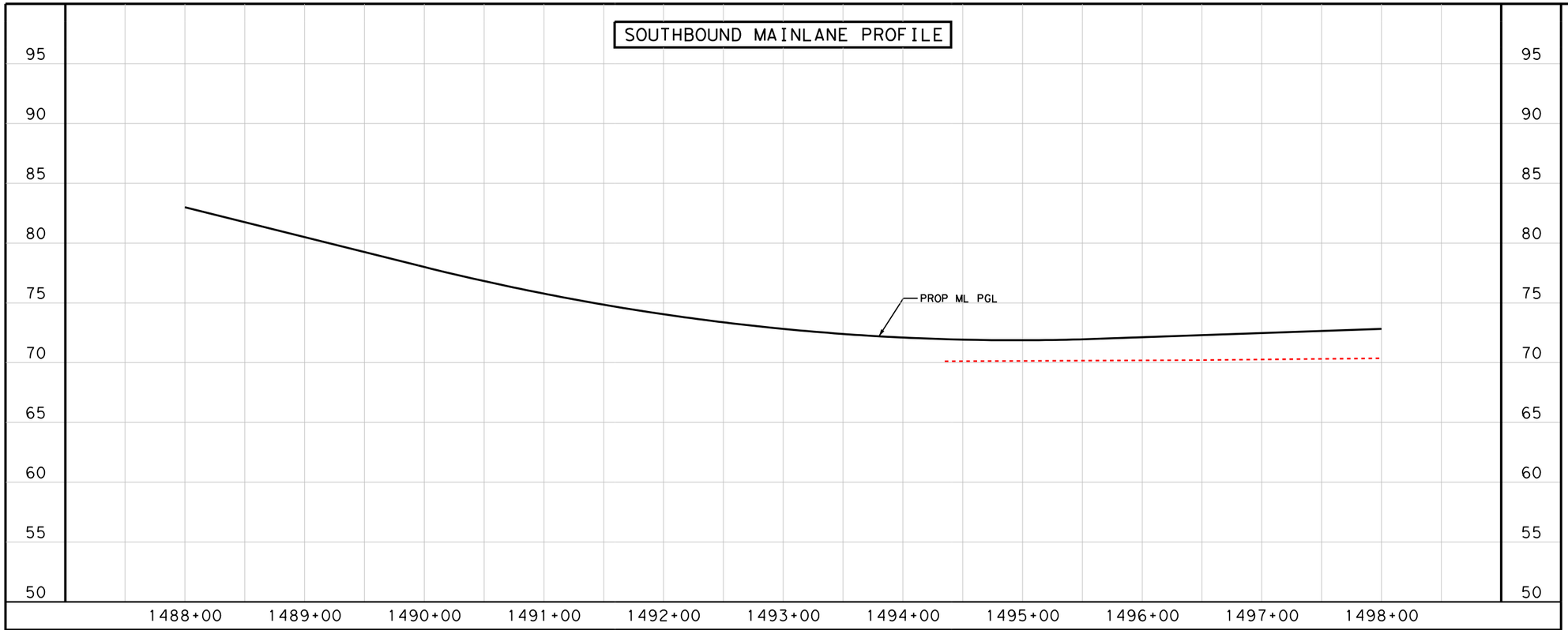
EXHIBIT 9
PROPOSED SWMM LAYOUT
PROJECT START TO STA 1498+00

SHEET 1 OF 13

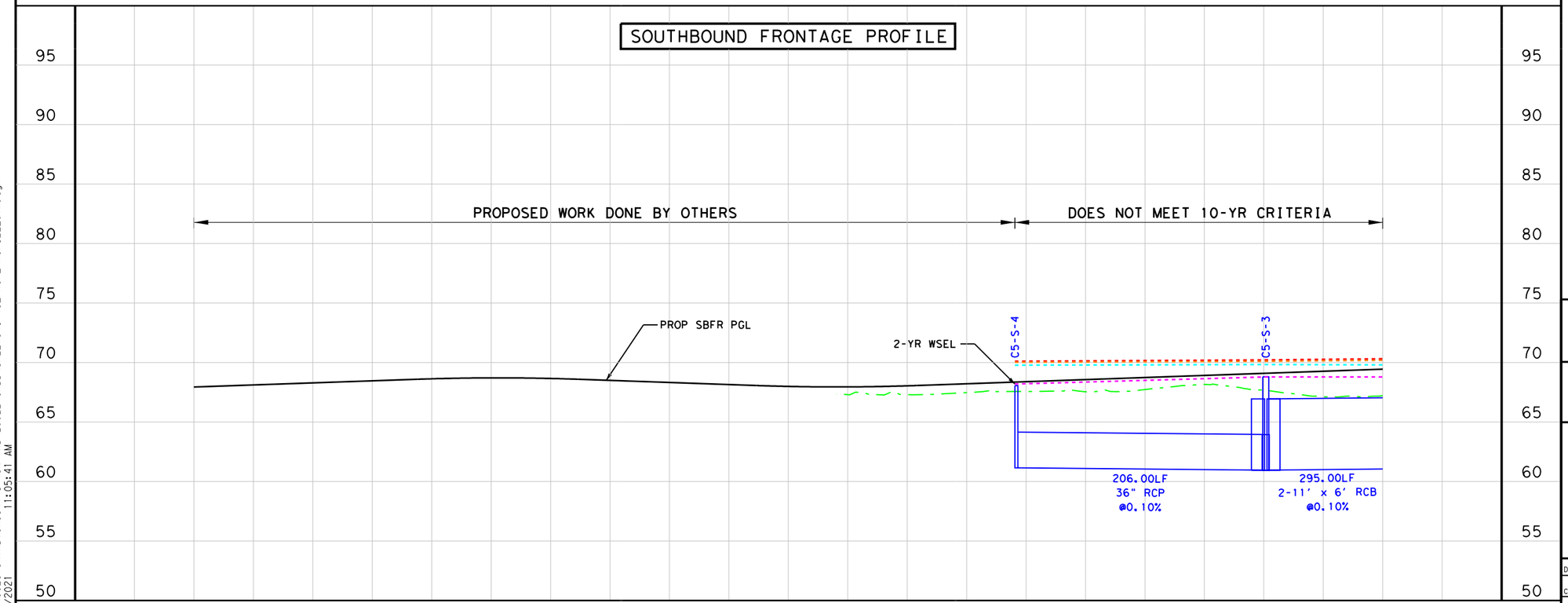
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\HOU\14 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_01.dgn
7/21/2021 11:05:37 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

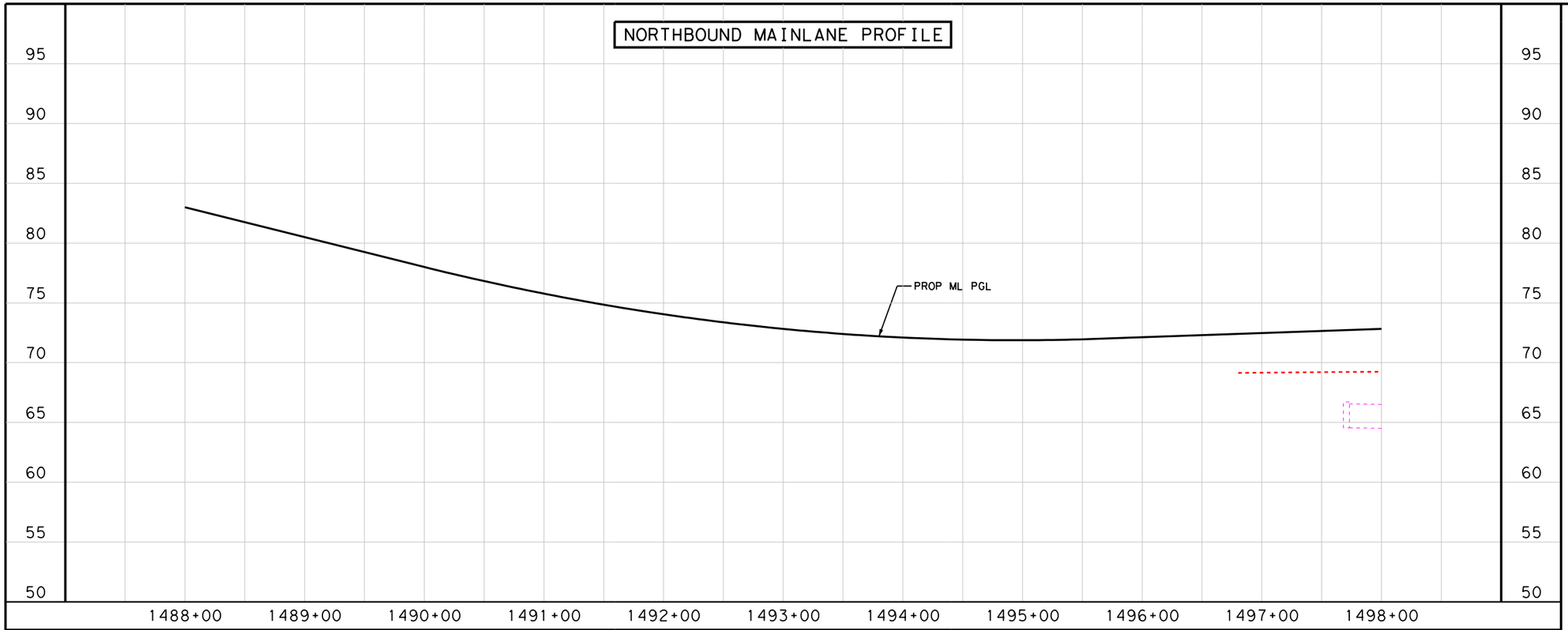
STA 1488+00 TO 1498+00

SHEET 1A OF 13

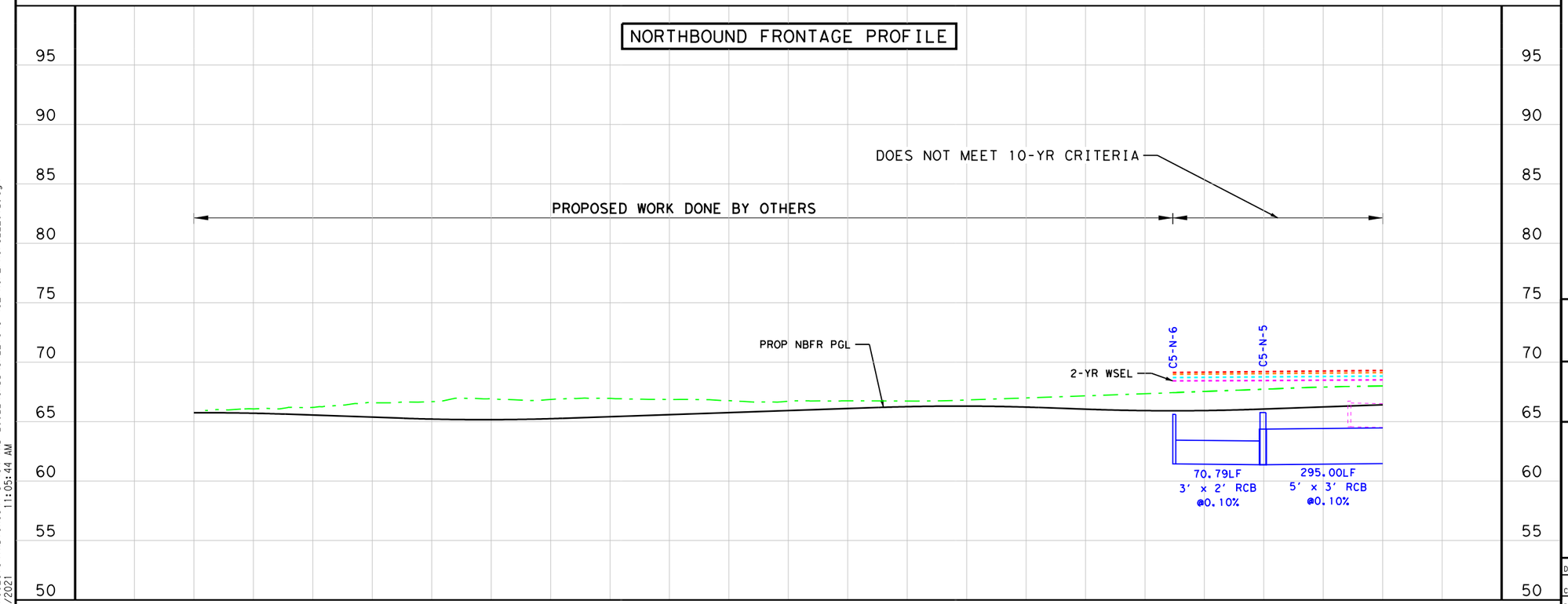
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_01A.dgn
7/21/2021 11:05:41 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

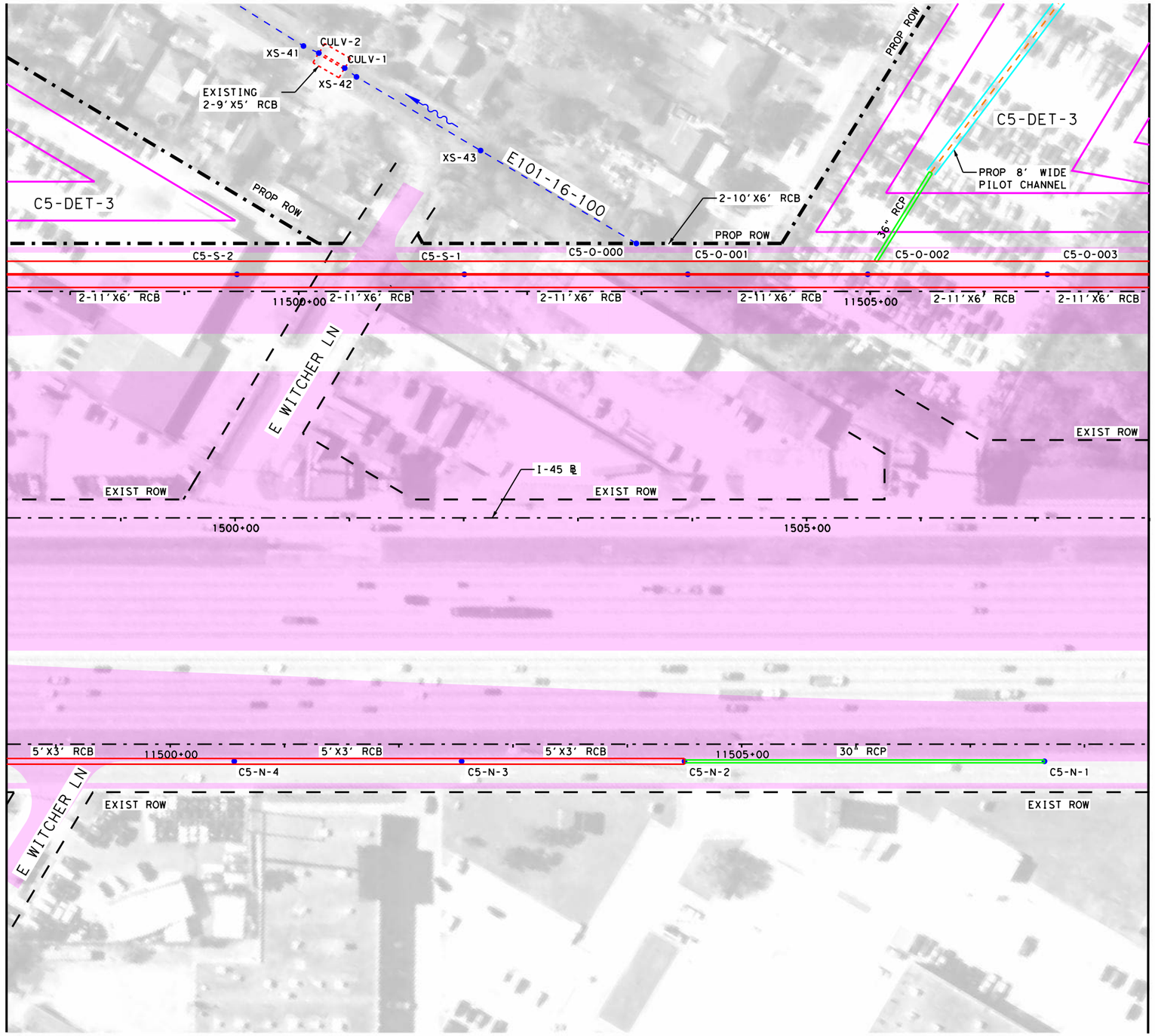
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1488+00 TO 1498+00

SHEET 1B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_01B.dgn
7/21/2021 11:05:44 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

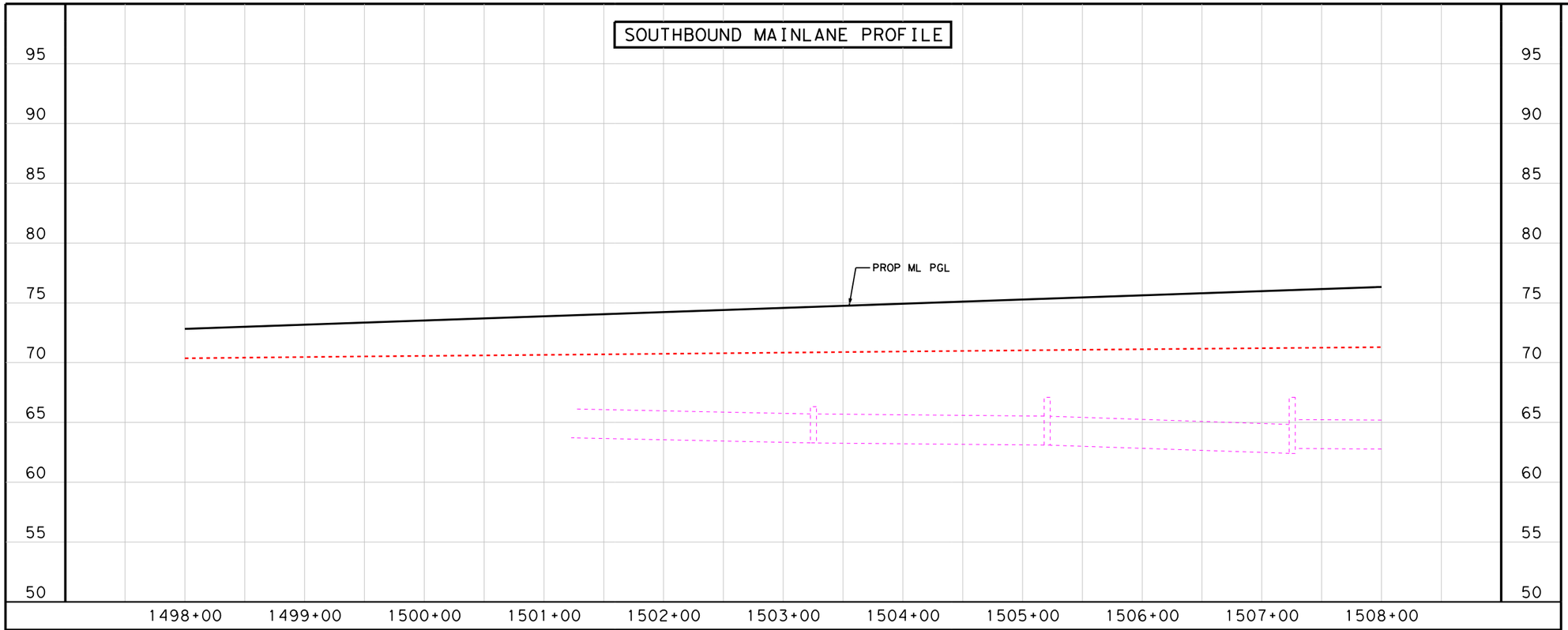
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1498+00 TO STA 1508+00
SHEET 2 OF 13

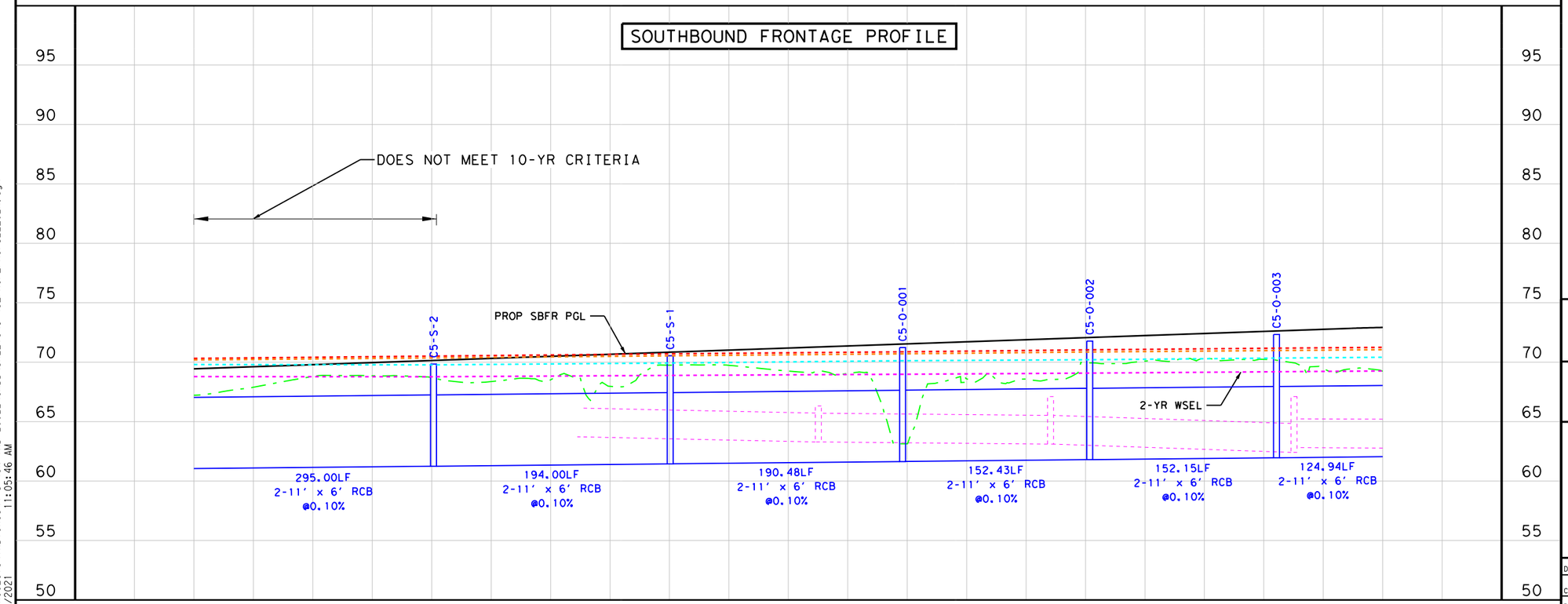
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.				HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)				I-45
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS		0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_02.dgn
7/21/2021 11:05:45 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

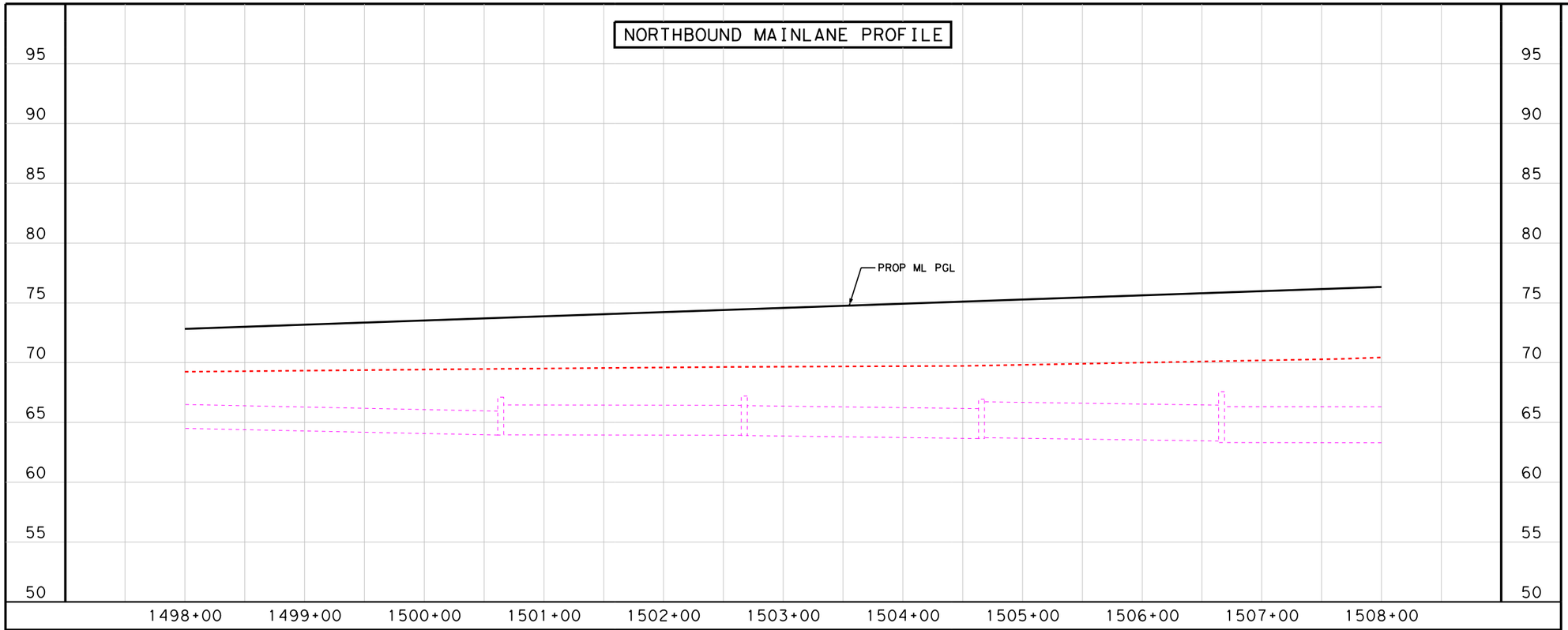
STA 1498+00 TO 1508+00

SHEET 2A OF 13

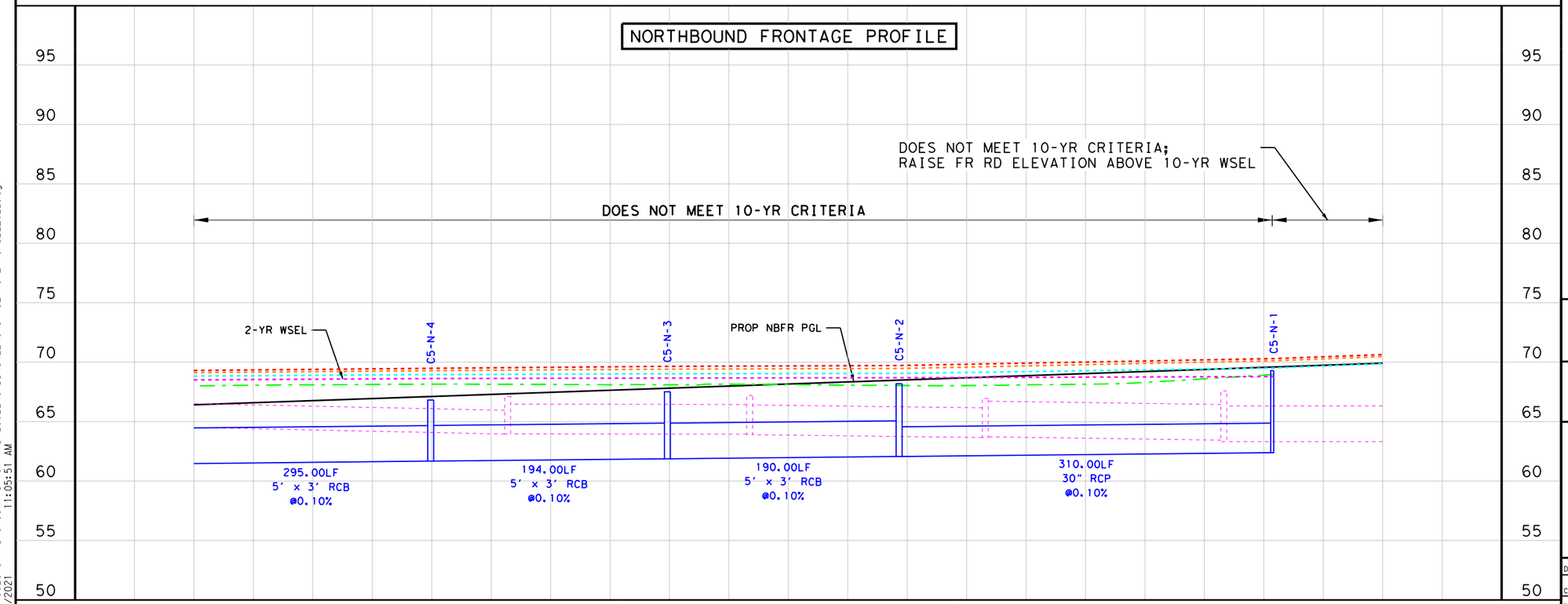
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_02A.dgn
7/21/2021 11:05:46 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

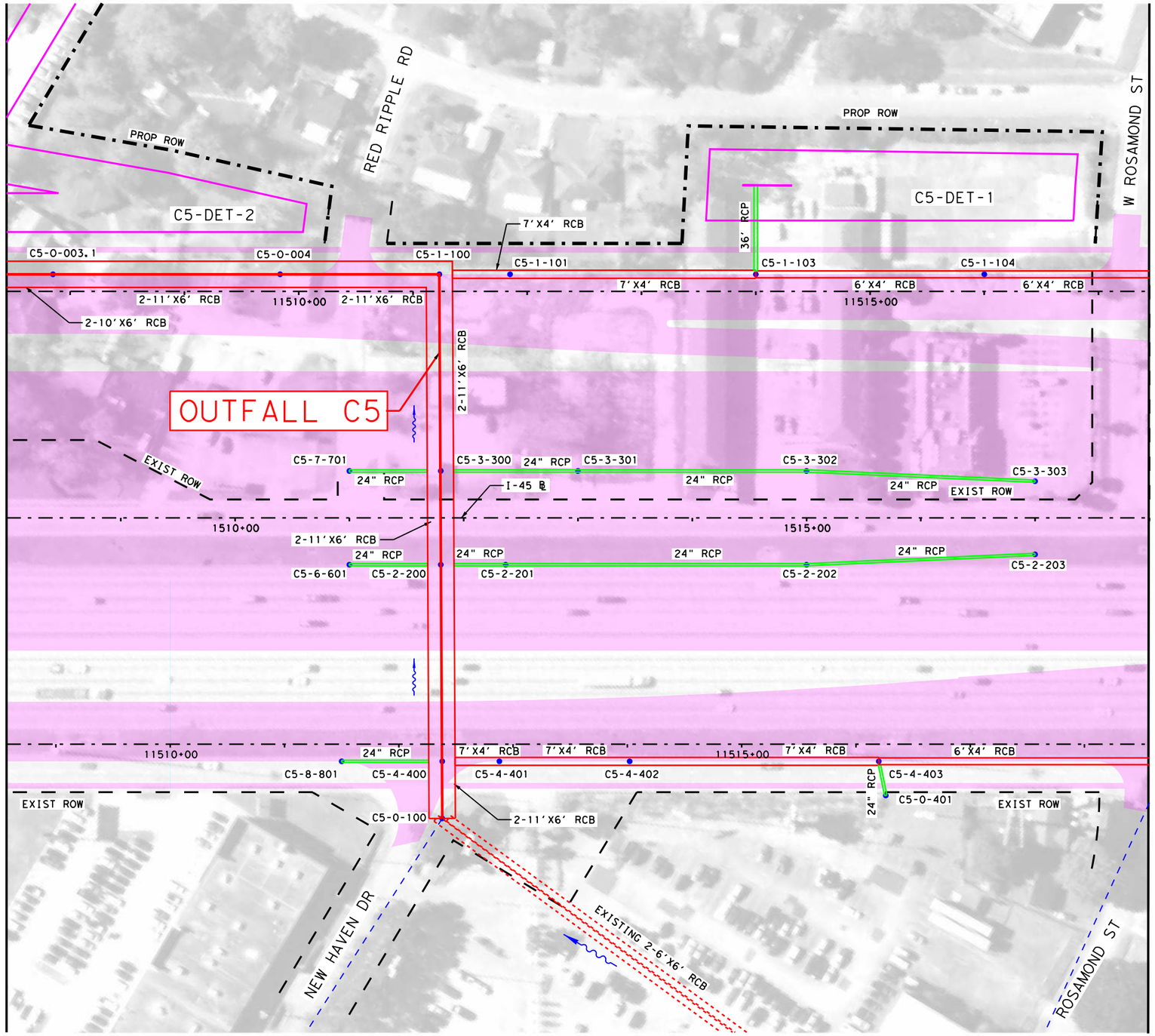
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1498+00 TO 1508+00

SHEET 2B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_02B.dgn
7/21/2021 11:05:51 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230
tnp

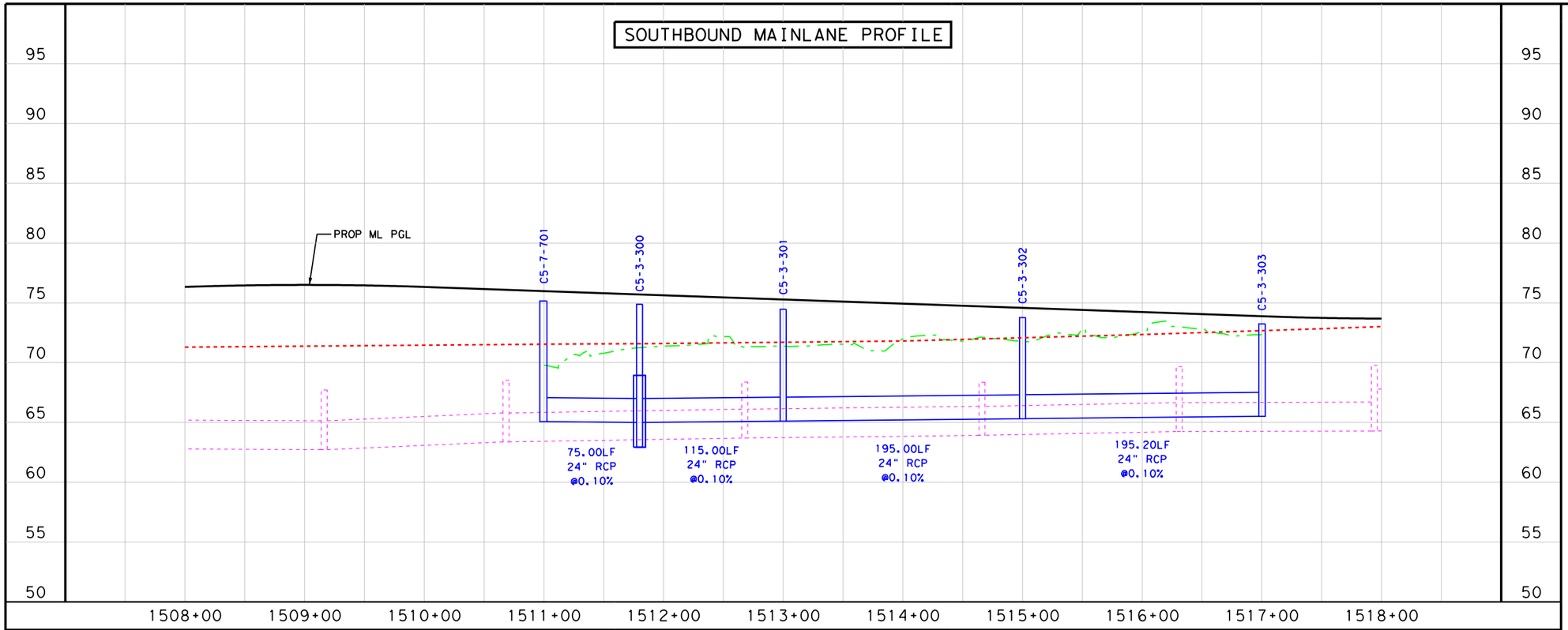
I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1508+00 TO STA 1518+00

SHEET 3 OF 13

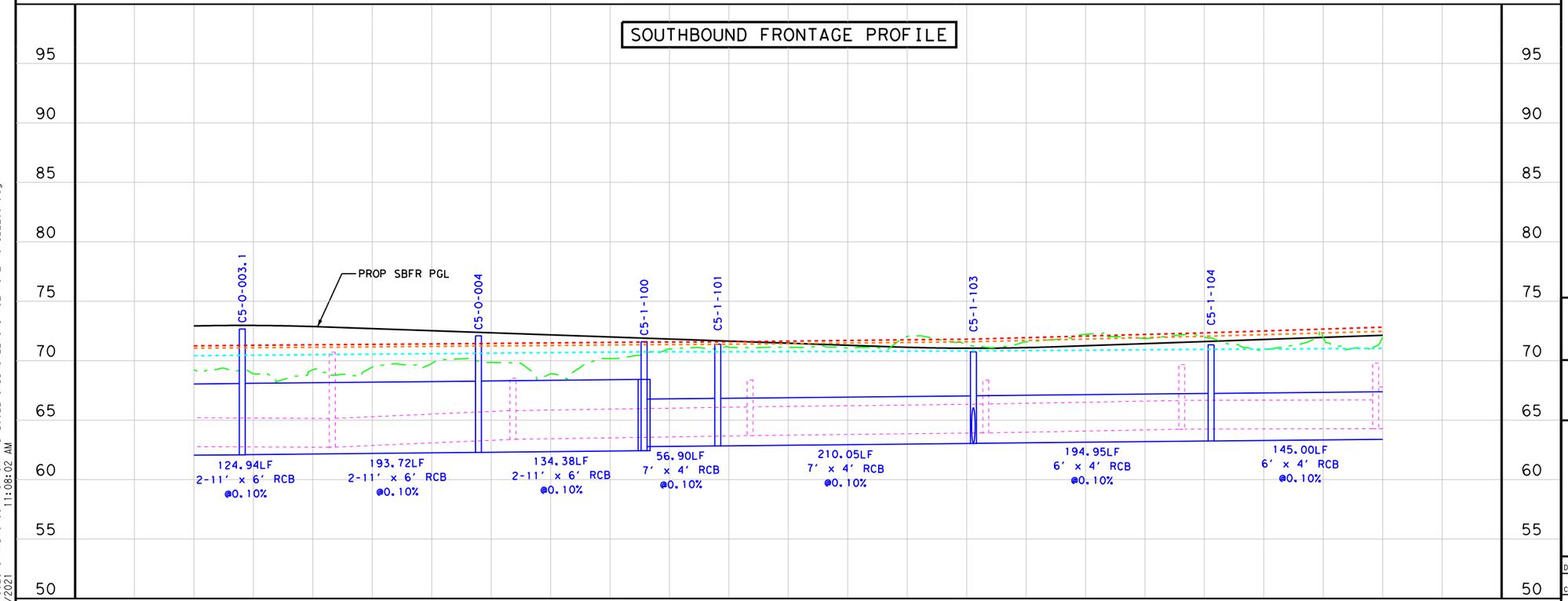
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_LAYOUT_03.dgn
7/21/2021 11:05:53 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

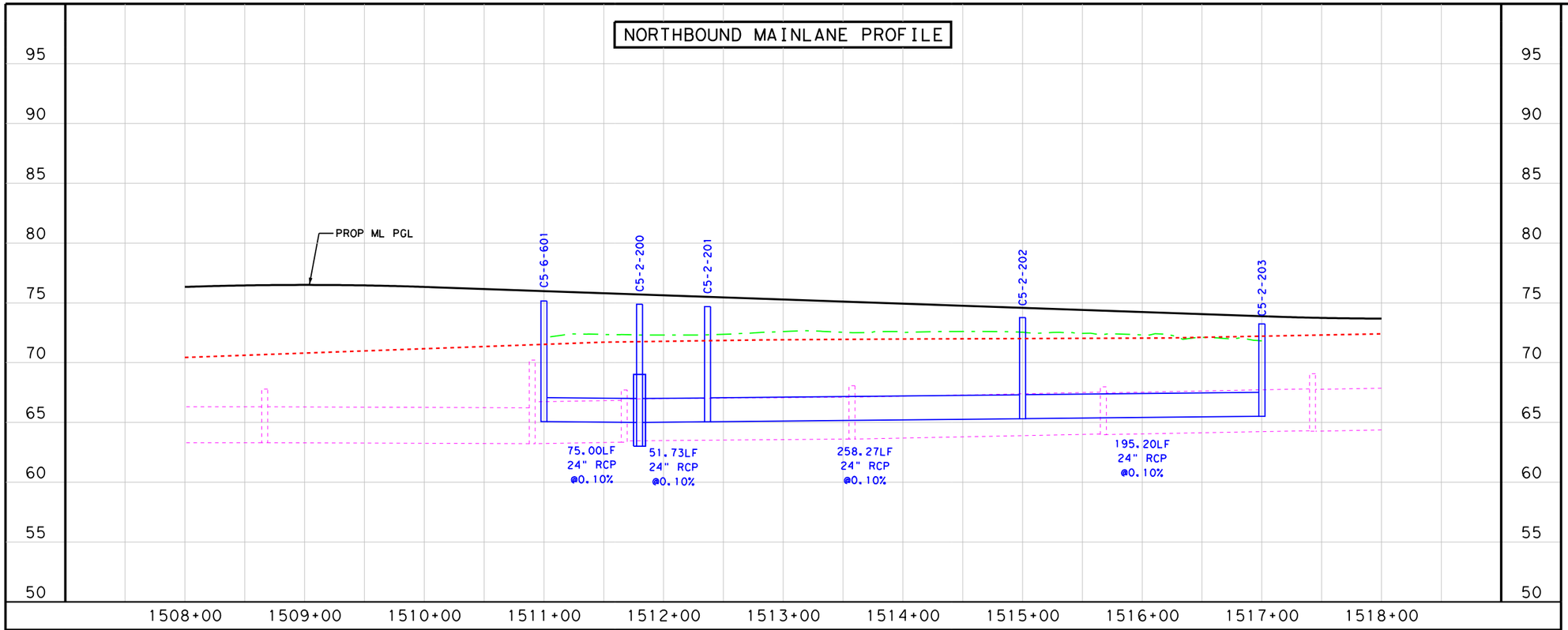
STA 1508+00 TO 1518+00

SHEET 3A OF 13

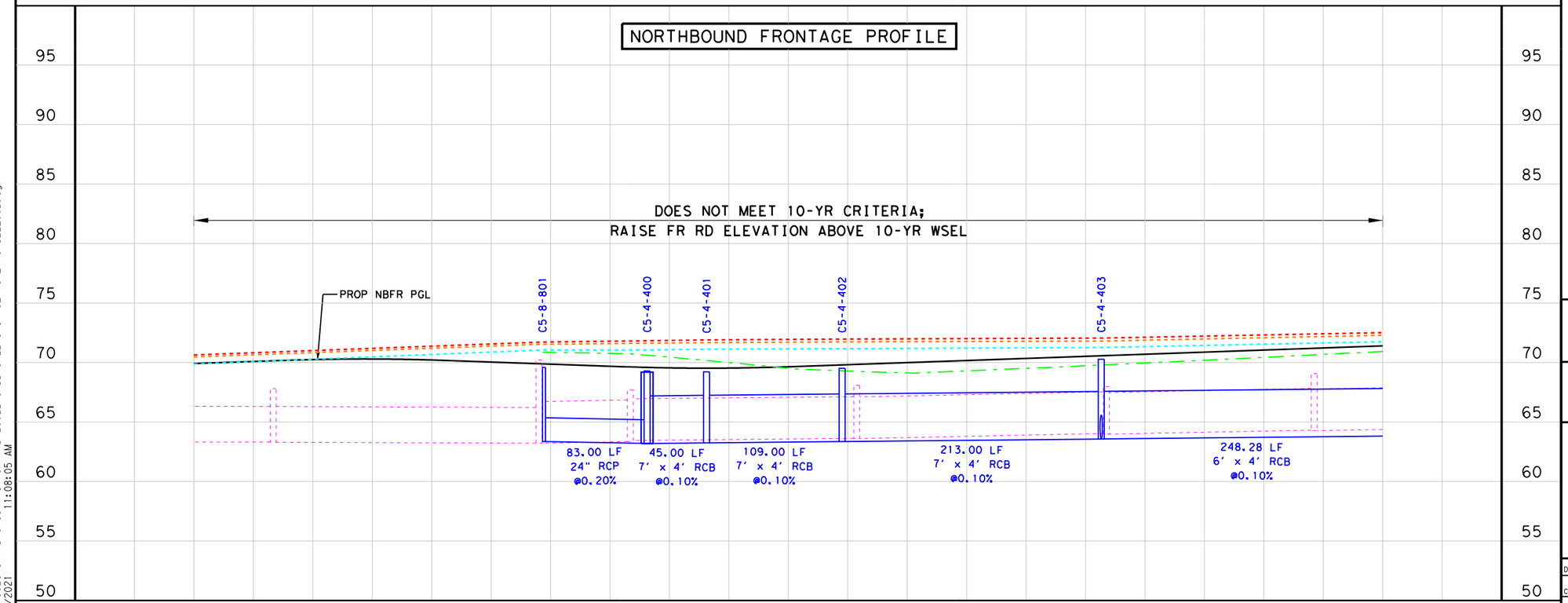
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_03A.dgn
7/21/2021 11:08:02 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

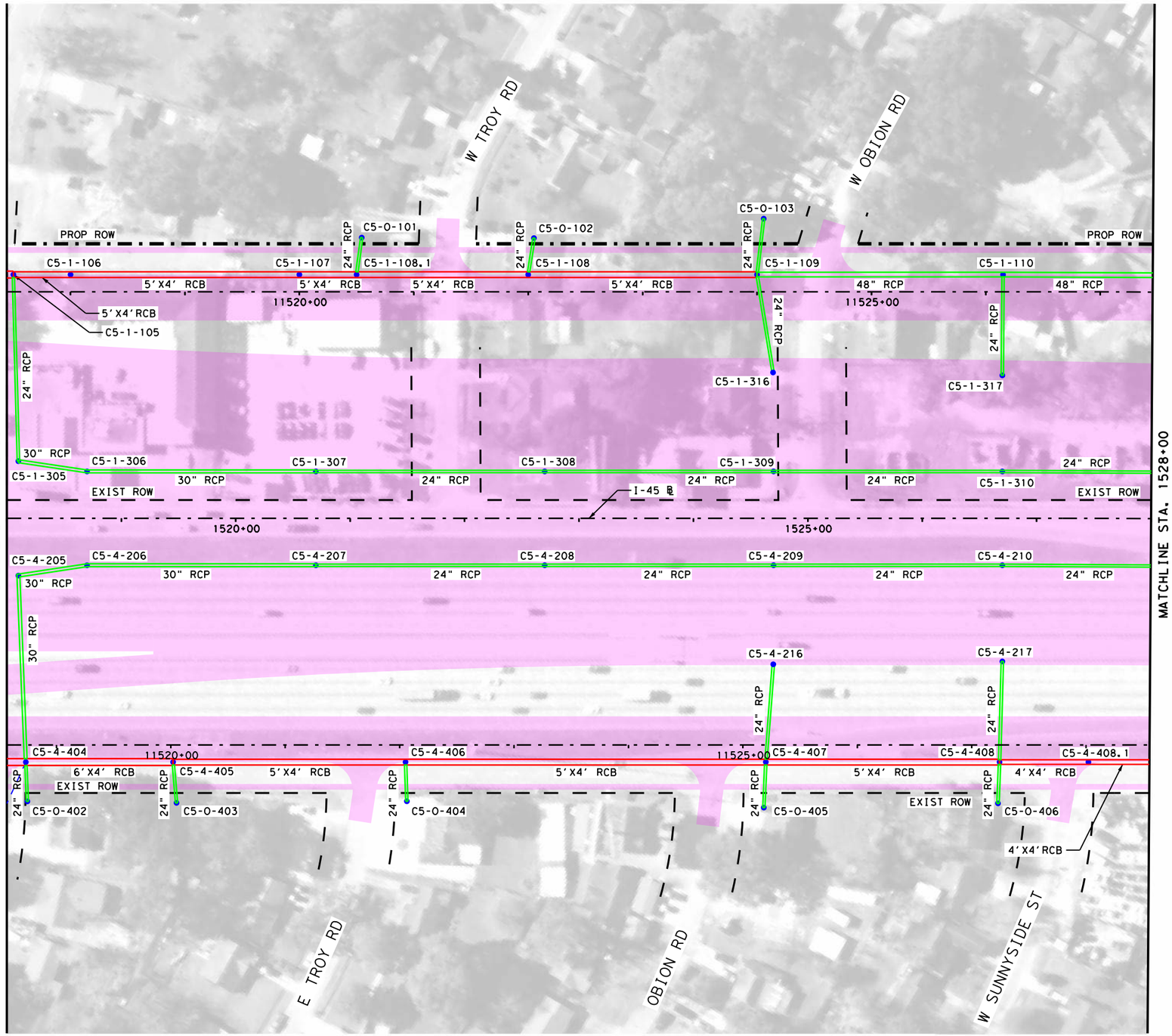
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1508+00 TO 1518+00

SHEET 3B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_03B.dgn
7/21/2021 11:08:05 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY, NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

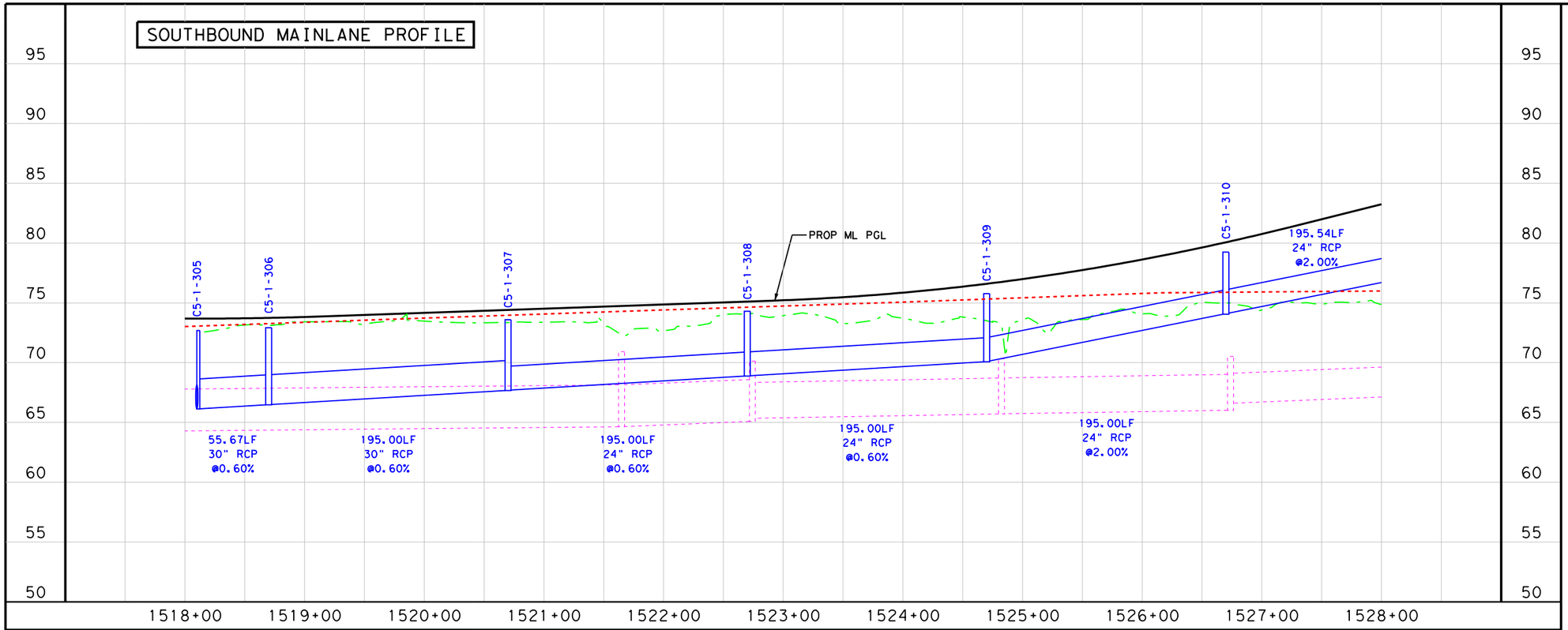
I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1518+00 TO STA 1528+00

SHEET 4 OF 13

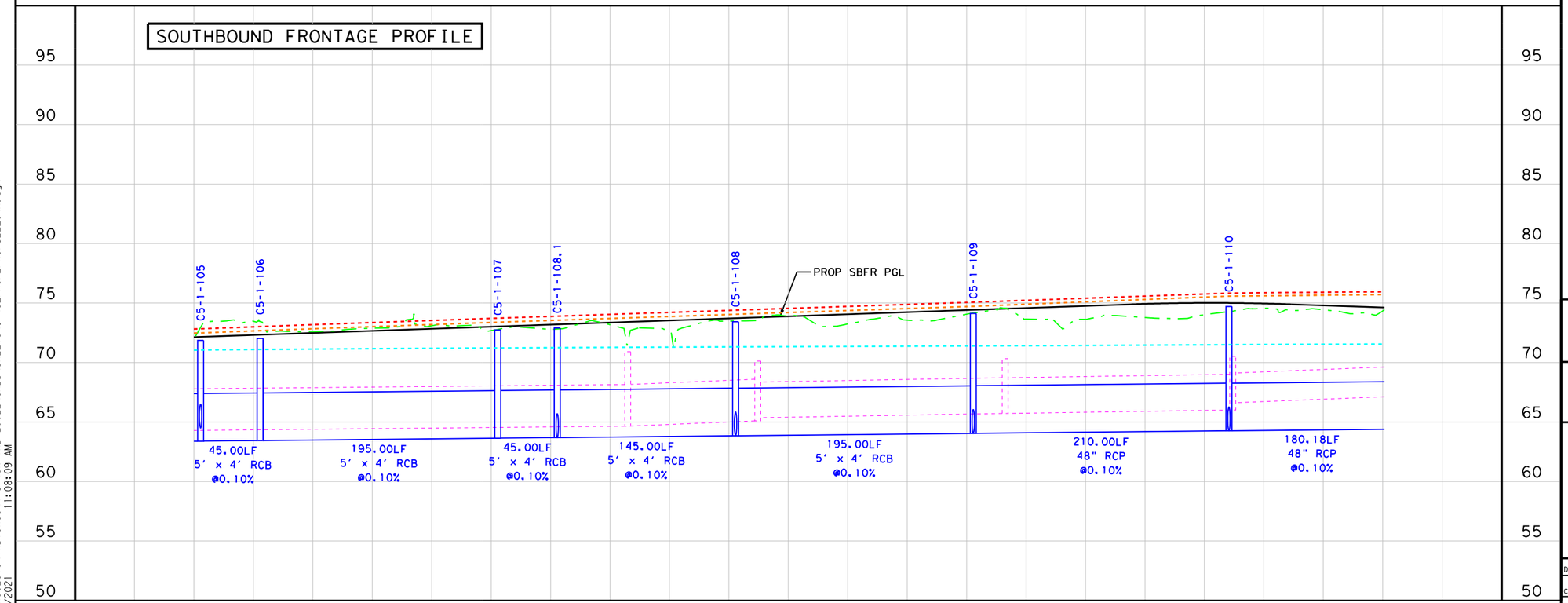
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_LAYOUT_04.dgn
7/21/2021 11:06:01 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

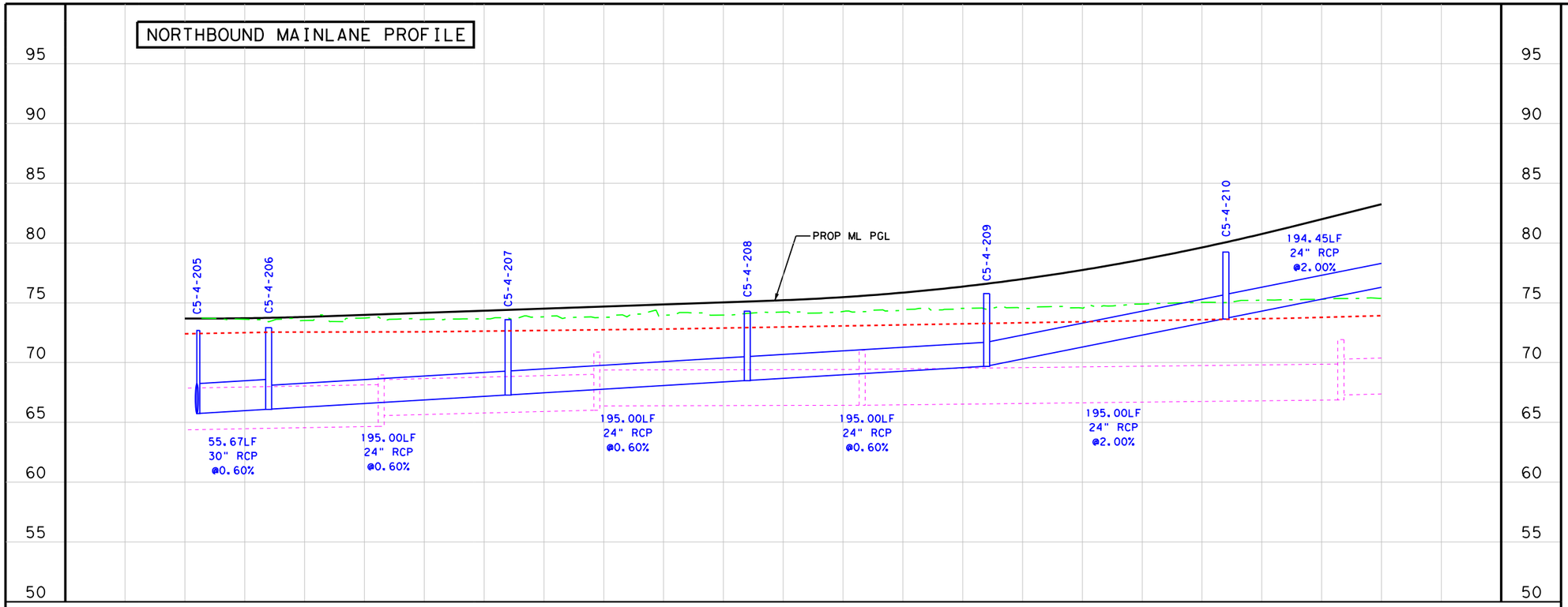
STA 1518+00 TO 1528+00

SHEET 4A OF 13

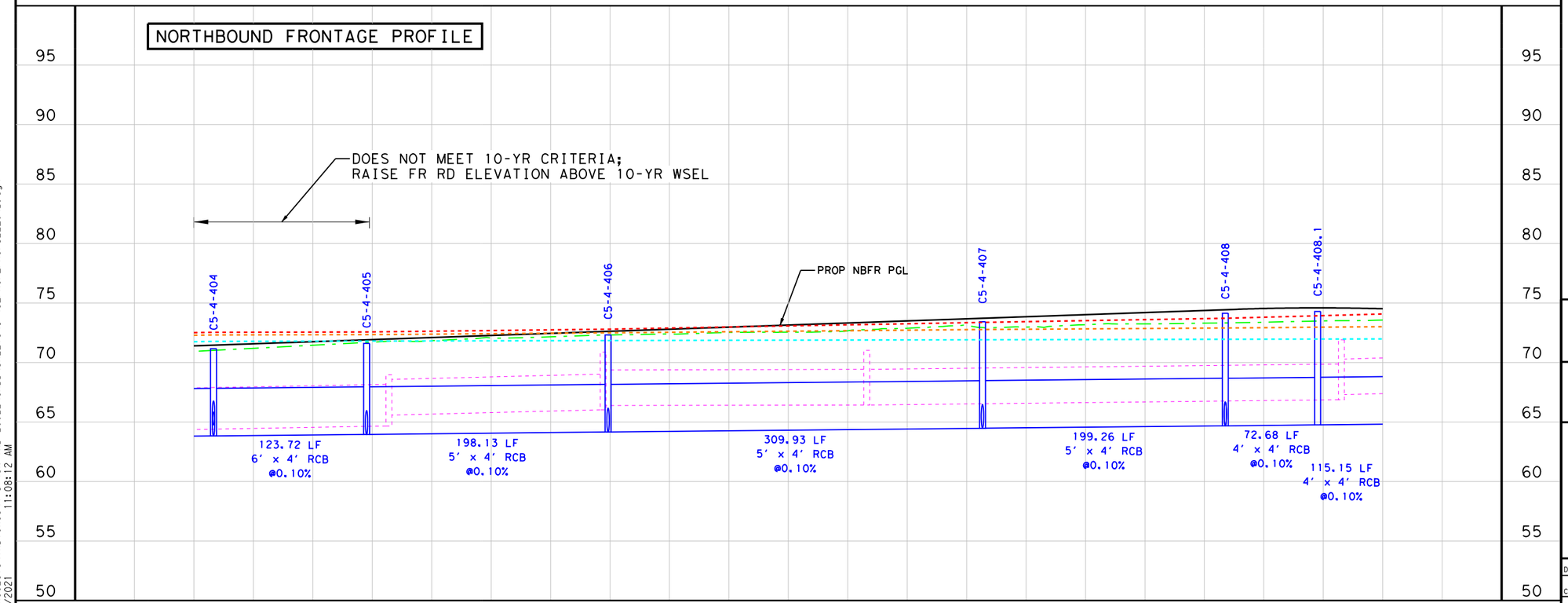
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_04A.dgn
7/21/2021 11:08:09 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

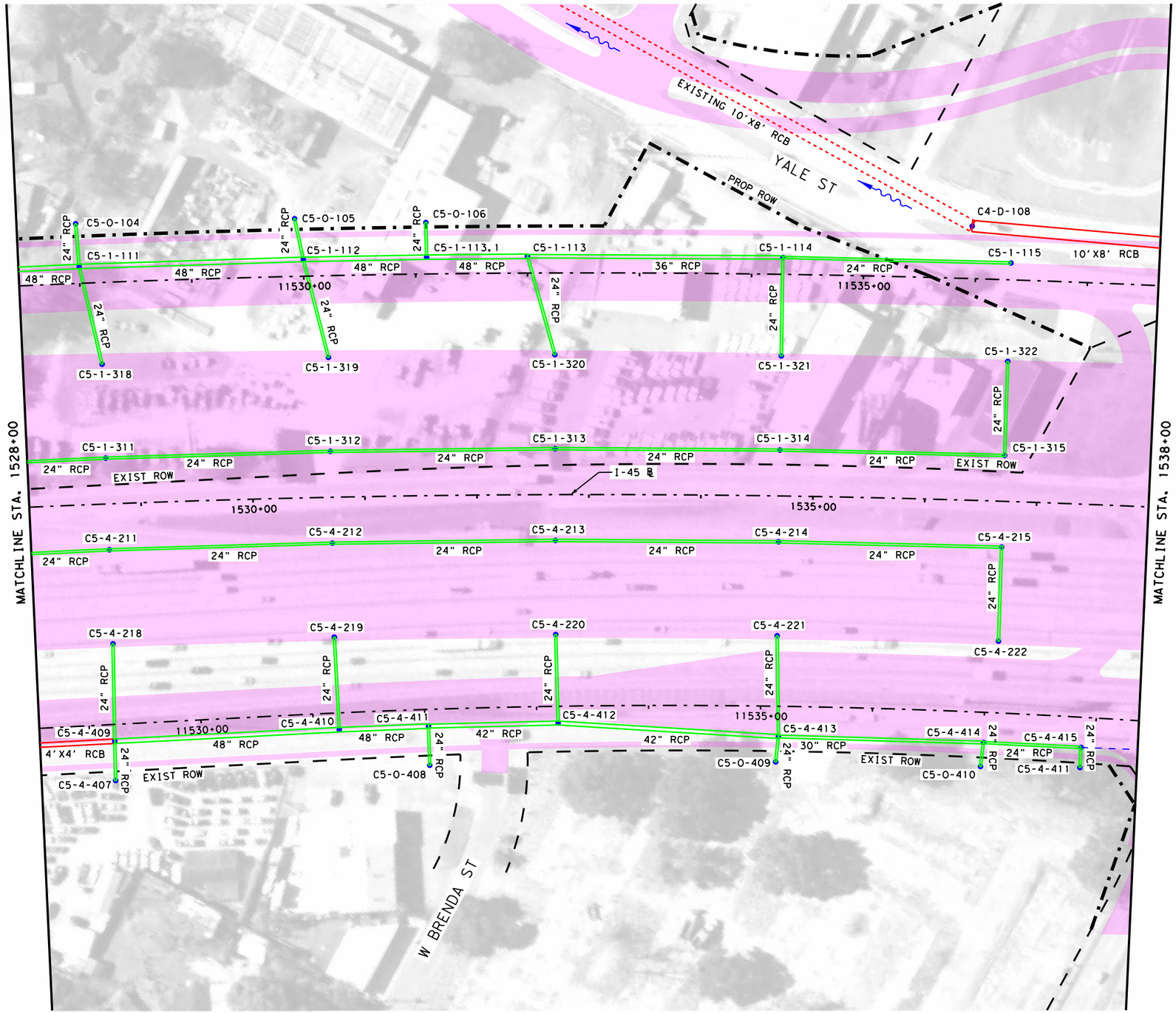
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1518+00 TO 1528+00

SHEET 4B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_04B.dgn
7/21/2021 11:08:12 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

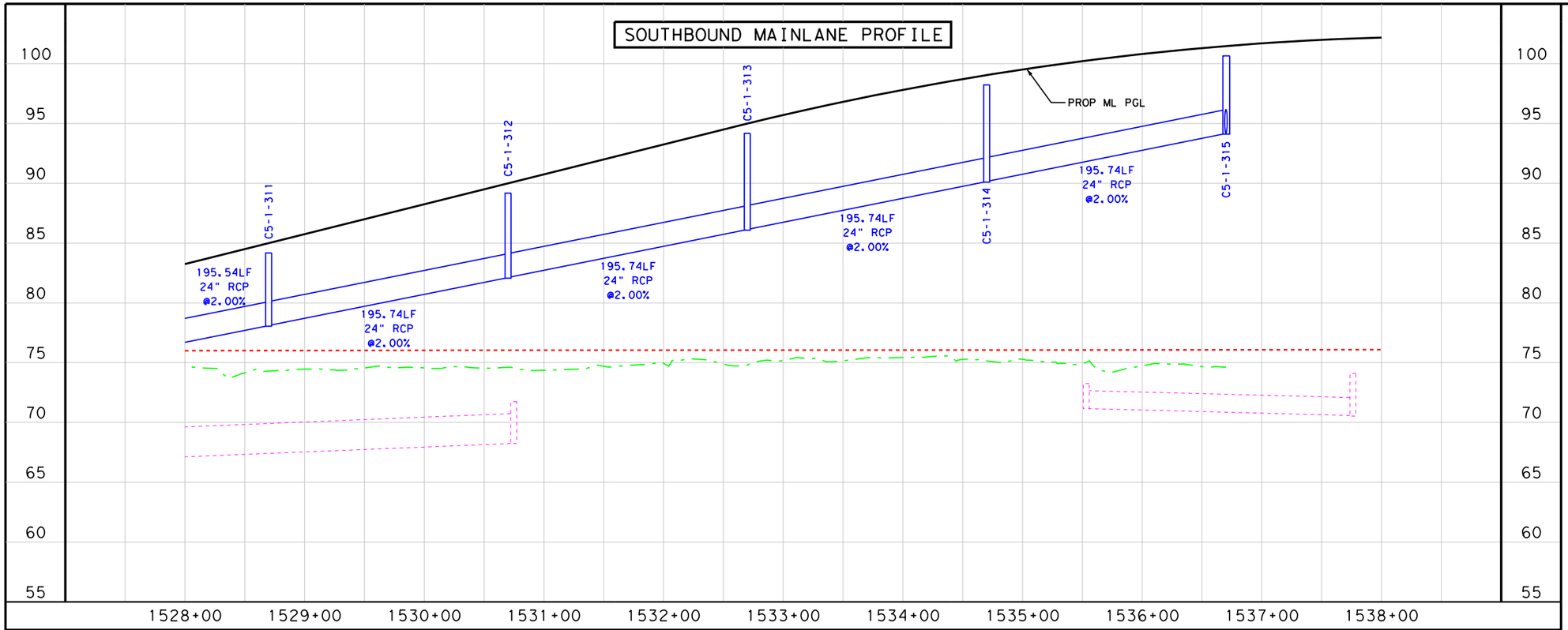
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1528+00 TO STA 1538+00
SHEET 5 OF 13

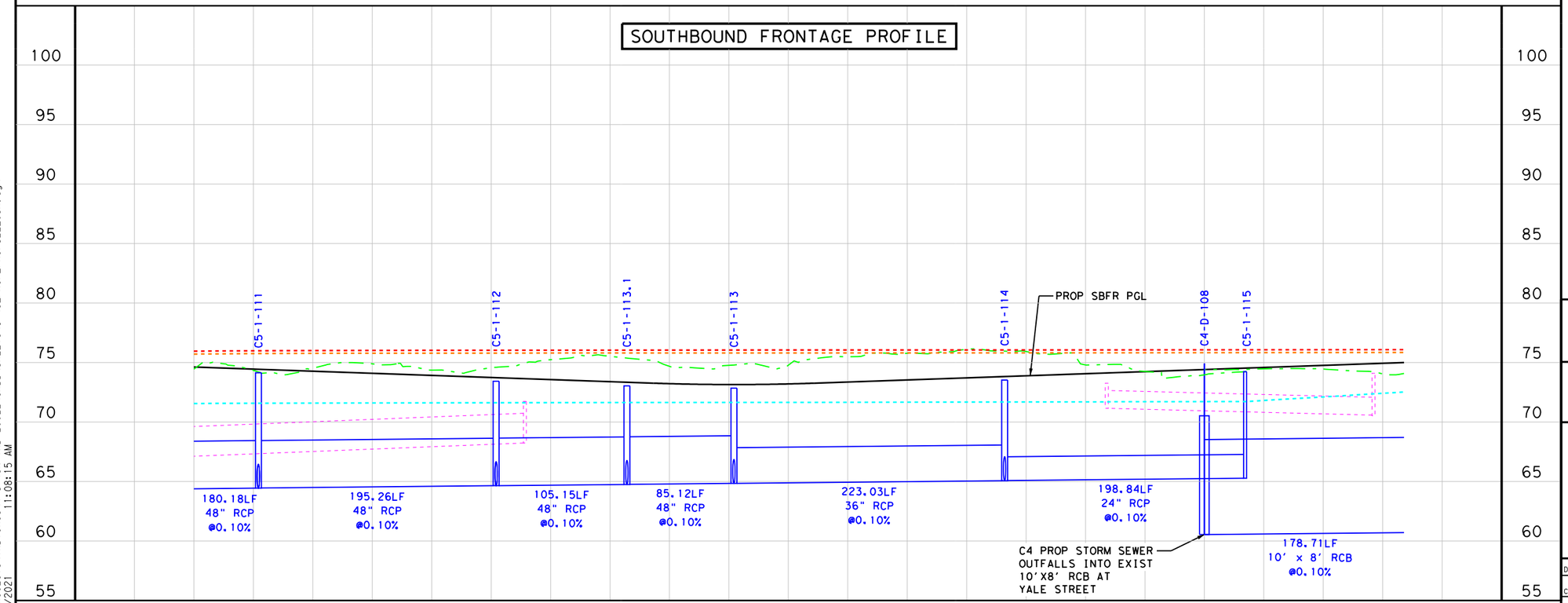
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

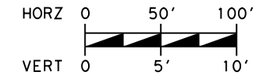
P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_05.dgn
7/21/2021 11:06:09 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE





LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

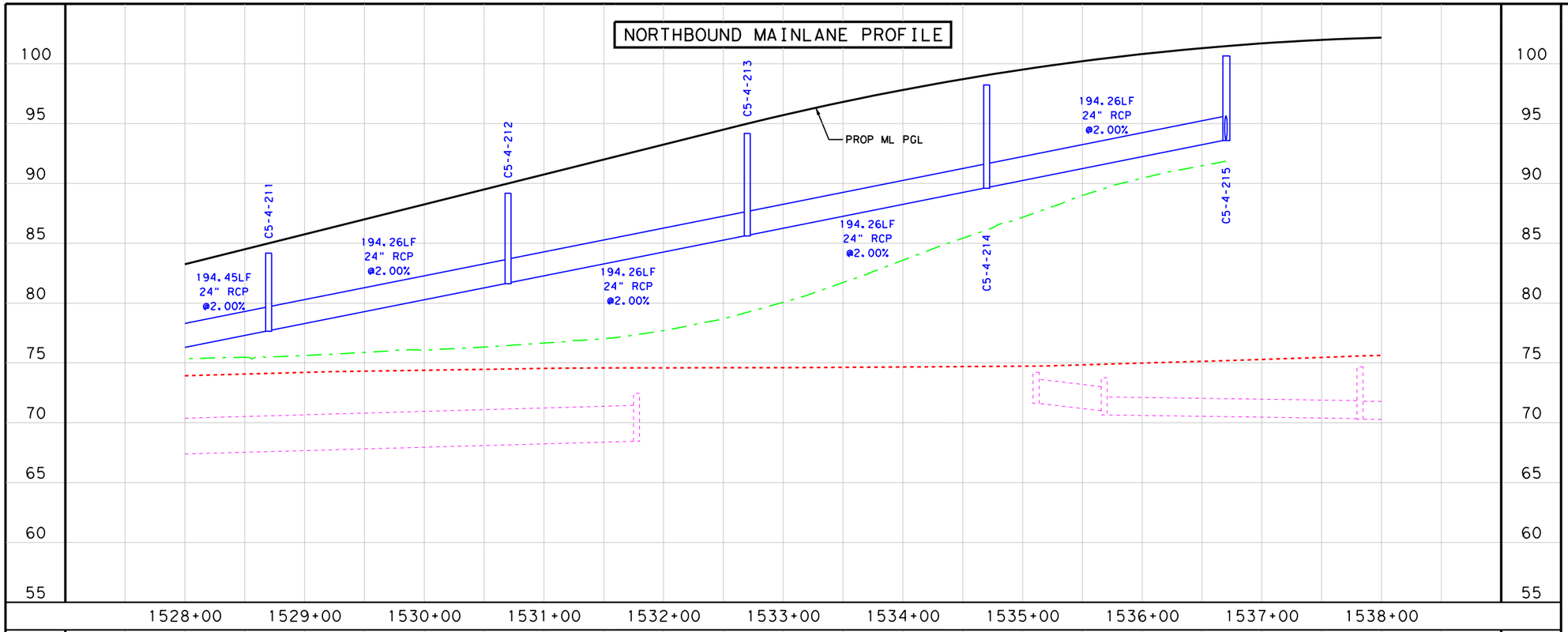
STA 1528+00 TO 1538+00

SHEET 5A OF 13

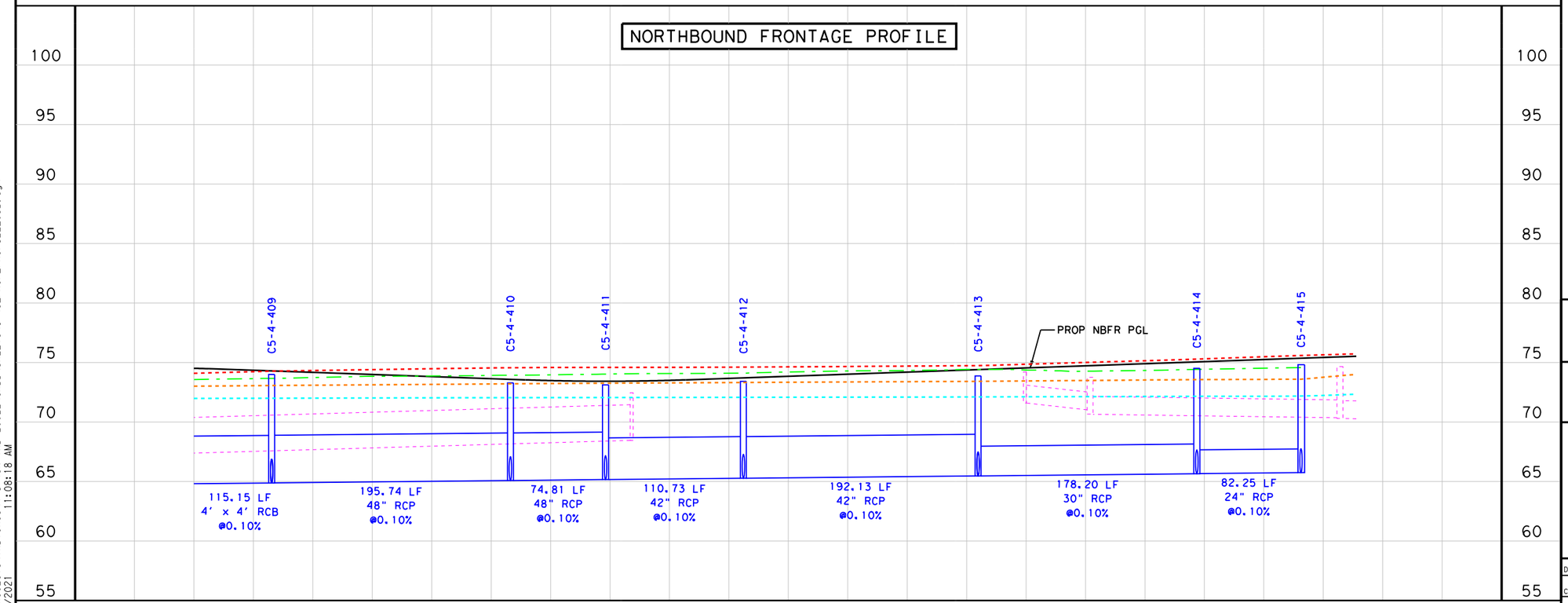
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_PROFILE_05A.dgn
7/21/2021 11:08:15 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50′ 100′

VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

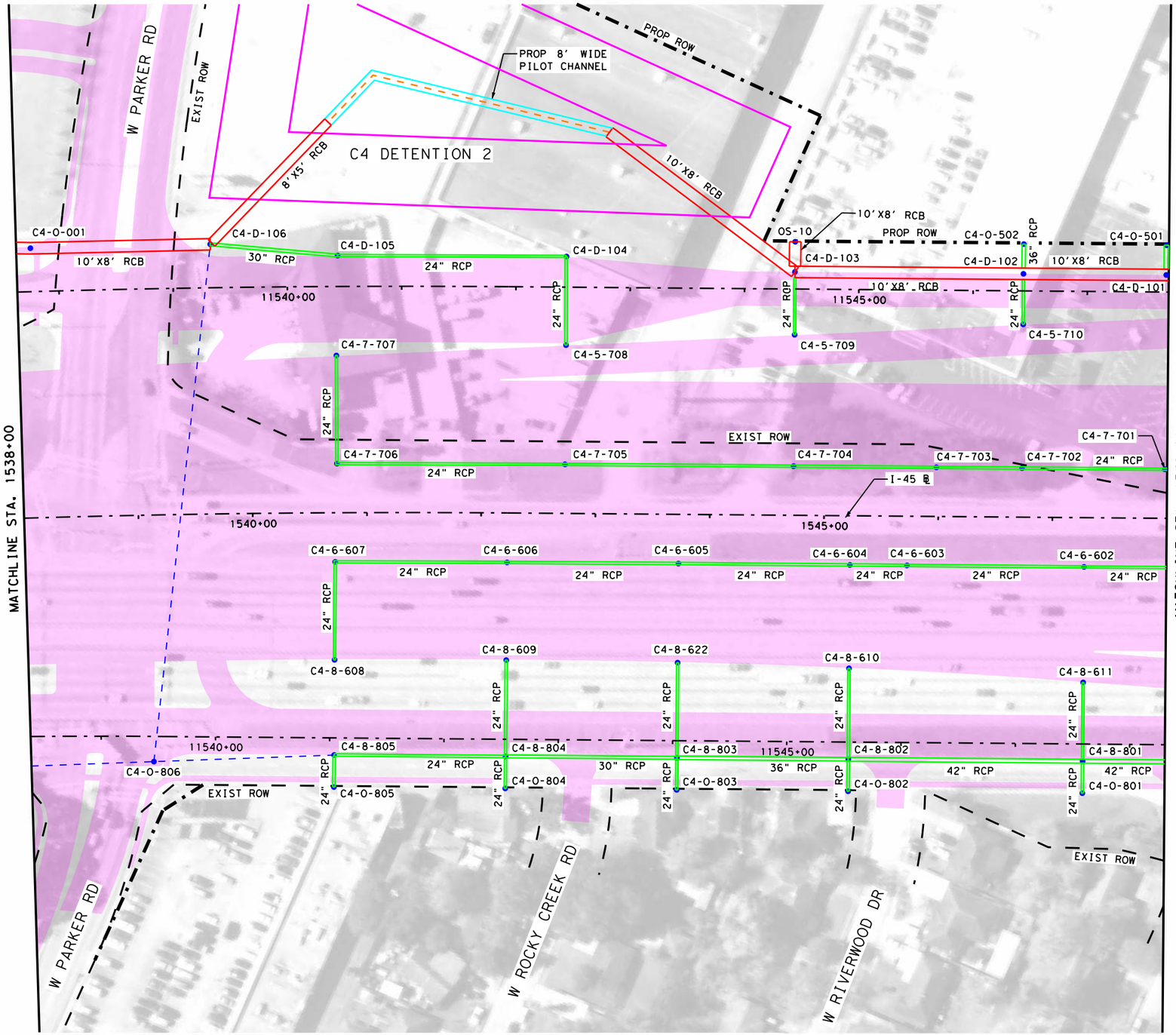
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1528+00 TO 1538+00

SHEET 5B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_05B.dgn
7/21/2021 11:08:18 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

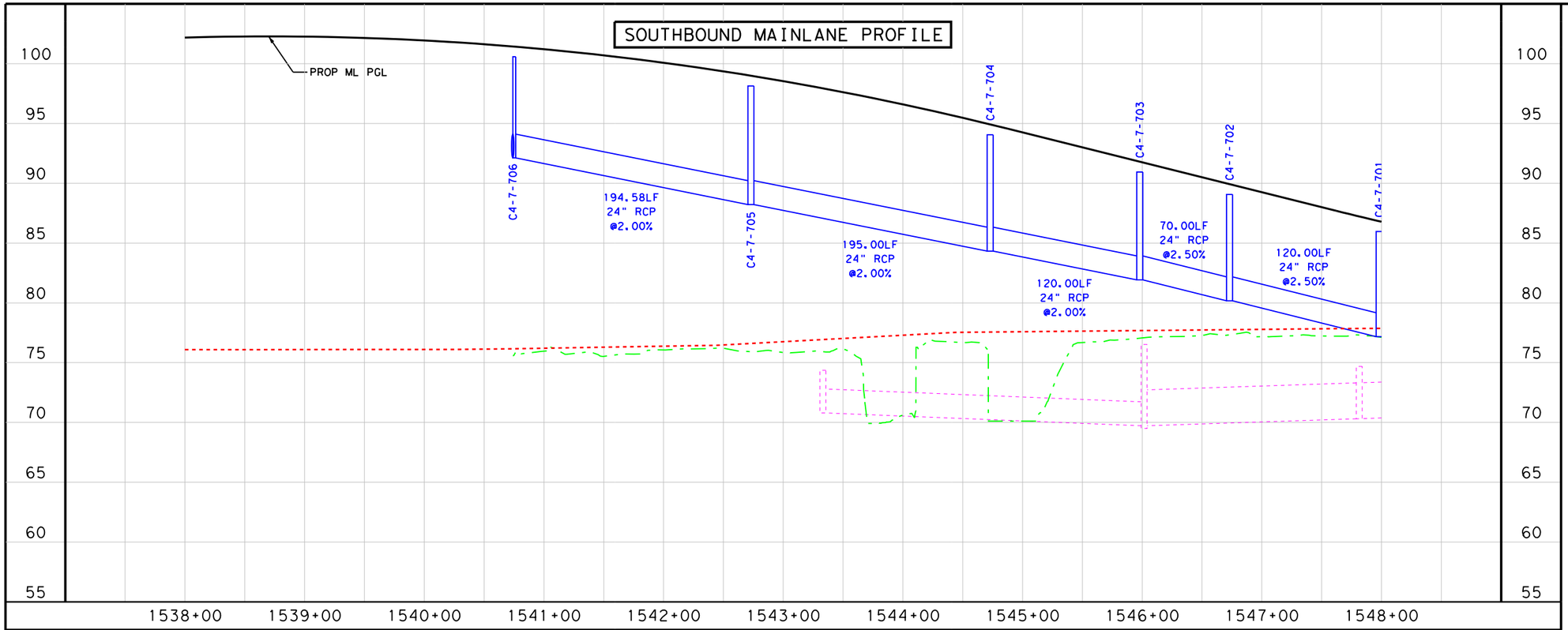
I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1538+00 TO STA 1548+00

SHEET 6 OF 13

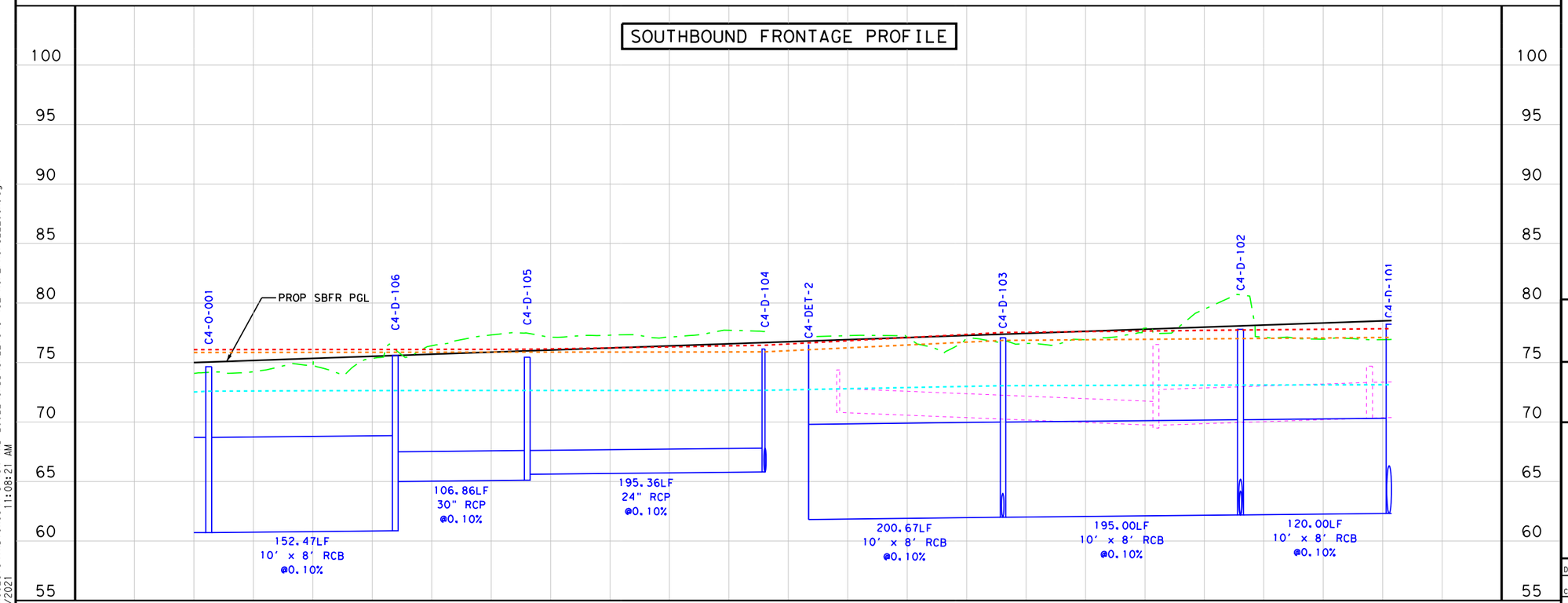
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_06.dgn
7/21/2021 11:06:17 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'
VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230
tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

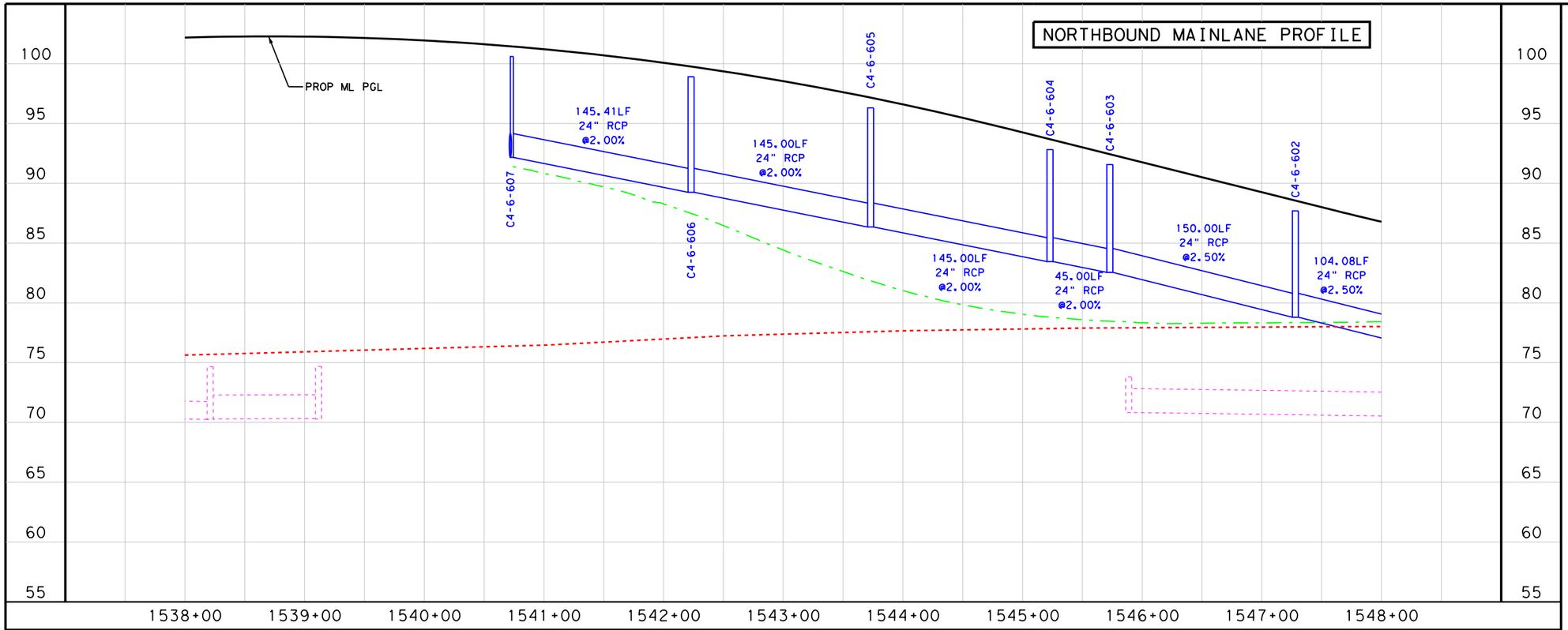
STA 1538+00 TO 1548+00

SHEET 6A OF 13

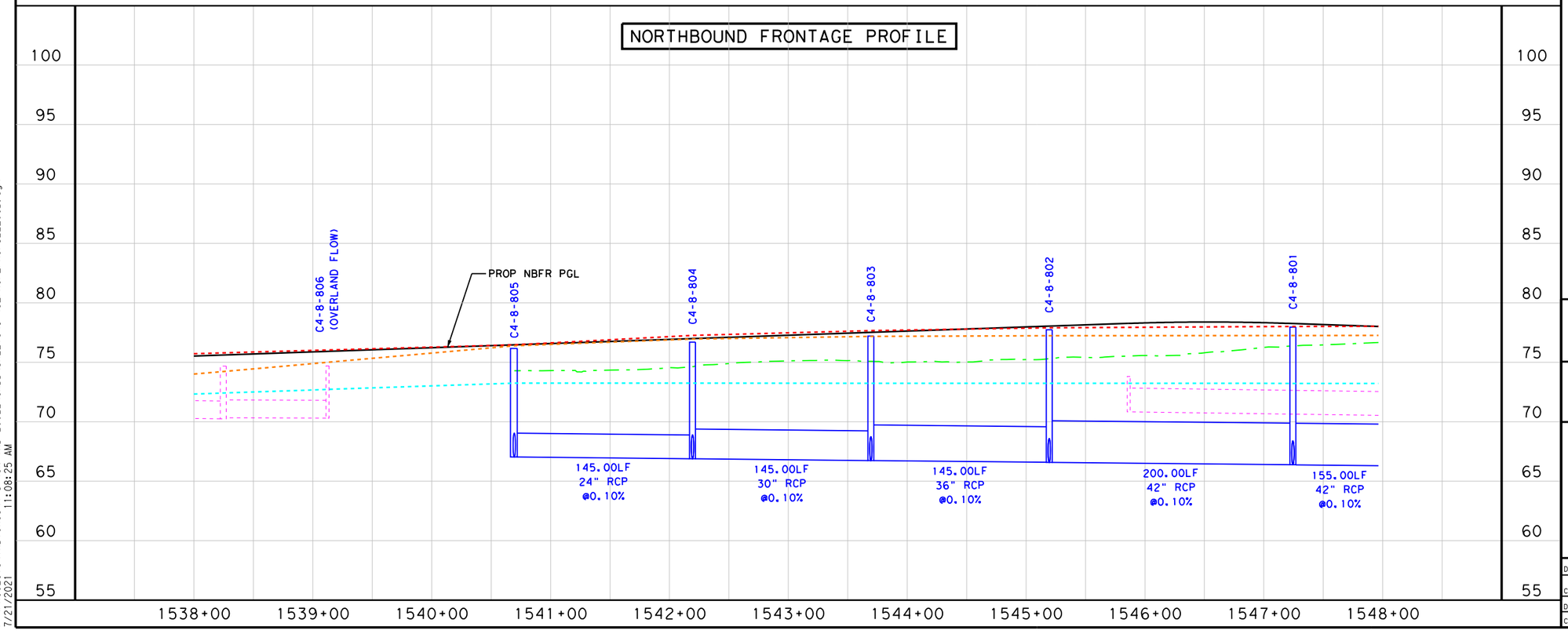
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_PROFILE_06A.dgn
7/21/2021 11:08:21 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50′ 100′
VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230
tnp

I-45

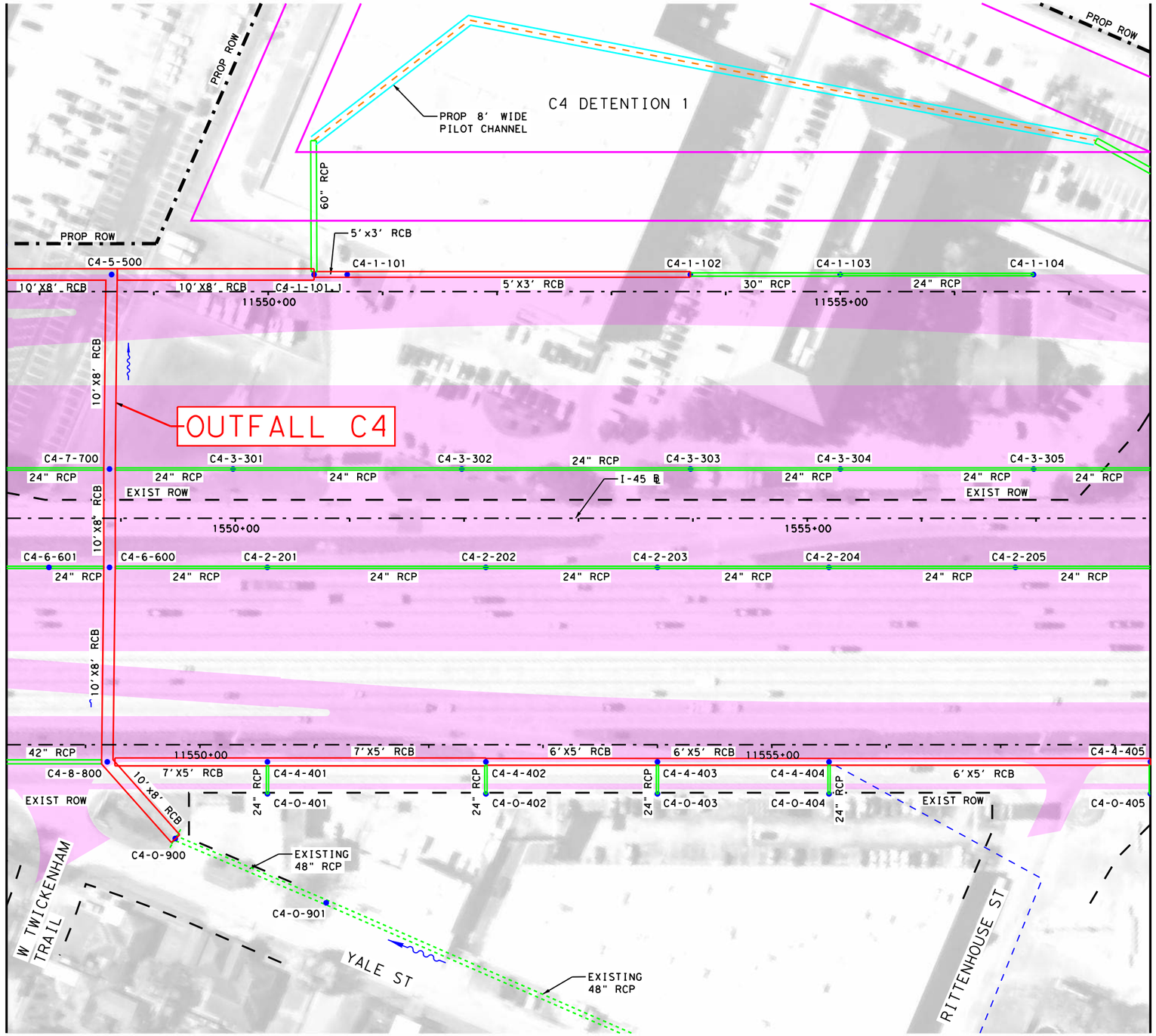
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1538+00 TO 1548+00

SHEET 6B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_06B.dgn
7/21/2021 11:08:25 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

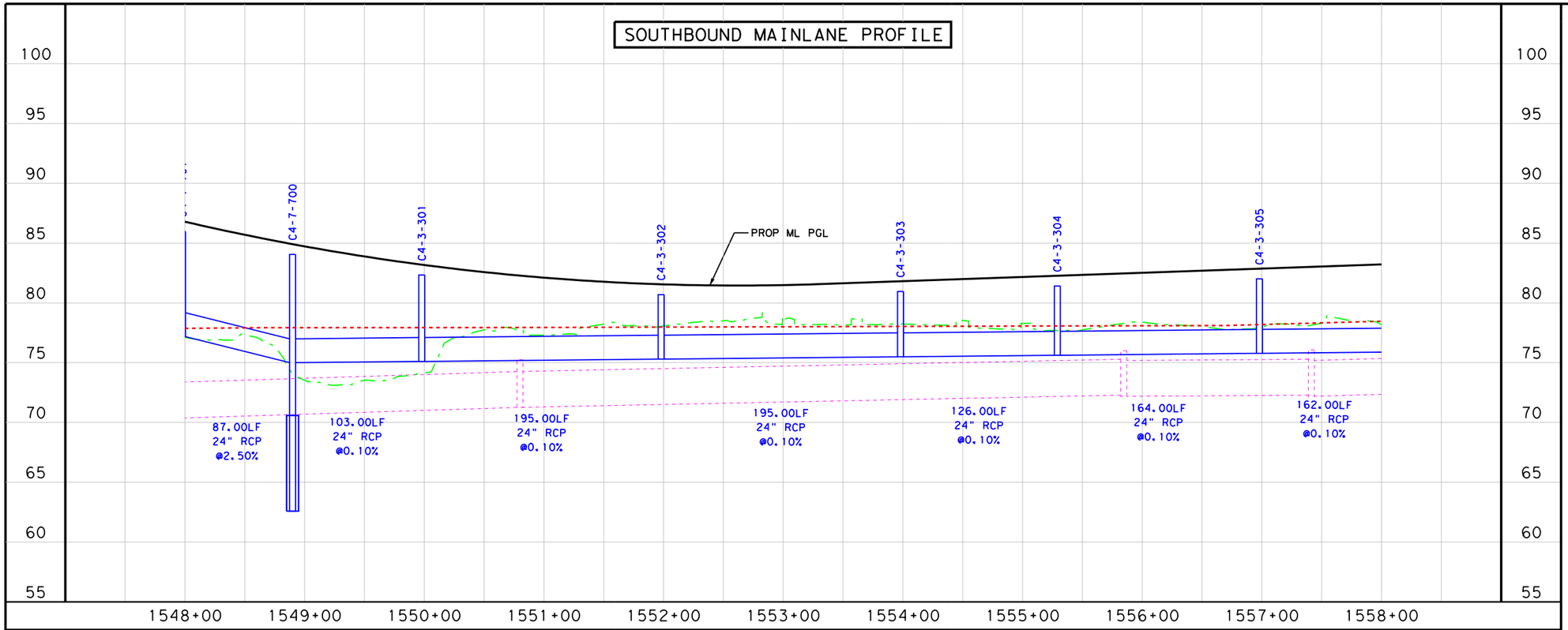
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1548+00 TO STA 1558+00

SHEET 7 OF 13

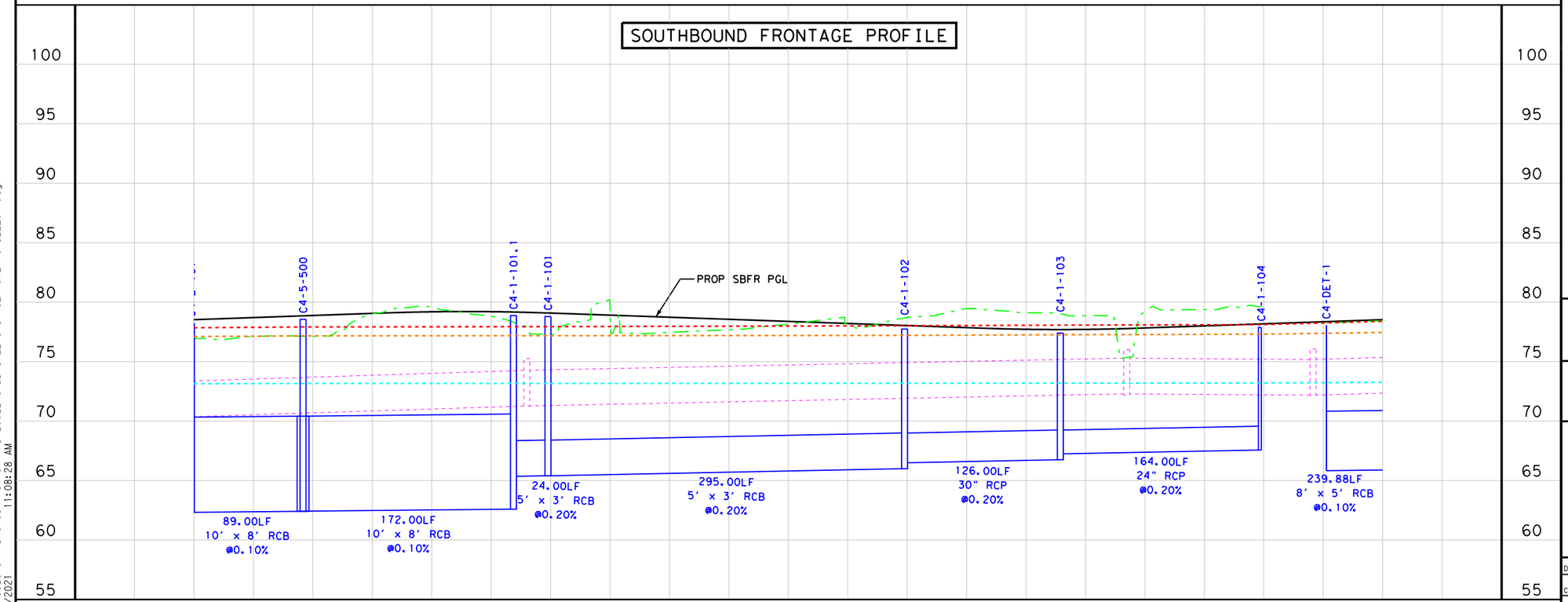
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_07.dgn
7/21/2021 11:06:24 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

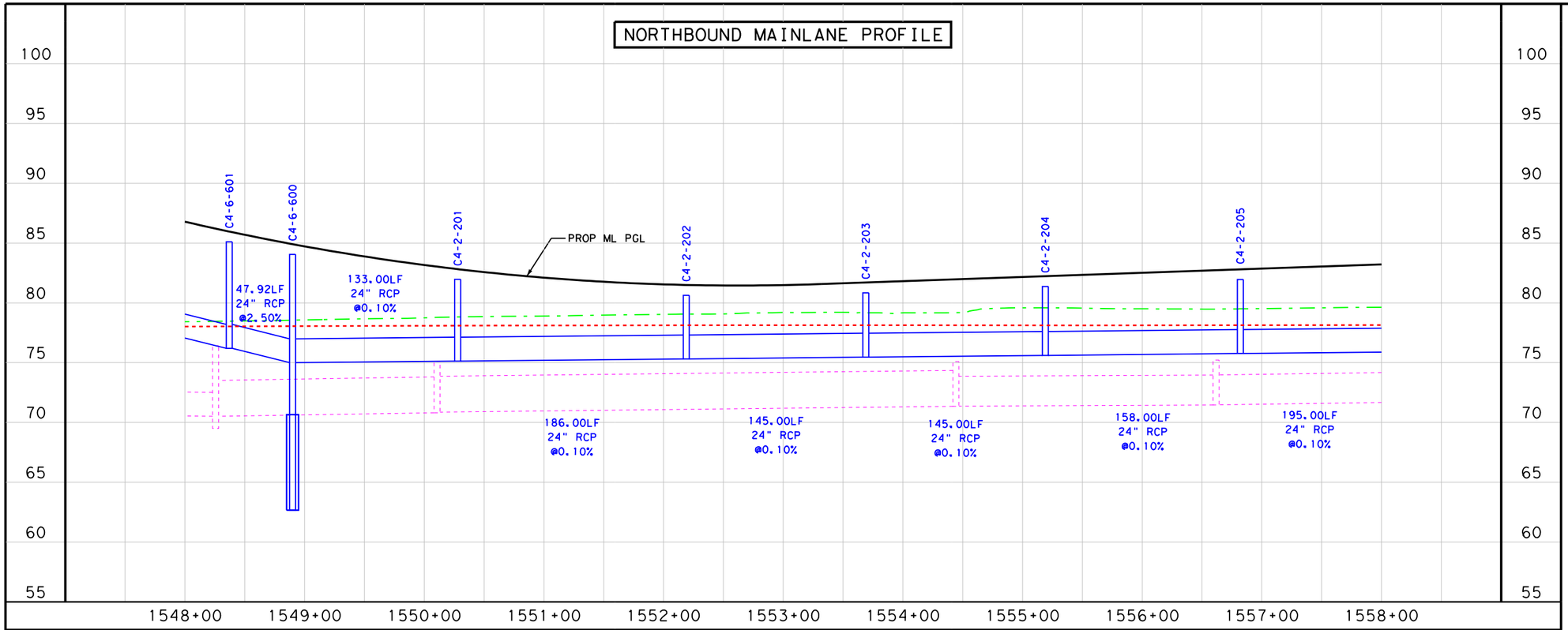
STA 1548+00 TO 1558+00

SHEET 7A OF 13

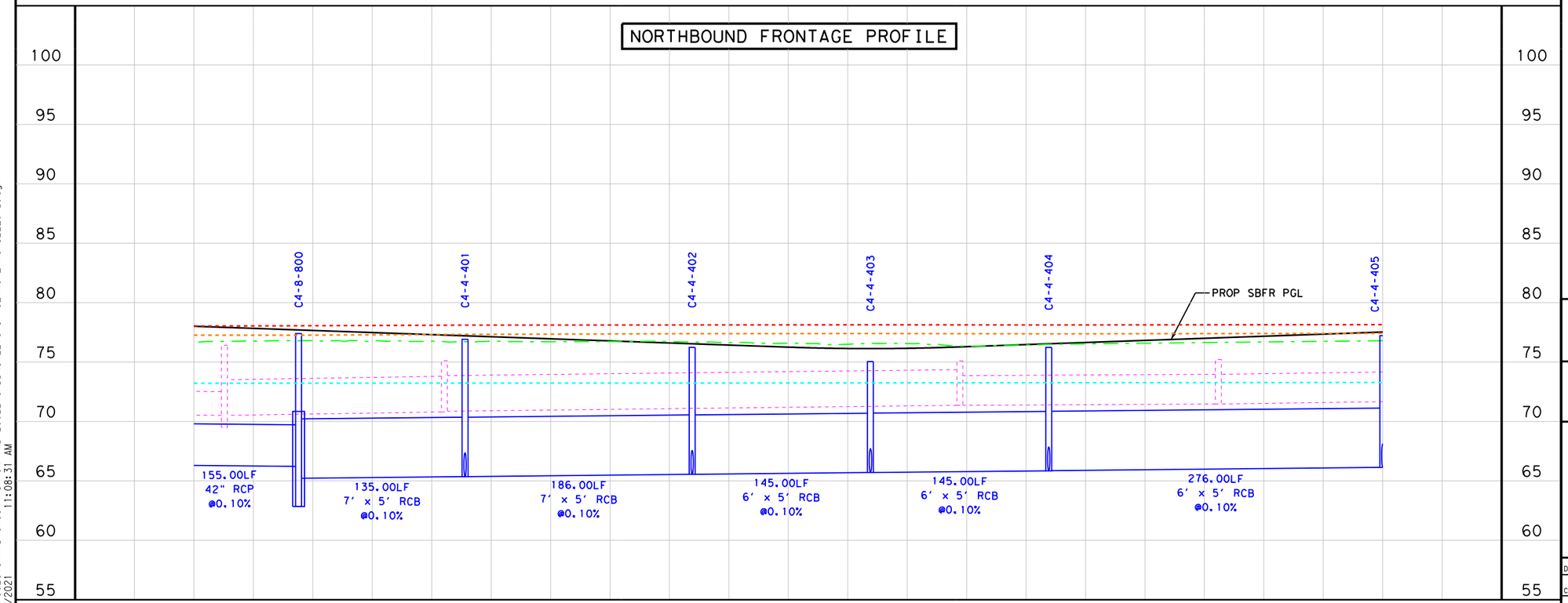
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_07A.dgn
7/21/2021 11:08:28 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

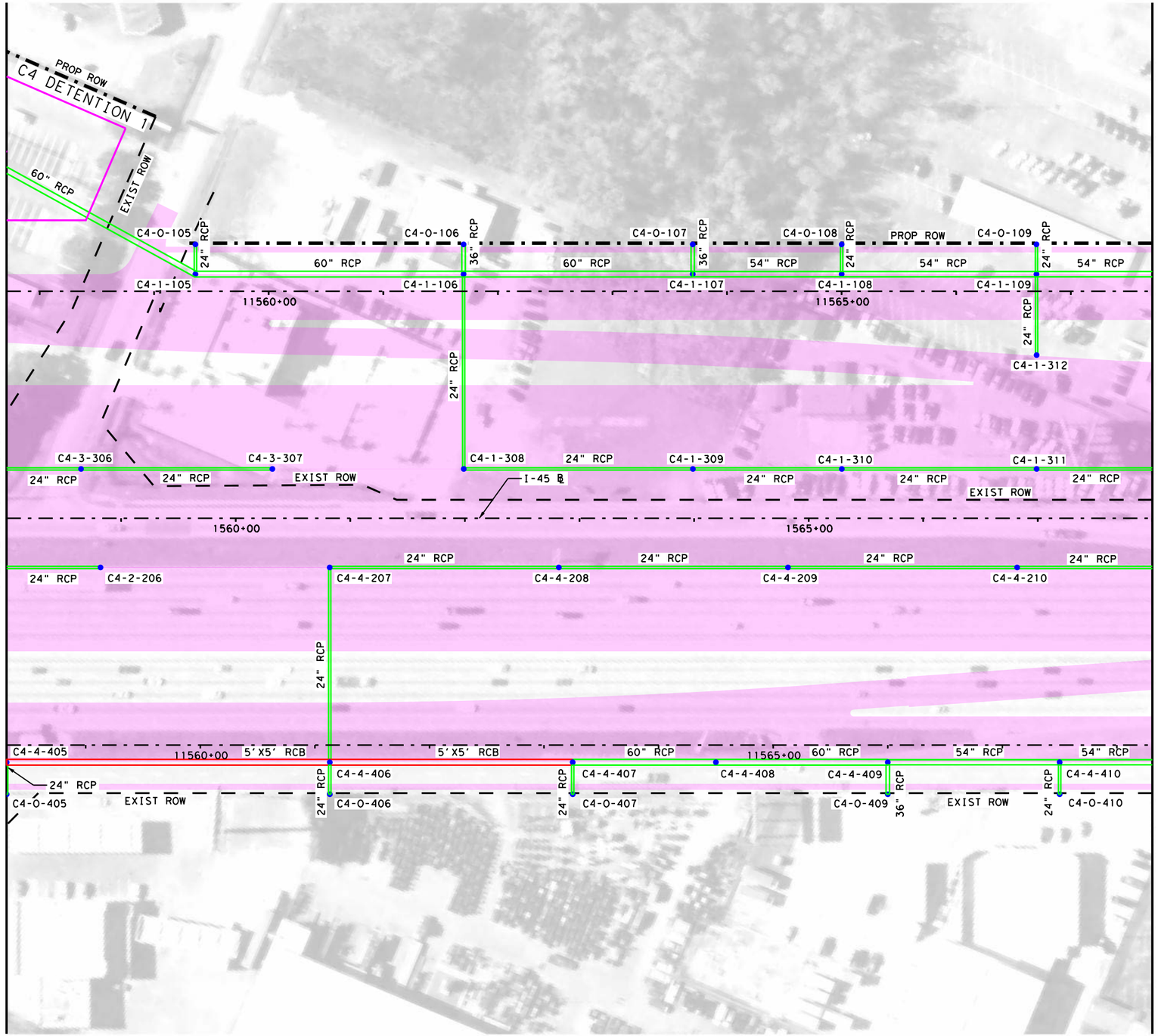
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1548+00 TO 1558+00

SHEET 7B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_07B.dgn
7/21/2021 11:08:31 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY, NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1558+00 TO STA 1568+00

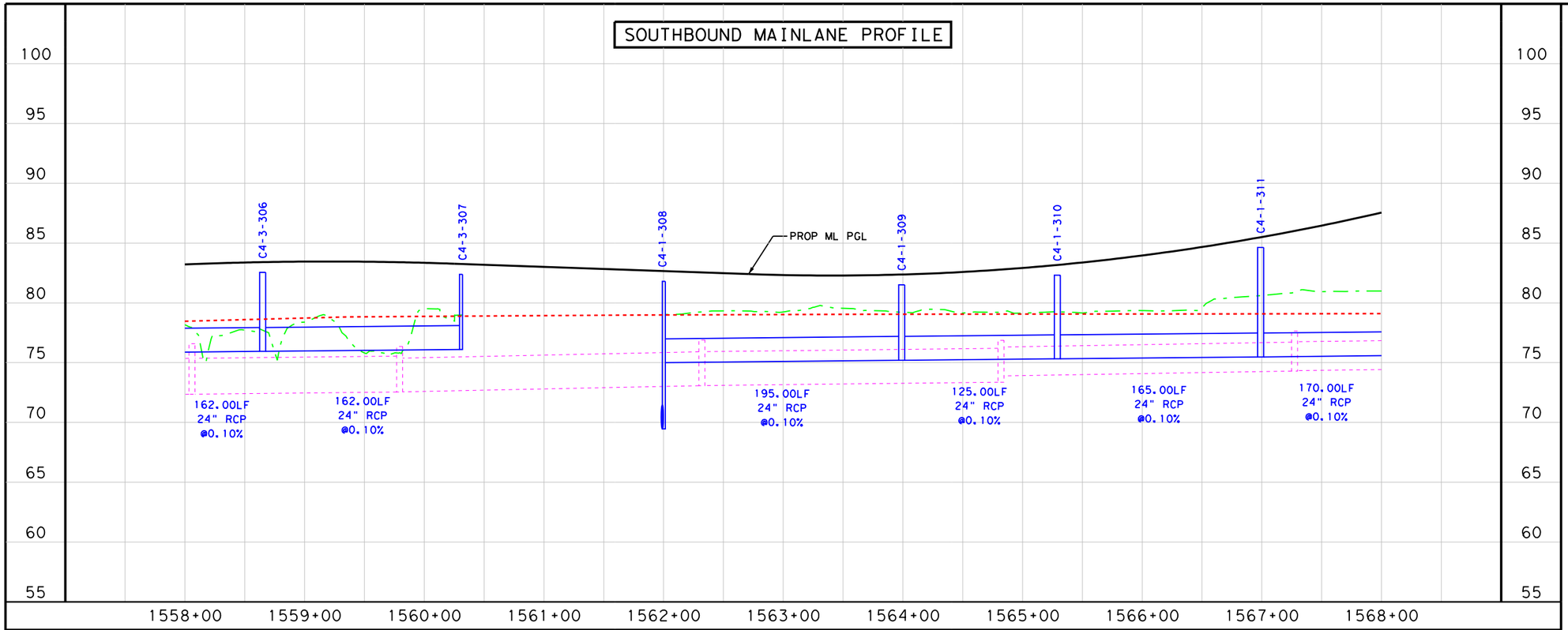
SHEET 8 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)	I-45

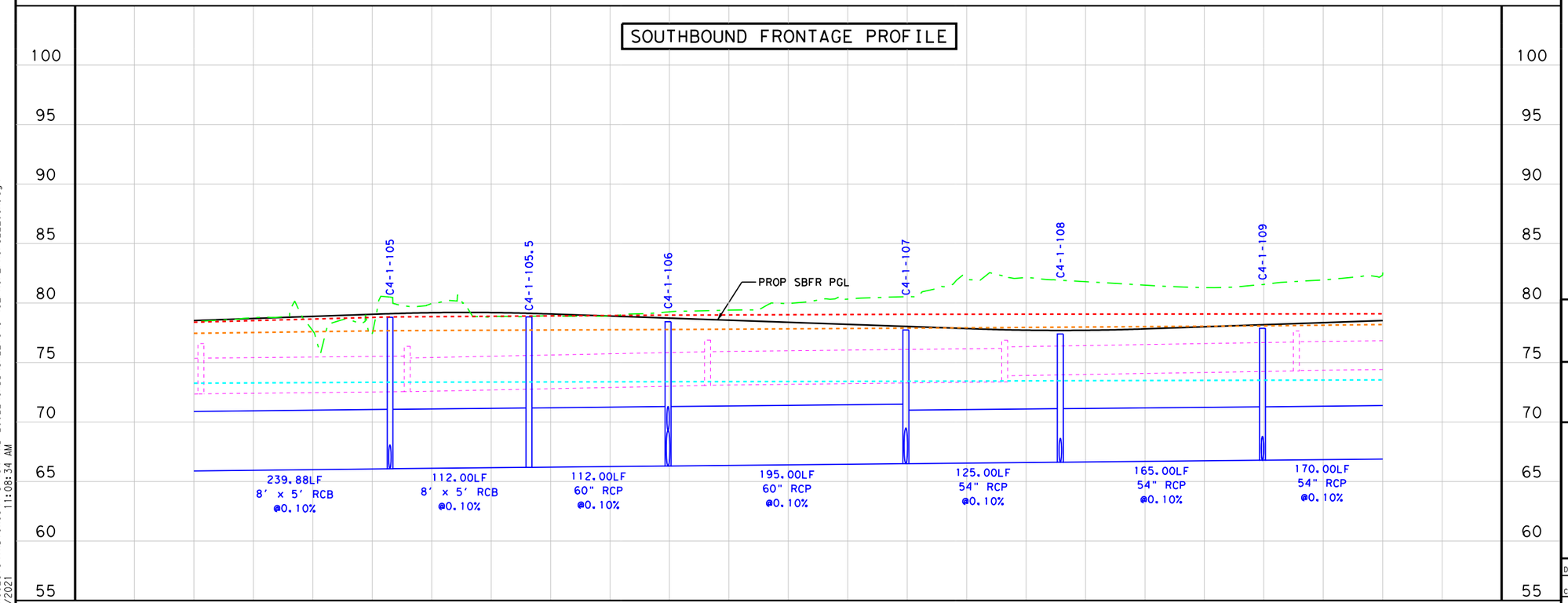
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_08.dgn
7/21/2021 11:06:32 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

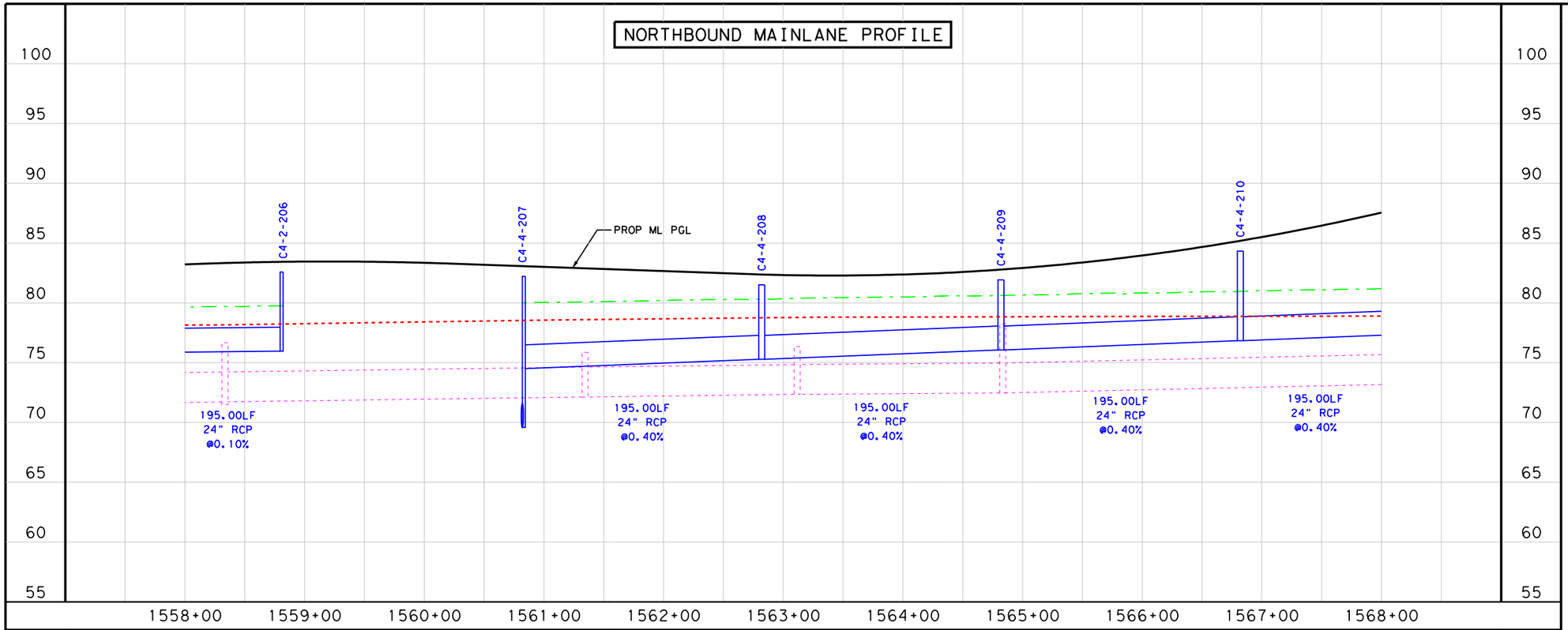
STA 1558+00 TO 1568+00

SHEET 8A OF 13

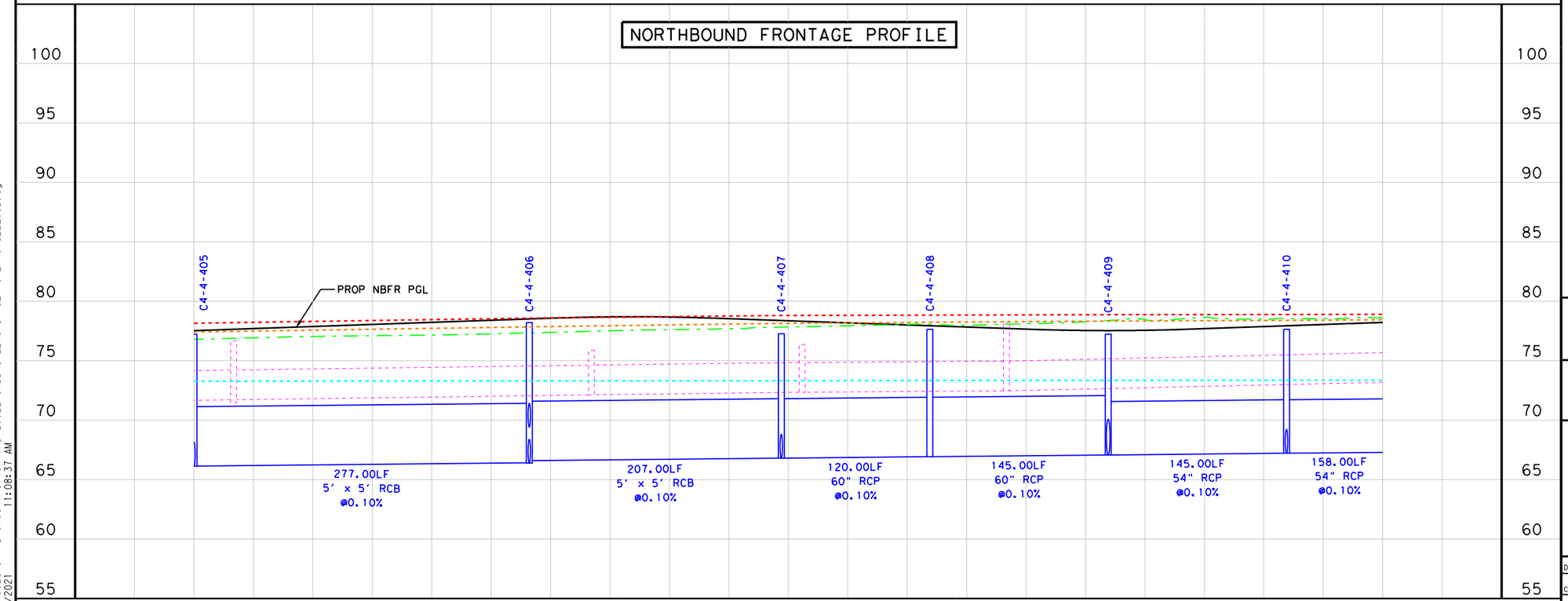
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_08A.dgn
7/21/2021 11:08:34 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

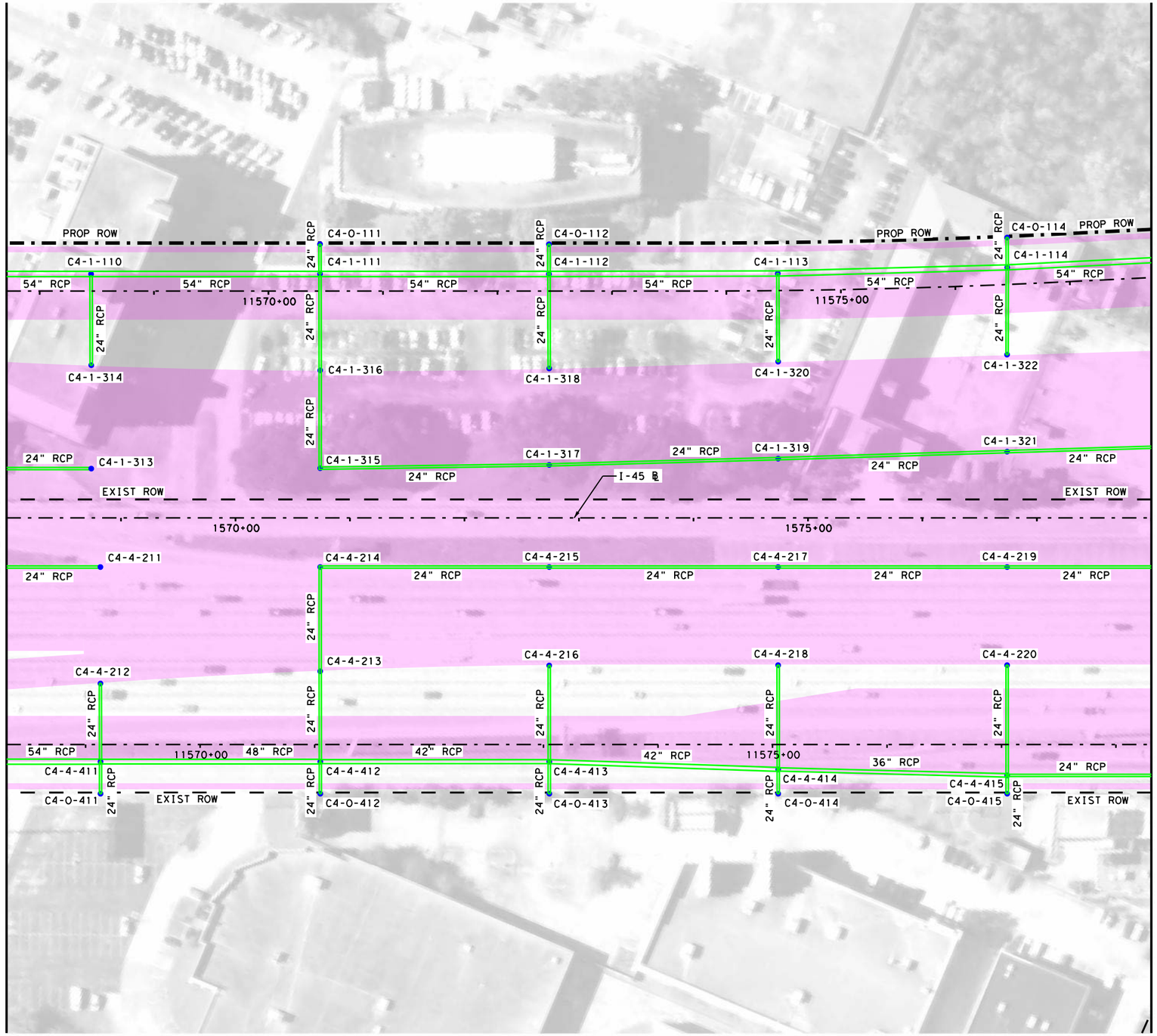
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1558+00 TO 1568+00

SHEET 8B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.				HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)				I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_08B.dgn
7/21/2021 11:08:37 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

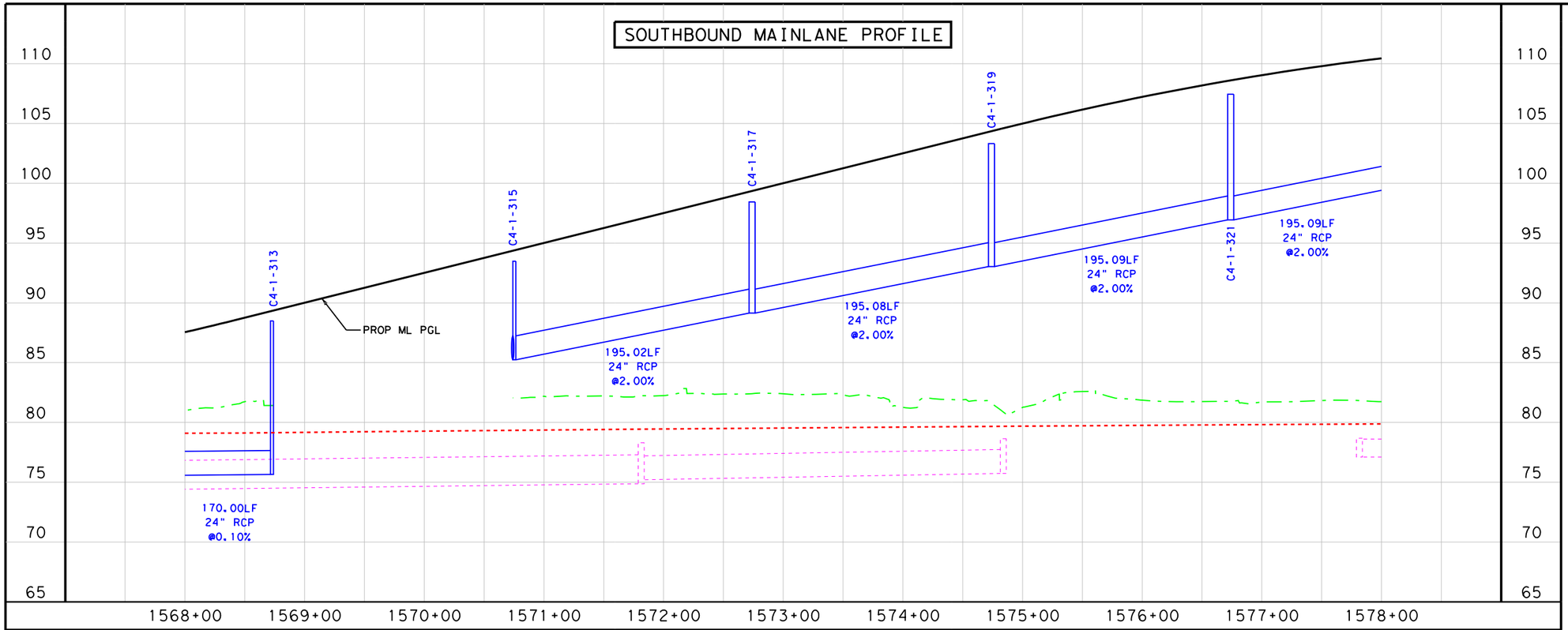
I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1568+00 TO STA 1578+00

SHEET 9 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.				HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)				I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_09.dgn
7/21/2021 11:06:40 AM



HORZ 0 50′ 100′

VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

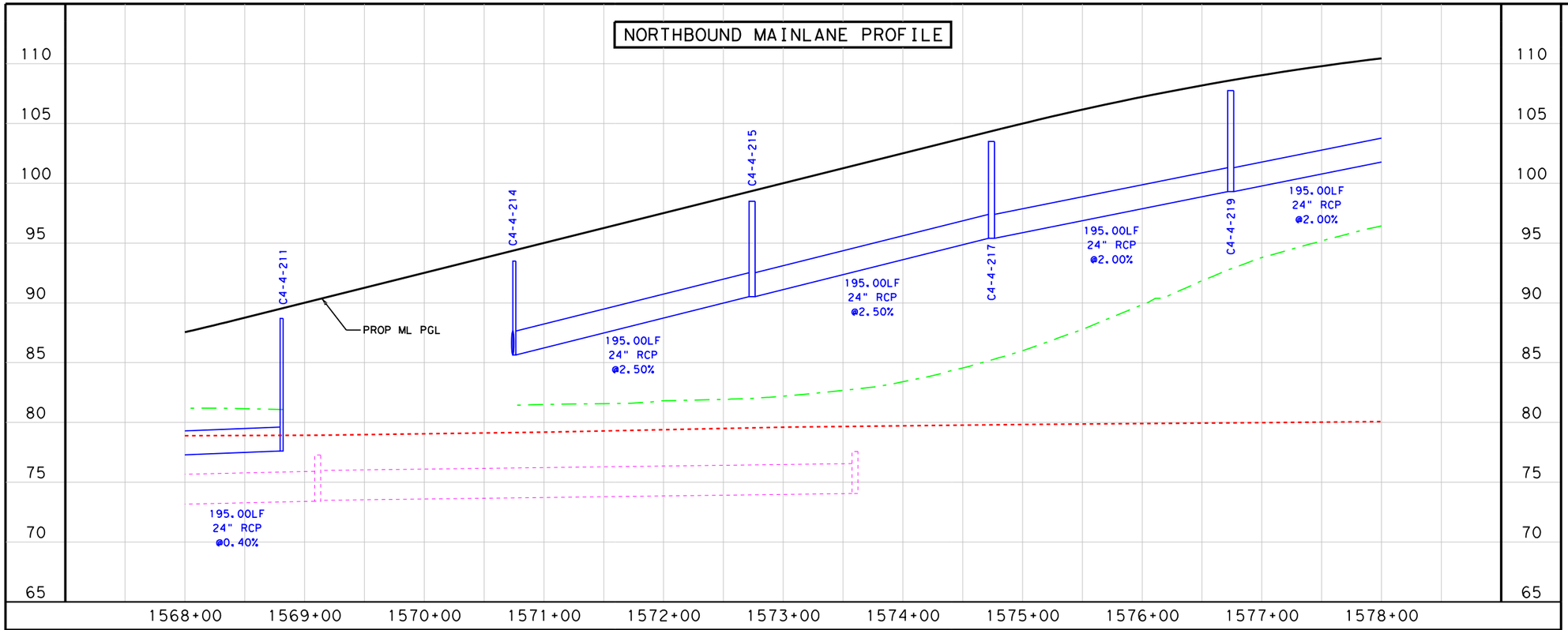
STA 1568+00 TO 1578+00

SHEET 9A OF 13

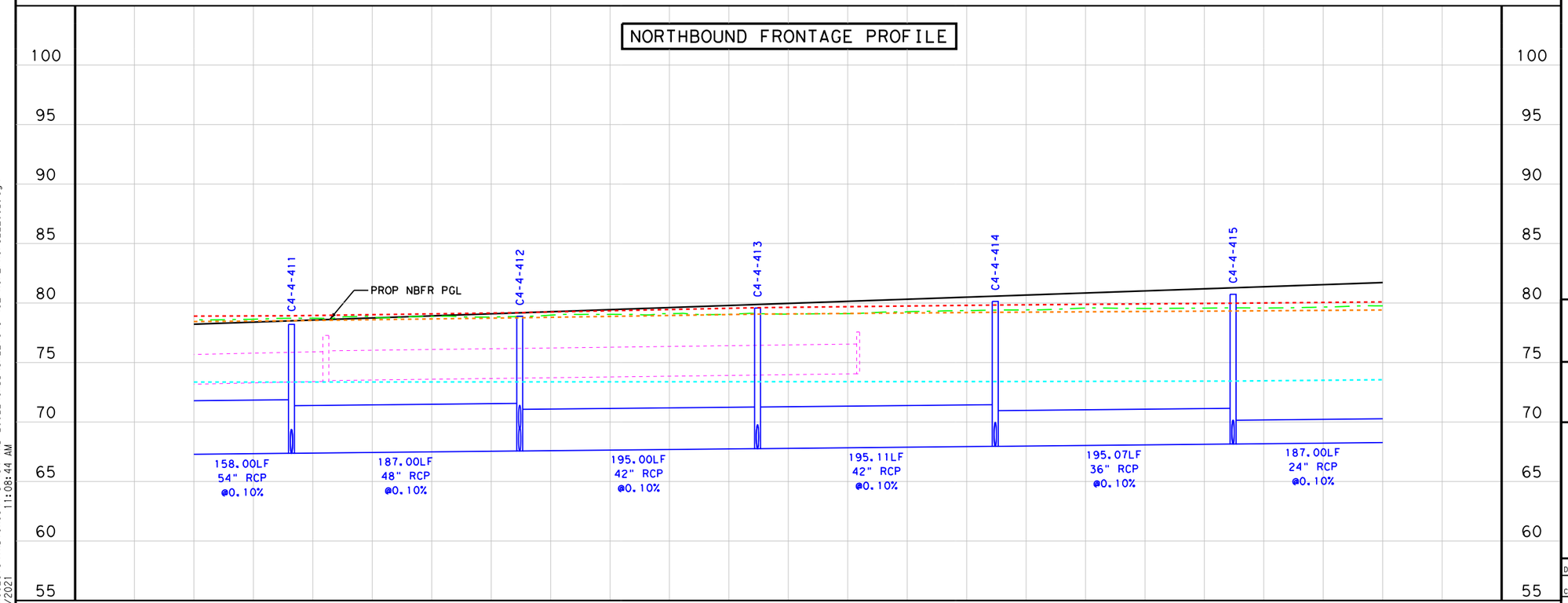
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_09A.dgn
7/21/2021 11:08:41 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50′ 100′
VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

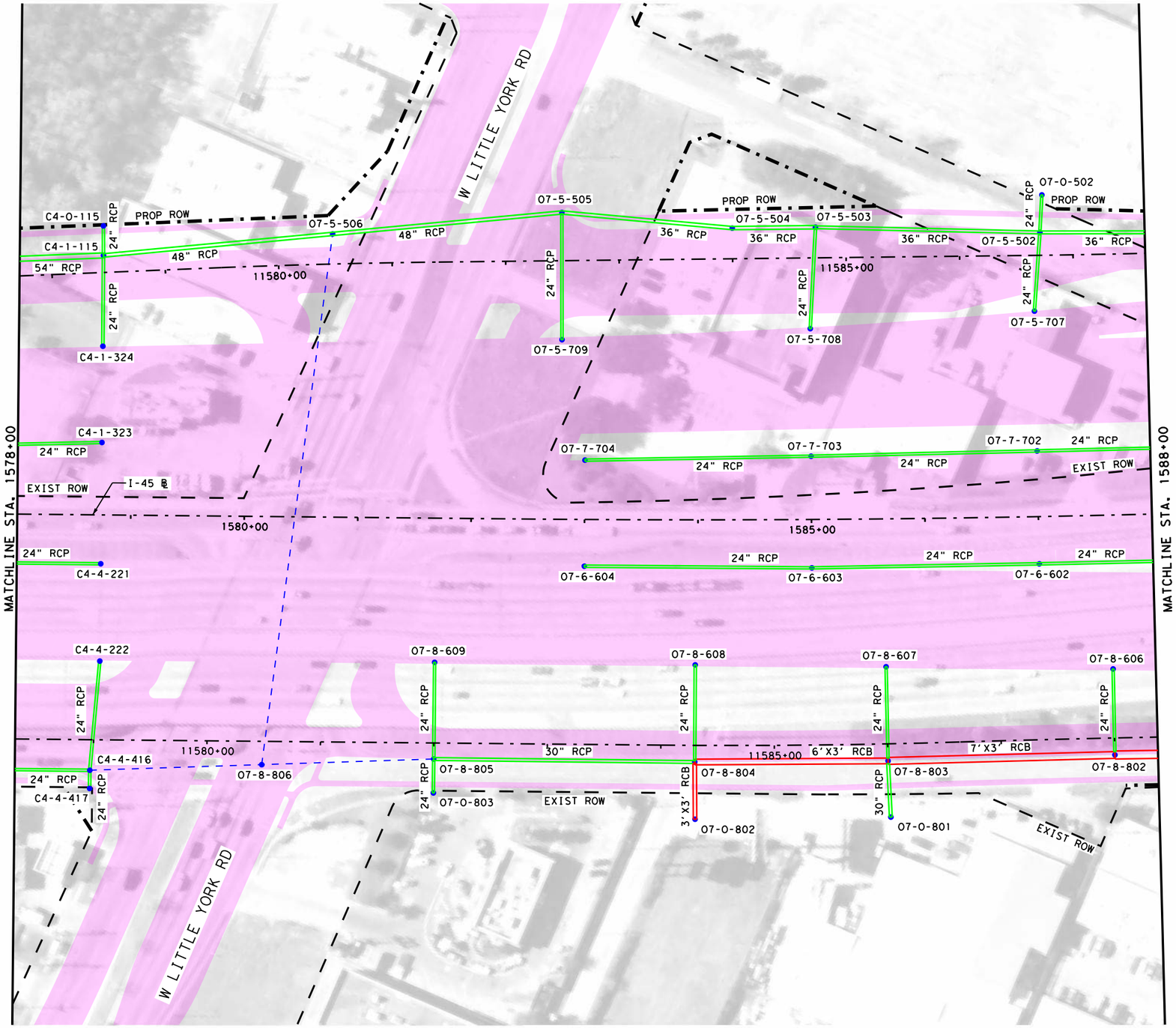
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1568+00 TO 1578+00

SHEET 9B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_09B.dgn
7/21/2021 11:08:44 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1578+00 TO STA 1588+00

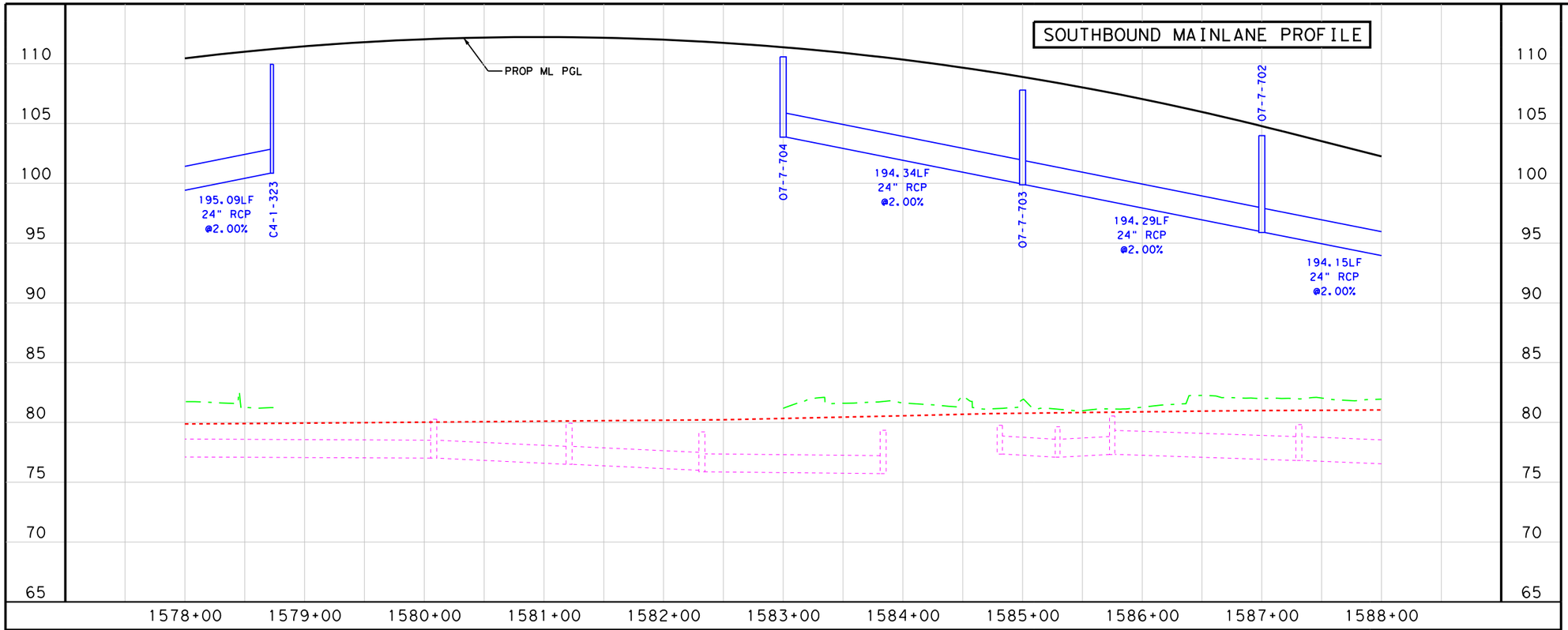
SHEET 10 OF 13

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)	I-45

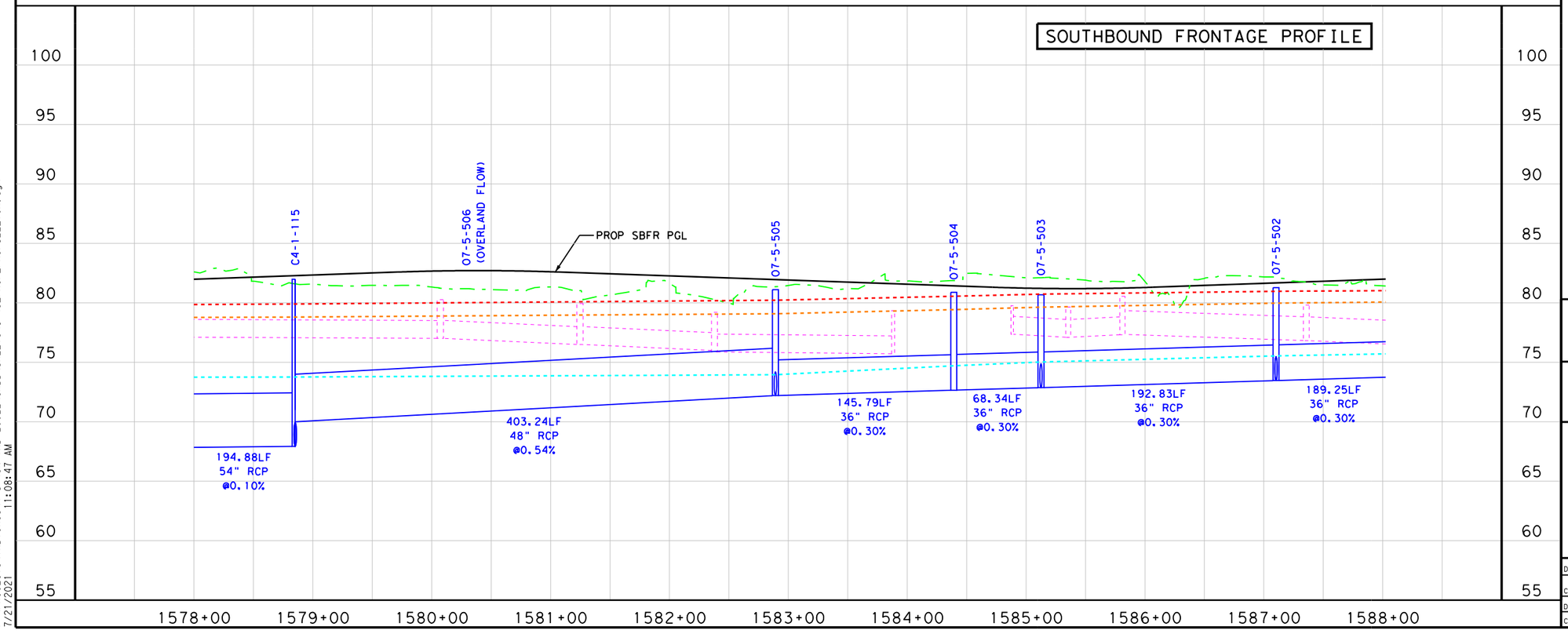
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_LAYOUT_10.dgn
7/21/2021 11:06:48 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50′ 100′

VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

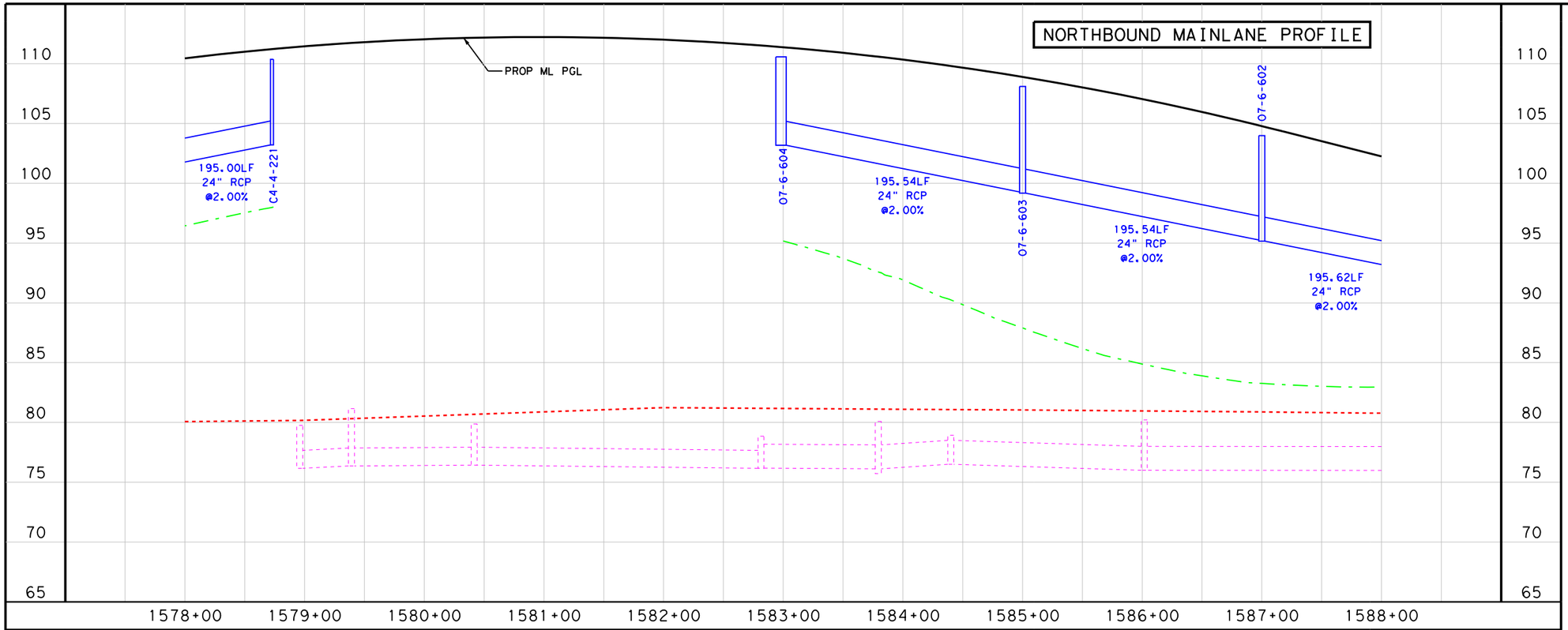
EXHIBIT 9
PROPOSED SWMM LAYOUT

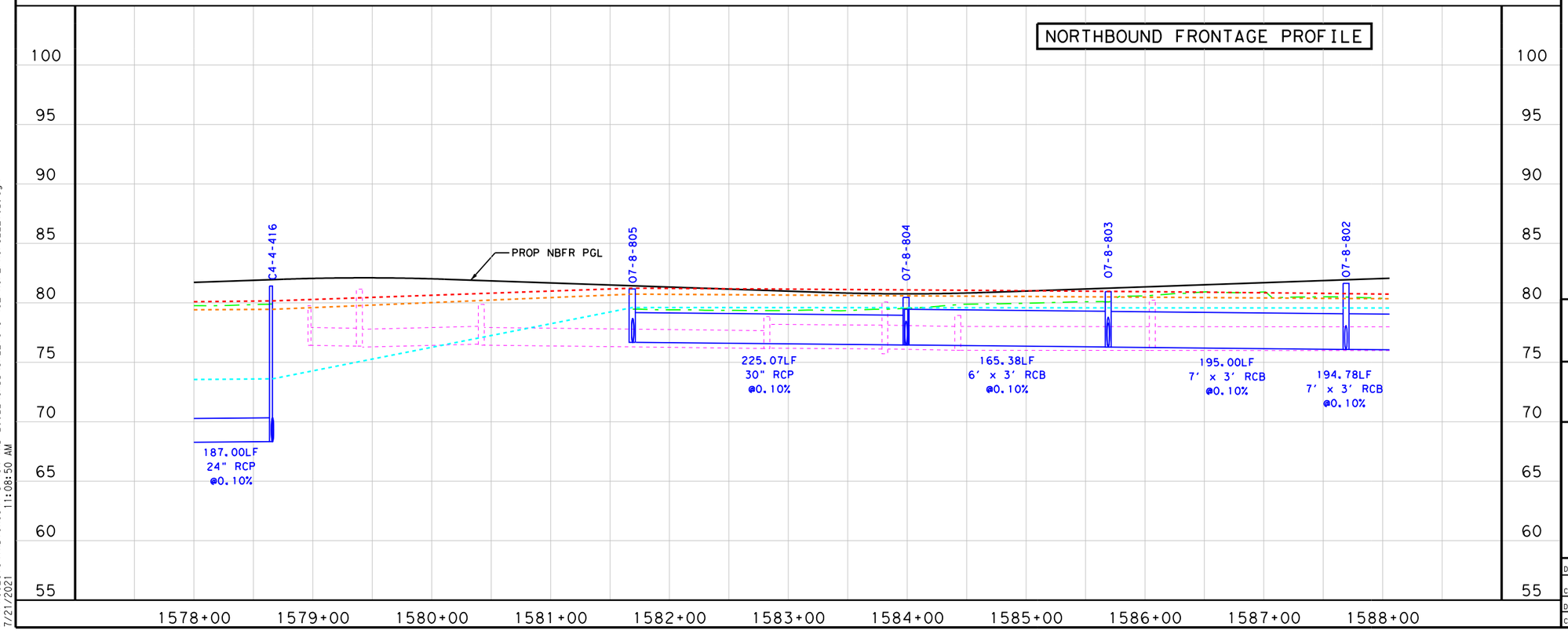
STA 1578+00 TO 1588+00

SHEET 10A OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_10A.dgn
7/21/2021 11:08:47 AM





HORZ 0 50' 100'
VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

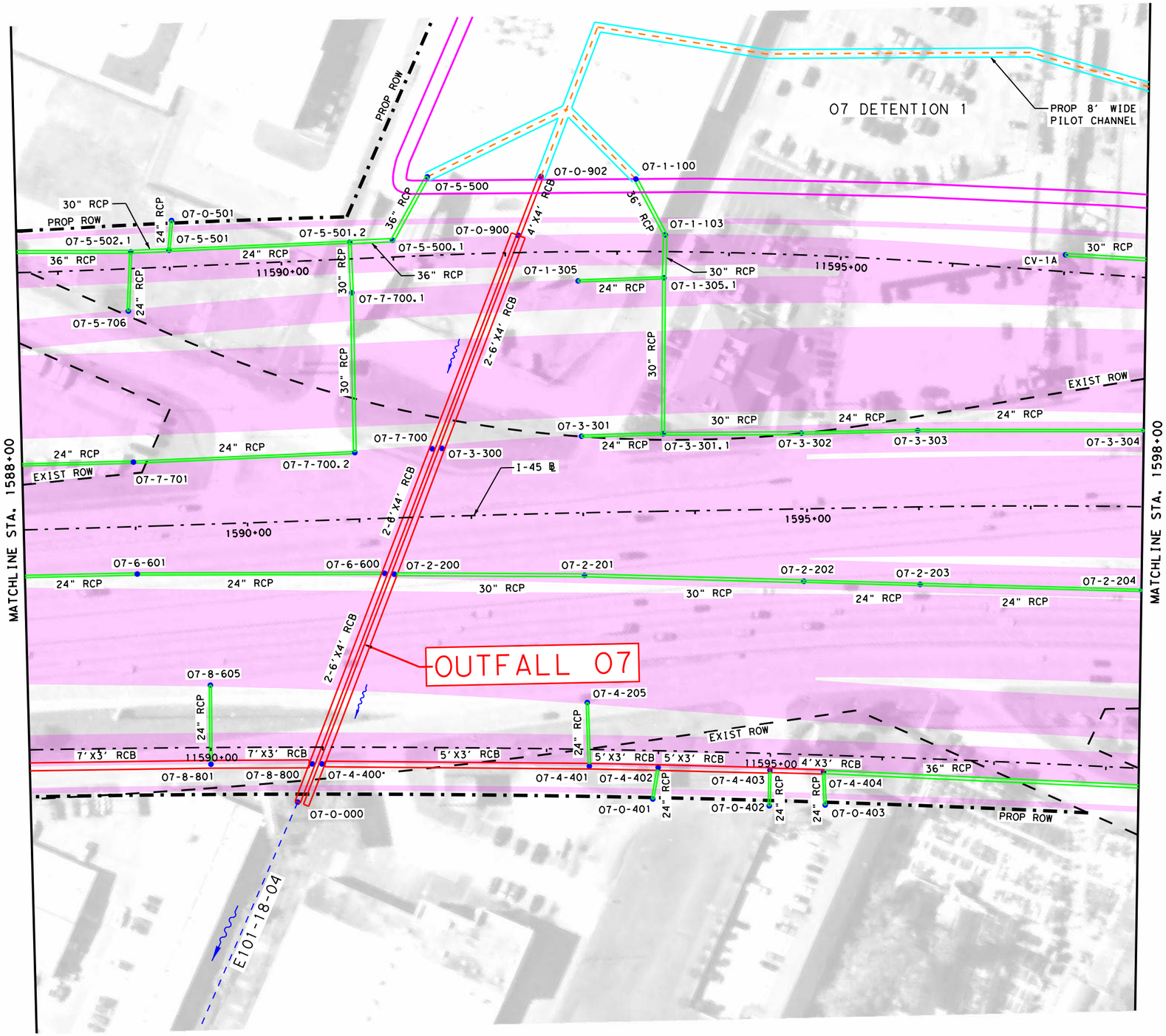
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1578+00 TO 1588+00

SHEET 10B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_PROFILE_10B.dgn
7/21/2021 11:08:50 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

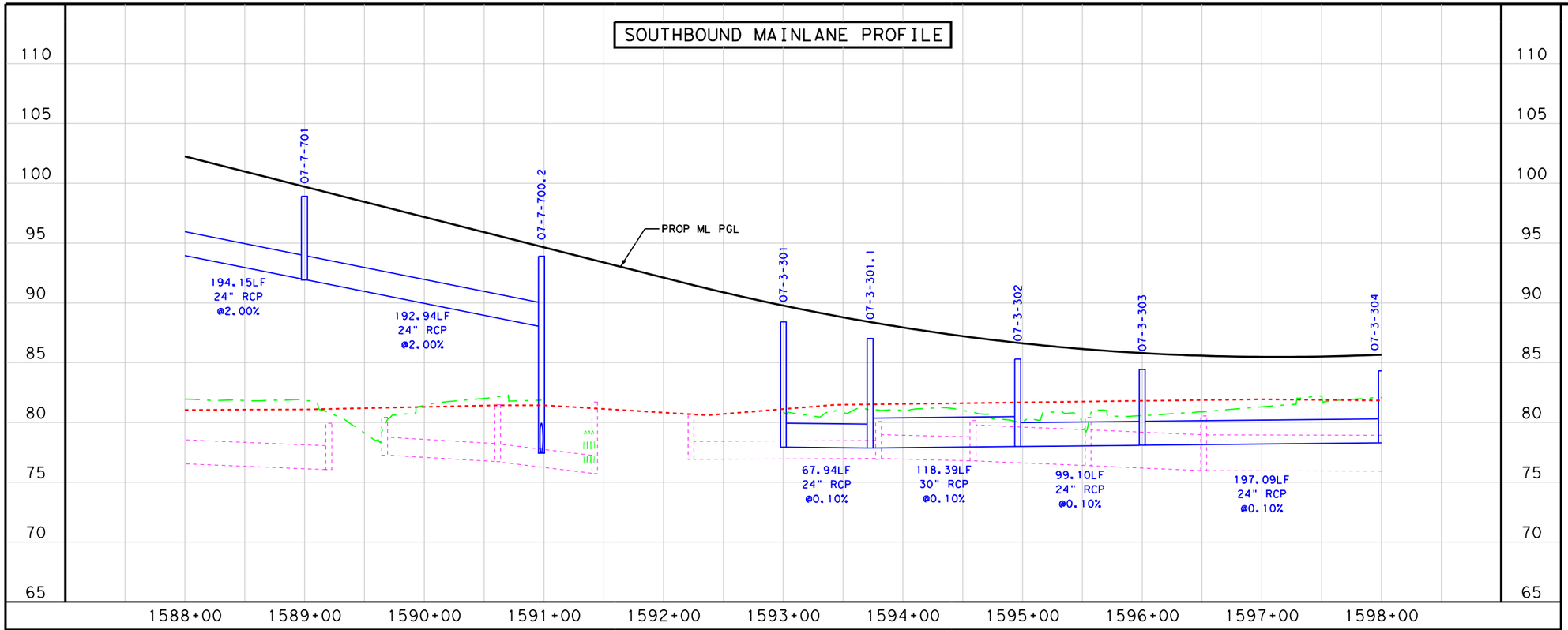
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1588+00 TO STA 1598+00
SHEET 11 OF 13

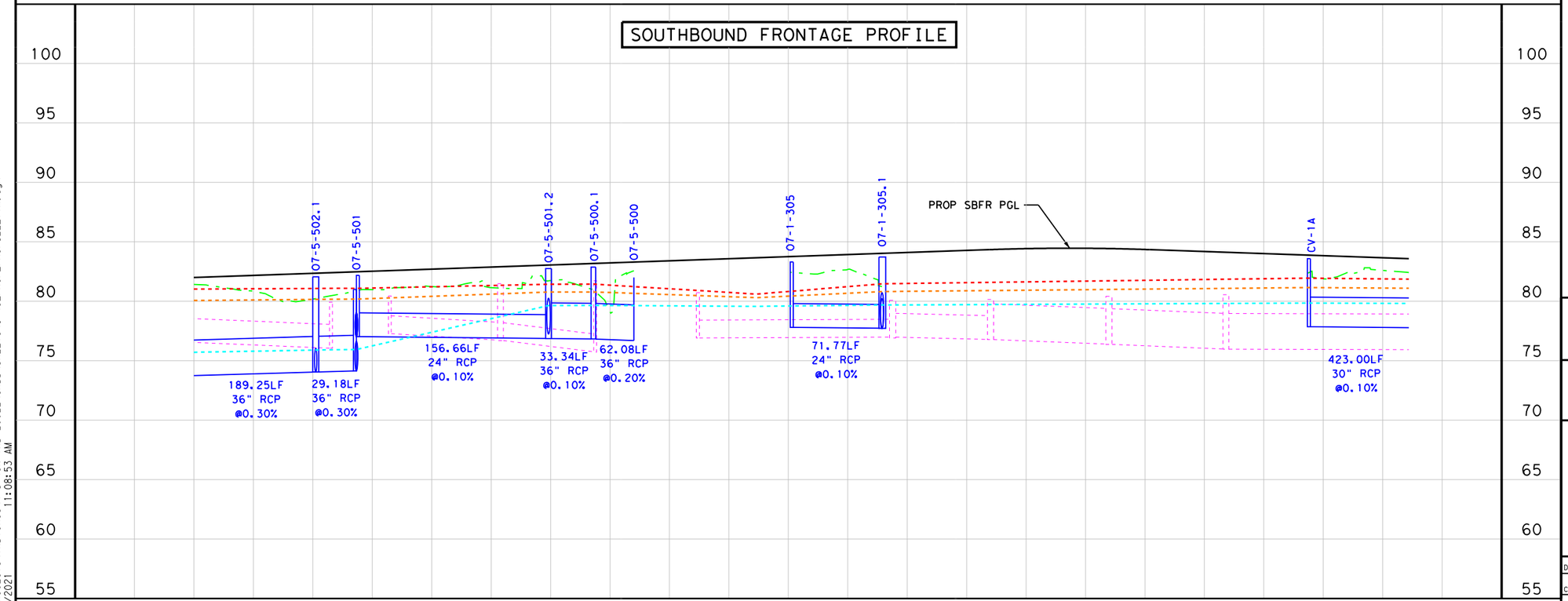
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_11.dgn
7/21/2021 11:06:56 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50′ 100′

VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

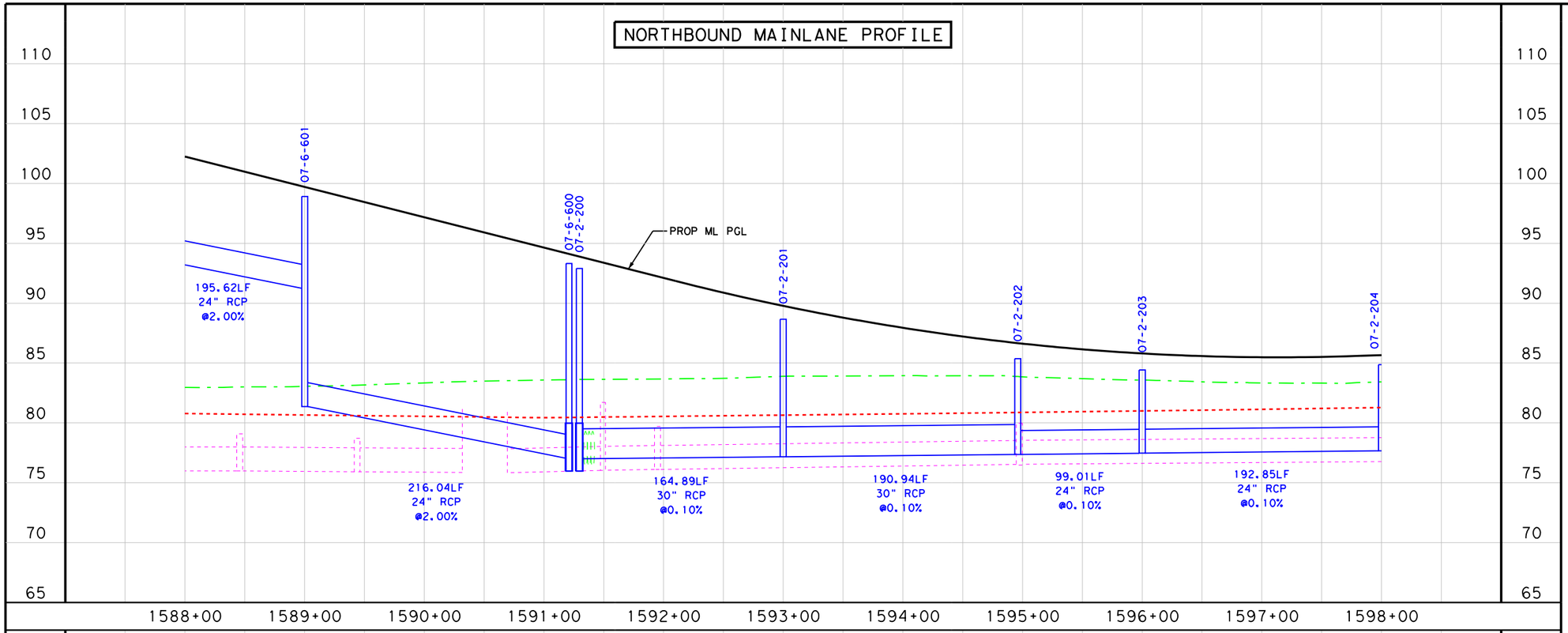
STA 1588+00 TO 1598+00

SHEET 11A OF 13

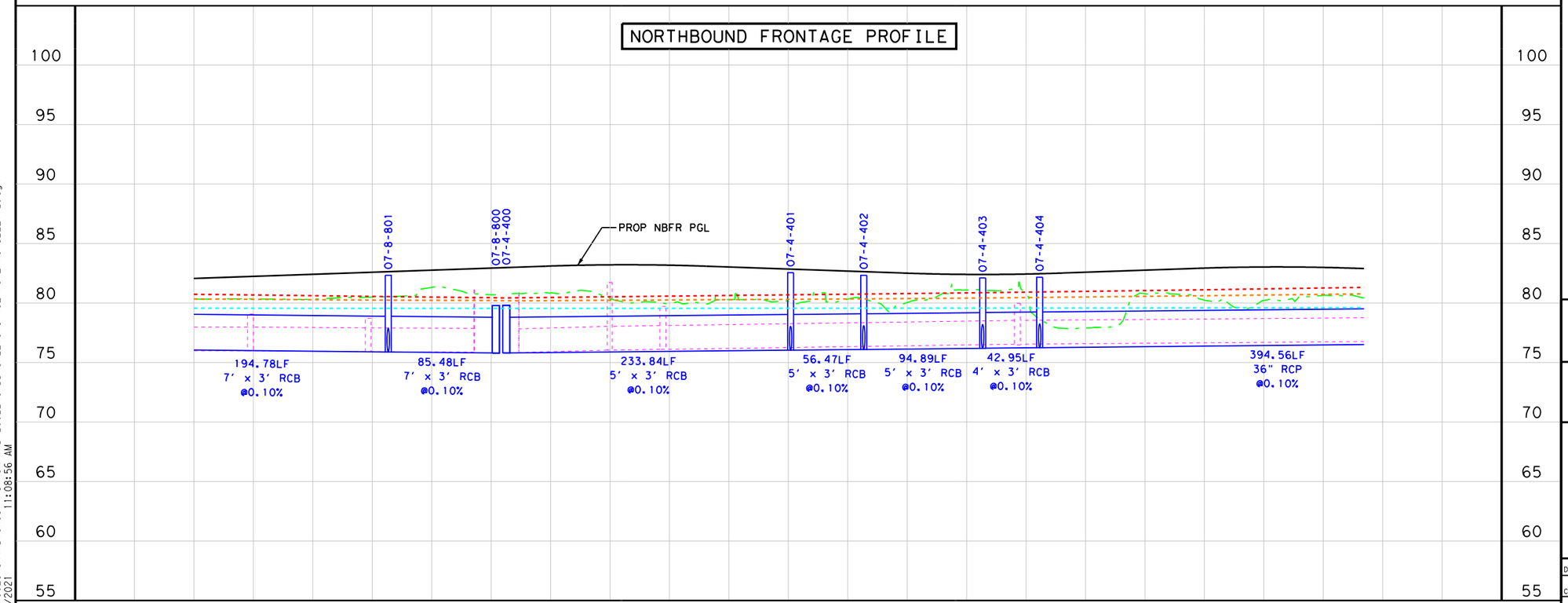
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2002\CADD\SHEETS\I-45_PROP_PROFILE_11A.dgn
7/21/2021 11:08:53 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

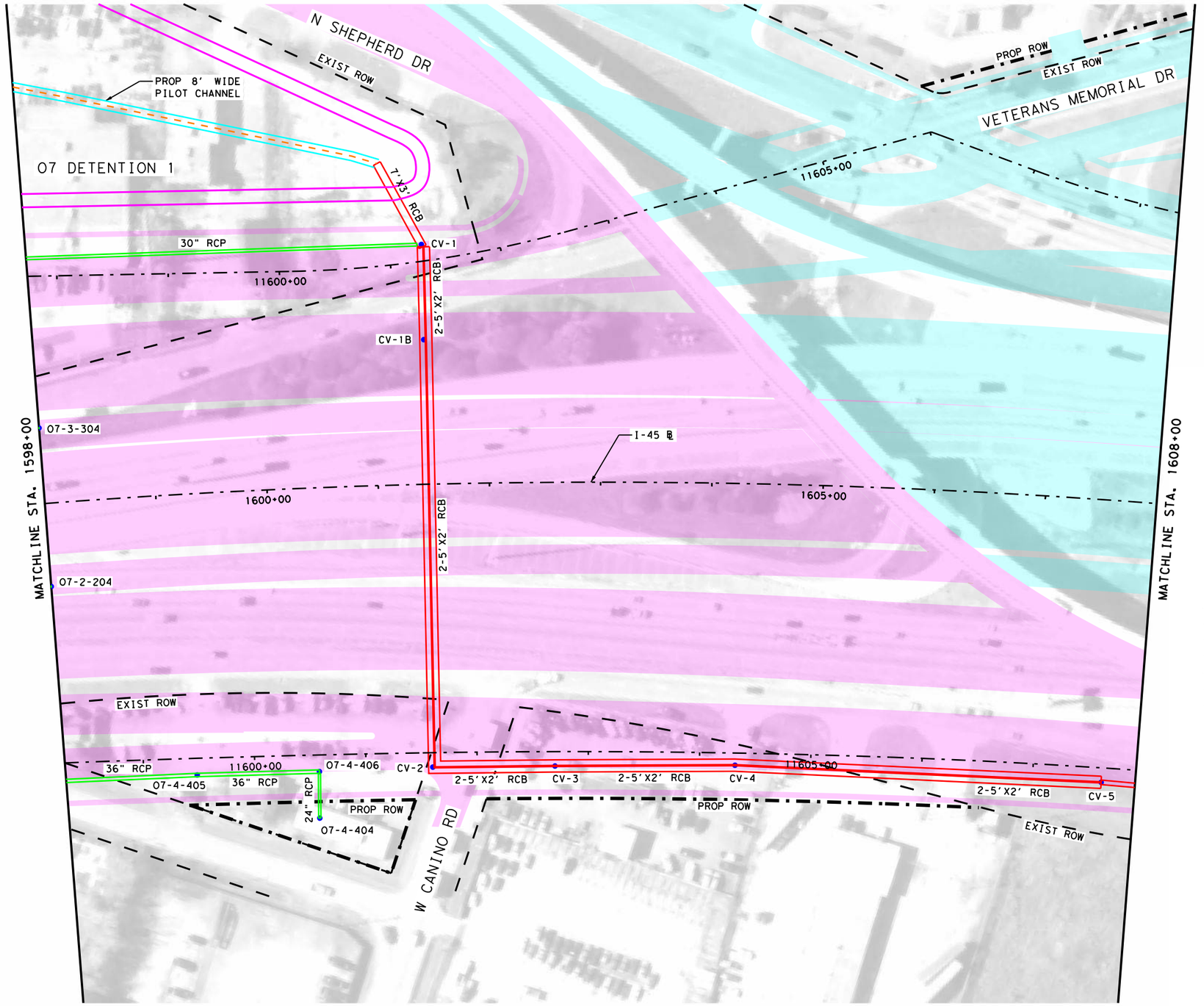
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1588+00 TO 1598+00

SHEET 11B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_PROFILE_11B.dgn
7/21/2021 11:08:56 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

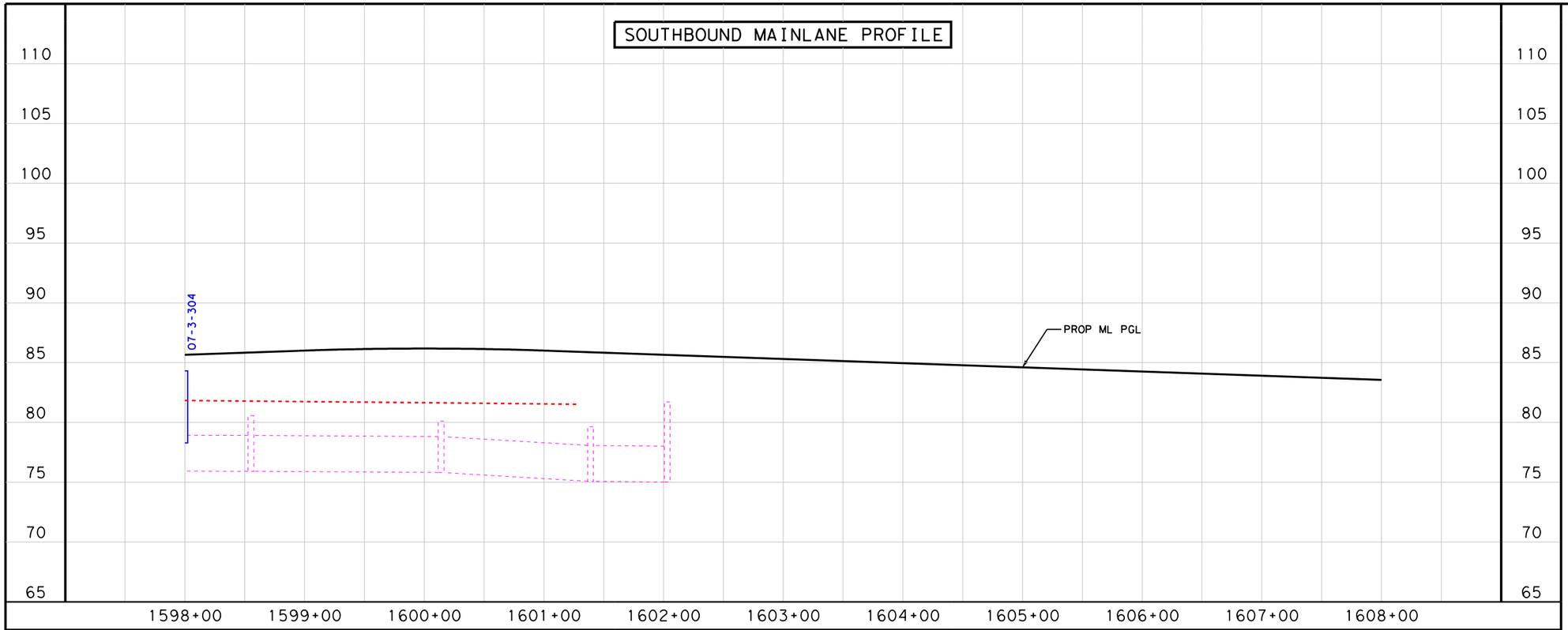
tnp

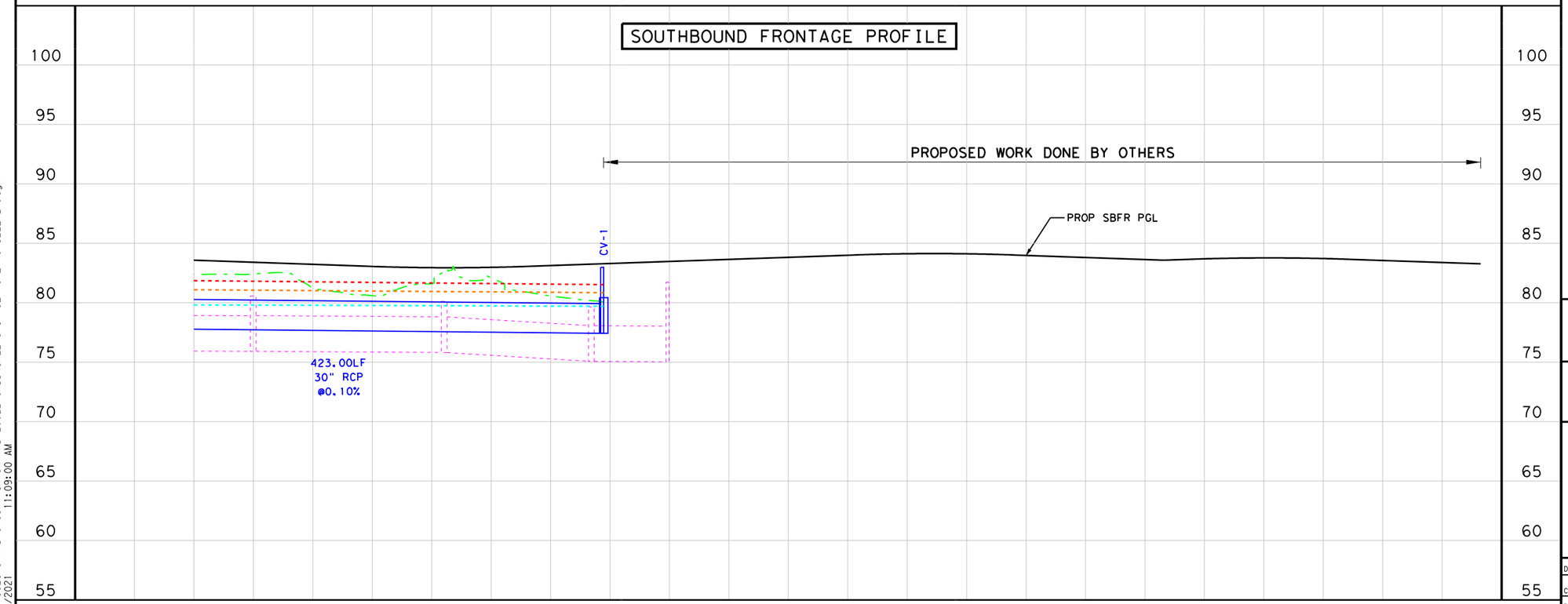
I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1598+00 TO STA 1608+00

SHEET 12 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_12.dgn
7/21/2021 11:07:05 AM





HORZ 0 50′ 100′

VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

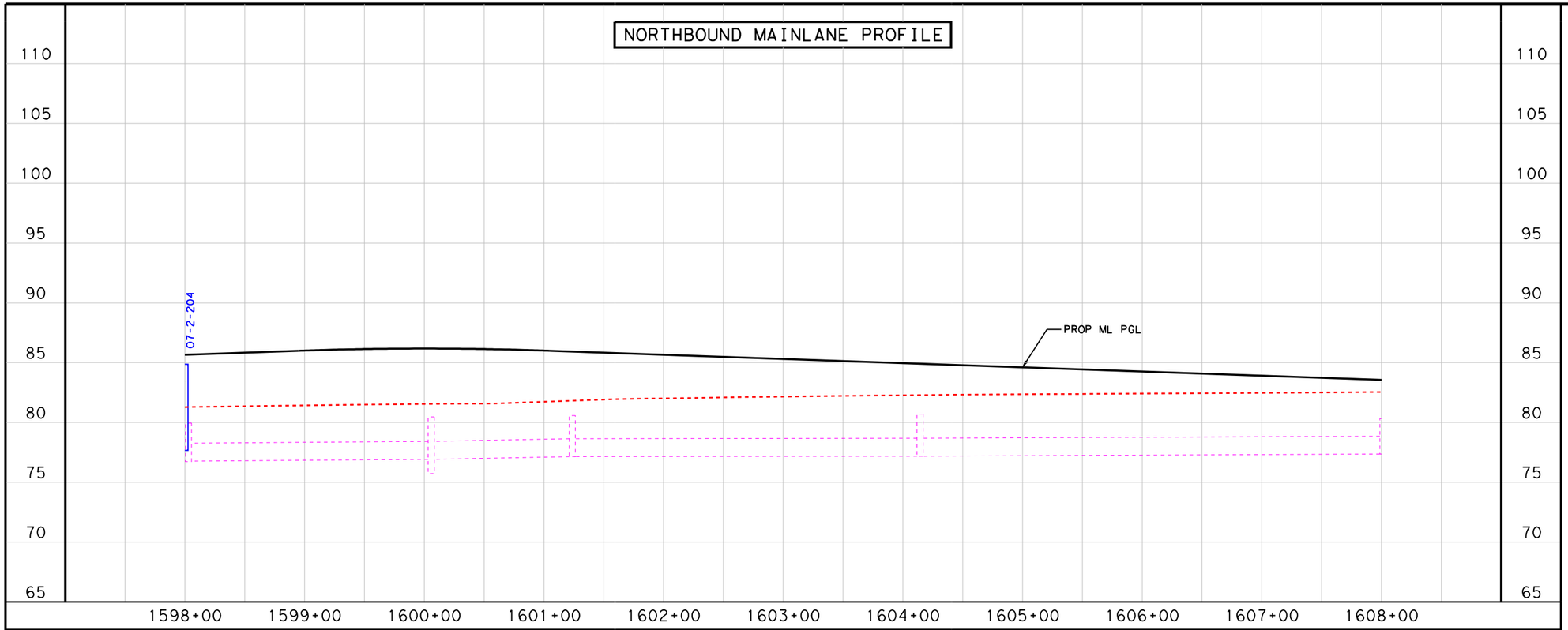
STA 1598+00 TO 1608+00

SHEET 12A OF 13

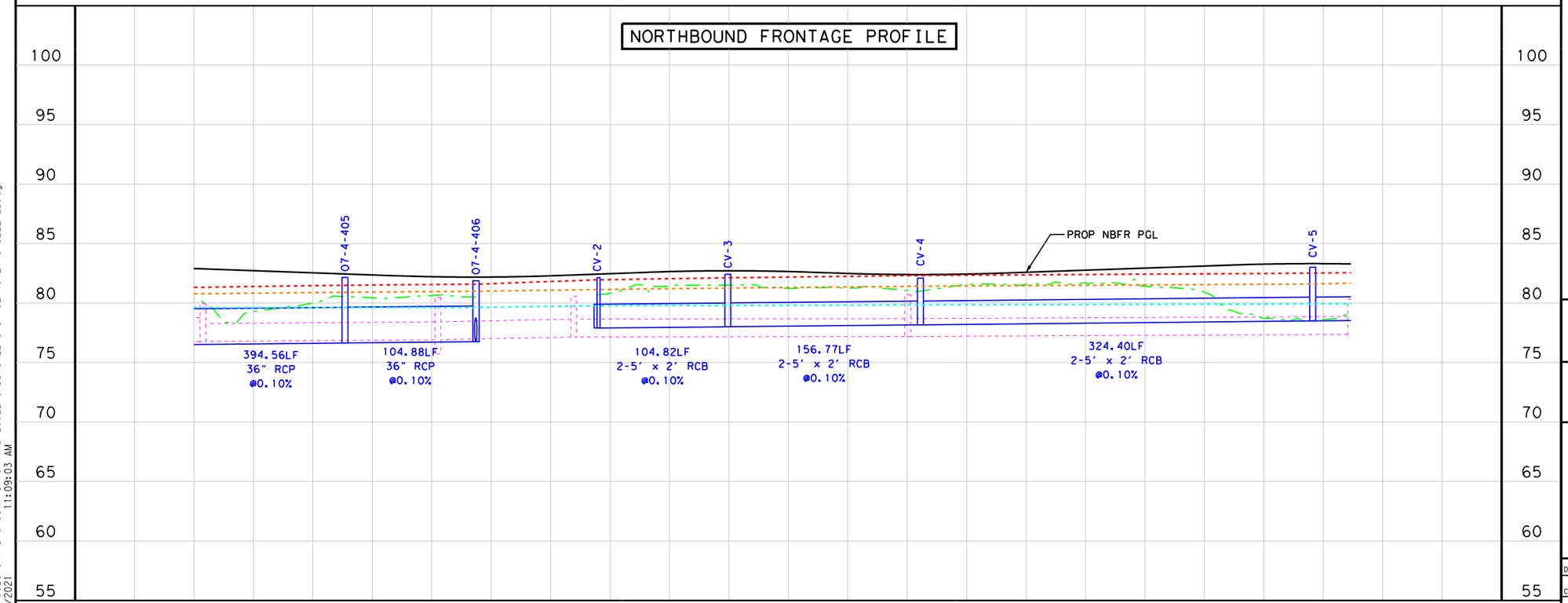
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_12A.dgn
7/21/2021 11:09:00 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

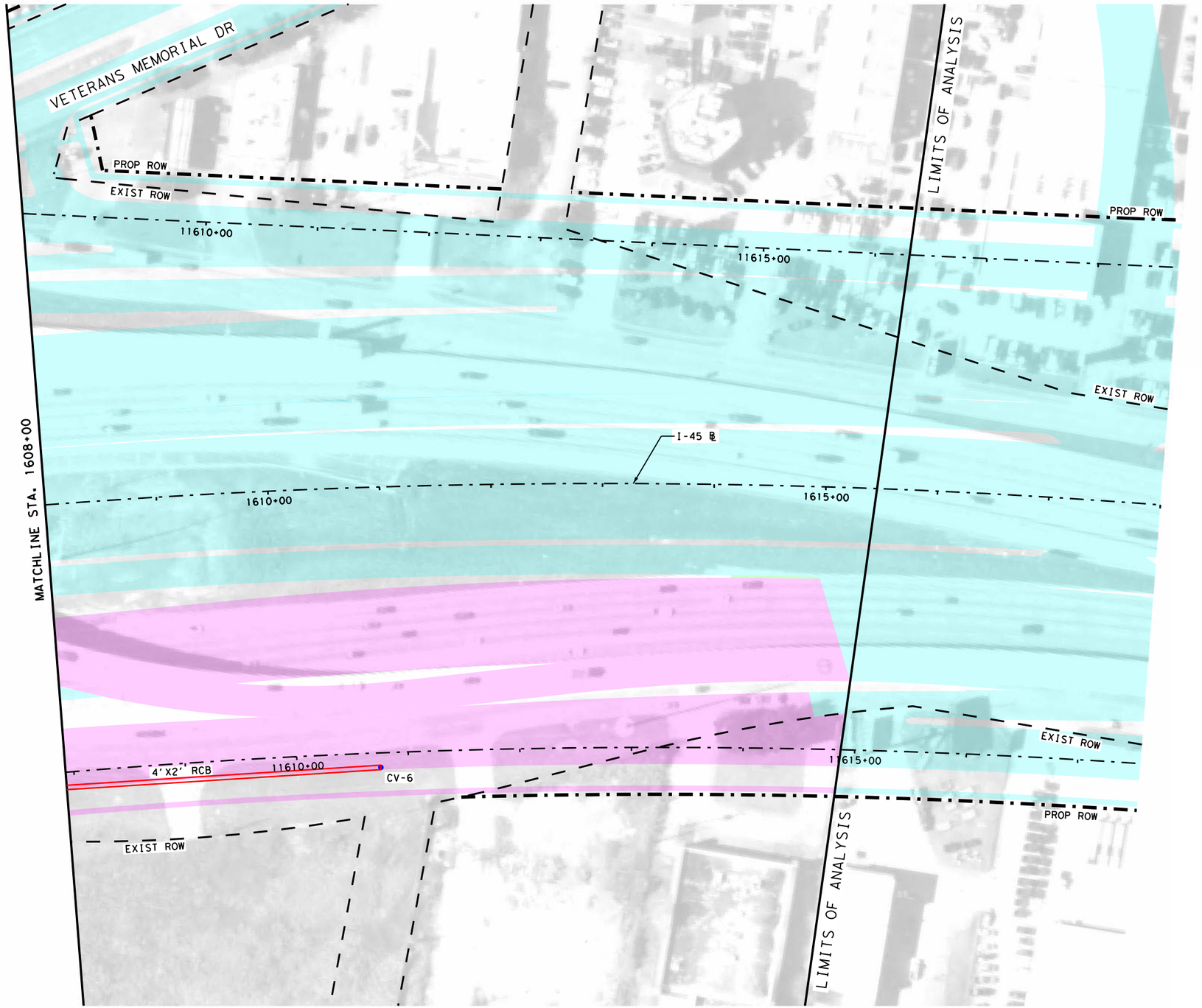
EXHIBIT 9
PROPOSED SWMM LAYOUT

STA 1598+00 TO 1608+00

SHEET 12B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_12B.dgn
7/21/2021 11:09:03 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 10: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

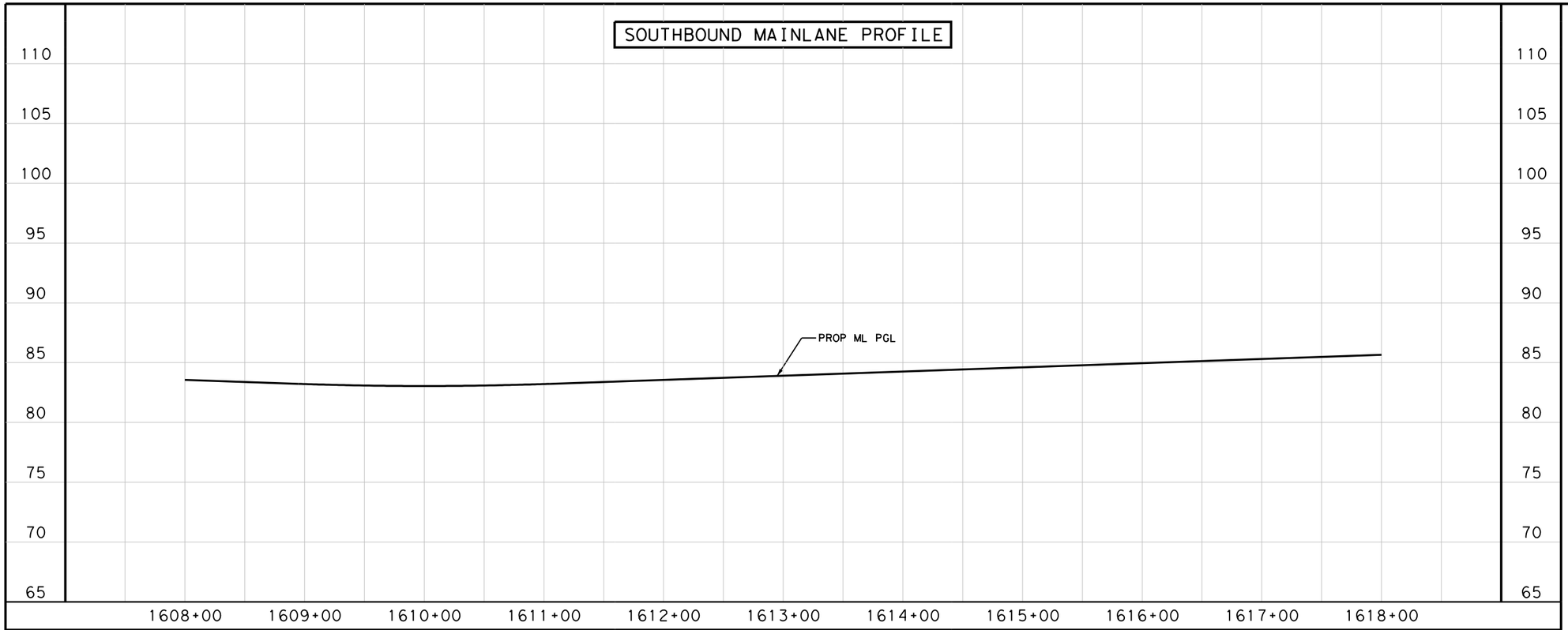
I-45
EXHIBIT 9
PROPOSED SWMM LAYOUT
STA 1608+00 TO PROJECT END

SHEET 13 OF 13

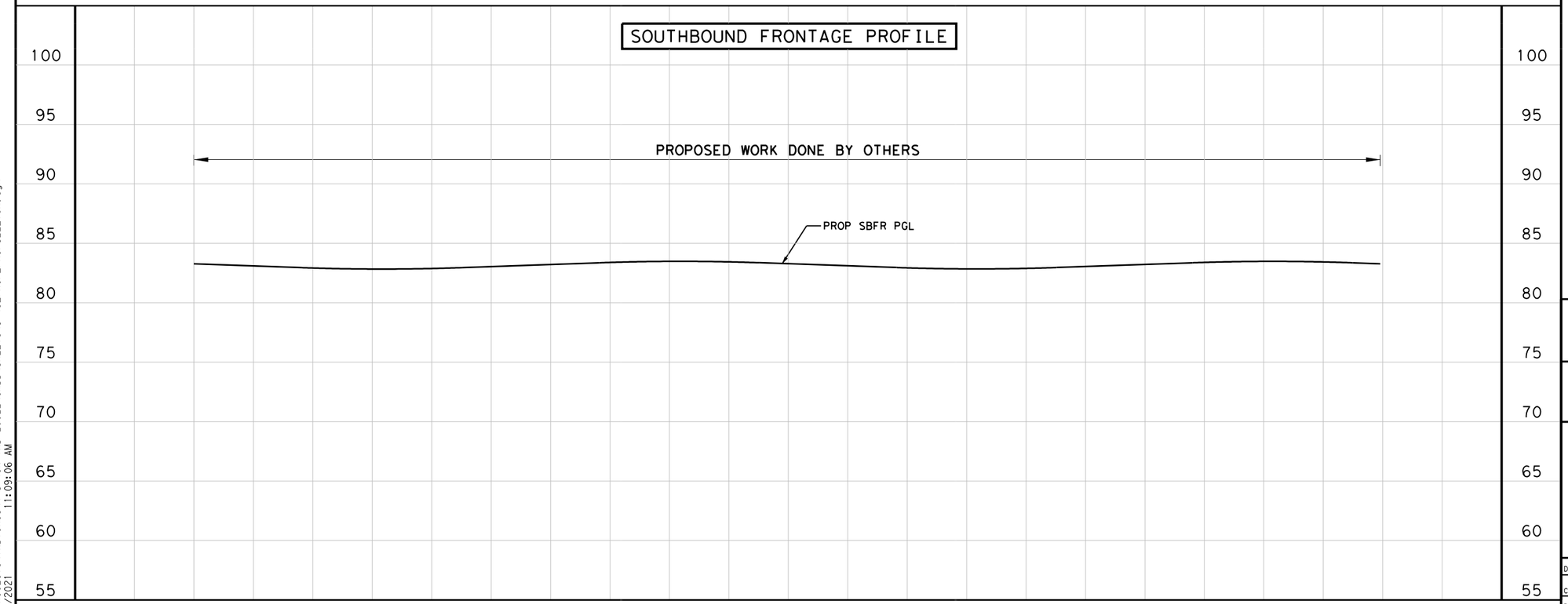
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_LAYOUT_13.dgn
7/21/2021 11:07:13 AM

SOUTHBOUND MAINLANE PROFILE



SOUTHBOUND FRONTAGE PROFILE



HORZ 0 50′ 100′

VERT 0 5′ 10′

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

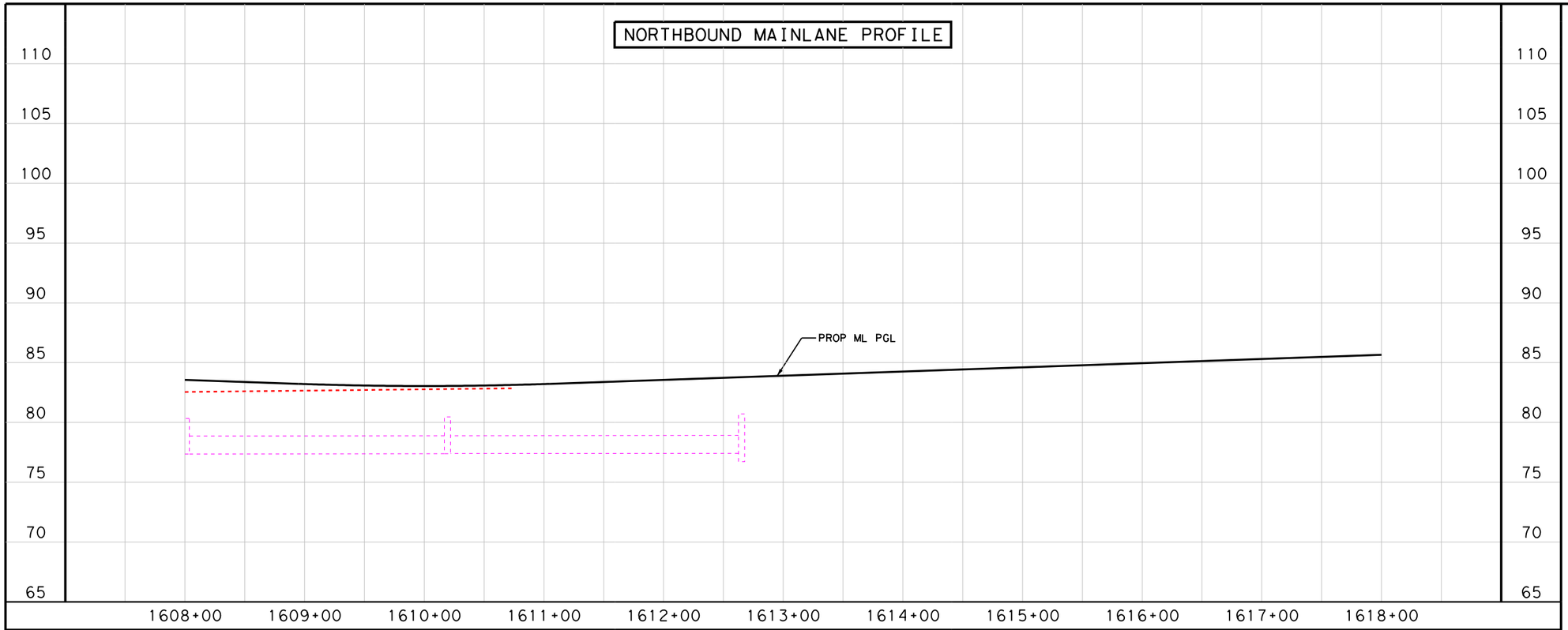
STA 1608+00 TO 1618+00

SHEET 13A OF 13

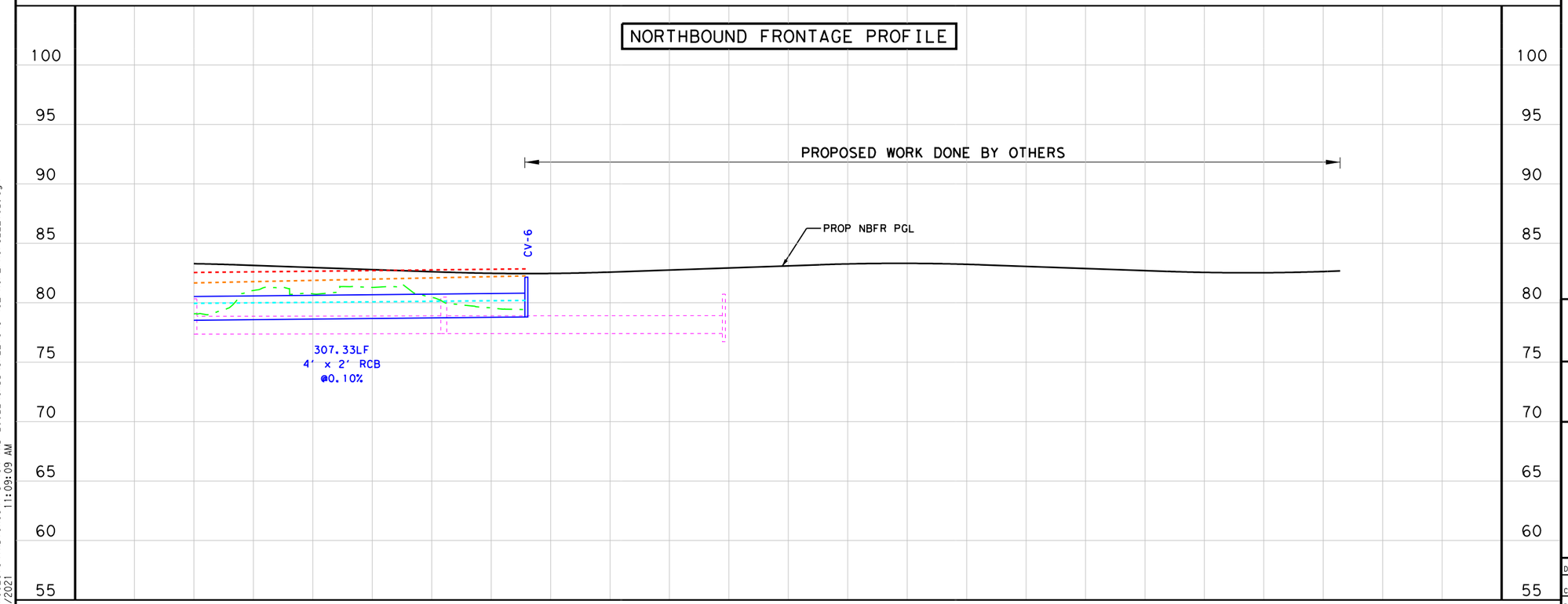
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_13A.dgn
7/21/2021 11:09:06 AM

NORTHBOUND MAINLANE PROFILE



NORTHBOUND FRONTAGE PROFILE



HORZ 0 50' 100'

VERT 0 5' 10'

LEGEND

- EXISTING STORM
- PROPOSED STORM
- PGL
- 100-YR WSEL
- 50-YR WSEL
- 10-YR WSEL
- NATURAL GROUND @ PGL

NOTES:

1. ATLAS 14 AND THE RATIONAL METHOD WERE USED FOR HYDROLOGIC ANALYSIS.
2. XP-STORM VERSION 2017.2 WAS USED FOR HYDRAULIC DESIGN.
3. FRONTAGE ROADS ARE PROJECTED TO MAINLANE STATIONS ON PROFILES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 9
PROPOSED SWMM LAYOUT

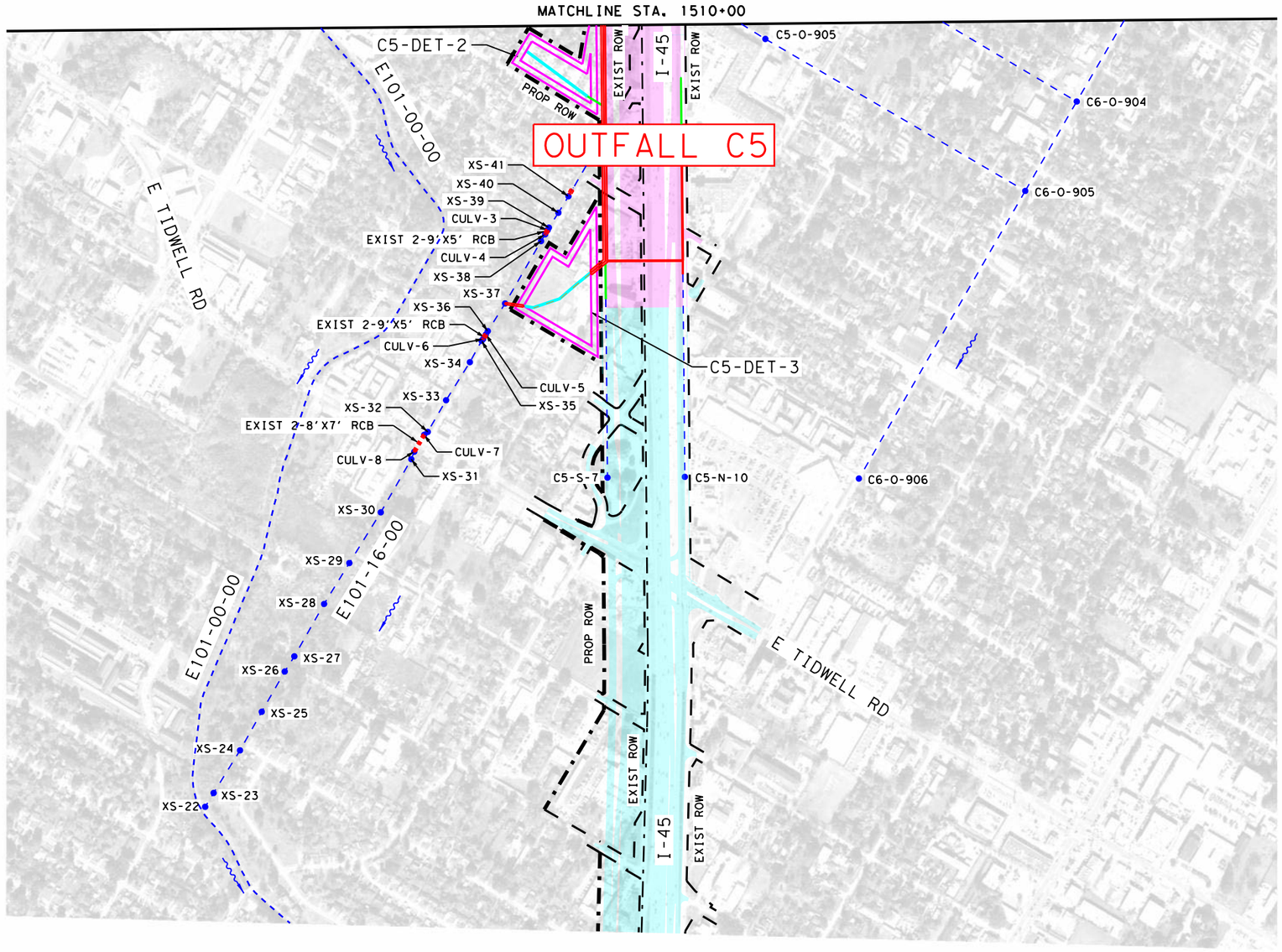
STA 1608+00 TO 1618+00

SHEET 13B OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_PROFILE_13B.dgn
7/21/2021 11:09:09 AM

EXHIBIT 10



0 350 700

SCALE: 1" = 700'

LEGEND

- SWMM NODE
- SWMM LINK
- PROPOSED RCP
- PROPOSED RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 9: PROPOSED SWMM LAYOUT FOR ONSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 10

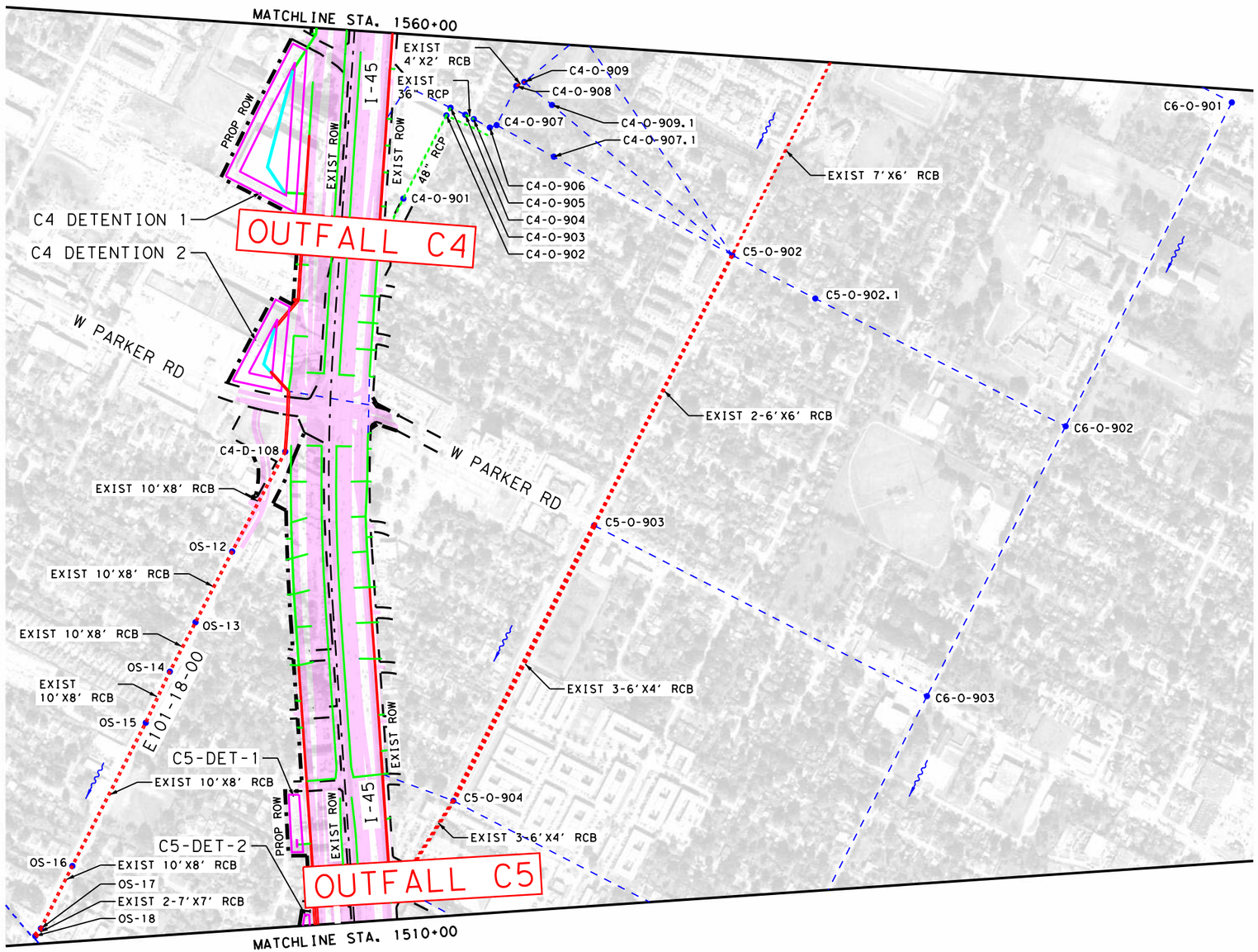
PROPOSED OFFSITE SWMM LAYOUT

PROJECT START TO STA 1510+00

SHEET 1 OF 3

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_OFFSITE_LAYOUT_01.dgn
7/21/2021 11:07:21 AM



0 350 700

SCALE: 1" = 700'

LEGEND

- SWMM NODE
- SWMM LINK
- PROPOSED RCP
- PROPOSED RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 9: PROPOSED SWMM LAYOUT FOR ONSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

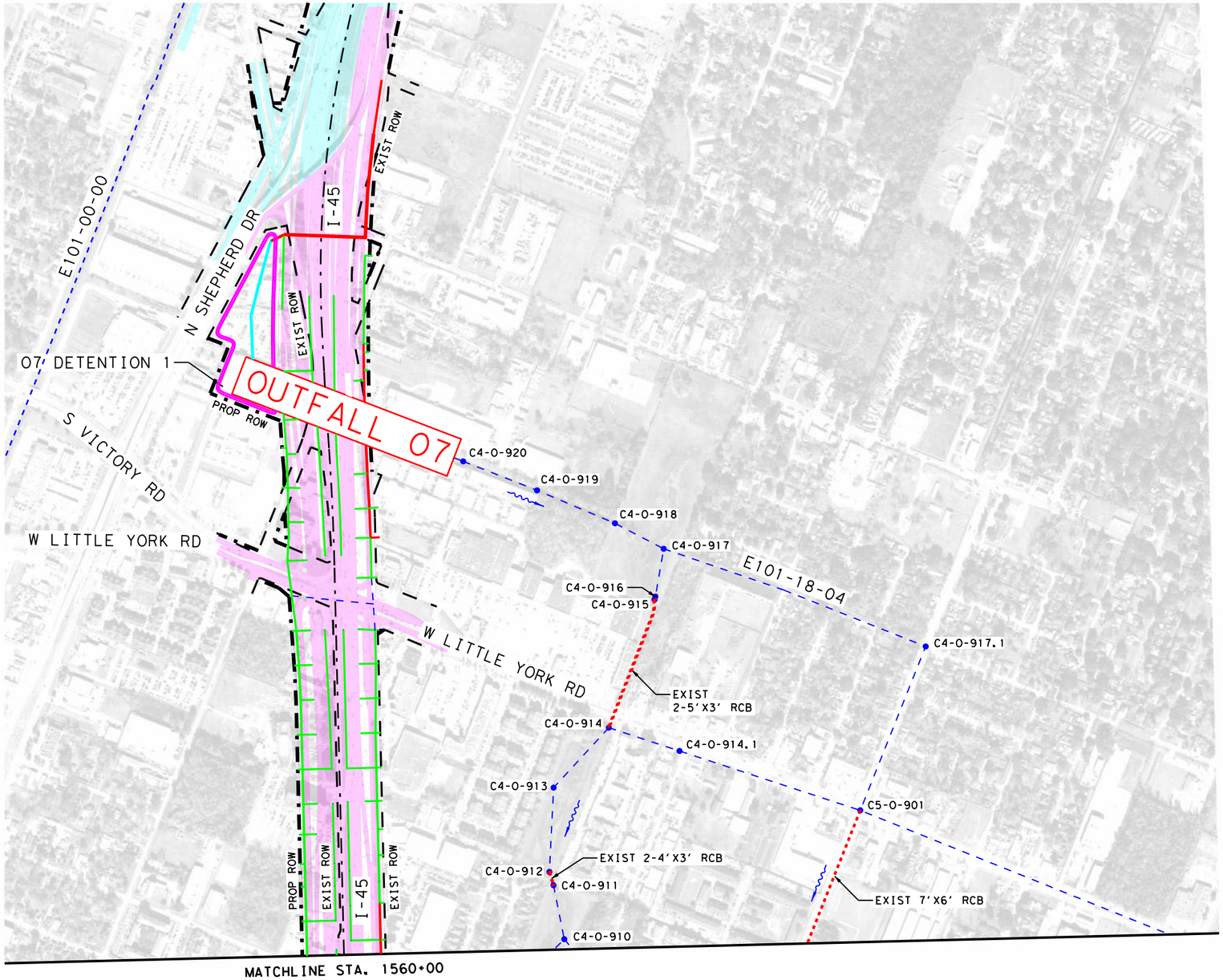
I-45

EXHIBIT 10
PROPOSED OFFSITE SWMM LAYOUT
STA 1510+00 TO STA 1560+00

SHEET 2 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_OFFSITE_LAYOUT_02.dgn
7/21/2021 11:07:28 AM



0 350 700

SCALE: 1" = 700'

LEGEND

- SWMM NODE
- SWMM LINK
- PROPOSED RCP
- PROPOSED RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)

NOTES:

1. SEE EXHIBIT 9: PROPOSED SWMM LAYOUT FOR ONSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 10

PROPOSED OFFSITE SWMM LAYOUT

STA 1560+00 TO PROJECT END

SHEET 3 OF 3

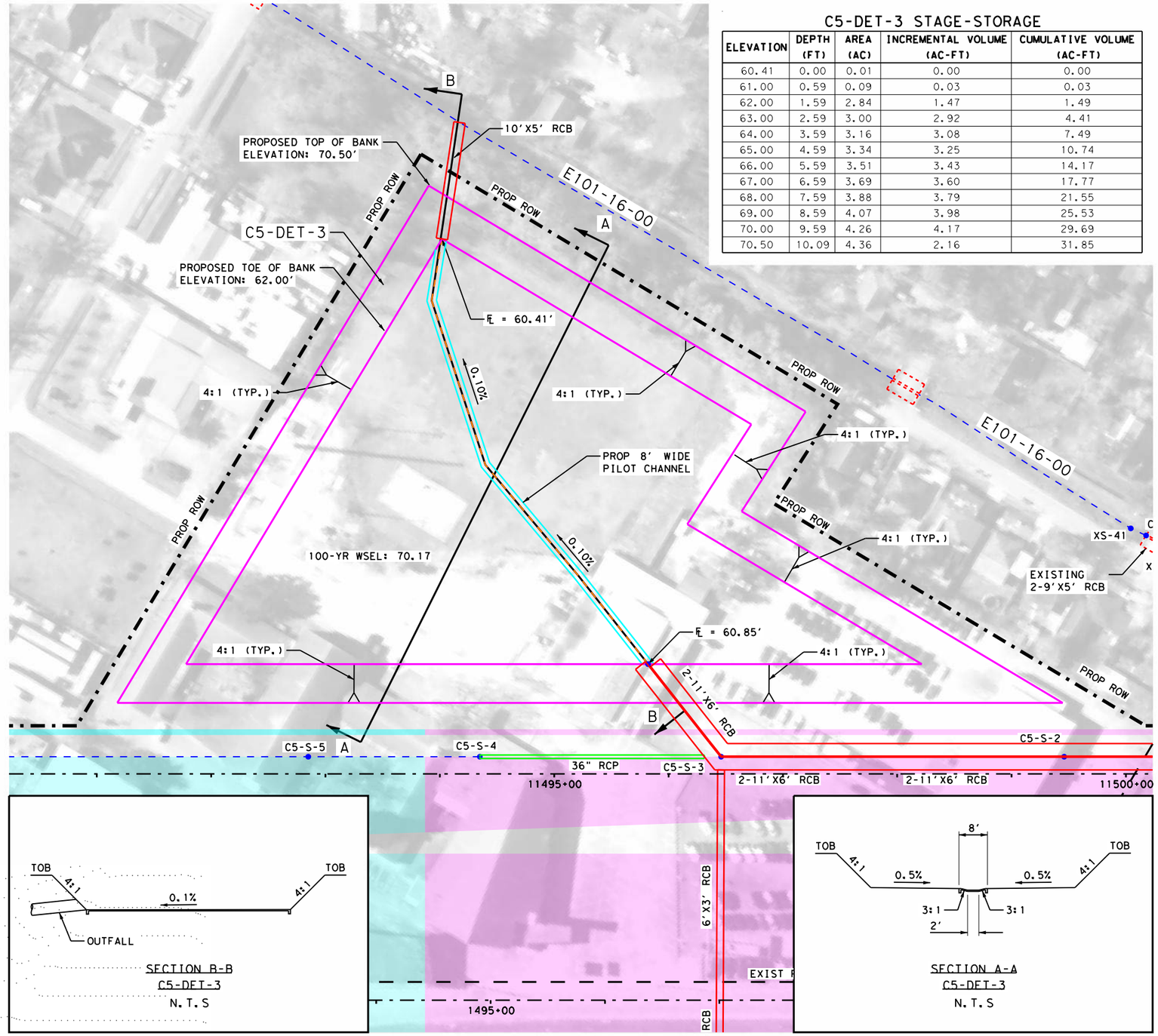
DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_OFFSITE_LAYOUT_03.dgn
7/21/2021 11:07:36 AM

EXHIBIT 11

C5-DET-3 STAGE-STORAGE

ELEVATION	DEPTH (FT)	AREA (AC)	INCREMENTAL VOLUME (AC-FT)	CUMULATIVE VOLUME (AC-FT)
60.41	0.00	0.01	0.00	0.00
61.00	0.59	0.09	0.03	0.03
62.00	1.59	2.84	1.47	1.49
63.00	2.59	3.00	2.92	4.41
64.00	3.59	3.16	3.08	7.49
65.00	4.59	3.34	3.25	10.74
66.00	5.59	3.51	3.43	14.17
67.00	6.59	3.69	3.60	17.77
68.00	7.59	3.88	3.79	21.55
69.00	8.59	4.07	3.98	25.53
70.00	9.59	4.26	4.17	29.69
70.50	10.09	4.36	2.16	31.85



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)
- PROP CONTOUR
- PROP PILOT CHANNEL
- PROP PILOT CHANNEL ℄

NOTES:

1. SEE EXHIBIT 9: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 11
C5 BASIN LAYOUTS
C5-DET-3

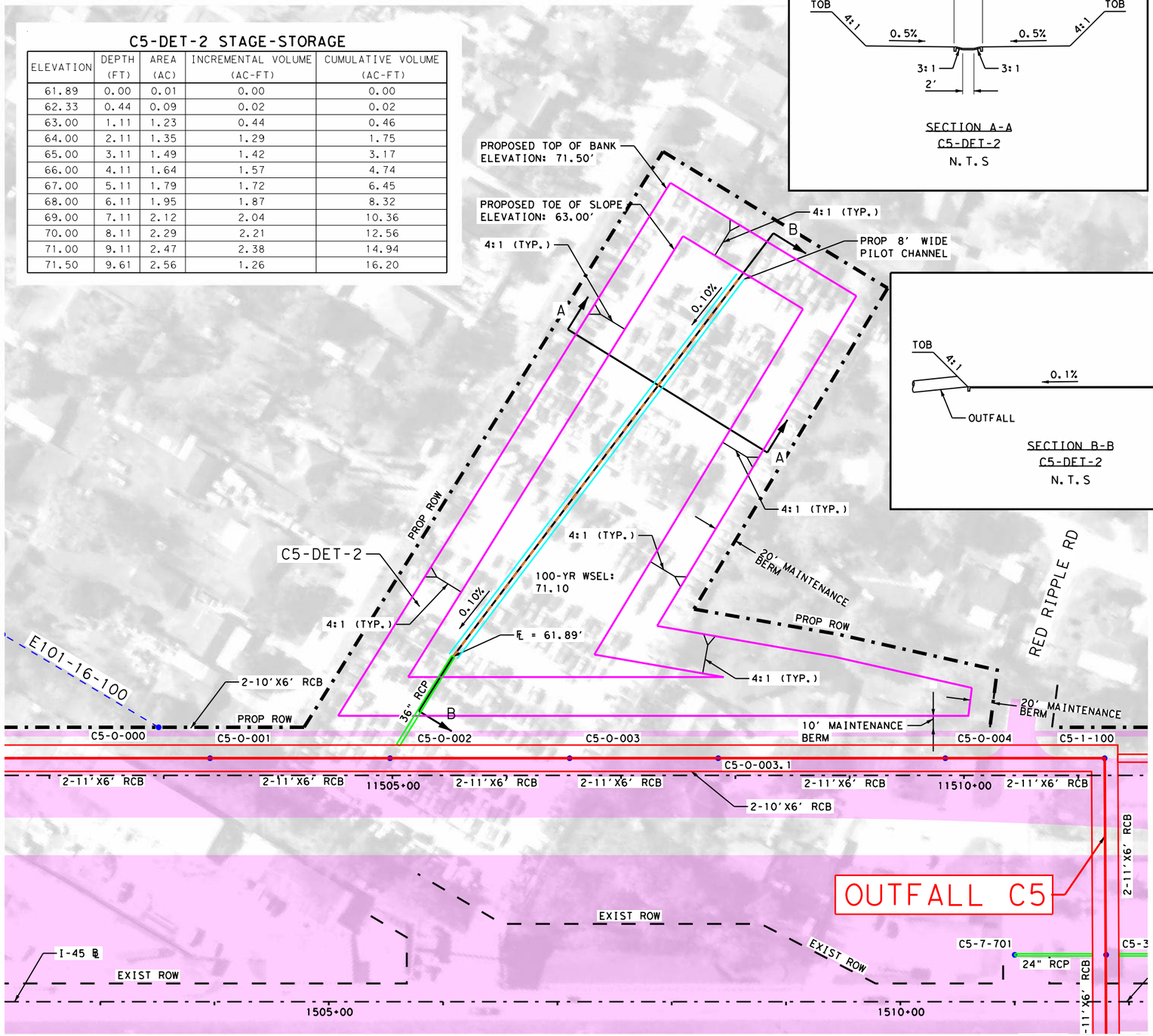
SHEET 1 OF 3

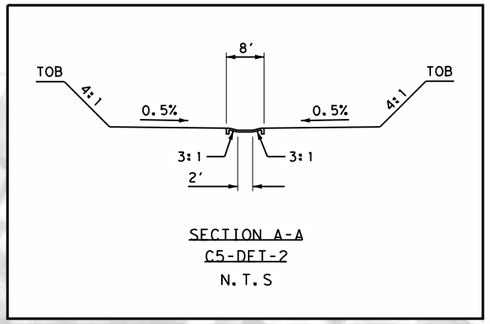
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

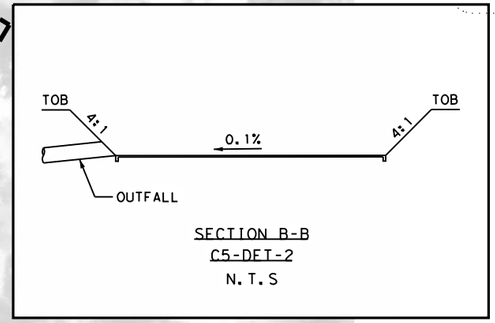
P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_church_C5_DETENTION.dgn
7/21/2021 11:10:01 AM

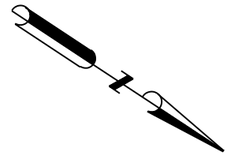
C5-DET-2 STAGE-STORAGE

ELEVATION	DEPTH (FT)	AREA (AC)	INCREMENTAL VOLUME (AC-FT)	CUMULATIVE VOLUME (AC-FT)
61.89	0.00	0.01	0.00	0.00
62.33	0.44	0.09	0.02	0.02
63.00	1.11	1.23	0.44	0.46
64.00	2.11	1.35	1.29	1.75
65.00	3.11	1.49	1.42	3.17
66.00	4.11	1.64	1.57	4.74
67.00	5.11	1.79	1.72	6.45
68.00	6.11	1.95	1.87	8.32
69.00	7.11	2.12	2.04	10.36
70.00	8.11	2.29	2.21	12.56
71.00	9.11	2.47	2.38	14.94
71.50	9.61	2.56	1.26	16.20









0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)
- PROP CONTOUR
- PROP PILOT CHANNEL
- PROP PILOT CHANNEL ℄

NOTES:

1. SEE EXHIBIT 9: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 11
C5 BASIN LAYOUTS
C5-DET-2

SHEET 2 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

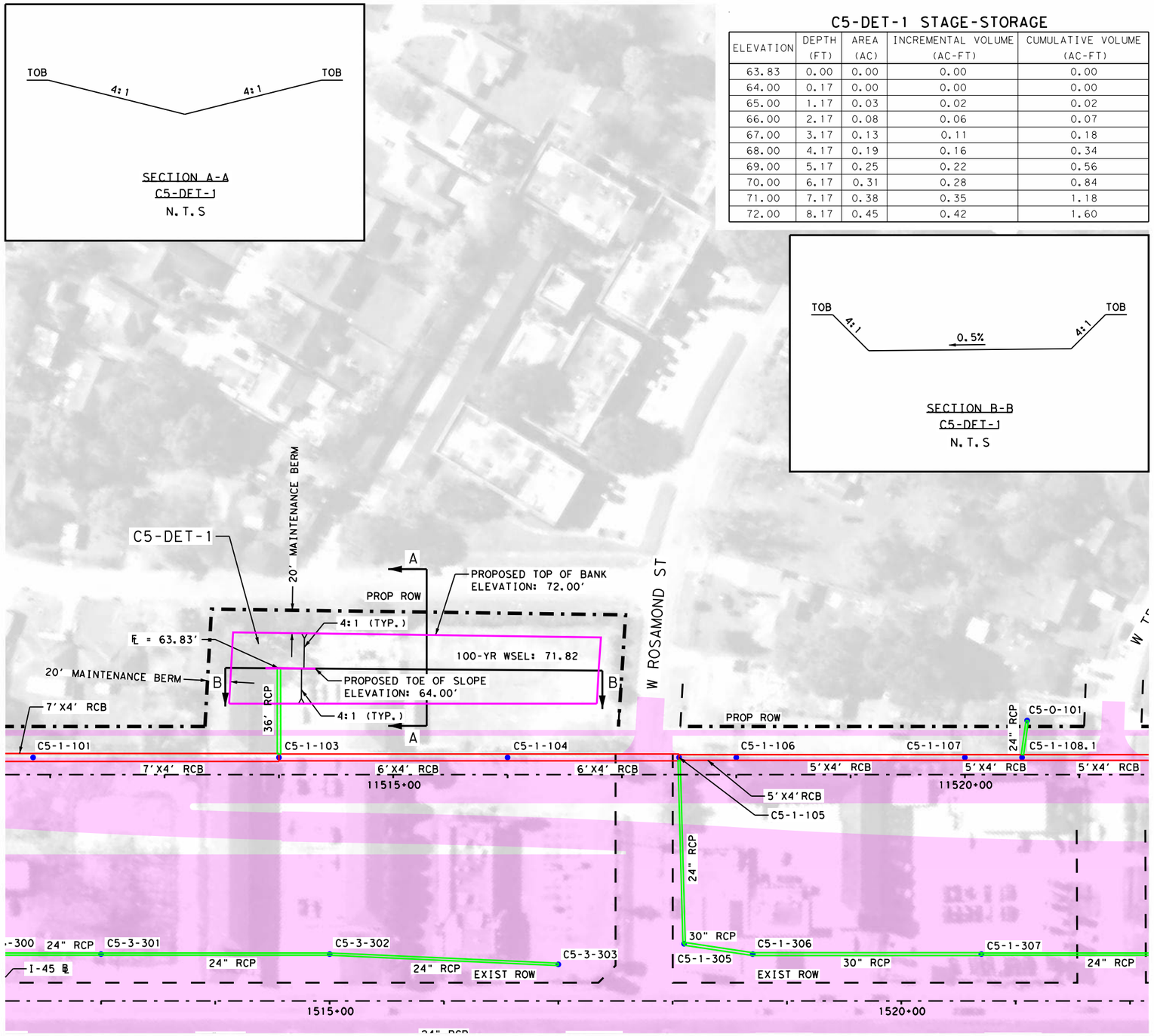
P:\PROJECTS\TXDOT9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_C5_DETENTION.dgn
7/21/2021 11:09:51 AM

SECTION A-A
C5-DET-1
N.T.S

C5-DET-1 STAGE-STORAGE

ELEVATION	DEPTH (FT)	AREA (AC)	INCREMENTAL VOLUME (AC-FT)	CUMULATIVE VOLUME (AC-FT)
63.83	0.00	0.00	0.00	0.00
64.00	0.17	0.00	0.00	0.00
65.00	1.17	0.03	0.02	0.02
66.00	2.17	0.08	0.06	0.07
67.00	3.17	0.13	0.11	0.18
68.00	4.17	0.19	0.16	0.34
69.00	5.17	0.25	0.22	0.56
70.00	6.17	0.31	0.28	0.84
71.00	7.17	0.38	0.35	1.18
72.00	8.17	0.45	0.42	1.60

SECTION B-B
C5-DET-1
N.T.S



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)
- PROP CONTOUR
- PROP PILOT CHANNEL
- PROP PILOT CHANNEL ℄

NOTES:

1. SEE EXHIBIT 9: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

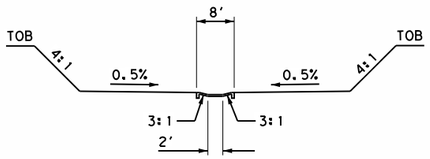
EXHIBIT 11
C5 BASIN LAYOUTS
C5-DET-1

SHEET 3 OF 3

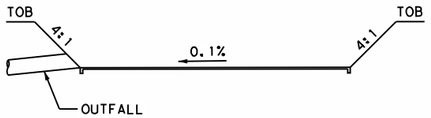
DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT\19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_TOP_C5_DETENTION.dgn
7/21/2021 11:09:43 AM

EXHIBIT 12



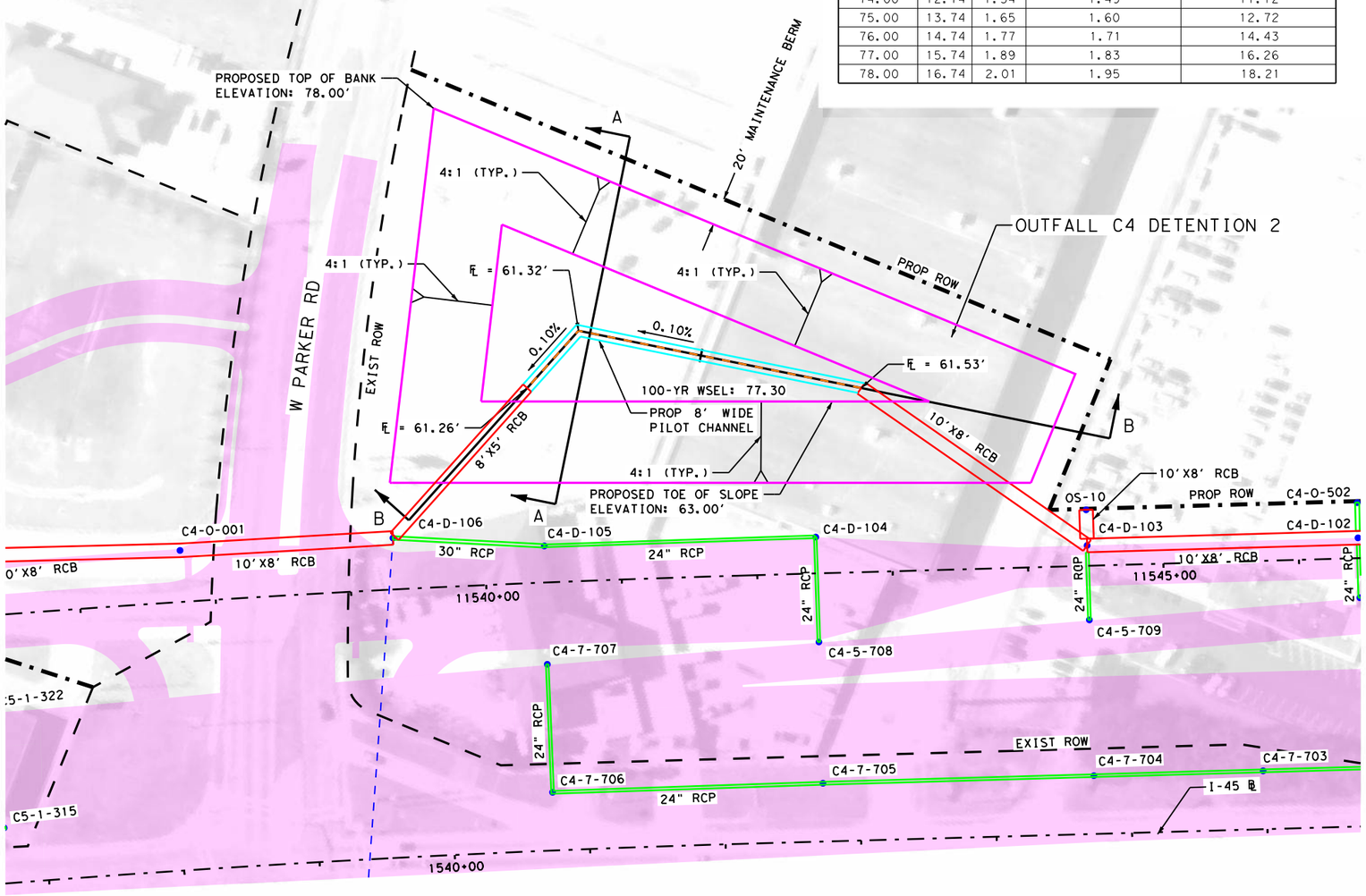
SECTION A-A
OUTFALL C4 DETENTION 2
N.T.S



SECTION B-B
OUTFALL C4 DETENTION 2
N.T.S

C4 DETENTION 2 STAGE-STORAGE

ELEVATION	DEPTH (FT)	AREA (AC)	INCREMENTAL VOLUME (AC-FT)	CUMULATIVE VOLUME (AC-FT)
61.26	0.00	0.01	0.00	0.00
62.00	0.74	0.04	0.01	0.01
63.00	1.74	0.5	0.27	0.28
64.00	2.74	0.57	0.54	0.82
65.00	3.74	0.65	0.61	1.43
66.00	4.74	0.74	0.70	2.12
67.00	5.74	0.83	0.79	2.91
68.00	6.74	0.92	0.88	3.78
69.00	7.74	1.02	0.97	4.75
70.00	8.74	1.12	1.07	5.82
71.00	9.74	1.22	1.17	6.99
72.00	10.74	1.32	1.27	8.26
73.00	11.74	1.43	1.38	9.64
74.00	12.74	1.54	1.49	11.12
75.00	13.74	1.65	1.60	12.72
76.00	14.74	1.77	1.71	14.43
77.00	15.74	1.89	1.83	16.26
78.00	16.74	2.01	1.95	18.21



0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)
- PROP CONTOUR
- PROP PILOT CHANNEL
- PROP PILOT CHANNEL ℄

NOTES:

1. SEE EXHIBIT 9: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

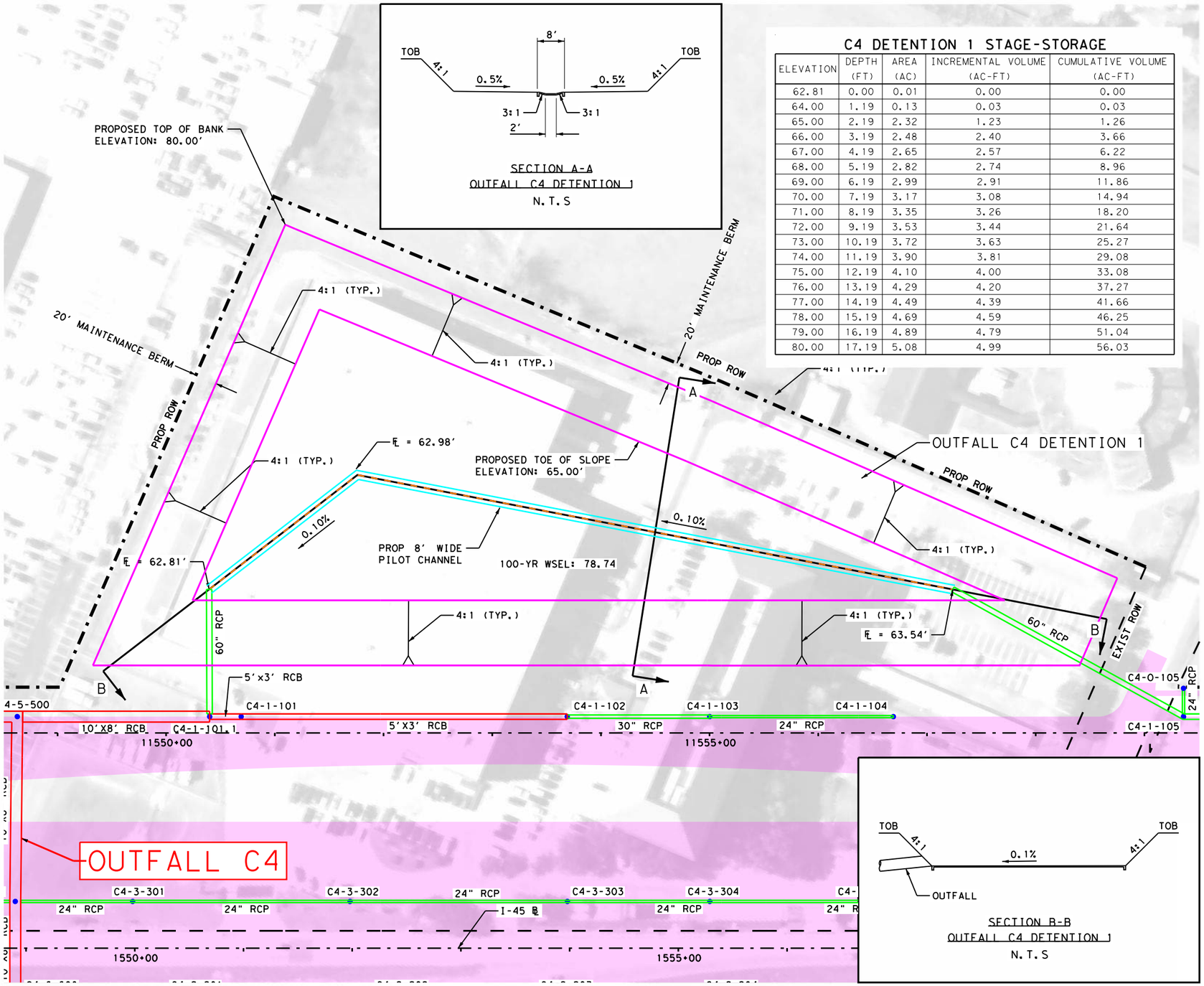
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 12
OUTFALL C4 BASIN LAYOUT

SHEET 1 OF 2

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT\19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_MIDDLE_C4_DETENTION.dgn
7/21/2021 11:09:34 AM



SECTION A-A
OUTFALL C4 DETENTION 1
N.T.S

SECTION B-B
OUTFALL C4 DETENTION 1
N.T.S

C4 DETENTION 1 STAGE-STORAGE

ELEVATION	DEPTH (FT)	AREA (AC)	INCREMENTAL VOLUME (AC-FT)	CUMULATIVE VOLUME (AC-FT)
62.81	0.00	0.01	0.00	0.00
64.00	1.19	0.13	0.03	0.03
65.00	2.19	2.32	1.23	1.26
66.00	3.19	2.48	2.40	3.66
67.00	4.19	2.65	2.57	6.22
68.00	5.19	2.82	2.74	8.96
69.00	6.19	2.99	2.91	11.86
70.00	7.19	3.17	3.08	14.94
71.00	8.19	3.35	3.26	18.20
72.00	9.19	3.53	3.44	21.64
73.00	10.19	3.72	3.63	25.27
74.00	11.19	3.90	3.81	29.08
75.00	12.19	4.10	4.00	33.08
76.00	13.19	4.29	4.20	37.27
77.00	14.19	4.49	4.39	41.66
78.00	15.19	4.69	4.59	46.25
79.00	16.19	4.89	4.79	51.04
80.00	17.19	5.08	4.99	56.03

0 50 100
SCALE: 1" = 100'

LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)
- PROP CONTOUR
- PROP PILOT CHANNEL
- PROP PILOT CHANNEL ℄

NOTES:

1. SEE EXHIBIT 9: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230
tnp

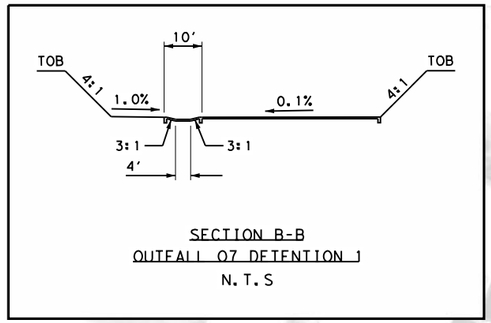
I-45
EXHIBIT 12
OUTFALL C4 BASIN LAYOUTS

SHEET 2 OF 2

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 2022\CADD\SHEETS\I-45_PROP_TOP_C4_DETENTION.dgn
7/21/2021 11:09:25 AM

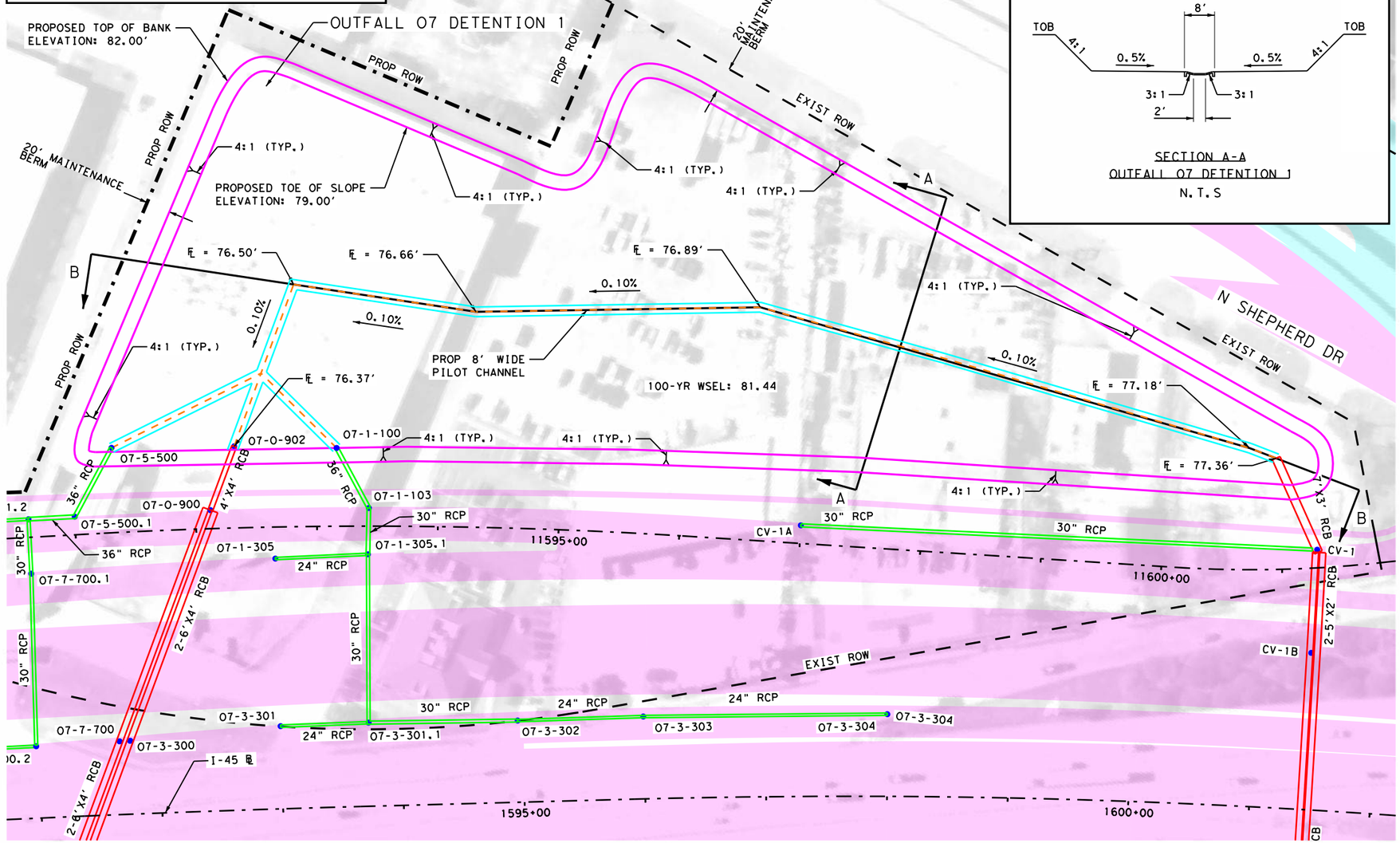
EXHIBIT 13

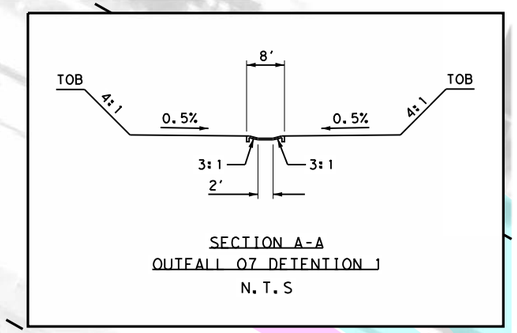


SECTION B-B
OUTFALL 07 DETENTION 1
N.T.S

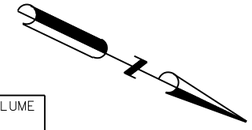
07 DETENTION 1 STAGE-STORAGE

ELEVATION	DEPTH (FT)	AREA (AC)	INCREMENTAL VOLUME (AC-FT)	CUMULATIVE VOLUME (AC-FT)
76.37	0.00	0.00	0.00	0.00
76.50	0.13	0.02	0.00	0.00
77.00	0.63	0.15	0.04	0.04
78.00	1.63	2.29	1.22	1.26
79.00	2.63	4.70	3.50	4.76
80.00	3.63	4.92	4.81	9.57
81.00	4.63	5.14	5.03	14.60
82.00	5.63	5.37	5.26	19.86





SECTION A-A
OUTFALL 07 DETENTION 1
N.T.S



LEGEND

- SWMM NODE
- SWMM LINK
- PROP RCP
- PROP RCB
- PROP RDWY (TNP)
- PROP RDWY (OTHERS)
- PROP CONTOUR
- PROP PILOT CHANNEL
- PROP PILOT CHANNEL ℄

NOTES:

1. SEE EXHIBIT 9: PROPOSED OFFSITE SWMM LAYOUT FOR OFFSITE LAYOUT.
2. FLOWS CALCULATED FROM INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE NOAA ATLAS 14 POINT PRECIPITATION ESTIMATES.

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

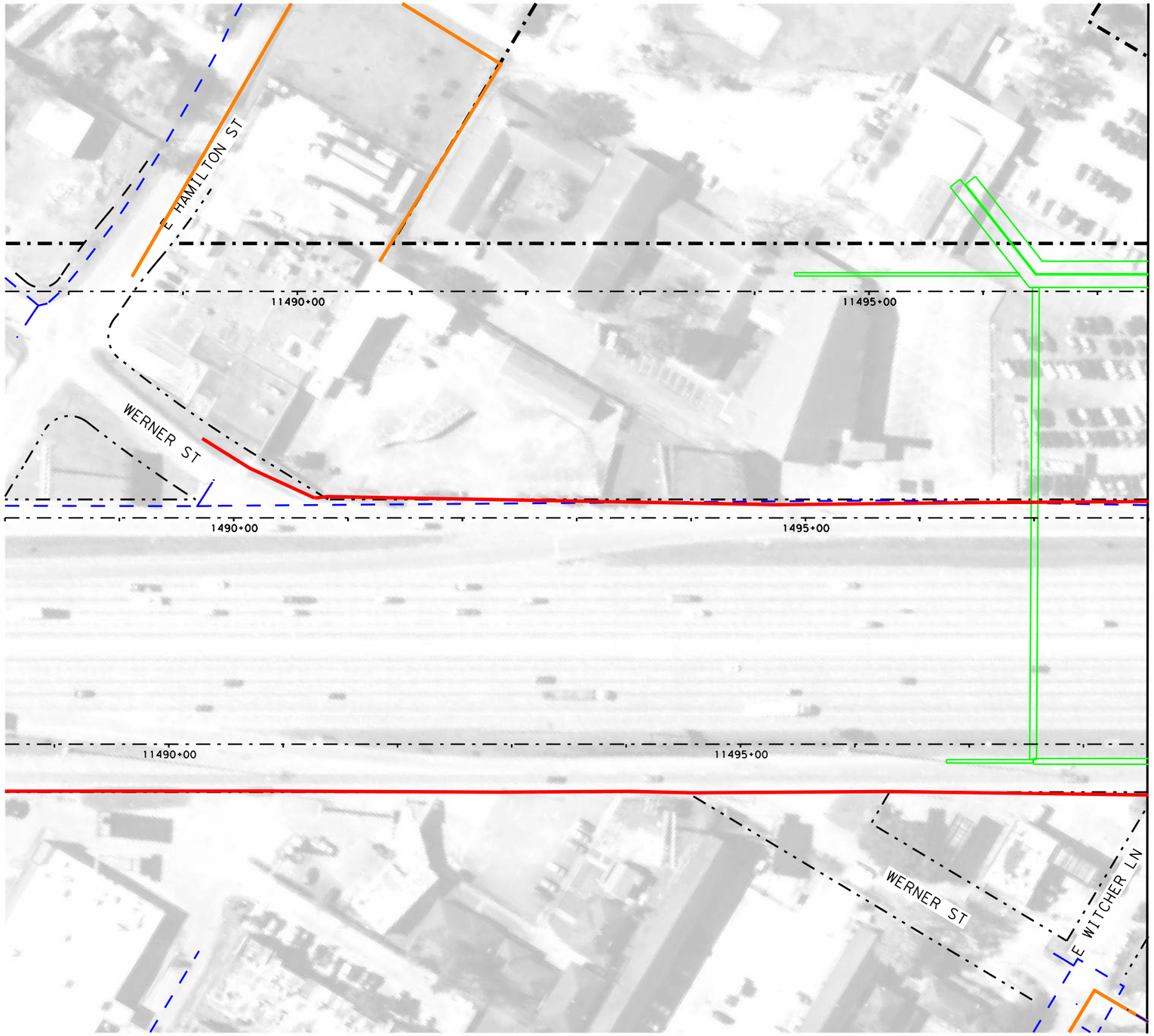
I-45
EXHIBIT 13
OUTFALL 07 BASIN LAYOUT

SHEET 1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOUV4 I-45N TXD 20022\CADD\SHEETS\I-45_PROP_07_DETENTION.dgn
7/21/2021 11:09:15 AM

EXHIBIT 14



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

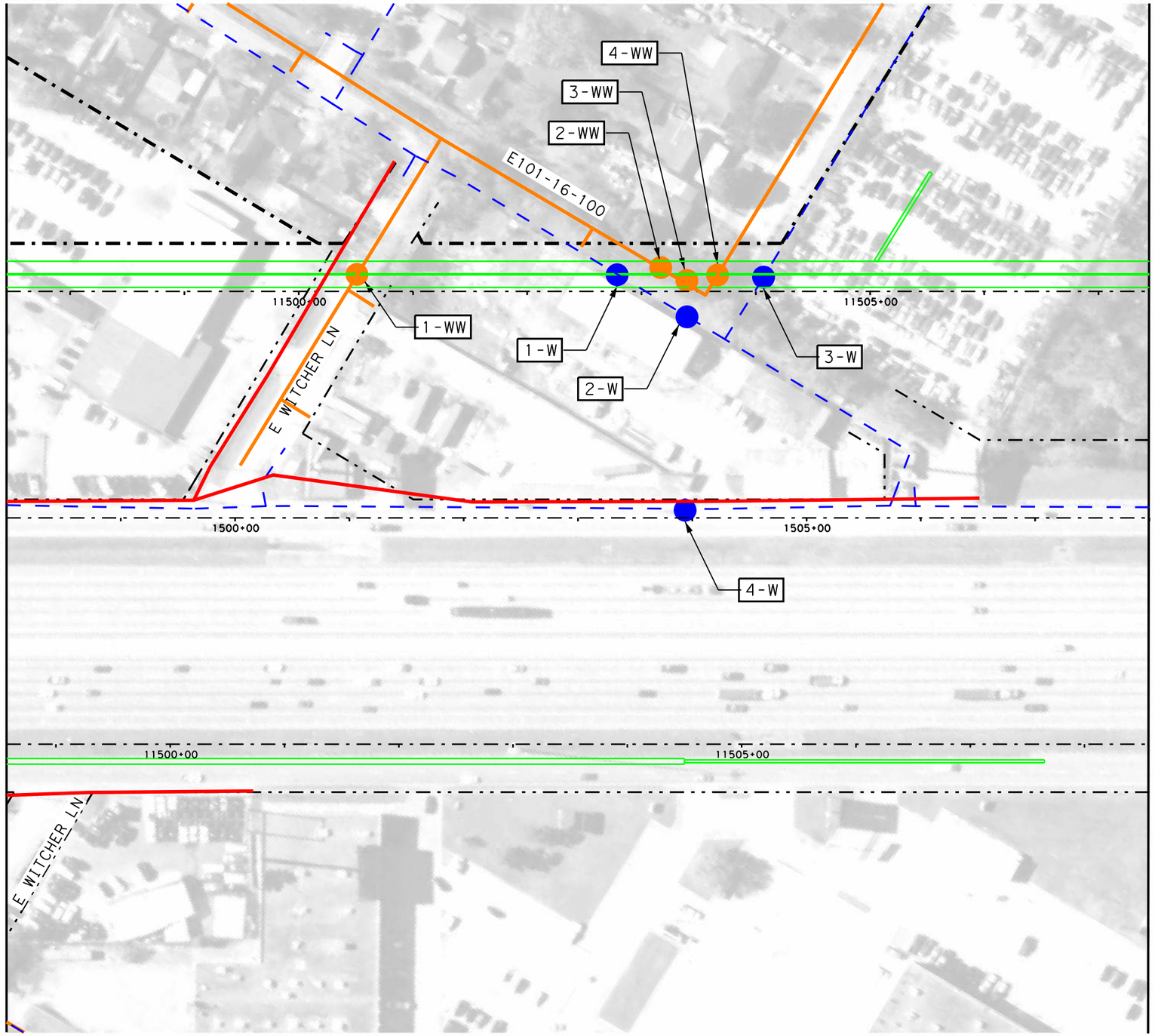
I-45

EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
PROJECT START TO STA 1498+00

SHEET 1 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS		0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_01.dgn
7/21/2021 11:12:07 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

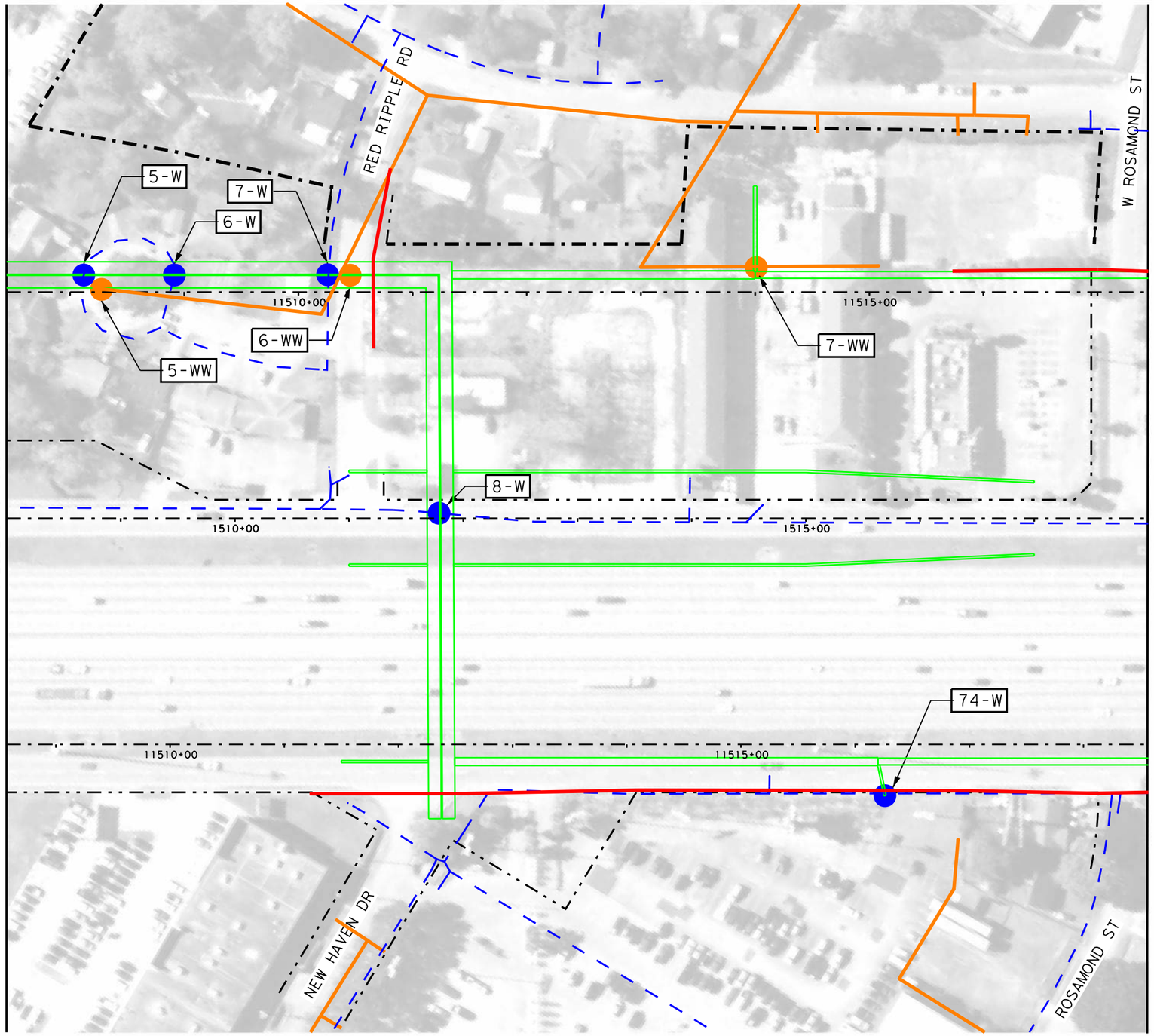
I-45

EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1498+00 TO STA 1508+00

SHEET 2 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_02.dgn
7/21/2021 11:12:17 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation
© 2021

FIRM REGISTRATION NO. F-230

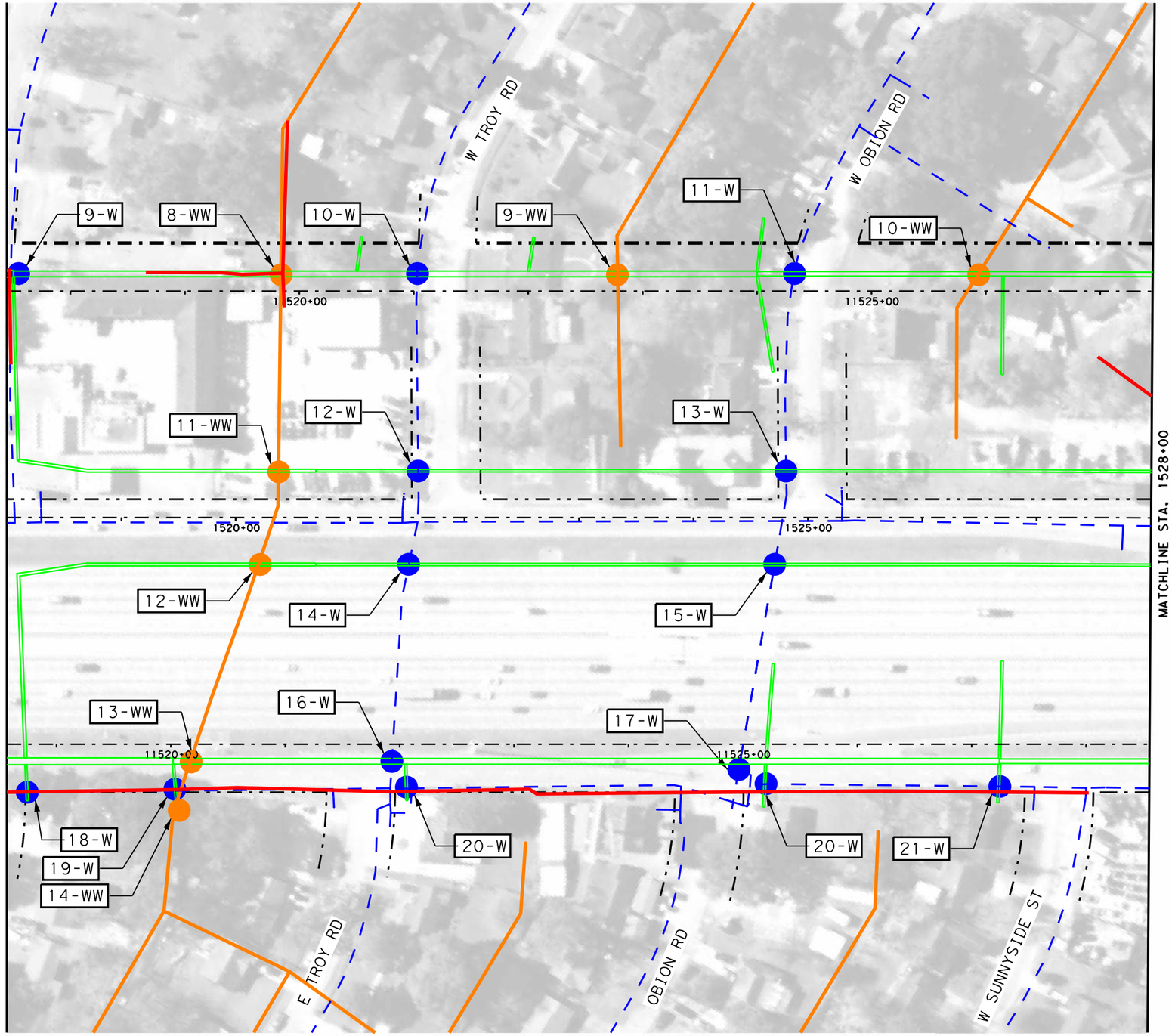
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1508+00 TO STA 1518+00

SHEET 3 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDI9HOU\4_I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_03.dgn
7/21/2021 11:12:26 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

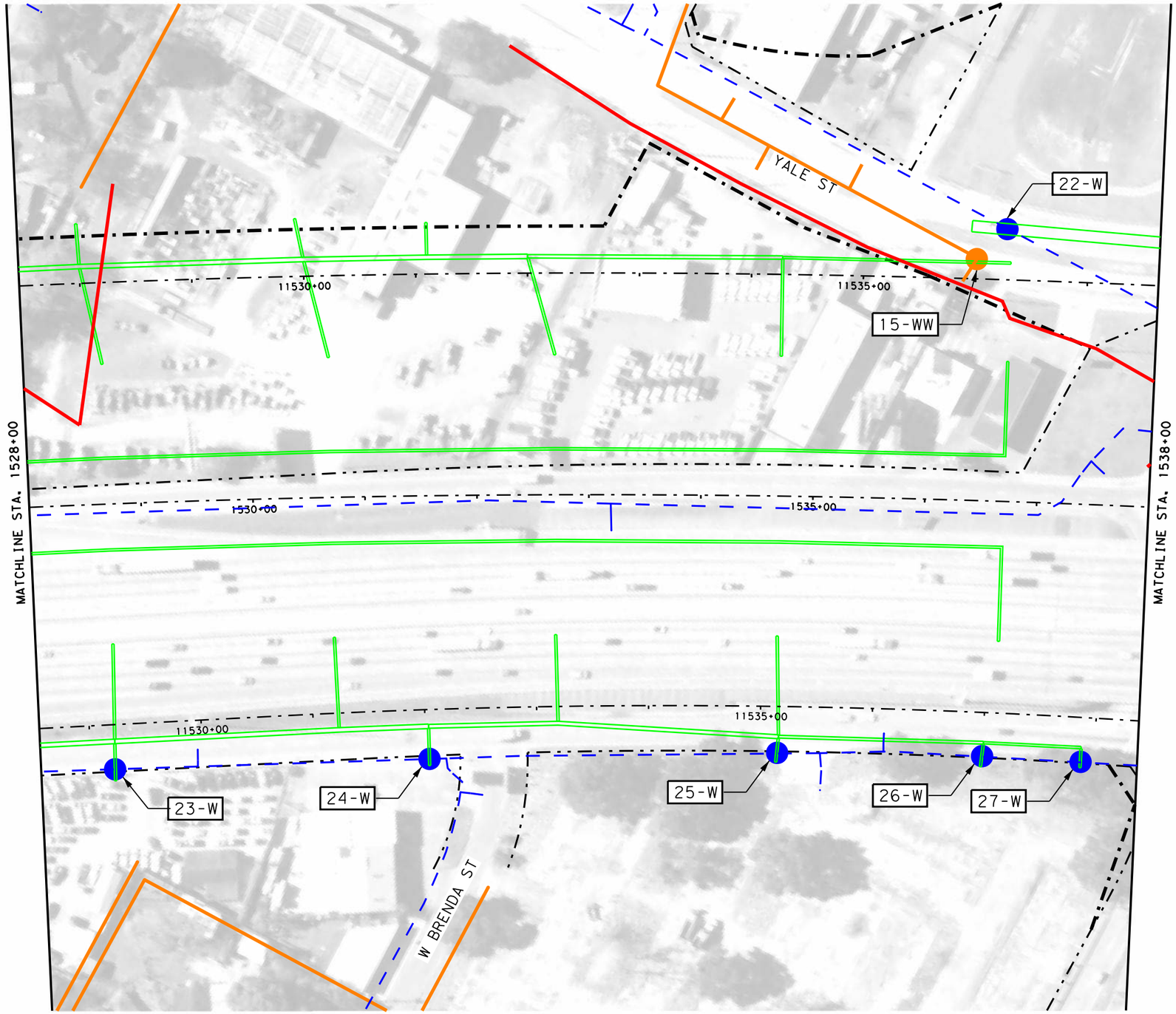
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1518+00 TO STA 1528+00

SHEET 4 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)		I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_04.dgn
7/21/2021 11:12:34 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

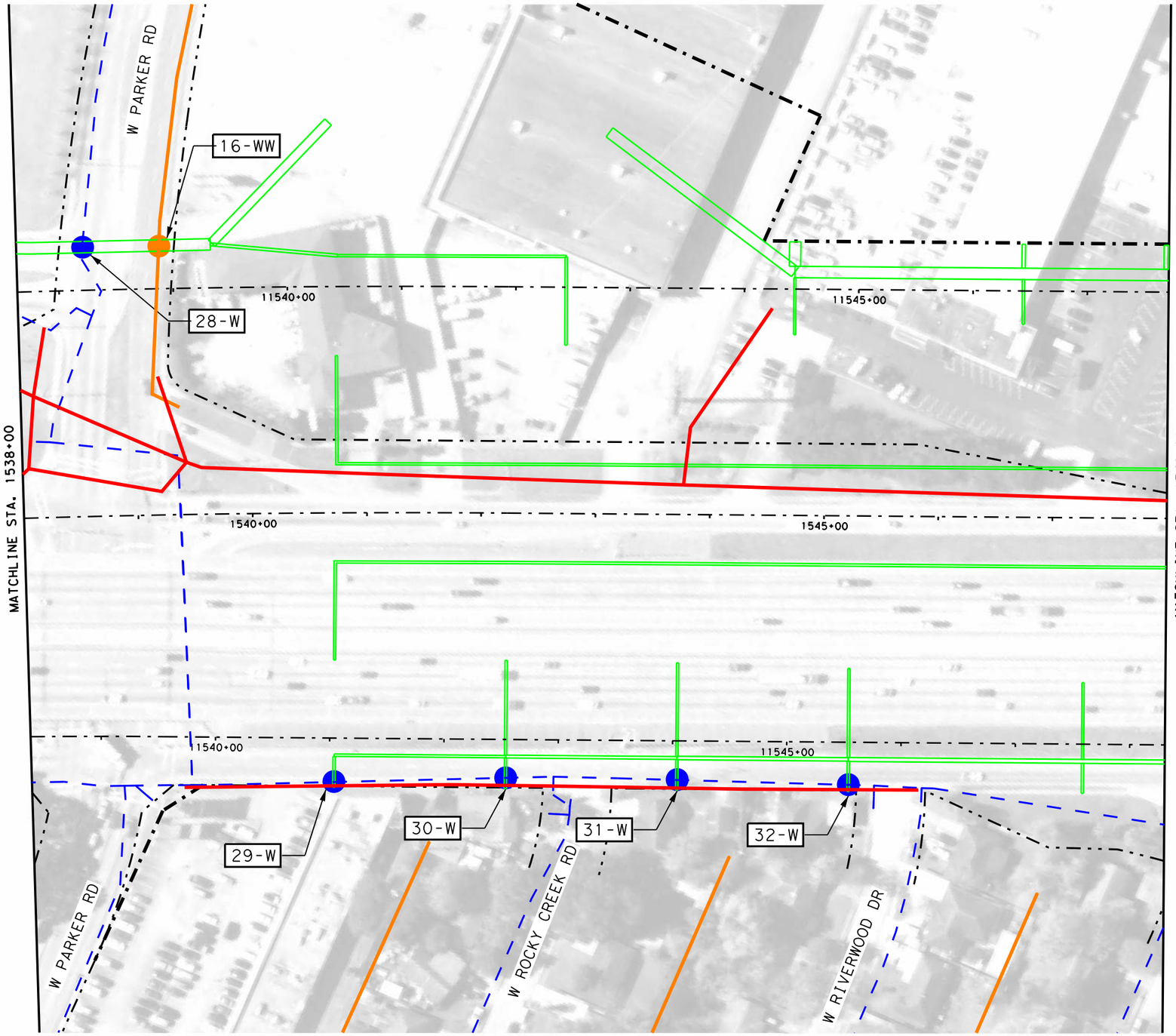
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1528+00 TO STA 1538+00

SHEET 5 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19H00\N4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_05.dgn
7/21/2021 11:14:37 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

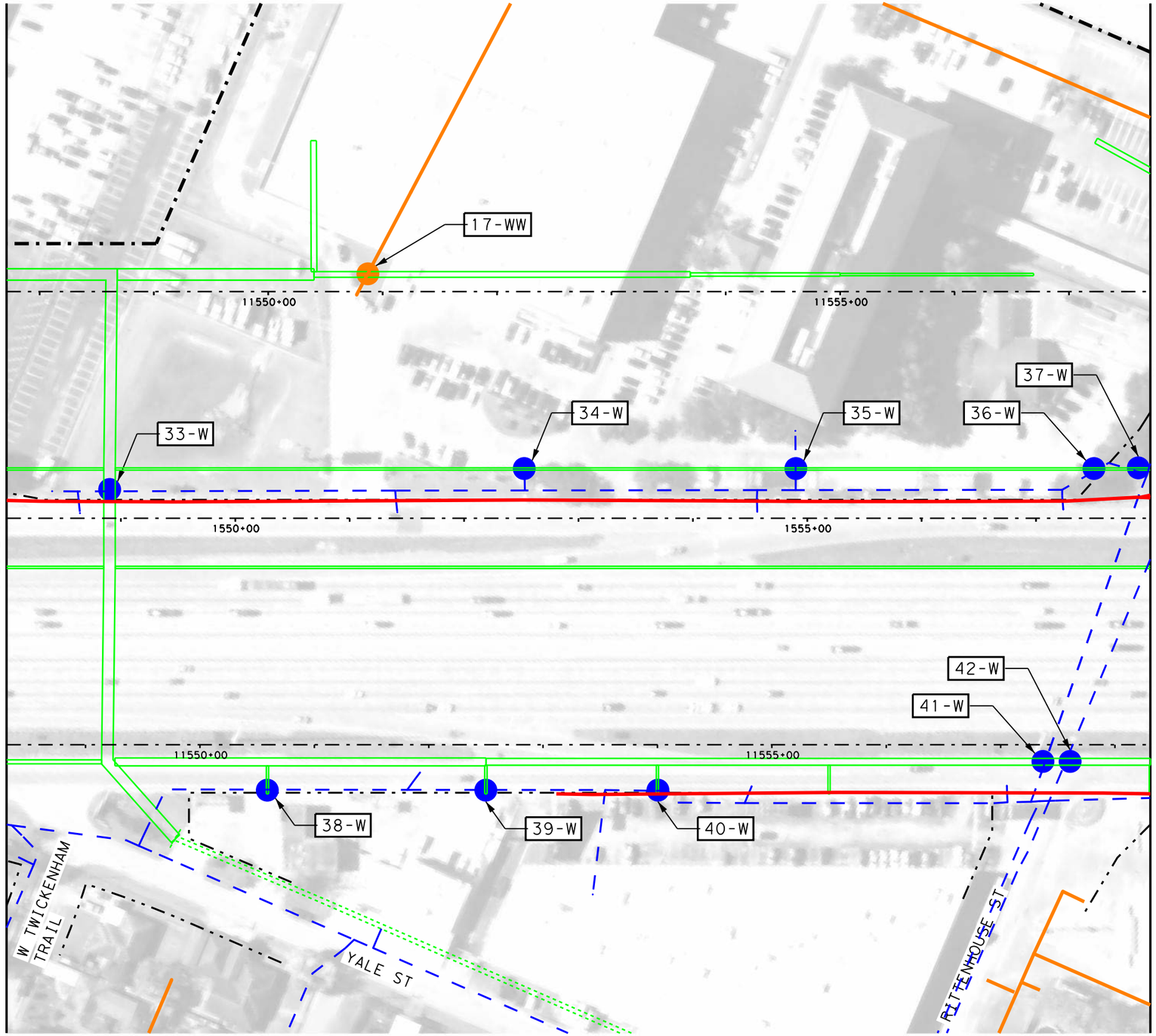
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1538+00 TO STA 1548+00

SHEET 6 OF 13

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_06.dgn
7/21/2021 11:14:47 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

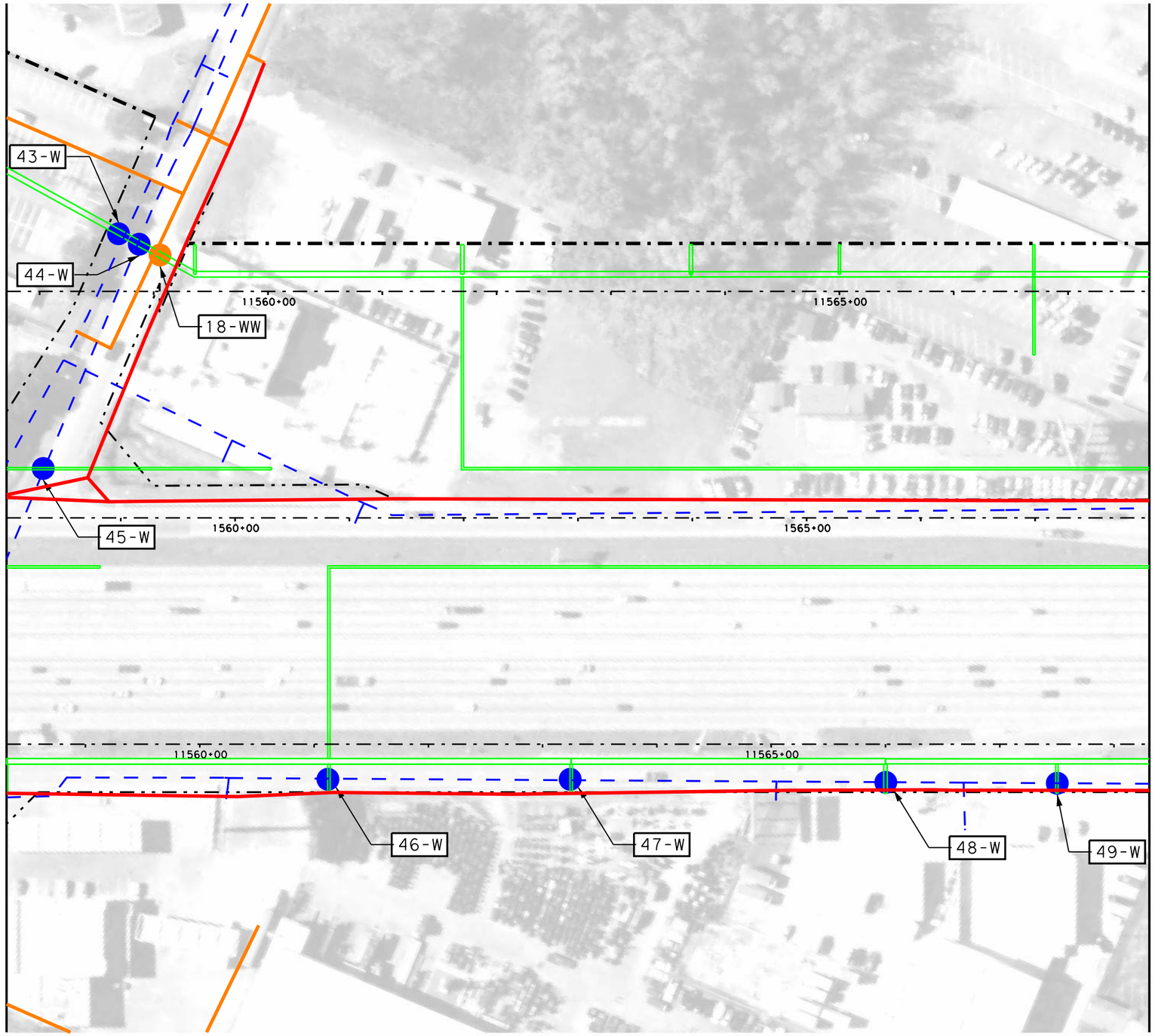
FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1548+00 TO STA 1558+00

SHEET 7 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	HOU	HARRIS	0500	03	446	

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_07.dgn
7/21/2021 11:14:56 AM



0 50 100

SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 14

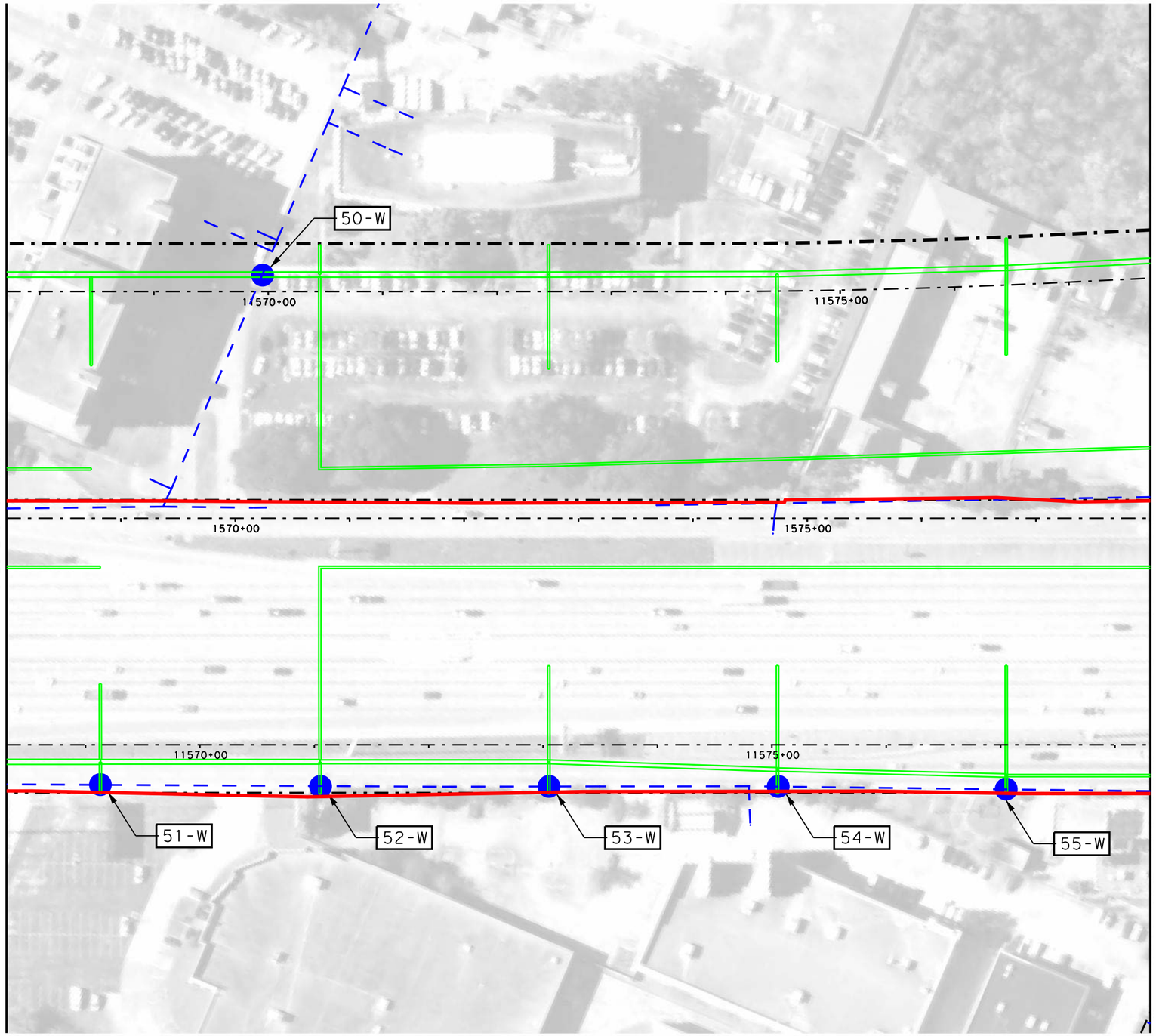
POTENTIAL UTILITY CONFLICTS

STA 1558+00 TO STA 1568+00

SHEET 8 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDI9HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_08.dgn
7/21/2021 11:15:05 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

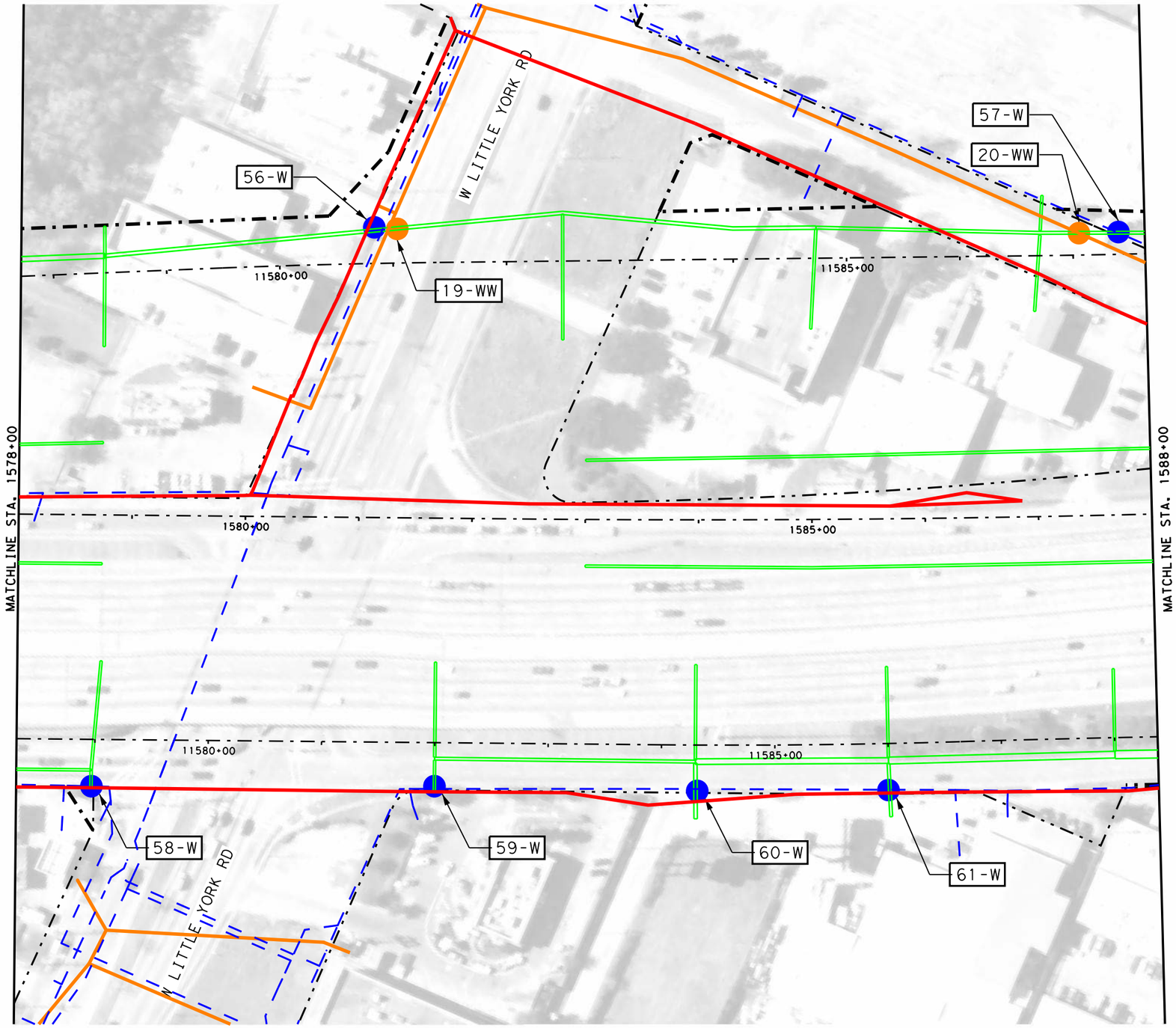
Texas Department of Transportation

FIRM REGISTRATION NO. F-230
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1568+00 TO STA 1578+00
SHEET 9 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.				HIGHWAY No.
CHECKED:		TEXAS	(SEE TITLE SHEET)				I-45
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT\HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_09.dgn
7/21/2021 11:15:14 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

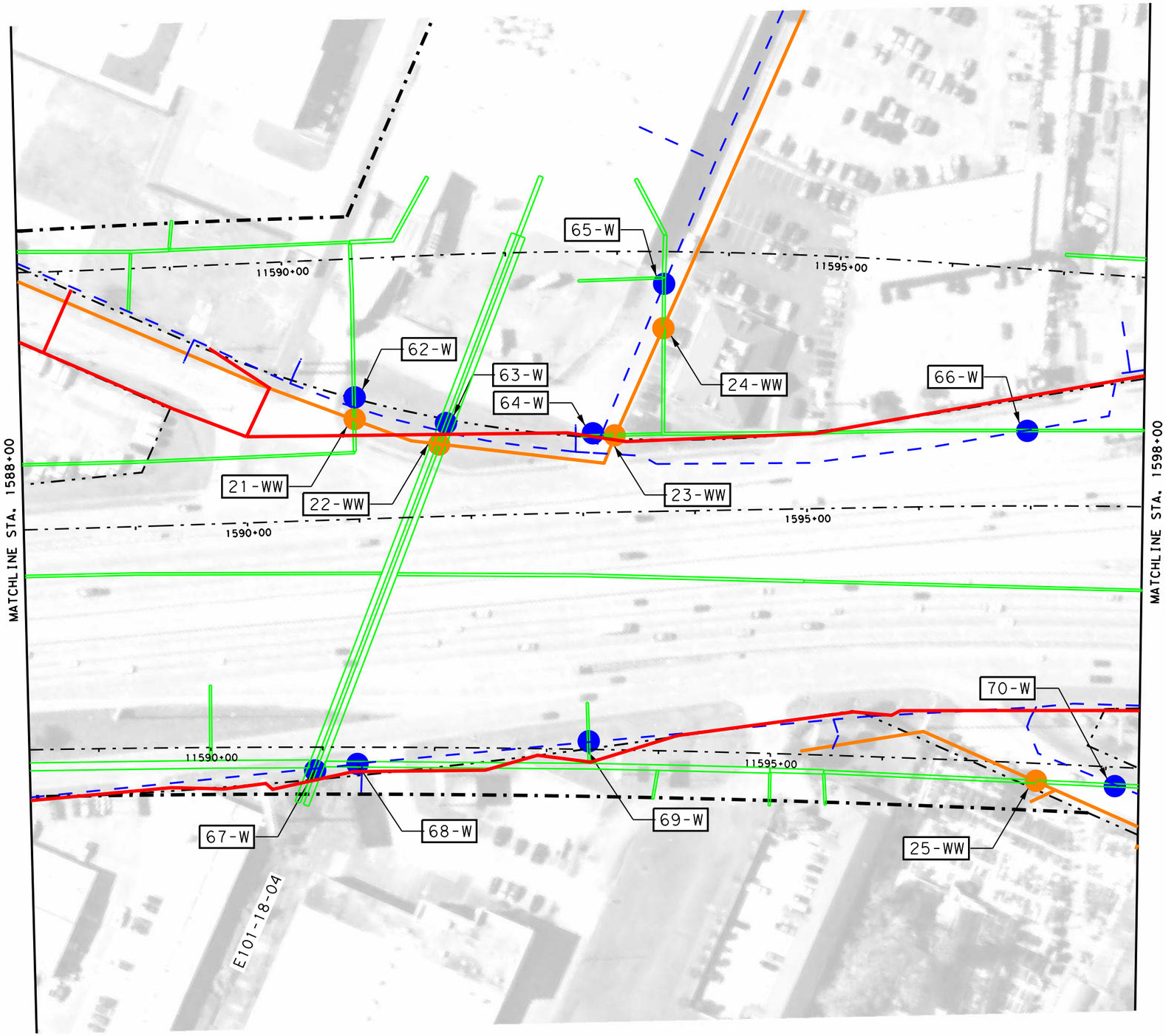
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1578+00 TO STA 1588+00

SHEET 10 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_10.dgn
7/21/2021 11:15:23 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

Texas Department of Transportation

FIRM REGISTRATION NO. F-230

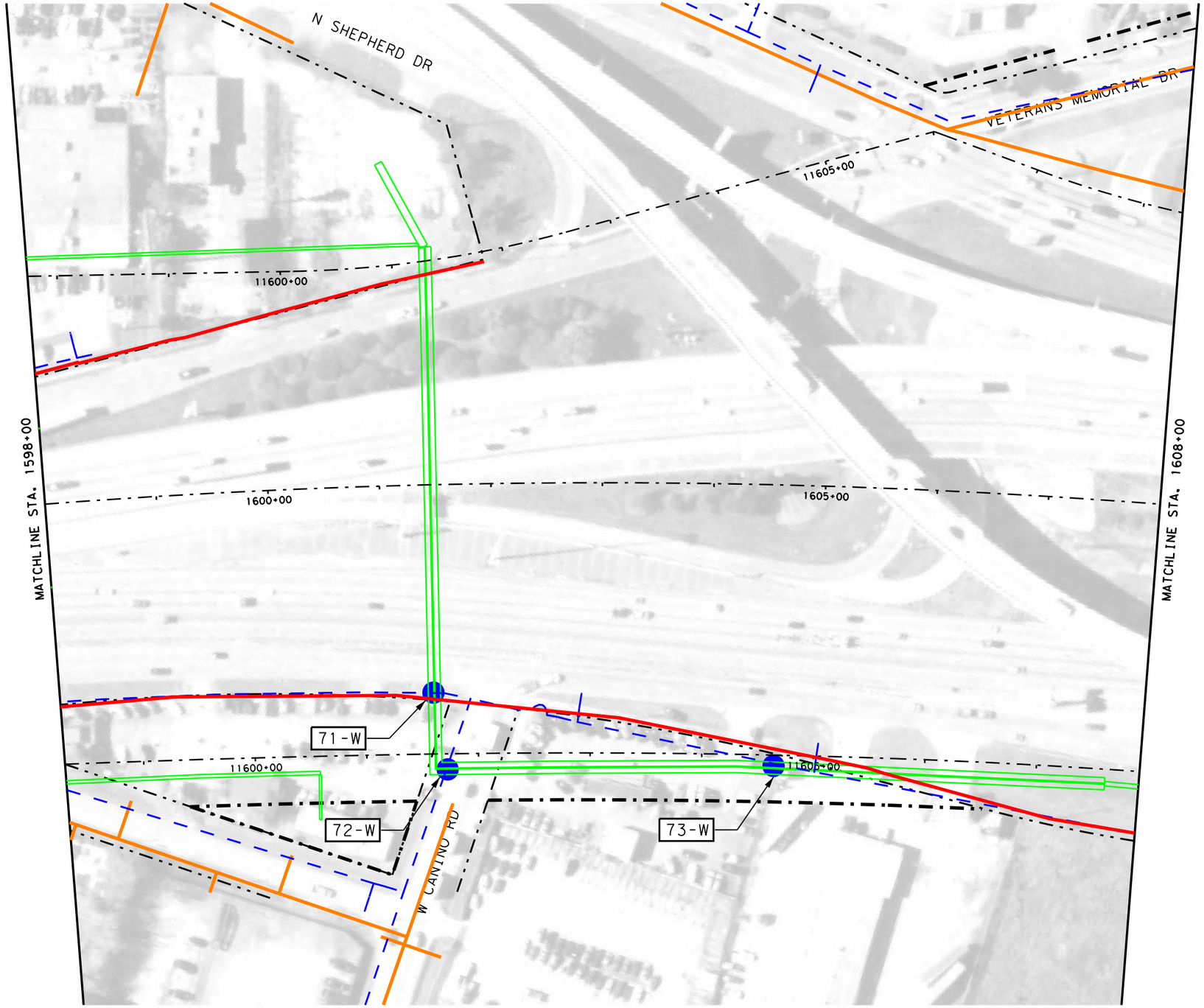
tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1588+00 TO STA 1598+00

SHEET 11 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_11.dgn
7/21/2021 11:15:32 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45

EXHIBIT 14

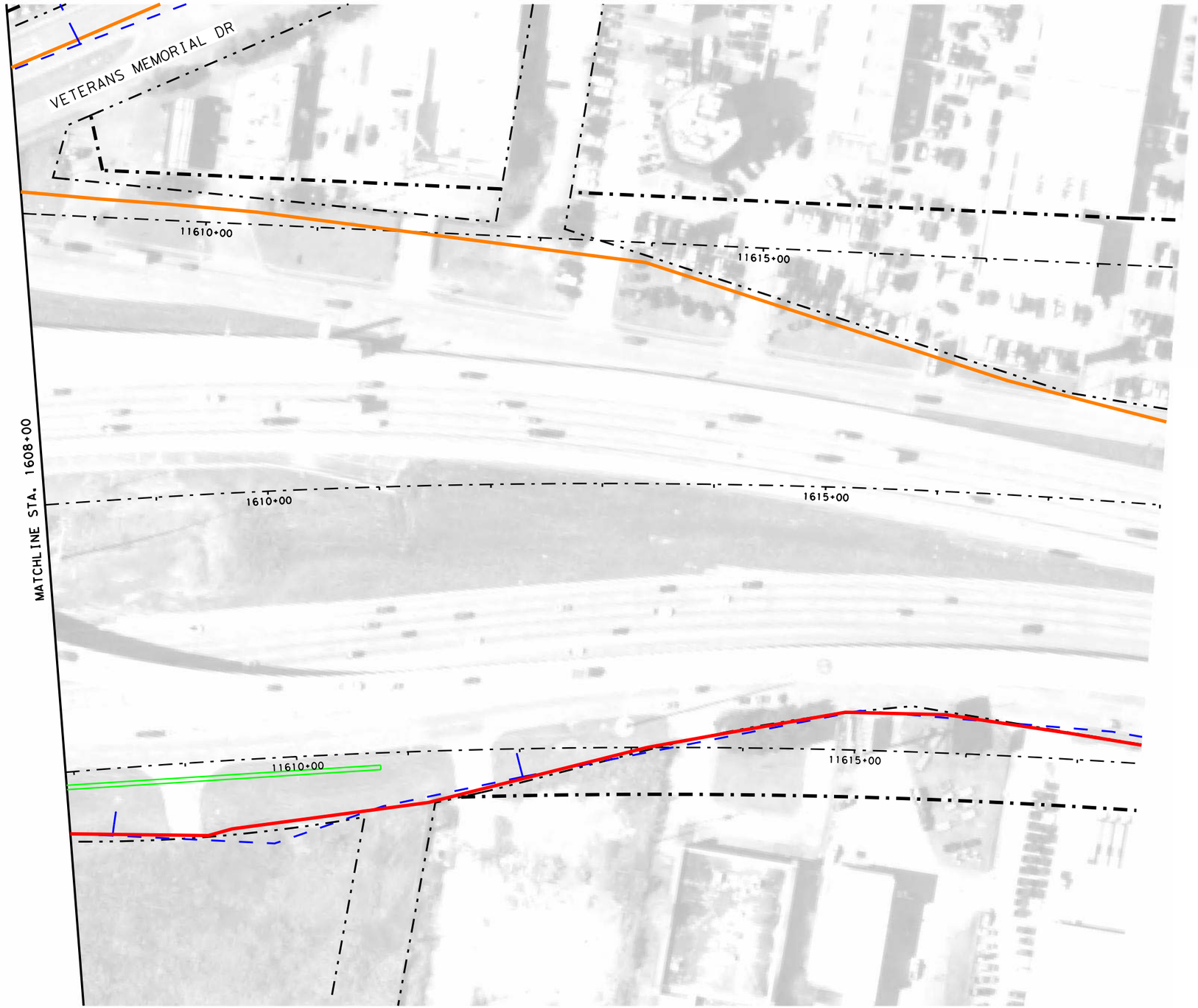
POTENTIAL UTILITY CONFLICTS

STA 1598+00 TO STA 1608+00

SHEET 12 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

P:\PROJECTS\TXDOT9HOU\04 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_12.dgn
7/21/2021 11:15:42 AM



0 50 100
SCALE: 1" = 100'

LEGEND

- PROP STRUCTURE
- WASTE WATER LINE
- WATER LINE
- OVERHEAD ELECTRIC

PRELIMINARY
FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.
Prepared by or under the Direct Supervision of
ERIC J. CALVERT, P.E. 91710
7/21/2021

FIRM REGISTRATION NO. F-230

tnp

I-45
EXHIBIT 14
POTENTIAL UTILITY CONFLICTS
STA 1608+00 TO PROJECT END

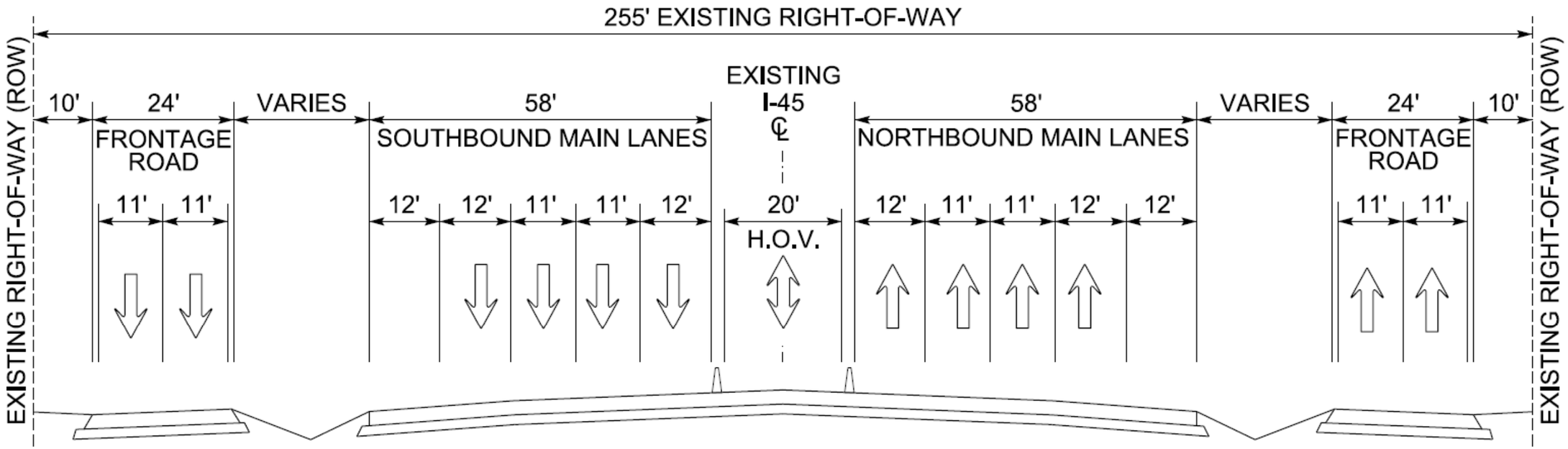
SHEET 13 OF 13

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:		TEXAS	(SEE TITLE SHEET)			I-45	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	HOU	HARRIS	0500	03	446		

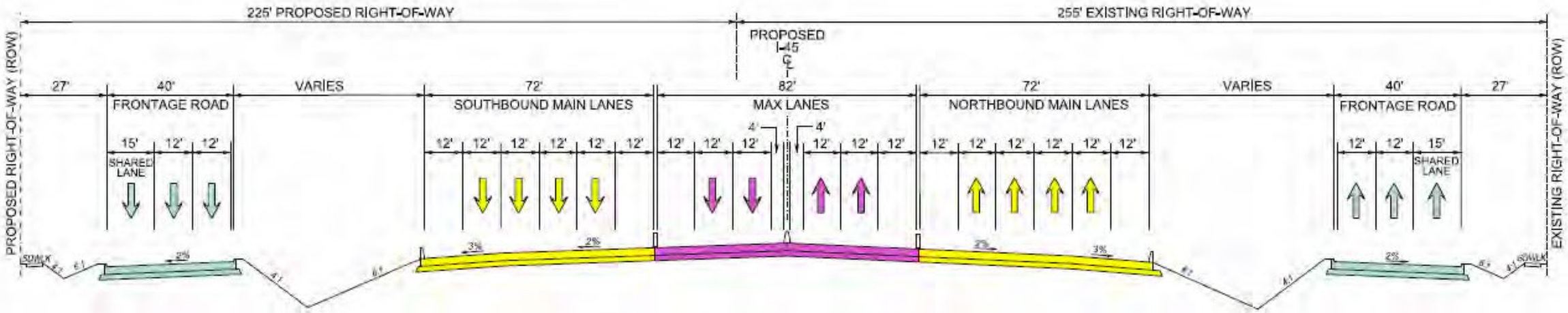
P:\PROJECTS\TXD19HOU\4 I-45N TXD 20022\CADD\SHEETS\I-45_UTILITY_CONFLICT_13.dgn
7/21/2021 11:55:51 AM

APPENDICIES

APPENDIX A



EXISTING TYPICAL SECTION
TIDWELL ROAD TO SHEPHERD DRIVE



PROPOSED TYPICAL SECTION
TIDWELL ROAD TO SHEPHERD DRIVE

APPENDIX B

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator, Zone 15. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit their website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the Harris Galveston Area Council and was revised and enhanced by Harris County.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

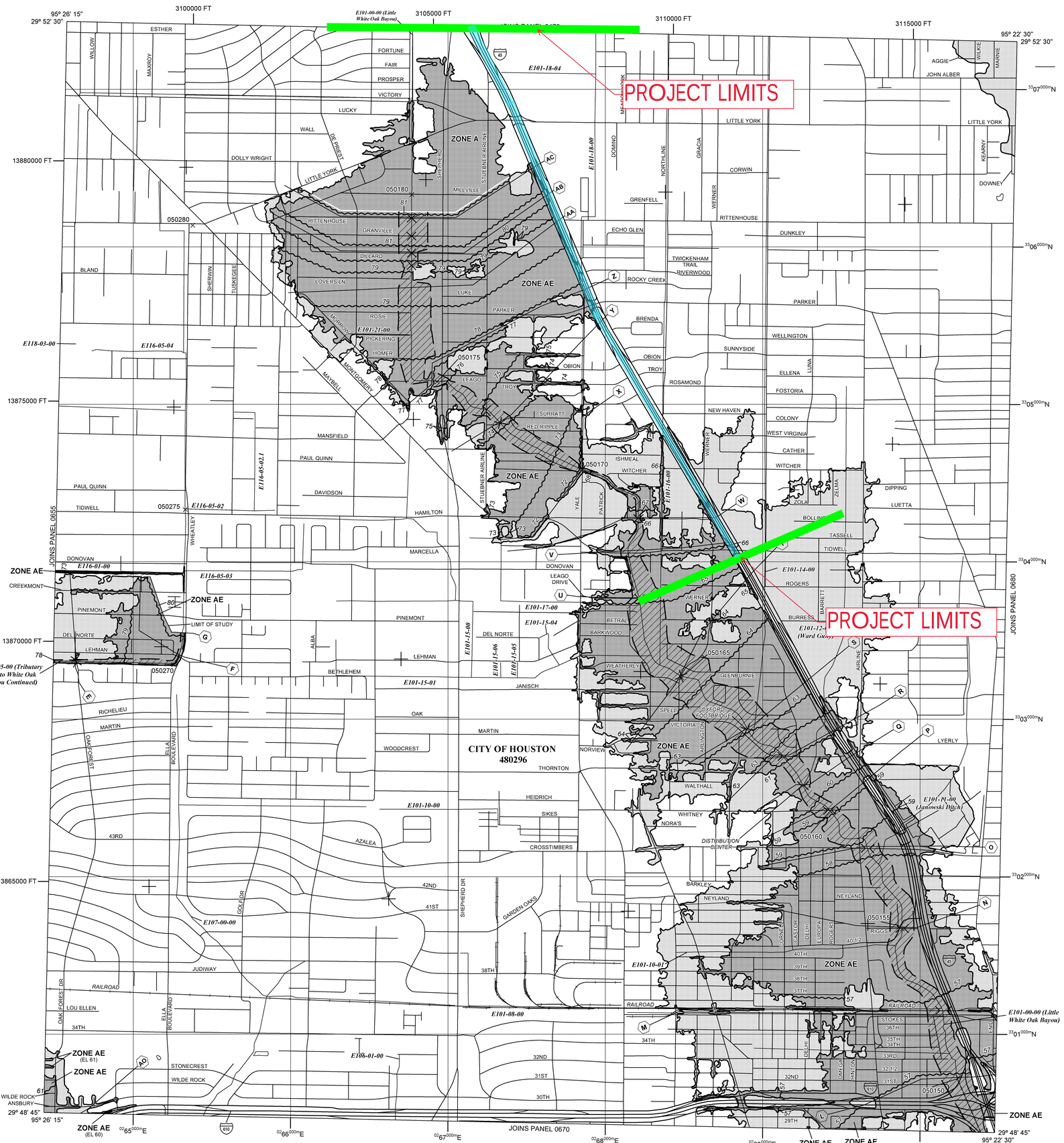
For information on available products associated with this FIRM visit the **FEMA Map Service Center** (MSC) website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Vertical Datum Adjustment due to subsidence is the 2001 adjustment.

Benchmarks shown on this map were provided by either Harris County or the National Geodetic Survey. To obtain elevation, description, and location information for benchmarks provided by Harris County, please contact the Permits Office of the Public Infrastructure Department at (713) 956-3000 or visit their website at http://www.eng.hctx.net/permits. For information regarding the benchmarks provided by the National Geodetic Survey, please see note above.

Some bridges and other structures shown on the detailed studied streams are not labeled. See corresponding flood profile for appropriate name.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA Boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 (EL 987) Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line
23 — 23 Transect line
Culvert, Flume, Penstock or Aqueduct
Road or Railroad Bridge
Footbridge
97° 07' 30", 32° 22' 30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{4}76^{000}$E 1000-meter Universal Transverse Mercator grid values, zone 15
600000 FT 5000-foot grid ticks: Texas State Plane coordinate system, zone South Central (FIPSZONE 4204), Lambert Conformal Conic Projection
DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP PANEL
SEPTEMBER 28, 1990

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 30, 1992
NOVEMBER 6, 1996
APRIL 20, 2000
JUNE 18, 2007
OCTOBER 16, 2013
JUNE 9, 2014

For accompanying Reasons for Revision, refer to the Notice to Flood Insurance Study Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0660M

FIRM
FLOOD INSURANCE RATE MAP
HARRIS COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 660 OF 1150

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HOUSTON, CITY OF	480296	0660	M

APPENDIX B

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48201C0660M

MAP REVISED
JUNE 9, 2014

Federal Emergency Management Agency

APPENDIX C

Appendix C: Outfall Field Photos

Northbound side: facing west at Station 1590+46

Northbound side: facing east at Station 1590+46

Southbound side: manhole at Station 1591+70

Southbound side: facing west at Station 1591+70

Southbound side: facing east at Station 1591+70

Southbound side: culvert at Station 1544+71

Southbound side: facing east at Station 1545+55

Southbound side: facing east at Station 1545+55

Southbound side: culvert at Station 1544+12

Southbound side: RCPs at Station 1543+68

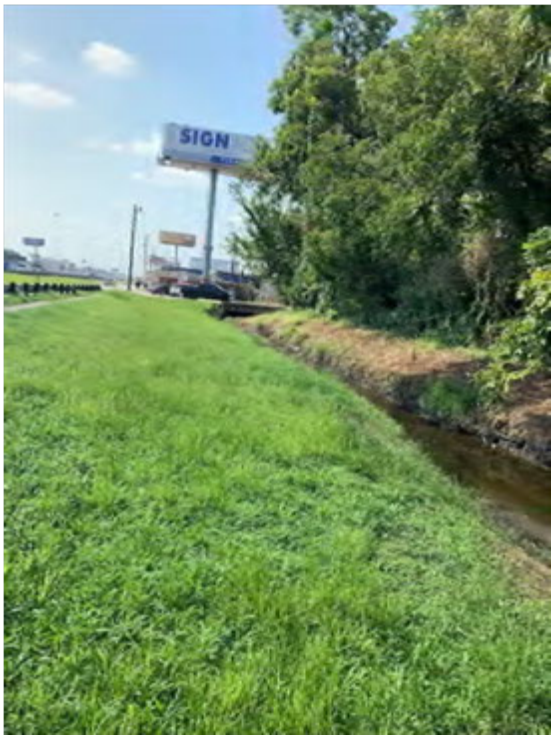
Northbound side: culvert at Station 1548+82

Northbound: RCP at Station 1549+48

Northbound side: channel at Station 1554+85 from side road

Northbound side: RCP at Station 1511+81

Southbound side: culvert at Station 1508+71



Northbound side: ditch facing south at Station 1508+71

Southbound side: facing south at Station 1508+71

Southbound side: culvert at Station 1508+71

APPENDIX D

NOAA Atlas 14, Volume 11, Version 2 HOUSTON INDEP HTS
Station ID: 41-4323
Location name: Houston, Texas, USA*
Latitude: 29.8667°, Longitude: -95.4167°
Elevation:
Elevation (station metadata): 92 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

AMS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Annual exceedance probability (1/years)								
	1/2	1/5	1/10	1/25	1/50	1/100	1/200	1/500	1/1000
5-min	**0.539** (0.411-0.708)	**0.708** (0.540-0.929)	**0.834** (0.627-1.11)	**1.00** (0.725-1.37)	**1.12** (0.792-1.58)	**1.25** (0.859-1.81)	**1.38** (0.927-2.05)	**1.56** (1.01-2.41)	**1.71** (1.08-2.70)
10-min	**0.854** (0.651-1.12)	**1.13** (0.859-1.48)	**1.33** (0.998-1.77)	**1.59** (1.16-2.19)	**1.79** (1.27-2.53)	**1.99** (1.37-2.89)	**2.19** (1.47-3.26)	**2.46** (1.60-3.78)	**2.66** (1.68-4.20)
15-min	**1.09** (0.828-1.43)	**1.42** (1.08-1.86)	**1.67** (1.25-2.22)	**1.99** (1.45-2.73)	**2.23** (1.58-3.14)	**2.47** (1.71-3.59)	**2.73** (1.84-4.07)	**3.09** (2.01-4.76)	**3.37** (2.13-5.33)
30-min	**1.55** (1.19-2.05)	**2.02** (1.54-2.65)	**2.36** (1.78-3.14)	**2.81** (2.03-3.83)	**3.13** (2.20-4.39)	**3.46** (2.38-5.01)	**3.83** (2.58-5.71)	**4.38** (2.85-6.76)	**4.83** (3.06-7.63)
60-min	**2.05** (1.57-2.70)	**2.70** (2.06-3.54)	**3.18** (2.39-4.23)	**3.81** (2.75-5.19)	**4.26** (3.00-5.98)	**4.74** (3.27-6.88)	**5.31** (3.58-7.92)	**6.17** (4.01-9.53)	**6.90** (4.37-10.9)
2-hr	**2.53** (1.92-3.27)	**3.45** (2.63-4.49)	**4.17** (3.15-5.53)	**5.18** (3.77-7.05)	**5.96** (4.22-8.35)	**6.83** (4.73-9.86)	**7.87** (5.31-11.7)	**9.47** (6.18-14.6)	**10.9** (6.89-17.1)
3-hr	**2.80** (2.12-3.59)	**3.92** (2.99-5.07)	**4.83** (3.65-6.38)	**6.13** (4.48-8.35)	**7.18** (5.12-10.1)	**8.39** (5.82-12.1)	**9.83** (6.64-14.6)	**12.1** (7.88-18.5)	**14.0** (8.90-22.0)
6-hr	**3.29** (2.48-4.16)	**4.76** (3.64-6.12)	**6.00** (4.55-7.90)	**7.82** (5.76-10.7)	**9.37** (6.72-13.1)	**11.2** (7.78-16.0)	**13.3** (9.01-19.6)	**16.6** (10.8-25.3)	**19.4** (12.4-30.3)
12-hr	**3.82** (2.88-4.78)	**5.64** (4.33-7.20)	**7.19** (5.48-9.43)	**9.52** (7.06-12.9)	**11.5** (8.32-16.2)	**13.9** (9.72-19.9)	**16.6** (11.3-24.4)	**20.8** (13.7-31.8)	**24.5** (15.7-38.1)
24-hr	**4.41** (3.33-5.47)	**6.60** (5.08-8.38)	**8.50** (6.50-11.1)	**11.4** (8.49-15.4)	**13.9** (10.1-19.4)	**16.8** (11.8-24.0)	**20.2** (13.7-29.4)	**25.1** (16.5-38.0)	**29.2** (18.8-45.4)
2-day	**5.08** (3.83-6.24)	**7.72** (5.96-9.75)	**10.0** (7.71-13.1)	**13.6** (10.3-18.5)	**16.8** (12.3-23.5)	**20.5** (14.4-29.0)	**24.2** (16.5-35.1)	**29.4** (19.4-44.2)	**33.5** (21.6-51.9)
3-day	**5.55** (4.20-6.81)	**8.45** (6.54-10.6)	**11.0** (8.44-14.2)	**14.8** (11.2-20.2)	**18.3** (13.5-25.6)	**22.2** (15.7-31.4)	**26.1** (17.8-37.7)	**31.3** (20.7-47.0)	**35.3** (22.9-54.6)
4-day	**5.92** (4.50-7.28)	**8.94** (6.94-11.3)	**11.5** (8.91-15.0)	**15.5** (11.7-21.0)	**19.0** (14.0-26.5)	**23.0** (16.2-32.5)	**26.9** (18.4-38.8)	**32.1** (21.3-48.2)	**36.2** (23.5-55.8)
7-day	**6.73** (5.16-8.31)	**9.93** (7.74-12.5)	**12.6** (9.78-16.3)	**16.7** (12.6-22.5)	**20.2** (14.9-28.0)	**24.1** (17.1-34.0)	**28.0** (19.3-40.4)	**33.3** (22.2-49.9)	**37.5** (24.4-57.6)
10-day	**7.41** (5.73-9.19)	**10.8** (8.41-13.5)	**13.5** (10.5-17.4)	**17.6** (13.4-23.7)	**21.1** (15.6-29.2)	**25.0** (17.8-35.2)	**28.9** (19.9-41.6)	**34.2** (22.8-51.1)	**38.3** (25.0-58.8)
20-day	**9.57** (7.50-12.0)	**13.2** (10.4-16.7)	**16.2** (12.6-20.8)	**20.3** (15.4-27.0)	**23.7** (17.4-32.4)	**27.3** (19.5-38.2)	**31.0** (21.5-44.6)	**36.2** (24.3-53.9)	**40.3** (26.3-61.6)
30-day	**11.4** (9.00-14.3)	**15.4** (12.2-19.4)	**18.4** (14.4-23.6)	**22.6** (17.1-29.9)	**25.8** (19.0-35.2)	**29.2** (20.9-40.9)	**32.8** (22.9-47.1)	**37.8** (25.5-56.3)	**41.8** (27.4-63.8)
45-day	**14.1** (11.2-17.8)	**18.6** (14.8-23.4)	**21.9** (17.2-28.0)	**26.3** (19.9-34.7)	**29.6** (21.8-40.1)	**32.9** (23.6-45.9)	**36.3** (25.4-52.0)	**40.9** (27.6-60.7)	**44.5** (29.2-67.7)
60-day	**16.6** (13.3-21.0)	**21.5** (17.2-27.1)	**25.1** (19.7-32.1)	**29.8** (22.6-39.2)	**33.2** (24.5-44.9)	**36.5** (26.2-50.8)	**39.7** (27.8-56.8)	**43.9** (29.7-65.0)	**46.9** (30.9-71.4)

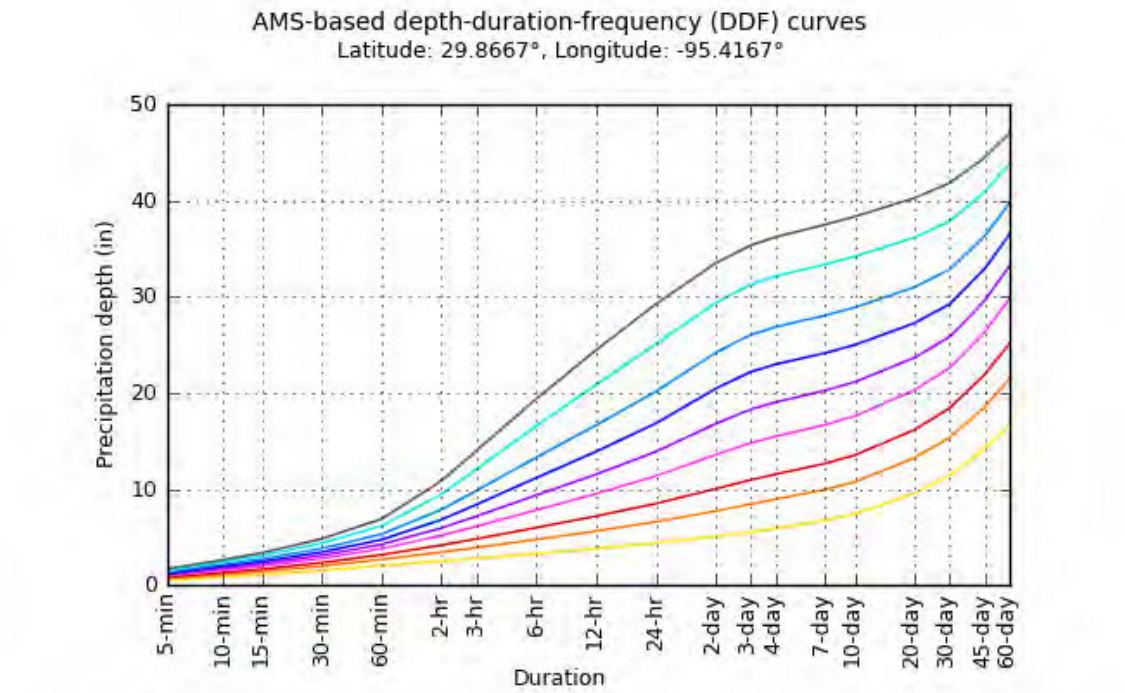
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of annual maxima series (AMS).

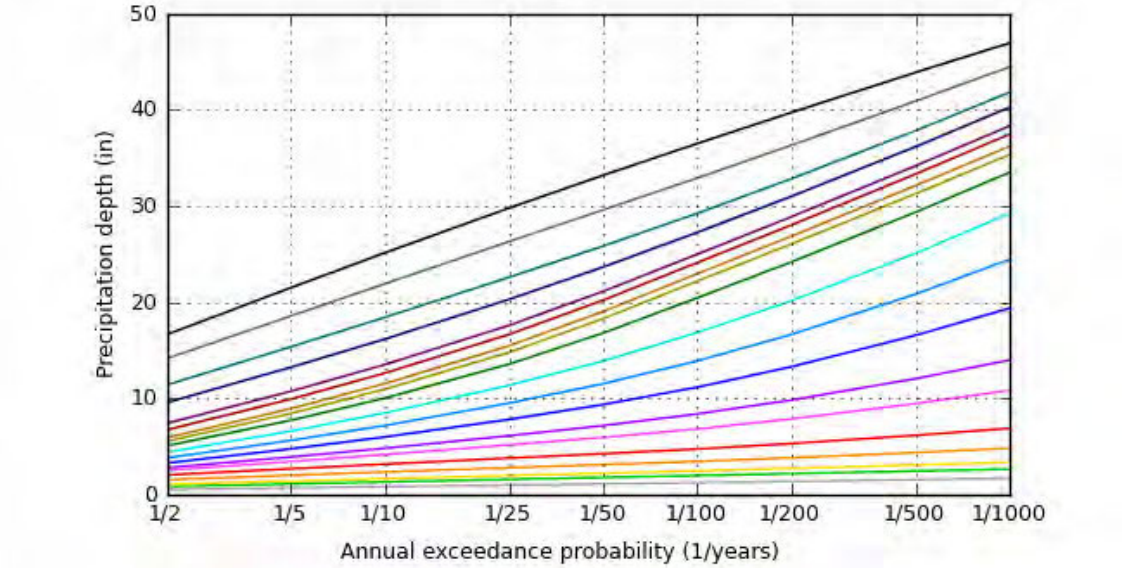
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and annual exceedance probability) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical





NOAA Atlas 14, Volume 11, Version 2

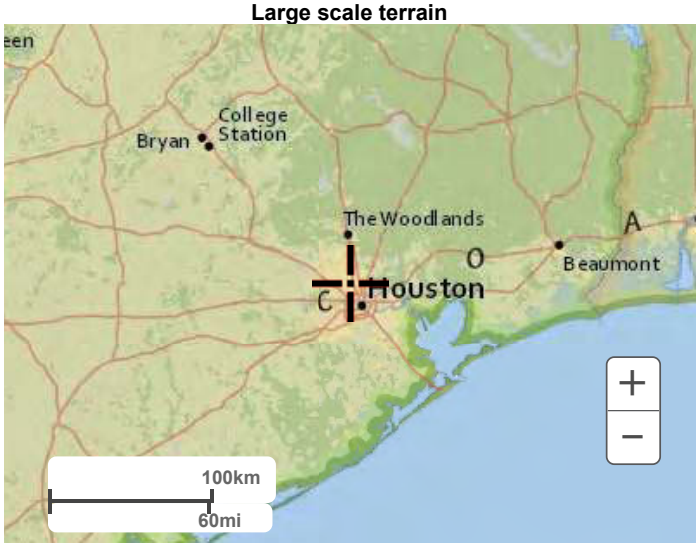
Created (GMT): Tue Jan 26 20:46:29 2021

Back to Top

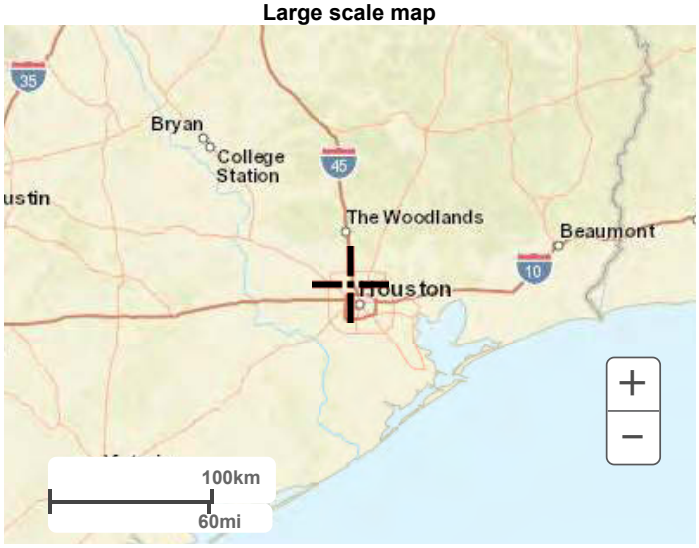
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map



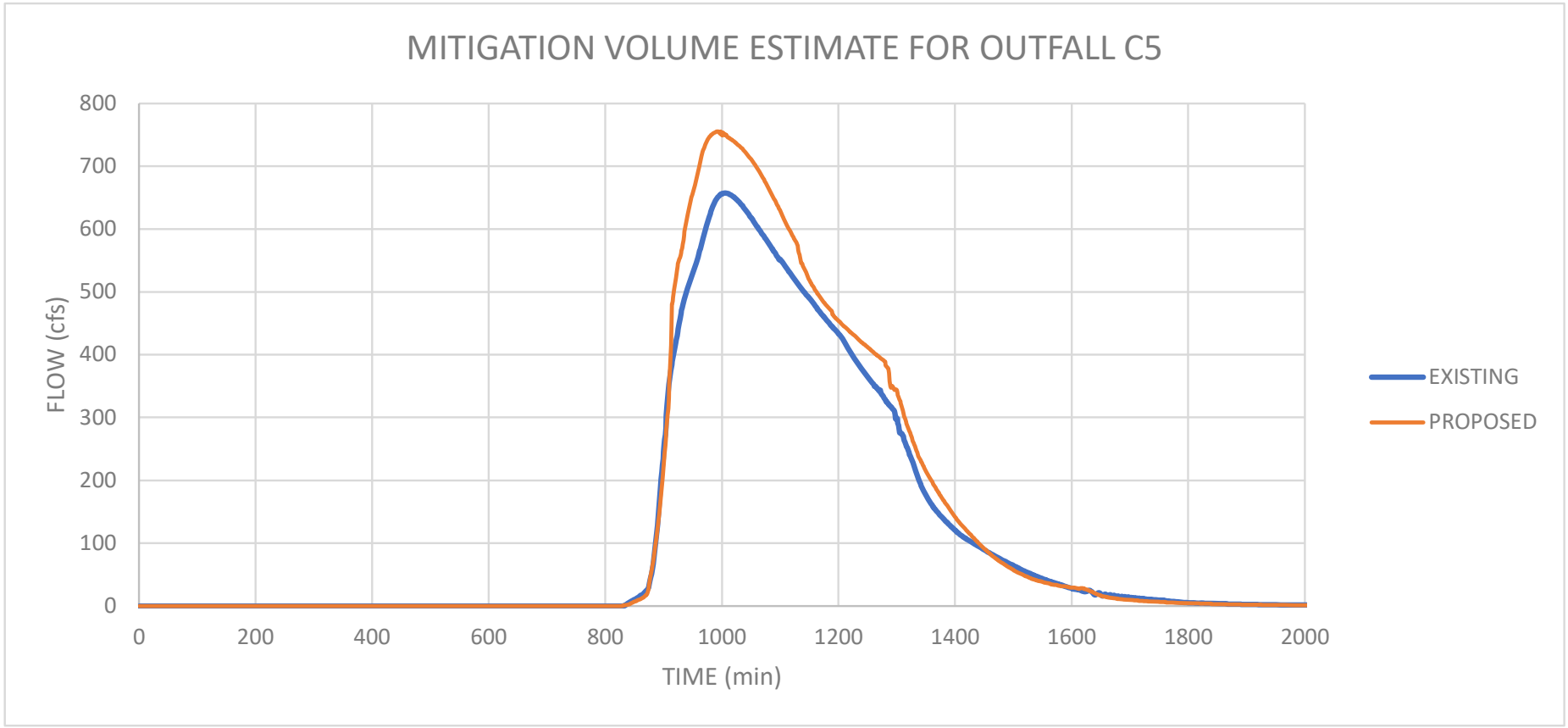
Large scale aerial

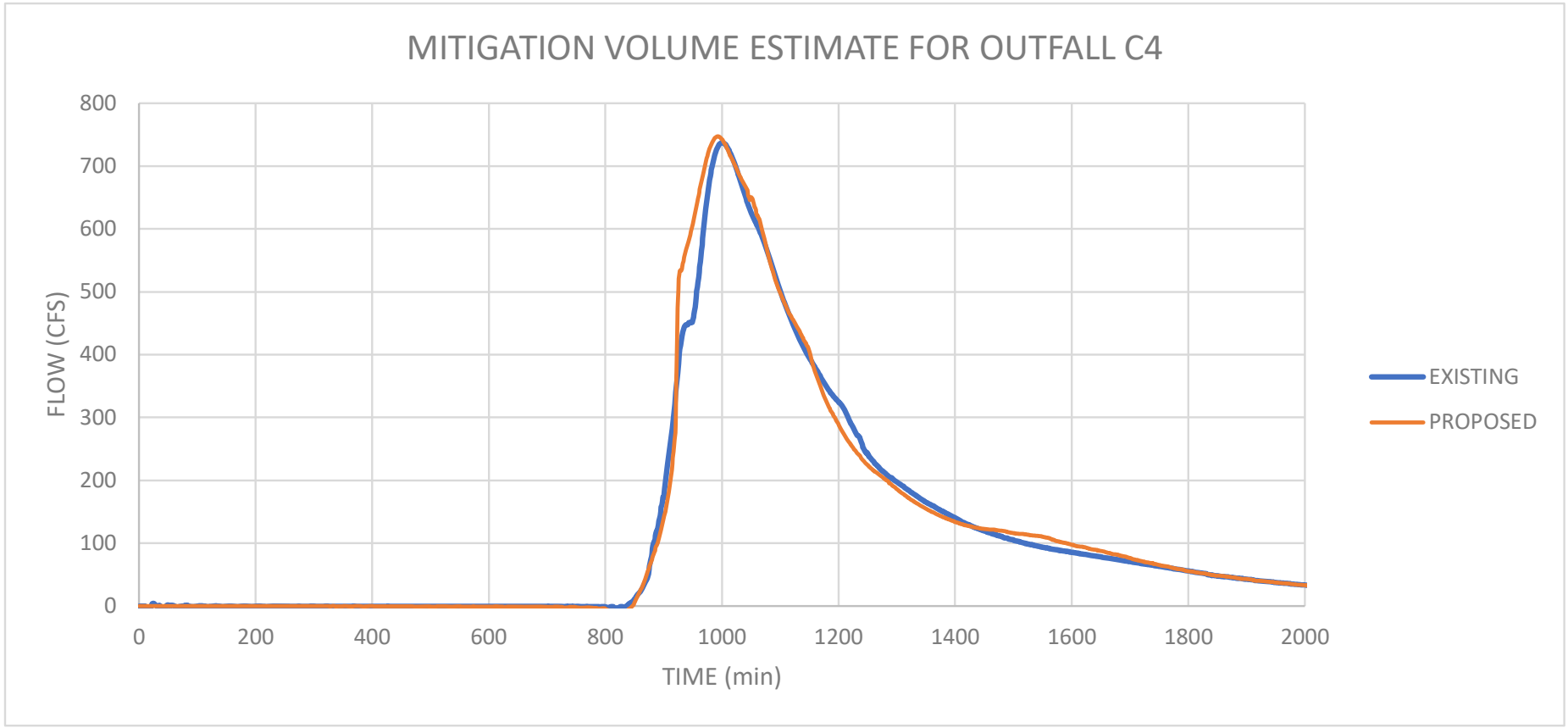
Back to Top

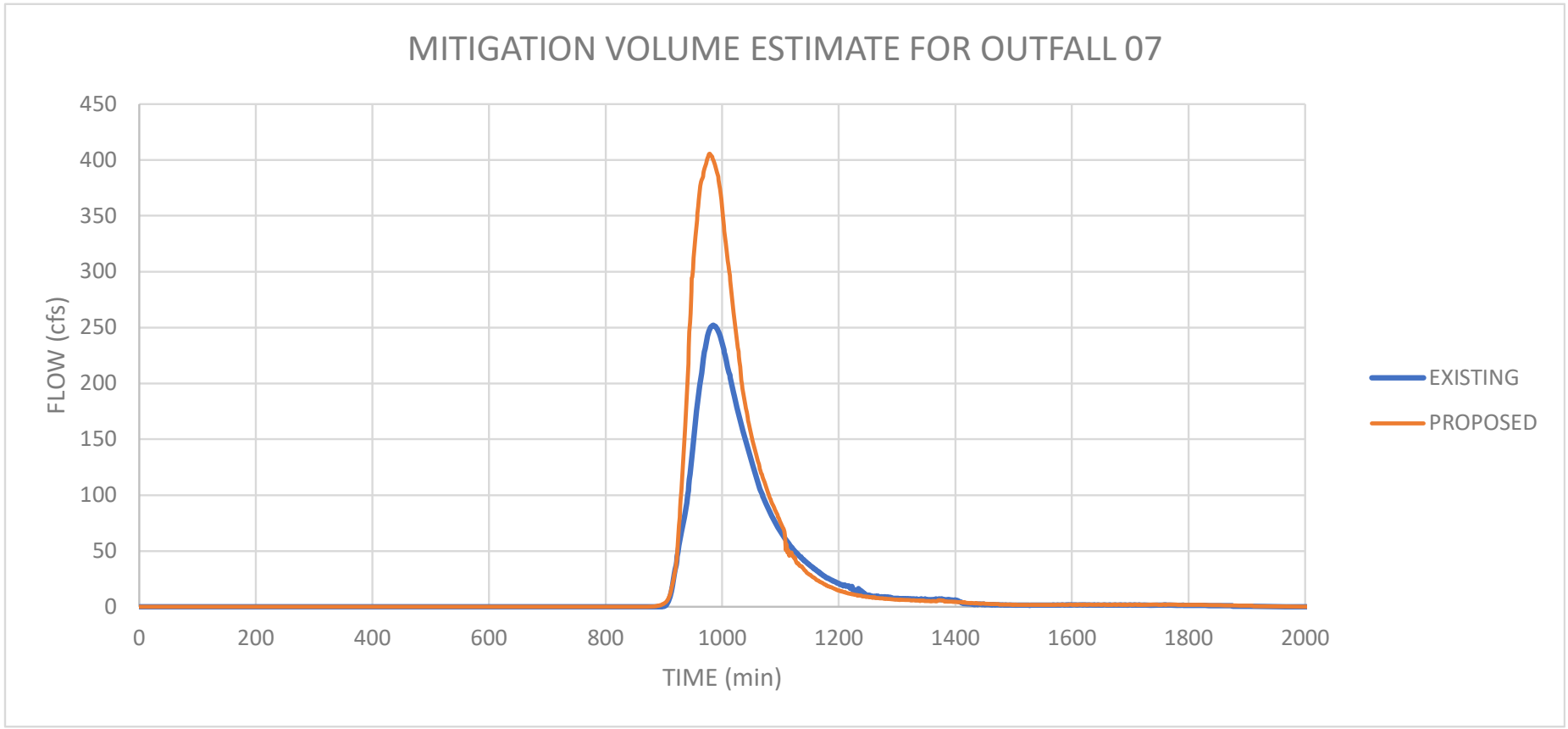
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX E


MITIGATION VOLUME ESTIMATE FOR OUTFALL C5
FLOW (cfs)
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
TIME (min)
EXISTING
PROPOSED


MITIGATION VOLUME ESTIMATE FOR OUTFALL C4
FLOW (CFS)
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
TIME (min)
EXISTING
PROPOSED


MITIGATION VOLUME ESTIMATE FOR OUTFALL 07
FLOW (cfs)
450
400
350
300
250
200
150
100
50
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
TIME (min)
EXISTING
PROPOSED

APPENDIX F

STATION	CUT VOLUME (ft^3)	FILL VOLUME (ft^3)	NET VOLUME (ft^3)
1509+00.00	0.00	0.00	0.00
1511+00.00	0.00	0.00	0.00
1513+00.00	0.00	0.00	0.00
1515+00.00	0.00	0.00	0.00
1517+00.00	0.00	0.00	0.00
1519+00.00	0.00	0.00	0.00
1521+00.00	0.00	0.00	0.00
1523+00.00	0.00	0.00	0.00
1525+00.00	0.00	0.00	0.00
1527+00.00	0.00	0.00	0.00
1529+00.00	0.00	0.00	0.00
1531+00.00	428.20	0.00	-428.20
1533+00.00	4183.10	0.00	-4183.10
1535+00.00	7035.10	698.00	-6337.10
1537+00.00	9451.20	6139.00	-3312.20
1539+00.00	12403.70	33597.50	21193.80
1541+00.00	17513.40	46714.90	29201.50
1543+00.00	19666.30	42354.60	22688.30
1545+00.00	10357.10	69468.50	59111.40
1547+00.00	7447.60	77264.30	69816.70
1549+00.00	11401.90	87647.10	76245.20
1551+00.00	5975.10	90192.90	84217.80
1553+00.00	2017.70	50985.80	48968.10
1555+00.00	14477.20	31632.20	17155.00
1557+00.00	24738.20	30371.40	5633.20
1559+00.00	12348.60	41680.10	29331.50
1561+00.00	2014.40	62540.90	60526.50
1563+00.00	21043.70	57654.00	36610.30
1565+00.00	54517.20	47988.70	-6528.50
1567+00.00	67885.10	42377.30	-25507.80
1569+00.00	57557.30	24241.80	-33315.50
1571+00.00	25040.90	8647.20	-16393.70
1573+00.00	0.00	0.00	0.00

TOTAL (ft^3)	464693.20
TOTAL (ac-ft)	10.67

APPENDIX G

POTENTIAL UTILITY CONFLICTS

CONFLICT ID	UTILITY	CONFLICT DESCRIPTION	EXHIBIT
1-WW	Waste Water Line	Proposed 48" pipe conflicts with existing Waste Water Gravity Main	Sheet 2 of 13
2-WW	Waste Water Line	Proposed 2-10'x6' box conflicts with existing Waste Water Gravity Main	Sheet 2 of 13
3-WW	Waste Water Line	Proposed 2-10'x6' box conflicts with existing Waste Water Gravity Main	Sheet 2 of 13
4-WW	Waste Water Line	Proposed 2-10'x6' box conflicts with existing Waste Water Gravity Main	Sheet 2 of 13
1-W	Water Line	Proposed 48" pipe conflics with existing Water Pump Pressure Main	Sheet 2 of 13
2-W	Water Line	Proposed 6'x3' box conflics with existing Water Pump Pressure Main	Sheet 2 of 13
3-W	Water Line	Proposed 2-10'x6' box conflicts with existing Waste Pump Pressure Main	Sheet 2 of 13
4-W	Water Line	Proposed 6'x3' box conflics with existing Water Pump Pressure Main	Sheet 2 of 13
5-WW	Waste Water Line	Proposed 2-10'x6' box conflicts with existing Waste Water Gravity Main	Sheet 3 of 13
6-WW	Waste Water Line	Proposed 2-10'x6' box conflicts with existing Waste Water Gravity Main	Sheet 3 of 13
7-WW	Waste Water Line	Proposed 36" pipe conflicts with existing Waste Water Gravity Main	Sheet 3 of 13
5-W	Water Line	Proposed 2-10'x6' box conflicts with existing Waste Pump Pressure Main	Sheet 3 of 13
6-W	Water Line	Proposed 2-10'x6' box conflicts with existing Waste Pump Pressure Main	Sheet 3 of 13
7-W	Water Line	Proposed 2-10'x6' box conflicts with existing Waste Pump Pressure Main	Sheet 3 of 13
8-W	Water Line	Proposed 2-10'x6' box conflicts with existing Waste Pump Pressure Main	Sheet 3 of 13
74-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 3 of 13
8-WW	Waste Water Line	Proposed 5'x4' box conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
9-WW	Waste Water Line	Proposed 5'x4' box conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
10-WW	Waste Water Line	Proposed 48" pipe conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
11-WW	Waste Water Line	Proposed 24" pipe conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
12-WW	Waste Water Line	Proposed 24" pipe conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
13-WW	Waste Water Line	Proposed 5'x4' box conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
14-WW	Waste Water Line	Proposed 24" pipe conflicts with existing Waste Water Gravity Main	Sheet 4 of 13
9-W	Water Line	Proposed 6'x4' box conflics with existing Water Pump Pressure Main	Sheet 4 of 13
10-W	Water Line	Proposed 5'x4' box conflics with existing Water Pump Pressure Main	Sheet 4 of 13
11-W	Water Line	Proposed 48" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
12-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
13-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
14-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
15-W	Water Line	Proposed 24" pipe conflics with existing Water Casing	Sheet 4 of 13
16-W	Water Line	Proposed 5'x4' box conflics with existing Water Pump Pressure Main	Sheet 4 of 13
17-W	Water Line	Proposed 5'x4' box conflics with existing Water Pump Pressure Main	Sheet 4 of 13
18-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
19-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
20-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
21-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 4 of 13
15-WW	Waste Water Line	Proposed 24" pipe conflicts with existing Waste Water Gravity Main	Sheet 5 of 13
22-W	Water Line	Proposed 10'x8' box conflicts with existing Water Pump Pressure Main	Sheet 5 of 13
23-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 5 of 13
24-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 5 of 13
25-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 5 of 13
26-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 5 of 13
27-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 5 of 13
16-WW	Waste Water Line	Proposed 10'x8' box conflicts with existing Waste Water Gravity Main	Sheet 6 of 13
28-W	Water Line	Proposed 10'x8' box conflicts with existing Water Pump Pressure Main	Sheet 6 of 13
29-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 6 of 13
30-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 6 of 13
31-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 6 of 13
32-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 6 of 13
17-WW	Waste Water Line	Proposed 5'x3' box conflicts with existing Waste Water Gravity Main	Sheet 7 of 13
33-W	Water Line	Proposed 10'x8' box conflicts with existing Water Pump Pressure Main	Sheet 7 of 13
34-W	Water Line	Proposed 24" pipe conflics with existing Water Lateral Service	Sheet 7 of 13
35-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 7 of 13
36-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 7 of 13
37-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 7 of 13
38-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 7 of 13
39-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 7 of 13
40-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 7 of 13
41-W	Water Line	Proposed 6'x5' box conflicts with existing Water Casing	Sheet 7 of 13
42-W	Water Line	Proposed 6'x5' box conflicts with existing Water Pump Pressure Main	Sheet 7 of 13

18-WW	Waste Water Line	Proposed 60" pipe conflicts with existing Waste Water Gravity Main	Sheet 8 of 13
43-W	Water Line	Proposed 60" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
44-W	Water Line	Proposed 60" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
45-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
46-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
47-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
48-W	Water Line	Proposed 36" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
49-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 8 of 13
50-W	Water Line	Proposed 54" pipe conflicts with existing Waste Water Gravity Main	Sheet 9 of 13
51-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 9 of 13
52-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 9 of 13
53-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 9 of 13
54-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 9 of 13
55-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 9 of 13
19-WW	Waste Water Line	Proposed 36" pipe conflicts with existing Waste Water Gravity Main	Sheet 10 of 13
20-WW	Waste Water Line	Proposed 30" pipe conflicts with existing Waste Water Gravity Main	Sheet 10 of 13
56-W	Water Line	Proposed 36" pipe conflics with existing Water Pump Pressure Main	Sheet 10 of 13
57-W	Water Line	Proposed 30" pipe conflics with existing Water Pump Pressure Main	Sheet 10 of 13
58-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 10 of 13
59-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 10 of 13
60-W	Water Line	Proposed 3'x3' box conflicts with existing Water Pump Pressure Main	Sheet 10 of 13
61-W	Water Line	Proposed 30" pipe conflics with existing Water Pump Pressure Main	Sheet 10 of 13
21-WW	Waste Water Line	Proposed 30" pipe conflicts with existing Waste Water Gravity Main	Sheet 11 of 13
22-WW	Waste Water Line	Proposed 2-6'x4' box conflicts with existing Waste Water Gravity Main	Sheet 11 of 13
23-WW	Waste Water Line	Proposed 24" pipe conflicts with existing Waste Water Gravity Main	Sheet 11 of 13
24-WW	Waste Water Line	Proposed 30" pipe conflicts with existing Waste Water Gravity Main	Sheet 11 of 13
25-WW	Waste Water Line	Proposed 36" pipe conflicts with existing Waste Water Gravity Main	Sheet 11 of 13
62-W	Water Line	Proposed 30" pipe conflics with existing Water Pump Pressure Main	Sheet 11 of 13
63-W	Water Line	Proposed 2-6'x4' box conflicts with existing Water Pump Pressure Main	Sheet 11 of 13
64-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 11 of 13
65-W	Water Line	Proposed 30" pipe conflics with existing Water Pump Pressure Main	Sheet 11 of 13
66-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 11 of 13
67-W	Water Line	Proposed 2-6'x4' box conflicts with existing Water Pump Pressure Main	Sheet 11 of 13
68-W	Water Line	Proposed 5'x3' box conflicts with existing Water Pump Pressure Main	Sheet 11 of 13
69-W	Water Line	Proposed 24" pipe conflics with existing Water Pump Pressure Main	Sheet 11 of 13
70-W	Water Line	Proposed 36" pipe conflics with existing Water Pump Pressure Main	Sheet 11 of 13
71-W	Water Line	Proposed 2-5'x2' box conflicts with existing Water Pump Pressure Main	Sheet 12 of 13
72-W	Water Line	Proposed 2-5'x2' box conflicts with existing Water Pump Pressure Main	Sheet 12 of 13
73-W	Water Line	Proposed 2-5'x2' box conflicts with existing Water Pump Pressure Main	Sheet 12 of 13

APPENDIX H

NHHIP SEGMENT 1 (CSJ: 0500-03-446) - PRELIMINARY DRAINAGE ESTIMATE
FROM NORTH OF TIDWELL ROAD TO SOUTH OF SHEPHERD DRIVE

ITEM NO	DESCRIPTION	UNITS	QUANTITY	UNIT COST	COST
	SWPPP	LS	3	$20,000.00	$60,000.00
	REMOVE AND DISPOSE OF EXISTING STM SWR	LF	25706	$10.00	$257,060.00
	REMOVE OLD STR, INLETS AND MANHOLES	EA	159	$300.00	$47,700.00
110 6003	EXCAVATION (SPECIAL)	CY	261480	$6.94	$1,814,671.20
400 6005	CEM STABIL BKFL	CY	36,980	$37.53	$1,387,859.40
402 6001	TRENCH EXCAVATION PROTECTION	LF	26,502	$1.63	$43,198.26
432 6002	RIPRAP(CONC)(5 IN)	CY	437	$392.75	$171,631.75
462 6001	CONC BOX CULV (3 FT X 2 FT)	LF	71	$153.74	$10,915.54
462 6002	CONC BOX CULV (3 FT X 3 FT)	LF	45	$200.33	$9,014.85
462 6003	CONC BOX CULV (4 FT X 2 FT)	LF	307	$166.30	$51,054.10
462 6004	CONC BOX CULV (4 FT X 3 FT)	LF	43	$224.49	$9,653.07
462 6005	CONC BOX CULV (4 FT X 4 FT)	LF	188	$254.98	$47,936.24
462 6006	CONC BOX CULV (5 FT X 2 FT)	LF	2,116	$249.09	$527,074.44
462 6007	CONC BOX CULV (5 FT X 3 FT)	LF	1,383	$282.42	$390,586.86
462 6008	CONC BOX CULV (5 FT X 4 FT)	LF	1,332	$324.20	$431,834.40
462 6009	CONC BOX CULV (5 FT X 5 FT)	LF	484	$333.36	$161,346.24
462 6010	CONC BOX CULV (6 FT X 3 FT)	LF	421	$346.55	$145,897.55
462 6011	CONC BOX CULV (6 FT X 4 FT)	LF	1,872	$429.47	$803,967.84
462 6012	CONC BOX CULV (6 FT X 5 FT)	LF	566	$452.53	$256,131.98
462 6014	CONC BOX CULV (7 FT X 3 FT)	LF	537	$348.24	$187,004.88
462 6015	CONC BOX CULV (7 FT X 4 FT)	LF	634	$486.50	$308,441.00
462 6016	CONC BOX CULV (7 FT X 5 FT)	LF	321	$557.35	$178,909.35
462 6030	CONC BOX CULV (8 FT X 5 FT)	LF	493	$561.76	$276,947.68
462 6030	CONC BOX CULV (10 FT X 5 FT)	LF	102	$647.04	$65,998.08
462 6032	CONC BOX CULV (10 FT X 8 FT)	LF	1,641	$856.44	$1,405,418.04
462 6032	CONC BOX CULV (11 FT X 6 FT)	LF	4,042	$880.70	$3,559,789.40
464 6005	RC PIPE (CL III) (24 IN)	LF	20,049	$70.22	$1,407,840.78
464 6007	RC PIPE (CL III) (30 IN)	LF	2,728	$84.30	$229,970.40
464 6008	RC PIPE (CL III) (36 IN)	LF	2,338	$100.22	$234,314.36
464 6009	RC PIPE (CL III) (42 IN)	LF	1,048	$112.99	$118,413.52
464 6010	RC PIPE (CL III) (48 IN)	LF	1,662	$150.30	$249,798.60
464 6011	RC PIPE (CL III) (54 IN)	LF	1,850	$186.83	$345,635.50
464 6012	RC PIPE (CL III) (60 IN)	LF	572	$212.57	$121,590.04
465 6166	INLET (COMPL) (TY AAD)	EA	25	$7,459.72	$186,493.00
465 6167	INLET (COMPL) (TY AD)	EA	18	$4,628.72	$83,316.96
465 6168	INLET (COMPL) (TY A)	EA	25	$3,624.43	$90,610.75
465 6172	INLET (COMPL) (TY AZR2G)	EA	131	$10,325.26	$1,352,609.06
465 6173	MANH (COMPL)(TY A)	EA	72	$6,749.09	$485,934.48
465 6175	INLET (COMPL) (CURB) (TY C)	EA	111	$3,719.53	$412,867.83
465 6259	INLET (COMPL)(EXT TY C)	EA	111	$883.95	$98,118.45
466 6200	WINGWALL (SW-0) (HW=12 FT)	EA	1	$33,100.00	$33,100.00
466 6210	WINGWALL (SW-0) (HW=7 FT)	EA	4	$9,933.33	$39,733.32
466 6211	WINGWALL (SW-0) (HW=8 FT)	EA	1	$20,435.00	$20,435.00
467 6178	SET (TY I)(S= 5 FT)(HW= 4 FT)(4:1) (P)	EA	4	$9,000.00	$36,000.00
467 6391	SET (TY II)(24 IN((RCP)(4:1)(P)	EA	34	$1,506.43	$51,218.62
467 6420	SET (TY II)(30 IN((RCP)(4:1)(P)	EA	20	$2,578.38	$51,567.60

PRELIMINARY DRAINAGE ESTIMATE - SUBTOTAL		$18,259,610.42
CONTINGENCY	20.00%	$3,651,922.08
PRELIMINARY DRAINAGE ESTIMATE - TOTAL		$21,911,532.50

APPENDIX I

NORTH HOUSTON HIGHWAY IMPROVEMENT PROJECT – PRELIMINARY DRAINAGE STUDY (USB ONLY)