APPENDIX C: DRAINAGE ANALYSIS

TEXAS DEPARTMENT OF TRANSPORTATION

Hydrology & Hydraulics Findings
Draft Report

Highway: SH 34
County: Hunt
From: IH 30 to CR 2312
CSJ: 0173-07-054, 0173-06-042

Texas Department of Transportation – Paris District Office
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SH 34 SCHEMATICS

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1.0 INTRODUCTION

1.1 Project Location

The Texas Department of Transportation (TxDOT), Paris District is proposing to reconstruct State Highway (SH) 34 within Hunt County, TX. The study area includes approximately 20 mile of SH 34 from Interstate Highway (IH) 30 (north) to County Road (CR) 2312 (south) in Hunt County, Texas. See **Exhibit 1** for Vicinity Map and **Exhibit 2** for the Project Location Map.

1.2 Project Scope

SH 34 currently has varied lane configurations, approximately 9.50 miles of the project is a two-lane road; approximately 6.80 miles is three-lane road; approximately 2.50 miles is four-lane road and 0.20 mile is a five-lane road. In recent times, there has been significant increase in vehicular traffic and heavy vehicles in Quinlan, Greenville and surrounding areas in Hunt County. Hence TxDOT is planning to reconstruct SH 34. The proposed roadway improvements consists of widening the existing pavement to four-lane road with a center turn lane.

The scope of the work is to establish a hydraulic model based on the existing drainage system and demonstrate that the proposed drainage improvements will effectively convey flow to the project outfalls. Additionally, the intent of the study is to demonstrate that the proposed drainage improvements will not have any impact on the receiving system relative to existing conditions.

The scope for the drainage study includes: (1) Existing Hydrology: perform hydrologic analysis of existing drainage system (2) Existing Hydraulics: Evaluate existing drainage system under existing conditions, (3) Proposed Improvements: Evaluate and recommend necessary drainage improvements for the proposed roadway improvements and (4) Impact and Mitigation analysis: Identify the increase in flow due to proposed roadway improvements and determine the mitigation measures to offset any impacts.

This following design and analysis steps were considered to evaluate the existing drainage system and design the proposed drainage system:

- Determine the existing drainage boundaries based on available information.
- Perform a preliminary hydrologic and hydraulic analysis of the existing drainage system to understand and identify any existing drainage challenges.
- Perform a preliminary hydrologic and hydraulic analysis for the improvements. Size the proposed drainage system to convey the proposed flow.
- Identify the impacts and provide necessary mitigation measures to offset any impacts on the receiving system.
- Limit the discharge at outfalls to existing condition flows.

1.3 Drainage Overview

The proposed project is located in Hunt County, Texas. Hunt County is located far northeast corner of Texas. The county covers approximately 882 square miles. The annual average rainfall is approximately 44 inches.

The proposed project lies with in Caddo Creek, Lake Tawakoni, and Royse City-South Fork Sabine River watersheds. The general topography of the project varies from approximately 1% to 4% overland slopes. Land use is mainly undeveloped with some commercial and residential properties concentrated at major street and highway crossings.

The project area is predominantly served by open-ditch system on both sides. Runoff from the overland areas is routed through roadside ditches and outfall into Mustang branch, Farber Creek, East Caddo Creek, Caddo Creek, Jones Creek, and South Fork Sabin River.

1.4 Data Collection

Data to perform the drainage study was obtained from various sources including the TxDOT, Federal Emergency Management Agency (FEMA), field investigation, LiDAR, aerial imagery and Texas Parks and Wildlife (TPWD). TxDOT provided record drawings of SH 34 culvert crossings from IH 30 to FM 2101 (approximately 10 miles). There is no topographic survey conducted for the project.

1.5 FEMA Effective Floodplain

The project is located on Flood Insurance Rate Map (FIRM) Panels 48231C0380G (January 6, 2012), 48231C0400G (January 6, 2012), 48231C0525G (January 6, 2012), 48231C0500G (January 6, 2012), 48231C0625G (January 6, 2012), Hunt county; 48231C0100D (July 3, 2012) Kaufman county. Majority of the roadway section is in Zone X (Areas determined to be outside the 0.2% annual chance floodplain), areas to the east of SH34 is in Zone A (Inside 1% annual chance flood, No Base Flood Elevations determined), and the section of the roadway where it crosses Caddo Creek, Jones Creek, South Fork Sabin River are in Zone AE (Inside 1% annual chance flood, Base Flood Elevations determined). See **Exhibit 3** Floodplain Maps along the project.

1.6 Project Datum

The project datum for the proposed roadway improvements is referenced to the North American Vertical Datum of 1988 (NAVD 88). Some of the record drawings were referenced to National Geodetic Vertical Datum of 1929 (NGVD 29). All the data has been adjusted to NAVD88.

2.0 METHODOLOGY

2.1 General Approach

This drainage analysis was performed in accordance with TxDOT criteria found in *Hydraulic Design Manual. Texas Department of Transportation, Revised July 2016 (HDM).* The following analysis steps were considered to evaluate the existing drainage system and design of the proposed drainage system:

- Define the existing drainage system
- Define drainage area boundaries and sub-basins for the each drainage system
- Establish hydrologic parameters
- Calculate Time of Concentration using NRCS TR-55 method
- Compute peak flows
- Evaluate existing drainage system
- Design proposed drainage system

2.2 Hydrology Computations

The Rational Method was used to compute the peak flows for each sub-basin as the project has relatively smaller drainage areas (less than 200 acres), which are unaffected by complex hydrologic features. The Rational Method parameters include the drainage area, the runoff coefficient (C), time of concentration, and rainfall intensity. Peak flows were computed for multiple frequencies including 2, 5, 10, 25, 50, and 100-year rainfall events.

$$Q = CiA$$

Where:
Q = computed peak runoff discharge (cfs)
C = runoff coefficient
i = rainfall intensity (in/hr)
A = drainage area (ac)
T_c = time of concentration (min)

Runoff Coefficient (C) for the contributing drainage areas is based on the current land use. The impervious area within the right-of-way was measured from the topographic survey. The offsite contributing drainage areas impervious area was determined based on aerial imagery and field observations.

Rainfall intensity was derived from the method published by TxDOT as follows:

$$i = \frac{b}{(d+Tc)^e}$$

Where:
i = rainfall intensity (in/hr)
T_c = time of concentration (min)
e, b, d = intensity coefficients

e, b, d coefficients for Hunt County are listed in **Table 2-1.**

Table 2-1. e, b, d Coefficients for Hunt County

Coefficient	50% 2-year	20% 5-year	10% 10-year	4% 25-year	2% 50-year	1% 100-year
e	0.8069	0.7973	0.7862	0.7798	0.7756	0.7735
b	54.58	63.15	71.43	80.72	91.28	102.96
d	10.04	9.2	8.63	8.22	8.35	8.53

Time of Concentrations (Tc) were determined based on the NRCS Method. Flow segments were divided into three groups: overland flow, shallow concentrated flow, and concentrated flow. Travel time for each flows' segments were computed based on the topography and summed to obtain the total time of concentration for each drainage area. A minimum of 10-minutes time of concentration was considered for smaller drainage areas.

Since the Rational Method does not produce hydrographs or runoff volume, the hydrographs for this project were developed using the Small Watershed Hydrograph Method (Malcolm Method). This method utilizes a pattern hydrograph to obtain a curvilinear design hydrograph which peaks at the Rational Method calculated flows and which contains a runoff volume consistent with the design rainfall. The pattern hydrograph is a step function approximation to the dimensionless hydrograph proposed by the Natural Resources Conservation Service (NRCS). The Small Watershed Hydrograph Method consists of the following equations:

$$T_p = \frac{V}{1.39Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \leq 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

Where:
Q_p = Peak discharge from site runoff curves (cfs)
T_p = time to Q_p (s)
V = total volume of runoff for the design storm (cfs)
t_i, q_i = respective time and discharges which determine the shape of the hydrograph

The total runoff volume were computed using excess rainfall based on percent impervious ground cover. The excess rainfall was determined using the USDA-SCS Curve Number Method (CN), as described below:

$$P_e = \frac{(P - I_a)^2}{(P - I_a) + S}$$

$$I_a = 0.2S \; and \; S = \frac{1000}{CN} - 10$$

Where:
P_e = the excess rainfall

I_a = initial abstraction (in)
S = potential maximum retention (in)
P = total 24 hour rainfall depth (in)
CN = curve number, which depends upon soil type and land use

CN value is determined from following **Table 2.2** . The watershed predominantly falls under soil type "D ". There are also some areas which fall under soil type "B" and "C", however the areas are very small and were not considered for runoff calculations. Only soil type "D" is considered for analysis purpose.

Table 2-2 CN Value Estimation (USGS Soil Type Map)

NLCD_2011	Area A (Ac.)	CN-A	Area B (Ac.)	CN-B	Area C (Ac.)	CN-C	Area D (Ac.)	CN-D
Barren Land		77		86		91	1.77	94
Cultivated Crops		67		78		85	169.50	89
Deciduous Forest		30		30		41	181.87	48
Developed, Low Intensity		54		70		80	276.73	85
Developed, Medium Intensity		77		85		90	142.73	92
Developed, High Intensity		89		92		94	85.68	95
Developed, Open Space		39		61		74	514.74	80
Evergreen Forest		30		55		70	3.15	77
Hay/Pasture		81		58		71	574.07	78
Herbaceuous		49		69		79	358.91	84
Mixed Forest		36		60		73	16.02	79
Open Water		100		100		100	2.00	100
Shrub/Scrub		35		56		70	36.59	77
Woody Wetlands		100		100		100	58.58	100
Total	0	0	0	0	0	0	2422.34	81
Average								81
Adjustment Factor								0
Final Value								**81**

2.3 Hydraulic Approach

A hydraulic analysis was performed to evaluate the performance of the existing ditches and cross-drainage culverts, and to design the proposed drainage system. The XP-SWMM (Version 2018) dynamic computer program was used as the primary hydraulic modeling tool to perform the analysis. The XP-SWMM model was selected based on its ability to incorporate all the components of the drainage system. The XP-SWMM model allows modeling of ponding, storage, and flow in open ditches, culverts, and storm sewers. This model can readily determine impacts

of the changed hydrological conditions and to assist in mitigation design. The XP-SWMM model uses a series of nodes and links to represent the physical characteristics of a drainage system. Each contributing area was modeled as a node with a hydrograph inserted from the Small Watershed Hydrograph method.

3.0 EXISTING HYDROLOGIC AND HYDRAULIC ANALYSIS

A hydrologic analysis was performed to determine the peak flows for each of the drainage areas contributing to individual outfall for 2, 5, 10, 25, 50, and 100-year rainfall events using Rational Method. This section presents drainage areas delineation, hydrologic parameters used and peak flow calculations.

With computed peak flows, hydraulic analysis was performed using the XP-SWMM model to evaluate the performance of the existing drainage system, to determine the deficiencies, to design the proposed system, and to establish a base condition model for impact analysis.

3.1 Drainage Area Delineation

The contributing drainage areas to the SH 34 corridor were delineated using ArcHydro tools within ArcGIS in conjunction with the US Geological Survey (USGS) Digital Elevation Models (DEM-30 M) dataset and aerial photography.

Overland flow areas and overland flow routes were developed from the DEM dataset and aerial imagery. The overland flow analysis focused on identifying and confirming drainage areas outside the right-of-way (ROW) that will flow into the ROW drainage system. The drainage boundaries from the overland flow analysis were considered while delineating the sub drainage areas.

The proposed project lies within three (3) different watersheds: Caddo Creek, Lake Tawakoni, and Royse City-South Fork Sabine River watersheds. The project has 55 individual drainage systems (System A to BBB). Each drainage system has multiple sub-drainage areas as shown in **Table 3-1**.

A total of 204 drainage sub areas (from A to BBB) were delineated along the SH34 in the project area. A total of 49 drainage systems were identified including 49 crossing culverts as outfall.

The Overall Drainage Area Map is shown in **Exhibit 6.** Existing Drainage Area Maps for each watershed are shown in **Exhibit 7**.

Table 3-1. Existing Drainage Systems and Associated Sub-Basins

Drainage System	Sub Areas
System A	A1, A2, A3, A4
System B	B1, B2, B3, B4
System C	C1, C2, C3, C4
System D	D1, D2, D3, D4
System E	E1, E2, E3, E4
System F	F1, F2, F3, F4
System G	G1, G2, G3, G4
System H	H1, H2, H3, H4
System I	I1, I2, I3, I4
System J	J1, J2, J3, J4

Drainage System	Sub Areas
System K	K1, K2, K3, K4
System L	L1, L2, L3, L4
System M	M1, M2, M3, M4
System N	N1, N2
System O	O1, O2, O3, O4
System P	P1, P2, P3, P4
System Q	Q1, Q2, Q3, Q4
System R	R1, R2
System S	S1, S2, S3, S4
System T	T1, T2, T3, T4
System U	U1, U2, U3, U4
System V	V1, V2, V3, V4
System W	W1, W2, W3, W4
System X	X1, X2, X3, X4
System Y	Y1, Y2, Y3, Y4
System Z	Z1, Z2, Z3, Z4
System AA	AA1, AA2, AA3, AA4
System BB	BB1, BB2, BB3, BB4
System CC	CC1, CC2, CC3, CC4
System DD	DD1, DD2, DD3, DD4
System EE	EE1, EE2, EE3, EE4
System FF	FF1, FF2, FF3, FF4
System GG	GG1, GG2, GG3, GG4
System HH	HH1, HH2, HH3, HH4
System II	II1, II2, II3, II4
System JJ	JJ1, JJ2, JJ3, JJ4
System KK	KK1, KK2
System LL	LL1, LL2, LL3, LL4
System MM	MM1, MM2
System NN	NN1, NN2, NN3, NN4
System OO	OO1, OO2, OO3, OO4
System PP	PP1, PP2, PP3, PP4
System QQ	QQ1, QQ2, QQ3, QQ4
System RR	RR1, RR2, RR3, RR4
System SS	SS1, SS2, SS3, SS4
System TT	TT1, TT2, TT3, TT4
System UU	UU1, UU2, UU3, UU4
System WW	WW1, WW2, WW3, WW4
System XX	XX1, XX2, XX3, XX4

Drainage System	Sub Areas
System YY	YY1, YY2, YY3, YY4
System ZZ	ZZ1, ZZ2, ZZ3, ZZ4
System AAA	AAA1, AAA2, AAA3, AAA4
System BBB	BBB1, BBB2, BBB3, BBB4

3.2 Existing Culverts

The project area is predominantly served by an open-ditch system on both sides of SH 34. Runoff from the overland areas is collected by sheet flow into the roadside ditches and eventually outfalls into Caddo Creek, Lake Tawakoni, and Royse City-South Fork Sabine River as shown in **Exhibit 7**. **Table 3-2** shows the existing ditch geometry within each individual drainage system. **Table 3-3** shows the size, length and type of cross culvert for each individual drainage system.

Table 3-2. Existing Ditch Information

Drainage System	Ditch Shape	Depth (feet)	Top Width (feet)
System A	Triangular/Trapezoidal	~1.5-3	~15-20
System B	Triangular/Trapezoidal	~1.5-3	~15-20
System C	Triangular/Trapezoidal	~1.5-3	~15-20
System D	Triangular/Trapezoidal	~1.5-3	~15-20
System E	Triangular/Trapezoidal	~1.5-3	~15-20
System F	Triangular/Trapezoidal	~1.5-3	~15-20
System G	Triangular/Trapezoidal	~1.5-3	~15-20
System H	Triangular/Trapezoidal	~1.5-3	~15-20
System I	Triangular/Trapezoidal	~1.5-3	~15-20
System J	Triangular/Trapezoidal	~1.5-3	~15-20
System K	Triangular/Trapezoidal	~1.5-3	~15-20
System L	Triangular/Trapezoidal	~1.5-3	~15-20
System M	Triangular/Trapezoidal	~1.5-3	~15-20
System N	Triangular/Trapezoidal	~1.5-3	~15-20
System O	Triangular/Trapezoidal	~1.5-3	~15-20
System P	Triangular/Trapezoidal	~1.5-3	~15-20
System Q	Triangular/Trapezoidal	~1.5-3	~15-20
System R	Triangular/Trapezoidal	~1.5-3	~15-20
System S	Triangular/Trapezoidal	~1.5-3	~15-20
System T	Triangular/Trapezoidal	~1.5-3	~15-20
System U	Triangular/Trapezoidal	~1.5-3	~15-20
System V	Triangular/Trapezoidal	~1.5-3	~15-20
System W	Triangular/Trapezoidal	~1.5-3	~15-20
System X	Triangular/Trapezoidal	~1.5-3	~15-20
System Y	Triangular/Trapezoidal	~1.5-3	~15-20
System Z	Triangular/Trapezoidal	~1.5-3	~15-20

Drainage System	Ditch Shape	Depth (feet)	Top Width (feet)
System AA	Triangular/Trapezoidal	~1.5-3	~15-20
System BB	Triangular/Trapezoidal	~1.5-3	~15-20
System CC	Triangular/Trapezoidal	~1.5-3	~15-20
System DD	Triangular/Trapezoidal	~1.5-3	~15-20
System EE	Triangular/Trapezoidal	~1.5-3	~15-20
System FF	Triangular/Trapezoidal	~1.5-3	~15-20
System GG	Triangular/Trapezoidal	~1.5-3	~15-20
System HH	Triangular/Trapezoidal	~1.5-3	~15-20
System II	Triangular/Trapezoidal	~1.5-3	~15-20
System JJ	Triangular/Trapezoidal	~1.5-3	~15-20
System KK	Triangular/Trapezoidal	~1.5-3	~15-20
System LL	Triangular/Trapezoidal	~1.5-3	~15-20
System MM	Triangular/Trapezoidal	~1.5-3	~15-20
System NN	Triangular/Trapezoidal	~1.5-3	~15-20
System OO	Triangular/Trapezoidal	~1.5-3	~15-20
System PP	Triangular/Trapezoidal	~1.5-3	~15-20
System QQ	Triangular/Trapezoidal	~1.5-3	~15-20
System RR	Triangular/Trapezoidal	~1.5-3	~15-20
System SS	Triangular/Trapezoidal	~1.5-3	~15-20
System TT	Triangular/Trapezoidal	~1.5-3	~15-20
System UU	Triangular/Trapezoidal	~1.5-3	~15-20
System WW	Triangular/Trapezoidal	~1.5-3	~15-20
System XX	Triangular/Trapezoidal	~1.5-3	~15-20
System YY	Triangular/Trapezoidal	~1.5-3	~15-20
System ZZ	Triangular/Trapezoidal	~1.5-3	~15-20
System AAA	Triangular/Trapezoidal	~1.5-3	~15-20
System BBB	Triangular/Trapezoidal	~1.5-3	~15-20

Table 3-3. Existing Outfall Information

Outfall Name	Culvert Size	Bridge Size	Source of Information	Outfall Creek Name	Bridge Class Culvert (Yes or No)
A-OUTFALL	-	40' x 5'	Aerial Imagery	Mustang Branch	-
B-OUTFALL	-	27' x 3'	Aerial Imagery	Mustang Branch	-
C-OUTFALL	3' x 3'	-	Aerial Imagery		N
D-OUTFALL	24" Pipe	-	Record Drawings		N
E-OUTFALL	5' x 2'	-	Record Drawings		N
F-OUTFALL	6' x 3'	-	Record Drawings		N
G-OUTFALL	4' x 3'	-	Record Drawings		N
H-OUTFALL	6' x 3'	-	Record Drawings		N

Outfall Name	Culvert Size	Bridge Size	Source of Information	Outfall Creek Name	Bridge Class Culvert (Yes or No)
I-OUTFALL	4' x 3'	-	Record Drawings		N
J-OUTFALL	24" Pipe	-	Record Drawings		N
K-OUTFALL	3' x 3'	-	Record Drawings		N
L-OUTFALL	6' x 3'	-	Record Drawings		N
M-OUTFALL	24" Pipe	-	Record Drawings		N
O-OUTFALL	2-30" Pipes	-	Record Drawings		N
P-OUTFALL	3' x 2'	-	Record Drawings		N
Q-OUTFALL	4' x 2'	-	Record Drawings		N
S-OUTFALL	5' x 2'	-	Record Drawings		N
T-OUTFALL	24" Pipe	-	Record Drawings		N
U-OUTFALL	3' x 2'	-	Record Drawings		N
V-OUTFALL	5' x 2'	-	Record Drawings		N
W-OUTFALL	6' x 3'	-	Record Drawings		N
X-OUTFALL	6' x 3'	-	Record Drawings		N
Y-OUTFALL	4' x 3'	-	Record Drawings		N
Z-OUTFALL	5' x 2'	-	Record Drawings		N
AA-OUTFALL	10' x 5'	-	Record Drawings		N
BB-OUTFALL	36" Pipe	-	Record Drawings		N
CC-OUTFALL	4' x 3'	-	Aerial Imagery		N
DD-OUTFALL	3-10' x 6'	-	Aerial Imagery		Y
EE-OUTFALL	4' x 3'	-	Aerial Imagery		N
FF-OUTFALL	-	6' x 3'	Aerial Imagery	Caddo Creek	-
GG-OUTFALL	-	6' x 3'	Aerial Imagery	Caddo Creek	-
HH-OUTFALL	-	6' x 3'	Aerial Imagery	Caddo Creek	-
II-OUTFALL	-	6' x 3'	Aerial Imagery	Caddo Creek	-
JJ-OUTFALL	2-6'x3'	-	Aerial Imagery		N
LL-OUTFALL	3-6' x 3'	-	Aerial Imagery		Y
NN-OUTFALL	3-5' x 3'	-	Aerial Imagery		N
OO-OUTFALL	6' x 3'	-	Aerial Imagery		N
PP-OUTFALL	6' x 3'	-	Aerial Imagery		N
QQ-OUTFALL	6' x 3'	-	Aerial Imagery		N
RR-OUTFALL	-	6' x 3'	Aerial Imagery	Jones Creek	N
SS-OUTFALL	-	6' x 3'	Aerial Imagery	Jones Creek	N
TT-OUTFALL	-	12' x 3'	Aerial Imagery	S. Fork Sabin River	N
UU-OUTFALL	-	6' x 3'	Aerial Imagery		N
WW-OUTFALL	-	6' x 3'	Aerial Imagery		N
XX-OUTFALL	6' x 3'	-	Aerial Imagery		N
YY-OUTFALL	9' x 3'	-	Aerial Imagery		N
ZZ-OUTFALL	3' x 3'	-	Aerial Imagery		N
AAA-OUTFALL	3-5' x 3'	-	Aerial Imagery		N
BBB-OUTFALL	6' x 3'	-	Aerial Imagery		N

3.3 Land Use

The land use of the contributing drainage areas is a mixture of undeveloped, residential and commercial. The land use for each drainage area was determined based on aerial imagery. The TxDOT Hydraulic Design Manual provides standard values of runoff coefficient (C). The Land Use values adopted for this study are listed in **Table 3-4**.

Table 3-4. Land Use Classification

	Grass	Residentia l - 1/2ac	Residential - 1/4ac	Industrial	Commercial	Paved
Runoff Coeff. (C)	0.35	0.40	0.50	0.55	0.65	0.90

3.4 Existing Peak Flow Computations

Peak flows were computed using Rational Method for multiple rainfall frequencies including 2, 5 10, 25, 50, and 100-year rainfall events. The hydrographs for each drainage areas' peak flows were computed using the Malcolm Method as described in Chapter 2. The existing peak flows for each drainage area are summarized in **Table 3-5**.

Table 3-5. Peak Flows– Existing Condition

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
1	A1	115.21	41.11	0.52	136.92	166.13	198.72	231.74	265.84	301.48
2	A2	2.32	10.00	0.40	4.56	5.57	6.72	7.88	8.97	10.10
3	A3	2.17	10.00	0.43	4.51	5.51	6.66	7.80	8.88	10.00
4	A4	4.20	14.25	0.35	6.12	7.45	8.96	10.48	11.95	13.49
5	B1	151.29	63.88	0.45	116.61	141.56	169.37	197.59	227.17	258.06
6	B2	2.11	10.00	0.54	5.55	6.78	8.19	9.59	10.92	12.30
7	B3	1.75	10.00	0.66	5.60	6.84	8.26	9.68	11.02	12.41
8	B4	4.58	15.10	0.35	6.48	7.89	9.49	11.09	12.65	14.28
9	C1	28.91	56.27	0.44	23.30	28.27	33.82	39.45	45.33	51.47
10	C2	0.61	10.00	0.60	1.78	2.17	2.62	3.07	3.49	3.93
11	C3	0.64	10.00	0.64	1.99	2.43	2.93	3.43	3.91	4.40
12	C4	2.09	10.00	0.35	3.55	4.33	5.23	6.13	6.98	7.86
13	D1	37.85	48.03	0.37	29.10	35.31	42.24	49.26	56.55	64.17
14	D2	1.30	10.00	0.55	3.47	4.24	5.12	5.99	6.82	7.68
15	D3	1.27	10.00	0.62	3.86	4.72	5.70	6.67	7.60	8.56
16	D4	3.64	11.98	0.35	5.74	7.00	8.44	9.88	11.25	12.69
17	E1	34.75	50.91	0.39	27.13	32.93	39.38	45.93	52.75	59.87
18	E2	1.03	10.00	0.54	2.67	3.26	3.94	4.62	5.26	5.92

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
19	E3	1.02	10.00	0.63	3.13	3.82	4.62	5.41	6.16	6.94
20	E4	3.08	11.84	0.35	4.87	5.94	7.16	8.38	9.55	10.77
21	F1	91.97	65.41	0.53	80.76	98.04	117.31	136.86	157.37	178.78
22	F2	3.26	10.91	0.64	9.82	11.98	14.45	16.92	19.27	21.72
23	F3	3.08	10.91	0.66	9.55	11.65	14.06	16.47	18.75	21.13
24	F4	8.77	19.20	0.35	11.00	13.37	16.04	18.73	21.40	24.19
25	G1	11.39	24.88	0.52	18.54	22.52	26.98	31.48	36.02	40.76
26	G2	1.12	10.00	0.66	3.57	4.36	5.27	6.17	7.03	7.92
27	G3	0.98	10.00	0.68	3.24	3.95	4.77	5.59	6.36	7.17
28	G4	2.52	16.95	0.35	3.37	4.11	4.93	5.76	6.58	7.43
29	H1	52.12	47.52	0.35	37.83	45.90	54.91	64.03	73.51	83.41
30	H2	2.05	10.00	0.55	5.44	6.64	8.02	9.39	10.69	12.04
31	H3	2.05	10.00	0.63	6.33	7.73	9.34	10.94	12.46	14.03
32	H4	6.16	37.92	0.35	5.18	6.29	7.53	8.78	10.06	11.41
33	I1	31.37	35.05	0.38	30.22	36.67	43.88	51.17	58.65	66.47
34	I2	2.78	10.00	0.85	11.45	13.98	16.88	19.78	22.51	25.36
35	I3	2.78	10.00	0.85	11.45	13.98	16.88	19.78	22.51	25.36
36	I4	8.34	33.68	0.35	7.56	9.17	10.98	12.81	14.67	16.63
37	J1	10.79	17.27	0.37	15.16	18.44	22.14	25.87	29.54	33.37
38	J2	1.01	10.00	0.89	4.39	5.36	6.47	7.58	8.63	9.72
39	J3	1.01	10.00	0.89	4.38	5.35	6.46	7.57	8.62	9.71
40	J4	3.01	22.85	0.35	3.43	4.17	5.00	5.84	6.67	7.55
41	K1	12.79	19.54	0.39	17.51	21.28	25.54	29.82	34.07	38.51
42	K2	1.16	10.00	0.83	4.71	5.75	6.94	8.13	9.25	10.42
43	K3	1.17	10.00	0.83	4.72	5.76	6.96	8.15	9.28	10.45
44	K4	3.55	18.60	0.35	4.53	5.51	6.61	7.72	8.82	9.97
45	L1	13.50	24.02	0.38	16.23	19.72	23.63	27.57	31.54	35.68
46	L2	1.00	10.00	0.81	3.94	4.81	5.81	6.80	7.75	8.72
47	L3	0.99	10.00	0.82	3.93	4.80	5.80	6.79	7.73	8.71
48	L4	2.95	18.57	0.35	3.76	4.57	5.49	6.41	7.32	8.27
49	M1	24.46	41.67	0.37	20.72	25.15	30.08	35.08	40.24	45.64
50	M2	2.26	10.00	0.55	6.04	7.38	8.91	10.44	11.89	13.39
51	M3	2.26	10.00	0.62	6.79	8.29	10.01	11.73	13.35	15.04
52	M4	6.79	30.27	0.35	6.57	7.97	9.54	11.13	12.75	14.44
53	N1	6.58	27.83	0.35	6.70	8.13	9.73	11.36	13.00	14.72
54	N2	2.14	10.00	0.64	6.64	8.10	9.79	11.47	13.06	14.70
55	O1	29.50	23.41	0.38	35.83	43.52	52.16	60.88	69.63	78.77
56	O2	6.06	11.36	0.59	16.40	20.01	24.13	28.25	32.18	36.27
57	O3	5.15	11.36	0.54	12.81	15.63	18.85	22.06	25.13	28.33

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
58	O4	35.36	23.17	0.37	42.69	51.85	62.15	72.53	82.95	93.83
59	P1	10.35	18.93	0.39	14.39	17.49	20.99	24.52	28.01	31.65
60	P2	1.70	10.00	0.65	5.34	6.52	7.87	9.22	10.50	11.82
61	P3	1.71	10.00	0.61	5.04	6.15	7.43	8.71	9.91	11.17
62	P4	5.14	18.82	0.35	6.52	7.93	9.51	11.11	12.69	14.34
63	Q1	12.48	40.55	0.35	10.05	12.20	14.59	17.01	19.52	22.13
64	Q2	4.44	11.36	0.62	12.68	15.47	18.65	21.84	24.88	28.04
65	Q3	4.65	11.36	0.59	12.57	15.33	18.49	21.64	24.65	27.79
66	Q4	12.84	47.37	0.35	9.34	11.33	13.55	15.81	18.15	20.59
67	R1	5.83	28.98	0.35	5.79	7.03	8.41	9.81	11.24	12.72
68	R2	1.96	10.00	0.62	5.93	7.24	8.74	10.25	11.66	13.14
69	S1	10.22	57.09	0.35	6.55	7.96	9.52	11.10	12.75	14.48
70	S2	3.48	10.17	0.60	10.12	12.36	14.92	17.48	19.90	22.42
71	S3	1.28	10.00	0.63	3.91	4.78	5.77	6.76	7.69	8.67
72	S4	17.38	28.87	0.36	18.03	21.88	26.20	30.56	34.99	39.62
73	T1	2.03	15.77	0.35	2.82	3.43	4.13	4.82	5.50	6.21
74	T2	0.69	10.00	0.62	2.09	2.55	3.08	3.61	4.11	4.63
75	T3	0.92	10.00	0.56	2.49	3.04	3.68	4.31	4.90	5.52
76	T4	7.35	22.58	0.35	8.43	10.24	12.28	14.33	16.39	18.54
77	U1	3.79	14.25	0.35	5.52	6.73	8.09	9.46	10.79	12.18
78	U2	1.26	10.00	0.61	3.71	4.52	5.46	6.40	7.29	8.21
79	U3	1.50	10.00	0.60	4.33	5.29	6.39	7.48	8.52	9.60
80	U4	28.33	41.35	0.37	23.87	28.96	34.64	40.40	46.35	52.56
81	V1	6.33	27.83	0.35	6.44	7.82	9.36	10.92	12.50	14.16
82	V2	2.11	10.00	0.60	6.19	7.56	9.13	10.70	12.18	13.71
83	V3	2.12	10.00	0.65	6.65	8.12	9.80	11.49	13.08	14.73
84	V4	15.53	37.72	0.40	14.87	18.04	21.59	25.17	28.86	32.72
85	W1	11.87	36.99	0.39	11.19	13.58	16.24	18.94	21.72	24.62
86	W2	2.85	10.00	0.62	8.57	10.46	12.63	14.80	16.85	18.98
87	W3	2.85	10.00	0.63	8.77	10.71	12.93	15.15	17.24	19.42
88	W4	8.56	45.32	0.35	6.41	7.78	9.30	10.85	12.45	14.13
89	X1	6.66	34.60	0.35	5.94	7.21	8.62	10.06	11.52	13.06
90	X2	1.20	10.00	0.87	5.08	6.20	7.49	8.77	9.99	11.25
91	X3	1.20	10.00	0.90	5.22	6.38	7.70	9.03	10.27	11.57
92	X4	3.59	22.22	0.35	4.16	5.05	6.05	7.07	8.08	9.14
93	Y1	9.34	24.91	0.35	10.14	12.32	14.76	17.22	19.70	22.29
94	Y2	1.12	10.00	0.91	4.96	6.06	7.32	8.57	9.76	10.99
95	Y3	1.13	10.00	0.95	5.21	6.36	7.68	9.00	10.24	11.54
96	Y4	3.36	18.30	0.35	4.32	5.25	6.30	7.36	8.40	9.50

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
97	Z1	20.08	34.96	0.35	17.78	21.58	25.82	30.11	34.51	39.11
98	Z2	4.29	10.00	0.62	12.97	15.83	19.12	22.40	25.50	28.73
99	Z3	4.66	10.00	0.61	13.74	16.78	20.26	23.74	27.02	30.44
100	Z4	28.11	35.80	0.38	26.31	31.93	38.20	44.55	51.07	57.88
101	AA1	3.42	19.24	0.35	4.28	5.20	6.24	7.29	8.33	9.41
102	AA2	1.14	10.00	0.63	3.48	4.25	5.13	6.01	6.84	7.71
103	AA3	1.14	10.00	0.62	3.44	4.19	5.07	5.94	6.76	7.61
104	AA4	9.68	26.54	0.35	10.13	12.29	14.73	17.18	19.66	22.26
105	BB1	7.27	31.33	0.40	7.86	9.54	11.42	13.32	15.26	17.28
106	BB2	2.90	10.00	0.58	8.16	9.97	12.04	14.10	16.05	18.08
107	BB3	2.42	10.00	0.63	7.35	8.98	10.84	12.71	14.46	16.29
108	BB4	7.29	31.33	0.35	6.91	8.39	10.04	11.71	13.41	15.19
109	CC1	22.55	40.94	0.37	19.07	23.13	27.67	32.27	37.02	41.98
110	CC2	2.99	10.00	0.62	9.06	11.06	13.36	15.65	17.82	20.07
111	CC3	3.00	10.00	0.63	9.12	11.14	13.45	15.76	17.94	20.21
112	CC4	8.95	40.48	0.35	7.22	8.76	10.48	12.22	14.01	15.89
113	DD1A	163.51	50.76	0.35	113.55	137.79	164.81	192.21	220.73	250.53
114	DD1B	105.89	54.19	0.36	71.45	86.71	103.71	120.97	138.96	157.76
115	DD2	7.80	17.04	0.66	19.51	23.74	28.52	33.32	38.04	42.96
116	DD3	7.79	17.04	0.59	17.61	21.42	25.74	30.07	34.33	38.78
117	DD4	23.38	25.33	0.35	25.14	30.52	36.57	42.67	48.82	55.25
118	EE1	31.27	32.62	0.38	31.27	37.94	45.41	52.96	60.68	68.75
119	EE2	1.57	10.00	0.67	5.10	6.23	7.52	8.81	10.03	11.30
120	EE3	1.54	10.00	0.58	4.35	5.32	6.42	7.52	8.56	9.65
121	EE4	4.49	13.97	0.35	6.59	8.03	9.67	11.30	12.89	14.55
122	FF1	4.69	13.06	0.35	7.11	8.66	10.43	12.20	13.91	15.69
123	FF2	1.53	10.00	0.52	3.90	4.76	5.75	6.74	7.67	8.64
124	FF3	1.52	10.00	0.63	4.66	5.70	6.88	8.06	9.17	10.33
125	FF4	4.47	13.06	0.35	6.77	8.25	9.94	11.63	13.25	14.95
126	GG1	4.78	12.83	0.35	7.31	8.91	10.73	12.56	14.31	16.14
127	GG2	1.79	10.00	0.47	4.07	4.97	6.00	7.04	8.01	9.02
128	GG3	1.78	10.00	0.61	5.33	6.50	7.86	9.20	10.48	11.80
129	GG4	4.79	12.83	0.35	7.32	8.92	10.74	12.57	14.33	16.16
130	HH1	4.11	11.92	0.35	6.50	7.92	9.55	11.18	12.74	14.36
131	HH2	2.06	10.00	0.43	4.34	5.30	6.41	7.51	8.55	9.62
132	HH3	2.06	10.00	0.55	5.48	6.70	8.09	9.48	10.79	12.15
133	HH4	4.11	11.92	0.35	6.50	7.92	9.55	11.18	12.74	14.36
134	II1	7.26	17.38	0.35	9.58	11.66	14.00	16.36	18.68	21.10
135	II2	3.83	10.00	0.49	9.10	11.11	13.41	15.72	17.89	20.15

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
136	II3	3.86	10.00	0.56	10.41	12.72	15.36	17.99	20.48	23.07
137	II4	7.79	17.38	0.35	10.29	12.52	15.03	17.56	20.05	22.65
138	JJ1	73.50	44.33	0.36	56.97	69.12	82.67	96.41	110.64	125.51
139	JJ2	7.25	10.85	0.73	24.80	30.26	36.52	42.76	48.70	54.88
140	JJ3	5.03	10.85	0.89	20.91	25.51	30.78	36.05	41.05	46.26
141	JJ4	12.45	25.45	0.35	13.35	16.21	19.41	22.65	25.92	29.33
142	KK1	10.48	39.53	0.35	8.58	10.41	12.46	14.53	16.66	18.89
143	KK2	4.90	12.50	0.90	19.47	23.73	28.59	33.46	38.13	43.00
144	LL1	15.07	25.33	0.43	19.91	24.18	28.96	33.79	38.67	43.76
145	LL2	7.54	19.32	0.54	14.51	17.64	21.16	24.71	28.24	31.91
146	LL3	4.92	10.79	0.90	20.77	25.34	30.58	35.82	40.79	45.96
147	LL4	59.86	28.85	0.40	67.71	82.19	98.40	114.79	131.43	148.83
148	MM1	22.82	16.48	0.37	32.97	40.12	48.21	56.33	64.30	72.61
149	MM2	6.34	10.00	0.65	20.11	24.55	29.65	34.74	39.55	44.54
150	NN1	7.30	13.97	0.35	10.73	13.06	15.72	18.39	20.97	23.66
151	NN2	3.54	13.64	0.89	13.41	16.33	19.66	23.00	26.22	29.58
152	NN3	9.75	17.04	0.52	19.38	23.57	28.32	33.08	37.77	42.66
153	NN4	101.00	52.45	0.37	73.06	88.65	106.04	4.00	142.05	161.25
154	OO1	3.73	18.80	0.35	4.73	5.75	6.90	8.06	9.21	10.40
155	OO2	1.88	10.00	0.54	4.96	6.06	7.32	8.57	9.76	10.99
156	OO3	1.89	10.00	0.52	4.82	5.88	7.11	8.32	9.48	10.67
157	OO4	15.86	20.72	0.38	20.53	24.95	29.92	34.94	39.93	45.14
158	PP1	3.17	11.13	0.40	5.89	7.18	8.67	10.15	11.56	13.03
159	PP2	1.71	10.00	0.54	4.47	5.46	6.59	7.72	8.79	9.90
160	PP3	1.74	10.00	0.53	4.49	5.48	6.62	7.75	8.83	9.94
161	PP4	11.53	20.84	0.38	14.85	18.05	21.65	25.28	28.89	32.67
162	QQ1	18.41	35.78	0.37	16.96	20.59	24.63	28.72	32.93	37.32
163	QQ2	3.26	10.00	0.74	11.67	14.25	17.21	20.17	22.96	25.86
164	QQ3	3.33	10.00	0.70	11.27	13.76	16.62	19.47	22.16	24.96
165	QQ4	6.67	17.82	0.35	8.69	10.57	12.69	14.82	16.93	19.13
166	RR1	25.59	38.97	0.35	21.15	25.66	30.70	35.80	41.05	46.55
167	RR2	3.34	10.00	0.73	11.81	14.43	17.42	20.41	23.24	26.17
168	RR3	3.25	10.00	0.70	11.15	13.61	16.44	19.26	21.93	24.70
169	RR4	6.25	15.10	0.35	8.85	10.77	12.95	15.14	17.27	19.50
170	SS1	5.58	16.81	0.35	7.49	9.11	10.95	12.79	14.61	16.50
171	SS2	2.90	10.00	0.53	7.48	9.14	11.04	12.93	14.72	16.58
172	SS3	2.98	10.00	0.54	7.77	9.49	11.46	13.43	15.28	17.22
173	SS4	6.42	16.81	0.35	8.63	10.49	12.61	14.73	16.82	18.99
174	TT1	13.37	21.35	0.35	15.83	19.24	23.07	26.93	30.79	34.81

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
175	TT2	6.68	13.07	0.52	14.91	18.16	21.87	25.59	29.17	32.90
176	TT3	6.67	13.07	0.55	15.94	19.43	23.40	27.37	31.20	35.19
177	TT4	51.19	27.50	0.35	52.46	63.69	76.27	88.98	101.86	115.31
178	UU1	2.27	11.36	0.35	3.66	4.46	5.38	6.30	7.18	8.09
179	UU2	1.14	10.00	0.53	2.96	3.62	4.37	5.12	5.82	6.56
180	UU3	1.15	10.00	0.53	2.97	3.63	4.38	5.13	5.84	6.58
181	UU4	2.56	11.36	0.35	4.13	5.03	6.07	7.11	8.10	9.13
182	WW1	10.45	19.37	0.35	13.04	15.86	19.03	22.22	25.39	28.69
183	WW2	5.19	11.08	0.53	12.82	15.64	18.87	22.09	25.17	28.36
184	WW3	5.17	11.08	0.54	12.92	15.77	19.02	22.27	25.37	28.59
185	WW4	10.30	19.37	0.35	12.85	15.63	18.75	21.90	25.02	28.28
186	XX1	4.76	14.54	0.35	6.86	8.36	10.06	11.76	13.41	15.13
187	XX2	2.30	10.00	0.51	5.71	6.97	8.42	9.86	11.23	12.65
188	XX3	2.25	10.00	0.56	6.08	7.43	8.97	10.51	11.96	13.48
189	XX4	4.53	14.54	0.35	6.53	7.95	9.57	11.19	12.76	14.40
190	YY1	14.41	21.01	0.35	17.22	20.92	25.09	29.29	33.48	37.86
191	YY2	7.14	12.73	0.52	16.20	19.75	23.79	27.83	31.73	35.78
192	YY3	7.13	12.73	0.55	17.17	20.93	25.21	29.50	33.62	37.92
193	YY4	20.70	31.20	0.37	20.67	25.09	30.03	35.03	40.12	45.45
194	ZZ1	11.24	23.36	0.35	12.66	15.38	18.43	21.51	24.60	27.83
195	ZZ2	1.75	10.00	0.53	4.53	5.53	6.68	7.83	8.91	10.04
196	ZZ3	1.77	10.00	0.54	4.63	5.65	6.83	8.00	9.11	10.26
197	ZZ4	4.11	13.80	0.35	6.07	7.40	8.90	10.41	11.88	13.40
198	AAA1	105.54	41.96	0.35	83.36	101.14	120.98	141.09	161.87	183.58
199	AAA2	6.86	11.36	0.53	16.66	20.32	24.51	28.69	32.68	36.83
200	AAA3	6.99	11.36	0.54	17.35	21.17	25.53	29.88	34.04	38.37
201	AAA4	14.01	19.65	0.35	17.35	21.10	25.31	29.56	33.77	38.17
202	BBB1	17.18	21.25	0.39	22.64	27.51	32.99	38.51	44.02	49.78
203	BBB2	2.38	10.00	0.43	4.97	6.07	7.34	8.59	9.78	11.02
204	BBB3	2.22	10.00	0.40	4.33	5.29	6.39	7.49	8.52	9.60
205	BBB4	4.43	15.10	0.35	6.27	7.64	9.18	10.74	12.25	13.83

3.5 Existing Hydraulic Findings

The XP-SWMM model network (layout) is shown in **Appendix A.** The results of hydraulic analysis of the existing system indicate that most of the culverts and roadside diches drainage systems have capacity to convey 2-year and 100-year rainfall event runoffs. The Hydraulic Grade Line for each culvert from the XP-SWMM model is shown on **Appendix B**. This indicates that the culverts have enough capacity to convey 100-yr flows without overtopping the road**.** Some of the existing culverts as listed in **Table 3-6** have steep slopes and have high velocities (over 8 fps).

Table 3-6. Outfall Peak Flows-Exist Conditions

Outfall Name	Culvert Size	2 Yr Flow (cfs)	100 Yr Flow (cfs)
A-OUTFALL	40' x 5' BRIDGE	182.3	400.8
B-OUTFALL	27' x 3' BRIDGE	116.9	258.7
C-OUTFALL	3' x 3' Box	23.4	51.6
D-OUTFALL	24" Pipe	29.2	50.2
E-OUTFALL	5' x 2' Box	27.3	60.2
F-OUTFALL	6' x 3' Box	81.2	179.9
G-OUTFALL	4' x 3' Box	19.8	43.5
H-OUTFALL	6' x 3' Box	62.2	136.8
I-OUTFALL	4' x 3' Box	30.4	80.2
J-OUTFALL	24" Pipe	37.7	33.1
K-OUTFALL	3' x 3' Box	19.3	42.4
L-OUTFALL	6' x 3' Box	17.5	38.4
M-OUTFALL	24" Pipe	30.3	56.0
O-OUTFALL	2-30" Pipes	51.9	114.4
P-OUTFALL	3' x 2' Box	19.9	43.9
Q-OUTFALL	4' x 2' Box	29.7	66.0
S-OUTFALL	5' x 2' Box	27.4	59.2
T-OUTFALL	24" Pipe	9.0	19.7
U-OUTFALL	3' x 2' Box	31.6	69.2
V-OUTFALL	5' x 2' Box	25.8	56.7
W-OUTFALL	6' x 3' Box	23.1	50.9
X-OUTFALL	6' x 3' Box	8.3	18.2
Y-OUTFALL	4' x 3' Box	12.1	26.6
Z-OUTFALL	5' x 2' Box	54.5	120.5
AA-OUTFALL	10' x 5' Box	13.0	28.7
BB-OUTFALL	36" Pipe	28.1	36.5
CC-OUTFALL	4' x 3' Box	33.4	73.4
DD-OUTFALL	3-10' x 6' Box	192.4	424.5
EE-OUTFALL	4' x 3' Box	60.3	133.5
FF-OUTFALL	6' x 3' BRIDGE	9.9	22.0
GG-OUTFALL	6' x 3' BRIDGE	11.0	24.6
HH-OUTFALL	6' x 3' BRIDGE	10.9	24.4
II-OUTFALL	6' x 3' BRIDGE	20.6	46.0
JJ-OUTFALL	2-6'x3' Box	140.7	168.7
LL-OUTFALL	3-6' x 3' Box	119.5	319.4
NN-OUTFALL	3-5' x 3' Box	107.7	217.8
OO-OUTFALL	6' x 3' Box	32.5	50.9
PP-OUTFALL	6' x 3' Box	24.3	61.0
QQ-OUTFALL	6' x 3' Box	39.0	46.5

Outfall Name	Culvert Size	2 Yr Flow (cfs)	100 Yr Flow (cfs)
RR-OUTFALL	6' x 3' BRIDGE	16.9	40.2
SS-OUTFALL	6' x 3' BRIDGE	16.6	40.1
TT-OUTFALL	12' x 3' BRIDGE	70.86	155.8
UU-OUTFALL	6' x 3' BRIDGE	6.53	14.5
WW-OUTFALL	6' x 3' BRIDGE	26.52	58.8
XX-OUTFALL	6' x 3' Box	12.00	26.8
YY-OUTFALL	9' x 3' Box	45.85	101.3
ZZ-OUTFALL	3' x 3' Box	16.22	35.7
AAA-OUTFALL	15' x 3' Box	187.52	415.5
BBB-OUTFALL	6' x 3' Box	36.03	79.8

4.0 PROPOSED HYDROLOGY AND HYDRAULICS ANALYSIS

The proposed paving improvements consist of reconstructing the existing with a center turn lane into a 4-lane road with a center turn lane (from IH 30 to Spur 264), and a 4-lane road with a median ditch (from Spur 264 to South Fork Sabine River). See **Exhibit 4** for Existing Typical Sections and **Exhibit 5** for Proposed Typical Sections. The proposed drainage will be an open-ditch system with cross culverts. The following pavement design changes had impact on the existing drainage system and warranted designing a new drainage system.

- Increase in impervious area due to increase in number of lanes.
- Reconfiguring the pavement geometry (median ditch section).
- Acquisition of additional ROW to accommodate the proposed pavement section.

4.1 Proposed Hydrology Analysis

The existing drainage areas within the ROW will remain the same. The hydrological parameters were adjusted to reflect the revisions to impervious cover. Off-site areas (drainage areas outside of the ROW) are generally unchanged by the proposed project, and hydrological parameters will remain the same. The peak flows with revised hydrological parameters were computed and hydrographs for each drainage area were established as described in Chapter 2.

As shown in **Table 4-1,** a comparison was made between existing and proposed impervious cover to determine the runoff coefficient (C).

Table 4.1 Impervious Area Existing vs Proposed

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
1	A1	115.21	0.00	0.00	0.00
2	A2	2.32	0.23	0.37	0.14
3	A3	2.17	0.31	0.44	0.14
4	A4	4.20	0.00	0.00	0.00
5	B1	151.29	0.00	0.00	0.00
6	B2	2.11	0.74	1.23	0.49
7	B3	1.75	0.98	1.48	0.49
8	B4	4.58	0.00	0.00	0.00
9	C1	28.91	0.00	0.00	0.00
10	C2	0.61	0.28	0.48	0.20
11	C3	0.64	0.34	0.54	0.20
12	C4	2.09	0.00	0.00	0.00
13	D1	37.85	0.00	0.00	0.00
14	D2	1.30	0.47	0.88	0.41
15	D3	1.27	0.63	1.05	0.41

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
16	D4	3.64	0.00	0.00	0.00
17	E1	34.75	0.00	0.00	0.00
18	E2	1.03	0.35	0.68	0.33
19	E3	1.02	0.52	0.85	0.33
20	E4	3.08	0.00	0.00	0.00
21	F1	91.97	0.00	0.00	0.00
22	F2	3.26	1.73	2.64	0.90
23	F3	3.08	1.75	2.65	0.90
24	F4	8.77	0.00	0.00	0.00
25	G1	11.39	0.00	0.00	0.00
26	G2	1.12	0.62	0.70	0.07
27	G3	0.98	0.58	0.66	0.07
28	G4	2.52	0.00	0.00	0.00
29	H1	52.12	0.00	0.00	0.00
30	H2	2.05	0.73	1.39	0.66
31	H3	2.05	1.06	1.72	0.66
32	H4	6.16	0.00	0.00	0.00
33	I1	31.37	0.00	0.00	0.00
34	I2	2.78	2.51	3.41	0.89
35	I3	2.78	2.51	3.41	0.89
36	I4	8.34	0.00	0.00	0.00
37	J1	10.79	0.00	0.00	0.00
38	J2	1.01	1.00	1.32	0.32
39	J3	1.01	1.00	1.32	0.32
40	J4	3.01	0.00	0.00	0.00
41	K1	12.79	0.00	0.00	0.00
42	K2	1.16	1.02	1.40	0.37
43	K3	1.17	1.02	1.40	0.37
44	K4	3.55	0.00	0.00	0.00
45	L1	13.50	0.00	0.00	0.00
46	L2	1.00	0.84	1.16	0.32
47	L3	0.99	0.84	1.16	0.32
48	L4	2.95	0.00	0.00	0.00
49	M1	24.46	0.00	0.00	0.00
50	M2	2.26	0.83	1.54	0.72
51	M3	2.26	1.10	1.82	0.72
52	M4	6.79	0.00	0.00	0.00

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
53	N1	6.58	0.00	0.00	0.00
54	N2	2.14	1.12	1.67	0.55
55	O1	29.50	0.00	0.00	0.00
56	O2	6.06	2.62	3.71	1.10
57	O3	5.15	1.78	2.87	1.10
58	O4	35.36	0.00	0.00	0.00
59	P1	10.35	0.00	0.00	0.00
60	P2	1.70	0.91	1.46	0.55
61	P3	1.71	0.80	1.35	0.55
62	P4	5.14	0.00	0.00	0.00
63	Q1	12.48	0.00	0.00	0.00
64	Q2	4.44	2.18	3.51	1.33
65	Q3	4.65	2.00	3.33	1.33
66	Q4	12.84	0.00	0.00	0.00
67	R1	5.83	0.00	0.00	0.00
68	R2	1.96	0.97	1.60	0.63
69	S1	10.22	0.00	0.00	0.00
70	S2	3.48	1.60	2.63	1.04
71	S3	1.28	0.65	1.06	0.41
72	S4	17.38	0.00	0.00	0.00
73	T1	2.03	0.00	0.00	0.00
74	T2	0.69	0.34	0.56	0.22
75	T3	0.92	0.35	0.57	0.22
76	T4	7.35	0.00	0.00	0.00
77	U1	3.79	0.00	0.00	0.00
78	U2	1.26	0.59	0.99	0.40
79	U3	1.50	0.67	1.07	0.40
80	U4	28.33	0.00	0.00	0.00
81	V1	6.33	0.00	0.00	0.00
82	V2	2.11	0.97	1.65	0.68
83	V3	2.12	1.14	1.82	0.68
84	V4	15.53	0.00	0.00	0.00
85	W1	11.87	0.00	0.00	0.00
86	W2	2.85	1.39	2.30	0.91
87	W3	2.85	1.47	2.38	0.91
88	W4	8.56	0.00	0.00	0.00
89	X1	6.66	0.00	0.00	0.00

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
90	X2	1.20	1.13	1.52	0.39
91	X3	1.20	1.19	1.58	0.39
92	X4	3.59	0.00	0.00	0.00
93	Y1	9.34	0.00	0.00	0.00
94	Y2	1.12	1.13	1.50	0.36
95	Y3	1.13	1.19	1.55	0.36
96	Y4	3.36	0.00	0.00	0.00
97	Z1	20.08	0.00	0.00	0.00
98	Z2	4.29	2.12	3.50	1.38
99	Z3	4.66	2.17	3.55	1.38
100	Z4	28.11	0.00	0.00	0.00
101	AA1	3.42	0.00	0.00	0.00
102	AA2	1.14	0.58	0.94	0.36
103	AA3	1.14	0.56	0.92	0.36
104	AA4	9.68	0.00	0.00	0.00
105	BB1	7.27	0.00	0.00	0.00
106	BB2	2.90	1.21	1.98	0.78
107	BB3	2.42	1.21	1.99	0.78
108	BB4	7.29	0.00	0.00	0.00
109	CC1	22.55	0.00	0.00	0.00
110	CC2	2.99	1.49	2.45	0.96
111	CC3	3.00	1.51	2.47	0.96
112	CC4	8.95	0.00	0.00	0.00
113	DD1A	163.51	0.00	0.00	0.00
114	DD1B	105.89	0.00	0.00	0.00
115	DD2	7.80	4.35	6.85	2.50
116	DD3	7.79	3.44	5.94	2.50
117	DD4	23.38	0.00	0.00	0.00
118	EE1	31.27	0.00	0.00	0.00
119	EE2	1.57	0.91	1.41	0.50
120	EE3	1.54	0.65	1.15	0.50
121	EE4	4.49	0.00	0.00	0.00
122	FF1	4.69	0.00	0.00	0.00
123	FF2	1.53	0.48	0.97	0.49
124	FF3	1.52	0.78	1.26	0.49
125	FF4	4.47	0.00	0.00	0.00
126	GG1	4.78	0.00	0.00	0.00

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
127	GG2	1.79	0.39	0.90	0.52
128	GG3	1.78	0.86	1.37	0.52
129	GG4	4.79	0.00	0.00	0.00
130	HH1	4.11	0.00	0.00	0.00
131	HH2	2.06	0.32	0.75	0.44
132	HH3	2.06	0.74	1.18	0.44
133	HH4	4.11	0.00	0.00	0.00
134	II1	7.26	0.00	0.00	0.00
135	II2	3.83	0.97	1.79	0.82
136	II3	3.86	1.44	2.26	0.82
137	II4	7.79	0.00	0.00	0.00
138	JJ1	73.50	0.00	0.00	0.00
139	JJ2	7.25	4.99	6.24	1.25
140	JJ3	5.03	4.89	5.97	1.08
141	JJ4	12.45	0.00	0.00	0.00
142	KK1	10.48	0.00	0.00	0.00
143	KK2	4.90	4.89	5.94	1.05
144	LL1	15.07	0.00	0.00	0.00
145	LL2	7.54	2.59	3.64	1.05
146	LL3	4.92	4.89	5.94	1.05
147	LL4	59.86	0.00	0.00	0.00
148	MM1	22.82	0.00	0.00	0.00
149	MM2	6.34	3.49	4.83	1.34
150	NN1	7.30	0.00	0.00	0.00
151	NN2	3.54	3.49	4.25	0.76
152	NN3	9.75	3.04	5.11	2.07
153	NN4	101.00	0.00	0.00	0.00
154	OO1	3.73	0.00	0.00	0.00
155	OO2	1.88	0.66	1.36	0.70
156	OO3	1.89	0.60	1.30	0.70
157	OO4	15.86	0.00	0.00	0.00
158	PP1	3.17	0.00	0.00	0.00
159	PP2	1.71	0.58	0.95	0.36
160	PP3	1.74	0.57	0.94	0.36
161	PP4	11.53	0.00	0.00	0.00
162	QQ1	18.41	0.00	0.00	0.00
163	QQ2	3.26	2.29	2.99	0.70

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
164	QQ3	3.33	2.10	2.80	0.70
165	QQ4	6.67	0.00	0.00	0.00
166	RR1	25.59	0.00	0.00	0.00
167	RR2	3.34	2.29	3.00	0.70
168	RR3	3.25	2.10	2.80	0.70
169	RR4	6.25	0.00	0.00	0.00
170	SS1	5.58	0.00	0.00	0.00
171	SS2	2.90	0.95	1.58	0.63
172	SS3	2.98	1.01	1.64	0.63
173	SS4	6.42	0.00	0.00	0.00
174	TT1	13.37	0.00	0.00	0.00
175	TT2	6.68	2.01	3.44	1.43
176	TT3	6.67	2.45	3.88	1.43
177	TT4	51.19	0.00	0.00	0.00
178	UU1	2.27	0.00	0.00	0.00
179	UU2	1.14	0.38	0.62	0.24
180	UU3	1.15	0.38	0.62	0.24
181	UU4	2.56	0.00	0.00	0.00
182	WW1	10.45	0.00	0.00	0.00
183	WW2	5.19	1.70	2.81	1.11
184	WW3	5.17	1.75	2.86	1.11
185	WW4	10.30	0.00	0.00	0.00
186	XX1	4.76	0.00	0.00	0.00
187	XX2	2.30	0.67	1.15	0.48
188	XX3	2.25	0.85	1.33	0.48
189	XX4	4.53	0.00	0.00	0.00
190	YY1	14.41	0.00	0.00	0.00
191	YY2	7.14	2.18	3.70	1.53
192	YY3	7.13	2.58	4.11	1.53
193	YY4	20.70	0.00	0.00	0.00
194	ZZ1	11.24	0.00	0.00	0.00
195	ZZ2	1.75	0.58	0.97	0.38
196	ZZ3	1.77	0.61	0.99	0.38
197	ZZ4	4.11	0.00	0.00	0.00
198	AAA1	105.54	0.00	0.00	0.00
199	AAA2	6.86	2.20	3.70	1.50
200	AAA3	6.99	2.40	3.89	1.50

Area #	Area	Total Area	Pavement Area EXIST	Proposed Pavement Area	Change in Pavement Area
ID	ID	(Acres)	(Acres)	(Acres)	(Acres)
201	AAA4	14.01	0.00	0.00	0.00
202	BBB1	17.18	0.00	0.00	0.00
203	BBB2	2.38	0.35	0.51	0.16
204	BBB3	2.22	0.21	0.37	0.16
205	BBB4	4.43	0.00	0.00	0.00

Peak flows for the proposed conditions were computed using the Rational Method for multiple rainfall frequencies including 2, 5, 10, 25, 50, and 100-year rainfall events as described in Chapter 2. The peak flow hydrographs for each drainage area within the ROW were computed using the Malcolm Method as described in Chapter 2. The proposed peak flows for each drainage area are summarized in **Table 4-2**.

Table 4-2 Peak Flows – Proposed Condition

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
1	A1	115.21	41.11	0.52	136.92	166.13	198.72	231.74	265.84	301.48
2	A2	2.32	10.00	0.44	4.92	6.01	7.26	8.51	9.68	10.91
3	A3	2.17	10.00	0.46	4.88	5.96	7.19	8.43	9.59	10.81
4	A4	4.20	14.25	0.35	6.12	7.45	8.96	10.48	11.95	13.49
5	B1	151.29	63.88	0.45	116.61	141.56	169.37	197.59	227.17	258.06
6	B2	2.11	10.00	0.67	6.86	8.38	10.12	11.86	13.50	15.21
7	B3	1.75	10.00	0.81	6.92	8.45	10.20	11.95	13.61	15.33
8	B4	4.58	15.10	0.35	6.48	7.89	9.49	11.09	12.65	14.28
9	C1	28.91	56.27	0.44	23.30	28.27	33.82	39.45	45.33	51.47
10	C2	0.61	10.00	0.78	2.31	2.82	3.40	3.98	4.53	5.11
11	C3	0.64	10.00	0.82	2.52	3.07	3.71	4.35	4.95	5.58
12	C4	2.09	10.00	0.35	3.55	4.33	5.23	6.13	6.98	7.86
13	D1	37.85	48.03	0.37	29.10	35.31	42.24	49.26	56.55	64.17
14	D2	1.30	10.00	0.72	4.57	5.58	6.74	7.90	8.99	10.13
15	D3	1.27	10.00	0.80	4.96	6.06	7.32	8.58	9.76	11.00
16	D4	3.64	11.98	0.35	5.74	7.00	8.44	9.88	11.25	12.69
17	E1	34.75	50.91	0.39	27.13	32.93	39.38	45.93	52.75	59.87
18	E2	1.03	10.00	0.71	3.55	4.34	5.24	6.13	6.98	7.87
19	E3	1.02	10.00	0.81	4.01	4.90	5.91	6.93	7.89	8.88
20	E4	3.08	11.84	0.35	4.87	5.94	7.16	8.38	9.55	10.77
21	F1	91.97	65.41	0.53	80.76	98.04	117.31	136.86	157.37	178.78
22	F2	3.26	10.91	0.80	12.15	14.82	17.88	20.94	23.85	26.87

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
23	F3	3.08	10.91	0.82	11.88	14.50	17.49	20.48	23.33	26.29
24	F4	8.77	19.20	0.35	11.00	13.37	16.04	18.73	21.40	24.19
25	G1	11.39	24.88	0.52	18.54	22.52	26.98	31.48	36.02	40.76
26	G2	1.12	10.00	0.69	3.77	4.60	5.56	6.51	7.41	8.35
27	G3	0.98	10.00	0.72	3.43	4.19	5.06	5.93	6.75	7.60
28	G4	2.52	16.95	0.35	3.37	4.11	4.93	5.76	6.58	7.43
29	H1	52.12	47.52	0.35	37.83	45.90	54.91	64.03	73.51	83.41
30	H2	2.05	10.00	0.72	7.20	8.79	10.62	12.44	14.17	15.96
31	H3	2.05	10.00	0.81	8.10	9.89	11.95	14.00	15.93	17.94
32	H4	6.16	37.92	0.35	5.18	6.29	7.53	8.78	10.06	11.41
33	I1	31.37	35.05	0.38	30.22	36.67	43.88	51.17	58.65	66.47
34	I2	2.78	10.00	1.10	14.89	18.18	21.96	25.73	29.29	32.99
35	I3	2.78	10.00	1.10	14.89	18.18	21.96	25.73	29.29	32.99
36	I4	8.34	33.68	0.35	7.56	9.17	10.98	12.81	14.67	16.63
37	J1	10.79	17.27	0.37	15.16	18.44	22.14	25.87	29.54	33.37
38	J2	1.01	10.00	1.18	5.78	7.05	8.52	9.98	11.36	12.80
39	J3	1.01	10.00	1.18	5.78	7.05	8.52	9.98	11.36	12.80
40	J4	3.01	22.85	0.35	3.43	4.17	5.00	5.84	6.67	7.55
41	K1	12.79	19.54	0.39	17.51	21.28	25.54	29.82	34.07	38.51
42	K2	1.16	10.00	1.08	6.10	7.45	9.00	10.54	12.00	13.52
43	K3	1.17	10.00	1.07	6.10	7.45	9.00	10.54	12.00	13.52
44	K4	3.55	18.60	0.35	4.53	5.51	6.61	7.72	8.82	9.97
45	L1	13.50	24.02	0.38	16.23	19.72	23.63	27.57	31.54	35.68
46	L2	1.00	10.00	1.05	5.07	6.19	7.48	8.76	9.97	11.23
47	L3	0.99	10.00	1.05	5.07	6.19	7.48	8.76	9.97	11.23
48	L4	2.95	18.57	0.35	3.76	4.57	5.49	6.41	7.32	8.27
49	M1	24.46	41.67	0.37	20.72	25.15	30.08	35.08	40.24	45.64
50	M2	2.26	10.00	0.73	7.96	9.72	11.75	13.76	15.66	17.64
51	M3	2.26	10.00	0.79	8.71	10.63	12.84	15.05	17.13	19.29
52	M4	6.79	30.27	0.35	6.57	7.97	9.54	11.13	12.75	14.44
53	N1	6.58	27.83	0.35	6.70	8.13	9.73	11.36	13.00	14.72
54	N2	2.14	10.00	0.78	8.11	9.90	11.96	14.01	15.95	17.97
55	O1	29.50	23.41	0.38	35.83	43.52	52.16	60.88	69.63	78.77
56	O2	6.06	11.36	0.69	19.18	23.40	28.22	33.04	37.63	42.42
57	O3	5.15	11.36	0.66	15.59	19.02	22.94	26.85	30.59	34.48
58	O4	35.36	23.17	0.37	42.69	51.85	62.15	72.53	82.95	93.83
59	P1	10.35	18.93	0.39	14.39	17.49	20.99	24.52	28.01	31.65
60	P2	1.70	10.00	0.82	6.80	8.31	10.03	11.76	13.38	15.07
61	P3	1.71	10.00	0.78	6.51	7.95	9.60	11.24	12.80	14.42

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
62	P4	5.14	18.82	0.35	6.52	7.93	9.51	11.11	12.69	14.34
63	Q1	12.48	40.55	0.35	10.05	12.20	14.59	17.01	19.52	22.13
64	Q2	4.44	11.36	0.78	16.06	19.59	23.63	27.66	31.51	35.51
65	Q3	4.65	11.36	0.74	15.95	19.45	23.46	27.46	31.28	35.26
66	Q4	12.84	47.37	0.35	9.34	11.33	13.55	15.81	18.15	20.59
67	R1	5.83	28.98	0.35	5.79	7.03	8.41	9.81	11.24	12.72
68	R2	1.96	10.00	0.80	7.62	9.30	11.23	13.16	14.98	16.87
69	S1	10.22	57.09	0.35	6.55	7.96	9.52	11.10	12.75	14.48
70	S2	3.48	10.17	0.77	12.87	15.72	18.98	22.23	25.31	28.51
71	S3	1.28	10.00	0.81	5.00	6.11	7.37	8.64	9.84	11.08
72	S4	17.38	28.87	0.36	18.03	21.88	26.20	30.56	34.99	39.62
73	T1	2.03	15.77	0.35	2.82	3.43	4.13	4.82	5.50	6.21
74	T2	0.69	10.00	0.80	2.67	3.26	3.94	4.62	5.26	5.92
75	T3	0.92	10.00	0.69	3.08	3.75	4.54	5.31	6.05	6.81
76	T4	7.35	22.58	0.35	8.43	10.24	12.28	14.33	16.39	18.54
77	U1	3.79	14.25	0.35	5.52	6.73	8.09	9.46	10.79	12.18
78	U2	1.26	10.00	0.78	4.77	5.83	7.04	8.25	9.39	10.58
79	U3	1.50	10.00	0.74	5.40	6.59	7.96	9.33	10.62	11.96
80	U4	28.33	41.35	0.37	23.87	28.96	34.64	40.40	46.35	52.56
81	V1	6.33	27.83	0.35	6.44	7.82	9.36	10.92	12.50	14.16
82	V2	2.11	10.00	0.78	8.00	9.77	11.80	13.83	15.74	17.73
83	V3	2.12	10.00	0.82	8.46	10.33	12.48	14.62	16.64	18.75
84	V4	15.53	37.72	0.40	14.87	18.04	21.59	25.17	28.86	32.72
85	W1	11.87	36.99	0.39	11.19	13.58	16.24	18.94	21.72	24.62
86	W2	2.85	10.00	0.79	11.01	13.44	16.24	19.02	21.65	24.39
87	W3	2.85	10.00	0.81	11.21	13.69	16.53	19.37	22.05	24.84
88	W4	8.56	45.32	0.35	6.41	7.78	9.30	10.85	12.45	14.13
89	X1	6.66	34.60	0.35	5.94	7.21	8.62	10.06	11.52	13.06
90	X2	1.20	10.00	1.14	6.65	8.12	9.81	11.49	13.08	14.74
91	X3	1.20	10.00	1.18	6.90	8.42	10.17	11.92	13.57	15.28
92	X4	3.59	22.22	0.35	4.16	5.05	6.05	7.07	8.08	9.14
93	Y1	9.34	24.91	0.35	10.14	12.32	14.76	17.22	19.70	22.29
94	Y2	1.12	10.00	1.20	6.54	7.99	9.65	11.30	12.87	14.49
95	Y3	1.13	10.00	1.24	6.79	8.29	10.01	11.73	13.35	15.04
96	Y4	3.36	18.30	0.35	4.32	5.25	6.30	7.36	8.40	9.50
97	Z1	20.08	34.96	0.35	17.78	21.58	25.82	30.11	34.51	39.11
98	Z2	4.29	10.00	0.80	16.65	20.33	24.56	28.77	32.75	36.89
99	Z3	4.66	10.00	0.77	17.42	21.28	25.70	30.10	34.27	38.60
100	Z4	28.11	35.80	0.38	26.31	31.93	38.20	44.55	51.07	57.88

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
101	AA1	3.42	19.24	0.35	4.28	5.20	6.24	7.29	8.33	9.41
102	AA2	1.14	10.00	0.80	4.45	5.43	6.56	7.69	8.75	9.86
103	AA3	1.14	10.00	0.80	4.41	5.38	6.50	7.61	8.67	9.76
104	AA4	9.68	26.54	0.35	10.13	12.29	14.73	17.18	19.66	22.26
105	BB1	7.27	31.33	0.40	7.86	9.54	11.42	13.32	15.26	17.28
106	BB2	2.90	10.00	0.73	10.23	12.50	15.09	17.68	20.13	22.67
107	BB3	2.42	10.00	0.80	9.43	11.51	13.90	16.28	18.54	20.88
108	BB4	7.29	31.33	0.35	6.91	8.39	10.04	11.71	13.41	15.19
109	CC1	22.55	40.94	0.37	19.07	23.13	27.67	32.27	37.02	41.98
110	CC2	2.99	10.00	0.80	11.63	14.20	17.15	20.10	22.88	25.77
111	CC3	3.00	10.00	0.80	11.69	14.28	17.24	20.20	23.00	25.90
112	CC4	8.95	40.48	0.35	7.22	8.76	10.48	12.22	14.01	15.89
113	DD1A	163.51	50.76	0.35	113.55	137.79	164.81	192.21	220.73	250.53
114	DD1B	105.89	54.19	0.36	71.45	86.71	103.71	120.97	138.96	157.76
115	DD2	7.80	17.04	0.83	24.75	30.11	36.17	42.26	48.25	54.50
116	DD3	7.79	17.04	0.77	22.85	27.80	33.39	39.02	44.55	50.31
117	DD4	23.38	25.33	0.35	25.14	30.52	36.57	42.67	48.82	55.25
118	EE1	31.27	32.62	0.38	31.27	37.94	45.41	52.96	60.68	68.75
119	EE2	1.57	10.00	0.84	6.44	7.86	9.49	11.12	12.66	14.26
120	EE3	1.54	10.00	0.76	5.69	6.95	8.39	9.83	11.19	12.60
121	EE4	4.49	13.97	0.35	6.59	8.03	9.67	11.30	12.89	14.55
122	FF1	4.69	13.06	0.35	7.11	8.66	10.43	12.20	13.91	15.69
123	FF2	1.53	10.00	0.70	5.20	6.35	7.66	8.98	10.22	11.51
124	FF3	1.52	10.00	0.81	5.96	7.28	8.79	10.30	11.72	13.21
125	FF4	4.47	13.06	0.35	6.77	8.25	9.94	11.63	13.25	14.95
126	GG1	4.78	12.83	0.35	7.31	8.91	10.73	12.56	14.31	16.14
127	GG2	1.79	10.00	0.63	5.45	6.66	8.04	9.42	10.72	12.08
128	GG3	1.78	10.00	0.77	6.71	8.19	9.89	11.59	13.19	14.86
129	GG4	4.79	12.83	0.35	7.32	8.92	10.74	12.57	14.33	16.16
130	HH1	4.11	11.92	0.35	6.50	7.92	9.55	11.18	12.74	14.36
131	HH2	2.06	10.00	0.55	5.51	6.73	8.13	9.52	10.84	12.21
132	HH3	2.06	10.00	0.67	6.65	8.12	9.81	11.49	13.08	14.73
133	HH4	4.11	11.92	0.35	6.50	7.92	9.55	11.18	12.74	14.36
134	II1	7.26	17.38	0.35	9.58	11.66	14.00	16.36	18.68	21.10
135	II2	3.83	10.00	0.61	11.29	13.78	16.65	19.50	22.20	25.01
136	II3	3.86	10.00	0.67	12.61	15.39	18.59	21.78	24.79	27.92
137	II4	7.79	17.38	0.35	10.29	12.52	15.03	17.56	20.05	22.65
138	JJ1	73.50	44.33	0.36	56.97	69.12	82.67	96.41	110.64	125.51
139	JJ2	7.25	10.85	0.82	28.04	34.21	41.28	48.34	55.05	62.03

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
140	JJ3	5.03	10.85	1.07	25.23	30.79	37.15	43.50	49.54	55.83
141	JJ4	12.45	25.45	0.35	13.35	16.21	19.41	22.65	25.92	29.33
142	KK1	10.48	39.53	0.35	8.58	10.41	12.46	14.53	16.66	18.89
143	KK2	4.90	12.50	1.09	23.61	28.78	34.68	40.58	46.25	52.15
144	LL1	15.07	25.33	0.43	19.91	24.18	28.96	33.79	38.67	43.76
145	LL2	7.54	19.32	0.62	16.57	20.14	24.17	28.23	32.25	36.45
146	LL3	4.92	10.79	1.09	25.18	30.73	37.08	43.42	49.45	55.72
147	LL4	59.86	28.85	0.40	67.71	82.19	98.40	114.79	131.43	148.83
148	MM1	22.82	16.48	0.37	32.97	40.12	48.21	56.33	64.30	72.61
149	MM2	6.34	10.00	0.77	23.69	28.93	34.94	40.94	46.60	52.49
150	NN1	7.30	13.97	0.35	10.73	13.06	15.72	18.39	20.97	23.66
151	NN2	3.54	13.64	1.08	16.23	19.77	23.80	27.83	31.73	35.80
152	NN3	9.75	17.04	0.64	23.72	28.85	34.66	40.50	46.24	52.22
153	NN4	101.00	52.45	0.37	73.06	88.65	106.04	4.00	142.05	161.25
154	OO1	3.73	18.80	0.35	4.73	5.75	6.90	8.06	9.21	10.40
155	OO2	1.88	10.00	0.75	6.83	8.34	10.08	11.81	13.44	15.14
156	OO3	1.89	10.00	0.73	6.69	8.17	9.87	11.56	13.16	14.83
157	OO4	15.86	20.72	0.38	20.53	24.95	29.92	34.94	39.93	45.14
158	PP1	3.17	11.13	0.40	5.89	7.18	8.67	10.15	11.56	13.03
159	PP2	1.71	10.00	0.65	5.44	6.65	8.03	9.41	10.71	12.06
160	PP3	1.74	10.00	0.65	5.46	6.67	8.06	9.44	10.74	12.10
161	PP4	11.53	20.84	0.38	14.85	18.05	21.65	25.28	28.89	32.67
162	QQ1	18.41	35.78	0.37	16.96	20.59	24.63	28.72	32.93	37.32
163	QQ2	3.26	10.00	0.85	13.53	16.53	19.96	23.38	26.62	29.98
164	QQ3	3.33	10.00	0.81	13.13	16.03	19.36	22.68	25.82	29.08
165	QQ4	6.67	17.82	0.35	8.69	10.57	12.69	14.82	16.93	19.13
166	RR1	25.59	38.97	0.35	21.15	25.66	30.70	35.80	41.05	46.55
167	RR2	3.34	10.00	0.84	13.69	16.71	20.19	23.65	26.92	30.32
168	RR3	3.25	10.00	0.82	13.01	15.88	19.18	22.48	25.59	28.82
169	RR4	6.25	15.10	0.35	8.85	10.77	12.95	15.14	17.27	19.50
170	SS1	5.58	16.81	0.35	7.49	9.11	10.95	12.79	14.61	16.50
171	SS2	2.90	10.00	0.65	9.17	11.20	13.53	15.85	18.04	20.32
172	SS3	2.98	10.00	0.65	9.46	11.55	13.95	16.35	18.61	20.96
173	SS4	6.42	16.81	0.35	8.63	10.49	12.61	14.73	16.82	18.99
174	TT1	13.37	21.35	0.35	15.83	19.24	23.07	26.93	30.79	34.81
175	TT2	6.68	13.07	0.63	18.31	22.32	26.88	31.44	35.84	40.43
176	TT3	6.67	13.07	0.67	19.35	23.58	28.40	33.22	37.87	42.71
177	TT4	51.19	27.50	0.35	52.46	63.69	76.27	88.98	101.86	115.31
178	UU1	2.27	11.36	0.35	3.66	4.46	5.38	6.30	7.18	8.09

#	Area ID	Total Area (Acres)	Tc (min.)	C	Peak Flows (cfs)					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
179	UU2	1.14	10.00	0.65	3.61	4.41	5.32	6.23	7.10	7.99
180	UU3	1.15	10.00	0.65	3.62	4.41	5.33	6.25	7.11	8.01
181	UU4	2.56	11.36	0.35	4.13	5.03	6.07	7.11	8.10	9.13
182	WW1	10.45	19.37	0.35	13.04	15.86	19.03	22.22	25.39	28.69
183	WW2	5.19	11.08	0.65	15.66	19.11	23.05	26.99	30.74	34.64
184	WW3	5.17	11.08	0.65	15.76	19.23	23.20	27.17	30.94	34.87
185	WW4	10.30	19.37	0.35	12.85	15.63	18.75	21.90	25.02	28.28
186	XX1	4.76	14.54	0.35	6.86	8.36	10.06	11.76	13.41	15.13
187	XX2	2.30	10.00	0.63	7.00	8.55	10.33	12.10	13.78	15.52
188	XX3	2.25	10.00	0.68	7.38	9.01	10.88	12.75	14.51	16.35
189	XX4	4.53	14.54	0.35	6.53	7.95	9.57	11.19	12.76	14.40
190	YY1	14.41	21.01	0.35	17.22	20.92	25.09	29.29	33.48	37.86
191	YY2	7.14	12.73	0.64	19.89	24.24	29.20	34.16	38.94	43.92
192	YY3	7.13	12.73	0.67	20.86	25.42	30.62	35.83	40.84	46.06
193	YY4	20.70	31.20	0.37	20.67	25.09	30.03	35.03	40.12	45.45
194	ZZ1	11.24	23.36	0.35	12.66	15.38	18.43	21.51	24.60	27.83
195	ZZ2	1.75	10.00	0.65	5.56	6.79	8.20	9.60	10.93	12.31
196	ZZ3	1.77	10.00	0.66	5.66	6.91	8.34	9.77	11.13	12.53
197	ZZ4	4.11	13.80	0.35	6.07	7.40	8.90	10.41	11.88	13.40
198	AAA1	105.54	41.96	0.35	83.36	101.14	120.98	141.09	161.87	183.58
199	AAA2	6.86	11.36	0.65	20.45	24.94	30.08	35.22	40.12	45.22
200	AAA3	6.99	11.36	0.66	21.14	25.79	31.10	36.41	41.48	46.75
201	AAA4	14.01	19.65	0.35	17.35	21.10	25.31	29.56	33.77	38.17
202	BBB1	17.18	21.25	0.39	22.64	27.51	32.99	38.51	44.02	49.78
203	BBB2	2.38	10.00	0.47	5.40	6.60	7.97	9.34	10.63	11.97
204	BBB3	2.22	10.00	0.44	4.76	5.82	7.02	8.23	9.37	10.55
205	BBB4	4.43	15.10	0.35	6.27	7.64	9.18	10.74	12.25	13.83

A comparison of existing and proposed peak flows, shown in **Table 4.3**, to determine the increase in peak flows for each drainage area.

Table 4.3 Existing Vs Proposed Peak Flows

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
1	A1	115.21	178.5	178.5	0.0	392.4	392.4	0.0
2	A2	2.32	4.6	4.9	0.4	10.1	10.9	0.8
3	A3	2.17	4.5	4.9	0.4	10.0	10.8	0.8

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
4	A4	4.20	7.1	7.1	0.0	15.8	15.8	0.0
5	B1	151.29	116.6	116.6	0.0	258.1	258.1	0.0
6	B2	2.11	5.6	6.9	1.3	12.3	15.2	2.9
7	B3	1.75	5.6	6.9	1.3	12.4	15.3	2.9
8	B4	4.58	7.8	7.8	0.0	17.2	17.2	0.0
9	C1	28.91	23.3	23.3	0.0	51.5	51.5	0.0
10	C2	0.61	1.8	2.3	0.5	3.9	5.1	1.2
11	C3	0.64	2.0	2.5	0.5	4.4	5.6	1.2
12	C4	2.09	3.5	3.5	0.0	7.9	7.9	0.0
13	D1	37.85	29.1	29.1	0.0	64.2	64.2	0.0
14	D2	1.30	3.5	4.6	1.1	7.7	10.1	2.4
15	D3	1.27	3.9	5.0	1.1	8.6	11.0	2.4
16	D4	3.64	6.2	6.2	0.0	13.7	13.7	0.0
17	E1	34.75	27.1	27.1	0.0	59.9	59.9	0.0
18	E2	1.03	2.7	3.6	0.9	5.9	7.9	1.9
19	E3	1.02	3.1	4.0	0.9	6.9	8.9	1.9
20	E4	3.08	5.2	5.2	0.0	11.6	11.6	0.0
21	F1	91.97	80.8	80.8	0.0	178.8	178.8	0.0
22	F2	3.26	9.8	12.1	2.3	21.7	26.9	5.2
23	F3	3.08	9.6	11.9	2.3	21.1	26.3	5.2
24	F4	8.77	14.9	14.9	0.0	33.0	33.0	0.0
25	G1	11.39	18.5	18.5	0.0	40.8	40.8	0.0
26	G2	1.12	3.6	3.8	0.2	7.9	8.4	0.4
27	G3	0.98	3.2	3.4	0.2	7.2	7.6	0.4
28	G4	2.52	3.6	3.6	0.0	8.0	8.0	0.0
29	H1	52.12	61.0	61.0	0.0	134.1	134.1	0.0
30	H2	2.05	5.4	7.2	1.8	12.0	16.0	3.9
31	H3	2.05	6.3	8.1	1.8	14.0	17.9	3.9
32	H4	6.16	10.5	10.5	0.0	23.2	23.2	0.0
33	I1	31.37	30.2	30.2	0.0	66.5	66.5	0.0
34	I2	2.78	11.4	14.9	3.4	25.4	33.0	7.6
35	I3	2.78	11.4	14.9	3.4	25.4	33.0	7.6
36	I4	8.34	14.2	14.2	0.0	31.4	31.4	0.0
37	J1	10.79	15.2	15.2	0.0	33.4	33.4	0.0
38	J2	1.01	4.4	5.8	1.4	9.7	12.8	3.1
39	J3	1.01	4.4	5.8	1.4	9.7	12.8	3.1
40	J4	3.01	5.1	5.1	0.0	11.3	11.3	0.0

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
41	K1	12.79	18.7	18.7	0.0	41.1	41.1	0.0
42	K2	1.16	4.7	6.1	1.4	10.4	13.5	3.1
43	K3	1.17	4.7	6.1	1.4	10.5	13.5	3.1
44	K4	3.55	6.0	6.0	0.0	13.4	13.4	0.0
45	L1	13.50	17.2	17.2	0.0	37.8	37.8	0.0
46	L2	1.00	3.9	5.1	1.1	8.7	11.2	2.5
47	L3	0.99	3.9	5.1	1.1	8.7	11.2	2.5
48	L4	2.95	5.0	5.0	0.0	11.1	11.1	0.0
49	M1	24.46	29.3	29.3	0.0	64.4	64.4	0.0
50	M2	2.26	6.0	8.0	1.9	13.4	17.6	4.3
51	M3	2.26	6.8	8.7	1.9	15.0	19.3	4.3
52	M4	6.79	11.5	11.5	0.0	25.6	25.6	0.0
53	N1	6.58	11.2	11.2	0.0	24.8	24.8	0.0
54	N2	2.14	6.6	8.1	1.5	14.7	18.0	3.3
55	O1	29.50	42.3	42.3	0.0	93.2	93.2	0.0
56	O2	6.06	11.1	12.9	1.9	24.3	28.4	4.1
57	O3	5.15	11.6	14.1	2.5	25.5	31.1	5.5
58	O4	35.36	42.7	42.7	0.0	93.8	93.8	0.0
59	P1	10.35	17.6	17.6	0.0	38.9	38.9	0.0
60	P2	1.70	5.3	6.8	1.5	11.8	15.1	3.3
61	P3	1.71	5.0	6.5	1.5	11.2	14.4	3.3
62	P4	5.14	8.7	8.7	0.0	19.4	19.4	0.0
63	Q1	12.48	21.2	21.2	0.0	47.0	47.0	0.0
64	Q2	4.44	10.0	12.6	2.7	22.0	27.8	5.9
65	Q3	4.65	9.9	12.6	2.7	21.8	27.6	5.9
66	Q4	12.84	21.8	21.8	0.0	48.4	48.4	0.0
67	R1	5.83	9.9	9.9	0.0	22.0	22.0	0.0
68	R2	1.96	5.9	7.6	1.7	13.1	16.9	3.7
69	S1	10.22	17.4	17.4	0.0	38.5	38.5	0.0
70	S2	3.48	10.1	12.9	2.8	22.4	28.5	6.1
71	S3	1.28	3.9	5.0	1.1	8.7	11.1	2.4
72	S4	17.38	25.7	25.7	0.0	56.6	56.6	0.0
73	T1	2.03	3.5	3.5	0.0	7.7	7.7	0.0
74	T2	0.69	2.1	2.7	0.6	4.6	5.9	1.3
75	T3	0.92	2.5	3.1	0.6	5.5	6.8	1.3
76	T4	7.35	8.4	8.4	0.0	18.5	18.5	0.0
77	U1	3.79	6.5	6.5	0.0	14.3	14.3	0.0

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
78	U2	1.26	3.7	4.8	1.1	8.2	10.6	2.4
79	U3	1.50	4.3	5.4	1.1	9.6	12.0	2.4
80	U4	28.33	31.0	31.0	0.0	68.0	68.0	0.0
81	V1	6.33	10.8	10.8	0.0	23.8	23.8	0.0
82	V2	2.11	6.2	8.0	1.8	13.7	17.7	4.0
83	V3	2.12	6.6	8.5	1.8	14.7	18.7	4.0
84	V4	15.53	23.7	23.7	0.0	52.2	52.2	0.0
85	W1	11.87	19.3	19.3	0.0	42.6	42.6	0.0
86	W2	2.85	8.6	11.0	2.4	19.0	24.4	5.4
87	W3	2.85	8.8	11.2	2.4	19.4	24.8	5.4
88	W4	8.56	14.6	14.6	0.0	32.2	32.2	0.0
89	X1	6.66	8.0	8.0	0.0	17.7	17.7	0.0
90	X2	1.20	5.1	6.7	1.6	11.2	14.7	3.5
91	X3	1.20	5.2	6.9	1.7	11.6	15.3	3.7
92	X4	3.59	6.1	6.1	0.0	13.5	13.5	0.0
93	Y1	9.34	11.9	11.9	0.0	26.1	26.1	0.0
94	Y2	1.12	5.0	6.5	1.6	11.0	14.5	3.5
95	Y3	1.13	5.2	6.8	1.6	11.5	15.0	3.5
96	Y4	3.36	5.7	5.7	0.0	12.6	12.6	0.0
97	Z1	20.08	24.6	24.6	0.0	54.0	54.0	0.0
98	Z2	4.29	9.6	12.3	2.7	21.1	27.0	6.0
99	Z3	4.66	10.1	12.9	2.7	22.3	28.3	6.0
100	Z4	28.11	46.3	46.3	0.0	102.3	102.3	0.0
101	AA1	3.42	5.8	5.8	0.0	12.9	12.9	0.0
102	AA2	1.14	3.5	4.5	1.0	7.7	9.9	2.2
103	AA3	1.14	3.4	4.4	1.0	7.6	9.8	2.2
104	AA4	9.68	12.3	12.3	0.0	27.1	27.1	0.0
105	BB1	7.27	14.1	14.1	0.0	31.3	31.3	0.0
106	BB2	2.90	8.2	10.2	2.1	18.1	22.7	4.6
107	BB3	2.42	7.4	9.4	2.1	16.3	20.9	4.6
108	BB4	7.29	12.4	12.4	0.0	27.5	27.5	0.0
109	CC1	22.55	30.7	30.7	0.0	67.5	67.5	0.0
110	CC2	2.99	8.3	10.6	2.4	18.3	23.5	5.2
111	CC3	3.00	8.3	10.7	2.4	18.4	23.6	5.2
112	CC4	8.95	15.2	15.2	0.0	33.7	33.7	0.0
113	DD1A	163.51	113.6	113.6	0.0	250.5	250.5	0.0
114	DD2	7.80	9.7	12.3	2.6	21.5	27.2	5.8

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
115	DD3	7.79	11.3	14.6	3.4	24.8	32.2	7.4
116	DD4	23.38	19.9	19.9	0.0	43.9	43.9	0.0
117	EE1	31.27	57.5	57.5	0.0	127.4	127.4	0.0
118	EE2	1.57	4.0	5.1	1.1	8.9	11.2	2.3
119	EE3	1.54	4.4	5.7	1.3	9.6	12.6	3.0
120	EE4	4.49	7.6	7.6	0.0	16.9	16.9	0.0
121	FF1	4.69	8.0	8.0	0.0	17.7	17.7	0.0
122	FF2	1.53	3.9	5.2	1.3	8.6	11.5	2.9
123	FF3	1.52	4.7	6.0	1.3	10.3	13.2	2.9
124	FF4	4.47	7.6	7.6	0.0	16.8	16.8	0.0
125	GG1	4.78	8.1	8.1	0.0	18.0	18.0	0.0
126	GG2	1.79	4.1	5.5	1.4	9.0	12.1	3.1
127	GG3	1.78	5.3	6.7	1.4	11.8	14.9	3.1
128	GG4	4.79	8.1	8.1	0.0	18.0	18.0	0.0
129	HH1	4.11	7.0	7.0	0.0	15.5	15.5	0.0
130	HH2	2.06	4.3	5.5	1.2	9.6	12.2	2.6
131	HH3	2.06	5.5	6.7	1.2	12.1	14.7	2.6
132	HH4	4.11	7.0	7.0	0.0	15.5	15.5	0.0
133	II1	7.26	12.3	12.3	0.0	27.3	27.3	0.0
134	II2	3.83	9.1	11.3	2.2	20.2	25.0	4.9
135	II3	3.86	10.4	12.6	2.2	23.1	27.9	4.9
136	II4	7.79	13.3	13.3	0.0	29.4	29.4	0.0
137	JJ1	73.50	127.5	127.5	0.0	282.4	282.4	0.0
138	JJ2	7.25	13.5	15.3	1.8	29.7	33.6	3.9
139	JJ3	5.03	16.3	19.7	3.4	35.9	43.4	7.4
140	JJ4	12.45	20.5	20.5	0.0	45.3	45.3	0.0
141	KK1	10.48	12.2	12.2	0.0	26.7	26.7	0.0
142	KK2	4.90	21.4	26.0	4.6	47.4	57.5	10.1
143	LL1	15.07	28.6	28.6	0.0	63.3	63.3	0.0
144	LL2	7.54	19.7	22.5	2.8	43.7	49.9	6.2
145	LL3	4.92	15.7	19.1	3.3	34.6	42.0	7.4
146	LL4	59.86	112.0	112.0	0.0	247.9	247.9	0.0
147	MM1	22.82	36.1	36.1	0.0	79.7	79.7	0.0
148	MM2	6.34	16.0	18.8	2.9	35.2	41.5	6.3
149	NN1	7.30	8.9	8.9	0.0	19.5	19.5	0.0
150	NN2	3.54	15.3	18.6	3.2	34.0	41.1	7.1
151	NN3	9.75	24.7	30.2	5.5	54.7	67.0	12.3

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
152	NN4	101.00	103.2	103.2	0.0	226.9	226.9	0.0
153	OO1	3.73	2.6	2.6	0.0	5.7	5.7	0.0
154	OO2	1.88	5.0	6.8	1.9	11.0	15.1	4.2
155	OO3	1.89	4.8	6.7	1.9	10.7	14.8	4.2
156	OO4	15.86	29.0	29.0	0.0	64.3	64.3	0.0
157	PP1	3.17	4.1	4.1	0.0	9.0	9.0	0.0
158	PP2	1.71	4.5	5.4	1.0	9.9	12.1	2.2
159	PP3	1.74	4.5	5.5	1.0	9.9	12.1	2.2
160	PP4	11.53	21.1	21.1	0.0	46.6	46.6	0.0
161	QQ1	18.41	25.2	25.2	0.0	55.4	55.4	0.0
162	QQ2	3.26	6.3	7.3	1.0	13.9	16.1	2.2
163	QQ3	3.33	11.3	13.1	1.9	25.0	29.1	4.1
164	QQ4	6.67	11.3	11.3	0.0	25.1	25.1	0.0
165	RR1	25.59	42.8	42.8	0.0	94.7	94.7	0.0
166	RR2	3.34	7.2	8.3	1.1	15.7	18.2	2.5
167	RR3	3.25	11.1	13.0	1.9	24.7	28.8	4.1
168	RR4	6.25	10.6	10.6	0.0	23.5	23.5	0.0
169	SS1	5.58	9.5	9.5	0.0	21.0	21.0	0.0
170	SS2	2.90	7.5	9.2	1.7	16.6	20.3	3.7
171	SS3	2.98	7.8	9.5	1.7	17.2	21.0	3.7
172	SS4	6.42	10.9	10.9	0.0	24.2	24.2	0.0
173	TT1	13.37	22.7	22.7	0.0	50.4	50.4	0.0
174	TT2	6.68	16.7	20.5	3.8	37.0	45.5	8.5
175	TT3	6.67	13.0	15.8	2.8	28.6	34.7	6.1
176	TT4	51.19	63.2	63.2	0.0	139.0	139.0	0.0
177	UU1	2.27	2.6	2.6	0.0	5.7	5.7	0.0
178	UU2	1.14	3.0	3.6	0.6	6.6	8.0	1.4
179	UU3	1.15	3.0	3.6	0.6	6.6	8.0	1.4
180	UU4	2.56	4.4	4.4	0.0	9.6	9.6	0.0
181	WW1	10.45	17.8	17.8	0.0	39.4	39.4	0.0
182	WW2	5.19	13.4	16.3	3.0	29.6	36.2	6.6
183	WW3	5.17	12.9	15.8	2.8	28.6	34.9	6.3
184	WW4	10.30	16.8	16.8	0.0	37.1	37.1	0.0
185	XX1	4.76	8.1	8.1	0.0	17.9	17.9	0.0
186	XX2	2.30	5.7	7.0	1.3	12.6	15.5	2.9
187	XX3	2.25	6.1	7.4	1.3	13.5	16.3	2.9
188	XX4	4.53	7.7	7.7	0.0	17.1	17.1	0.0

#	Area ID	Total Area (Acres)	Peak Flows (cfs)					
			2 Year Exist	2 Year Prop	Delta	100 Year Exist	100 Year Prop	Delta
189	YY1	14.41	24.5	24.5	0.0	54.3	54.3	0.0
190	YY2	7.14	18.0	22.0	4.1	39.8	48.8	9.1
191	YY3	7.13	17.2	20.9	3.7	37.9	46.1	8.1
192	YY4	20.70	33.4	33.4	0.0	73.7	73.7	0.0
193	ZZ1	11.24	14.0	14.0	0.0	30.7	30.7	0.0
194	ZZ2	1.75	3.0	3.7	0.7	6.6	8.1	1.5
195	ZZ3	1.77	4.6	5.7	1.0	10.3	12.5	2.3
196	ZZ4	4.11	7.0	7.0	0.0	15.5	15.5	0.0
197	AAA1	105.54	179.9	179.9	0.0	398.6	398.6	0.0
198	AAA2	6.86	9.0	11.0	2.0	19.8	24.2	4.5
199	AAA3	6.99	13.9	17.0	3.0	30.7	37.4	6.7
200	AAA4	14.01	18.2	18.2	0.0	40.0	40.0	0.0
201	BBB1	17.18	32.4	32.4	0.0	71.8	71.8	0.0
202	BBB2	2.38	3.8	4.2	0.3	8.4	9.1	0.7
203	BBB3	2.22	4.3	4.8	0.4	9.6	10.6	1.0
204	BBB4	4.43	7.5	7.5	0.0	16.7	16.7	0.0

4.2 Proposed Hydraulics Analysis

The existing XP-SWMM models were modified to establish the proposed conditions models, as follows:

- Revised hydrographs were inserted for the proposed conditions drainage areas.
- The open-ditch systems were re-sized to convey the proposed flows.
- The ditch flowlines were revised.
- The existing cross culverts have capacity to convey the proposed flow, so the sizes remained unchanged.

4.3 Outfall Loading Analysis

A comparison between existing and proposed 2-year and 100-year outfall loadings at different outfalls were made to see if the proposed improvements have any adverse impact on the receiving channel. The XP-SWMM output does not indicate any significant flow impact to the receiving channels. **Table 4-4** compares the outfall flow rates between existing and proposed conditions.

Table 4-4 Outfall Flow Comparison – Existing Vs Proposed

OUTFALL FLOW COMPARISON						
Node	2 Year			100 Year		
	Existing	Proposed	Difference	Existing	Proposed	Diff
A-OUTFALL	182.3	182.1	-0.2	400.8	400.3	-0.5
B-OUTFALL	116.9	116.7	-0.2	258.7	258.3	-0.4
C-OUTFALL	23.4	23.3	0.0	51.6	51.5	-0.1
D-OUTFALL	29.2	29.1	-0.1	50.2	50.1	-0.1
E-OUTFALL	27.3	27.2	-0.1	60.2	60.0	-0.2
F-OUTFALL	81.2	81.0	-0.3	179.9	179.2	-0.6
G-OUTFALL	19.8	19.7	-0.1	43.5	43.3	-0.2
H-OUTFALL	62.2	61.6	-0.6	136.8	135.4	-1.4
I-OUTFALL	30.4	30.3	-0.2	80.2	77.6	-2.7
J-OUTFALL	37.7	37.3	-0.4	33.1	32.7	-0.5
K-OUTFALL	19.3	18.9	-0.3	42.4	41.7	-0.7
L-OUTFALL	17.5	17.3	-0.2	38.4	38.1	-0.4
M-OUTFALL	30.3	29.5	-0.8	56.0	55.7	-0.4
O-OUTFALL	51.9	51.1	-0.8	114.4	112.6	-1.8
P-OUTFALL	19.9	19.1	-0.8	43.9	42.2	-1.7
Q-OUTFALL	29.7	28.8	-1.0	66.0	63.8	-2.2
S-OUTFALL	27.4	26.4	-1.0	59.2	58.2	-1.0
T-OUTFALL	9.0	8.7	-0.2	19.7	19.2	-0.5
U-OUTFALL	31.6	31.3	-0.3	69.2	68.6	-0.6
V-OUTFALL	25.8	25.0	-0.8	56.7	56.7	0.0
W-OUTFALL	23.1	21.8	-1.3	50.9	48.0	-2.9
X-OUTFALL	8.3	8.1	-0.2	18.2	17.8	-0.4
Y-OUTFALL	12.1	12.0	-0.2	26.6	26.3	-0.4
Z-OUTFALL	54.5	53.0	-1.5	120.5	117.2	-3.3
AA-OUTFALL	13.0	12.7	-0.3	28.7	27.9	-0.7
BB-OUTFALL	28.1	30.5	2.3	36.5	36.1	-0.4
CC-OUTFALL	33.4	32.3	-1.1	73.4	71.1	-2.3
DD-OUTFALL	192.4	191.0	-1.3	424.5	421.6	-2.9
EE-OUTFALL	60.3	59.7	-0.6	133.5	132.1	-1.4
FF-OUTFALL	9.9	9.2	-0.7	22.0	20.7	-1.3
GG-OUTFALL	11.0	10.4	-0.6	24.6	23.5	-1.0
HH-OUTFALL	10.9	10.7	-0.2	24.4	24.1	-0.3
II-OUTFALL	20.6	20.2	-0.4	46.0	45.4	-0.6

OUTFALL FLOW COMPARISON						
Node	2 Year			100 Year		
	Existing	Proposed	Difference	Existing	Proposed	Diff
JJ-OUTFALL	140.7	141.1	0.4	311.7	312.79	1.1
LL-OUTFALL	119.5	117.6	-1.9	264.8	260.65	-4.1
NN-OUTFALL	107.7	105.8	-1.8	236.5	232.57	-3.9
OO-OUTFALL	32.5	31.5	-1.1	72.1	69.71	-2.4
PP-OUTFALL	24.3	23.7	-0.6	53.9	52.61	-1.2
QQ-OUTFALL	39.0	29.2	-9.8	65.6	64.29	-1.3
RR-OUTFALL	16.9	17.3	0.4	37.4	38.43	1.0
SS-OUTFALL	16.6	16.3	-0.3	37.0	36.26	-0.7
TT-OUTFALL	70.86	70.9	0.0	155.8	152.29	-3.5
UU-OUTFALL	6.53	6.4	-0.2	14.5	14.15	-0.4
WW-OUTFALL	26.52	26.2	-0.4	58.8	58.03	-0.7
XX-OUTFALL	12.00	11.8	-0.2	26.8	26.39	-0.4
UU-OUTFALL	45.85	43.9	-2.0	101.3	96.94	-4.4
ZZ-OUTFALL	16.22	15.8	-0.4	35.7	34.87	-0.9
AAA-OUTFALL	187.52	190.6	3.1	415.5	422.31	6.8
BBB-OUTFALL	36.03	36.5	0.5	79.8	80.82	1.1

4.4 Detention Calculations

Increase in runoff volume due to the proposed roadway improvements is provided through oversizing the proposed ditches. **Table 4-5** shows the detention volume required, and additional volume provided as in-line detention to offset the increased runoff volume.

The 100-year rainfall event hydrographs for existing and proposed conditions for each drainage area produced using the Small Watershed Method were overlaid and compared. The storage volume required for the increase in the runoff was estimated by calculating the area under the proposed hydrograph and existing hydrograph as illustrated in **Figure 4.1.**

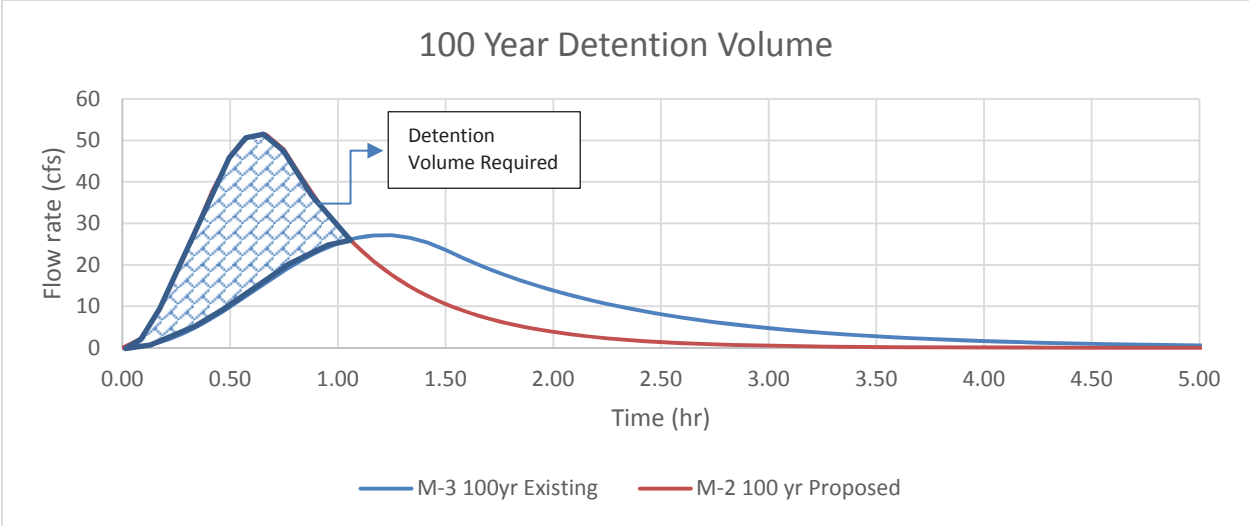


Figure 4.1 Detention Volume Calculations for each drainage area

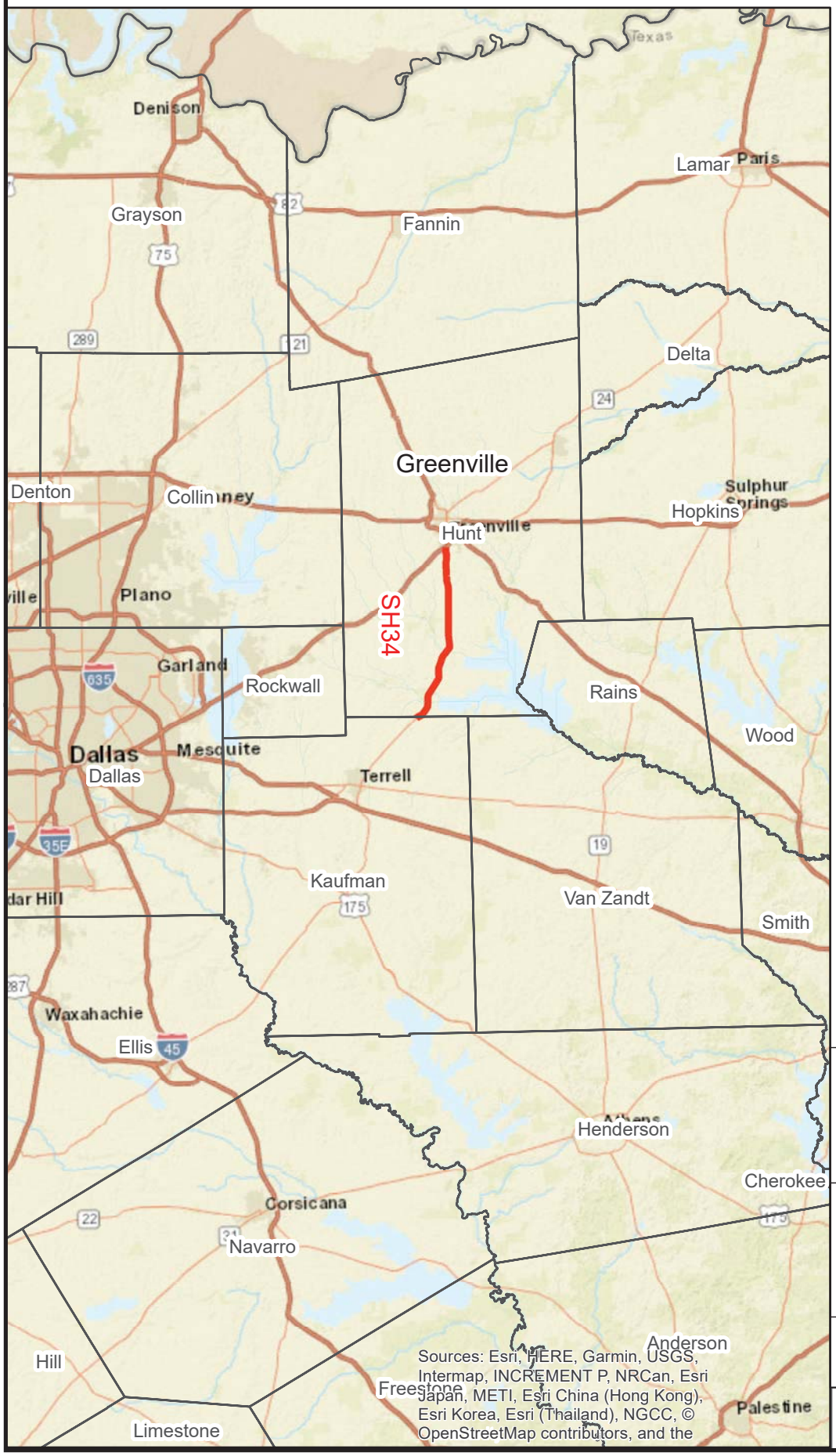
Table 4-5 Detention Volume

	Existing Conditions	Proposed Conditions
Project Length (miles)	19.2	19.2
Project Area ROW (acre)	237.4	307.2
Pavement (acre)	121	191
Detention Volume required (ac-ft)	171.8	
Detention Volume Provided (ac-ft)	180	
Detention Rate (ac-ft/ac)	0.59	

EXHIBITS

Exhibit 1
Vicinity Map

SH34 Feasibility Study



N

0 50,000 Feet

SH34
Project Vicinity Map

Job Number:
18008.02
Prepared By:
DSU

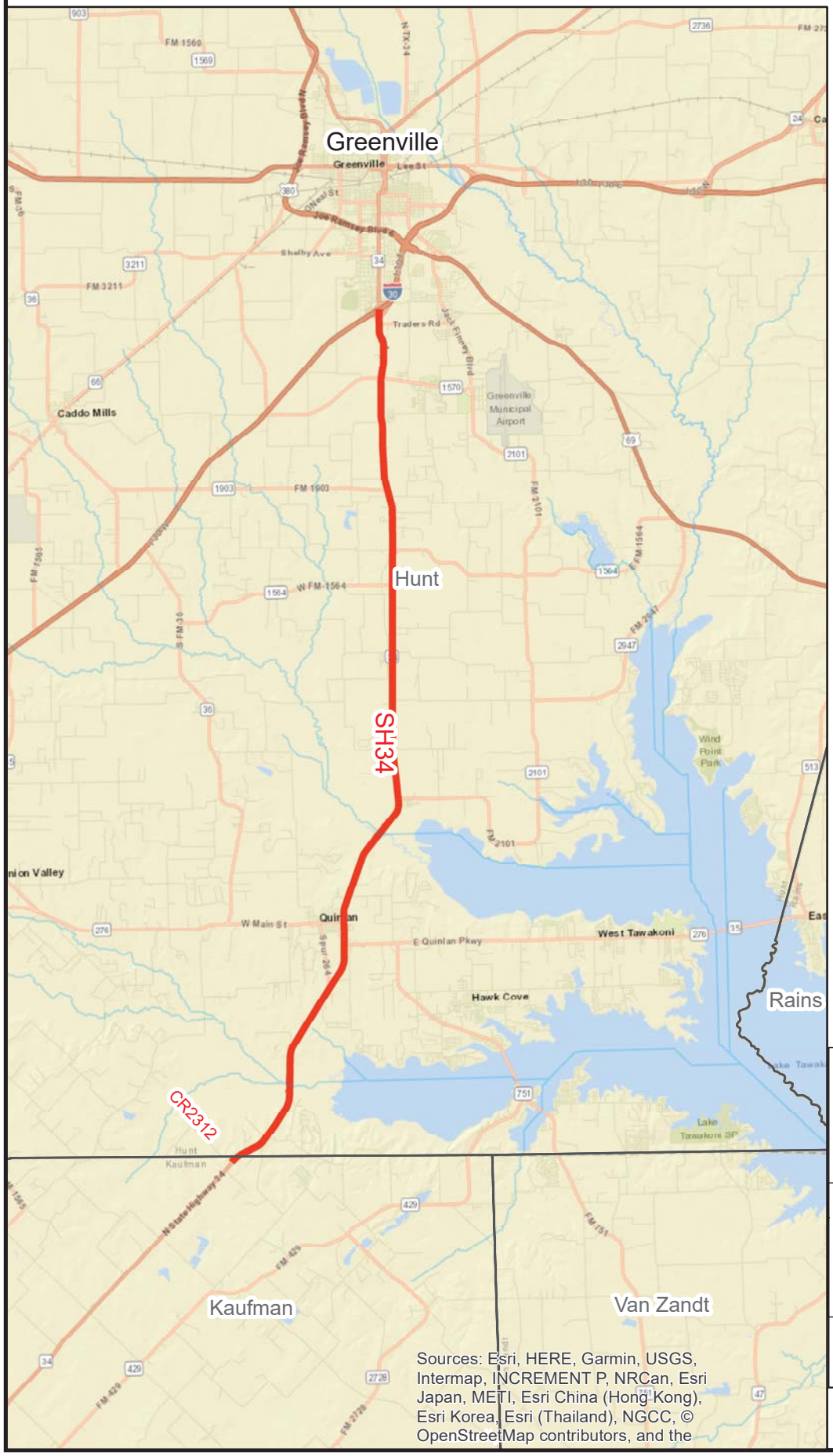
Date:
Date: 10/11/2019

Exhibit
No: 1

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX01_SH34_Project Vicity Map.mxd

Exhibit 2
Location Map

SH34 Feasibility Study



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0 12,000 Feet

SH34
Project Location Map

Job Number:
18008.02
Prepared By:
DSU

Date:
Date: 10/11/2019

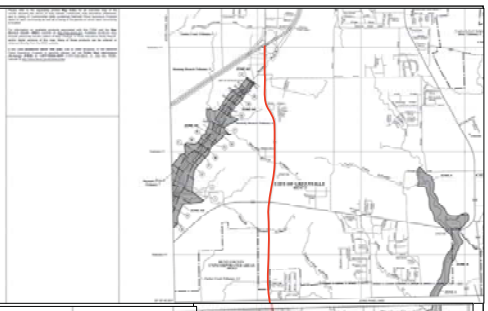
Exhibit
No: 2

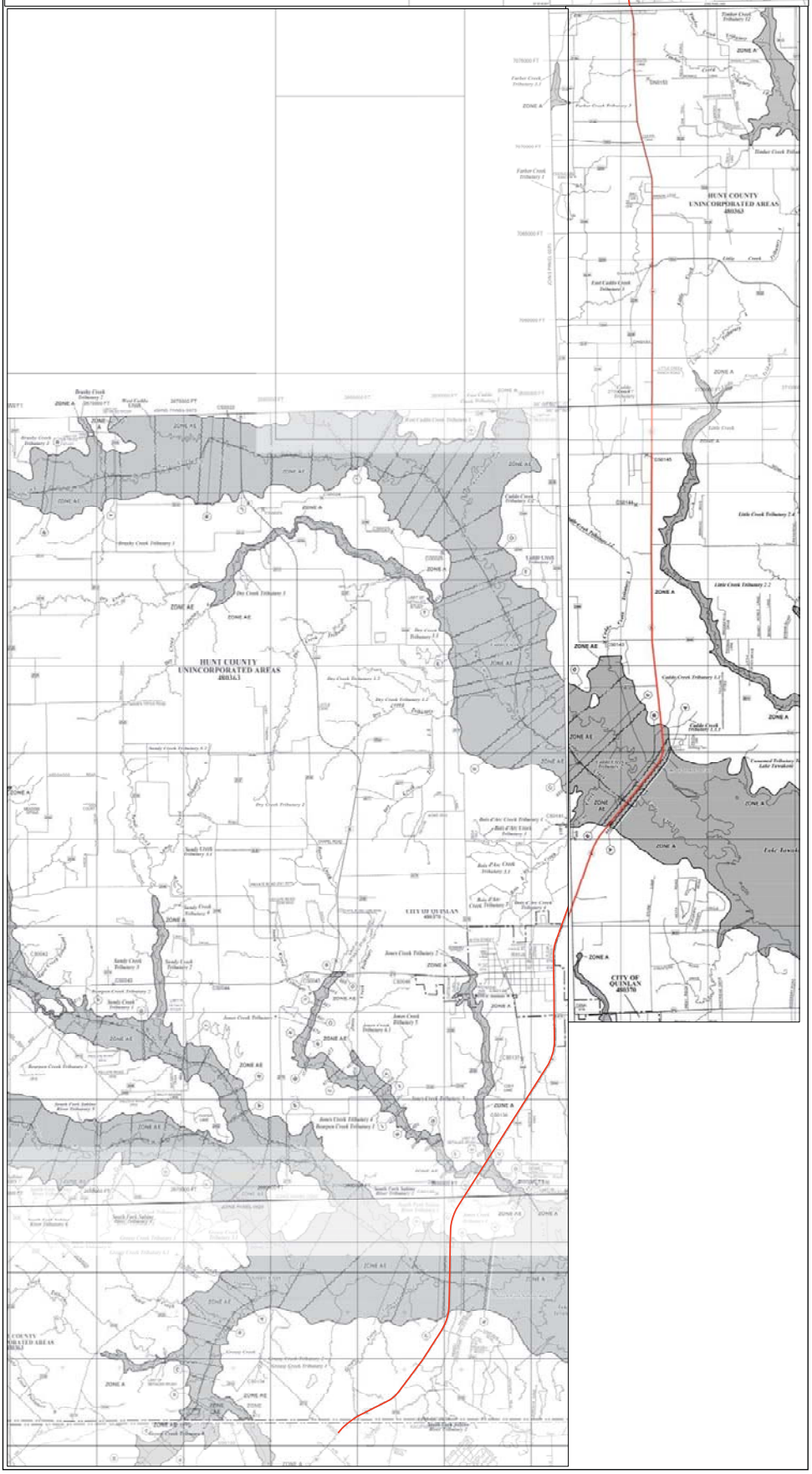
Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX02_SH34_Project Location Map.mxd

Exhibit 3
FEMA Floodplain Map

FLOOD INSURANCE MAP
HUNT COUNTY TEXAS
48231C0380G
48231C0400G
48231C0525G
48231C0500G
48231C0625G
MAP REVISED
JANUARY 6,2012

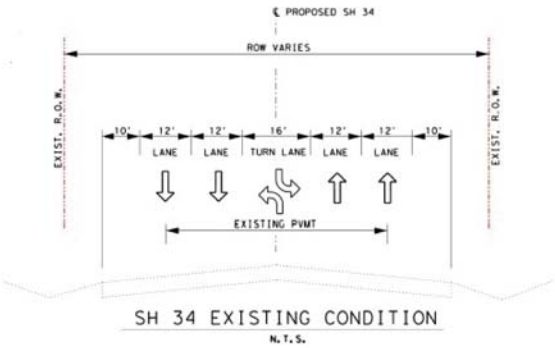
KAUFMAN COUNTY TEXAS
48257C0100D
EFFECTIVE DATE
JULY 3,2012



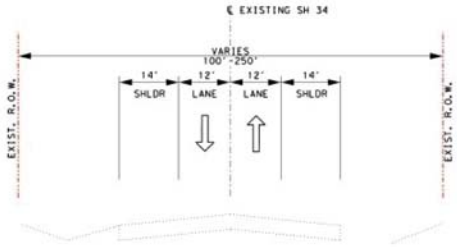


SH34			
FEMA FLOODPLAIN MAP			
Job Number: 18008.02	Date: Date: 8/20/2019	Prepared By: DSU DJK	

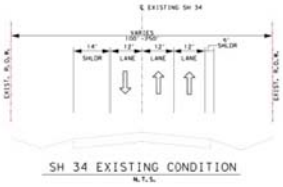
Exhibit 4
Existing Typical Sections



STA 110+26.28 - STA 116+72.00



STA 117+65.50 - STA 164+80.93
STA 182+00.00 - STA 297+30.56
STA 550+00.00 - STA 704+00.00
STA 829+00.00 - STA 889+00.00
STA 908+00.00 - STA 1124+07.13



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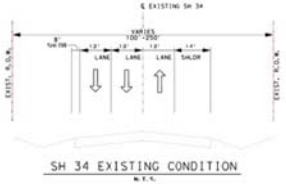

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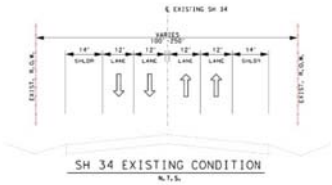

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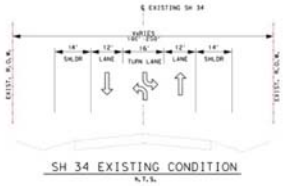
STA 704+00.00 - STA 747+00.00



STA 302+00.00 - STA 535+50.00
STA 761+50.00 - STA 820+00.00
STA 889+00.00 - STA 908+00.00

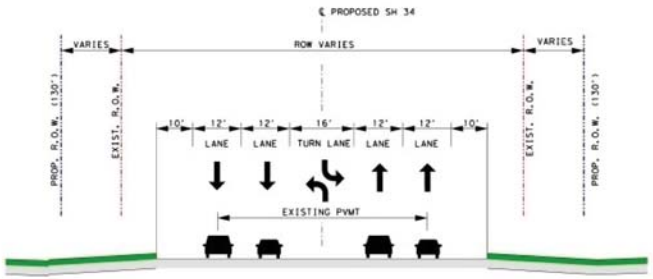
SH34

Existing Typical Cross Sections

Job Number:	Date:	Prepared By:	Exhibit
18008.02	Date: 8/20/2019	DSU	No: 4

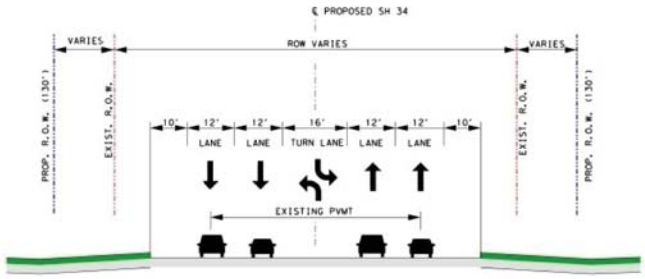
Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX05_Proposed Typical Sections.mxd

Exhibit 5
Proposed Typical Sections



SH 34 PROPOSED CONDITION
N.T.S.

STA 110+26.28 - STA 116+72.00



SH 34 PROPOSED CONDITION
N.T.S.

STA 117+65.50 - STA 164+80.93
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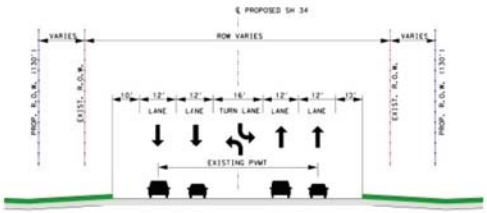

SH 34 PROPOSED CONDITION
N.T.S.

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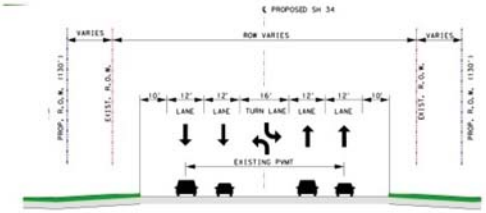

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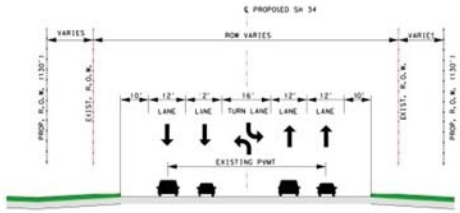

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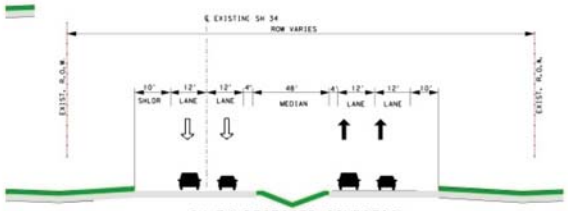

SH 34 PROPOSED CONDITION
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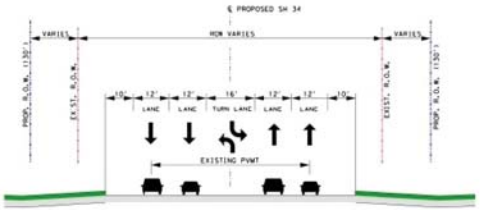
STA 956+00.00 - STA 1015+00.00
STA 1035+00.00 - STA 1124+07.13



SH 34 PROPOSED CONDITION
N.T.S.

STA 302+00.00 - STA 535+50.00
STA 761+50.00 - STA 820+00.00
STA 889+00.00 - STA 908+00.00

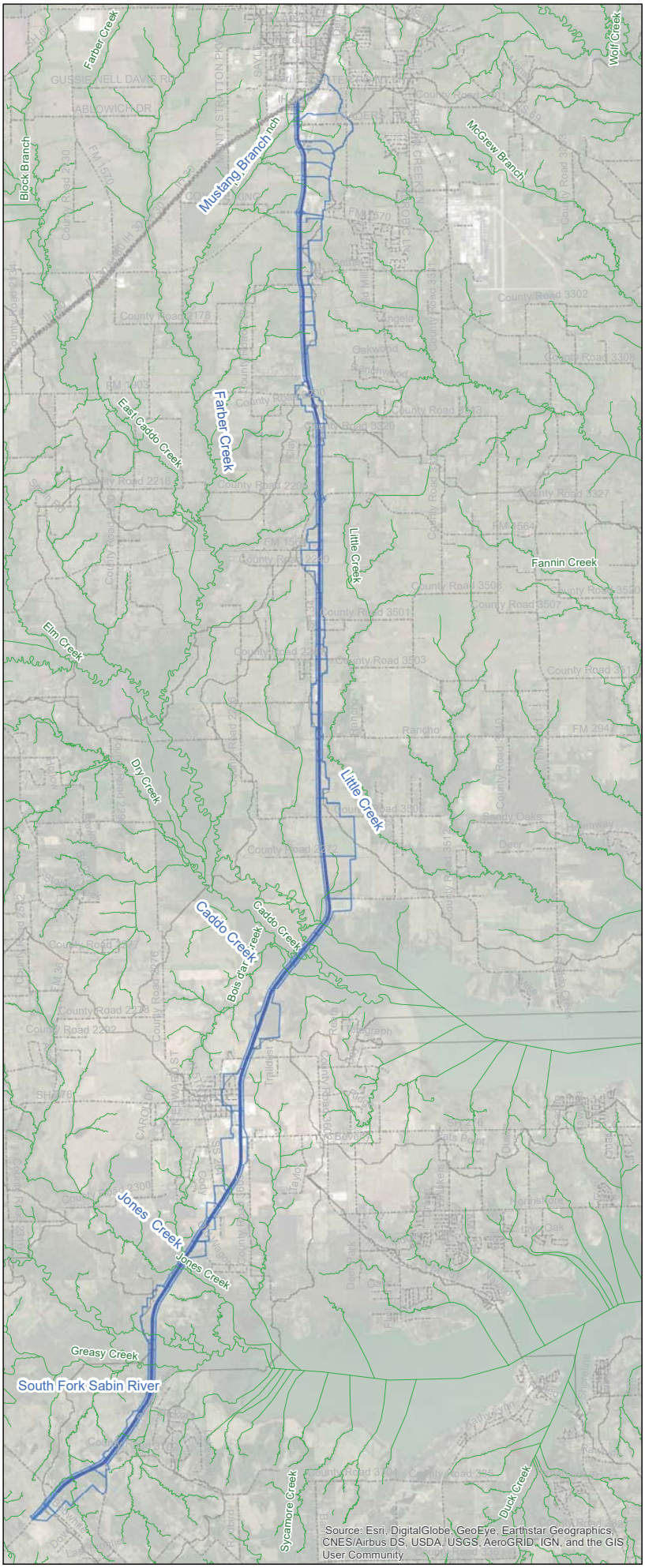
SH34

Proposed Typical Cross Sections

Job Number:	Date:	Prepared By:	Exhibit
18008.02	Date: 8/20/2019	DSU	No: 5

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX05_Proposed Typical Sections.mxd

Exhibit 6
Overall Drainage Area Map



Legend

- EXIST DA
- Rivers_Streams
- Catchment

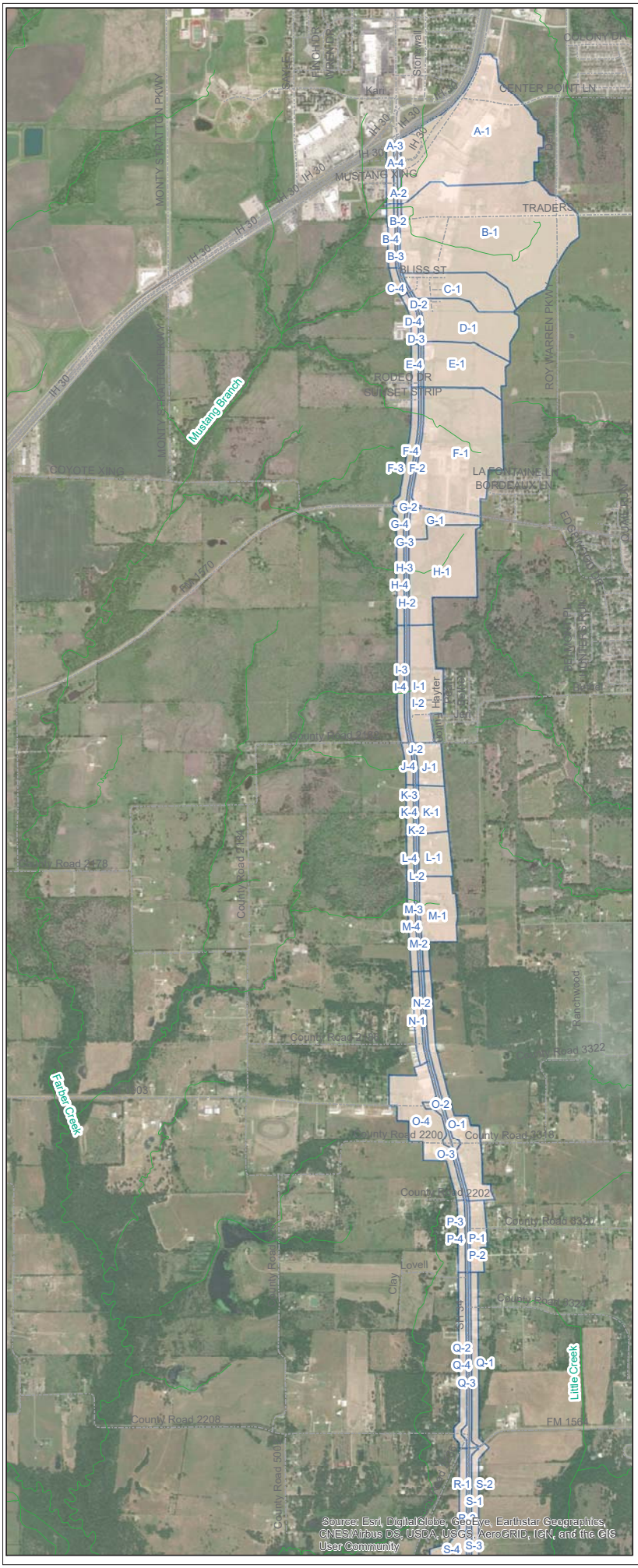
N

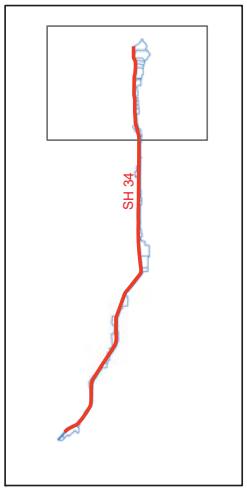
4,000 0 4,000 Feet

SH34			
Overall Drainage Area Map			
Job Number: 18008.02	Date: Date: 8/20/2019	Prepared By: DSU	Exhibit No: 6

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX04_Overall Drainage and Outfalls(11X17).mxd

Exhibit 7
Existing & Proposed Drainage Area Map





Legend

EXIST_PROP_ DA

Rivers_Streams

N

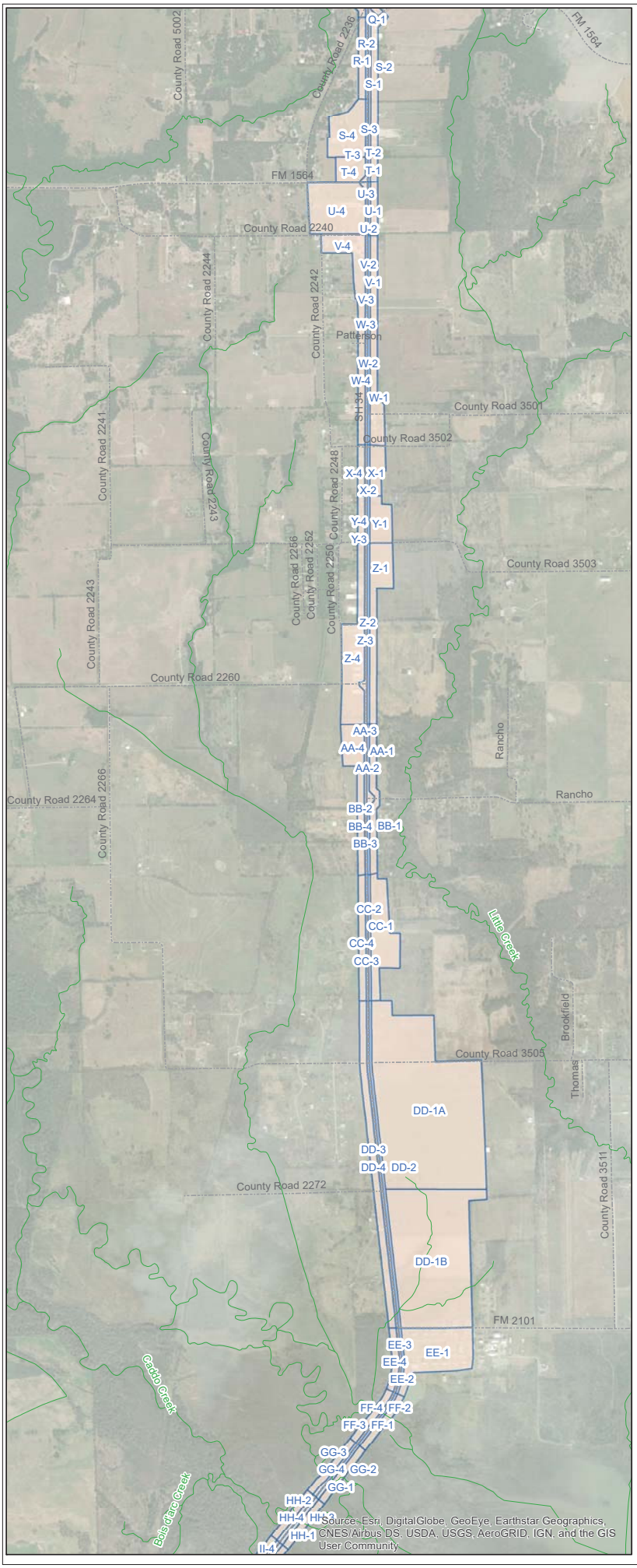
1,000 0 1,000
Feet

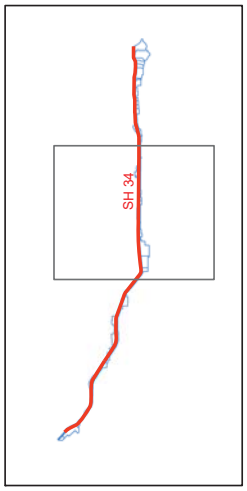
SH34

Existing/Proposed Drainage Area Map
Mustang Branch,Farber Creek

Job Number: 18008.02	Date: Date: 8/21/2019	Prepared By: DSU	Exhibit No: 7-1

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX05-1_EXIST DA_SEC01(11X17)_.mxd





Legend

EXIST PROP_DA

Rivers_Streams

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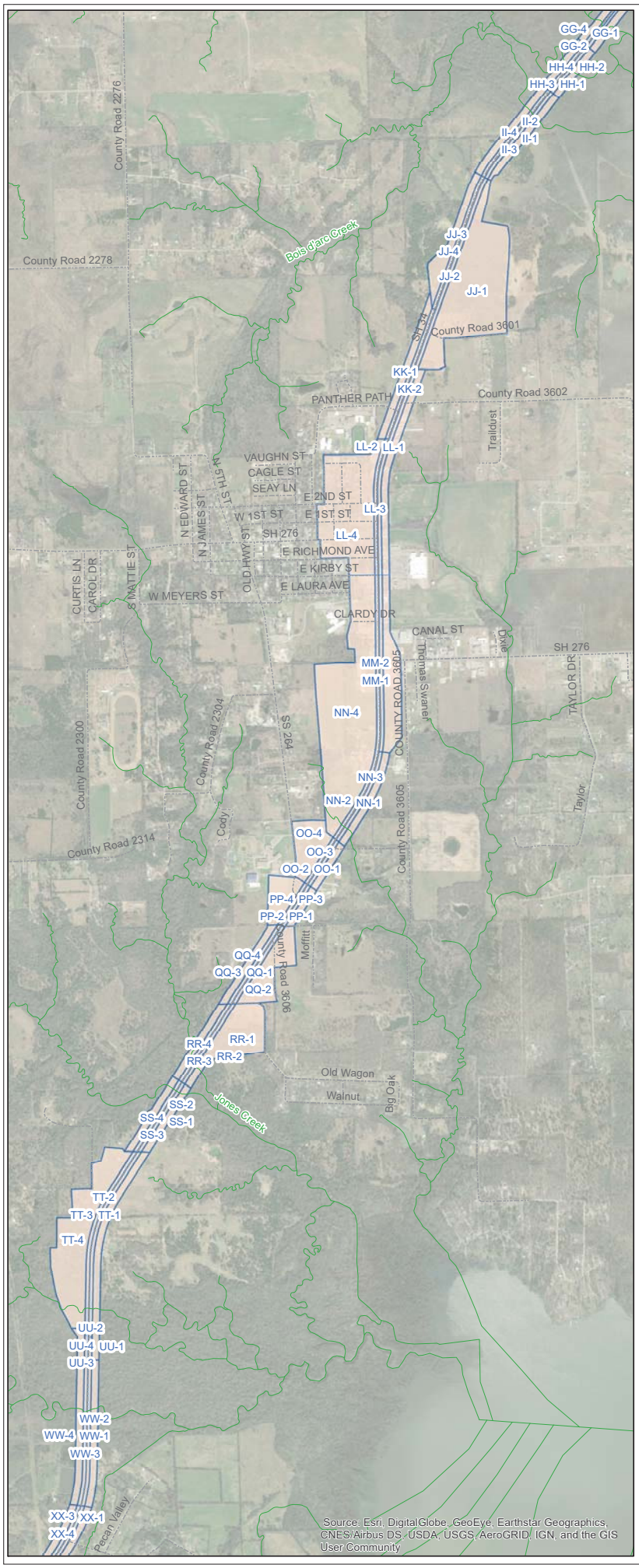
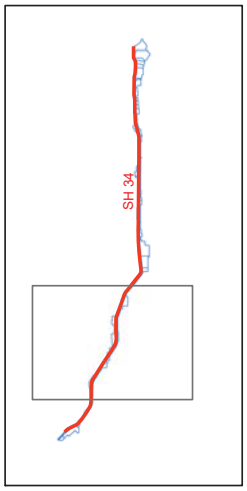
Feet

SH34			
Existing _Proposed Drainage Area Map Caddo Creek			
Job Number: 18008.02	Date: Date: 8/21/2019	Prepared By: DSU	Exhibit No: 7-2

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX05-2_EXIST DA_SEC02(11X17)_.mxd





Legend

EXIST PROP DA

Rivers_Streams

N

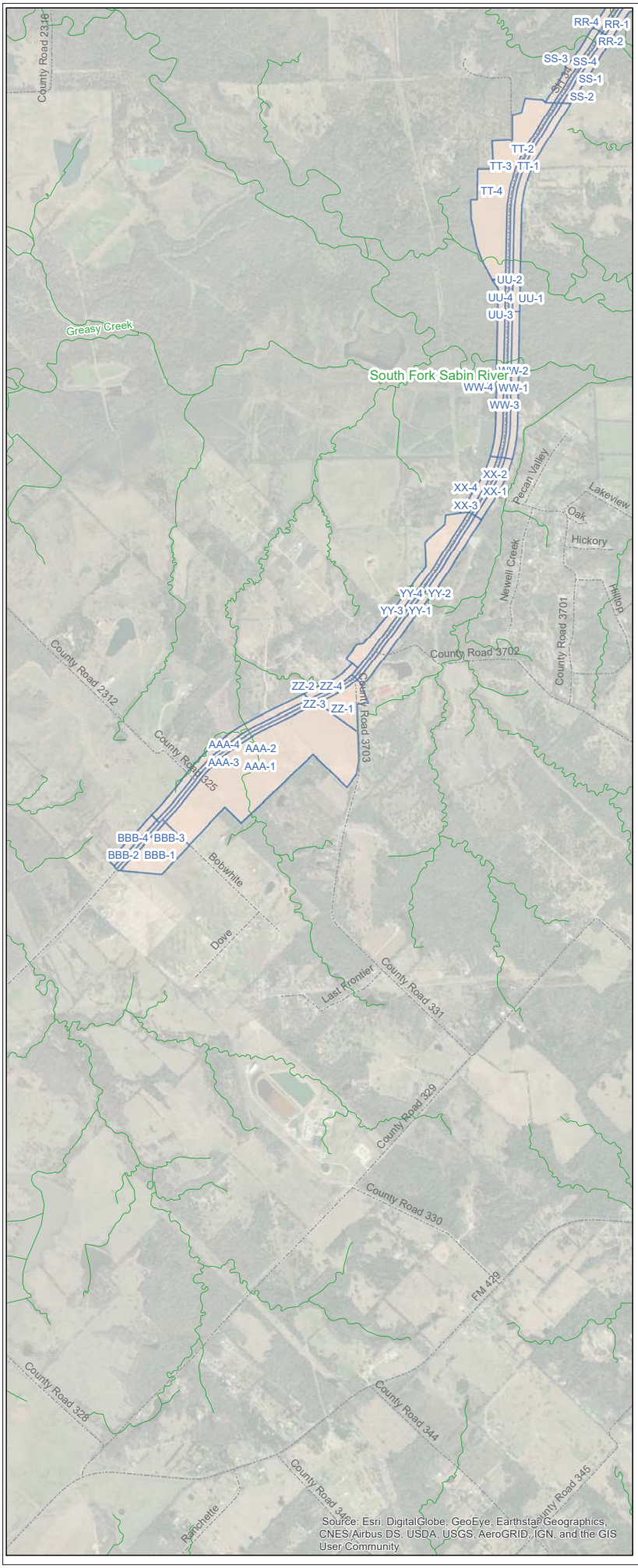
1,000 0 1,000
Feet

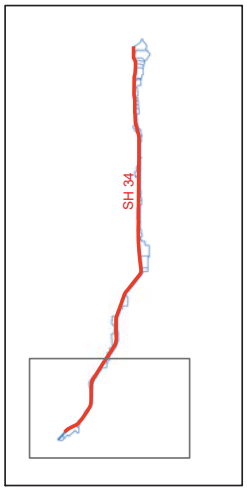
SH34

Existing Proposed Drainage Area Map
Jones Creek

Job Number: 18008.02	Date: Date: 8/21/2019	Prepared By: DSU	Exhibit No: 7-3

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\FinalReport\EX07-3_EXIST PROP DA_SEC03.mxd





Legend

EXIST PROP DA

Rivers_Streams

N

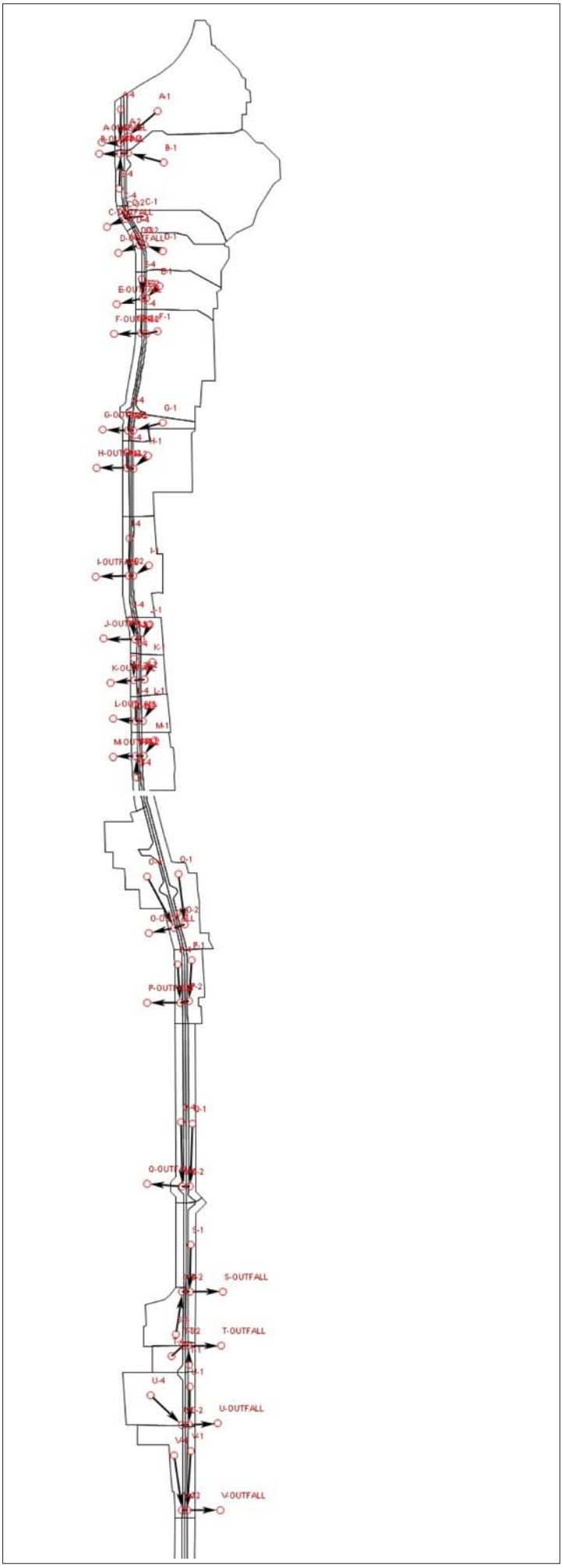
1,000 0 1,000
Feet

SH34			
Existing Proposed Drainage Area Map South Fork Sabin River			
Job Number: 18008.02	Date: Date: 8/21/2019	Prepared By: DSU	Exhibit No: 7-4

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\FinalReport\EX07-4_EXIST PROP DA_SEC04.mxd

APPENDICIES

Appendix A
XP-SWMM Layout

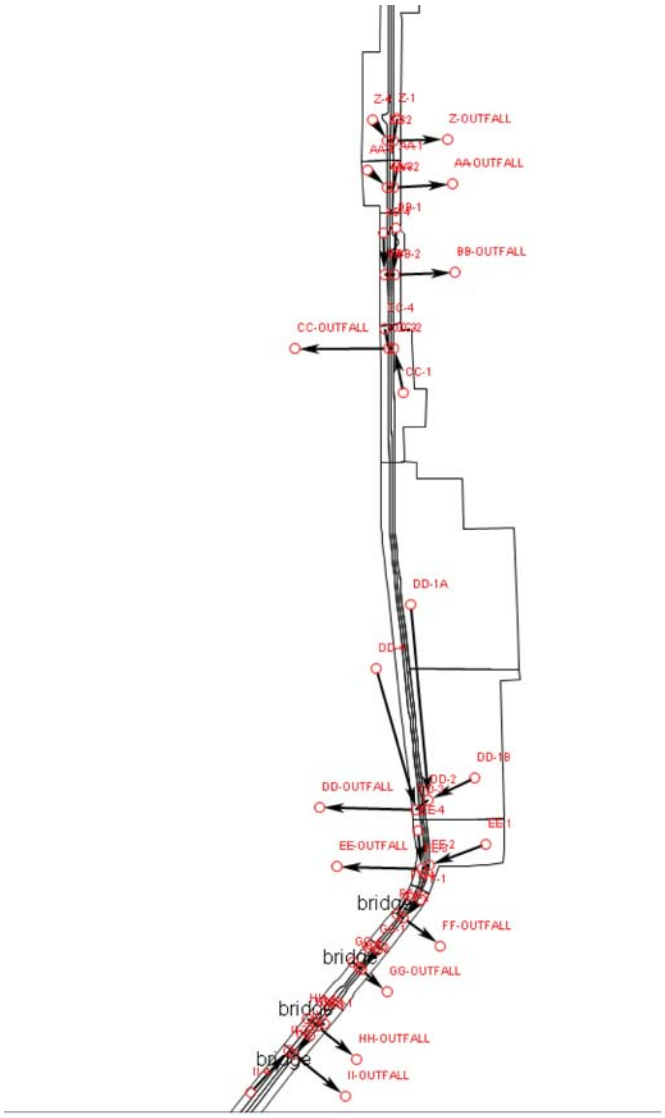


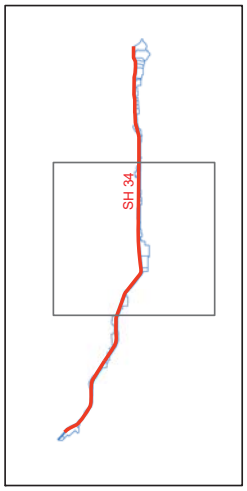
Legend

XP SWMM Node

SH34 Feasibility Study			
Existing Drainage Network XP SWMM Section01			
Job Number: 18008.02	Date: Date: 8/22/2019	Prepared By: DSU DJK	Exhibit No: A-1

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX06-1_XP SWMM Layout _Sec01.mxd





Legend
XP SWMM Node

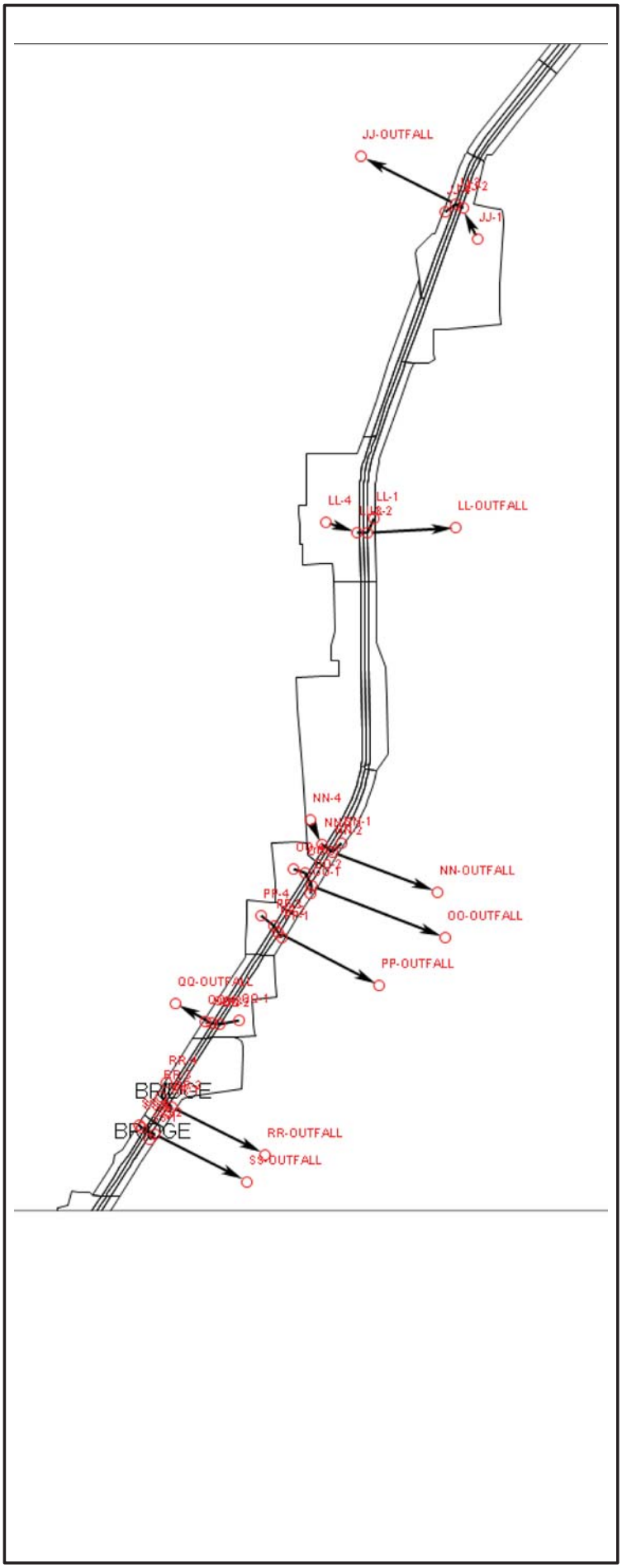
N

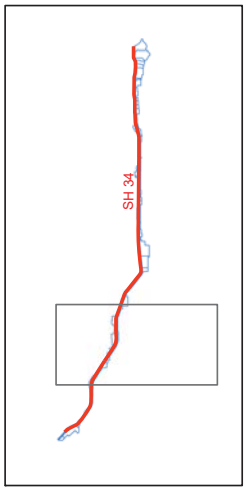
SH34

XP SWMM Model
Existing Drainage Network XP Layout
Caddor Creek

Job Number:	Date:	Prepared By:	Exhibit
18008.02	Date: 8/22/2019	DSU DJK	No: A-2

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX06-2_XP SWMM Layout _Sec02.mxd





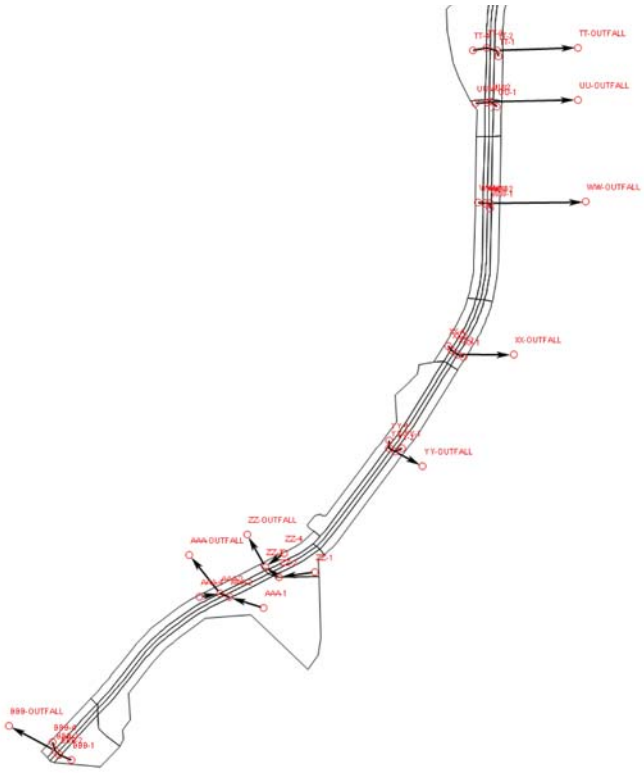
Legend
XP SWMM Node

N

SH34			
XP SWMM Model Existing Drainage Network XP Layout Jones Creek			
Job Number: 18008.02	Date: Date: 8/22/2019	Prepared By: DSU DJK	Exhibit A-3

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX06-3_XP SWMM Layout _Sec03.mxd

Legend
XP SWMM Node



N

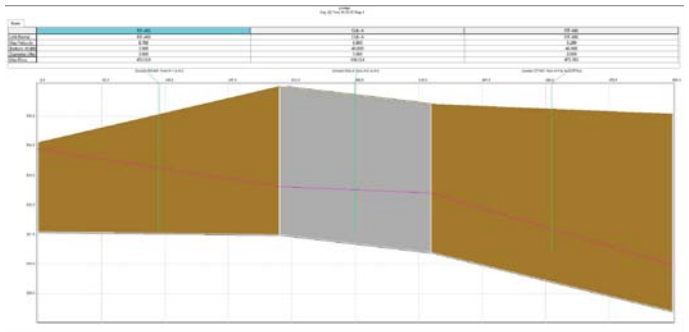
SH34

XP SWMM Model
Existing Drainage Network XP Layout
South Fork Sabin River

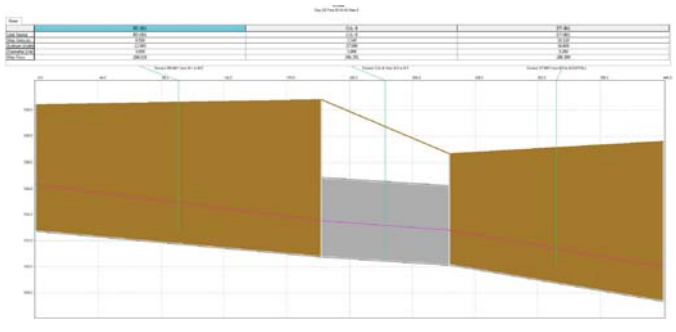
Job Number: 18008.02	Date: Date: 8/22/2019	Prepared By: DSU DJK	Exhibit A-4

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX06-4_XP SWMM Layout _Sec04.mxd

Appendix B
XP-SWMM Profiles



CULV_A

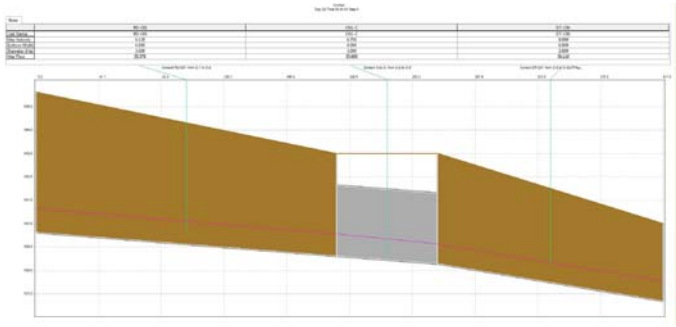


CULV_B

100 YR WSEL

CULVERT

OPEN DITCH



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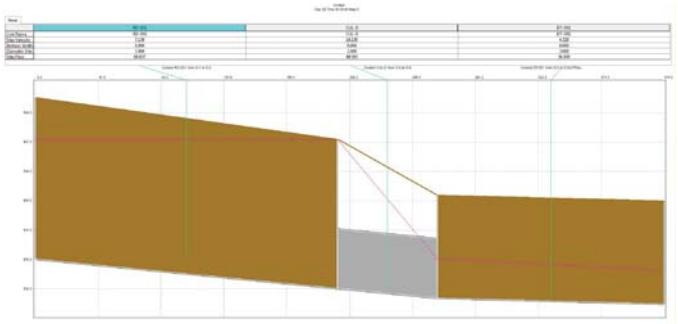

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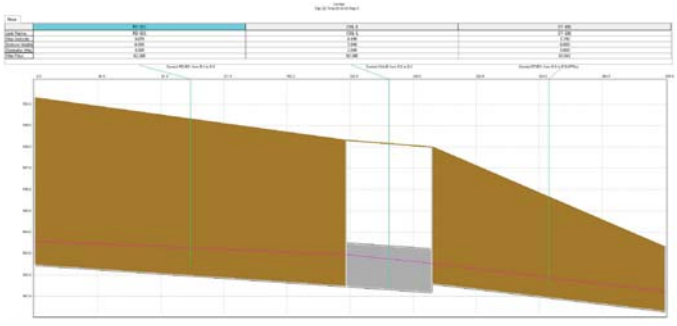

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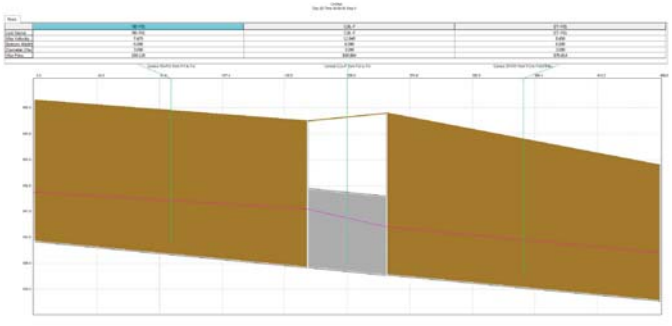
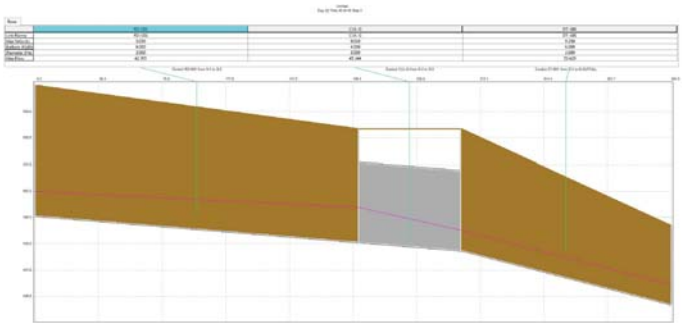


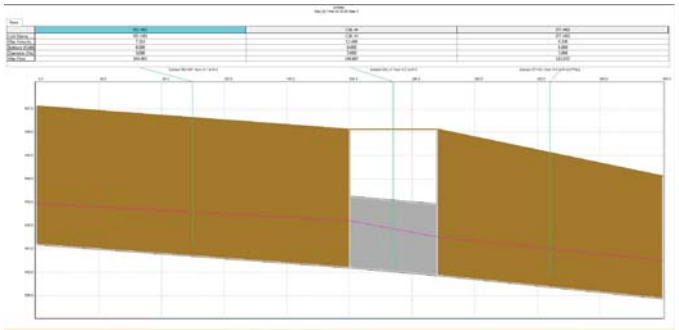
CULV_F

SH34			
Existing Hydraulic Model Output(100YR) Mustang Branch System A to F			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-1

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\MXD\culvert exhibits\7-1 A-F.mxd



CULV_G



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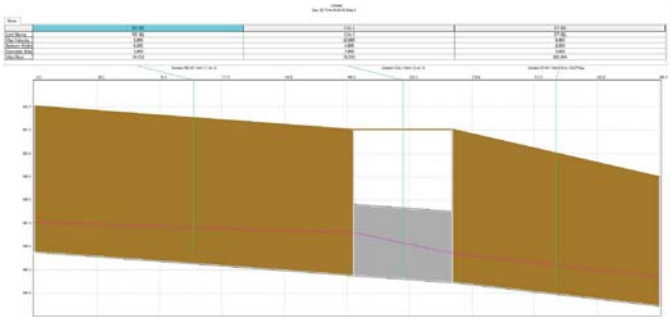

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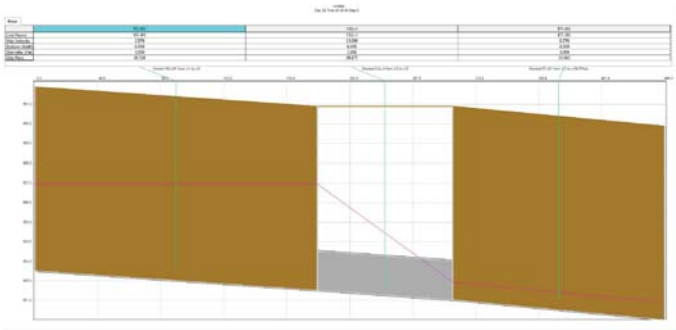

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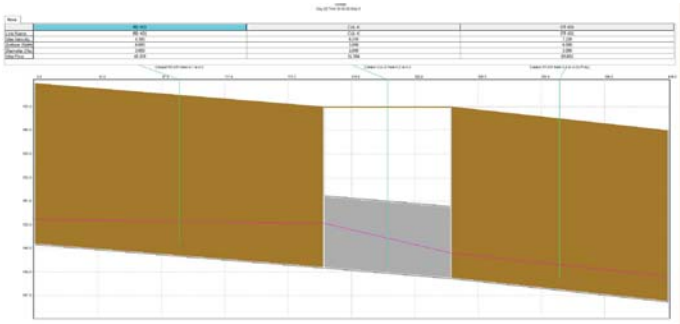

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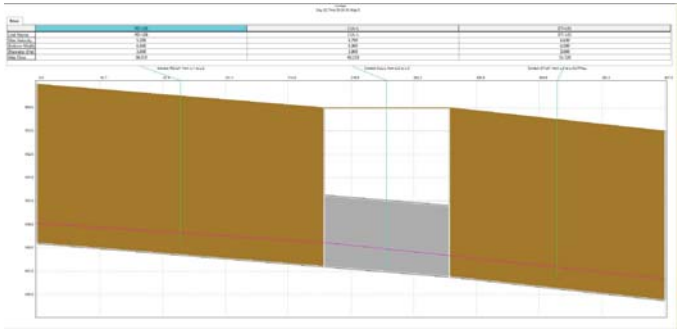


CULV_L

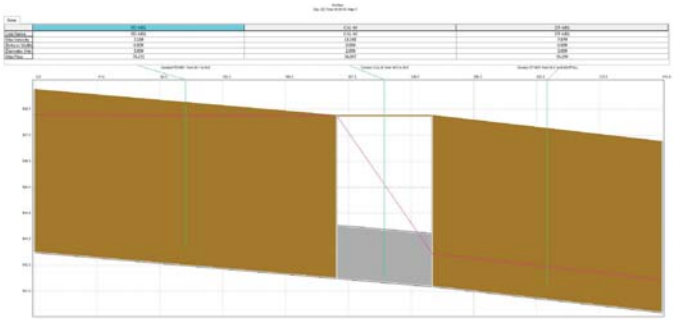
100 YR WSEL

CULVERT

OPEN DITCH

SH34			
Existing Hydraulic Model Output(100YR) Mustang Branch System G to L			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-2

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\MXD\culvert exhibits\7-2 G-L.mxd



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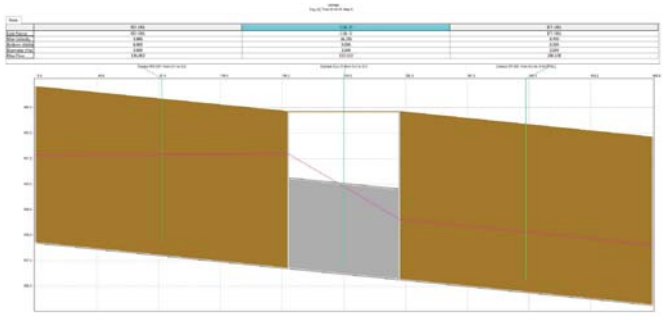

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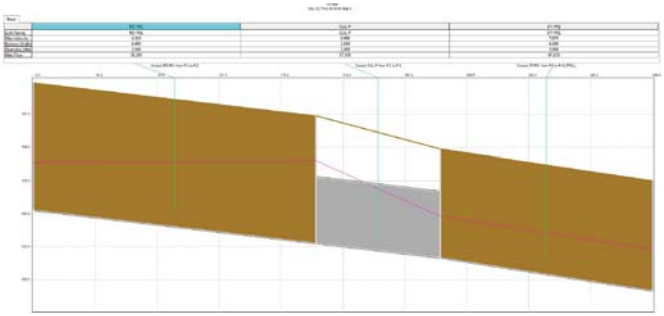
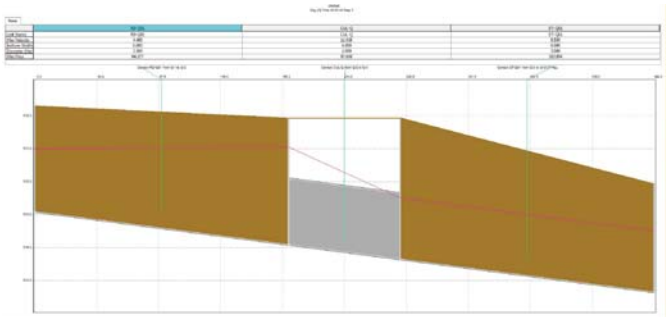
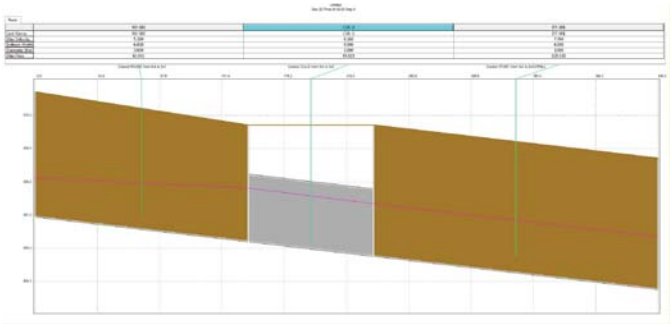


CULV_P



CULV_Q



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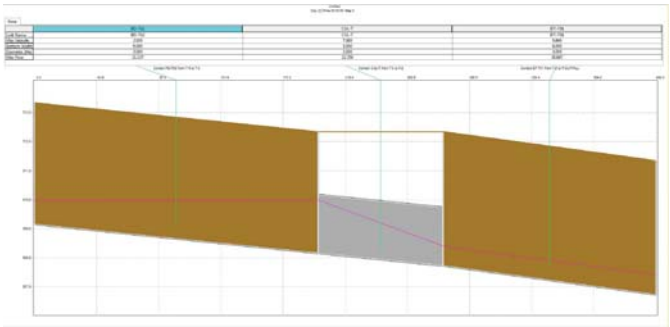


CULV_T

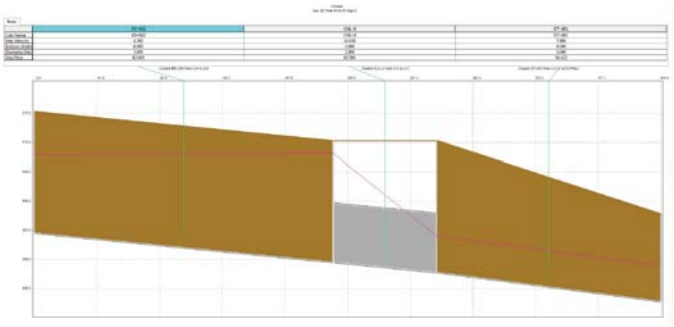
100 YR WSEL

CULVERT

OPEN DITCH

SH34			
Existing Hydraulic Model Output(100YR) Mustang Branch/ Farber Creek System M to T			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-3

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\MXD\culvert exhibits\7-3 M-T.mxd



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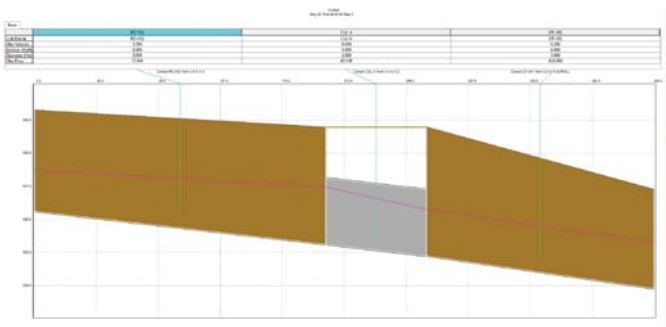
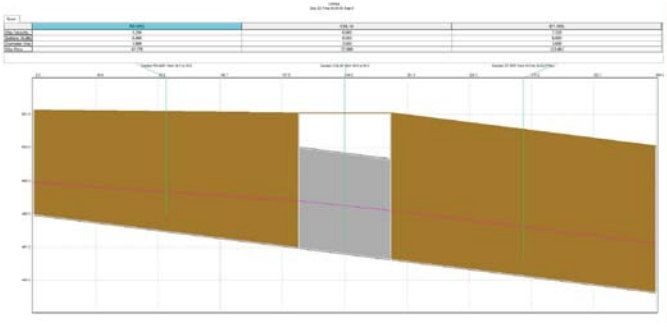
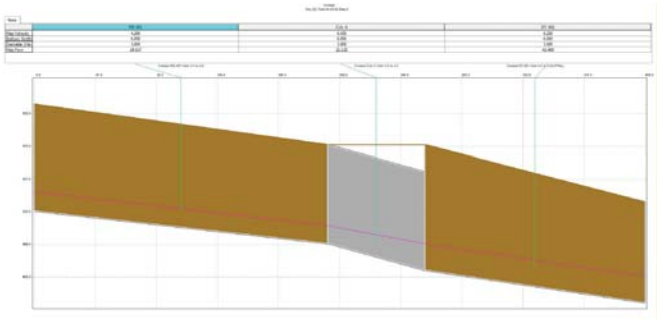


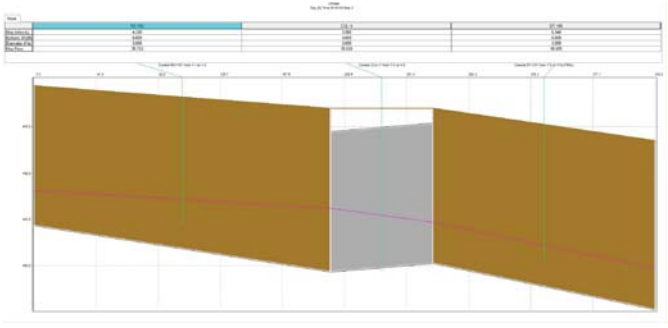
CULV_V



CULV_W



CULV_X



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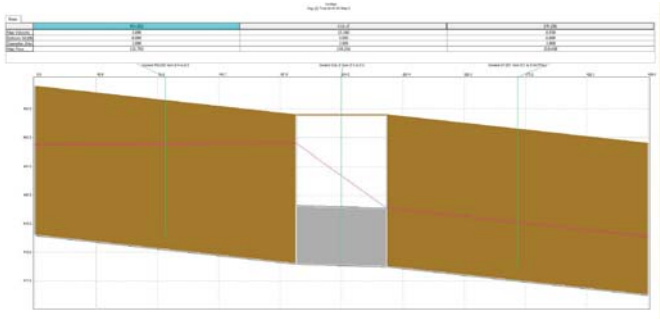


CULV_Z

100 YR WSEL

CULVERT

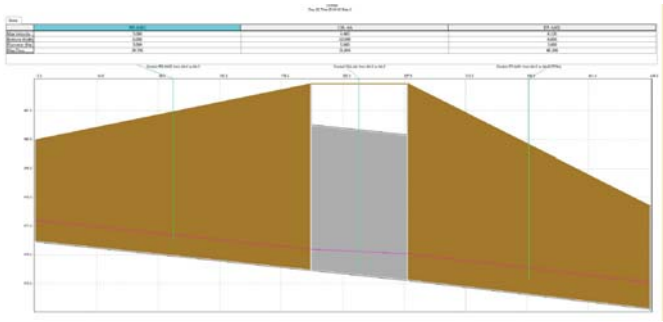
OPEN DITCH

SH34

Existing Hydraulic Model Output(100YR)
Farber Creek/ Caddo Creek
System U to Z

Job Number:	Date:	Prepared By:	Exhibit No:
18008.03	Date: 3/30/2019	DSU	7-4

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\MXD\culvert exhibits\7-4 U-Z.mxd



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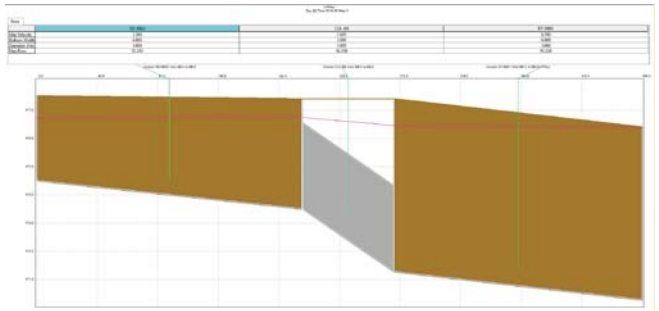
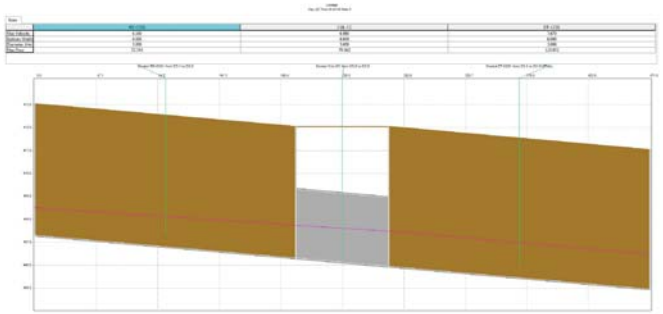


CULV_BB

100 YR WSEL

CULVERT

OPEN DITCH



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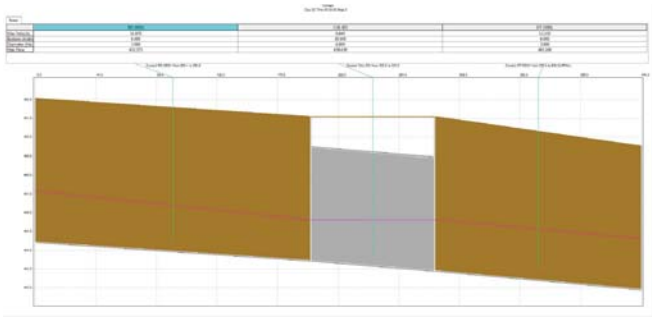

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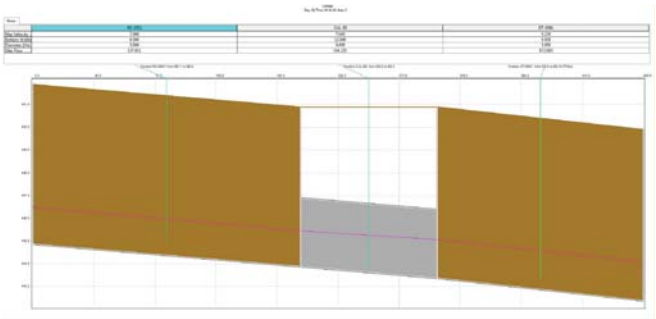

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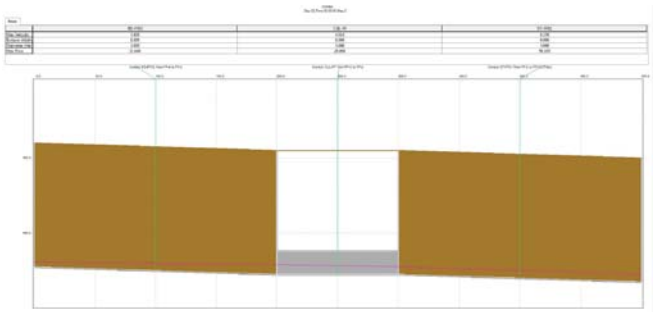
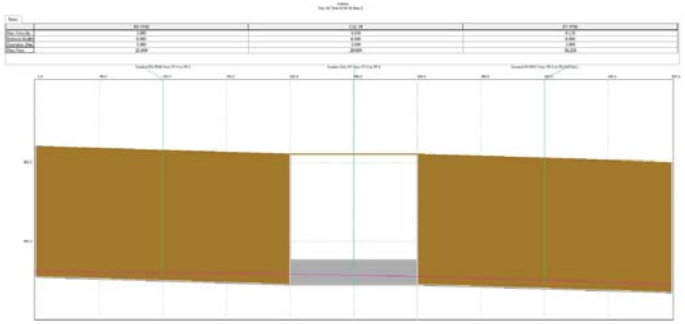


CULV_FF

SH34			
Existing Hydraulic Model Output(100YR) Caddo Creek System AA to EE			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-5

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\MXD\culvert exhibits\7-5 AA-FF.mxd



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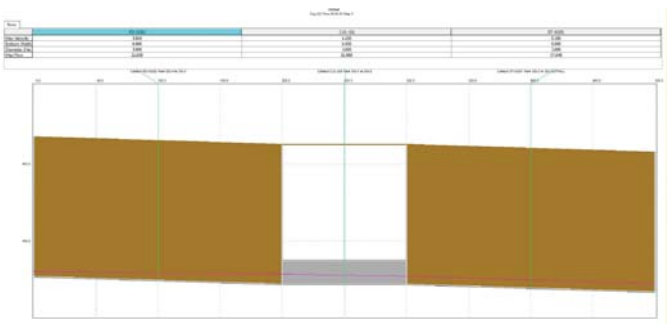
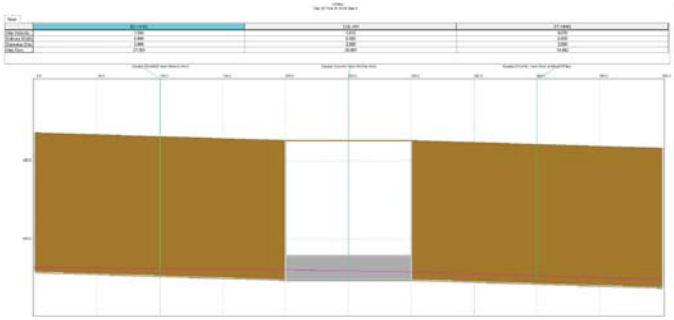


CULV_GG



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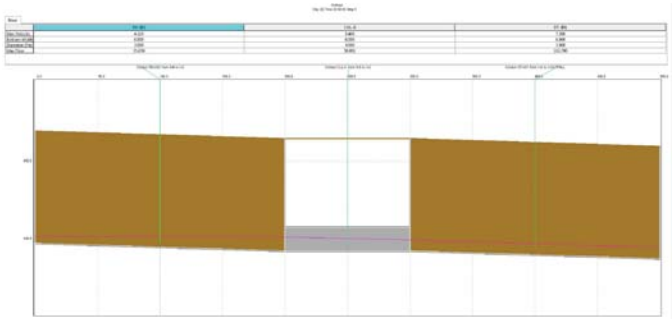

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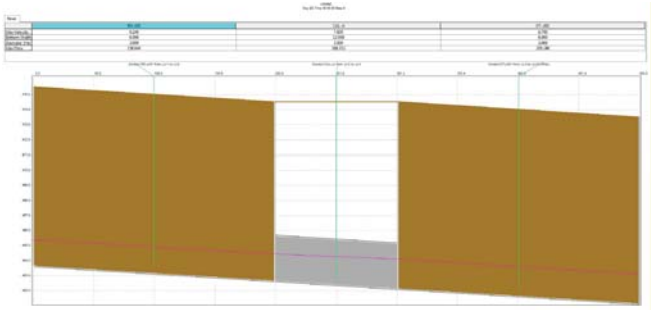

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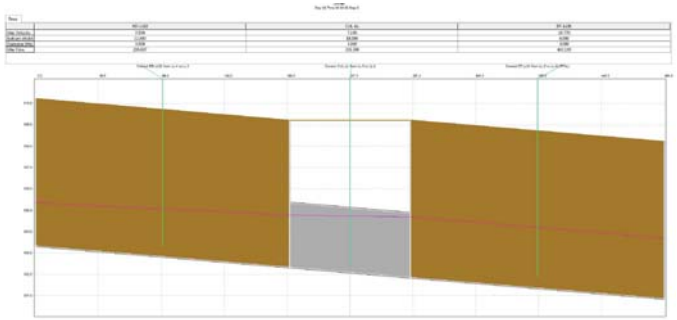


CULV_LL

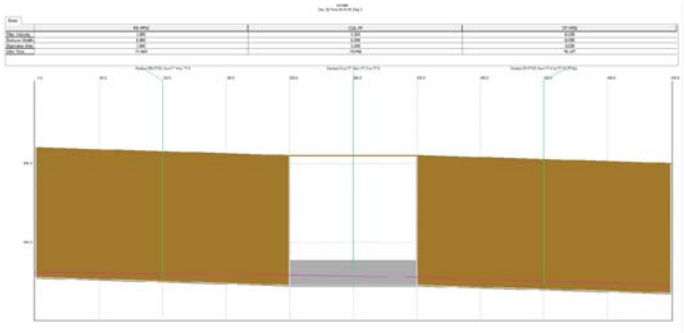
100 YR WSEL

CULVERT

OPEN DITCH

SH34			
Existing Hydraulic Model Output(100YR) Caddo Creek, Jones Creek System FF to LL			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-6

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX07_6_SH34_HGL CULV_Update.mxd



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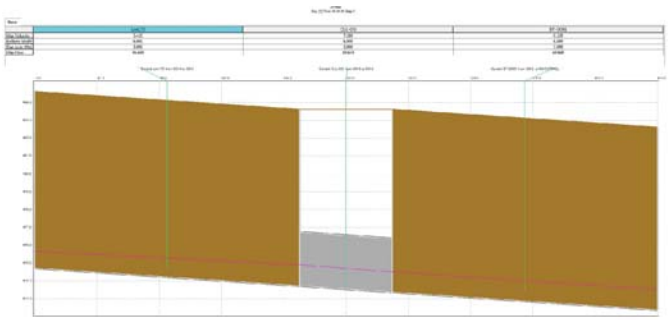

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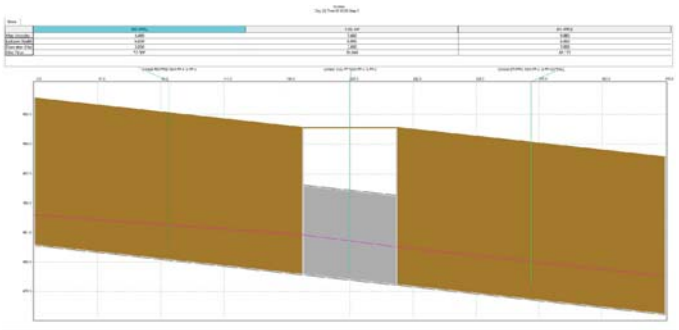
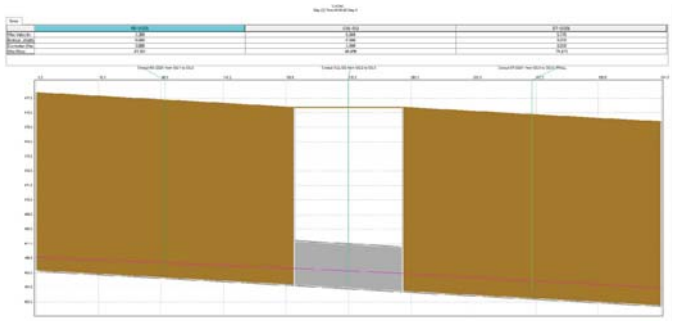


CULV_PP



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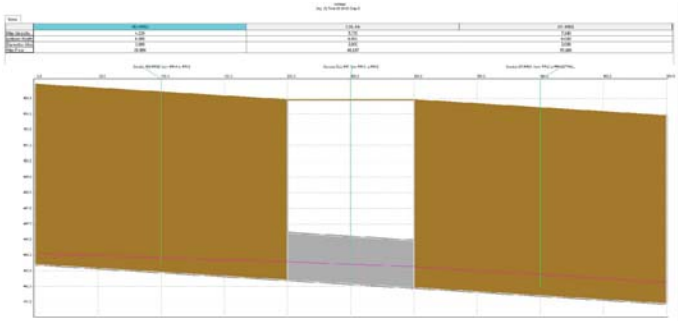

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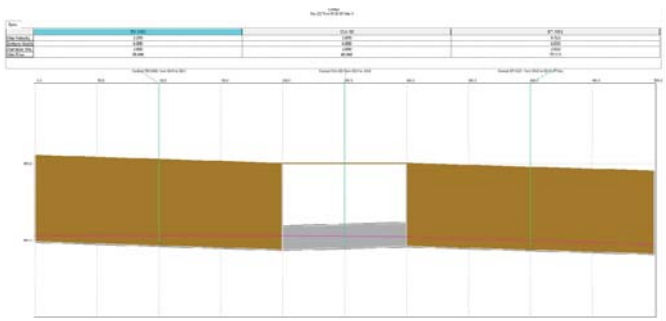


CULV_SS

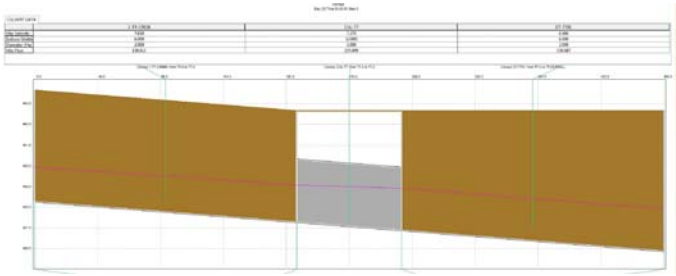
100 YR WSEL

CULVERT

OPEN DITCH

SH34			
Existing Hydraulic Model Output Jones Creek			
Job Number: 18008.03	Date: Date: 3/20/2019	Prepared By: DSU	Exhibit No: 7-7

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX07_6_SH34_HGL CULV_SEC01.mxd



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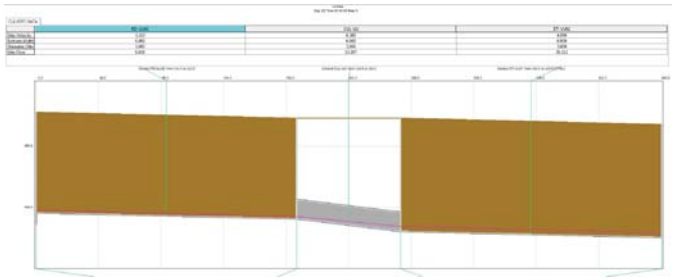

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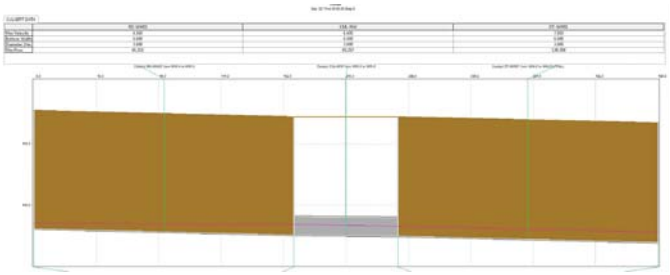

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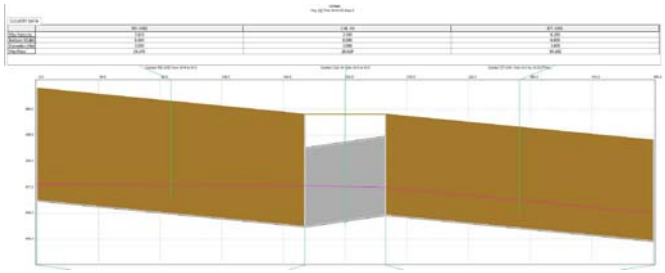

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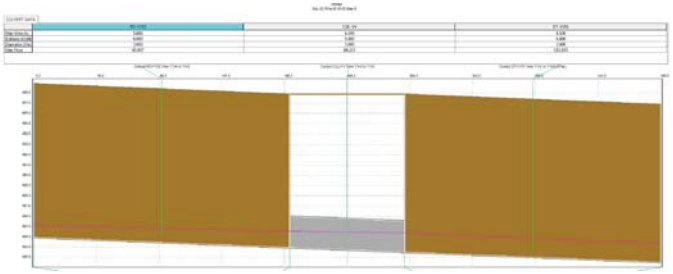

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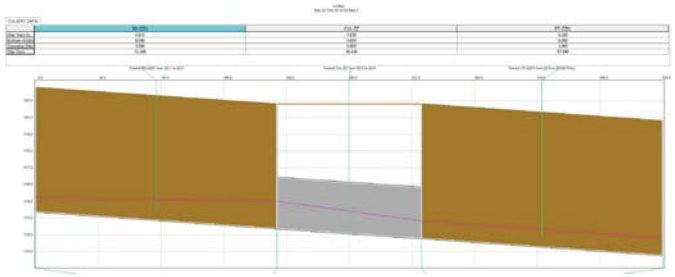


CULV_ZZ

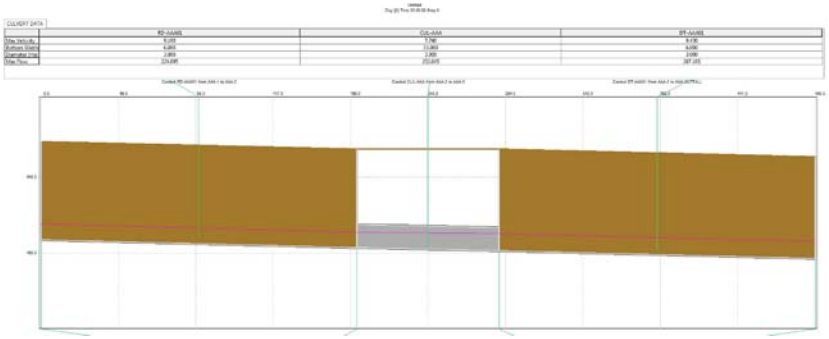
100 YR WSEL

CULVERT

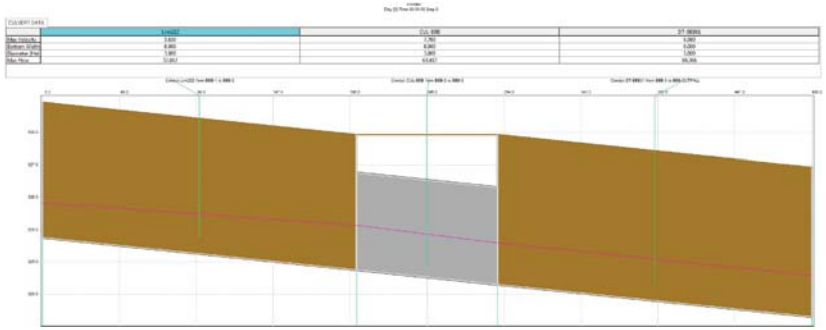
OPEN DITCH

SH34			
Existing Hydraulic Model Output(100YR) Jones Creek, South Fork Sabin River System TT to ZZ			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-8

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX07_8_SH34_HGL CULV_SEC01.mxd



CULV_AAA



CULV_BBB

100 YR WSEL

CULVERT

OPEN DITCH

SH34			
Existing Hydraulic Model Output(100YR) South Fork Sabin River System AAA to BBB			
Job Number: 18008.03	Date: Date: 3/30/2019	Prepared By: DSU	Exhibit No: 7-9

Document Path: P:\2018 Projects\18008-02 TXDOT Paris SH 34 Feasibility Study\GIS\Drainage\MXD\EX07_9_SH34_HGL CULV_SEC01.mxd

Appendix C
XP-SWMM Output

SH 34 SEC-01 : Existing 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-A01	A-1	A-2	Trapezoidal	3	3	200	0.014	531.10	531.00	178.48	6.63	533.07	531.88
CUL-A	A-2	A-3	Rectangular	5	40	125	0.014	531.00	530.40	182.35	4.98	531.88	531.63
RD-A02	A-4	A-3	Trapezoidal	3	40	200	0.014	532.10	530.40	7.13	1.70	532.30	531.63
DT-A01	A-3	A-OUTFALL	Trapezoidal	2	10	200	0.040	530.40	528.40	192.80	3.71	531.63	529.28
RD-B01	B-1	B-2	Trapezoidal	3	12	200	0.014	531.40	530.40	116.60	6.99	532.52	531.22
CUL-B	B-2	B-3	Rectangular	3	27	90	0.014	530.40	530.10	116.88	5.30	531.22	530.89
DT-B01	B-3	B-OUTFALL	Trapezoidal	3	16	150	0.014	530.10	528.70	118.98	7.90	530.89	529.49
RD-B02	B-4	B-3	Trapezoidal	1	3	200	0.014	533.27	530.10	7.77	4.20	533.57	530.89
RD-C01	C-1	C-2	Trapezoidal	3	6	200	0.014	539.64	538.64	23.30	4.11	540.28	539.74
RD-C02	C-4	C-3	Trapezoidal	3	3	67	0.014	539.97	538.30	3.54	2.58	540.15	538.82
DT-C01	C-3	C-OUTFALL	Trapezoidal	3	6	150	0.014	538.30	536.70	24.45	6.18	538.82	537.22
CUL-C	C-2	C-3	Rectangular	3	6	200	0.014	538.64	538.30	23.37	7.44	539.74	538.82
DT-D01	D-3	D-OUTFALL	Trapezoidal	3	6	200	0.014	541.70	541.50	30.75	3.59	542.68	542.31
CUL-D	D-2	D-3	Circular	2	9	66	0.014	542.03	541.70	29.16	9.37	544.37	542.68
RD-D01	D-1	D-2	Trapezoidal	3	6	150	0.014	543.03	542.03	29.05	3.13	544.33	544.37
RD-D02	D-4	D-3	Trapezoidal	3	6	200	0.014	542.70	541.70	6.19	2.46	543.00	542.68
DT-E01	E-3	E-OUTFALL	Trapezoidal	3	6	200	0.014	541.60	540.30	28.79	6.07	542.21	540.91
CUL-E	E-2	E-3	Rectangular	2	5	55	0.014	541.48	541.20	27.29	5.59	542.45	542.21
RD-E02	E-4	E-3	Trapezoidal	3	6	150	0.014	547.00	541.60	5.22	3.97	547.16	542.21
RD-E01	E-1	E-2	Trapezoidal	3	6	200	0.014	542.48	541.48	27.13	4.54	543.18	542.45
RD-F01	F-1	F-2	Trapezoidal	3	6	200	0.014	539.86	538.86	80.75	6.32	541.13	540.35
CUL-F	F-2	F-3	Rectangular	3	6	58	0.014	538.86	538.57	81.24	9.22	540.35	539.86
DT-F01	F-3	F-OUTFALL	Trapezoidal	3	6	200	0.014	538.58	537.58	87.31	6.96	539.86	538.86
RD_F02	F-4	F-3	Trapezoidal	3	6	200	0.014	540.09	538.58	14.89	3.84	540.53	539.86
RD-G01	G-1	G-2	Trapezoidal	3	6	200	0.014	549.08	548.08	18.53	4.06	549.64	548.89
CUL-G	G-2	G-3	Rectangular	3	4	63	0.014	548.08	547.76	19.78	6.32	548.89	548.23
DT-G01	G-3	G-OUTFALL	Trapezoidal	3	6	130	0.014	547.76	545.70	24.33	7.06	548.23	546.16
RD-G02	G-4	G-3	Trapezoidal	3	6	200	0.014	551.00	547.76	3.63	2.99	551.15	548.23
RD-H01	H-1	H-2	Trapezoidal	3	6	200	0.014	541.22	540.22	60.97	5.96	542.31	541.44
CUL-H	H-2	H-3	Rectangular	3	6	56	0.014	540.22	539.89	62.19	8.62	541.44	540.94
DT-H01	H-3	H-OUTFALL	Trapezoidal	3	6	144	0.014	539.89	538.89	70.72	7.37	540.94	539.94
RD-H02	H-4	H-3	Trapezoidal	3	6	200	0.014	540.90	539.89	10.47	3.03	541.30	540.94
RD-I01	I-1	I-2	Trapezoidal	3	6	200	0.014	545.79	544.79	30.21	4.65	546.54	545.85
CUL-I	I-2	I-3	Rectangular	3	4	62	0.014	544.79	544.48	30.40	7.42	545.85	545.21
DT-I01	I-3	I-OUTFALL	Trapezoidal	3	6	130	0.014	544.48	543.48	38.27	6.36	545.21	544.21
RD-I02	I-4	I-3	Trapezoidal	3	6	200	0.014	545.48	544.48	14.16	3.75	545.96	545.21
RD-J01	J-1	J-2	Trapezoidal	3	6	200	0.014	552.52	551.52	38.19	2.89	556.78	556.79
CUL-J	J-2	J-3	Circular	2	6	96	0.014	551.52	551.04	37.70	12.67	556.79	551.85
DT-J01	J-3	J-OUTFALL	Trapezoidal	3	6	150	0.014	551.04	550.00	43.50	6.38	551.85	550.81
RD-J02	J-4	J-3	Trapezoidal	3	6	200	0.014	552.04	551.04	5.11	2.23	552.30	551.85
RD-K01	K-1	K-2	Trapezoidal	3	6	200	0.014	549.20	548.20	18.67	3.82	549.77	549.24

SH 34 SEC-01 : Existing 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
CUL-K	K-2	K-3	Rectangular	3	3	88	0.014	548.20	547.76	19.26	6.43	549.24	548.39
DT-K01	K-3	K-OUTFALL	Trapezoidal	3	6	150	0.014	547.76	546.76	27.01	5.44	548.39	547.39
RD-K02	K-4	K-3	Trapezoidal	3	6	200	0.014	548.76	547.76	6.03	2.63	549.05	548.39
RD-L01	L-1	L-2	Trapezoidal	3	6	200	0.014	548.22	547.22	17.18	4.16	548.75	547.82
CUL-L	L-2	L-3	Rectangular	3	6	87	0.014	547.22	546.78	17.50	4.84	547.82	547.34
DT-L01	L-3	L-OUTFALL	Trapezoidal	3	6	150	0.014	546.78	545.78	22.16	5.11	547.34	546.34
RD-L02	L-4	L-3	Trapezoidal	3	6	100	0.014	547.78	546.78	5.00	2.96	547.99	547.34
RD-M01	M-1	M-2	Trapezoidal	3	6	200	0.014	542.52	541.52	29.16	3.16	544.13	544.16
CUL-M	M-2	M-3	Circular	2	9	63	0.014	541.52	541.20	30.29	10.29	544.16	542.00
DT-M01	M-3	M-OUTFALL	Trapezoidal	3	6	152	0.014	541.20	540.20	41.40	6.17	542.00	541.00
RD-M02	M-4	M-3	Trapezoidal	3	6	200	0.014	542.20	541.20	11.52	3.37	542.62	542.00
RD-O01	O-1	O-2	Trapezoidal	3	6	200	0.014	537.72	536.72	42.36	4.01	538.74	538.69
RD-O02	O-4	O-3	Trapezoidal	4	9	88	0.014	537.28	536.28	42.68	5.27	538.16	537.64
CUL-O	O-2	O-3	Circular	3	6	200	0.014	536.72	536.28	51.91	9.67	538.69	537.64
DT-O01	O-3	O-OUTFALL	Trapezoidal	3	6	150	0.014	536.28	535.28	98.19	7.19	537.64	536.64
RD-P01	P-1	P-2	Trapezoidal	3	6	200	0.014	534.11	533.11	17.60	3.70	534.66	534.17
CUL-P	P-2	P-3	Rectangular	2	3	88	0.014	533.11	532.67	19.88	6.46	534.17	533.35
DT-P01	P-3	P-OUTFALL	Trapezoidal	3	6	150	0.014	532.67	531.67	31.22	5.69	533.35	532.35
RD-P02	P-4	P-3	Trapezoidal	3	6	200	0.014	533.67	532.67	8.73	3.08	534.03	533.35
RD-Q01	Q-1	Q-2	Trapezoidal	3	6	200	0.014	515.09	514.09	21.20	3.93	515.71	515.24
CUL-Q	Q-2	Q-3	Rectangular	2	4	88	0.014	514.09	513.65	29.74	6.51	515.24	514.71
DT-Q01	Q-3	Q-OUTFALL	Trapezoidal	3	6	200	0.014	513.65	512.65	60.54	6.27	514.71	513.70
RD-Q02	Q-4	Q-3	Trapezoidal	3	6	200	0.014	514.65	513.65	21.80	4.08	515.27	514.71
RD-S01	S-1	S-2	Trapezoidal	3	6	150	0.014	506.78	505.78	17.36	4.02	507.29	506.72
DT-S01	S-2	S-OUTFALL	Trapezoidal	3	6	200	0.014	505.78	504.78	49.20	5.90	506.72	505.72
CUL-S	S-3	S-2	Rectangular	2	5	88	0.014	506.22	505.78	27.44	5.85	507.16	506.72
RD-S02	S-4	S-3	Trapezoidal	3	6	150	0.014	506.97	506.22	25.67	4.41	507.66	507.16
RD-T02	T-4	T-3	Trapezoidal	3	6	200	0.014	509.18	508.18	8.43	2.64	509.53	509.22
CUL-T	T-3	T-2	Circular	3	6	150	0.014	508.18	507.74	8.95	5.83	509.22	508.14
DT-T01	T-2	T-OUTFALL	Trapezoidal	2	3	88	0.014	507.74	506.74	12.26	4.21	508.14	507.14
RD-T01	T-1	T-2	Trapezoidal	3	6	200	0.014	509.40	508.40	3.45	2.46	509.61	508.60
RD-U02	U-4	U-3	Trapezoidal	3	6	200	0.014	506.92	505.92	30.95	4.35	507.69	507.25
CUL-U	U-3	U-2	Rectangular	3	6	150	0.014	505.92	505.57	31.55	8.25	507.25	506.31
DT-U01	U-2	U-OUTFALL	Trapezoidal	2	3	69	0.014	505.57	504.57	36.20	5.95	506.31	505.31
RD-U01	U-1	U-2	Trapezoidal	3	6	200	0.014	506.57	505.57	6.44	2.65	506.88	506.31
RD-V02	V-4	V-3	Trapezoidal	3	6	200	0.014	506.25	505.25	23.66	4.42	506.90	506.12
CUL-V	V-3	V-2	Rectangular	3	6	156	0.014	505.25	504.91	25.76	6.00	506.12	505.69
DT-V01	V-2	V-OUTFALL	Trapezoidal	2	5	69	0.014	504.91	503.91	39.25	6.02	505.69	504.69
RD-V01	V-1	V-2	Trapezoidal	3	6	200	0.014	505.91	504.91	10.75	3.27	506.31	505.69

SH 34 SEC-02 : Existing 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-W01	W-1	W-2	Trapezoidal	3	6	200	0.014	497.99	496.99	42.56	5.10	498.89	498.26
CUL-W	W-2	W-3	Rectangular	3	6	69	0.014	496.99	496.64	50.91	6.63	498.26	497.96
DT-W01	W-3	W-OUTFALL	Trapezoidal	3	6	200	0.014	496.64	495.64	92.45	7.07	497.96	496.96
RD-W02	W-4	W-3	Trapezoidal	3	6	200	0.014	497.64	496.64	32.22	4.47	498.43	497.96
RD-X01	X-1	X-2	Trapezoidal	3	6	200	0.014	500.04	499.04	17.69	4.24	500.60	499.53
CUL-X	X-2	X-3	Rectangular	3	6	66	0.014	499.04	498.22	18.22	6.07	499.53	498.90
DT-X01	X-3	X-OUTFALL	Trapezoidal	3	6	150	0.014	498.22	497.22	31.48	5.70	498.90	497.90
RD-X02	X-4	X-3	Trapezoidal	3	6	200	0.014	499.22	498.22	13.51	3.71	499.68	498.90
RD-Y01	Y-1	Y-2	Trapezoidal	3	6	200	0.014	490.89	489.89	26.10	4.10	491.59	491.17
CUL-Y	Y-2	Y-3	Rectangular	3	4	69	0.014	489.89	490.07	26.64	5.44	491.17	490.83
DT-Y01	Y-3	Y-OUTFALL	Trapezoidal	3	6	150	0.014	490.07	489.07	38.51	6.07	490.83	489.83
RD-Y02	Y-4	Y-3	Trapezoidal	3	6	200	0.014	491.07	490.07	12.63	3.53	491.51	490.83
RD-Z01	Z-1	Z-2	Trapezoidal	3	6	200	0.014	478.53	477.53	24.57	4.23	479.20	478.77
DT-Z01	Z-2	Z-OUTFALL	Trapezoidal	3	6	200	0.014	477.53	476.53	82.11	6.84	478.77	477.77
CUL-Z	Z-3	Z-2	Rectangular	2	5	69	0.014	477.62	477.53	54.60	7.20	479.16	478.77
RD-Z02	Z-4	Z-3	Trapezoidal	3	6	200	0.014	478.62	477.62	46.32	4.91	479.59	479.16
RD-AA01	AA-1	AA-2	Trapezoidal	3	6	200	0.014	476.14	475.14	12.86	3.47	476.59	475.99
DT-AA01	AA-2	AA-OUTFALL	Trapezoidal	3	6	176	0.014	475.14	474.14	42.62	5.91	475.99	474.99
CUL-AA	AA-3	AA-2	Rectangular	5	10	70	0.014	475.49	475.14	28.67	4.27	476.15	475.99
RD-AA02	AA-4	AA-3	Trapezoidal	3	6	200	0.014	476.49	475.49	27.09	4.91	477.18	476.15
RD-BB01	BB-1	BB-2	Trapezoidal	3	6	200	0.014	472.29	471.29	31.24	1.31	476.50	476.46
DT-BB01	BB-2	BB-OUTFALL	Trapezoidal	3	6	187	0.014	471.29	470.29	81.15	1.37	476.46	476.42
CUL-BB	BB-3	BB-2	Circular	3	3	69	0.014	473.52	471.29	36.49	6.59	476.66	476.46
RD-BB02	BB-4	BB-3	Trapezoidal	3	6	200	0.014	474.52	473.52	-28.25	2.10	476.65	476.66
RD-CC01	CC-1	CC-2	Trapezoidal	3	6	200	0.014	467.31	466.31	67.48	5.36	468.52	468.18
CUL-CC	CC-2	CC-3	Rectangular	3	4	71	0.014	466.31	465.95	73.39	10.04	468.18	467.41
DT-CC01	CC-3	CC-OUTFALL	Trapezoidal	3	6	200	0.014	465.95	464.95	113.58	7.49	467.41	466.41
RD-CC02	CC-4	CC-3	Trapezoidal	3	6	200	0.014	466.95	465.95	33.69	4.35	467.77	467.41
RD-DD03	DD-1A	DD-2	Trapezoidal	3	6	200	0.014	443.63	443.47	250.53	6.76	446.34	445.63
RD-DD01	DD-1B	DD-2	Trapezoidal	3	6	200	0.014	444.47	443.47	164.76	7.51	446.32	445.63
CUL-DD	DD-2	DD-3	Rectangular	6	30	90	0.014	443.47	442.92	424.50	6.38	445.63	445.66
DT-DD01	DD-3	DD-OUTFALL	Trapezoidal	3	6	150	0.014	442.92	441.92	472.62	12.18	445.66	444.66
RD-DD02	DD-4	DD-3	Trapezoidal	3	6	200	0.014	443.92	442.92	43.77	2.59	445.62	445.66
RD-EE01	EE-1	EE-2	Trapezoidal	3	6	200	0.014	444.89	443.89	127.36	5.75	446.77	446.81
CUL-EE	EE-2	EE-3	Rectangular	3	4	102	0.014	443.89	443.38	133.53	12.63	446.81	444.99
DT-EE01	EE-3	EE-OUTFALL	Trapezoidal	3	6	154	0.014	443.38	442.38	155.86	8.98	444.99	443.98
RD-EE02	EE-4	EE-3	Trapezoidal	3	6	200	0.014	444.38	443.38	16.92	2.90	445.01	444.99
RD-FF01	FF-1	FF-2	Trapezoidal	3	6	200	0.014	435.58	434.58	17.64	3.90	436.13	435.49
DT-FF01	FF-2	FF-OUTFALL	Trapezoidal	3	6	200	0.014	434.58	433.58	45.83	5.78	435.49	434.49
CUL-FF	FF-3	FF-2	Rectangular	3	6	100	0.014	434.58	434.58	22.01	3.40	435.69	435.49
RD-FF02	FF-4	FF-3	Trapezoidal	3	6	200	0.014	435.58	434.58	16.81	3.60	436.12	435.69

SH 34 SEC-02 : Existing 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-GG01	GG-1	GG-2	Trapezoidal	3	6	200	0.014	435.48	434.48	18.00	3.89	436.03	435.43
DT-GG01	GG-2	GG-OUTFALL	Trapezoidal	3	6	200	0.014	434.48	433.48	49.98	5.93	435.43	434.43
CUL-GG	GG-3	GG-2	Rectangular	3	6	100	0.014	434.48	434.48	24.57	3.62	435.64	435.43
RD-GG02	GG-4	GG-3	Trapezoidal	3	6	200	0.014	435.48	434.48	18.02	3.65	436.04	435.64
RD-HH01	HH-1	HH-2	Trapezoidal	3	6	200	0.014	434.94	434.78	15.52	2.08	435.82	435.71
DT-HH01	HH-2	HH-OUTFALL	Trapezoidal	3	6	200	0.014	434.78	433.78	48.13	5.86	435.71	434.71
CUL-HH	HH-3	HH-2	Rectangular	3	6	100	0.014	434.78	434.78	24.39	3.61	435.93	435.71
RD-HH02	HH-4	HH-3	Trapezoidal	3	6	200	0.014	435.78	434.78	15.49	3.44	436.29	435.93
RD-II01	II-1	II-2	Trapezoidal	3	6	200	0.014	438.48	438.48	27.35	2.67	439.62	439.41
DT-II01	II-2	II-OUTFALL	Trapezoidal	3	6	200	0.014	438.48	437.48	47.88	5.85	439.41	438.41
CUL-II	II-3	II-2	Rectangular	3	6	100	0.014	438.48	438.48	20.69	3.24	439.57	439.41
RD-II02	II-4	II-3	Trapezoidal	3	6	200	0.014	439.48	438.48	13.23	3.24	439.95	439.57

SH 34 SEC-03 : Existing 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-JJ01	JJ-1	JJ-2	Trapezoidal	3	6	200	0.014	463.65	462.65	127.40	7.54	465.22	464.28
CUL-JJ	JJ-2	JJ-3	Rectangular	3	12	102	0.014	462.65	462.14	140.67	7.09	464.28	463.99
DT-JJ01	JJ-3	JJ-OUTFALL	Trapezoidal	3	6	200	0.014	462.14	461.14	182.15	8.52	463.99	462.99
RD-JJ02	JJ-4	JJ-3	Trapezoidal	3	6	200	0.014	463.14	462.14	45.28	4.86	464.12	463.99
RD-LL01	LL-1	LL-2	Trapezoidal	3	6	200	0.014	502.87	501.87	63.26	5.47	504.02	503.74
DT-LL01	LL-2	LL-OUTFALL	Trapezoidal	3	6	200	0.014	501.87	500.87	186.06	8.56	503.74	502.74
CUL-LL	LL-3	LL-2	Rectangular	3	18	95	0.014	502.34	501.87	119.48	4.58	503.75	503.74
RD-LL02	LL-4	LL-3	Trapezoidal	3	12	200	0.014	503.34	502.34	111.96	6.16	504.49	503.75
RD-NN01	NN-1	NN-2	Trapezoidal	3	6	200	0.014	475.39	474.39	8.85	1.98	475.87	475.87
DT-NN01	NN-2	NN-OUTFALL	Trapezoidal	3	6	200	0.014	474.39	473.39	116.41	7.54	475.87	474.87
CUL-NN	NN-3	NN-2	Rectangular	3	15	69	0.014	474.74	474.39	107.66	5.64	475.99	475.87
RD-NN02	NN-4	NN-3	Trapezoidal	3	6	200	0.014	475.74	474.74	103.18	7.38	477.13	475.99
Link179	OO-1	OO-2	Trapezoidal	3	6	200	0.014	474.38	473.38	2.59	2.07	474.56	474.19
DT-OO01	OO-2	OO-OUTFALL	Trapezoidal	3	6	200	0.014	473.38	472.38	36.95	5.42	474.19	473.19
CUL-OO	OO-3	OO-2	Rectangular	3	6	70	0.014	473.73	473.38	32.53	6.18	474.62	474.19
Link175	OO-4	OO-3	Trapezoidal	3	6	200	0.014	474.73	473.73	28.98	4.77	475.45	474.62
RD-PP01	PP-1	PP-2	Trapezoidal	3	6	200	0.014	480.25	479.25	4.08	2.22	480.48	479.98
DT-PP01	PP-2	PP-OUTFALL	Trapezoidal	3	6	200	0.014	479.25	478.25	30.71	5.12	479.98	478.98
CUL-PP	PP-3	PP-2	Rectangular	3	6	70	0.014	479.60	479.25	24.30	5.42	480.35	479.98
RD-PP02	PP-4	PP-3	Trapezoidal	3	6	200	0.014	480.60	479.60	21.04	4.35	481.20	480.35
RD-QQ01	QQ-1	QQ-2	Trapezoidal	3	6	200	0.014	465.18	464.18	25.16	4.36	465.85	465.19
CUL-QQ	QQ-2	QQ-3	Rectangular	3	6	84	0.014	464.18	463.76	39.04	6.46	465.19	464.73
DT-QQ01	QQ-3	QQ-OUTFALL	Trapezoidal	3	6	200	0.014	463.76	462.76	51.76	5.99	464.73	463.73
RD-QQ02	QQ-4	QQ-3	Trapezoidal	3	6	200	0.014	464.76	463.76	11.32	3.16	465.18	464.73
RD-RR01	RR-1	RR-2	Trapezoidal	3	6	200	0.014	442.92	441.92	42.74	5.34	443.82	443.00
DT-RR01	RR-2	RR-OUTFALL	Trapezoidal	3	6	200	0.014	441.92	440.92	63.31	6.35	443.00	442.00
CUL-RR	RR-3	RR-2	Rectangular	3	6	100	0.014	442.42	441.92	16.86	4.07	443.11	443.00
RD-RR02	RR-4	RR-3	Trapezoidal	3	6	200	0.014	443.42	442.42	10.61	3.37	443.83	443.11
RD-SS01	SS-1	SS-2	Trapezoidal	3	6	200	0.014	440.29	439.29	9.47	3.16	440.67	440.04
DT-SS01	SS-2	SS-OUTFALL	Trapezoidal	3	6	200	0.014	439.29	438.29	31.86	5.18	440.04	439.04
CUL-SS	SS-3	SS-2	Rectangular	3	6	100	0.014	438.85	439.29	16.64	2.29	440.12	440.04
RD-SS02	SS-4	SS-3	Trapezoidal	3	6	200	0.014	439.85	438.85	10.91	2.74	440.28	440.12

SH 34 SEC-04 : Existing 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
3-TT-CREEK	TT-1	TT-2	Trapezoidal	3	6	200	0.014	437.90	436.90	22.71	3.74	438.56	438.27
DT-TT01	TT-2	TT-OUTFALL	Trapezoidal	3	6	200	0.014	436.90	435.90	98.92	7.20	438.27	437.27
CUL-TT	TT-3	TT-2	Rectangular	3	12	80	0.014	437.30	436.90	70.86	5.34	438.40	438.27
1-TT-CREEK	TT-4	TT-3	Trapezoidal	3	6	200	0.014	438.30	437.30	63.14	6.34	439.38	438.40
RD-UU01	UU-1	UU-2	Trapezoidal	3	6	200	0.014	437.23	436.23	2.58	2.07	437.40	436.63
DT-UU01	UU-2	UU-OUTFALL	Trapezoidal	3	6	200	0.014	436.23	435.23	10.59	3.65	436.63	435.62
CUL-UU	UU-3	UU-2	Rectangular	3	6	80	0.014	438.23	436.23	6.53	4.97	438.43	436.63
RD-UU02	UU-4	UU-3	Trapezoidal	3	6	200	0.014	439.23	438.23	4.34	2.55	439.49	438.43
RD-WW01	WW-1	WW-2	Trapezoidal	3	6	200	0.014	436.05	435.05	17.74	3.83	436.60	436.05
DT-WW01	WW-2	WW-OUTFALL	Trapezoidal	3	6	200	0.014	435.05	434.05	54.40	6.08	436.05	435.05
CUL-WW	WW-3	WW-2	Rectangular	3	6	80	0.014	435.25	435.05	26.52	4.39	436.26	436.05
RD-WW02	WW-4	WW-3	Trapezoidal	3	6	200	0.014	436.25	435.25	16.78	3.76	436.78	436.26
RD-XX01	XX-1	XX-2	Trapezoidal	3	6	200	0.014	456.49	455.94	17.92	3.50	457.14	456.65
DT-XX01	XX-2	XX-OUTFALL	Trapezoidal	3	6	200	0.014	455.94	454.94	29.51	5.06	456.65	455.65
CUL-XX	XX-3	XX-2	Rectangular	3	6	60	0.014	455.49	455.94	12.00	1.79	456.68	456.65
RD-XX02	XX-4	XX-3	Trapezoidal	3	6	200	0.014	456.49	455.49	7.69	2.31	456.84	456.68
RD-YY01	YY-1	YY-2	Trapezoidal	3	6	200	0.014	483.53	482.53	24.48	4.06	484.20	483.78
DT-YY01	YY-2	YY-OUTFALL	Trapezoidal	3	6	200	0.014	482.53	481.53	83.96	6.88	483.78	482.78
CUL-YY	YY-3	YY-2	Rectangular	3	9	90	0.014	482.98	482.53	45.85	5.02	483.97	483.78
RD-YY02	YY-4	YY-3	Trapezoidal	3	6	200	0.014	483.98	482.98	33.34	4.97	484.76	483.97
RD-ZZ01	ZZ-1	ZZ-2	Trapezoidal	3	6	200	0.014	514.41	513.41	13.95	3.44	514.88	514.38
CUL-ZZ	ZZ-2	ZZ-3	Rectangular	3	3	120	0.014	513.41	512.81	16.22	5.74	514.38	513.45
DT-ZZ01	ZZ-3	ZZ-OUTFALL	Trapezoidal	3	6	200	0.014	512.81	511.81	24.51	4.78	513.45	512.45
RD-ZZ02	ZZ-4	ZZ-3	Trapezoidal	3	6	200	0.014	513.81	512.81	6.98	2.81	514.12	513.45
RD-AAA01	AAA-1	AAA-2	Trapezoidal	3	6	200	0.014	481.80	480.80	179.66	8.59	483.63	482.55
CUL-AAA	AAA-2	AAA-3	Rectangular	3	15	90	0.014	480.80	480.35	187.52	7.04	482.55	482.36
DT-AAA01	AAA-3	AAA-OUTFALL	Trapezoidal	3	6	200	0.014	480.35	479.35	216.18	8.92	482.36	481.36
RD-AAA02	AAA-4	AAA-3	Trapezoidal	3	6	200	0.014	481.35	480.35	18.38	2.80	482.34	482.36
Link222	BBB-1	BBB-2	Trapezoidal	3	6	200	0.014	524.76	523.76	32.38	4.89	525.53	524.73
CUL-BBB	BBB-2	BBB-3	Rectangular	3	6	90	0.014	523.76	523.31	36.03	6.23	524.73	524.24
DT-BBB01	BBB-3	BBB-OUTFALL	Trapezoidal	3	6	200	0.014	523.31	522.31	47.74	5.85	524.24	523.24
Link224	BBB-4	BBB-3	Trapezoidal	3	6	200	0.014	524.31	523.31	7.52	2.61	524.64	524.24

SH 34 SEC-01 : Existing 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-A01	A-1	A-2	Trapezoidal	3	3	200	0.014	531.10	531.00	453.51	8.78	533.89	532.63
CUL-A	A-2	A-3	Rectangular	5	40	125	0.014	531.00	530.40	458.51	6.86	532.63	532.42
DT-A01	A-3	A-OUTFALL	Trapezoidal	3	40	200	0.040	530.40	528.40	475.78	5.24	532.42	529.97
RD-A02	A-4	A-3	Trapezoidal	2	10	200	0.014	532.10	530.40	29.74	3.53	532.56	532.42
RD-B01	B-1	B-2	Trapezoidal	3	12	200	0.014	531.40	530.40	286.03	9.55	533.18	531.78
CUL-B	B-2	B-3	Rectangular	3	27	90	0.014	530.40	530.10	286.35	7.74	531.78	531.40
DT-B01	B-3	B-OUTFALL	Trapezoidal	3.25	16	150	0.014	530.10	528.70	288.31	10.52	531.40	530.00
RD-B02	B-4	B-3	Trapezoidal	1.25	3	200	0.014	533.27	530.10	30.38	6.51	533.86	531.40
RD-C01	C-1	C-2	Trapezoidal	3	6	200	0.014	539.64	538.64	55.58	4.91	540.74	540.47
CUL-C	C-2	C-3	Rectangular	3	3	67	0.014	538.64	538.30	55.68	10.71	540.47	539.14
DT-C01	C-3	C-OUTFALL	Trapezoidal	3	6	150	0.014	538.30	536.70	58.08	8.09	539.14	537.54
RD-C02	C-4	C-3	Trapezoidal	3	6	200	0.014	539.97	538.30	9.03	3.63	540.29	539.14
RD-D01	D-1	D-2	Trapezoidal	3	6	200	0.014	543.03	542.03	68.84	3.13	547.11	547.10
CUL-D	D-2	D-3	Circular	2	9	66	0.014	542.03	541.70	49.50	16.13	547.10	543.03
DT-D01	D-3	D-OUTFALL	Trapezoidal	3	6	150	0.014	541.70	541.50	56.03	4.32	543.03	542.64
RD-D02	D-4	D-3	Trapezoidal	3	6	200	0.014	542.70	541.70	28.01	4.20	543.43	543.03
RD-E01	E-1	E-2	Trapezoidal	3	6	200	0.014	542.48	541.48	62.19	5.67	543.59	542.96
CUL-E	E-2	E-3	Rectangular	2	5	55	0.014	541.48	541.20	62.34	8.49	542.96	542.54
DT-E01	E-3	E-OUTFALL	Trapezoidal	3	6	150	0.014	541.60	540.30	63.94	7.74	542.54	541.24
RD-E02	E-4	E-3	Trapezoidal	3	6	200	0.014	547.00	541.60	16.88	6.35	547.32	542.54
RD-F01	F-1	F-2	Trapezoidal	3	6	200	0.014	539.86	538.86	169.11	7.47	541.75	541.11
CUL-F	F-2	F-3	Rectangular	3	6	58	0.014	538.86	538.57	169.88	12.84	541.11	540.41
DT-F01	F-3	F-OUTFALL	Trapezoidal	3	6	200	0.014	538.58	537.58	176.81	8.45	540.41	539.40
RD_F02	F-4	F-3	Trapezoidal	3	6	200	0.014	540.09	538.58	43.56	5.29	540.95	540.41
RD-G01	G-1	G-2	Trapezoidal	3	6	200	0.014	549.08	548.08	42.71	5.03	549.99	549.39
CUL-G	G-2	G-3	Rectangular	3	4	63	0.014	548.08	547.76	45.34	9.01	549.39	548.51
DT-G01	G-3	G-OUTFALL	Trapezoidal	3	6	130	0.014	547.76	545.70	57.43	9.25	548.51	546.45
RD-G02	G-4	G-3	Trapezoidal	3	6	200	0.014	551.00	547.76	9.30	4.15	551.27	548.51
RD-H01	H-1	H-2	Trapezoidal	3	6	200	0.014	541.22	540.22	144.09	7.31	542.94	542.22
CUL-H	H-2	H-3	Rectangular	3	6	56	0.014	540.22	539.89	146.69	12.49	542.22	541.51
DT-H01	H-3	H-OUTFALL	Trapezoidal	3	6	144	0.014	539.89	538.89	163.94	9.33	541.51	540.51
RD-H02	H-4	H-3	Trapezoidal	3	6	200	0.014	540.90	539.89	29.90	4.13	541.67	541.51
RD-I01	I-1	I-2	Trapezoidal	3	6	200	0.014	545.79	544.79	74.72	5.69	547.05	546.60
CUL-I	I-2	I-3	Rectangular	3	4	62	0.014	544.79	544.48	76.56	10.96	546.60	545.72
DT-I01	I-3	I-OUTFALL	Trapezoidal	3	6	130	0.014	544.48	543.48	101.96	8.48	545.72	544.72
RD-I02	I-4	I-3	Trapezoidal	3	6	200	0.014	545.48	544.48	33.68	4.66	546.28	545.72
RD-J01	J-1	J-2	Trapezoidal	3	6	200	0.014	552.52	551.52	38.52	2.87	556.95	556.95
CUL-J	J-2	J-3	Circular	2	6	96	0.014	551.52	551.04	39.18	13.09	556.95	551.94
DT-J01	J-3	J-OUTFALL	Trapezoidal	3	6	150	0.014	551.04	550.00	53.00	6.77	551.94	550.90
RD-J02	J-4	J-3	Trapezoidal	3	6	200	0.014	552.04	551.04	12.12	3.32	552.48	551.94
RD-K01	K-1	K-2	Trapezoidal	3	6	200	0.014	549.20	548.20	48.34	4.50	550.24	550.08

SH 34 SEC-01 : Existing 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
CUL-K	K-2	K-3	Rectangular	3	3	88	0.014	548.20	547.76	51.58	9.57	550.08	548.81
DT-K01	K-3	K-OUTFALL	Trapezoidal	3	6	150	0.014	547.76	546.76	69.80	7.23	548.81	547.81
RD-K02	K-4	K-3	Trapezoidal	3	6	200	0.014	548.76	547.76	14.42	3.39	549.25	548.81
RD-L01	L-1	L-2	Trapezoidal	3	6	200	0.014	548.22	547.22	38.72	5.20	549.06	548.23
CUL-L	L-2	L-3	Rectangular	3	6	87	0.014	547.22	546.78	40.15	6.70	548.23	547.68
DT-L01	L-3	L-OUTFALL	Trapezoidal	3	6	150	0.014	546.78	545.78	51.73	6.63	547.68	546.68
RD-L02	L-4	L-3	Trapezoidal	3	6	100	0.014	547.78	546.78	11.80	3.74	548.16	547.68
RD-M01	M-1	M-2	Trapezoidal	3	6	200	0.014	542.52	541.52	78.23	3.18	547.78	547.76
CUL-M	M-2	M-3	Circular	2	9	63	0.014	541.52	541.20	56.95	18.54	547.76	542.44
DT-M01	M-3	M-OUTFALL	Trapezoidal	3	6	152	0.014	541.20	540.20	95.19	7.87	542.44	541.44
RD-M02	M-4	M-3	Trapezoidal	3	6	200	0.014	542.20	541.20	28.83	4.34	542.94	542.44
RD-O01	O-1	O-2	Trapezoidal	3	6	200	0.014	537.72	536.72	126.06	3.99	541.15	541.18
CUL-O	O-2	O-3	Circular	3.5	9	88	0.014	536.72	536.28	152.11	16.25	541.18	538.63
DT-O01	O-3	O-OUTFALL	Trapezoidal	3	6	200	0.014	536.28	535.28	296.53	9.70	538.63	537.63
RD-O02	O-4	O-3	Trapezoidal	3	6	150	0.014	537.28	536.28	128.35	6.85	538.91	538.63
RD-P01	P-1	P-2	Trapezoidal	2.5	6	200	0.014	534.11	533.11	50.21	4.31	535.55	535.62
CUL-P	P-2	P-3	Rectangular	2	3	88	0.014	533.11	532.67	57.58	9.98	535.62	533.93
DT-P01	P-3	P-OUTFALL	Trapezoidal	3	6	150	0.014	532.67	531.67	97.84	7.97	533.93	532.93
RD-P02	P-4	P-3	Trapezoidal	3	6	200	0.014	533.67	532.67	32.04	4.53	534.45	533.93
RD-Q01	Q-1	Q-2	Trapezoidal	2.5	6	200	0.014	515.09	514.09	64.28	4.49	517.01	517.06
CUL-Q	Q-2	Q-3	Rectangular	2	4	88	0.014	514.09	513.65	87.61	11.02	517.06	515.51
DT-Q01	Q-3	Q-OUTFALL	Trapezoidal	3	6	200	0.014	513.65	512.65	182.95	8.53	515.51	514.51
RD-Q02	Q-4	Q-3	Trapezoidal	3	6	200	0.014	514.65	513.65	73.56	5.60	515.90	515.51
RD-S01	S-1	S-2	Trapezoidal	3	6	150	0.014	506.78	505.78	57.01	5.62	507.82	507.34
DT-S01	S-2	S-OUTFALL	Trapezoidal	3	6	200	0.014	505.78	504.78	129.53	7.76	507.34	506.34
CUL-S	S-3	S-2	Rectangular	2	5	88	0.014	506.22	505.78	65.62	8.36	507.82	507.34
RD-S02	S-4	S-3	Trapezoidal	3	6	150	0.014	506.97	506.22	62.04	5.39	508.13	507.82
RD-T01	T-1	T-2	Trapezoidal	3	6	200	0.014	509.40	508.40	8.12	3.34	509.75	508.74
DT-T01	T-2	T-OUTFALL	Trapezoidal	3	6	150	0.014	507.74	506.74	30.69	5.66	508.42	507.41
CUL-T	T-3	T-2	Circular	2	3	88	0.014	508.18	507.74	22.35	7.98	510.01	508.42
RD-T02	T-4	T-3	Trapezoidal	3	6	200	0.014	509.18	508.18	21.14	2.93	509.99	510.01
RD-U01	U-1	U-2	Trapezoidal	3	6	200	0.014	506.57	505.57	18.67	3.69	507.15	506.81
DT-U01	U-2	U-OUTFALL	Trapezoidal	3	6	150	0.014	505.57	504.57	94.42	7.88	506.81	505.81
CUL-U	U-3	U-2	Rectangular	2	3	69	0.014	505.92	505.57	83.58	14.43	509.63	506.81
RD-U02	U-4	U-3	Trapezoidal	3	6	200	0.014	506.92	505.92	82.07	4.76	509.59	509.63
RD-V01	V-1	V-2	Trapezoidal	3	6	200	0.014	505.91	504.91	26.09	4.06	506.62	506.31
DT-V01	V-2	V-OUTFALL	Trapezoidal	3	6	156	0.014	504.91	503.91	118.10	8.28	506.31	505.31
CUL-V	V-3	V-2	Rectangular	2	5	69	0.014	505.25	504.91	83.54	9.85	506.98	506.31
RD-V02	V-4	V-3	Trapezoidal	3	6	200	0.014	506.25	505.25	73.56	5.78	507.49	506.98

SH 34 SEC-02 : Existing 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-W01	W-1	W-2	Trapezoidal	3	6	200	0.014	497.99	496.99	47.78	5.25	498.96	498.40
CUL-W	W-2	W-3	Rectangular	3	6	69	0.014	496.99	496.64	57.88	6.96	498.40	498.11
DT-W01	W-3	W-OUTFALL	Trapezoidal	3	6	200	0.014	496.64	495.64	115.48	7.52	498.11	497.11
RD-W02	W-4	W-3	Trapezoidal	3	6	200	0.014	497.64	496.64	43.92	4.89	498.58	498.11
RD-X01	X-1	X-2	Trapezoidal	3	6	200	0.014	500.04	499.04	19.32	4.39	500.62	499.58
CUL-X	X-2	X-3	Rectangular	3	6	66	0.014	499.04	498.22	21.13	6.43	499.58	499.02
DT-X01	X-3	X-OUTFALL	Trapezoidal	3	6	150	0.014	498.22	497.22	42.49	6.25	499.02	498.02
RD-X02	X-4	X-3	Trapezoidal	3	6	200	0.014	499.22	498.22	18.37	4.06	499.77	499.02
RD-Y01	Y-1	Y-2	Trapezoidal	3	6	200	0.014	490.89	489.89	28.75	4.19	491.63	491.25
CUL-Y	Y-2	Y-3	Rectangular	3	4	69	0.014	489.89	490.07	30.62	5.91	491.25	490.94
DT-Y01	Y-3	Y-OUTFALL	Trapezoidal	3	6	150	0.014	490.07	489.07	49.60	6.54	490.94	489.94
RD-Y02	Y-4	Y-3	Trapezoidal	3	6	200	0.014	491.07	490.07	20.60	4.17	491.66	490.94
RD-Z01	Z-1	Z-2	Trapezoidal	3	6	200	0.014	478.53	477.53	59.98	5.38	479.66	479.56
DT-Z01	Z-2	Z-OUTFALL	Trapezoidal	3	6	200	0.014	477.53	476.53	219.44	8.95	479.56	478.56
CUL-Z	Z-3	Z-2	Rectangular	2	5	69	0.014	477.62	477.53	154.25	15.34	481.81	479.56
RD-Z02	Z-4	Z-3	Trapezoidal	3	6	200	0.014	478.62	477.62	131.79	5.09	481.77	481.81
RD-AA01	AA-1	AA-2	Trapezoidal	3	6	200	0.014	476.14	475.14	16.01	3.73	476.66	476.05
DT-AA01	AA-2	AA-OUTFALL	Trapezoidal	3	6	176	0.014	475.14	474.14	48.21	6.13	476.05	475.04
CUL-AA	AA-3	AA-2	Rectangular	5	10	70	0.014	475.49	475.14	31.80	4.46	476.20	476.05
RD-AA02	AA-4	AA-3	Trapezoidal	3	6	200	0.014	476.49	475.49	29.71	5.06	477.21	476.20
RD-BB01	BB-1	BB-2	Trapezoidal	3	6	200	0.014	472.29	471.29	34.19	1.60	476.50	476.46
DT-BB01	BB-2	BB-OUTFALL	Trapezoidal	3	6	187	0.014	471.29	470.29	91.12	1.78	476.46	476.42
CUL-BB	BB-3	BB-2	Circular	3	3	69	0.014	473.52	471.29	41.56	7.07	476.75	476.46
RD-BB02	BB-4	BB-3	Trapezoidal	3	6	200	0.014	474.52	473.52	31.14	2.50	476.74	476.75
RD-CC01	CC-1	CC-2	Trapezoidal	3	6	200	0.014	467.31	466.31	72.75	5.42	468.57	468.28
CUL-CC	CC-2	CC-3	Rectangular	3	4	71	0.014	466.31	465.95	79.52	10.37	468.28	467.48
DT-CC01	CC-3	CC-OUTFALL	Trapezoidal	3	6	200	0.014	465.95	464.95	123.89	7.67	467.48	466.48
RD-CC02	CC-4	CC-3	Trapezoidal	3	6	200	0.014	466.95	465.95	36.25	4.40	467.81	467.48
RD-DD03	DD-1A	DD-2	Trapezoidal	3	6	200	0.014	443.63	443.47	168.47	6.27	445.85	445.06
RD-DD01	DD-1B	DD-2	Trapezoidal	3	6	200	0.014	444.47	443.47	109.11	7.05	445.94	445.06
CUL-DD	DD-2	DD-3	Rectangular	6	30	90	0.014	443.47	442.92	279.08	5.64	445.06	445.06
DT-DD01	DD-3	DD-OUTFALL	Trapezoidal	3	6	150	0.014	442.92	441.92	283.10	10.65	445.06	444.06
RD-DD02	DD-4	DD-3	Trapezoidal	3	6	200	0.014	443.92	442.92	98.40	6.54	445.35	445.06
RD-EE01	EE-1	EE-2	Trapezoidal	3	6	200	0.014	444.89	443.89	137.69	5.79	447.02	447.13
CUL-EE	EE-2	EE-3	Rectangular	3	4	102	0.014	443.89	443.38	143.55	12.69	447.13	445.06
DT-EE01	EE-3	EE-OUTFALL	Trapezoidal	3	6	154	0.014	443.38	442.38	170.74	9.20	445.06	444.06
RD-EE02	EE-4	EE-3	Trapezoidal	3	6	200	0.014	444.38	443.38	27.49	3.74	445.15	445.06
RD-FF01	FF-1	FF-2	Trapezoidal	3	6	200	0.014	435.58	434.58	19.78	4.01	436.17	435.59
DT-FF01	FF-2	FF-OUTFALL	Trapezoidal	3	6	200	0.014	434.58	433.58	56.11	6.13	435.59	434.59
CUL-FF	FF-3	FF-2	Rectangular	3	6	100	0.014	434.58	434.58	29.90	4.01	435.85	435.59
RD-FF02	FF-4	FF-3	Trapezoidal	3	6	200	0.014	435.58	434.58	21.65	3.81	436.21	435.85

SH 34 SEC-02 : Existing 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-GG01	GG-1	GG-2	Trapezoidal	3	6	200	0.014	435.48	434.48	19.12	3.95	436.06	435.51
DT-GG01	GG-2	GG-OUTFALL	Trapezoidal	3	6	200	0.014	434.48	433.48	57.65	6.18	435.51	434.51
CUL-GG	GG-3	GG-2	Rectangular	3	6	100	0.014	434.48	434.48	31.07	4.10	435.77	435.51
RD-GG02	GG-4	GG-3	Trapezoidal	3	6	200	0.014	435.48	434.48	21.94	3.81	436.12	435.77
RD-HH01	HH-1	HH-2	Trapezoidal	3	6	200	0.014	434.94	434.78	16.51	2.13	435.87	435.77
DT-HH01	HH-2	HH-OUTFALL	Trapezoidal	3	6	200	0.014	434.78	433.78	54.08	6.07	435.77	434.77
CUL-HH	HH-3	HH-2	Rectangular	3	6	100	0.014	434.78	434.78	28.09	3.87	436.01	435.77
RD-HH02	HH-4	HH-3	Trapezoidal	3	6	200	0.014	435.78	434.78	17.78	3.54	436.34	436.01
RD-II01	II-1	II-2	Trapezoidal	3	6	200	0.014	438.48	438.48	29.21	2.14	439.94	439.87
DT-II01	II-2	II-OUTFALL	Trapezoidal	3	6	200	0.014	438.48	437.48	102.80	7.28	439.87	438.87
CUL-II	II-3	II-2	Rectangular	3	6	100	0.014	438.48	438.48	56.06	5.46	440.23	439.87
RD-II02	II-4	II-3	Trapezoidal	3	6	200	0.014	439.48	438.48	35.66	4.11	440.37	440.23

SH 34 SEC-03 : Existing 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-JJ01	JJ-1	JJ-2	Trapezoidal	3	6	200	0.014	463.65	462.65	282.31	8.98	466.02	465.18
CUL-JJ	JJ-2	JJ-3	Rectangular	3	12	102	0.014	462.65	462.14	311.67	10.22	465.18	464.75
DT-JJ01	JJ-3	JJ-OUTFALL	Trapezoidal	3	6	200	0.014	462.14	461.14	370.55	10.28	464.75	463.75
RD-JJ02	JJ-4	JJ-3	Trapezoidal	3	6	200	0.014	463.14	462.14	45.37	2.98	464.70	464.75
RD-LL01	LL-1	LL-2	Trapezoidal	3	6	200	0.014	502.87	501.87	63.29	3.67	504.37	504.44
DT-LL01	LL-2	LL-OUTFALL	Trapezoidal	3	6	200	0.014	501.87	500.87	361.36	10.21	504.44	503.44
CUL-LL	LL-3	LL-2	Rectangular	3	18	95	0.014	502.34	501.87	264.77	6.70	504.50	504.44
RD-LL02	LL-4	LL-3	Trapezoidal	3	12	200	0.014	503.34	502.34	247.79	7.64	505.16	504.50
RD-NN01	NN-1	NN-2	Trapezoidal	3	6	200	0.014	475.39	474.39	19.47	1.67	476.55	476.58
DT-NN01	NN-2	NN-OUTFALL	Trapezoidal	3	6	200	0.014	474.39	473.39	255.75	9.32	476.58	475.58
CUL-NN	NN-3	NN-2	Rectangular	3	15	69	0.014	474.74	474.39	236.51	7.78	476.75	476.58
RD-NN02	NN-4	NN-3	Trapezoidal	3	6	200	0.014	475.74	474.74	226.89	9.11	477.79	476.75
Link179	OO-1	OO-2	Trapezoidal	3	6	200	0.014	474.38	473.38	5.72	2.74	474.66	474.62
DT-OO01	OO-2	OO-OUTFALL	Trapezoidal	3	6	200	0.014	473.38	472.38	81.96	6.83	474.62	473.62
CUL-OO	OO-3	OO-2	Rectangular	3	6	70	0.014	473.73	473.38	72.10	8.58	475.15	474.62
Link175	OO-4	OO-3	Trapezoidal	3	6	200	0.014	474.73	473.73	64.23	5.84	475.86	475.15
RD-PP01	PP-1	PP-2	Trapezoidal	3	6	200	0.014	480.25	479.25	8.97	2.90	480.61	480.37
DT-PP01	PP-2	PP-OUTFALL	Trapezoidal	3	6	200	0.014	479.25	478.25	68.00	6.48	480.37	479.37
CUL-PP	PP-3	PP-2	Rectangular	3	6	70	0.014	479.60	479.25	53.87	7.44	480.81	480.37
RD-PP02	PP-4	PP-3	Trapezoidal	3	6	200	0.014	480.60	479.60	46.63	5.35	481.54	480.81
RD-QQ01	QQ-1	QQ-2	Trapezoidal	3	6	200	0.014	465.18	464.18	55.38	5.52	466.23	465.59
CUL-QQ	QQ-2	QQ-3	Rectangular	3	6	84	0.014	464.18	463.76	65.57	7.81	465.59	465.10
DT-QQ01	QQ-3	QQ-OUTFALL	Trapezoidal	3	6	200	0.014	463.76	462.76	96.59	7.15	465.10	464.10
RD-QQ02	QQ-4	QQ-3	Trapezoidal	3	6	200	0.014	464.76	463.76	25.09	3.94	465.45	465.10
RD-RR01	RR-1	RR-2	Trapezoidal	3	6	200	0.014	442.92	441.92	94.68	6.59	444.31	443.55
DT-RR01	RR-2	RR-OUTFALL	Trapezoidal	3	6	200	0.014	441.92	440.92	140.35	7.93	443.55	442.55
CUL-RR	RR-3	RR-2	Rectangular	3	6	100	0.014	442.42	441.92	37.45	5.37	443.64	443.55
RD-RR02	RR-4	RR-3	Trapezoidal	3	6	200	0.014	443.42	442.42	23.51	4.02	444.08	443.64
RD-SS01	SS-1	SS-2	Trapezoidal	3	6	200	0.014	440.29	439.29	21.00	3.95	440.90	440.44
DT-SS01	SS-2	SS-OUTFALL	Trapezoidal	3	6	200	0.014	439.29	438.29	70.81	6.55	440.44	439.44
CUL-SS	SS-3	SS-2	Rectangular	3	6	100	0.014	438.85	439.29	37.02	3.70	440.58	440.44
RD-SS02	SS-4	SS-3	Trapezoidal	3	6	200	0.014	439.85	438.85	24.20	3.35	440.61	440.581

SH 34 SEC-04 : Existing 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
3-TT-CREEK	TT-1	TT-2	Trapezoidal	3	6	200	0.014	437.90	436.90	58.01	4.81	439.06	438.94
DT-TT01	TT-2	TT-OUTFALL	Trapezoidal	3	6	200	0.014	436.90	435.90	220.69	8.96	438.94	437.94
CUL-TT	TT-3	TT-2	Rectangular	3	12	80	0.014	437.30	436.90	155.10	7.27	439.09	438.94
1-TT-CREEK	TT-4	TT-3	Trapezoidal	3	6	200	0.014	438.30	437.30	138.01	7.63	439.95	439.09
RD-UU01	UU-1	UU-2	Trapezoidal	3	6	200	0.014	437.23	436.23	9.65	3.21	437.61	436.92
DT-UU01	UU-2	UU-OUTFALL	Trapezoidal	3	6	200	0.014	436.23	435.23	28.21	4.99	436.92	435.92
CUL-UU	UU-3	UU-2	Rectangular	3	6	80	0.014	438.23	436.23	13.27	6.38	438.54	436.92
RD-UU02	UU-4	UU-3	Trapezoidal	3	6	200	0.014	439.23	438.23	8.92	3.31	439.62	438.54
RD-WW01	WW-1	WW-2	Trapezoidal	3	6	200	0.014	436.05	435.05	47.18	4.88	437.04	436.67
DT-WW01	WW-2	WW-OUTFALL	Trapezoidal	3	6	200	0.014	435.05	434.05	138.56	7.91	436.67	435.67
CUL-WW	WW-3	WW-2	Rectangular	3	6	80	0.014	435.25	435.05	65.26	6.40	436.96	436.67
RD-WW02	WW-4	WW-3	Trapezoidal	3	6	200	0.014	436.25	435.25	41.22	4.56	437.18	436.96
RD-XX01	XX-1	XX-2	Trapezoidal	3	6	200	0.014	456.49	455.94	20.58	3.20	457.24	456.99
DT-XX01	XX-2	XX-OUTFALL	Trapezoidal	3	6	200	0.014	455.94	454.94	60.28	6.26	456.99	455.99
CUL-XX	XX-3	XX-2	Rectangular	3	6	60	0.014	455.49	455.94	28.62	3.16	457.06	456.99
RD-XX02	XX-4	XX-3	Trapezoidal	3	6	200	0.014	456.49	455.49	18.15	3.11	457.12	457.06
RD-YY01	YY-1	YY-2	Trapezoidal	3	6	200	0.014	483.53	482.53	61.08	5.12	484.68	484.38
DT-YY01	YY-2	YY-OUTFALL	Trapezoidal	3	6	200	0.014	482.53	481.53	182.94	8.53	484.38	483.38
CUL-YY	YY-3	YY-2	Rectangular	3	9	90	0.014	482.98	482.53	88.22	6.34	484.54	484.38
RD-YY02	YY-4	YY-3	Trapezoidal	3	6	200	0.014	483.98	482.98	65.87	5.88	485.13	484.54
RD-ZZ01	ZZ-1	ZZ-2	Trapezoidal	3	6	200	0.014	514.41	513.41	33.20	4.11	515.24	515.02
CUL-ZZ	ZZ-2	ZZ-3	Rectangular	3	3	120	0.014	513.41	512.81	36.45	7.83	515.02	513.83
DT-ZZ01	ZZ-3	ZZ-OUTFALL	Trapezoidal	3	6	200	0.014	512.81	511.81	57.60	6.18	513.83	512.83
RD-ZZ02	ZZ-4	ZZ-3	Trapezoidal	3	6	200	0.014	513.81	512.81	16.99	3.68	514.34	513.83
RD-AAA01	AAA-1	AAA-2	Trapezoidal	3	6	200	0.014	481.80	480.80	224.10	9.10	483.84	482.79
CUL-AAA	AAA-2	AAA-3	Rectangular	3	15	90	0.014	480.80	480.35	232.65	7.74	482.79	482.58
DT-AAA01	AAA-3	AAA-OUTFALL	Trapezoidal	3	6	200	0.014	480.35	479.35	267.11	9.43	482.58	481.58
RD-AAA02	AAA-4	AAA-3	Trapezoidal	3	6	200	0.014	481.35	480.35	57.75	4.63	482.54	482.58
Link222	BBB-1	BBB-2	Trapezoidal	3	6	200	0.014	524.76	523.76	57.60	5.65	525.83	525.14
CUL-BBB	BBB-2	BBB-3	Rectangular	3	6	90	0.014	523.76	523.31	63.42	7.76	525.14	524.60
DT-BBB01	BBB-3	BBB-OUTFALL	Trapezoidal	3	6	200	0.014	523.31	522.31	88.37	6.98	524.60	523.60
Link224	BBB-4	BBB-3	Trapezoidal	3	6	200	0.014	524.31	523.31	18.49	3.48	524.90	524.60

SH 34 SEC-01 : Proposed 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-A01	A-1	A-2	Trapezoidal	3	3	200	0.014	531.10	531.00	178.48	6.63	533.07	531.88
CUL-A	A-2	A-3	Rectangular	5	40	125	0.014	531.00	530.40	182.15	4.98	531.88	531.63
DT-A01	A-3	A-OUTFALL	Trapezoidal	3	40	200	0.040	530.40	528.40	192.39	3.71	531.63	529.28
RD-A02	A-4	A-3	Trapezoidal	2	10	200	0.014	532.10	530.40	7.13	1.70	532.30	531.63
RD-B01	B-1	B-2	Trapezoidal	3	12	200	0.014	531.40	530.40	116.60	6.99	532.52	531.22
CUL-B	B-2	B-3	Rectangular	3	27	90	0.014	530.40	530.10	116.72	5.30	531.22	530.89
DT-B01	B-3	B-OUTFALL	Trapezoidal	3	16	150	0.014	530.10	528.70	118.73	7.89	530.89	529.49
RD-B02	B-4	B-3	Trapezoidal	1	3	200	0.014	533.27	530.10	7.77	4.22	533.57	530.89
RD-C01	C-1	C-2	Trapezoidal	3	6	200	0.014	539.64	538.64	23.30	4.11	540.28	539.74
CUL-C	C-2	C-3	Rectangular	3	3	67	0.014	538.64	538.30	23.32	7.44	539.74	538.82
DT-C01	C-3	C-OUTFALL	Trapezoidal	3	6	150	0.014	538.30	536.70	24.36	6.18	538.82	537.22
RD-C02	C-4	C-3	Trapezoidal	3	6	200	0.014	539.97	538.30	3.54	2.60	540.15	538.82
RD-D01	D-1	D-2	Trapezoidal	3	6	200	0.014	543.03	542.03	29.04	3.13	544.31	544.35
CUL-D	D-2	D-3	Circular	2	9	66	0.014	542.03	541.70	29.06	9.33	544.35	542.68
DT-D01	D-3	D-OUTFALL	Trapezoidal	3	6	150	0.014	541.70	541.50	30.56	3.58	542.68	542.31
RD-D02	D-4	D-3	Trapezoidal	3	6	200	0.014	542.70	541.70	6.19	2.48	543.00	542.68
RD-E01	E-1	E-2	Trapezoidal	3	6	200	0.014	542.48	541.48	27.13	4.55	543.18	542.45
CUL-E	E-2	E-3	Rectangular	2	5	55	0.014	541.48	541.20	27.18	5.58	542.45	542.20
DT-E01	E-3	E-OUTFALL	Trapezoidal	3	6	150	0.014	541.60	540.30	28.61	6.06	542.20	540.90
RD-E02	E-4	E-3	Trapezoidal	3	6	200	0.014	547.00	541.60	5.22	4.00	547.16	542.20
RD-F01	F-1	F-2	Trapezoidal	3	6	200	0.014	539.86	538.86	80.75	6.32	541.13	540.35
CUL-F	F-2	F-3	Rectangular	3	6	58	0.014	538.86	538.57	80.95	9.21	540.35	539.85
DT-F01	F-3	F-OUTFALL	Trapezoidal	3	6	200	0.014	538.58	537.58	86.69	6.94	539.85	538.85
RD_F02	F-4	F-3	Trapezoidal	3	6	200	0.014	540.09	538.58	14.89	3.87	540.53	539.85
RD-G01	G-1	G-2	Trapezoidal	3	6	200	0.014	549.08	548.08	18.53	4.06	549.64	548.89
CUL-G	G-2	G-3	Rectangular	3	4	63	0.014	548.08	547.76	19.68	6.30	548.89	548.22
DT-G01	G-3	G-OUTFALL	Trapezoidal	3	6	130	0.014	547.76	545.70	24.13	7.04	548.22	546.16
RD-G02	G-4	G-3	Trapezoidal	3	6	200	0.014	551.00	547.76	3.63	2.99	551.15	548.22
RD-H01	H-1	H-2	Trapezoidal	3	6	200	0.014	541.22	540.22	60.97	5.98	542.30	541.43
CUL-H	H-2	H-3	Rectangular	3	6	56	0.014	540.22	539.89	61.59	8.59	541.43	540.93
DT-H01	H-3	H-OUTFALL	Trapezoidal	3	6	144	0.014	539.89	538.89	69.50	7.33	540.93	539.93
RD-H02	H-4	H-3	Trapezoidal	3	6	200	0.014	540.90	539.89	10.47	3.04	541.30	540.93
RD-I01	I-1	I-2	Trapezoidal	3	6	200	0.014	545.79	544.79	30.21	4.65	546.54	545.85
CUL-I	I-2	I-3	Rectangular	3	4	62	0.014	544.79	544.48	30.25	7.41	545.85	545.21
DT-I01	I-3	I-OUTFALL	Trapezoidal	3	6	130	0.014	544.48	543.48	37.56	6.33	545.21	544.21
RD-I02	I-4	I-3	Trapezoidal	3	6	200	0.014	545.48	544.48	14.16	3.77	545.96	545.21
RD-J01	J-1	J-2	Trapezoidal	3	6	200	0.014	552.52	551.52	38.19	2.90	556.70	556.70
CUL-J	J-2	J-3	Circular	2	6	96	0.014	551.52	551.04	37.27	12.53	556.70	551.84
DT-J01	J-3	J-OUTFALL	Trapezoidal	3	6	150	0.014	551.04	550.00	42.69	6.34	551.84	550.80
RD-J02	J-4	J-3	Trapezoidal	3	6	200	0.014	552.04	551.04	5.11	2.23	552.30	551.84
RD-K01	K-1	K-2	Trapezoidal	3	6	200	0.014	549.20	548.20	18.67	3.83	549.77	549.23

SH 34 SEC-01 : Proposed 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
CUL-K	K-2	K-3	Rectangular	3	3	88	0.014	548.20	547.76	18.93	6.40	549.23	548.36
DT-K01	K-3	K-OUTFALL	Trapezoidal	3	6	150	0.014	547.76	546.76	25.06	5.32	548.36	547.36
RD-K02	K-4	K-3	Trapezoidal	3	6	200	0.014	548.76	547.76	6.03	2.66	549.05	548.36
RD-L01	L-1	L-2	Trapezoidal	3	6	200	0.014	548.22	547.22	17.18	4.17	548.75	547.82
CUL-L	L-2	L-3	Rectangular	3	6	87	0.014	547.22	546.78	17.30	4.82	547.82	547.34
DT-L01	L-3	L-OUTFALL	Trapezoidal	3	6	150	0.014	546.78	545.78	21.65	5.07	547.34	546.33
RD-L02	L-4	L-3	Trapezoidal	3	6	100	0.014	547.78	546.78	5.00	2.98	547.99	547.34
RD-M01	M-1	M-2	Trapezoidal	3	6	200	0.014	542.52	541.52	29.08	3.19	543.99	544.01
CUL-M	M-2	M-3	Circular	2	9	63	0.014	541.52	541.20	29.47	9.94	544.01	541.98
DT-M01	M-3	M-OUTFALL	Trapezoidal	3	6	152	0.014	541.20	540.20	39.71	6.09	541.98	540.98
RD-M02	M-4	M-3	Trapezoidal	3	6	200	0.014	542.20	541.20	11.52	3.39	542.62	541.98
RD-O01	O-1	O-2	Trapezoidal	3	6	200	0.014	537.72	536.72	42.36	4.06	538.73	538.68
CUL-O	O-2	O-3	Circular	4	9	88	0.014	536.72	536.28	51.10	9.62	538.68	537.62
DT-O01	O-3	O-OUTFALL	Trapezoidal	3	6	200	0.014	536.28	535.28	95.70	7.14	537.62	536.62
RD-O02	O-4	O-3	Trapezoidal	3	6	150	0.014	537.28	536.28	42.68	5.29	538.16	537.62
RD-P01	P-1	P-2	Trapezoidal	3	6	200	0.014	534.11	533.11	17.60	3.73	534.66	534.15
CUL-P	P-2	P-3	Rectangular	2	3	88	0.014	533.11	532.67	19.12	6.37	534.15	533.33
DT-P01	P-3	P-OUTFALL	Trapezoidal	3	6	150	0.014	532.67	531.67	29.63	5.60	533.33	532.33
RD-P02	P-4	P-3	Trapezoidal	3	6	200	0.014	533.67	532.67	8.73	3.10	534.03	533.33
RD-Q01	Q-1	Q-2	Trapezoidal	3	6	200	0.014	515.09	514.09	21.20	3.97	515.71	515.22
CUL-Q	Q-2	Q-3	Rectangular	2	4	88	0.014	514.09	513.65	28.76	6.42	515.22	514.69
DT-Q01	Q-3	Q-OUTFALL	Trapezoidal	3	6	200	0.014	513.65	512.65	58.85	6.22	514.69	513.69
RD-Q02	Q-4	Q-3	Trapezoidal	3	6	200	0.014	514.65	513.65	21.80	4.11	515.27	514.69
RD-S01	S-1	S-2	Trapezoidal	3	6	150	0.014	506.78	505.78	17.36	4.04	507.30	506.70
DT-S01	S-2	S-OUTFALL	Trapezoidal	3	6	200	0.014	505.78	504.78	46.32	5.80	506.70	505.69
CUL-S	S-3	S-2	Rectangular	2	5	88	0.014	506.22	505.78	26.39	5.79	507.14	506.70
RD-S02	S-4	S-3	Trapezoidal	3	6	150	0.014	506.97	506.22	25.67	4.44	507.66	507.14
RD-T01	T-1	T-2	Trapezoidal	3	6	200	0.014	509.40	508.40	3.45	2.46	509.61	508.60
DT-T01	T-2	T-OUTFALL	Trapezoidal	3	6	150	0.014	507.74	506.74	11.74	4.15	508.13	507.13
CUL-T	T-3	T-2	Circular	2	3	88	0.014	508.18	507.74	8.75	5.78	509.21	508.13
RD-T02	T-4	T-3	Trapezoidal	3	6	200	0.014	509.18	508.18	8.43	2.65	509.53	509.21
RD-U01	U-1	U-2	Trapezoidal	3	6	200	0.014	506.57	505.57	6.44	2.66	506.88	506.31
DT-U01	U-2	U-OUTFALL	Trapezoidal	3	6	150	0.014	505.57	504.57	35.54	5.92	506.31	505.31
CUL-U	U-3	U-2	Rectangular	2	3	69	0.014	505.92	505.57	31.26	8.23	507.25	506.31
RD-U02	U-4	U-3	Trapezoidal	3	6	200	0.014	506.92	505.92	30.95	4.36	507.69	507.25
RD-V01	V-1	V-2	Trapezoidal	3	6	200	0.014	505.91	504.91	10.75	3.29	506.31	505.67
DT-V01	V-2	V-OUTFALL	Trapezoidal	3	6	156	0.014	504.91	503.91	37.40	5.93	505.67	504.67
CUL-V	V-3	V-2	Rectangular	2	5	69	0.014	505.25	504.91	24.96	5.94	506.10	505.67
RD-V02	V-4	V-3	Trapezoidal	3	6	200	0.014	506.25	505.25	23.66	4.44	506.90	506.10

SH 34 SEC-02 : Proposed 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-W01	W-1	W-2	Trapezoidal	3	6	200	0.014	497.99	496.99	42.56	5.23	498.89	498.13
CUL-W	W-2	W-3	Rectangular	3	6	69	0.014	496.99	496.64	43.22	6.25	498.13	497.83
DT-W01	W-3	W-OUTFALL	Trapezoidal	3	6	200	0.014	496.64	495.64	76.12	6.69	497.83	496.83
RD-W02	W-4	W-3	Trapezoidal	3	6	200	0.014	497.64	496.64	32.22	4.61	498.42	497.83
RD-X01	X-1	X-2	Trapezoidal	3	6	200	0.014	500.04	499.04	17.69	4.23	500.60	499.52
CUL-X	X-2	X-3	Rectangular	3	6	66	0.014	499.04	498.22	17.70	6.03	499.52	498.87
DT-X01	X-3	X-OUTFALL	Trapezoidal	3	6	150	0.014	498.22	497.22	29.00	5.56	498.87	497.87
RD-X02	X-4	X-3	Trapezoidal	3	6	200	0.014	499.22	498.22	13.51	3.76	499.68	498.87
RD-Y01	Y-1	Y-2	Trapezoidal	3	6	200	0.014	490.89	489.89	26.10	4.12	491.59	491.15
CUL-Y	Y-2	Y-3	Rectangular	3	4	69	0.014	489.89	490.07	26.12	5.40	491.15	490.81
DT-Y01	Y-3	Y-OUTFALL	Trapezoidal	3	6	150	0.014	490.07	489.07	36.77	5.98	490.81	489.81
RD-Y02	Y-4	Y-3	Trapezoidal	3	6	200	0.014	491.07	490.07	12.63	3.57	491.51	490.81
RD-Z01	Z-1	Z-2	Trapezoidal	3	6	200	0.014	478.53	477.53	24.57	4.26	479.20	478.74
DT-Z01	Z-2	Z-OUTFALL	Trapezoidal	3	6	200	0.014	477.53	476.53	78.95	6.76	478.74	477.74
CUL-Z	Z-3	Z-2	Rectangular	2	5	69	0.014	477.62	477.53	53.06	7.12	479.14	478.74
RD-Z02	Z-4	Z-3	Trapezoidal	3	6	200	0.014	478.62	477.62	46.32	4.94	479.59	479.14
RD-AA01	AA-1	AA-2	Trapezoidal	3	6	200	0.014	476.14	475.14	12.86	3.54	476.59	475.94
DT-AA01	AA-2	AA-OUTFALL	Trapezoidal	3	6	176	0.014	475.14	474.14	38.26	5.73	475.94	474.94
CUL-AA	AA-3	AA-2	Rectangular	5	10	70	0.014	475.49	475.14	27.18	4.22	476.12	475.94
RD-AA02	AA-4	AA-3	Trapezoidal	3	6	200	0.014	476.49	475.49	27.09	4.89	477.19	476.12
RD-BB01	BB-1	BB-2	Trapezoidal	3	6	200	0.014	472.29	471.29	31.25	1.12	476.45	476.44
DT-BB01	BB-2	BB-OUTFALL	Trapezoidal	3	6	187	0.014	471.29	470.29	60.52	1.45	476.44	476.42
CUL-BB	BB-3	BB-2	Circular	3	3	69	0.014	473.52	471.29	35.96	6.77	476.59	476.44
RD-BB02	BB-4	BB-3	Trapezoidal	3	6	200	0.014	474.52	473.52	-28.94	1.98	476.66	476.59
RD-CC01	CC-1	CC-2	Trapezoidal	3	6	200	0.014	467.31	466.31	67.47	5.47	468.50	468.09
CUL-CC	CC-2	CC-3	Rectangular	3	4	71	0.014	466.31	465.95	67.90	9.78	468.09	467.32
DT-CC01	CC-3	CC-OUTFALL	Trapezoidal	3	6	200	0.014	465.95	464.95	99.32	7.21	467.32	466.31
RD-CC02	CC-4	CC-3	Trapezoidal	3	6	200	0.014	466.95	465.95	33.69	4.51	467.76	467.32
RD-DD03	DD-1A	DD-2	Trapezoidal	3	6	200	0.014	443.63	443.47	250.53	6.82	446.33	445.59
RD-DD01	DD-1B	DD-2	Trapezoidal	3	6	200	0.014	444.47	443.47	164.76	7.56	446.31	445.59
CUL-DD	DD-2	DD-3	Rectangular	6	30	90	0.014	443.47	442.92	416.17	6.37	445.59	445.61
DT-DD01	DD-3	DD-OUTFALL	Trapezoidal	3	6	150	0.014	442.92	441.92	456.30	12.07	445.61	444.61
RD-DD02	DD-4	DD-3	Trapezoidal	3	6	200	0.014	443.92	442.92	43.75	2.86	445.57	445.61
RD-EE01	EE-1	EE-2	Trapezoidal	3	6	200	0.014	444.89	443.89	127.34	5.87	446.66	446.56
CUL-EE	EE-2	EE-3	Rectangular	3	4	102	0.014	443.89	443.38	128.23	12.55	446.56	444.93
DT-EE01	EE-3	EE-OUTFALL	Trapezoidal	3	6	154	0.014	443.38	442.38	145.59	8.81	444.93	443.93
RD-EE02	EE-4	EE-3	Trapezoidal	3	6	200	0.014	444.38	443.38	16.91	2.97	444.99	444.93
RD-FF01	FF-1	FF-2	Trapezoidal	3	6	200	0.014	435.58	434.58	17.64	4.01	436.13	435.37
DT-FF01	FF-2	FF-OUTFALL	Trapezoidal	3	6	200	0.014	434.58	433.58	35.56	5.36	435.37	434.37
CUL-FF	FF-3	FF-2	Rectangular	3	6	100	0.014	434.58	434.58	17.25	3.02	435.55	435.37
RD-FF02	FF-4	FF-3	Trapezoidal	3	6	200	0.014	435.58	434.58	16.81	3.73	436.11	435.55

SH 34 SEC-02 : Proposed 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-GG01	GG-1	GG-2	Trapezoidal	3	6	200	0.014	435.48	434.48	18.00	3.95	436.03	435.36
DT-GG01	GG-2	GG-OUTFALL	Trapezoidal	3	6	200	0.014	434.48	433.48	43.00	5.67	435.36	434.36
CUL-GG	GG-3	GG-2	Rectangular	3	6	100	0.014	434.48	434.48	24.58	3.75	435.60	435.36
RD-GG02	GG-4	GG-3	Trapezoidal	3	6	200	0.014	435.48	434.48	18.02	3.69	436.04	435.60
RD-HH01	HH-1	HH-2	Trapezoidal	3	6	200	0.014	434.94	434.78	15.50	2.32	435.74	435.55
DT-HH01	HH-2	HH-OUTFALL	Trapezoidal	3	6	200	0.014	434.78	433.78	33.54	5.26	435.55	434.54
CUL-HH	HH-3	HH-2	Rectangular	3	6	100	0.014	434.78	434.78	16.52	2.97	435.72	435.55
RD-HH02	HH-4	HH-3	Trapezoidal	3	6	200	0.014	435.78	434.78	15.49	3.63	436.28	435.72
RD-II01	II-1	II-2	Trapezoidal	3	6	200	0.014	438.48	438.48	12.37	1.65	439.39	439.33
DT-II01	II-2	II-OUTFALL	Trapezoidal	3	6	200	0.014	438.48	437.48	40.07	5.55	439.33	438.33
CUL-II	II-3	II-2	Rectangular	3	6	100	0.014	438.48	438.48	20.42	3.32	439.53	439.33
RD-II02	II-4	II-3	Trapezoidal	3	6	200	0.014	439.48	438.48	13.23	3.37	439.94	439.53

SH 34 SEC-03 : Proposed 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-JJ01	JJ-1	JJ-2	Trapezoidal	3	6	200	0.014	463.65	462.65	127.41	7.55	465.22	464.28
CUL-JJ	JJ-2	JJ-3	Rectangular	3	12	102	0.014	462.65	462.14	141.07	7.12	464.28	463.98
DT-JJ01	JJ-3	JJ-OUTFALL	Trapezoidal	3	6	200	0.014	462.14	461.14	180.61	8.50	463.98	462.98
RD-JJ02	JJ-4	JJ-3	Trapezoidal	3	6	200	0.014	463.14	462.14	45.28	4.87	464.11	463.98
RD-LL01	LL-1	LL-2	Trapezoidal	3	6	200	0.014	502.87	501.87	63.26	5.48	504.02	503.72
DT-LL01	LL-2	LL-OUTFALL	Trapezoidal	3	6	200	0.014	501.87	500.87	182.63	8.52	503.72	502.72
CUL-LL	LL-3	LL-2	Rectangular	3	18	95	0.014	502.34	501.87	117.62	4.56	503.73	503.72
RD-LL02	LL-4	LL-3	Trapezoidal	3	12	200	0.014	503.34	502.34	111.96	6.19	504.48	503.73
RD-NN01	NN-1	NN-2	Trapezoidal	3	6	200	0.014	475.39	474.39	8.85	2.04	475.86	475.86
DT-NN01	NN-2	NN-OUTFALL	Trapezoidal	3	6	200	0.014	474.39	473.39	114.27	7.50	475.86	474.86
CUL-NN	NN-3	NN-2	Rectangular	3	15	69	0.014	474.74	474.39	105.84	5.61	475.97	475.86
RD-NN02	NN-4	NN-3	Trapezoidal	3	6	200	0.014	475.74	474.74	103.18	7.38	477.13	475.97
Link179	OO-1	OO-2	Trapezoidal	3	6	200	0.014	474.38	473.38	2.59	2.08	474.56	474.16
DT-OO01	OO-2	OO-OUTFALL	Trapezoidal	3	6	200	0.014	473.38	472.38	34.79	5.32	474.16	473.16
CUL-OO	OO-3	OO-2	Rectangular	3	6	70	0.014	473.73	473.38	31.45	6.12	474.60	474.16
Link175	OO-4	OO-3	Trapezoidal	3	6	200	0.014	474.73	473.73	28.98	4.80	475.45	474.60
RD-PP01	PP-1	PP-2	Trapezoidal	3	6	200	0.014	480.25	479.25	4.08	2.24	480.48	479.96
DT-PP01	PP-2	PP-OUTFALL	Trapezoidal	3	6	200	0.014	479.25	478.25	29.59	5.07	479.96	478.96
CUL-PP	PP-3	PP-2	Rectangular	3	6	70	0.014	479.60	479.25	23.74	5.38	480.33	479.96
RD-PP02	PP-4	PP-3	Trapezoidal	3	6	200	0.014	480.60	479.60	21.04	4.36	481.20	480.33
RD-QQ01	QQ-1	QQ-2	Trapezoidal	3	6	200	0.014	465.18	464.18	25.16	4.56	465.84	465.03
CUL-QQ	QQ-2	QQ-3	Rectangular	3	6	84	0.014	464.18	463.76	29.20	5.70	465.03	464.63
DT-QQ01	QQ-3	QQ-OUTFALL	Trapezoidal	3	6	200	0.014	463.76	462.76	42.57	5.65	464.63	463.63
RD-QQ02	QQ-4	QQ-3	Trapezoidal	3	6	200	0.014	464.76	463.76	11.32	3.25	465.17	464.63
RD-RR01	RR-1	RR-2	Trapezoidal	3	6	200	0.014	442.92	441.92	42.74	5.35	443.82	442.99
DT-RR01	RR-2	RR-OUTFALL	Trapezoidal	3	6	200	0.014	441.92	440.92	61.91	6.31	442.99	441.99
CUL-RR	RR-3	RR-2	Rectangular	3	6	100	0.014	442.42	441.92	17.30	4.24	443.09	442.99
RD-RR02	RR-4	RR-3	Trapezoidal	3	6	200	0.014	443.42	442.42	10.61	3.39	443.83	443.09
RD-SS01	SS-1	SS-2	Trapezoidal	3	6	200	0.014	440.29	439.29	9.47	3.18	440.67	440.03
DT-SS01	SS-2	SS-OUTFALL	Trapezoidal	3	6	200	0.014	439.29	438.29	31.34	5.16	440.03	439.03
CUL-SS	SS-3	SS-2	Rectangular	3	6	100	0.014	438.85	439.29	16.30	2.26	440.11	440.03
RD-SS02	SS-4	SS-3	Trapezoidal	3	6	200	0.014	439.85	438.85	10.91	2.79	440.28	440.11

SH 34 SEC-04 : Proposed 2 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
3-TT-CREEK	TT-1	TT-2	Trapezoidal	3	6	200	0.014	437.90	436.90	22.71	3.77	438.25	438.56
DT-TT01	TT-2	TT-OUTFALL	Trapezoidal	3	6	200	0.014	436.90	435.90	96.78	7.16	437.25	438.25
CUL-TT	TT-3	TT-2	Rectangular	3	12	80	0.014	437.30	436.90	70.86	5.37	438.25	438.39
1-TT-CREEK	TT-4	TT-3	Trapezoidal	3	6	200	0.014	438.30	437.30	63.14	6.34	438.39	439.38
RD-UU01	UU-1	UU-2	Trapezoidal	3	6	200	0.014	437.23	436.23	2.58	2.08	436.63	437.40
DT-UU01	UU-2	UU-OUTFALL	Trapezoidal	3	6	200	0.014	436.23	435.23	10.66	3.65	435.63	436.63
CUL-UU	UU-3	UU-2	Rectangular	3	6	80	0.014	438.23	436.23	6.36	4.90	436.63	438.42
RD-UU02	UU-4	UU-3	Trapezoidal	3	6	200	0.014	439.23	438.23	4.34	2.54	438.42	439.49
RD-WW01	WW-1	WW-2	Trapezoidal	3	6	200	0.014	436.05	435.05	17.74	3.87	436.04	436.60
DT-WW01	WW-2	WW-OUTFALL	Trapezoidal	3	6	200	0.014	435.05	434.05	53.68	6.05	435.04	436.04
CUL-WW	WW-3	WW-2	Rectangular	3	6	80	0.014	435.25	435.05	26.16	4.37	436.04	436.25
RD-WW02	WW-4	WW-3	Trapezoidal	3	6	200	0.014	436.25	435.25	16.78	3.80	436.25	436.78
RD-XX01	XX-1	XX-2	Trapezoidal	3	6	200	0.014	456.49	455.94	17.92	3.52	456.63	457.14
DT-XX01	XX-2	XX-OUTFALL	Trapezoidal	3	6	200	0.014	455.94	454.94	28.06	4.98	455.63	456.63
CUL-XX	XX-3	XX-2	Rectangular	3	6	60	0.014	455.49	455.94	11.84	1.81	456.63	456.65
RD-XX02	XX-4	XX-3	Trapezoidal	3	6	200	0.014	456.49	455.49	7.69	2.35	456.65	456.84
RD-YY01	YY-1	YY-2	Trapezoidal	3	6	200	0.014	483.53	482.53	24.48	4.10	483.76	484.20
DT-YY01	YY-2	YY-OUTFALL	Trapezoidal	3	6	200	0.014	482.53	481.53	81.22	6.81	482.76	483.76
CUL-YY	YY-3	YY-2	Rectangular	3	9	90	0.014	482.98	482.53	43.86	4.94	483.76	483.94
RD-YY02	YY-4	YY-3	Trapezoidal	3	6	200	0.014	483.98	482.98	33.34	5.01	483.94	484.76
RD-ZZ01	ZZ-1	ZZ-2	Trapezoidal	3	6	200	0.014	514.41	513.41	13.95	3.46	514.37	514.88
CUL-ZZ	ZZ-2	ZZ-3	Rectangular	3	3	120	0.014	513.41	512.81	15.83	5.69	513.44	514.37
DT-ZZ01	ZZ-3	ZZ-OUTFALL	Trapezoidal	3	6	200	0.014	512.81	511.81	23.86	4.74	512.44	513.44
RD-ZZ02	ZZ-4	ZZ-3	Trapezoidal	3	6	200	0.014	513.81	512.81	6.98	2.81	513.44	514.12
RD-AAA01	AAA-1	AAA-2	Trapezoidal	3	6	200	0.014	481.80	480.80	179.66	8.57	482.56	483.63
CUL-AAA	AAA-2	AAA-3	Rectangular	3	15	90	0.014	480.80	480.35	190.61	7.10	482.37	482.56
DT-AAA01	AAA-3	AAA-OUTFALL	Trapezoidal	3	6	200	0.014	480.35	479.35	217.97	8.94	481.37	482.37
RD-AAA02	AAA-4	AAA-3	Trapezoidal	3	6	200	0.014	481.35	480.35	18.39	2.83	482.37	482.35
Link222	BBB-1	BBB-2	Trapezoidal	3	6	200	0.014	524.76	523.76	32.38	4.88	524.74	525.54
CUL-BBB	BBB-2	BBB-3	Rectangular	3	6	90	0.014	523.76	523.31	36.49	6.26	524.25	524.74
DT-BBB01	BBB-3	BBB-OUTFALL	Trapezoidal	3	6	200	0.014	523.31	522.31	48.35	5.87	523.25	524.25
Link224	BBB-4	BBB-3	Trapezoidal	3	6	200	0.014	524.31	523.31	7.52	2.61	524.25	524.64

SH 34 SEC-01 : Proposed 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-A01	A-1	A-2	Trapezoidal	3	3	200	0.014	531.10	531.00	392.39	8.40	533.75	532.50
CUL-A	A-2	A-3	Rectangular	5	40	125	0.014	531.00	530.40	400.34	6.50	532.50	532.29
DT-A01	A-3	A-OUTFALL	Trapezoidal	3	40	200	0.040	530.40	528.40	422.85	5.01	532.29	529.86
RD-A02	A-4	A-3	Trapezoidal	2	10	200	0.014	532.10	530.40	15.81	2.09	532.42	532.29
RD-B01	B-1	B-2	Trapezoidal	3	12	200	0.014	531.40	530.40	258.04	9.22	533.09	531.70
CUL-B	B-2	B-3	Rectangular	3	27	90	0.014	530.40	530.10	258.32	7.38	531.70	531.34
DT-B01	B-3	B-OUTFALL	Trapezoidal	3	16	150	0.014	530.10	528.70	262.73	10.22	531.34	529.94
RD-B02	B-4	B-3	Trapezoidal	1	3	200	0.014	533.27	530.10	17.22	5.06	533.72	531.34
RD-C01	C-1	C-2	Trapezoidal	3	6	200	0.014	539.64	538.64	51.47	4.85	540.69	540.39
CUL-C	C-2	C-3	Rectangular	3	3	67	0.014	538.64	538.30	51.52	10.37	540.39	539.11
DT-C01	C-3	C-OUTFALL	Trapezoidal	3	6	150	0.014	538.30	536.70	53.80	7.90	539.11	537.51
RD-C02	C-4	C-3	Trapezoidal	3	6	200	0.014	539.97	538.30	7.85	3.43	540.26	539.11
RD-D01	D-1	D-2	Trapezoidal	3	6	200	0.014	543.03	542.03	64.19	3.14	547.11	547.10
CUL-D	D-2	D-3	Circular	2	9	66	0.014	542.03	541.70	50.09	16.27	547.10	543.04
DT-D01	D-3	D-OUTFALL	Trapezoidal	3	6	150	0.014	541.70	541.50	57.58	4.36	543.04	542.66
RD-D02	D-4	D-3	Trapezoidal	3	6	200	0.014	542.70	541.70	13.71	3.16	543.18	543.04
RD-E01	E-1	E-2	Trapezoidal	3	6	200	0.014	542.48	541.48	59.87	5.61	543.57	542.93
CUL-E	E-2	E-3	Rectangular	2	5	55	0.014	541.48	541.20	59.97	8.30	542.93	542.53
DT-E01	E-3	E-OUTFALL	Trapezoidal	3	6	150	0.014	541.60	540.30	63.12	7.71	542.53	541.23
RD-E02	E-4	E-3	Trapezoidal	3	6	200	0.014	547.00	541.60	11.58	5.28	547.26	542.53
RD-F01	F-1	F-2	Trapezoidal	3	6	200	0.014	539.86	538.86	178.75	7.55	541.80	541.19
CUL-F	F-2	F-3	Rectangular	3	6	58	0.014	538.86	538.57	179.24	13.09	541.19	540.48
DT-F01	F-3	F-OUTFALL	Trapezoidal	3	6	200	0.014	538.58	537.58	191.88	8.63	540.48	539.48
RD_F02	F-4	F-3	Trapezoidal	3	6	200	0.014	540.09	538.58	33.01	4.72	540.81	540.48
RD-G01	G-1	G-2	Trapezoidal	3	6	200	0.014	549.08	548.08	40.76	4.98	549.96	549.35
CUL-G	G-2	G-3	Rectangular	3	4	63	0.014	548.08	547.76	43.27	8.88	549.35	548.47
DT-G01	G-3	G-OUTFALL	Trapezoidal	3	6	130	0.014	547.76	545.70	51.44	8.95	548.47	546.41
RD-G02	G-4	G-3	Trapezoidal	3	6	200	0.014	551.00	547.76	9.30	4.26	551.27	548.47
RD-H01	H-1	H-2	Trapezoidal	3	6	200	0.014	541.22	540.22	134.04	7.20	542.88	542.13
CUL-H	H-2	H-3	Rectangular	3	6	56	0.014	540.22	539.89	135.45	12.05	542.13	541.45
DT-H01	H-3	H-OUTFALL	Trapezoidal	3	6	144	0.014	539.89	538.89	152.62	9.14	541.45	540.45
RD-H02	H-4	H-3	Trapezoidal	3	6	200	0.014	540.90	539.89	23.19	3.67	541.58	541.45
RD-I01	I-1	I-2	Trapezoidal	3	6	200	0.014	545.79	544.79	74.72	5.64	547.05	546.64
CUL-I	I-2	I-3	Rectangular	3	4	62	0.014	544.79	544.48	77.55	10.82	546.64	545.78
DT-I01	I-3	I-OUTFALL	Trapezoidal	3	6	130	0.014	544.48	543.48	111.72	8.70	545.78	544.78
RD-I02	I-4	I-3	Trapezoidal	3	6	200	0.014	545.48	544.48	31.41	4.44	546.26	545.78
RD-J01	J-1	J-2	Trapezoidal	3	6	200	0.014	552.52	551.52	32.91	2.93	555.61	555.61
CUL-J	J-2	J-3	Circular	2	6	96	0.014	551.52	551.04	32.66	11.03	555.61	551.84
DT-J01	J-3	J-OUTFALL	Trapezoidal	3	6	150	0.014	551.04	550.00	42.64	6.34	551.84	550.80
RD-J02	J-4	J-3	Trapezoidal	3	6	200	0.014	552.04	551.04	11.33	3.35	552.46	551.84
RD-K01	K-1	K-2	Trapezoidal	3	6	200	0.014	549.20	548.20	41.14	4.49	550.13	549.85

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Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
CUL-K	K-2	K-3	Rectangular	3	3	88	0.014	548.20	547.76	41.68	8.80	549.85	548.69
DT-K01	K-3	K-OUTFALL	Trapezoidal	3	6	150	0.014	547.76	546.76	55.21	6.75	548.69	547.69
RD-K02	K-4	K-3	Trapezoidal	3	6	200	0.014	548.76	547.76	13.38	3.44	549.22	548.69
RD-L01	L-1	L-2	Trapezoidal	3	6	200	0.014	548.22	547.22	37.78	5.19	549.05	548.19
CUL-L	L-2	L-3	Rectangular	3	6	87	0.014	547.22	546.78	38.05	6.57	548.19	547.64
DT-L01	L-3	L-OUTFALL	Trapezoidal	3	6	150	0.014	546.78	545.78	47.59	6.46	547.64	546.64
RD-L02	L-4	L-3	Trapezoidal	3	6	100	0.014	547.78	546.78	11.09	3.75	548.14	547.64
RD-M01	M-1	M-2	Trapezoidal	3	6	200	0.014	542.52	541.52	64.48	3.20	547.77	547.76
CUL-M	M-2	M-3	Circular	2	9	63	0.014	541.52	541.20	55.66	18.22	547.76	542.36
DT-M01	M-3	M-OUTFALL	Trapezoidal	3	6	152	0.014	541.20	540.20	82.72	7.56	542.36	541.36
RD-M02	M-4	M-3	Trapezoidal	3	6	200	0.014	542.20	541.20	25.55	4.24	542.88	542.36
RD-O01	O-1	O-2	Trapezoidal	3	6	200	0.014	537.72	536.72	93.33	4.19	539.74	539.82
CUL-O	O-2	O-3	Circular	4	9	88	0.014	536.72	536.28	112.58	12.97	539.82	538.30
DT-O01	O-3	O-OUTFALL	Trapezoidal	3	6	200	0.014	536.28	535.28	217.28	8.93	538.30	537.30
RD-O02	O-4	O-3	Trapezoidal	3	6	150	0.014	537.28	536.28	93.83	6.42	538.65	538.30
RD-P01	P-1	P-2	Trapezoidal	3	6	200	0.014	534.11	533.11	38.91	4.34	535.02	534.79
CUL-P	P-2	P-3	Rectangular	2	3	88	0.014	533.11	532.67	42.25	8.72	534.79	533.70
DT-P01	P-3	P-OUTFALL	Trapezoidal	3	6	150	0.014	532.67	531.67	67.35	7.16	533.70	532.70
RD-P02	P-4	P-3	Trapezoidal	3	6	200	0.014	533.67	532.67	19.36	3.89	534.25	533.70
RD-Q01	Q-1	Q-2	Trapezoidal	3	6	200	0.014	515.09	514.09	47.04	4.63	516.13	516.05
CUL-Q	Q-2	Q-3	Rectangular	2	4	88	0.014	514.09	513.65	63.85	8.66	516.05	515.22
DT-Q01	Q-3	Q-OUTFALL	Trapezoidal	3	6	200	0.014	513.65	512.65	130.74	7.78	515.22	514.22
RD-Q02	Q-4	Q-3	Trapezoidal	3	6	200	0.014	514.65	513.65	48.34	5.03	515.64	515.22
RD-S01	S-1	S-2	Trapezoidal	3	6	150	0.014	506.78	505.78	38.48	4.97	507.61	507.17
DT-S01	S-2	S-OUTFALL	Trapezoidal	3	6	200	0.014	505.78	504.78	102.27	7.27	507.17	506.16
CUL-S	S-3	S-2	Rectangular	2	5	88	0.014	506.22	505.78	58.17	7.87	507.72	507.17
RD-S02	S-4	S-3	Trapezoidal	3	6	150	0.014	506.97	506.22	56.57	5.30	508.07	507.72
RD-T01	T-1	T-2	Trapezoidal	3	6	200	0.014	509.40	508.40	7.65	3.27	509.74	508.73
DT-T01	T-2	T-OUTFALL	Trapezoidal	3	6	150	0.014	507.74	506.74	25.75	5.36	508.35	507.35
CUL-T	T-3	T-2	Circular	2	3	88	0.014	508.18	507.74	19.21	7.64	509.79	508.35
RD-T02	T-4	T-3	Trapezoidal	3	6	200	0.014	509.18	508.18	18.54	2.95	509.83	509.79
RD-U01	U-1	U-2	Trapezoidal	3	6	200	0.014	506.57	505.57	14.28	3.41	507.06	506.69
DT-U01	U-2	U-OUTFALL	Trapezoidal	3	6	150	0.014	505.57	504.57	77.60	7.46	506.69	505.69
CUL-U	U-3	U-2	Rectangular	2	3	69	0.014	505.92	505.57	68.62	11.95	508.75	506.69
RD-U02	U-4	U-3	Trapezoidal	3	6	200	0.014	506.92	505.92	67.98	4.78	508.67	508.75
RD-V01	V-1	V-2	Trapezoidal	3	6	200	0.014	505.91	504.91	23.82	4.05	506.57	506.10
DT-V01	V-2	V-OUTFALL	Trapezoidal	3	6	156	0.014	504.91	503.91	86.56	7.58	506.10	505.10
CUL-V	V-3	V-2	Rectangular	2	5	69	0.014	505.25	504.91	56.75	8.28	506.65	506.10
RD-V02	V-4	V-3	Trapezoidal	3	6	200	0.014	506.25	505.25	52.13	5.39	507.27	506.65

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Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-W01	W-1	W-2	Trapezoidal	3	6	200	0.014	497.99	496.99	42.56	5.16	498.89	498.22
CUL-W	W-2	W-3	Rectangular	3	6	69	0.014	496.99	496.64	48.01	6.49	498.22	497.91
DT-W01	W-3	W-OUTFALL	Trapezoidal	3	6	200	0.014	496.64	495.64	86.48	6.94	497.91	496.91
RD-W02	W-4	W-3	Trapezoidal	3	6	200	0.014	497.64	496.64	32.22	4.52	498.42	497.91
RD-X01	X-1	X-2	Trapezoidal	3	6	200	0.014	500.04	499.04	17.69	4.24	500.60	499.52
CUL-X	X-2	X-3	Rectangular	3	6	66	0.014	499.04	498.22	17.85	6.04	499.52	498.94
DT-X01	X-3	X-OUTFALL	Trapezoidal	3	6	150	0.014	498.22	497.22	34.79	5.88	498.94	497.94
RD-X02	X-4	X-3	Trapezoidal	3	6	200	0.014	499.22	498.22	13.51	3.73	499.68	498.94
RD-Y01	Y-1	Y-2	Trapezoidal	3	6	200	0.014	490.89	489.89	26.10	4.11	491.59	491.16
CUL-Y	Y-2	Y-3	Rectangular	3	4	69	0.014	489.89	490.07	26.28	5.41	491.16	490.82
DT-Y01	Y-3	Y-OUTFALL	Trapezoidal	3	6	150	0.014	490.07	489.07	37.36	6.01	490.82	489.82
RD-Y02	Y-4	Y-3	Trapezoidal	3	6	200	0.014	491.07	490.07	12.63	3.56	491.51	490.82
RD-Z01	Z-1	Z-2	Trapezoidal	3	6	200	0.014	478.53	477.53	54.05	5.20	479.59	479.34
DT-Z01	Z-2	Z-OUTFALL	Trapezoidal	3	6	200	0.014	477.53	476.53	174.41	8.41	479.34	478.34
CUL-Z	Z-3	Z-2	Rectangular	2	5	69	0.014	477.62	477.53	117.22	11.81	480.61	479.34
RD-Z02	Z-4	Z-3	Trapezoidal	3	6	200	0.014	478.62	477.62	102.37	5.21	480.51	480.61
RD-AA01	AA-1	AA-2	Trapezoidal	3	6	200	0.014	476.14	475.14	12.86	3.50	476.59	475.97
DT-AA01	AA-2	AA-OUTFALL	Trapezoidal	3	6	176	0.014	475.14	474.14	40.68	5.83	475.97	474.97
CUL-AA	AA-3	AA-2	Rectangular	5	10	70	0.014	475.49	475.14	27.92	4.24	476.14	475.97
RD-AA02	AA-4	AA-3	Trapezoidal	3	6	200	0.014	476.49	475.49	27.09	4.90	477.18	476.14
RD-BB01	BB-1	BB-2	Trapezoidal	3	6	200	0.014	472.29	471.29	31.24	1.03	476.53	476.49
DT-BB01	BB-2	BB-OUTFALL	Trapezoidal	3	6	187	0.014	471.29	470.29	85.21	1.50	476.49	476.42
CUL-BB	BB-3	BB-2	Circular	3	3	69	0.014	473.52	471.29	36.07	6.69	476.63	476.49
RD-BB02	BB-4	BB-3	Trapezoidal	3	6	200	0.014	474.52	473.52	27.51	1.66	476.65	476.63
RD-CC01	CC-1	CC-2	Trapezoidal	3	6	200	0.014	467.31	466.31	67.47	5.41	468.51	468.14
CUL-CC	CC-2	CC-3	Rectangular	3	4	71	0.014	466.31	465.95	71.07	9.93	468.14	467.38
DT-CC01	CC-3	CC-OUTFALL	Trapezoidal	3	6	200	0.014	465.95	464.95	108.16	7.38	467.38	466.38
RD-CC02	CC-4	CC-3	Trapezoidal	3	6	200	0.014	466.95	465.95	33.69	4.40	467.77	467.38
RD-DD03	DD-1A	DD-2	Trapezoidal	3	6	200	0.014	443.63	443.47	250.53	6.78	446.34	445.62
RD-DD01	DD-1B	DD-2	Trapezoidal	3	6	200	0.014	444.47	443.47	164.76	7.53	446.32	445.62
CUL-DD	DD-2	DD-3	Rectangular	6	30	90	0.014	443.47	442.92	421.57	6.38	445.62	445.64
DT-DD01	DD-3	DD-OUTFALL	Trapezoidal	3	6	150	0.014	442.92	441.92	466.34	12.14	445.64	444.64
RD-DD02	DD-4	DD-3	Trapezoidal	3	6	200	0.014	443.92	442.92	43.76	2.47	445.60	445.64
RD-EE01	EE-1	EE-2	Trapezoidal	3	6	200	0.014	444.89	443.89	127.33	5.78	446.72	446.73
CUL-EE	EE-2	EE-3	Rectangular	3	4	102	0.014	443.89	443.38	132.07	12.64	446.73	444.97
DT-EE01	EE-3	EE-OUTFALL	Trapezoidal	3	6	154	0.014	443.38	442.38	152.69	8.93	444.97	443.97
RD-EE02	EE-4	EE-3	Trapezoidal	3	6	200	0.014	444.38	443.38	16.98	2.93	445.01	444.97
RD-FF01	FF-1	FF-2	Trapezoidal	3	6	200	0.014	435.58	434.58	17.64	3.94	436.13	435.45
DT-FF01	FF-2	FF-OUTFALL	Trapezoidal	3	6	200	0.014	434.58	433.58	42.57	5.65	435.45	434.45
CUL-FF	FF-3	FF-2	Rectangular	3	6	100	0.014	434.58	434.58	20.75	3.32	435.64	435.45
RD-FF02	FF-4	FF-3	Trapezoidal	3	6	200	0.014	435.58	434.58	16.81	3.65	436.12	435.64

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Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-GG01	GG-1	GG-2	Trapezoidal	3	6	200	0.014	435.48	434.48	18.00	3.93	436.03	435.41
DT-GG01	GG-2	GG-OUTFALL	Trapezoidal	3	6	200	0.014	434.48	433.48	47.36	5.83	435.41	434.40
CUL-GG	GG-3	GG-2	Rectangular	3	6	100	0.014	434.48	434.48	23.53	3.56	435.61	435.41
RD-GG02	GG-4	GG-3	Trapezoidal	3	6	200	0.014	435.48	434.48	18.02	3.70	436.04	435.61
RD-HH01	HH-1	HH-2	Trapezoidal	3	6	200	0.014	434.94	434.78	15.52	2.14	435.81	435.71
DT-HH01	HH-2	HH-OUTFALL	Trapezoidal	3	6	200	0.014	434.78	433.78	47.77	5.85	435.71	434.71
CUL-HH	HH-3	HH-2	Rectangular	3	6	100	0.014	434.78	434.78	24.09	3.59	435.92	435.71
RD-HH02	HH-4	HH-3	Trapezoidal	3	6	200	0.014	435.78	434.78	15.49	3.49	436.29	435.92
RD-II01	II-1	II-2	Trapezoidal	3	6	200	0.014	438.48	438.48	27.37	2.15	439.83	439.77
DT-II01	II-2	II-OUTFALL	Trapezoidal	3	6	200	0.014	438.48	437.48	88.96	6.99	439.77	438.77
CUL-II	II-3	II-2	Rectangular	3	6	100	0.014	438.48	438.48	45.37	4.85	440.07	439.77
RD-II02	II-4	II-3	Trapezoidal	3	6	200	0.014	439.48	438.48	29.34	4.07	440.25	440.07

SH 34 SEC-03 : Proposed 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
RD-JJ01	JJ-1	JJ-2	Trapezoidal	3	6	200	0.014	463.65	462.65	282.32	9.00	466.02	465.18
CUL-JJ	JJ-2	JJ-3	Rectangular	3	12	102	0.014	462.65	462.14	312.79	10.27	465.18	464.74
DT-JJ01	JJ-3	JJ-OUTFALL	Trapezoidal	3	6	200	0.014	462.14	461.14	368.56	10.27	464.74	463.74
RD-JJ02	JJ-4	JJ-3	Trapezoidal	3	6	200	0.014	463.14	462.14	45.39	3.02	464.69	464.74
RD-LL01	LL-1	LL-2	Trapezoidal	3	6	200	0.014	502.87	501.87	63.29	3.74	504.35	504.42
DT-LL01	LL-2	LL-OUTFALL	Trapezoidal	3	6	200	0.014	501.87	500.87	353.62	10.16	504.42	503.42
CUL-LL	LL-3	LL-2	Rectangular	3	18	95	0.014	502.34	501.87	260.65	6.67	504.48	504.42
RD-LL02	LL-4	LL-3	Trapezoidal	3	12	200	0.014	503.34	502.34	247.83	7.68	505.16	504.48
RD-NN01	NN-1	NN-2	Trapezoidal	3	6	200	0.014	475.39	474.39	19.46	1.75	476.53	476.56
DT-NN01	NN-2	NN-OUTFALL	Trapezoidal	3	6	200	0.014	474.39	473.39	251.19	9.28	476.56	475.56
CUL-NN	NN-3	NN-2	Rectangular	3	15	69	0.014	474.74	474.39	232.57	7.73	476.73	476.56
RD-NN02	NN-4	NN-3	Trapezoidal	3	6	200	0.014	475.74	474.74	226.89	9.14	477.79	476.73
Link179	OO-1	OO-2	Trapezoidal	3	6	200	0.014	474.38	473.38	5.72	2.75	474.66	474.58
DT-OO01	OO-2	OO-OUTFALL	Trapezoidal	3	6	200	0.014	473.38	472.38	77.17	6.72	474.58	473.58
CUL-OO	OO-3	OO-2	Rectangular	3	6	70	0.014	473.73	473.38	69.71	8.49	475.12	474.58
Link175	OO-4	OO-3	Trapezoidal	3	6	200	0.014	474.73	473.73	64.23	5.88	475.86	475.12
RD-PP01	PP-1	PP-2	Trapezoidal	3	6	200	0.014	480.25	479.25	8.97	2.92	480.61	480.34
DT-PP01	PP-2	PP-OUTFALL	Trapezoidal	3	6	200	0.014	479.25	478.25	65.51	6.41	480.34	479.34
CUL-PP	PP-3	PP-2	Rectangular	3	6	70	0.014	479.60	479.25	52.61	7.38	480.79	480.34
RD-PP02	PP-4	PP-3	Trapezoidal	3	6	200	0.014	480.60	479.60	46.63	5.38	481.54	480.79
RD-QQ01	QQ-1	QQ-2	Trapezoidal	3	6	200	0.014	465.18	464.18	55.38	5.54	466.22	465.57
CUL-QQ	QQ-2	QQ-3	Rectangular	3	6	84	0.014	464.18	463.76	64.29	7.76	465.57	465.08
DT-QQ01	QQ-3	QQ-OUTFALL	Trapezoidal	3	6	200	0.014	463.76	462.76	93.88	7.10	465.08	464.08
RD-QQ02	QQ-4	QQ-3	Trapezoidal	3	6	200	0.014	464.76	463.76	25.09	3.96	465.45	465.08
RD-RR01	RR-1	RR-2	Trapezoidal	3	6	200	0.014	442.92	441.92	94.68	6.61	444.30	443.53
DT-RR01	RR-2	RR-OUTFALL	Trapezoidal	3	6	200	0.014	441.92	440.92	137.17	7.88	443.53	442.53
CUL-RR	RR-3	RR-2	Rectangular	3	6	100	0.014	442.42	441.92	38.43	5.62	443.61	443.53
RD-RR02	RR-4	RR-3	Trapezoidal	3	6	200	0.014	443.42	442.42	23.51	4.06	444.08	443.61
RD-SS01	SS-1	SS-2	Trapezoidal	3	6	200	0.014	440.29	439.29	21.00	4.00	440.90	440.43
DT-SS01	SS-2	SS-OUTFALL	Trapezoidal	3	6	200	0.014	439.29	438.29	69.73	6.53	440.43	439.43
CUL-SS	SS-3	SS-2	Rectangular	3	6	100	0.014	438.85	439.29	36.26	3.65	440.57	440.43
RD-SS02	SS-4	SS-3	Trapezoidal	3	6	200	0.014	439.85	438.85	24.20	3.43	440.59	440.57

SH 34 SEC-04 : Proposed 100 Yr													
Link Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) ft	Bottom Width ft	Length ft	Roughness	Upstream Invert Elevation ft	Downstream Invert Elevation ft	Max Flow cfs	Max Velocity ft/s	Maximum Water Elevation (US) ft	Maximum Water Elevation (DS) ft
3-TT-CREEK	TT-1	TT-2	Trapezoidal	3	6	200	0.014	437.90	436.90	50.33	4.41	438.89	438.99
DT-TT01	TT-2	TT-OUTFALL	Trapezoidal	3	6	200	0.014	436.90	435.90	209.61	8.84	437.89	438.89
CUL-TT	TT-3	TT-2	Rectangular	3	12	80	0.014	437.30	436.90	152.29	7.22	438.89	439.06
1-TT-CREEK	TT-4	TT-3	Trapezoidal	3	6	200	0.014	438.30	437.30	138.95	7.70	439.06	439.95
RD-UU01	UU-1	UU-2	Trapezoidal	3	6	200	0.014	437.23	436.23	9.65	3.16	436.96	437.61
DT-UU01	UU-2	UU-OUTFALL	Trapezoidal	3	6	200	0.014	436.23	435.23	31.26	5.15	435.96	436.96
CUL-UU	UU-3	UU-2	Rectangular	3	6	80	0.014	438.23	436.23	14.15	6.57	436.96	438.55
RD-UU02	UU-4	UU-3	Trapezoidal	3	6	200	0.014	439.23	438.23	9.63	3.39	438.55	439.64
RD-WW01	WW-1	WW-2	Trapezoidal	3	6	200	0.014	436.05	435.05	39.35	4.76	436.55	436.94
DT-WW01	WW-2	WW-OUTFALL	Trapezoidal	3	6	200	0.014	435.05	434.05	118.99	7.58	435.55	436.55
CUL-WW	WW-3	WW-2	Rectangular	3	6	80	0.014	435.25	435.05	58.03	6.11	436.55	436.84
RD-WW02	WW-4	WW-3	Trapezoidal	3	6	200	0.014	436.25	435.25	37.13	4.58	436.84	437.11
RD-XX01	XX-1	XX-2	Trapezoidal	3	6	200	0.014	456.49	455.94	17.92	3.15	456.93	457.18
DT-XX01	XX-2	XX-OUTFALL	Trapezoidal	3	6	200	0.014	455.94	454.94	53.74	6.05	455.93	456.93
CUL-XX	XX-3	XX-2	Rectangular	3	6	60	0.014	455.49	455.94	26.39	3.05	456.93	456.99
RD-XX02	XX-4	XX-3	Trapezoidal	3	6	200	0.014	456.49	455.49	17.06	3.14	456.99	457.07
RD-YY01	YY-1	YY-2	Trapezoidal	3	6	200	0.014	483.53	482.53	54.27	4.95	484.37	484.61
DT-YY01	YY-2	YY-OUTFALL	Trapezoidal	3	6	200	0.014	482.53	481.53	179.80	8.49	483.37	484.37
CUL-YY	YY-3	YY-2	Rectangular	3	9	90	0.014	482.98	482.53	96.94	6.64	484.37	484.58
RD-YY02	YY-4	YY-3	Trapezoidal	3	6	200	0.014	483.98	482.98	73.72	6.04	484.58	485.20
RD-ZZ01	ZZ-1	ZZ-2	Trapezoidal	3	6	200	0.014	514.41	513.41	30.70	4.02	514.98	515.20
CUL-ZZ	ZZ-2	ZZ-3	Rectangular	3	3	120	0.014	513.41	512.81	34.87	7.71	513.79	514.98
DT-ZZ01	ZZ-3	ZZ-OUTFALL	Trapezoidal	3	6	200	0.014	512.81	511.81	52.59	6.01	512.78	513.79
RD-ZZ02	ZZ-4	ZZ-3	Trapezoidal	3	6	200	0.014	513.81	512.81	15.46	3.59	513.79	514.31
RD-AAA01	AAA-1	AAA-2	Trapezoidal	3	6	200	0.014	481.80	480.80	398.26	9.88	483.82	484.62
CUL-AAA	AAA-2	AAA-3	Rectangular	3	15	90	0.014	480.80	480.35	422.31	9.42	483.30	483.82
DT-AAA01	AAA-3	AAA-OUTFALL	Trapezoidal	3	6	200	0.014	480.35	479.35	482.51	11.01	482.30	483.30
RD-AAA02	AAA-4	AAA-3	Trapezoidal	3	6	200	0.014	481.35	480.35	40.38	3.15	483.30	483.28
Link222	BBB-1	BBB-2	Trapezoidal	3	6	200	0.014	524.76	523.76	71.81	5.89	525.35	525.97
CUL-BBB	BBB-2	BBB-3	Rectangular	3	6	90	0.014	523.76	523.31	80.82	8.60	524.73	525.35
DT-BBB01	BBB-3	BBB-OUTFALL	Trapezoidal	3	6	200	0.014	523.31	522.31	107.14	7.37	523.73	524.73
Link224	BBB-4	BBB-3	Trapezoidal	3	6	200	0.014	524.31	523.31	16.69	3.19	524.73	524.88

Appendix D
Small Watershed (Malcolm Method) Hydrographs
(Excel Spreadsheet in the Folder)