25YR/72HR STORM ANALYSIS

********** Basin Summary - 2572 **********

***		
Basin Name:	BASIN-3	B-3-PRE
Group Name:	BASE	BASE
Node Name:	POND-3	DUMMY
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH256	UH256
Peaking Factor:	256.00	256.00
Spec Time Inc (min):	1.33	1.33
Comp Time Inc (min):	1.33	1.33
Rainfall File:	SFWMD72	SFWMD72
Rainfall Amount (in):	10.50	10.50
Storm Duration (hr):	72.00	72.00
Status:	ONSITE	ONSITE
Time of Conc. (min):	10.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	19.91	19.91
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	82.00	70.00
DCIA (%):	0.00	0.00
Time Max (hrs):	60.02	60.02
Flow Max (cfs):	86.69	76.46
Runoff Volume (in):	8.26	6.67
Runoff Volume (cf):	596697	482314

72 HR STORM

PEAK ALLOWABLE DISCHARGE

(8U

Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.21) [1]

25YR/72HR STORM ANALYSIS

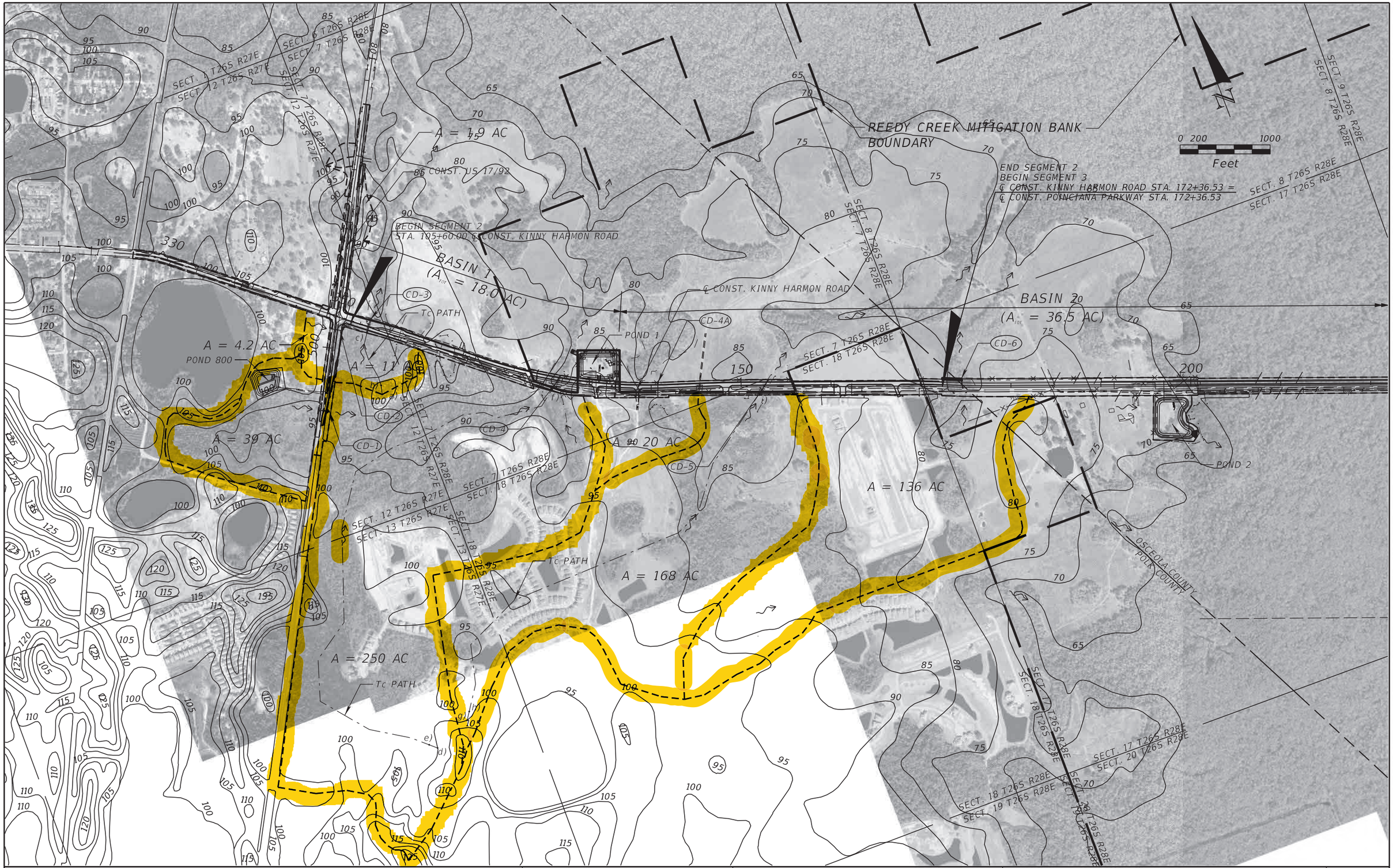
********** Basin Summary - 2572 **********

***		
Basin Name:	BASIN-4	B-4-PRE
Group Name:	BASE	BASE
Node Name:	POND-4	DUMMY
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH256	UH256
Peaking Factor:	256.00	256.00
Spec Time Inc (min):	1.33	1.33
Comp Time Inc (min):	1.33	1.33
Rainfall File:	SFWMD72	SFWMD72
Rainfall Amount (in):	10.50	10.50
Storm Duration (hr):	72.00	72.00
Status:	ONSITE	ONSITE
Time of Conc. (min):	10.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	5.51	5.51
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	84.00	70.00
DCIA (%):	0.00	0.00
Time Max (hrs):	60.02	60.02
Flow Max (cfs):	24.34	21.16
Runoff Volume (in):	8.51	6.67
Runoff Volume (cf):	170272	133478

72 HR STORM

PEAK ALLOWABLE DISCHARGE

Poinciana Parkway Segments 1, 2, 3
SFWMD ERP App. 141010-12



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

CLAYTON J. LEE, P.E.
P.E. LICENSE NUMBER 44032
DEWBERRY / BOWYER-SINGLETON
520 S. MAGNOLIA AVENUE
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 8794

OSCEOLA COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	POLK	

OVERALL DRAINAGE MAP (1)

SHEET NO.

dshoultz 9/24/2014 5:46:37 PM S:\50062305_Poinciana_Parkway\Design\drainage\DRMPRD00_PRE_POST.DGN

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

CLAYTON J. LEE, P.E.
P.E. LICENSE NUMBER 44032
DEWBERRY / BOWYER-SINGLETON
520 S. MAGNOLIA AVENUE
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 8794

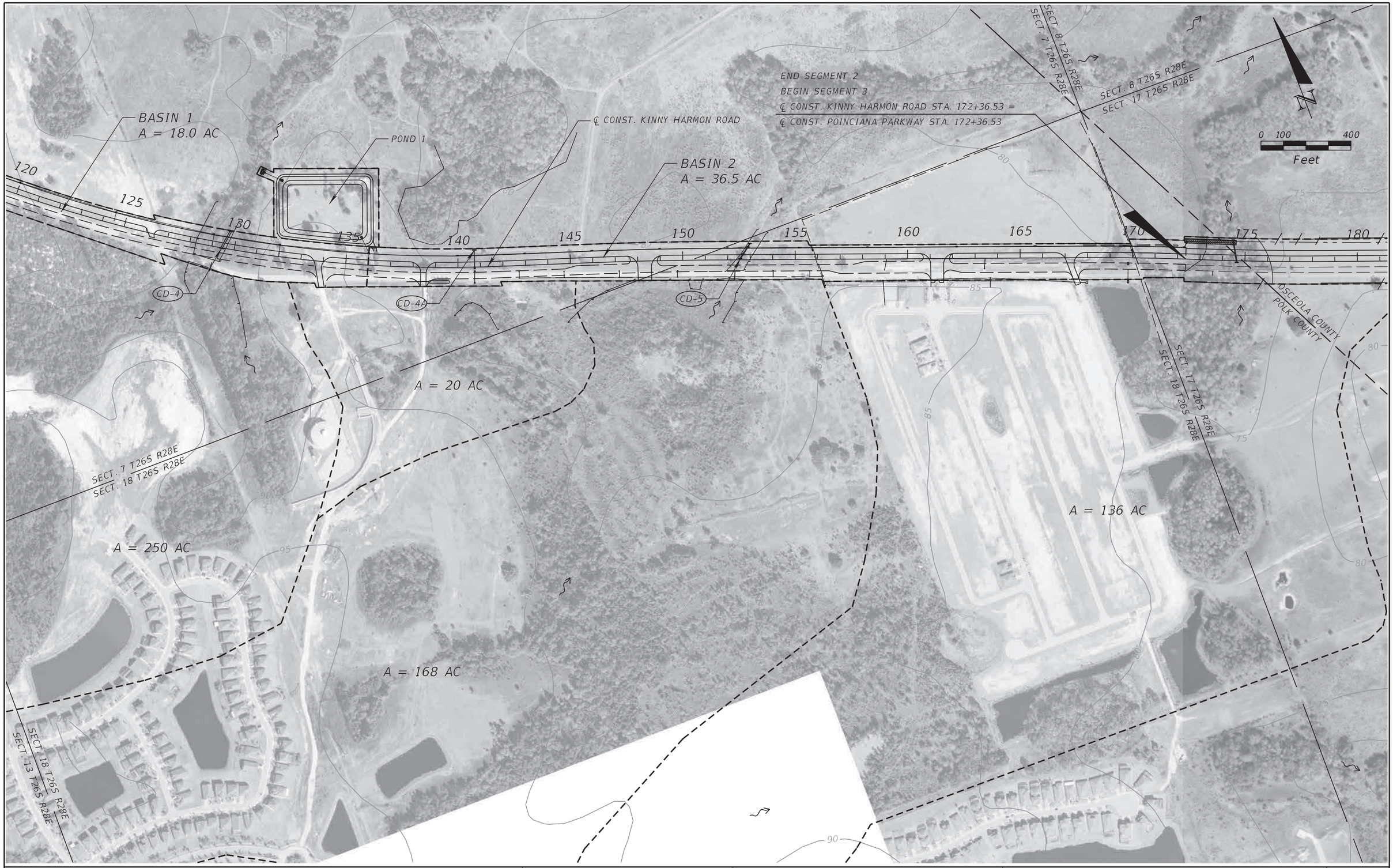
OSCEOLA COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	POLK	

POST - DRAINAGE MAP

SHEET NO.

dshoultz 9/24/2014 5:50:01 PM S:\50062305_Poinciana_Parkway\Design\drainage\DRMPRD00_PRE_POST.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

CLAYTON J. LEE, P.E.
P.E. LICENSE NUMBER 44032
DEWBERRY / BOWYER-SINGLETON
520 S. MAGNOLIA AVENUE
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 8794

OSCEOLA COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	POLK	

POST - DRAINAGE MAP

SHEET NO.

dshoultz 9/24/2014 5:50:23 PM S:\50062305_Poinciana_Parkway\Design\drainage\DRMPRD00_PRE_POST.DGN

℄ CONST. KINNY HARMON ROAD

SECT. 8 T26S R28E
SECT. 7 T26S R28E

SECT. 8 T26S R28E
SECT. 17 T26S R28E

SECT. 7 T26S R28E
SECT. 18 T26S R28E

END SEGMENT 2
BEGIN SEGMENT 3
℄ CONST. KINNY HARMON ROAD STA. 172+36.53 =
℄ CONST. POINCIANA PARKWAY STA. 172+36.53

CD-6

BEGIN BRIDGE
STA. 201+05.00

℄ CONST. POINCIANA PARKWAY

BASIN 2
A = 36.5 AC

POND 2

A = 136 AC

SECT. 17 T26S R28E
SECT. 18 T26S R28E

OSCEOLA COUNTY
POLK COUNTY

N

0 100 400
Feet

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

KEVIN E. KNUDSEN, P.E.
P.E. LICENSE NUMBER 41062
DEWBERRY | BOWYER-SINGLETON
520 SOUTH MAGNOLIA AVENUE
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 8794

OSCEOLA COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	OSCEOLA	

POST-DRAINAGE MAP SEGMENT 3

SHEET NO.

dshoultz 9/24/2014 5:50:45 PM S:\50062305_Poinciana_Parkway\Design\drainage\DRMPRD03_1_pp.DGN

POINCIANA PARKWAY DESIGN / BUILD PROJECT
Osceola and Polk Counties, FL

CROSS-DRAIN SUMMARY TABLE

Segment	ID	Station	Existing Cross-Drain			Proposed Cross-Drain			ULTIMATE Cross-Drain			Remarks
			Length	Size	DHW	Length	Size	DHW	Length	Size	DHW	
1	CD-1	493+00	63'	6' x 3' CBC	95.61	88'	6' x 3' CBC	95.19				Extend existing CD
1	CD-2	502+10	76'	24" pipe	95.13	122'	24" pipe	95.13				Extend existing CD
2	CD-3	107+60	50'	36" CMP	92.93	148'	36" pipe	92.06				
2	CD-4	129+45	41'	30" CMP	89.59	86'	(2) 24" pipes	89.13	169'	(2) 24" pipes	89.60	
2	CD-4A	140+74	57'	24" RCP	84.37	88'	24" pipe	84.36	156'	24" pipe	84.37	
2	CD-5	152+55	41'	24" RCP	84.33	81'	(2) 24" pipes	83.37	169'	(2) 24" pipes	83.55	
3	CD-6	174+64	20'	24" CMP	77.58	103'	(2) 24"x38" pipes	77.20	170'	(2) 24"x38" pipes	77.23	Use Class IV Pipe and Friable Base (Index 205)
3	CD-7	324+00				145'	(2) 36" pipes	67.02	192'	(2) 36" pipes	67.10	Wetland Equalizer Cross-drains. Use Class IV Pipe and Friable Base (Index 205)
3	CD-8	328+00				145'	(2) 36" pipes	67.02	192'	(2) 36" pipes	67.10	
3	CD-9	340+05				126'	30" pipe	68.09	200'	30" pipe	68.09	Basin W7 to W6 outfall. Use Class IV Pipe and Friable Base (Index 205)

NOTES:
DHW: Design High Water Elevation

****

F. A. Project No. : 432294-1-58-01

Date : 9/24/2014

****

STRUCTURE No.	STATION	DESIGN FLOOD		BASE FLOOD		OVERTOPPING FLOOD				GREATEST FLOOD			
		2 % Prob. Discharge	50 yr Freq. Stage	1 % Prob. Discharge	100 yr Freq. Stage	Discharge	Stage	Prob. %	Freq. yr	Discharge	Stage	Prob. %	Freq. yr
CD-1	493+00	135	95.2	151	95.6					257	96.4	0.2	500
CD-2	502+10	24	95.1	26	95.4					45	95.9	0.2	500
CD-3	107+60	53	92.1	59	92.6	77.8	94.3	0.43	231				
CD-4	129+45	37	89.1	41	89.4					70	92.1	0.2	500
CD-4A	140+74	24	84.4	26	84.4					45	84.5	0.2	500
CD-5	152+55	24	83.4	26	83.5					45	84.9	0.2	500
CD-6	174+64	24	77.2	26	77.2					45	77.7	0.2	500
CD-7	324+00	115	67.0	177	68.1					301	71.3	0.2	500
CD-8	328+00	115	67.0	177	68.1					301	71.3	0.2	500
CD-9	340+00	17	68.1	23	68.6					39	70.2	0.2	500

NOTE : The hydraulic data is shown for informational purposes only, to indicate the flood discharges and water surface elevations which may be anticipated in any given year. This data was generated using highly variable factors determined by a study of the watershed. Many judgements and assumptions assumptions are required to establish these factors. The resultant hydraulic data is sensitive to changes, particularly of antecedent conditions, urbanization, channelization, and land use. Users of this data are cautioned against the assumption of precision which can not be attained. Discharges are in cubic feet per second (cfs) and stages are in feet (ft), NGVD, 1929.

DEFINITIONS:

Design Flood : The flood selected by the FDOT to be utilized to assure a standard level of hydraulic performance.

Base Flood : The flood having a 1 % chance of being exceeded in any year. (100 yr frequency)

Overtopping Flood : The flood where flow occurs (A) over the highway, (B) over a watershed divide or (C) thru emergency relief structures.

Greatest Flood : The most severe flood which can be predicted where overtopping is not practicable, normally one with a 0.2 % chance of being exceeded in any year. (500 yr frequency)

Data adapted from : N/A

Prepared By : Kevin Koehler, PE

Date : September 24, 2014

Approved for use on this project By : _____

Date : _____

PROJECT: POINCIANA PARKWAY
SUBJECT: EXISTING / PROPOSED CULVERT ANALYSIS

CROSSDRAIN CHARATERISTICS:

CROSS DRAIN NO.			CD-1			
			Existing		Proposed	
LOCATION		STA.	493+00.00		493+00.00	
WIDTH			6.00	FT	6.00	FT
HEIGHT			3.00	FT	3.00	FT
BARRELS			1		1	
DIAMETER			0.00	IN	0.00	IN
LENGTH			62.5	FT	88.0	FT
TOTAL CROSS-SECTIONAL AREA			18.00	SF	18.00	SF
MANNING'S ROUGHNESS			0.012		0.012	
UPSTREAM INVERT			91.00	FT	91.00	FT
DOWNSTREAM INVERT			91.16	FT	90.90	FT
CRITICAL ELEVATION *			95.20	FT	95.20	FT
DETERMINE FLOWRATES (Q):						
ASSUMED VELOCITY (25 YR)	6.00	FT/S	Headwater Elevation		Headwater Elevation	
Q (25 YR) = V (25 YR) * TOTAL AREA	108	CFS	94.81	FT	94.49	FT
Q (50 YR) = 1.25 * Q (25 YR)	135	CFS	95.51	FT	95.19	FT
Q (100 YR) = 1.40 * Q (25 YR)	151	CFS	95.75	FT	95.55	FT
Q (500 YR) = 1.70 * Q (100 YR)	257	CFS	96.51	FT	96.42	FT

NOTES:

Adjacent Floodplain Limits, SHWT Avg=	91.0	FT	
Survey Adjacent Wetlands, SHWT Avg(East)=	91.3	FT	
Stainline observed at Ex. Conc. Box Culvert =	**91.9**	FT	Down-stream Tailwater used from stainline
*Surveyed overflow elevation to CD-2 =	**95.2**	FT	
Low Edge of Travel Lane (496+00)	**96.9**	FT	50YR DHW is lower

Analysis done with HY-8 Version 7.3 (Jan. 2013)

PROJECT: POINCIANA PARKWAY
SUBJECT: EXISTING / PROPOSED CULVERT ANALYSIS

CROSSDRAIN CHARATERISTICS:

			CD-4		
CROSS DRAIN NO.		Existing	Proposed	ULTIMATE	
LOCATION		129+10	129+45	129+45	
WIDTH		0.00 FT	0.00 FT	0.00 FT	
HEIGHT		0.00 FT	0.00 FT	0.00 FT	
BARRELS		1	2	2	
DIAMETER		30.00 IN	24.00 IN	24.00 IN	
LENGTH		41.00 FT	86.00 FT	169.00 FT	
TOTAL CROSS-SECTIONAL AREA		4.91 SF	6.28 SF	6.28 SF	
MANNING'S ROUGHNESS		0.024	0.012	0.012	
UPSTREAM INVERT		84.94 FT	85.20 FT	85.30 FT	
DOWNSTREAM INVERT		85.37 FT	85.10 FT	85.10 FT	
CRITICAL ELEVATION		89.5 FT	93.00 FT	93.00 FT	
DETERMINE FLOWRATES (Q):					
ASSUMED VELOCITY (25 YR)	6.00 FT/S	Headwater Elevation	Headwater Elevation	Headwater Elevation	
Q (25 YR) = V (25 YR) * TOTAL AREA	29 CFS	89.53 FT	88.70 FT	88.99 FT	
Q (50 YR) = 1.25 * Q (25 YR)	**37 CFS**	89.59 FT	89.13 FT	89.60 FT	
Q (100 YR) = 1.40 * Q (25 YR)	41 CFS	89.60 FT	89.40 FT	89.97 FT	
Q (500 YR) = 1.70 * Q (100 YR)	70 CFS	FT	FT	FT	

NOTES:

Survey Adjacent Wetlands, SHWT Avg	**88.0**	FT	Tailwater used
Overtopping Post (77.7 cfs)	**93.0**	FT	
Low Edge of Travel Lane (129+45)	**91.8**	FT	50YR DHW is lower

Analysis done with HY-8 Version 7.3 (Jan. 2013)

PROJECT: POINCIANA PARKWAY
SUBJECT: EXISTING / PROPOSED CULVERT ANALYSIS

CROSSDRAIN CHARATERISTICS:

			CD-4A					
CROSS DRAIN NO.			**Existing**		**Proposed**		**ULTIMATE**	
LOCATION			140+74		140+74		140+74	
WIDTH			0.00	FT	0.00	FT	0.00	FT
HEIGHT			0.00	FT	0.00	FT	0.00	FT
BARRELS			1		1		1	
DIAMETER			24.00	IN	24.00	IN	24.00	IN
LENGTH			88.00	FT	88.00	FT	156.00	FT
TOTAL CROSS-SECTIONAL AREA			3.14	SF	3.14	SF	3.14	SF
MANNING'S ROUGHNESS			0.012		0.012		0.012	
UPSTREAM INVERT			82.85	FT	82.80	FT	83.00	FT
DOWNSTREAM INVERT			82.42	FT	82.00	FT	82.00	FT
CRITICAL ELEVATION			84.20	FT	84.20	FT	84.20	FT
DETERMINE FLOWRATES (Q):								
ASSUMED VELOCITY (25 YR)	6.00	FT/S	Headwater Elevation		Headwater Elevation		Headwater Elevation	
Q (25 YR) = V (25 YR) * TOTAL AREA	19	CFS	84.34	FT	84.34	FT	84.35	FT
Q (50 YR) = 1.25 * Q (25 YR)	**24**	**CFS**	84.37	FT	84.36	FT	84.37	FT
Q (100 YR) = 1.40 * Q (25 YR)	26	CFS	84.38	FT	84.37	FT	84.38	FT
Q (500 YR) = 1.70 * Q (100 YR)	45	CFS	84.45	FT	84.45	FT	84.46	FT

NOTES:

Surveyed Outfall Overflow Elevation	**82.5**	FT	Tailwater used
Existing Connection to Adjacent Wetlands	**84.2**	FT	
Low Edge of Travel Lane (143+00)	**89.0**	FT	50YR DHW is lower

Analysis done with HY-8 Version 7.3 (Jan. 2013)

PROJECT: POINCIANA PARKWAY
SUBJECT: EXISTING / PROPOSED CULVERT ANALYSIS

CROSSDRAIN CHARATERISTICS:

			CD-5					
CROSS DRAIN NO.			Existing		Proposed		ULTIMATE	
LOCATION			152+32		152+55		152+55	
WIDTH			0.00	FT	0.00	FT	0.00	FT
HEIGHT			0.00	FT	0.00	FT	0.00	FT
BARRELS			1		2		2	
DIAMETER			24.00	IN	24.00	IN	24.00	IN
LENGTH			41.00	FT	81.00	FT	169.00	FT
TOTAL CROSS-SECTIONAL AREA			3.14	SF	6.28	SF	6.28	SF
MANNING'S ROUGHNESS			0.012		0.012		0.012	
UPSTREAM INVERT			81.79	FT	81.30	FT	81.40	FT
DOWNSTREAM INVERT			81.15	FT	81.20	FT	81.20	FT
CRITICAL ELEVATION *			84.27	FT	86.70	FT	86.70	FT
DETERMINE FLOWRATES (Q):								
ASSUMED VELOCITY (25 YR)	6.00	FT/S	Headwater Elevation		Headwater Elevation		Headwater Elevation	
Q (25 YR) = V (25 YR) * TOTAL AREA	19	CFS	84.30	FT	83.08	FT	83.23	FT
Q (50 YR) = 1.25 * Q (25 YR)	**24**	**CFS**	84.33	FT	83.37	FT	83.55	FT
Q (100 YR) = 1.40 * Q (25 YR)	26	CFS	84.34	FT	83.48	FT	83.68	FT
Q (500 YR) = 1.70 * Q (100 YR)	45	CFS		FT		FT		FT

NOTES:

Survey Adjacent Wetlands, SHWT Avg	**81.4**	FT	Tailwater used
* TOP OF ROAD AT STATION 152+30, RT Overtopping Post (61.9 cfs)	**86.7**	FT	
Low Edge of Travel Lane (152+55)	**85.3**	FT	50YR DHW is lower

Analysis done with HY-8 Version 7.3 (Jan. 2013)

PROJECT: POINCIANA PARKWAY
SUBJECT: EXISTING / PROPOSED CULVERT ANALYSIS

CROSSDRAIN CHARATERISTICS:

			CD-6					
CROSS DRAIN NO.			**Existing**		**Proposed**		**ULTIMATE**	
LOCATION			173+60		174+64		174+64	
WIDTH			0.00	FT	38.00	IN	38.00	FT
HEIGHT			0.00	FT	24.00	IN	24.00	FT
BARRELS			1		2		2	
DIAMETER			24.00	IN	0.00	IN	0.00	IN
LENGTH			20.00	FT	103.00	FT	170.00	FT
TOTAL CROSS-SECTIONAL AREA			3.14	SF	9.95	SF	9.95	SF
MANNING'S ROUGHNESS			0.024		0.012		0.012	
UPSTREAM INVERT			75.25	FT	74.64	FT	74.80	FT
DOWNSTREAM INVERT			74.89	FT	74.40	FT	74.40	FT
CRITICAL ELEVATION *			77.52	FT	80.70	FT	80.70	FT
DETERMINE FLOWRATES (Q):								
ASSUMED VELOCITY (25 YR)	6.00	FT/S	Headwater Elevation		Headwater Elevation		Headwater Elevation	
Q (25 YR) = V (25 YR) * TOTAL AREA	19	CFS	77.57	FT	77.12	FT	77.15	FT
Q (50 YR) = 1.25 * Q (25 YR)	**24**	**CFS**	77.58	FT	77.20	FT	77.23	FT
Q (100 YR) = 1.40 * Q (25 YR)	26	CFS	77.59	FT	77.23	FT	77.28	FT
Q (500 YR) = 1.70 * Q (100 YR)	45	CFS	77.64	FT	77.69	FT	77.83	FT

NOTES

a) Crown of Existing Pipe	**76.89**	FT	
b) Wetland Elevation Downstream (ACOE)	**77.00**	FT	Tailwater used
c) Top of Existing Road at Station 173+60	**77.52**	FT	
d) Top of Proposed Road at Station 175+00	**80.70**	FT	
e) Low Edge of Travel Lane (175+80)	**79.96**	FT	50YR DHW is lower

Analysis done with HY-8 Version 7.3 (Jan. 2013)

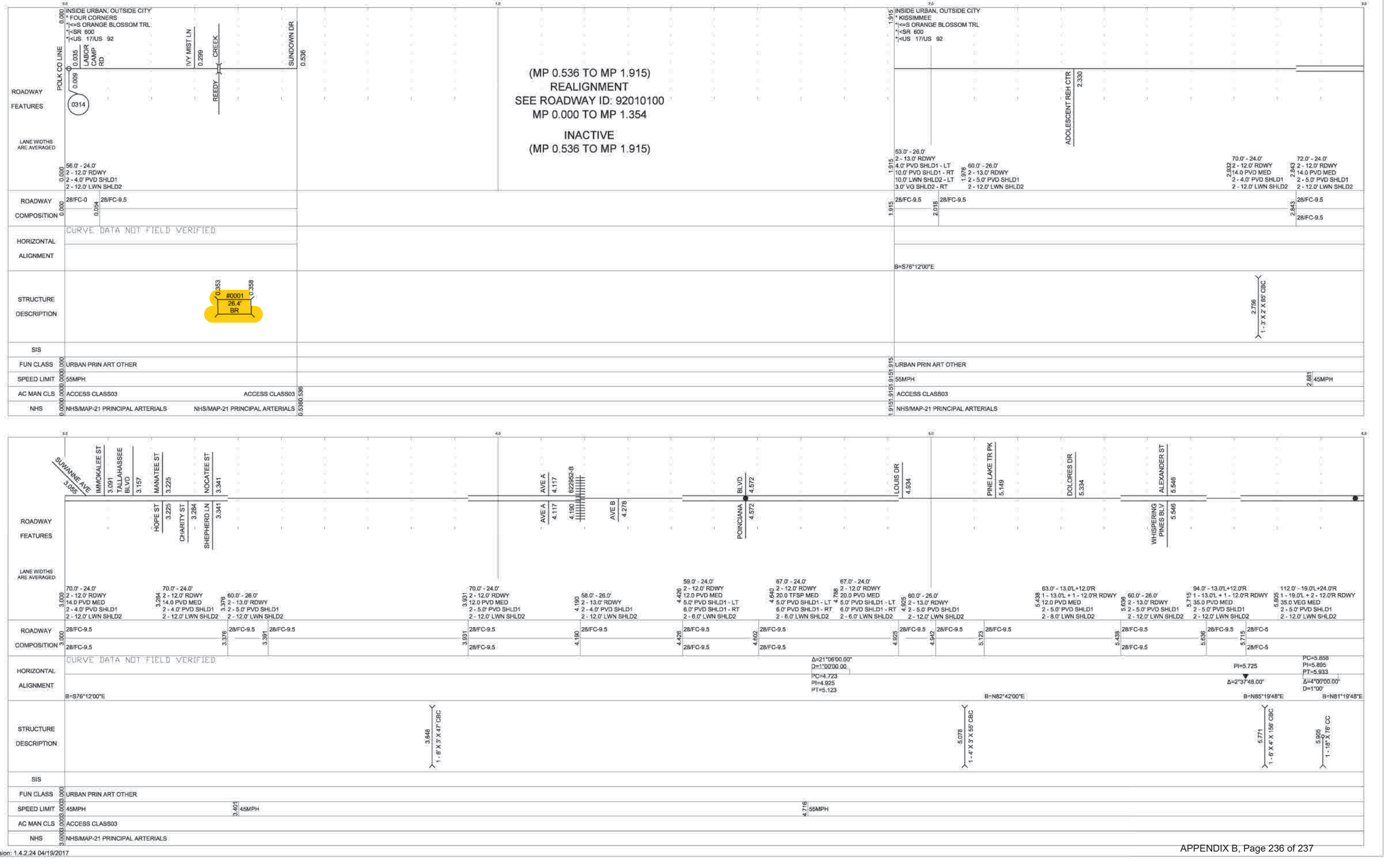
FDOT Straight Line Diagrams

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	01/24/2017	04/19/2017				
BY	Elizabeth Nelson	Glen Dvorovy				

FLORIDA DEPARTMENT OF TRANSPORTATION

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
12	US 92/US 17/US 441	SR 600/SR 500	OSCEOLA	05	92010000	1 OF 3



Version: 1.4.2.24 04/19/2017

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	09/06/2012	09/07/2012	000.000	010.750	12/18/2014 FC	12/18/2014 FC
BY	DEC	DEC	000.000	001.175	03/21/2014 DEC	04/08/2014 DEC

FLORIDA DEPARTMENT OF TRANSPORTATION

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02	US 17/US 92	SR 600	POLK	01	16050000	2 OF 2

6.0 7.0 8.0 9.0

ROADWAY FEATURES (LANE WIDTHS ARE AVERAGED)

OUTSIDE CITY & URBAN
*|<=US-17/92
*|<SR 600
*|<US 17/US 92

SCHOFIELD LN 6.874

SUNNY ACRES RD 7.624
CREEK
KISSIMMEE SOUTH ENT 7.615
HERBS LOST
DEER RUN DR 7.963
ORANGE COSMOS BLVD 8.088
CREEK
LOUGHMANS
PROVIDENCE BLVD 8.828

48.0' - 24.0'
2 - 12.0' RDWY
2 - 5.0' PVD SHLD1
2 - 7.0' LWN SHLD2

7.878 60.0' - 24.0'
2 - 12.0' RDWY
12.0 PVD MED
2 - 5.0' PVD SHLD1
2 - 7.0' LWN SHLD2

ROADWAY COMPOSITION

28/FC-2

7.878 28/FC-2
28/FC-2

HORIZONTAL ALIGNMENT

CURVE DATA NOT FIELD VERIFIED

B=N29°19'00"E

STRUCTURE DESCRIPTION

6.714 1 - 2' X 2' X 75' CBC
6.975 1 - 2' X 2' X 70' CBC
7.297 1 - 30" X 72' CC
7.450 1 - 30" X 76' CC
7.696 #0187 21' CB 7.700
7.934 1 - 3' X 3' X 85' CBC
8.188 #0120 21' CB 8.192
8.916 1 - 24" X 84' CC

DISTRICT USE

SIS

FUN CLASS

RURAL PRIN ART OTHER

9.0 10.0

ROADWAY FEATURES (LANE WIDTHS ARE AVERAGED)

HART RD 9.410
GAINES RD 9.758
54
RONALD REAGAN 9.806
KINNY HARMON RD 9.806

10.321 INSIDE URBAN, OUTSIDE CITY
FOUR CORNERS

US 17/92 >
SR 600 >
PARKER RD 10.546
OSCEOLA CO LINE

SECTION ENDS @
OSCEOLA CO LINE
MP: 10.750

GPS COORDINATES
28° 14'56.006" N
81° 33'05.2532" W

9.037 48.0' - 24.0'
2 - 12.0' RDWY
2 - 5.0' PVD SHLD1
2 - 7.0' LWN SHLD2

9.219 62.0' - 24.0'
2 - 12.0' RDWY
12.0 PVD MED
5.0' PVD SHLD1 - LT
4.0' PVD SHLD1 - RT
8.0' LWN SHLD2 - LT
9.0' LWN SHLD2 - RT

9.592 40.0' - 24.0'
2 - 12.0' RDWY
12.0 PVD MED
2 - 2.0' C&G SHLD1

10.036 48.0' - 24.0'
2 - 12.0' RDWY
2 - 5.0' PVD SHLD1
2 - 7.0' LWN SHLD2

END MP: 10.750
NET ROADWAY ID LENGTH: 10.750

ROADWAY COMPOSITION

9.037 28/FC-2
9.219 28/FC-2
28/FC-2
10.036 28/FC-2

HORIZONTAL ALIGNMENT

CURVE DATA NOT FIELD VERIFIED

PC=10.300
PI=10.511
PT=10.722
Δ=4°28'00.00"
D=0°12'00.00

B=N29°19'00"E
B=N33°47'00"E

STRUCTURE DESCRIPTION

9.605 1 - 6' X 3' X 66' CBC
10.354 1 - 4' X 3' X 65' CBC
10.661 1 - 10' X 3' X 75' CBC

DISTRICT USE

SIS

FUN CLASS

RURAL PRIN ART OTHER

10.321 URBAN PRIN ART OTHER

Version: 1.4.2.24 04/14/2015

Appendix C
Field Review Notes

Date: March 18, 2019

Time: 8:30am

Project Number: 599-224

Weather Conditions: Cloudy, cool

Distribution

Name	Organization
Makese Powe, E.I.	The Balmoral Group
Lori Stanfill, P.E.	The Balmoral Group

Review of Work

Review and verification of pipe sizes and conditions within project area.

Comments

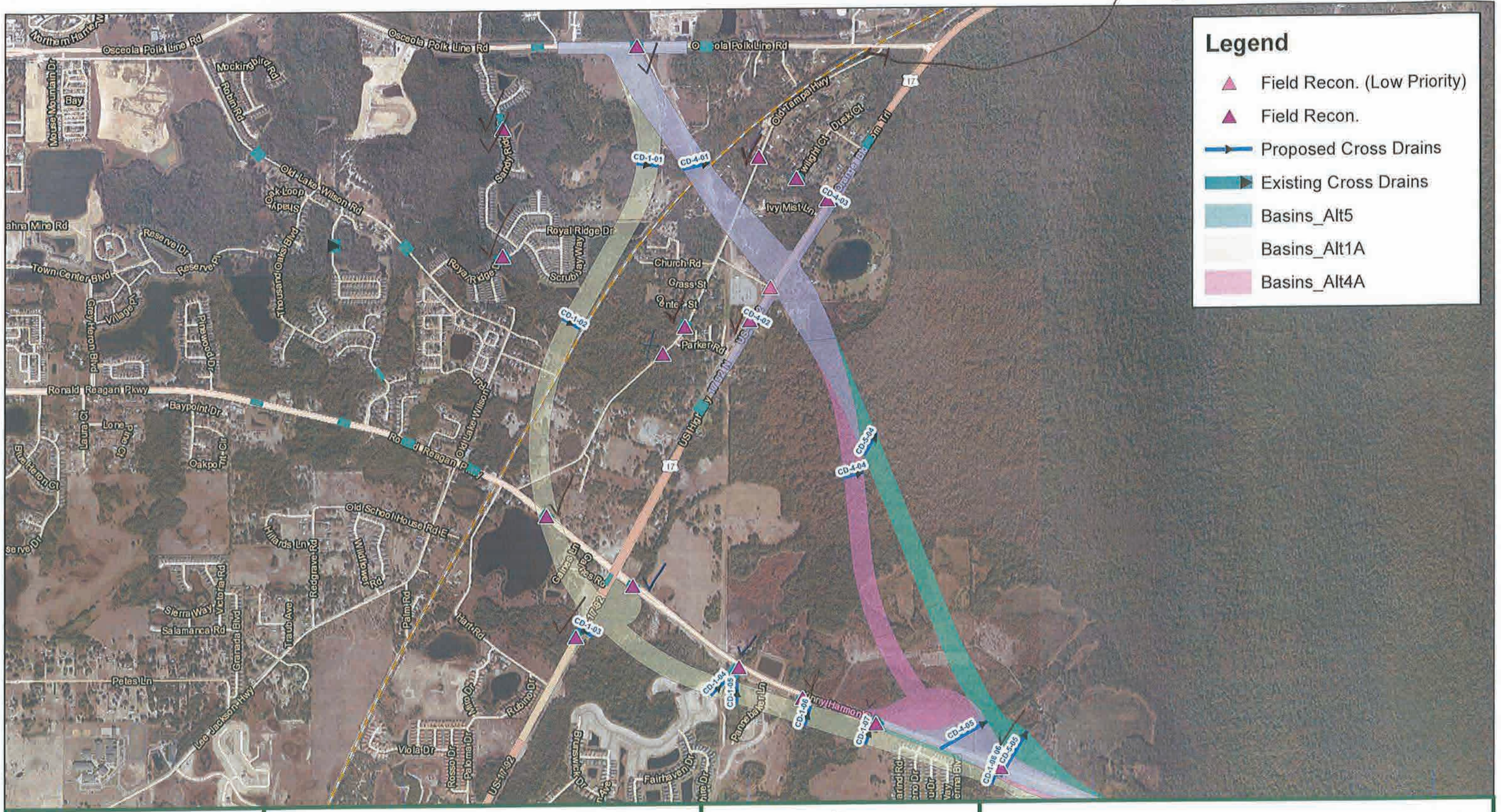
Item	Description
Resident Comment	[Just South of US-92 and Labor Camp Road] Concerned resident, Everette Davis, says pipe has not been attended to since the last hurricane. There is a tree that was uprooted out the ground and now within the flow's path. Pictures were taken. Resident says he had to get his son to help him saw the tree down to a point of non-obstruction. He would love to chat with someone from the city to resolve this. (321)-443-4192
Resident Comment	[Old Kissimmee Road and Parker Road] Concerned Polk county resident says pipe has not been cleaned out in nearly 15 years.
Erosion	[Just East of Delmar Lane and Kinney Harmon Road] East end of Northern headwall.

Field notes may be found in:
Poinciana Parkway Location Hydraulics Report - Appendix C

Photos

Photos taken during field visit can be found in:
Poinciana Parkway Location Hydraulics Report - Appendix C

↗ Plugged - not fully ≈ 18" metal pipe



The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.02 0.04 0.08 Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.0125 0.025 0.05 Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.0175 0.035 0.07
Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.02 0.04 0.08 Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

① 5.5'(L) x 5.0'(H) (approx due to silt & vegetation

FIELD SHEETS
03/18/2019

N W E S

0 0.015 0.03 0.06 Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

Concerned resident, Everette Davis, says pipe has not been attended to since the last hurricane. There is a tree that was uprooted out the ground and now within the flow's path. Pictures were taken. Resident says he had to get his son to help him saw the tree down to a point of non-obstruction. He would love to chat with someone from the city to resolve this.

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.015 0.03 0.06
Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

- Everette Davis & Willie Davis 321-443-4192

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.0275 0.055 0.11 Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
ORANGE & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

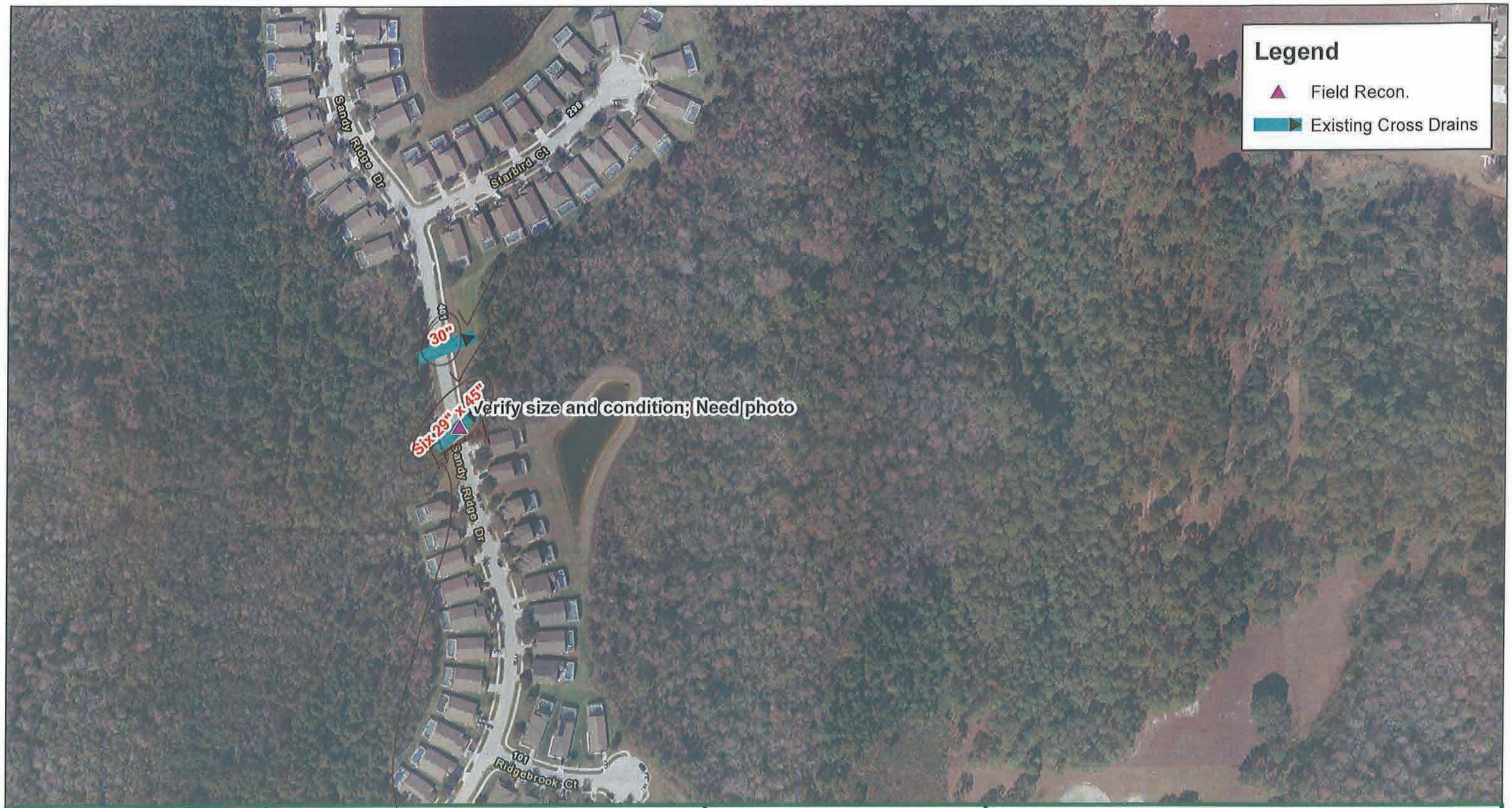
FIELD SHEETS
03/18/2019

Bad Pavement - Water may d.t. road here

3@8'x4' Bridge Culvert → good condition no apparent scour/erosion - Silted ~~to~~ or may not minor

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
ORANGE & OSCEOLA COUNTY, FLORIDA



The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIELD SHEETS
03/18/2019

N
W E
S

0 0.01 0.02 0.04
Miles

POINCIANA PARKWAY EXTENSION

CFX PD&E Study
~~ORANGE~~ & OSCEOLA COUNTY, FLORIDA

EX-CD-1; Upstream End (Northwest), Facing North

EX-CD-1; Upstream End (Northwest), Facing Southeast

EX-CD-1; Upstream End (Northwest), Facing Southeast

EX-CD-1; Upstream End (Northwest), Facing Southwest

EX-CD-4; Downstream End (Northeast), Facing Northeast

EX-CD-4; Upstream End (Southwest), Facing Northeast

EX-CD-4; Upstream End (Southwest), Facing Southwest

EX-CD-4A; Upstream End (Southwest), Facing Northeast

EX-CD-4A; Upstream End (Southwest), Facing Northeast

EX-CD-4A; Upstream End (Southwest), Facing Southwest

EX-CD-5; Downstream End (Northeast), Facing East

EX-CD-5; Upstream End (Southwest), Facing East

EX-CD-5; Upstream End (Southwest), Facing Northeast

EX-CD-6; Downstream End (Northeast)

EX-CD-6; Downstream End (Northeast), Facing Southeast

EX-CD-6; Upstream End (Southwest)

EX-CD-6; Upstream End (Southwest), Facing Northeast

EX-CD-6; Downstream End (Northeast), Facing Northwest

EX-A; Downstream End (East)

EX-A; Downstream End (East), Facing North

EX-A; Downstream End (East), Facing North

EX-A; Upstream End (West)

EX-A; Downstream End (East), Facing South

EX-A; Upstream End (West)

EX-A; Upstream End (West)

EX-B; Downstream End (South)

EX-B; Downstream End (South), Facing West

EX-B; Downstream End (South)

EX-C; Upstream End (Northwest)

EX-C; Upstream End (Northwest), Facing North

EX-C; Downstream End (Southeast)

EX-C; Downstream End (Southeast), Facing Northwest

EX-C; Downstream End (Southeast), Facing Northwest

EX-C; Downstream End (Southeast), Facing Northwest

EX-C; Downstream End (Southeast), Facing Northeast

EX-D; Upstream End (Northwest), Facing Northwest

EX-D; Downstream End (Southeast)

EX-D; Downstream End (Southeast), Facing Southeast

EX-D; Downstream End (Southeast), Facing Northwest

EX-D; Downstream End (Southeast)

EX-E; Upstream End (West), Facing East

EX-E; Upstream End (West), Facing East

EX-E; Upstream End (West), Facing South

EX-F; Upstream End (North), Facing North

EX-F; Upstream End (North), Facing North

EX-F; Downstream End (South), Facing North

EX-G; Upstream End (Southwest)

EX-G; Upstream End (Southwest), Facing Southwest

EX-L; Upstream End (Northwest), Facing East

EX-L; Downstream End (Southeast)

EX-N; Upstream End (Northwest), Facing Northwest

EX-N; Upstream (Northwest), Facing Southwest

EX-N; Downstream (Southeast), Facing Northwest

EX-N; Downstream (Southeast), Facing Northwest

Appendix D
Calculations

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.1 - Existing Offsite Conveyance Summary

Existing Cross Drain ID	Proposed Cross Drain ID	Size	Source	Existing Length	Existing 50-Yr		Existing 100-Yr		Comment
				(LF)	Stage (ft NAVD)	Flow (cfs)	Stage (ft NAVD)	Flow (cfs)	
EX-A1	CD-1-01	6-29"x45" Pipes	Field Review 3/18/2019; SFWMD Permit Application 020702-14 & SWFWMD Permit Application 43023879	52*	--	--	83.0	554.47	Existing information is from ICPR Routing; max stage in EAST5WET; Max Outflow from EAST5WET, Converted to NAVD (SWFWMD ERP App. 43023879)
EX-A2	CD-4-01, CD-5-01	6-29"x45" Pipes	Field Review 3/18/2019; SFWMD Permit Application 020702-14 & SWFWMD Permit Application 43023879	52*	--	--	78.8	584.05	Existing information is from ICPR Routing Upstream of Railroad; Max stage in EAST7WET; Max Outflow from EAST7WET, Converted to NAVD (SWFWMD ERP App. 43023879)
EX-B	CD-1-02	2-60" Pipes (act as control structure with DBIs upstream)	Field Review 3/18/2019; SFWMD Permit Application 020702-14 & SWFWMD Permit Application 43023879	72*	--	--	85.2	153.47	Existing information is from ICPR Routing, Upstream of Railroad, SOUTH5, Converted to NAVD (SWFWMD ERP App. 43023879)
EX-CD-1	CD-1-03	6'x3' CBC	Referred to as CD-1 in docs; Field Review 3/18/2019; SFWMD Permit Application 141010-12	88*	94.3	135	94.6	151	Existing information is from HY-8 using 6 fps velocity method, Converted to NAVD (SFWMD ERP App. 141010-12)
EX-CD-4	CD-1-04, CD-1-05	2-24" Pipes	Referred to as CD-4 in docs; Field Review 3/18/2019; SFWMD Permit Application 141010-12	86*	88.2	37	88.5	41	Existing information is from HY-8 using 6 fps velocity method, Converted to NAVD (SFWMD ERP App. 141010-12)
EX-CD-4A	CD-1-06	24" Pipe	Referred to as CD-4A in docs; Field Review 3/18/2019; SFWMD Permit Application 141010-12	88*	83.4	24	83.4	26	Existing information is from HY-8 using 6 fps velocity method, Converted to NAVD (SFWMD ERP App. 141010-12)
EX-CD-5	CD-1-07, CD-4-05A, CD-4-05B, CD-5-05A, CD-5-05B	2-24" Pipes	Referred to as CD-5 in docs; Field Review 3/18/2019; SFWMD Permit Application 141010-12	81*	82.4	24	82.5	26	Existing information is from HY-8 using 6 fps velocity method, Converted to NAVD (SFWMD ERP App. 141010-12)
EX-CD-6	CD-1-08, CD-4-06, CD-5-06, CD-5B-05B	2-24"x38" Pipes	Referred to as CD-6 in docs; Field Review 3/18/2019; SFWMD Permit Application 141010-12	103*	76.3	24	76.3	26	Existing information is from HY-8 using 6 fps velocity method, Converted to NAVD (SFWMD ERP App. 141010-12)
EX-C	CD-4-02, CD-5-02	10'x3' CBC	Field Review 3/18/2019; US 17/US 92 FDOT Straight Line Diagram (Polk Co) [Road ID: 16050000]	72*	--	--	73.3	158.85	Existing information is from ICPR Routing, Node 17-92SE, Converted to NAVD (SWFWMD ERP App. 43023879)
EX-D	CD-4-03, CD-5-03	3-8'x4' CBC (Bridge Culvert #920001)	Field Review 3/18/2019; US 17/US 92 FDOT Straight Line Diagram (Osceola Co)	91*	--	--	68.6	613.05	Existing information is from ICPR Routing, Node 17-92NE, Converted to NAVD (SWFWMD ERP App. 43023879)

* Measured off Aerial Imagery

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.2 - Proposed Offsite Conveyance Summary

Cross Drain ID	Required Minimum Size	Design Flow (cfs)	Basin Area (ac)	Method	Notes
CD-1-01	9-38"x60" Pipes	554.47	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Node EAST5WET (SWFWMD ERP App. 43023879) TW from FEMA BFE, Inverts from DEM
CD-1-02	4-60" Pipes	153.47	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Link RRSOUTH (SWFWMD ERP App. 43023879) TW from FEMA BFE, Inverts from DEM
CD-1-03	6'x3' CBC	124.79	39.60	Rational Method + Contributing Flow	Contributing Flow from Pond 800 (SWFWMD ERP App. 43028086)
CD-1-04	5-48" Pipes	12.00	119.27	Rational Method + Contributing Flow	Contributing flow from CD-1-03 and Providence Development
CD-1-05	3-36" Pipes	44.92	13.83	Rational Method + Contributing Flow	Contributing flow from Providence Development
CD-1-06	2-36" Pipes	26.67	8.90	Rational Method	N/A
CD-1-07	5-36" Pipes	264.98	95.64	Rational Method + Contributing Flow	Contributing flow from Providence Development
CD-1-08	2-38"x60" Pipes	106.69	59.90	Rational Method + Contributing Flow	Contributing flow from Nature's Preserve Development
CD-4-01	7-38"x60" Pipes	584.05	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Links at RRNORTH (SWFWMD ERP App. 43023879) TW from FEMA BFE, Inverts from DEM
CD-4-02	10'x3' CBC48" Pipe	158.85	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Node 17-92SE (SWFWMD ERP App. 43023879)
CD-4-03	3-8'x4' BRIDGE CULVERT	613.05	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Node 17-92NE Outflow (SWFWMD ERP App. 43023879) Inverts from DEM, TW at Crown of CBC
CD-4-04	BRIDGE	--	--	N/A	N/A
CD-4-05A	6-36" Pipes	276.49	107.62	Rational Method + Contributing Flow	Contributing flow from Providence Development
CD-4-05B	6-36" Pipes	302.16	10.85	Rational Method + Contributing Flow	Contributing flow from CD-4-05A
CD-4-06	2-38"x60" Pipes	109.72	63.25	Rational Method + Contributing Flow	Contributing flow from Nature's Preserve Development
CD-5-01	7-38"x60" Pipes	584.05	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Links at RRNORTH (SWFWMD ERP App. 43023879) TW from FEMA BFE, Inverts from DEM
CD-5-02	10'x3' CBC48" Pipe	158.85	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Node 17-92SE (SWFWMD ERP App. 43023879)
CD-5-03	3-8'x4' BRIDGE CULVERT	613.05	--	Existing Information	Flow from Old Kissimmee Road Basin Flood Study, Node 17-92NE Outflow (SWFWMD ERP App. 43023879) Inverts from DEM, TW at Crown of CBC
CD-5-04	BRIDGE	--	--	N/A	N/A
CD-5-05A	4-36" Pipes	276.39	106.40	Rational Method + Contributing Flow	Contributing flow from Providence Development
CD-5-05B	6-36" Pipes	355.42	41.34	Rational Method + Contributing Flow	Contributing flow from CD-5-05A
CD-5-06	2-38"x60" Pipes	110.32	64.02	Rational Method + Contributing Flow	Contributing flow from Nature's Preserve Development
CD-5B-05B	2-38"x60" Pipes	134.26	86.96	Rational Method + Contributing Flow	Contributing flow from Nature's Preserve Development

* Proposed pipe size from cross drain analysis

PROJECT: Poinciana Parkway Connector PD&E **PREPARED:** MDP **DATE:** 05/15/19
LOCATION: Osceola and Polk County, Florida **CHECKED:** JAN **DATE:** 05/15/19

Table B.3 - Cross-Drain DHW Summary

Proposed Cross Drain ID	Existing Cross Drain				Proposed Cross Drain			Difference in Proposed DHW - Reference*	Comments
	Existing Cross Drain ID	Size	Reference		Size	DHW			
			CD DHW	Min. Rdwy Elev.		50 YEAR	100 YEAR	(ft)	
CD-1-01	EX-A1	6-29"x45" Pipes	83.0 +	85.3	9-38"x60" Pipes	--	83.11	-2.2	(Min. Rdwy Elev. from Pond J in Sandy Ridge Development)
CD-1-02	EX-B	2-60" Pipes (act as control structure with DBIs upstream)	85.2 +	85.3	4-60" Pipes	--	85.15	-0.2	(Min. Rdwy Elev. from Pond J in Sandy Ridge Development)
CD-1-03	EX-CD-1	6'x3' CBC	94.3	96.0	6'x3' CBC	94.08	94.55	-1.9	(Min. Rdwy Elev. from CD-1 Low Edge of Travel Lane in SWFWMD ERP App. 141010-12)
CD-1-04	EX-CD-4	2-24" Pipes	88.2	96.4	5-48" Pipes	91.09	91.35	-5.3	Remains in wetland (Min. Rdwy Elev. from Pond 11 in Providence N2-3 Subdivision)
CD-1-05	EX-CD-4	2-24" Pipes	88.2	97.8	3-36" Pipes	89.79	89.93	-8.0	(Min. Rdwy Elev. from Pond 9 in Providence N2-3 Subdivision)
CD-1-06	EX-CD-4A	24" Pipe	83.4	88.7	2-36" Pipes	87.2	87.48	-1.5	Remains in wetland (Min. Rdwy Elev. from Pond 2 in Providence N26 Subdivision)
CD-1-07	EX-CD-5	2-24" Pipes	82.4	92.1	5-36" Pipes	86.36	87.24	-5.8	Remains in wetland (Min. Rdwy Elev. from Pond RD-3B in Providence N26 Subdivision)
CD-1-08	EX-CD-6	2-24"x38" Pipes	76.3	82.9	2-38"x60" Pipes	76.98	77.22	-5.9	(Min. Rdwy Elev. from Pond 2&3 in Nature's Preserve Development)
CD-4-01	EX-A2	6-29"x45" Pipes	78.8 +	85.3	7-38"x60" Pipes	--	81.3	-4.0	Remains in wetlands & channel (Min. Rdwy Elev. from Pond J in Sandy Ridge Development)
CD-4-02	EX-C	10'x3' CBC	73.3 +	--	10'x3' CBC 48" Pipe	--	73.74	0.5	Flooding issues at this pipe location
CD-4-03	EX-D	3-8'x4' CBC (Bridge Culvert #920001)	68.6 +	--	3-8'x4' CBC (Bridge Culvert #920001)	--	68.71	0.1	
CD-4-04	--	--	--	--	3,267-ft of New Bridge	--	--	N/A	
CD-4-05A	EX-CD-5	2-24" Pipes	82.4	92.1	6-36" Pipes	86.06	86.86	-6.1	Does not incroach on adjacent property (Min. Rdwy Elev. from Pond RD-3B in Providence N26 Subdivision)
CD-4-05B	EX-CD-5	2-24" Pipes	82.4	92.1	6-36" Pipes	84.04	84.78	-8.1	Does not incroach on adjacent property (Min. Rdwy Elev. from Pond RD-3B in Providence N26 Subdivision)
CD-4-06	EX-CD-6	2-24"x38" Pipes	76.3	82.9	2-38"x60" Pipes	77.08	77.32	-5.8	Does not incroach on adjacent property (Min. Rdwy Elev. from Pond 2&3 in Nature's Preserve Development)
CD-5-01	EX-A2	6-29"x45" Pipes	78.8 +	85.3	7-38"x60" Pipes	--	81.3	-4.0	Remains in wetlands & channel (Min. Rdwy Elev. from Pond J in Sandy Ridge Development)
CD-5-02	EX-C	10'x3' CBC	73.3 +	--	10'x3' CBC 48" Pipe	--	73.74	0.5	Flooding issues at this pipe location
CD-5-03	EX-D	3-8'x4' CBC (Bridge Culvert #920001)	68.6 +	--	3-8'x4' CBC (Bridge Culvert #920001)	--	68.71	0.1	
CD-5-04	--	--	--	--	3,272-ft of New Bridge	--	--	N/A	
CD-5-05A	EX-CD-5	2-24" Pipes	82.5	92.1	4-36" Pipes	86.75	87.66	-5.4	Does not incroach on adjacent property (Min. Rdwy Elev. from Pond RD-3B in Providence N26 Subdivision)
CD-5-05B	EX-CD-5	2-24" Pipes	82.5	92.1	6-36" Pipes	85.54	86.51	-6.6	Does not incroach on adjacent property (Min. Rdwy Elev. from Pond RD-3B in Providence N26 Subdivision)
CD-5-06	EX-CD-6	2-24"x38" Pipes	76.3	82.9	2-38"x60" Pipes	77.58	77.58	-5.3	Does not incroach on adjacent property (Min. Rdwy Elev. from Pond 2&3 in Nature's Preserve Development)
CD-5B-05B	EX-CD-6	2-24"x38" Pipes	76.3	82.9	2-38"x60" Pipes	77.33	77.55	-5.5	(Min. Rdwy Elev. from Pond 2&3 in Nature's Preserve Development)

DHW = Design High Water Elevation [ft]
+ 100 Year DHW retrieved from ERP
* Mininmum Roadway Elevation used as reference where present on table

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-01

Total Contributing Flow Calculations

Existing Flow from EAST5WET =	554.47	*(Node EAST5WET, 100-yr Storm)*
Existing Flow at Railroad =	584.05	*(Links RRNORTH1 & RRNORTH2, 100-yr Storm)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	82.00	*FEMA BFE*
Roadway Crest Elevation	87.00	*Assumed 5-ft above crown*
Upstream Culvert Invert	78.0	*From DEM*
Downstream Culvert Invert	77.82	*Minimum slope*
Culvert length	358.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	79.0	*NRCS Imagery estimate*

Existing Permitted Culvert Conveyance Size	6 - 29 inch x 45 inch	*In series upstream*

(Size information retrieved from SWFWMD Permit Application 43023879)

Proposed Culvert Size	9 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-02

Total Contributing Flow Calculations

Existing Flow at Railroad =	153.47	*(Link RRSOUTH, 100-yr Storm)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	85.00	*FEMA BFE*
Roadway Crest Elevation	90.00	*Assumed 5-ft above crown*
Upstream Culvert Invert	80.0	*Assumed invert for crown of pipe at tailwater*
Downstream Culvert Invert	79.82	*Minimum slope*
Culvert length	358.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	83.0	*NRCS Imagery estimate*

Existing Permitted Culvert Conveyance Size	2 - 60 inch	*In series upstream*

(Size information retrieved from SWFWMD Permit Application 43023879)

Proposed Culvert Size	4-60 inch

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-03
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**30.1**

Basin Runoff Calculations

Total Contributing Area (acres)	39.60
Pervious Contributing Area (acres)	39.20
Impervious Contributing Area (acres)	0.40
Weighted Runoff Coefficient[1]	0.37
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

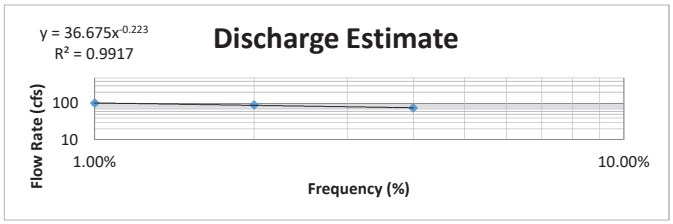
		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	5.59	6.13	6.70	N/A
Peak Flow (cfs)	74.60	89.25	101.65	**146.64**

Solve for 500-year flow rate using log-log graph based on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

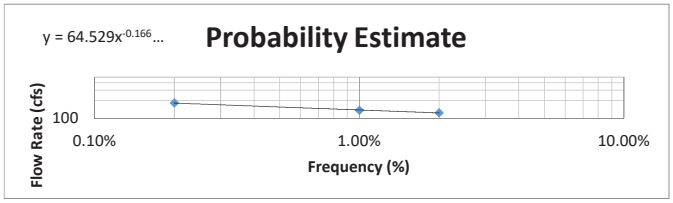
A= 36.675
B= 0.223
y= **146.64 cfs**
x= 0.002

$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates shown below.

A= 64.529
B= 0.166
y= 227.58 cfs
x= **0.05%**



Total Contributing Flow Calculations

Exist. Flow from Pond 800 =	35.54
Total Design Peak Flow (cfs)	124.79
Total Base Peak Flow (cfs)	137.19
Total Greatest Peak Flow (cfs)	182.18
Overtopping Flow - From HY8 (cfs)	227.58

SWFWMD ERP App. 43028086 (25-yr/24-hr Storm)

Lake Locke considered as a Closed Basin (SWFWMD ERP App. 43028086)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	90.97	*CBC Stainline used in ERP 141010-12 (Higher than FEMA BFE, 90.4)*
Roadway Crest Elevation	98.10	*Assumed 5-ft above crown*
Upstream Culvert Invert	90.1	*(Invert from SFWMD ERP 141010-12, Converted to NAVD)*
Downstream Culvert Invert	89.82	*(CBC slope from SFWMD ERP 141010-12)*
Culvert length	222.0	*Measured from GIS, extended 134 ft beyond the proposed EOS*
Upstream Est. SHWL Elev (ft-NAVD88)	89.1	*(Attained from SFWMD Permit Application 071212-21)*

Existing Permitted Culvert Conveyance Size	6 feet x 3 feet

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	6 feet x 3 feet

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-04
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**93.1**

Basin Runoff Calculations

Total Contributing Area (acres)	119.27
Pervious Contributing Area (acres)	119.27
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient[1]	0.36
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	2.88	3.20	3.40	N/A
Peak Flow (cfs)	113.32	137.50	152.07	**217.04**

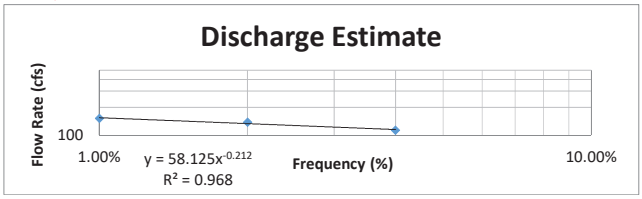
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph based on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 58.125
B= 0.212
y= **217.04 cfs**
x= 0.002

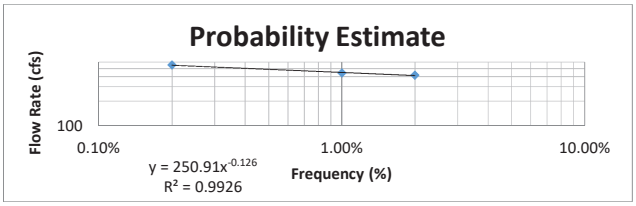
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 250.91
B= 0.126
y= 739.88 cfs
x= **0.02%**



Total Contributing Flow Calculations

Design Flow from CD-1-03 (cfs)	124.79	*(50-yr Storm)*	*POND RD-1 = 4.416 (cfs)*
Base Flow from CD-1-03 (cfs)	137.19		*POND PN23-2 = 44.481 (cfs)*
Greatest Flow from CD-1-03 (cfs)	182.18		*POND PN23-5 = 49.113 (cfs)*
Flow from Providence Development (cfs)	153.07	*(25-yr/24-hr Storm)*	*POND PN23-6 = 16.158 (cfs)*
Total Design Peak Flow (cfs)	415.35		*POND PN23-11 = 9.476 (cfs)*
Total Base Peak Flow (cfs)	442.33		*POND PN27 = 29.427 (cfs)*
Total Greatest Peak Flow (cfs)	552.29		***TOTAL = 153.07 (cfs)***

(Contributing pond flows attained from SFWMD Permit Application 040220-40)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	87.07	*(Tailwater from HY-8 Input in SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	95.50	*Assumed 5-ft above crown*
Upstream Culvert Invert	86.5	*From DEM*
Downstream Culvert Invert	86.00	*Assumed slope*
Culvert length	342.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	89.1	*(Attained from SFWMD Permit Application 071212-21)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	5- 48 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-05
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**18.7**

Basin Runoff Calculations

Total Contributing Area (acres)	13.83
Pervious Contributing Area (acres)	12.45
Impervious Contributing Area (acres)	1.38
Weighted Runoff Coefficient[1]	0.44
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 10(

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	6.79	7.42	8.00	N/A
Peak Flow (cfs)	37.71	44.92	50.48	71.34

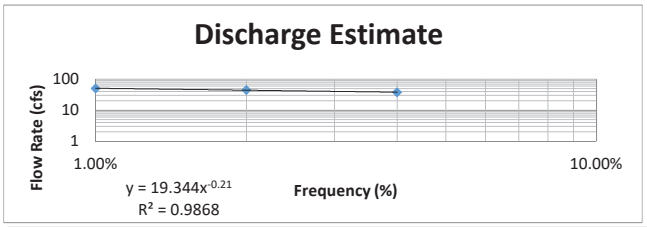
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 19.344
B= 0.21
y= **71.34 cfs**
x= 0.002

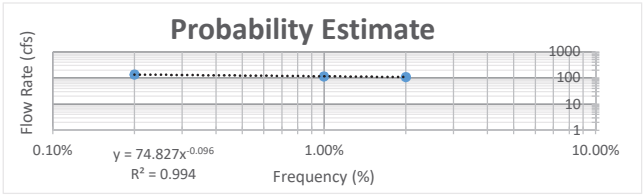
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 74.827
B= 0.096
y= 221.92
x= 0.00%



Total Contributing Flow Calculations

Flow from Providence Development (cfs)	64.58
Total Design Peak Flow (cfs)	109.50
Total Base Peak Flow (cfs)	115.06
Total Greatest Peak Flow (cfs)	135.92

(25-yr/24-hr Storm)

POND PN23-9 = 64.579 (cfs)
TOTAL = 64.579 (cfs)

(Contributing pond flow attained from SFWMD Permit Application 040220-40)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	87.07	*(Tailwater from HY-8 Input in SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	94.50	*Assumed 5-ft above crown*
Upstream Culvert Invert	86.5	*From DEM*
Downstream Culvert Invert	86.00	*Assumed slope*
Culvert length	343.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	88.0	*(Attained from SFWMD Permit Application 071212-21)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	3 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-06
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**23.2**

Basin Runoff Calculations

Total Contributing Area (acres)	8.90
Pervious Contributing Area (acres)	8.01
Impervious Contributing Area (acres)	0.89
Weighted Runoff Coefficient[1]	0.44
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	6.25	6.84	7.50	N/A
Peak Flow (cfs)	22.35	26.67	30.45	43.89

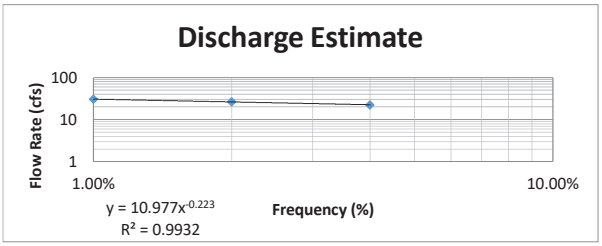
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

$x = \sqrt[B]{\frac{A}{y}}$

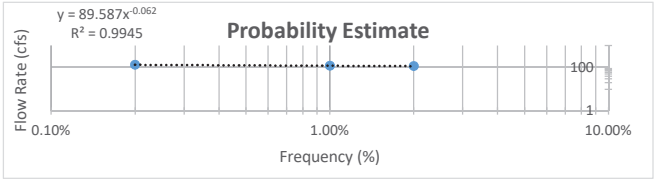
A= 10.977
B= 0.223
y= **43.89 cfs**
x= 0.002



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 89.587
B= 0.062
y= 126.7
x= 0.37%



Total Contributing Flow Calculations

Flow from Providence Development (cfs)	87.91
Total Design Peak Flow (cfs)	114.59
Total Base Peak Flow (cfs)	118.37
Total Greatest Peak Flow (cfs)	131.80

(25-yr/24-hr Storm)

POND PN23-8 = 75.526 (cfs)
POND RD-3B = 12.387 (cfs)
TOTAL = 87.913 (cfs)

(Contributing pond flow attained from SFWMD Permit Application 040220-40)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	81.57	*(Surveyed Outfall Overflow Elev., SFWMD ERP 141010-12)*
Roadway Crest Elevation	88.07	*(Low Edge of Pavement, SFWMD ERP 141010-12)*
Upstream Culvert Invert	81.0	*From DEM*
Downstream Culvert Invert	80.83	*Minimum slope*
Culvert length	336.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	80.5	*(Attained from SFWMD Permit Application 141010-12)*

Existing Permitted Culvert Conveyance Size	24 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	2 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-07
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**42.7**

Basin Runoff Calculations

Total Contributing Area (acres)	95.64
Pervious Contributing Area (acres)	90.86
Impervious Contributing Area (acres)	4.78
Weighted Runoff Coefficient[1]	0.40
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	4.70	5.17	5.70	N/A
Peak Flow (cfs)	164.40	197.37	226.58	330.45

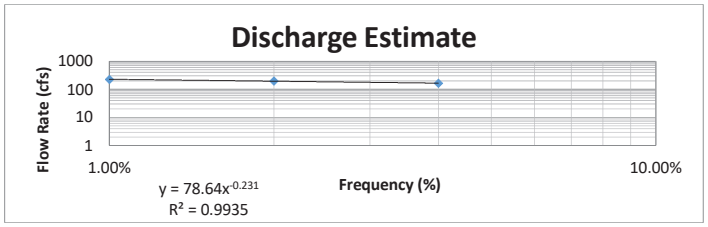
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

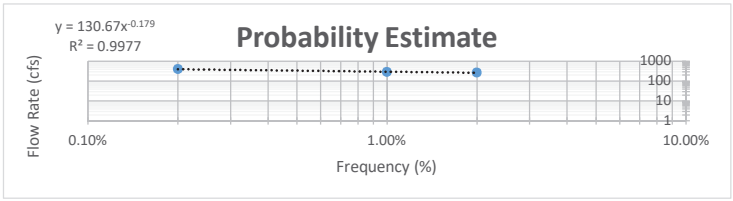
$x = \sqrt[B]{\frac{A}{y}}$

A= 78.64
B= 0.231
y= **330.45 cfs**
x= 0.002



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

A= 130.67
B= 0.179
y= 329.73
x= 0.57%



Total Contributing Flow Calculations

Flow from Providence Development (cfs)	67.61
Total Design Peak Flow (cfs)	264.98
Total Base Peak Flow (cfs)	294.19
Total Greatest Peak Flow (cfs)	398.06

(25-yr/24-hr Storm)

POND PN2-8 = 36.23 (cfs)
POND RD-3B = 12.39 (cfs)
POND RD-3A = 12.62 (cfs)
POND 10A-1 = 6.37 (cfs)
TOTAL = 67.61 (cfs)

(Contributing pond flows attained from SFWMD Permit Application 040220-40)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	80.47	*(Tailwater from SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	88.37	*Assumed 5-ft above crown*
Upstream Culvert Invert	80.37	*(Invert from SFWMD ERP 141010-12, Converted to NAVD)*
Downstream Culvert Invert	80.27	*(Culvert slope from SFWMD ERP 141010-12)*
Culvert length	392.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	80.5	*(Attained from SFWMD Permit Application 141010-12)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	5 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Existing Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-1-08
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**70.0**

Basin Runoff Calculations

Total Contributing Area (acres)	59.90
Pervious Contributing Area (acres)	59.90
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient[1]	0.36
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	3.51	3.88	4.30	N/A
Peak Flow (cfs)	69.35	83.77	96.59	142.99

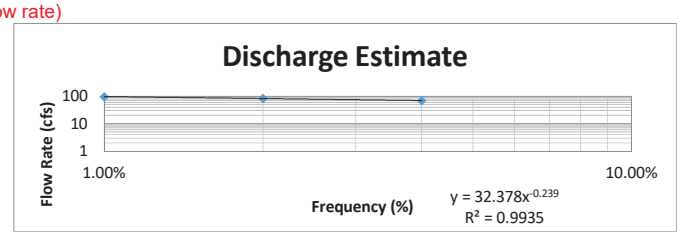
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 32.378
B= 0.239
y= **142.99 cfs**
x= 0.002

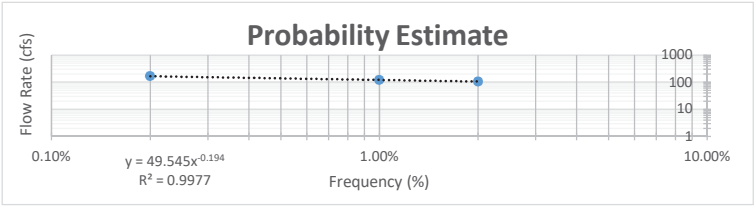
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 49.545
B= 0.194
y= 214.66
x= 0.05%



Total Contributing Flow Calculations

Flow from Natures Preserve Development (cfs)	22.92	*(25-yr/72-hr Storm)*
Total Design Peak Flow (cfs)	106.69	
Total Base Peak Flow (cfs)	119.51	
Total Greatest Peak Flow (cfs)	165.91	

POND 2& 3 = 15.12 (cfs)
POND4 = 2.60 (cfs)
POND5 = 5.20 (cfs)

TOTAL = 22.92 (cfs)

(Contributing pond flows attained from SFWMD Permit Application 101022-10)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	76.07	*(Tailwater from HY-8 Input in SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	79.77	*(From SFWMD ERP 141010-12, Converted to NAVD)*
Upstream Culvert Invert	70.0	*From DEM*
Downstream Culvert Invert	69.79	*Minimum slope*
Culvert length	430.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	75.1	*(Attained from SFWMD Permit Application 050613-21)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch x 38 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	2 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-4-01

Total Contributing Flow Calculations

Existing Flow from EAST5WET =	554.47	*(Node EAST5WET, 100-yr Storm)*
Exist. Flow from Flood Study	584.05	*(Links RRNORTH1 & RRNORTH2, 100-yr Storm)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	79.00	*FEMA BFE*
Roadway Crest Elevation	84.00	*Assumed 5-ft above BFE*
Upstream Culvert Invert	75.2	*From DEM*
Downstream Culvert Invert	75.00	*Minimum slope*
Culvert length	453.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	77.0	*NRCS Imagery estimate*

Existing Permitted Culvert Conveyance Size	6 - 29 inch x 45 inch	*In series upstream*

(size information retrieved from SWFWMD Permit Application 43023879)

Proposed Culvert Size	7 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-4-02

Total Contributing Flow Calculations

Exist. Flow from Flood Study	158.85	*(100-yr Storm)*	*Node 17-92SE = 158.85 (cfs)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	73.00	*(Tailwater from HY-8 Input in SWFWMD ERP 43023879.000)*
Roadway Crest Elevation	79.00	*Assumed 5-ft above crown*
Upstream Culvert Invert	71.0	*From DEM*
Downstream Culvert Invert	68.80	*Assumed slope*
Culvert length	130.0	*Measured from GIS, assumed extension of existing culvert*
Upstream Est. SHWL Elev (ft-NAVD88)	78.5	*Estimate based on NRCS soils*

Existing Permitted Culvert Conveyance Size	10 feet x 3 feet

(Size information retrieved from US 17/US 92 FDOT Straight Line Diagram - Polk County [Road ID: 16050000])

Proposed Culvert Sizes	10 feet x 3 feet	&	48 inch

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-4-03

Total Contributing Flow Calculations

Exist. Flow from Flood Study	613.05	*(100-yr Storm)*	*Node 17-92NE = 613.05 (cfs)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	66.50	*FEMA BFE*
Roadway Crest Elevation	72.50	*From DEM, Roadway Elevation*
Upstream Culvert Invert	64.0	*From DEM - assumed grade to culvert*
Downstream Culvert Invert	63.90	*Assumed slope*
Culvert length	140.0	*Measured from GIS, assume extension of existing culvert*
Upstream Est. SHWL Elev (ft-NAVD88)		

Existing Permitted Culvert Conveyance Size	3 - 8 feet x 4 feet

(Size information retrieved from US 17/US 92 FDOT Straight Line Diagram - Polk County [Road ID: 16050000])

Proposed Culvert Size	3 - 8 feet x 4 feet

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-4-05A
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**47.9**

Basin Runoff Calculations

Total Contributing Area (acres)	107.62
Pervious Contributing Area (acres)	107.62
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient[1]	0.36
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	4.42	4.87	5.40	N/A
Peak Flow (cfs)	156.87	188.57	217.93	321.00

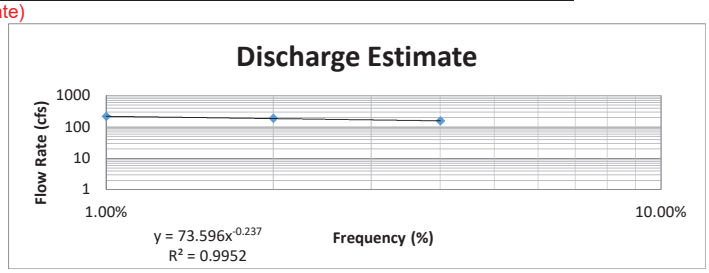
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 73.596
B= 0.237
y= **321.00 cfs**
x= 0.002

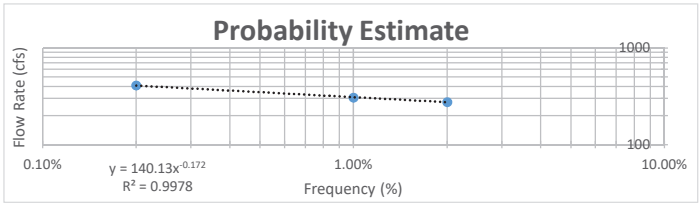
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 140.13
B= 0.172
y= 355.95
x= 0.44%



Total Contributing Flow Calculations

Flow from Providence Development (cfs)	87.91
Total Design Peak Flow (cfs)	276.49
Total Base Peak Flow (cfs)	305.84
Total Greatest Peak Flow (cfs)	408.92

(25-yr/24-hr Storm)

POND PN23-8 = 75.526 (cfs)
POND RD-3B = 12.387 (cfs)
TOTAL = 87.913 (cfs)

(Contributing pond flows attained from SFWMD Permit Application 040220-40)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	80.47	*(Tailwater from SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	88.37	*Assumed 5-ft above crown*
Upstream Culvert Invert	80.37	*(Invert from SFWMD ERP 141010-12, Converted to NAVD)*
Downstream Culvert Invert	80.27	*(Culvert slope from SFWMD ERP 141010-12)*
Culvert length	550.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	80.5	*(Attained from SFWMD Permit Application 141010-12)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	6 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-4-05B
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**25.6**

Basin Runoff Calculations

Total Contributing Area (acres)	10.85	
Pervious Contributing Area (acres)	10.85	
Impervious Contributing Area (acres)	0.00	
Weighted Runoff Coefficient[1]	0.36	*Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr*
Design Event[2]	50-year	

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	6.00	6.57	7.30	N/A
Peak Flow (cfs)	21.49	25.67	29.70	43.35

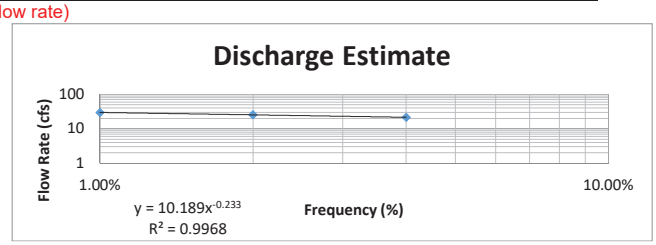
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

$x = \sqrt[B]{\frac{A}{y}}$

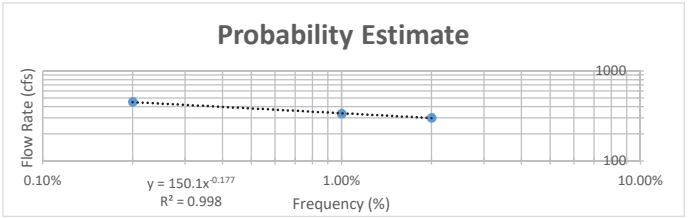
A= 10.189
B= 0.233
y= **43.35 cfs**
x= 0.002



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 150.1
B= 0.177
y= 424.03
x= 0.28%



Total Contributing Flow Calculations

Flow from CD-4-05A	276.49	*(50-year)*
	305.84	*(100-year)*
	408.92	*(500-year)*
Total Design Peak Flow (cfs)	302.16	
Total Base Peak Flow (cfs)	335.55	
Total Greatest Peak Flow (cfs)	452.27	

Cross Drain Sizing Calculations

Tailwater Elevation/Source	80.47	*(Tailwater from SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	87.00	*Assumed 5-ft above crown*
Upstream Culvert Invert	79.00	*Assumed invert for crown of pipe at tailwater*
Downstream Culvert Invert	78.83	*Minimum slope*
Culvert length	340.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	77.5	*(Attained from SFWMD Permit Application 070119-12)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	6 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Existing Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-4-06
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**72.1**

Basin Runoff Calculations

Total Contributing Area (acres)	63.25
Pervious Contributing Area (acres)	63.25
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient[1]	0.36
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	3.44	3.81	4.15	N/A
Peak Flow (cfs)	71.83	86.80	98.43	143.15

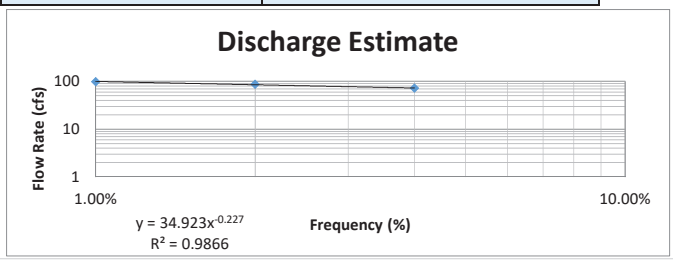
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 34.923
B= 0.227
y= **143.15 cfs**
x= 0.002

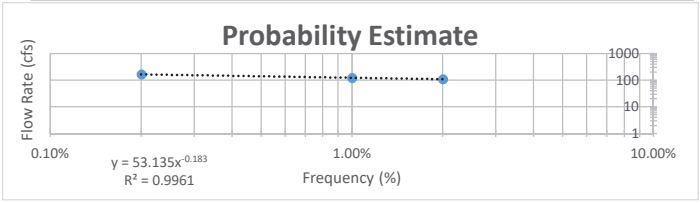
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 53.135
B= 0.183
y= 208.04
x= 0.06%



Total Contributing Flow Calculations

Flow from Natures Preserve Development (cfs)	22.92
Total Design Peak Flow (cfs)	109.72
Total Base Peak Flow (cfs)	121.35
Total Greatest Peak Flow (cfs)	166.07

(25-yr/72-hr Storm)

POND 2& 3 = 15.12 (cfs)
POND4 = 2.60 (cfs)
POND5 = 5.20 (cfs)

TOTAL = 22.92 (cfs)

(Contrib

(Contributing pond flows attained from SFWMD Permit Application 101022-10)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	76.07	*(Tailwater from HY-8 Input in SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	79.77	*(From SFWMD ERP 141010-12, Converted to NAVD)*
Upstream Culvert Invert	73.71	*From DEM*
Downstream Culvert Invert	72.59	*Minimum slope*
Culvert length	480.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	75.1	*(Attained from SFWMD Permit Application 050613-21)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch x 38 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	2 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5-01

Total Contributing Flow Calculations

Exist. Flow from Flood Study	584.05	*(100-yr Storm)*	*Links at RRNOTH = 584.05 (cfs)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	79.00	*FEMA BFE*
Roadway Crest Elevation	84.00	*Assumed 5-ft above BFE*
Upstream Culvert Invert	75.23	*From DEM*
Downstream Culvert Invert	75.00	*Minimum slope*
Culvert length	453.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	77.0	*NRCS Imagery estimate*

Existing Permitted Culvert Conveyance Size	6 - 29 inch x 45 inch	*In series upstream*

(size information retrieved from SWFWMD Permit Application 43023879)

Proposed Culvert Size	7 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5-02

Total Contributing Flow Calculations

Exist. Flow from Flood Study	158.85	*(100-yr Storm)*	*Node 17-92SE = 158.85 (cfs)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	73.00	*FEMA BFE*
Roadway Crest Elevation	79.00	*Assumed 5-ft above crown*
Upstream Culvert Invert	71.0	*From DEM*
Downstream Culvert Invert	68.80	*Assumed slope*
Culvert length	162.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	66.0	*Estimate based on NRCS soils*

Existing Permitted Culvert Conveyance Size	10 feet x 3 feet

(Size information retrieved from US 17/US 92 FDOT Straight Line Diagram - Polk County [Road ID: 16050000])

Proposed Culvert Size	10 feet x 3 feet	&	48 inch

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5-03

Total Contributing Flow Calculations

Exist. Flow from Flood Study	613.05	*(100-yr Storm)*	*Node 17-92NE = 613.05 (cfs)*

(Contributing link flow attained from SWFWMD ERP App. 43023879)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	66.50	*FEMA BFE*
Roadway Crest Elevation	72.50	*From DEM, Roadway Elevation*
Upstream Culvert Invert	64.0	*From DEM - assumed grade to culvert*
Downstream Culvert Invert	63.90	*Assumed slope*
Culvert length	140.0	*Measured from GIS, assume extension of existing culvert*
Upstream Est. SHWL Elev (ft-NAVD88)		

Existing Permitted Culvert Conveyance Size	3 - 8 feet x 4 feet

(Size information retrieved from US 17/US 92 FDOT Straight Line Diagram - Polk County [Road ID: 16050000])

Proposed Culvert Size	3 - 8 feet x 4 feet

(Size retrieved from HY-8 version 7.50)

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5-05A
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**46.9**

Basin Runoff Calculations

Total Contributing Area (acres)	106.40
Pervious Contributing Area (acres)	106.40
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient[1]	0.36
Design Event[2]	50-year

Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	4.47	4.92	5.40	N/A
Peak Flow (cfs)	156.83	188.48	215.46	313.92

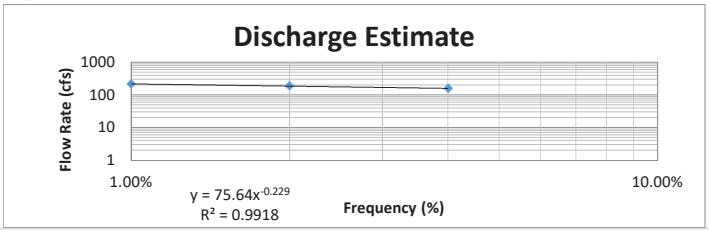
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 75.64
B= 0.229
y= **313.92 cfs**
x= 0.002

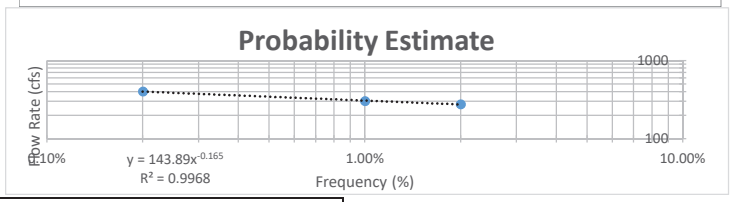
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 143.89
B= 0.165
y= 323.23
x= 0.74%



Total Contributing Flow Calculations

Flow from Providence Development (cfs)	87.91	*(25-yr/24-hr Storm)*	*POND PN23-8 = 75.526 (cfs)*
Total Design Peak Flow (cfs)	276.39		*POND RD-3B = 12.387 (cfs)*
Total Base Peak Flow (cfs)	303.37		***TOTAL = 87.913 (cfs)***
Total Greatest Peak Flow (cfs)	401.83		

(Contributing pond flows attained from SFWMD Permit Application 040220-40)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	80.47	*(Tailwater from SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	88.37	*Assumed 5-ft above crown*
Upstream Culvert Invert	80.37	*Assumed invert for crown of pipe at tailwater*
Downstream Culvert Invert	80.27	*Assumed slope*
Culvert length	220.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	80.5	*(Attained from SFWMD Permit Application 141010-12)*

Existing Permitted Culvert Conveyance Size	2 - 24 inch	*In series upstream*

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	4 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5-05B
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**40.6**

Basin Runoff Calculations

Total Contributing Area (acres)	41.34	
Pervious Contributing Area (acres)	41.34	
Impervious Contributing Area (acres)	0.00	
Weighted Runoff Coefficient[1]	0.36	*Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr*
Design Event[2]	50-year	

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	4.83	5.31	5.90	N/A
Peak Flow (cfs)	65.86	79.02	91.46	134.79

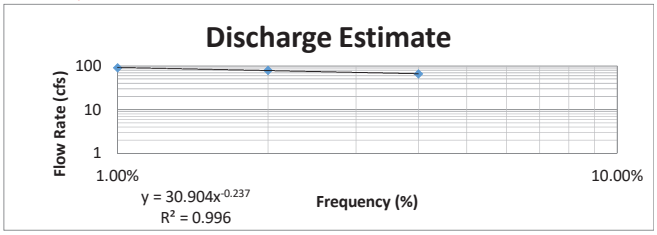
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 30.904
B= 0.237
y= **134.79 cfs**
x= 0.002

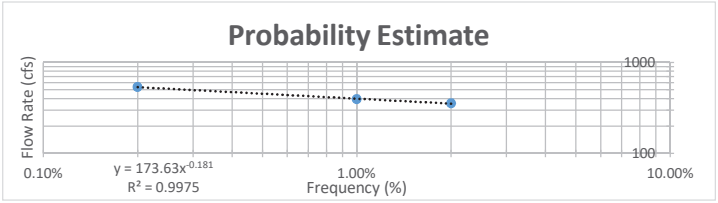
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 173.63
B= 0.181
y= 413.09
x= 0.83%



Total Contributing Flow Calculations

Flows from CD-5-05A	276.39	*(50-year)*
	303.37	*(100-year)*
	401.83	*(500-year)*
Total Design Peak Flow (cfs)	355.42	
Total Base Peak Flow (cfs)	394.84	
Total Greatest Peak Flow (cfs)	536.62	

Cross Drain Sizing Calculations

Tailwater Elevation/Source	80.47	*(Tailwater from SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	87.00	*Assumed 5-ft above crown*
Upstream Culvert Invert	79.0	*Assumed invert for crown of pipe at tailwater*
Downstream Culvert Invert	78.83	*Minimum slope*
Culvert length	344.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	74.0	*Estimate based on NRCS soils*

Existing Permitted Culvert Conveyance Size	2 - 24 inch	*In series upstream*

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	6 - 36 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5-06
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**72.7**

Basin Runoff Calculations

Total Contributing Area (acres)	64.02	
Pervious Contributing Area (acres)	64.02	
Impervious Contributing Area (acres)	0.00	
Weighted Runoff Coefficient[1]	0.36	*Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr*
Design Event[2]	50-year	

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	3.42	3.79	4.20	N/A
Peak Flow (cfs)	72.31	87.40	100.83	149.63

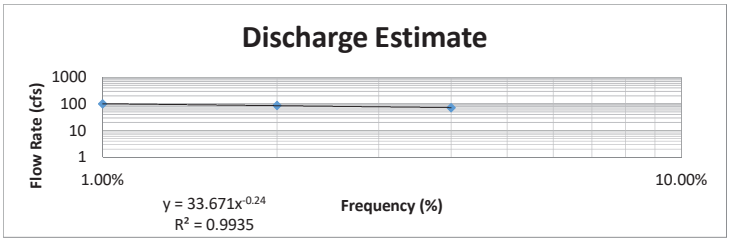
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 33.671
B= 0.24
y= **149.63 cfs**
x= 0.002

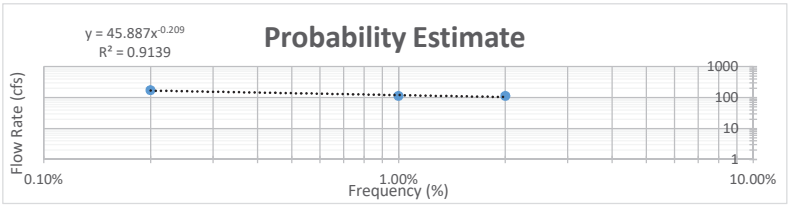
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 45.887
B= 0.209
y= 172.92
x= 0.18%



Total Contributing Flow Calculations

Flow from Natures Preserve Development (cfs)	22.92	*(25-yr/72-hr Storm)*	*POND 2& 3 = 15.12 (cfs)*
Total Design Peak Flow (cfs)	110.32		*POND4 = 2.60 (cfs)*
Total Base Peak Flow (cfs)	123.75		*POND5 = 5.20 (cfs)*
Total Greatest Peak Flow (cfs)	172.55		*TOTAL = 22.92 (cfs)*

(Contributing pond flows attained from SFWMD Permit Application 101022-10)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	76.07	*(Tailwater from HY-8 Input in SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	79.77	*(From SFWMD ERP 141010-12, Converted to NAVD)*
Upstream Culvert Invert	73.7	*From DEM*
Downstream Culvert Invert	72.59	*Minimum slope*
Culvert length	849.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	75.1	*(Attained from SFWMD Permit Application 050613-21)*

Proposed Culvert Size	2 - 24 inch x 38 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Required Minimum Size	2 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: / Poinciana Parkway Extension	**PREPARED:**	MDP	**DATE:**	05/15/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	JAN	**DATE:**	05/15/19

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Poinciana Pkwy Extension

Cross Drain Name	CD-5B-05B
Precipitation Zone	8
Pervious C-Value[1]	0.3
Impervious C-value	0.95
Time of Concentration (min)	**80.1**

Basin Runoff Calculations

Total Contributing Area (acres)	86.96	
Pervious Contributing Area (acres)	86.96	
Impervious Contributing Area (acres)	0.00	
Weighted Runoff Coefficient[1]	0.36	*Frequency Factor = 1.1 for 25-yr, 1.2 for 50-yr, 1.25 for 100-yr*
Design Event[2]	50-year	

Rational Method Peak Flow Rate Calculations

		Design	Base	Greatest
Event[2]	25-year	50-year	100-year	500-yr
Intensity (in/hr)[3]	3.21	3.56	3.75	N/A
Peak Flow (cfs)	91.98	111.34	122.29	172.53

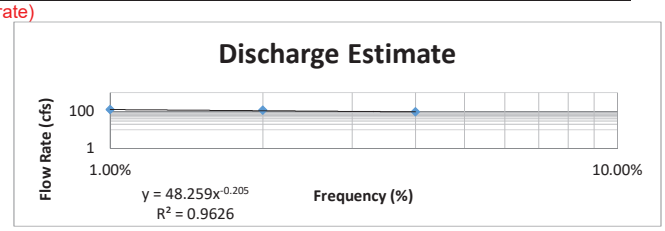
(Used 500-year Log-Log graph to obtain basin runoff flow rate)

Solve for 500-year flow rate using log-log graph on the above 25, 50, and 100-year peak flow rates

$y = Ax^{-B}$

A= 48.259
B= 0.205
y= **172.53 cfs**
x= 0.002

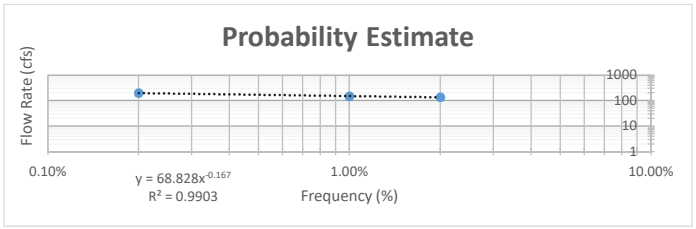
$x = \sqrt[B]{\frac{A}{y}}$



Solve for probability of overtopping using log-log graph based on 50, 100, and 500-year total peak flow rates. shown below.

$x = \sqrt[B]{\frac{A}{y}}$

A= 68.828
B= 0.167
y= 229.18
x= 0.07%



Total Contributing Flow Calculations

Flow from Natures Preserve Development (cfs)	22.92	*(25-yr/72-hr Storm)*	*POND 2& 3 = 15.12 (cfs)*
Total Design Peak Flow (cfs)	134.26		*POND4 = 2.60 (cfs)*
Total Base Peak Flow (cfs)	145.21		*POND5 = 5.20 (cfs)*
Total Greatest Peak Flow (cfs)	195.45		*TOTAL = 22.92 (cfs)*

(Contributing pond flows attained from SFWMD Permit Application 101022-10)

Cross Drain Sizing Calculations

Tailwater Elevation/Source	76.07	*(Tailwater from HY-8 Input in SFWMD ERP 141010-12, Converted to NAVD)*
Roadway Crest Elevation	79.77	*(From SFWMD ERP 141010-12, Converted to NAVD)*
Upstream Culvert Invert	73.7	*From DEM*
Downstream Culvert Invert	72.59	*Minimum slope*
Culvert length	335.0	*Measured from GIS, assume full R/W width*
Upstream Est. SHWL Elev (ft-NAVD88)	74.0	*Estimate based on NRCS soils*

Existing Permitted Culvert Conveyance Size	2 - 24 inch x 38 inch

(Size information retrieved from SWFWMD Permit Application 141010-12)

Proposed Culvert Size	2 - 38 inch x 60 inch

(Size retrieved from HY-8 version 7.50)

Notes:

[1] Pervious Runoff Coefficients value assumed to be the max of Pasture/Grass with poorly drained soils at 2-7% slope. Frequency Factor applied per Design Storm Event (Tables B-4 & B-5, FDOT Drainage Design Guide, January 2017).

[2] Per FDOT Drainage Manual, 50-year considered design event for mainline interstates and 100-year used if culvert proposed within regulated floodway.

[3] Design Intensity calculated from FDOT IDF Regression Equations for Tc < 180 minutes. If Tc > 180 minutes, intensity estimated directly from the IDF Curve.

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.5 - Proposed Time of Concentration Summary

Cross Drain ID	Time of Concentration (min)
CD-1-03	30.1
CD-1-04	93.1
CD-1-05	18.7
CD-1-06	23.2
CD-1-07	42.7
CD-1-08	70.0
CD-4-05A	47.9
CD-4-05B	25.6
CD-4-06	72.1
CD-5-05A	46.9
CD-5-05B	40.6
CD-5-06	72.7
CD-5B-05B	80.1

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-1-03

Tc -- Tt (through subarea)

L = 1,799 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Range
2. Mannings roughness coeff., n †	0.13
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.043
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.087
Subtotal	**0.09**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	1,699
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	0.41
Subtotal	**0.41**

Time of Concentration, hr. (summation of subtotals)

Hours	0.50
Minutes	30.1
Total	**30.1**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-1-04

Tc -- Tt (through subarea)

L = 6,147 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Fallow/Range
2. Mannings roughness coeff., n †	0.122
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.049
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.079
Subtotal	**0.08**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	6,047
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	1.47
Subtotal	**1.47**

Time of Concentration, hr. (summation of subtotals)

Hours	1.55
Minutes	93.1
Total	**93.1**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-1-05

Tc -- Tt (through subarea)

L = 1,127 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces/Light Underbrush
2. Mannings roughness coeff., n †	0.152
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.062
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.086
Subtotal	**0.09**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	1,027
9. Watercourse slope, s (ft/ft)	0.006
10. Average velocity†††, V = kS^0.5 (fps)	1.26
11. Compute Tt in hr, Tt = L/3600V	0.23
Subtotal	**0.23**

Time of Concentration, hr. (summation of subtotals)

Hours	0.31
Minutes	18.7
Total	**18.7**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study:	**PREPARED:**	MDP	**DATE:**	03/05/19
	I-4 / Poinciana Parkway Connector Extension				
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-1-06

Tc -- Tt (through subarea)

L = 1,110 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces/Range
2. Mannings roughness coeff., n †	0.119
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.005
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.193
Subtotal	**0.19**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	1,010
9. Watercourse slope, s (ft/ft)	0.008
10. Average velocity†††, V = kS^0.5 (fps)	1.45
11. Compute Tt in hr, Tt = L/3600V	0.19
Subtotal	**0.19**

Time of Concentration, hr. (summation of subtotals)

Hours	0.39
Minutes	23.2
Total	**23.2**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-1-07

Tc -- Tt (through subarea)

L = 2,916 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.006
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.026
Subtotal	**0.03**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	2,816
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	0.69
Subtotal	**0.69**

Time of Concentration, hr. (summation of subtotals)

Hours	0.71
Minutes	42.7
Total	**42.7**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-1-08

Tc or Tt (through subarea)

L = 4,831 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.023
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.016
Subtotal	**0.02**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	4,731
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	1.15
Subtotal	**1.15**

Time of Concentration, hr. (summation of subtotals)

Hours	1.17
Minutes	70.0
Total	**70.0**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-4-05A

Tc or Tt (through subarea)

L = 3,269 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.006
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.026
Subtotal	**0.03**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	3,169
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	0.77
Subtotal	**0.77**

Time of Concentration, hr. (summation of subtotals)

Hours	0.80
Minutes	47.9
Total	**47.9**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-4-05B

Tc or Tt (through subarea)

L = 1,454 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Fallow
2. Mannings roughness coeff., n †	0.05
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.005
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.096
Subtotal	**0.10**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	1,354
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	0.33
Subtotal	**0.33**

Time of Concentration, hr. (summation of subtotals)

Hours	0.43
Minutes	25.6
Total	**25.6**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-4-06

Tc or Tt (through subarea)

L = 4,973 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.023
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.016
Subtotal	**0.02**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	4,873
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	1.19
Subtotal	**1.19**

Time of Concentration, hr. (summation of subtotals)

Hours	1.20
Minutes	72.1
Total	**72.1**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-5-05A

Tc or Tt (through subarea)

L = 3,216 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.006
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.026
Subtotal	**0.03**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	3,116
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.15
11. Compute Tt in hr, Tt = L/3600V	0.76
Subtotal	**0.76**

Time of Concentration, hr. (summation of subtotals)

Hours	0.78
Minutes	46.9
Total	**46.9**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola and Polk County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-5-05B

Tc or Tt (through subarea)

L = 2,491 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Fallow
2. Mannings roughness coeff., n †	0.05
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.005
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.096
Subtotal	**0.10**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	2,391
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.15
11. Compute Tt in hr, Tt = L/3600V	0.58
Subtotal	**0.58**

Time of Concentration, hr. (summation of subtotals)

Hours	0.68
Minutes	40.6
Total	**40.6**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-5-06

Tc or Tt (through subarea)

L = 5,013 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.023
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.016
Subtotal	**0.02**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	4,913
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	1.20
Subtotal	**1.20**

Time of Concentration, hr. (summation of subtotals)

Hours	1.21
Minutes	72.7
Total	**72.7**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

PROJECT:	CFX Feasibility Study: I-4 / Poinciana Parkway Connector Extension	**PREPARED:**	MDP	**DATE:**	03/05/19
LOCATION:	Osceola County, Florida	**CHECKED:**	ALE	**DATE:**	05/13/19

Table B.6 - Proposed Offsite Time of Concentration Calculations

PROPOSED or DEVELOPED / UNDEVELOPED BASIN: CD-5B-05B

Tc or Tt (through subarea)

L = 5,519 ft

Sheet flow (Applicable to Tc only)

Segment ID	AB
1. Surface description†	Smooth Surfaces
2. Mannings roughness coeff., n †	0.011
3. Flow length, L (total L ≤ 100 ft.)	100
4. 2-year, 24-hour rainfall (in.) ††	4.8
5. Land slope, s (ft./ft.)	0.023
6. Compute Tt in hr, Tt = $[0.007(nL)^{0.8}] / [P_{24hr}^{0.5} s^{0.4}]$ †††	0.016
Subtotal	**0.02**

Shallow Concentrated Flow

Segment ID	BC
7. Surface description (Paved or Unpaved)	Unpaved
8. Flow length, L (ft)	5,419
9. Watercourse slope, s (ft/ft)	0.005
10. Average velocity†††, V = kS^0.5 (fps)	1.14
11. Compute Tt in hr, Tt = L/3600V	1.32
Subtotal	**1.32**

Time of Concentration, hr. (summation of subtotals)

Hours	1.33
Minutes	80.1
Total	**80.1**

Notes:

† Values from Table 3-1 of Urban Hydrology for Small Watersheds, Technical Release of TR-55

†† The 2-year, 24-hour rainfall was used based on TR-55 Figure B-3.

††† This equation is derived from TR-55

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: CD-1-01 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-01 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
83.11	EAST5WET	554.47	554.47	0.00	1
83.23	RRNORTH	584.05	584.05	0.00	1
87.00	Overtopping	1179.04	1179.04	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-01 POST

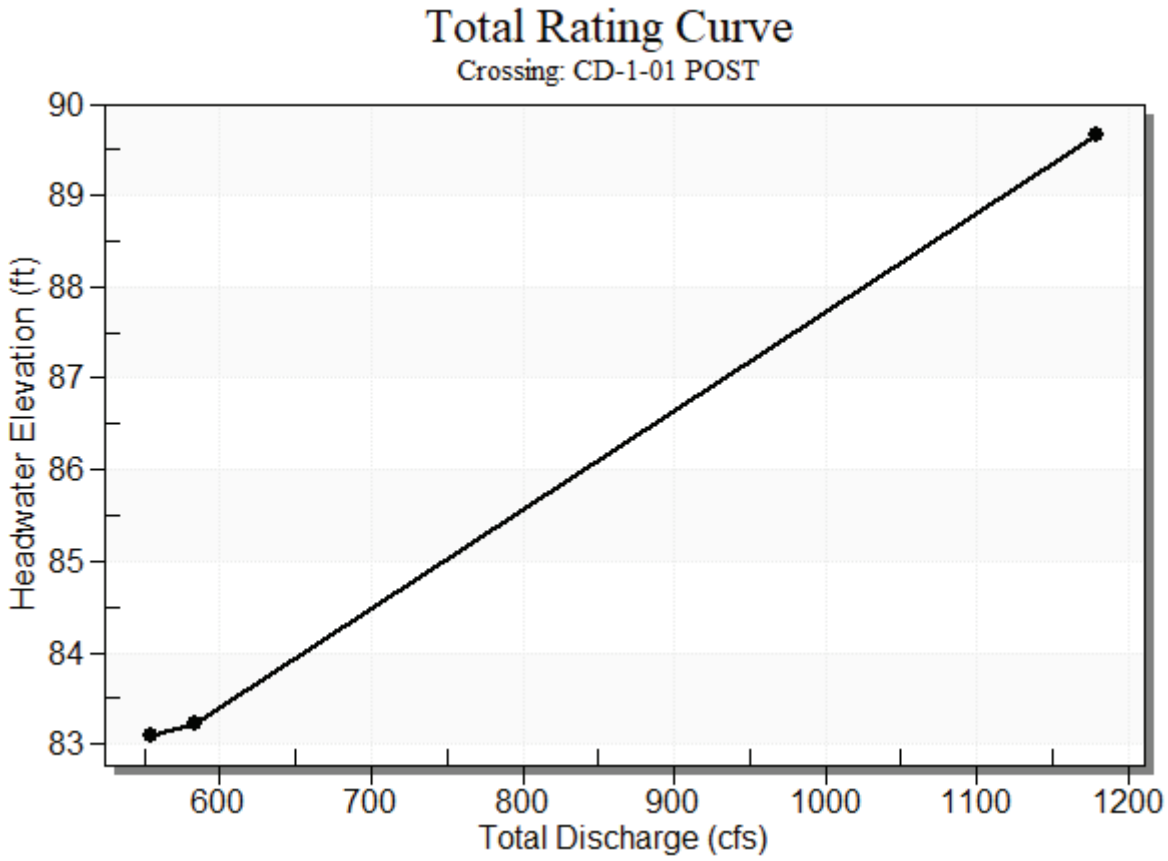


Table 2 - Culvert Summary Table: CD-1-01 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
EAST5WET	554.47	554.47	83.11	2.994	5.106	4-FFf	3.167	1.965	3.167	4.180	4.824
RRNORTH	584.05	584.05	83.23	3.109	5.227	4-FFf	3.167	2.020	3.167	4.180	5.082

****

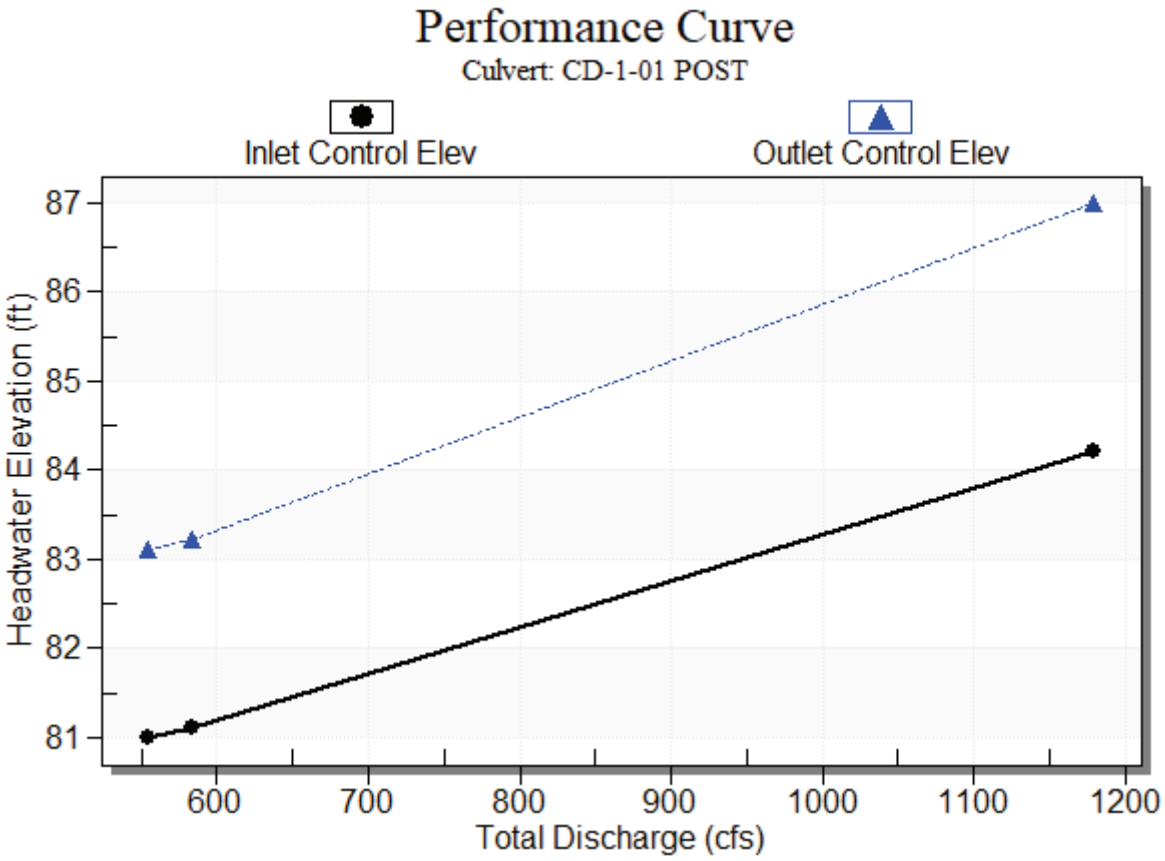
Straight Culvert

Inlet Elevation (invert): 78.00 ft, Outlet Elevation (invert): 77.82 ft

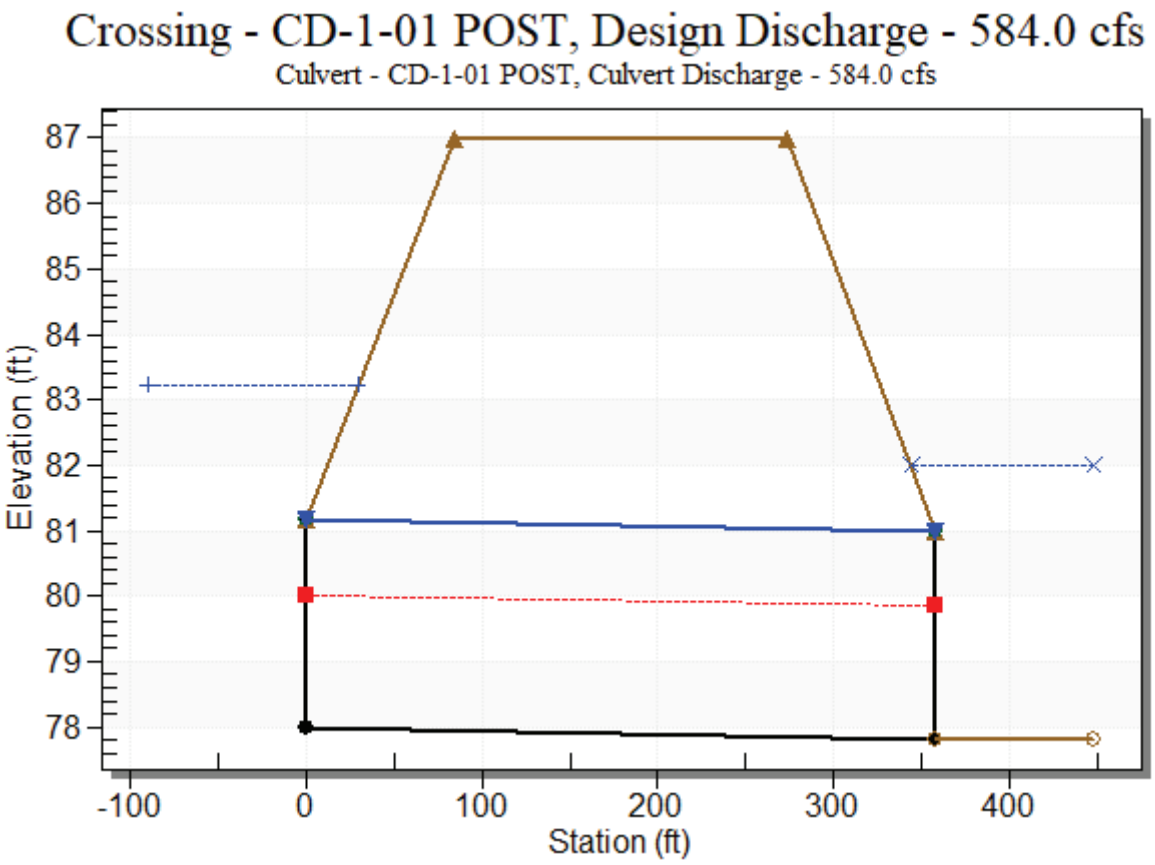
Culvert Length: 358.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-1-01 POST



Water Surface Profile Plot for Culvert: CD-1-01 POST



Site Data - CD-1-01 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 78.00 ft

Outlet Station: 358.00 ft

Outlet Elevation: 77.82 ft

Number of Barrels: 9

Culvert Data Summary - CD-1-01 POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: CD-1-01 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
554.47	82.00	4.18
584.05	82.00	4.18

Tailwater Channel Data - CD-1-01 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 82.00 ft

Roadway Data for Crossing: CD-1-01 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 87.00 ft

Roadway Surface: Paved

Roadway Top Width: 189.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 4 - Summary of Culvert Flows at Crossing: CD-1-02 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-02 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
85.15	RRSOUTH	153.47	153.47	0.00	1
85.15	RRSOUTH	153.47	153.47	0.00	1
90.00	Overtopping	872.29	872.29	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-02 POST

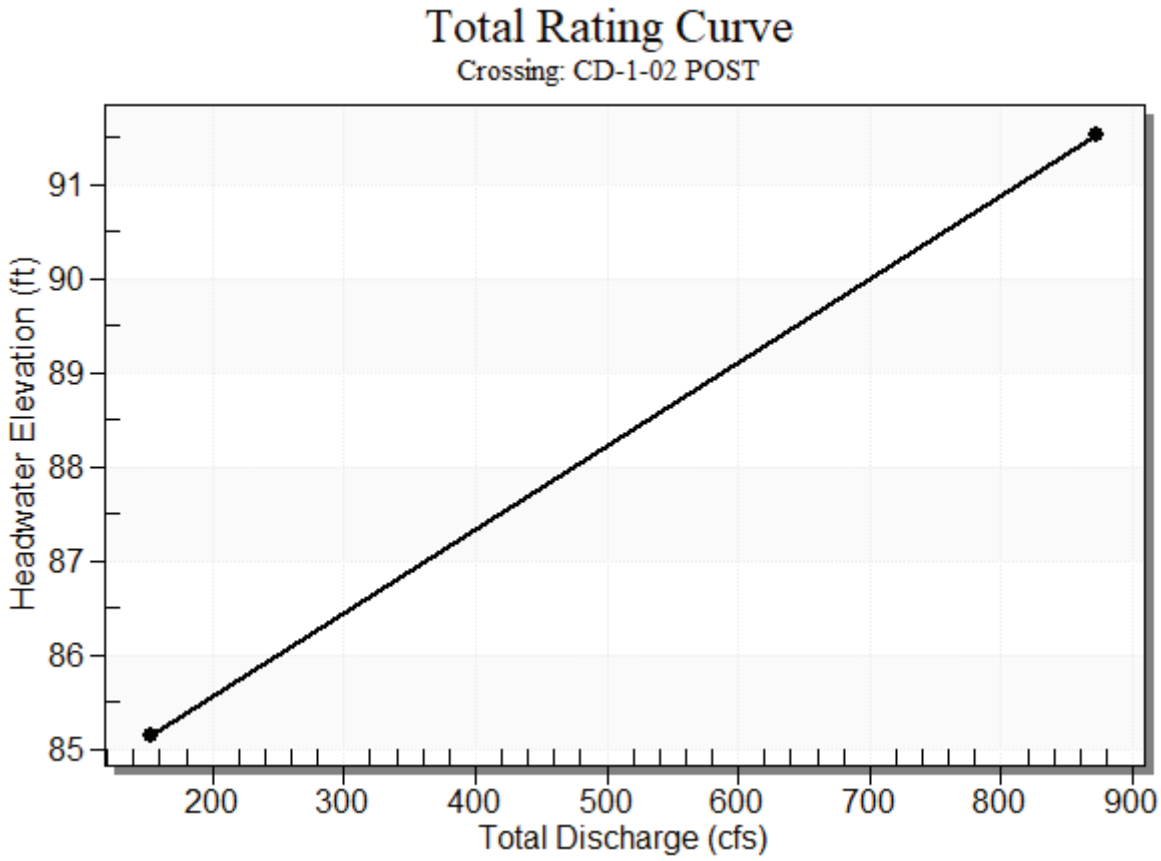


Table 5 - Culvert Summary Table: CD-1-02 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
RRSOUTH	153.47	153.47	85.15	2.386	5.155	4-FFf	2.735	1.723	5.000	5.000	1.954
RRSOUTH	153.47	153.47	85.15	2.386	5.155	4-FFf	2.735	1.723	5.000	5.000	1.954

****

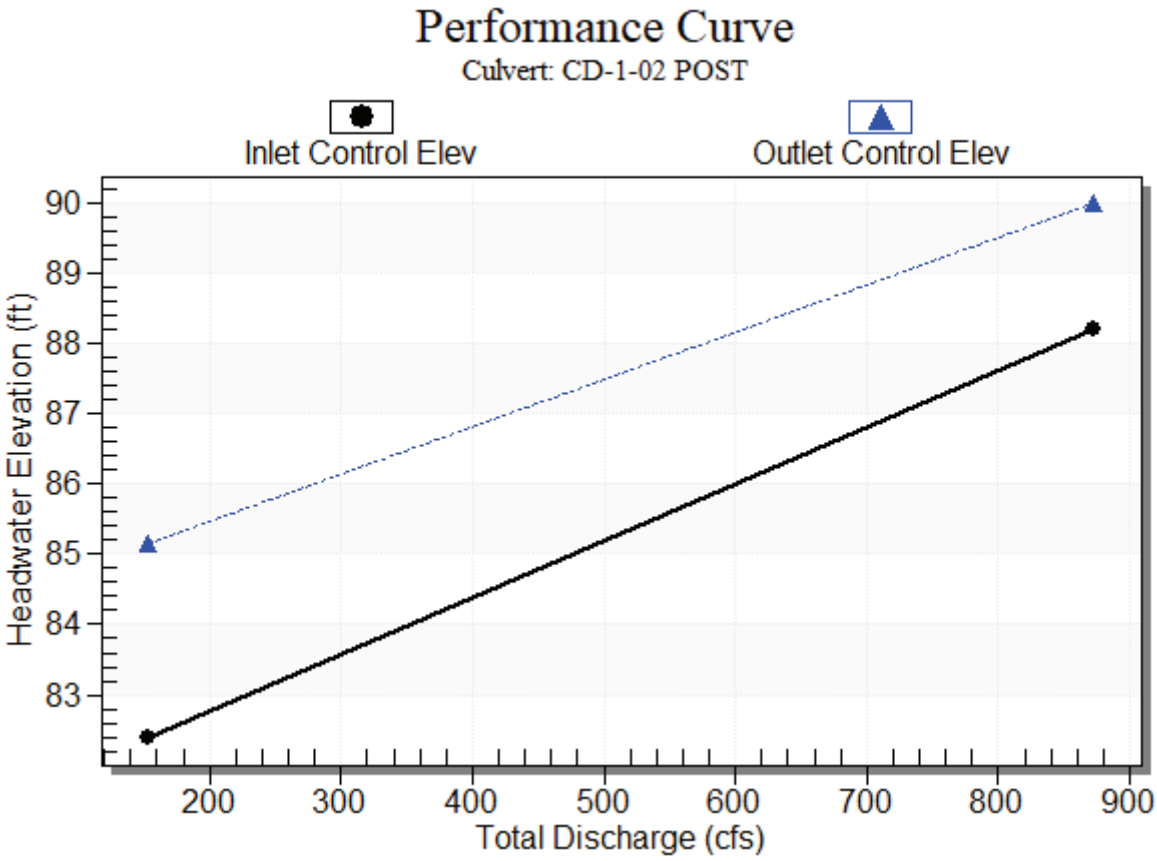
Straight Culvert

Inlet Elevation (invert): 80.00 ft, Outlet Elevation (invert): 79.82 ft

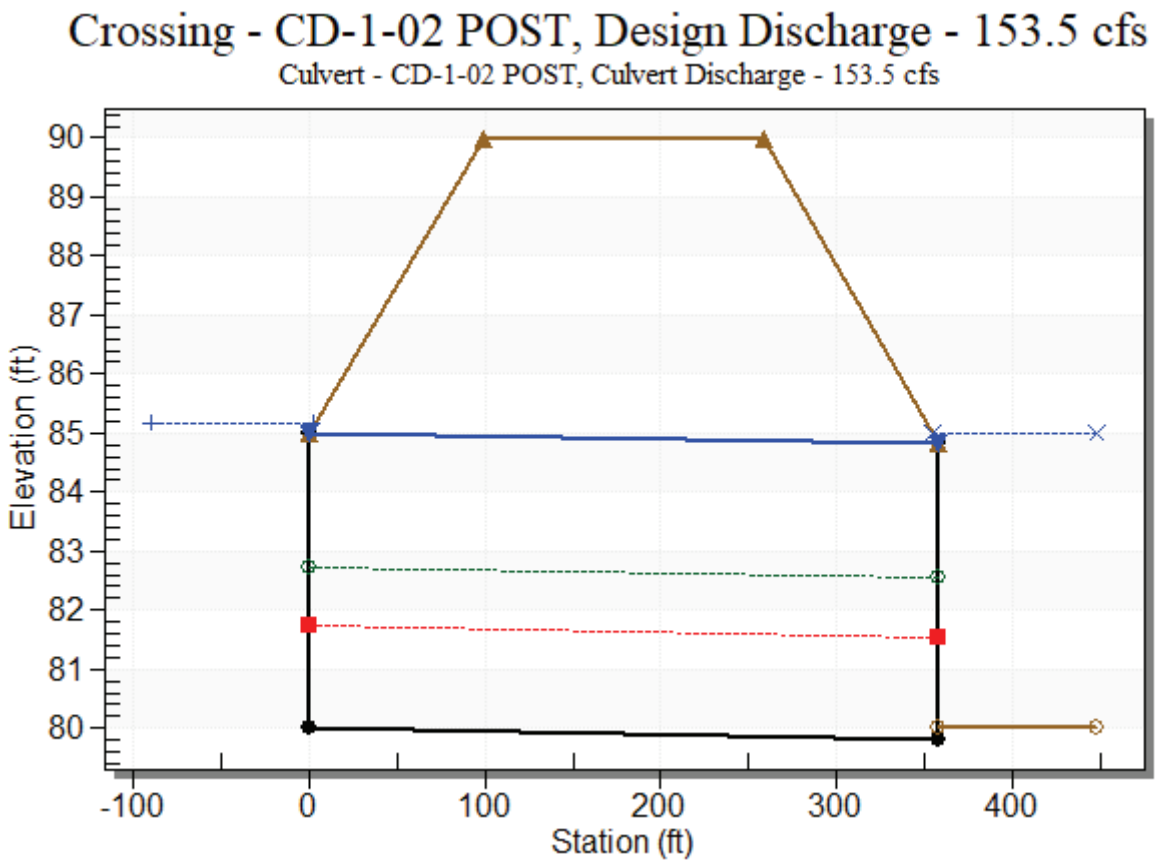
Culvert Length: 358.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-1-02 POST



Water Surface Profile Plot for Culvert: CD-1-02 POST



Site Data - CD-1-02 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 80.00 ft

Outlet Station: 358.00 ft

Outlet Elevation: 79.82 ft

Number of Barrels: 4

Culvert Data Summary - CD-1-02 POST

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: CD-1-02 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
153.47	85.00	5.00
153.47	85.00	5.00

Tailwater Channel Data - CD-1-02 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 85.00 ft

Roadway Data for Crossing: CD-1-02 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 90.00 ft

Roadway Surface: Paved

Roadway Top Width: 160.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 7 - Summary of Culvert Flows at Crossing: CD-1-03 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-03 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
94.08	50 year	124.79	124.79	0.00	1
94.55	100 year	137.19	137.19	0.00	1
96.20	500 year	182.18	182.18	0.00	1
98.10	Overtopping	227.58	227.58	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-03 POST

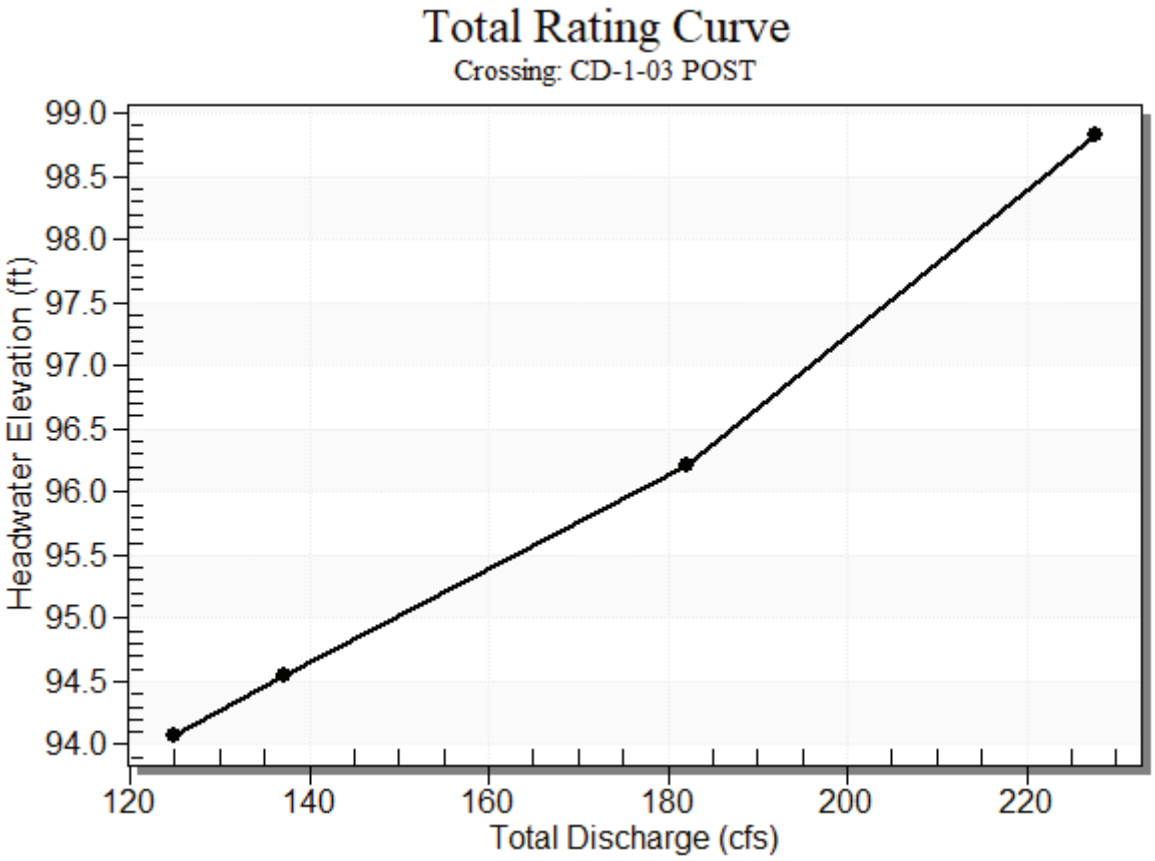


Table 8 - Culvert Summary Table: CD-1-03 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	124.79	124.79	94.08	3.914	3.979	7-M2c	3.000	2.377	2.377	0.870	8.749
100 year	137.19	137.19	94.55	4.254	4.453	7-M2c	3.000	2.532	2.532	0.870	9.030
500 year	182.18	182.18	96.20	5.678	6.103	6-FFc	3.000	3.000	3.000	0.870	10.121

****

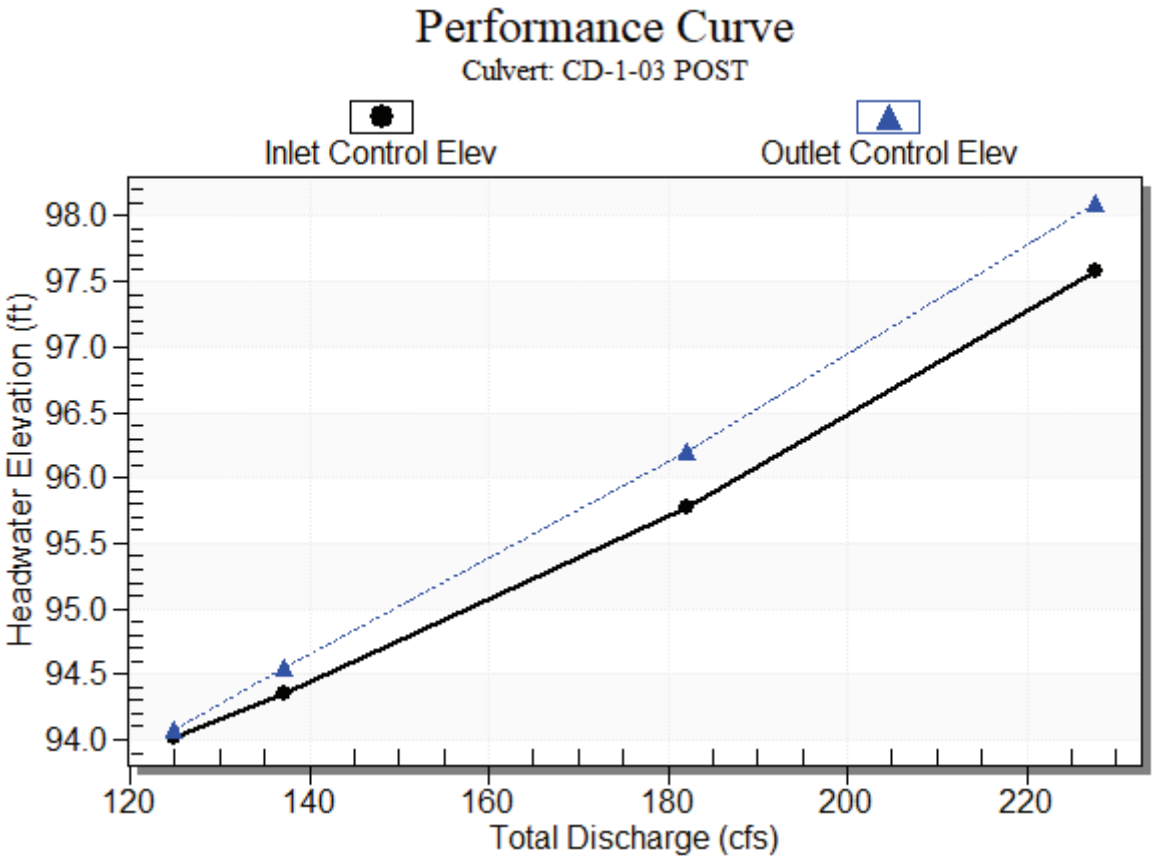
Straight Culvert

Inlet Elevation (invert): 90.10 ft, Outlet Elevation (invert): 89.82 ft

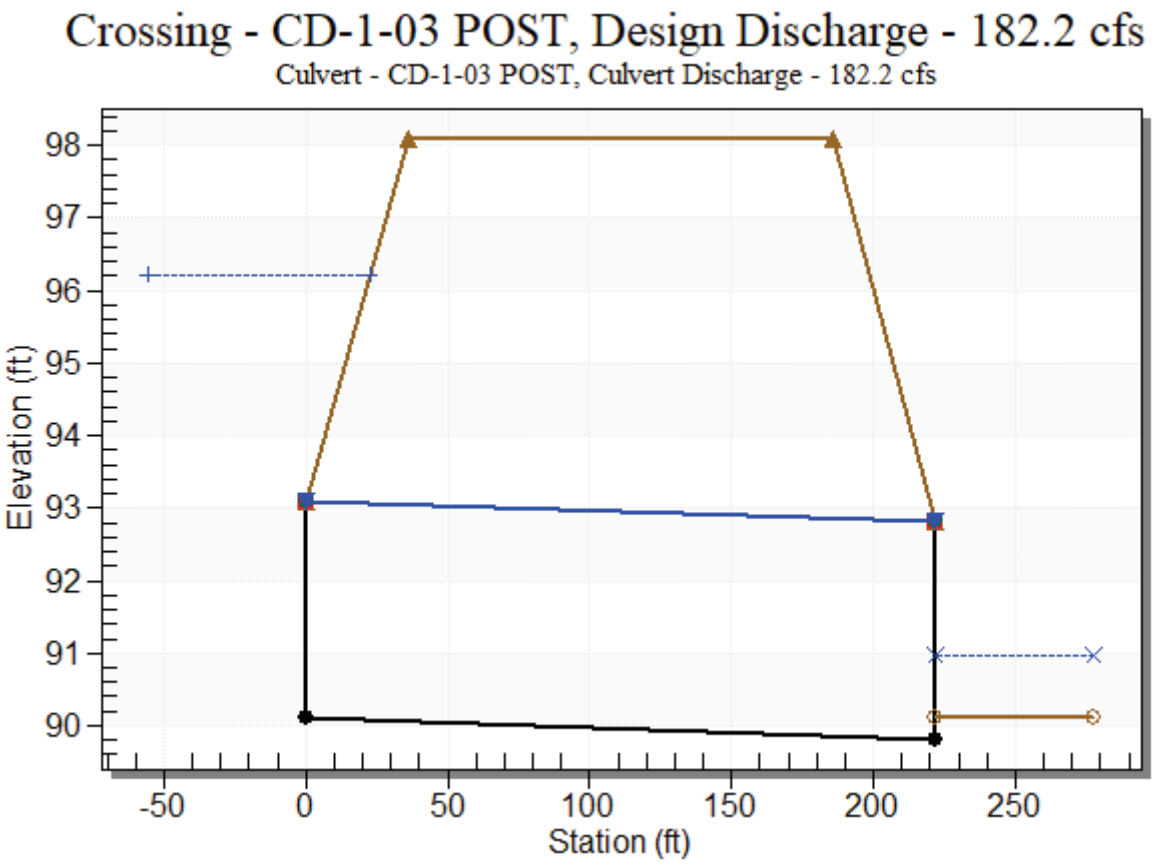
Culvert Length: 222.00 ft, Culvert Slope: 0.0013

****

Culvert Performance Curve Plot: CD-1-03 POST



Water Surface Profile Plot for Culvert: CD-1-03 POST



Site Data - CD-1-03 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 90.10 ft

Outlet Station: 222.00 ft

Outlet Elevation: 89.82 ft

Number of Barrels: 1

Culvert Data Summary - CD-1-03 POST

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1:1 Bevel Headwall

Inlet Depression: None

Table 9 - Downstream Channel Rating Curve (Crossing: CD-1-03 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
124.79	90.97	0.87
137.19	90.97	0.87
182.18	90.97	0.87

Tailwater Channel Data - CD-1-03 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 90.97 ft

Roadway Data for Crossing: CD-1-03 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 98.10 ft

Roadway Surface: Paved

Roadway Top Width: 149.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 10 - Summary of Culvert Flows at Crossing: CD-1-04 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-04 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
91.09	50 year	415.35	415.35	0.00	1
91.35	100 year	442.33	442.33	0.00	1
92.73	500 year	552.29	552.29	0.00	1
95.50	Overtopping	739.88	739.88	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-04 POST

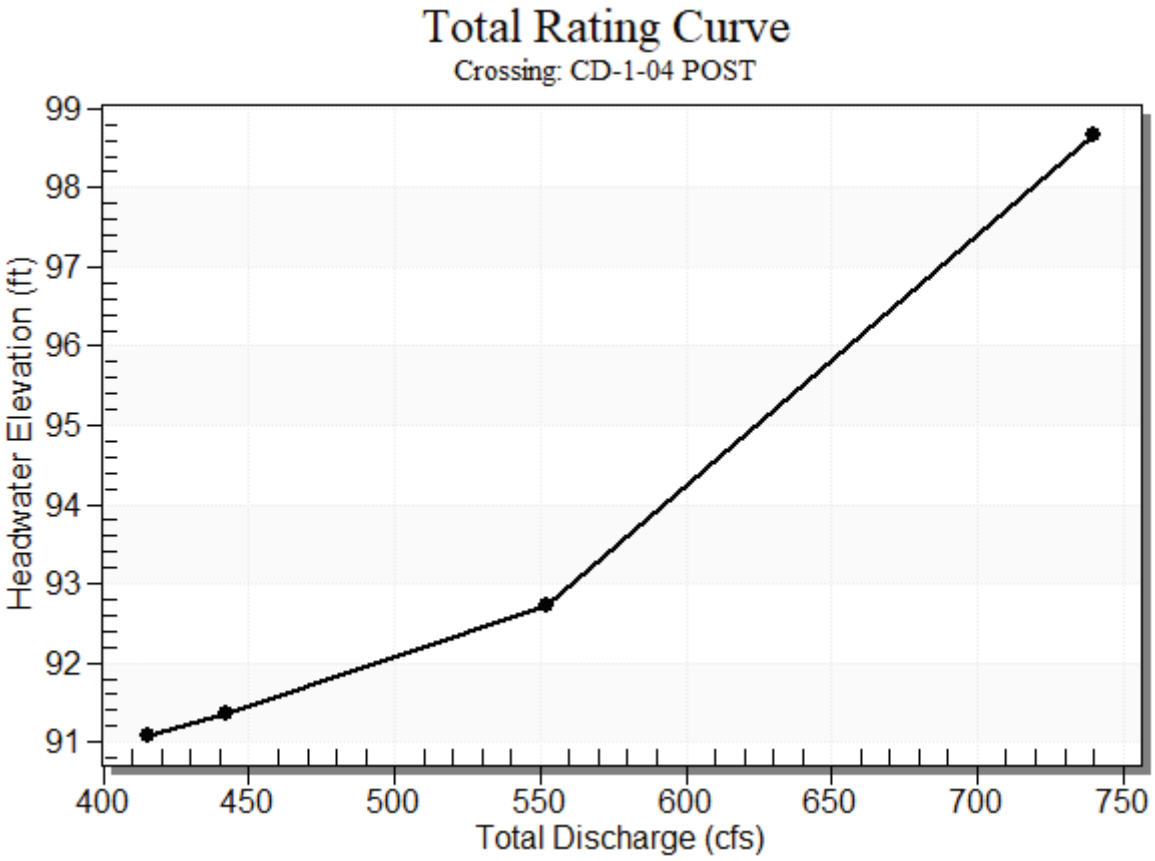


Table 11 - Culvert Summary Table: CD-1-04 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	415.35	415.35	91.09	4.233	4.592	7-M2c	4.000	2.759	2.759	0.570	8.986
100 year	442.33	442.33	91.35	4.444	4.851	7-M2c	4.000	2.848	2.848	0.570	9.243
500 year	552.29	552.29	92.73	5.422	6.226	7-M2c	4.000	3.173	3.173	0.570	10.332

****

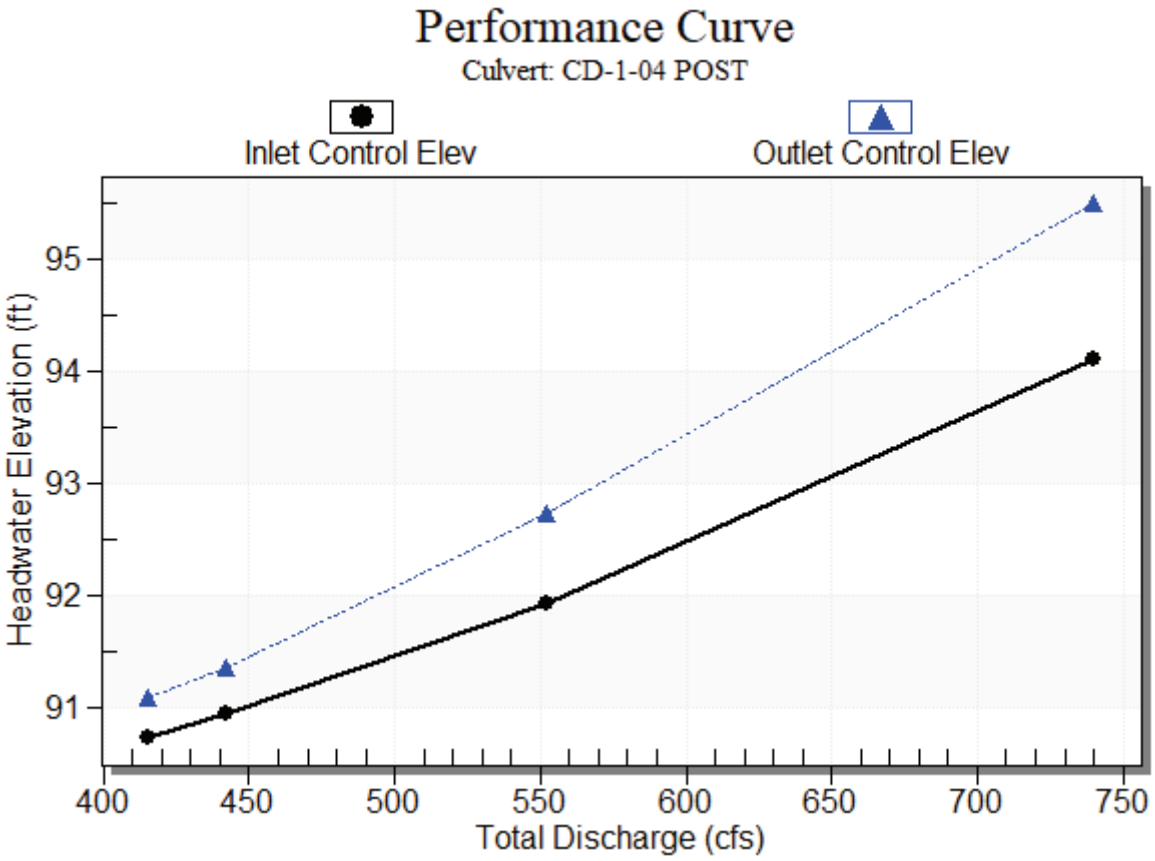
Straight Culvert

Inlet Elevation (invert): 86.50 ft, Outlet Elevation (invert): 86.00 ft

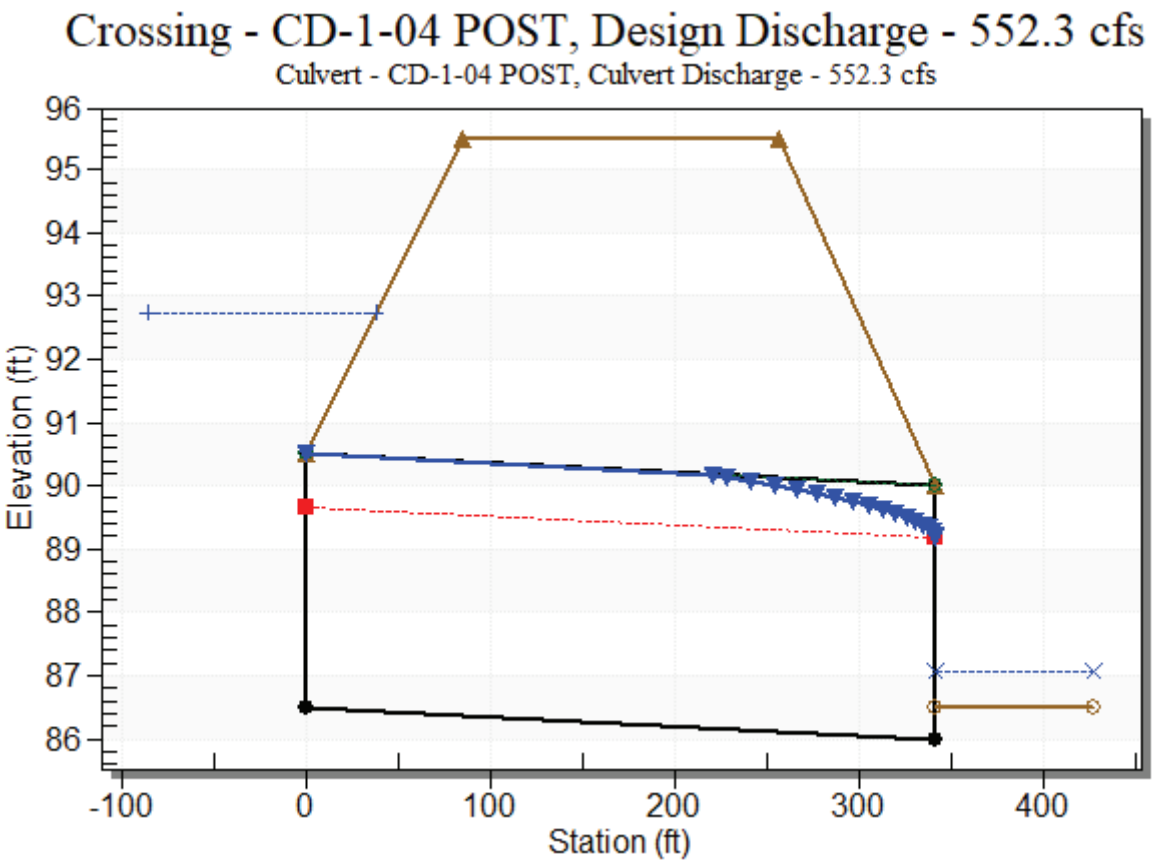
Culvert Length: 342.00 ft, Culvert Slope: 0.0015

****

Culvert Performance Curve Plot: CD-1-04 POST



Water Surface Profile Plot for Culvert: CD-1-04 POST



Site Data - CD-1-04 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 86.50 ft

Outlet Station: 342.00 ft

Outlet Elevation: 86.00 ft

Number of Barrels: 5

Culvert Data Summary - CD-1-04 POST

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

Table 12 - Downstream Channel Rating Curve (Crossing: CD-1-04 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
415.35	87.07	0.57
442.33	87.07	0.57
552.29	87.07	0.57

Tailwater Channel Data - CD-1-04 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 87.07 ft

Roadway Data for Crossing: CD-1-04 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 95.50 ft

Roadway Surface: Paved

Roadway Top Width: 172.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 13 - Summary of Culvert Flows at Crossing: CD-1-05 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-05 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
89.79	50 year	109.50	109.50	0.00	1
89.93	100 year	115.06	115.06	0.00	1
90.65	500 year	135.92	135.92	0.00	1
94.50	Overtopping	221.92	221.92	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-05 POST

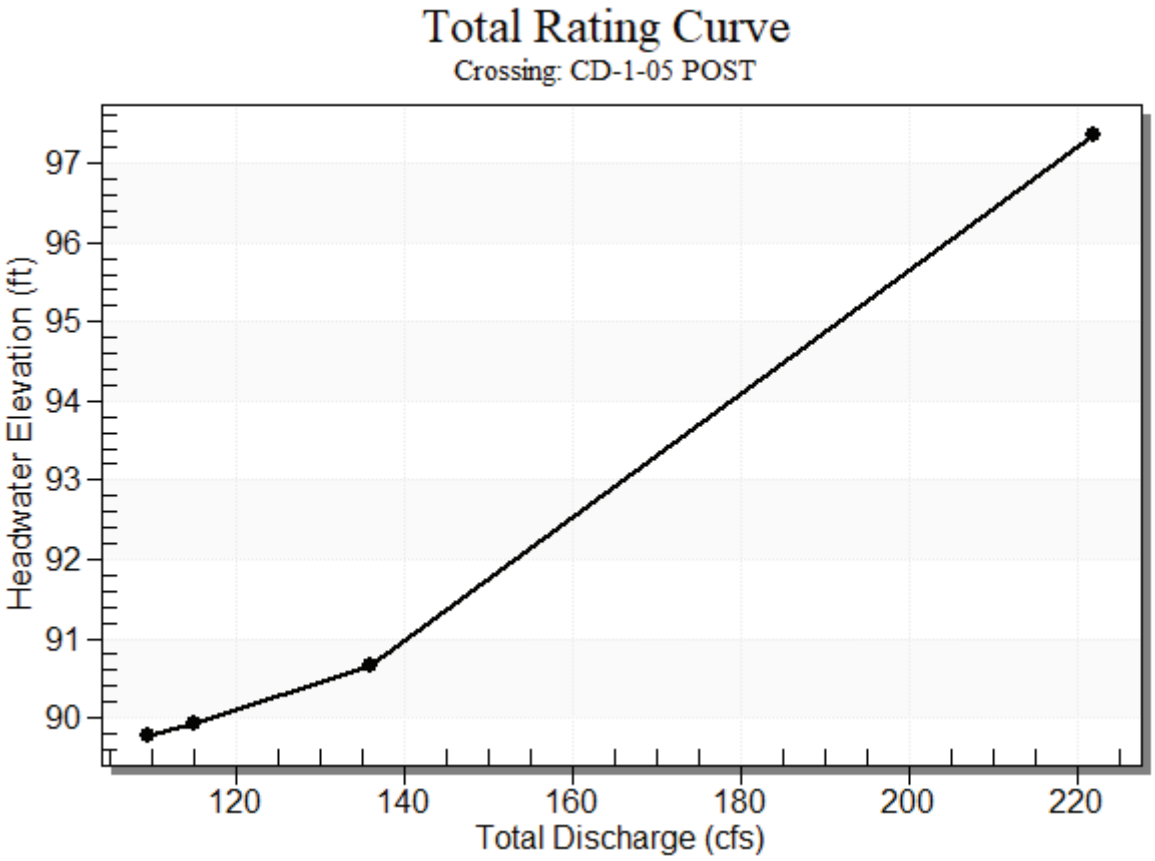


Table 14 - Culvert Summary Table: CD-1-05 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	109.50	109.50	89.79	2.950	3.287	7-M2c	3.000	1.960	1.960	1.070	7.459
100 year	115.06	115.06	89.93	3.054	3.429	7-M2c	3.000	2.010	2.010	1.070	7.617
500 year	135.92	135.92	90.65	3.472	4.155	7-M2c	3.000	2.190	2.190	1.070	8.194

****

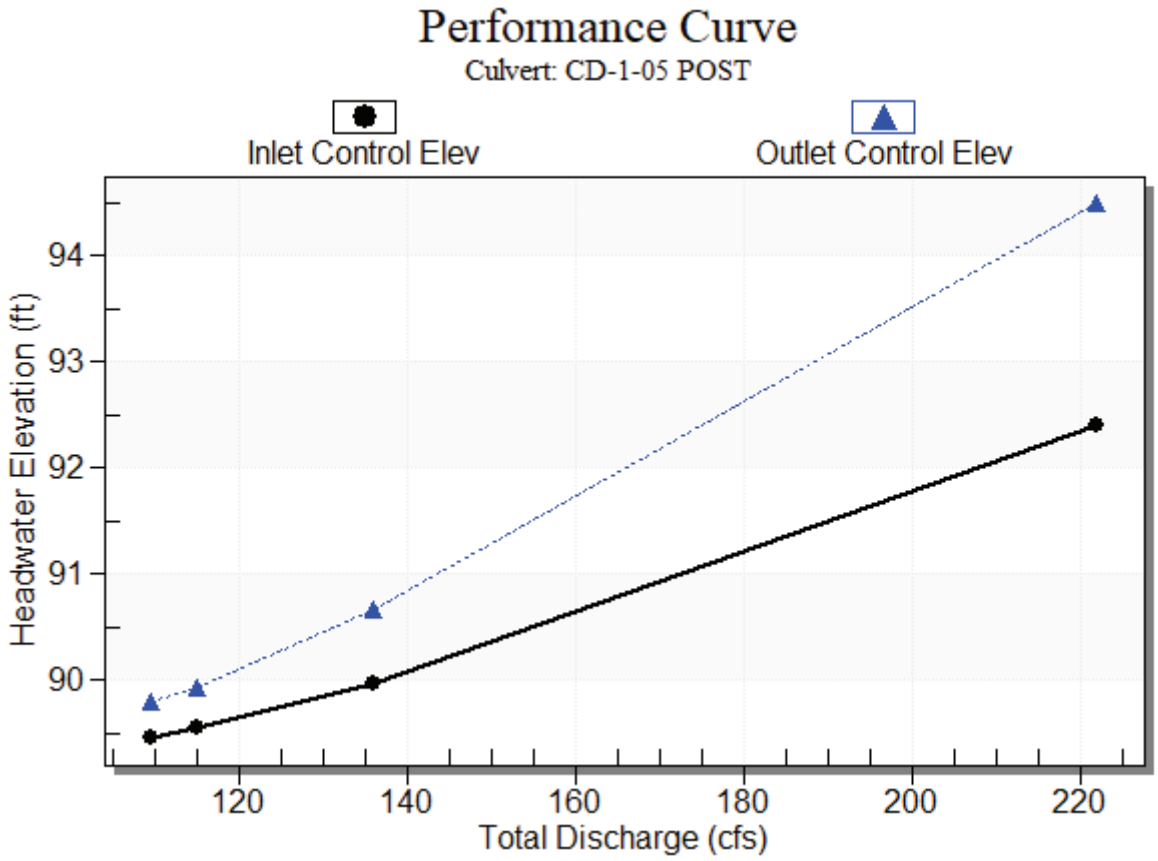
Straight Culvert

Inlet Elevation (invert): 86.50 ft, Outlet Elevation (invert): 86.00 ft

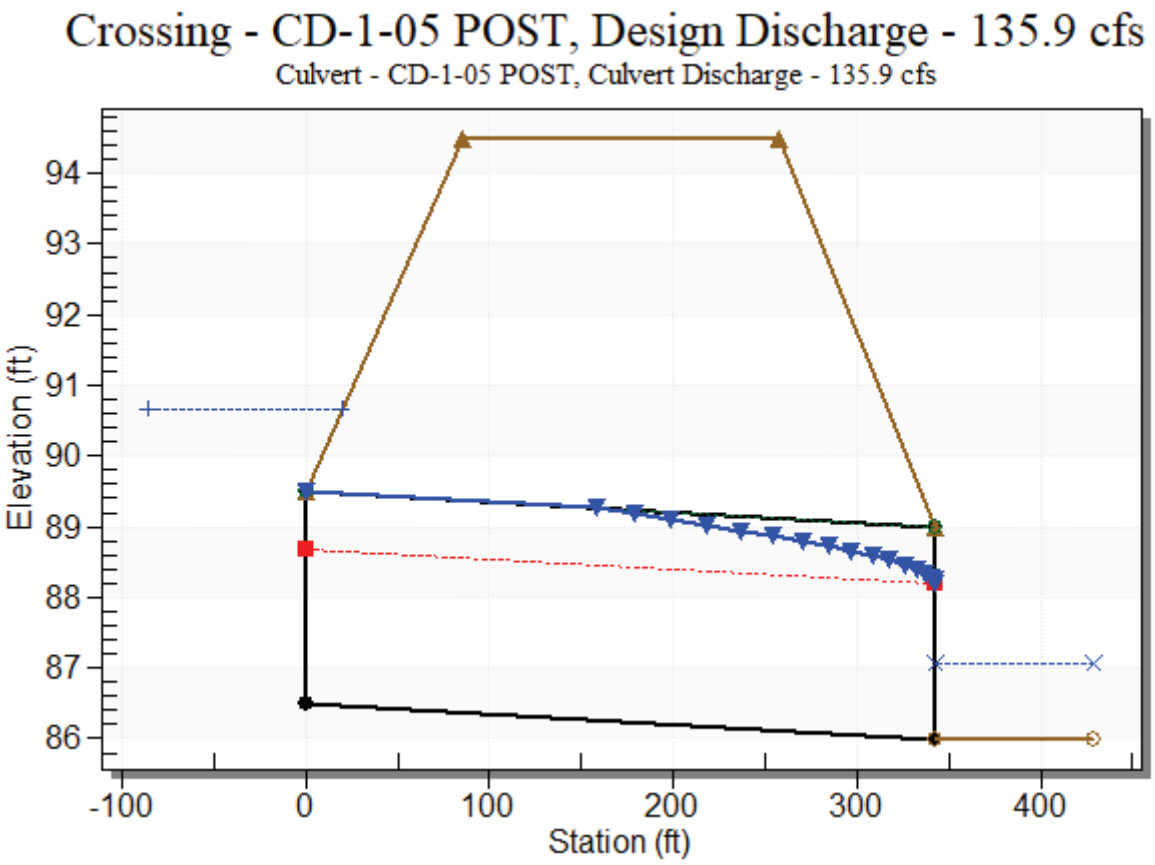
Culvert Length: 343.00 ft, Culvert Slope: 0.0015

****

Culvert Performance Curve Plot: CD-1-05 POST



Water Surface Profile Plot for Culvert: CD-1-05 POST



Site Data - CD-1-05 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 86.50 ft

Outlet Station: 343.00 ft

Outlet Elevation: 86.00 ft

Number of Barrels: 3

Culvert Data Summary - CD-1-05 POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

Table 15 - Downstream Channel Rating Curve (Crossing: CD-1-05 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
109.50	87.07	1.07
115.06	87.07	1.07
135.92	87.07	1.07

Tailwater Channel Data - CD-1-05 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 87.07 ft

Roadway Data for Crossing: CD-1-05 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 94.50 ft

Roadway Surface: Paved

Roadway Top Width: 172.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 16 - Summary of Culvert Flows at Crossing: CD-1-06 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-06 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
87.20	50 year	114.59	114.59	0.00	1
87.48	100 year	118.37	118.37	0.00	1
88.13	500 year	131.80	127.48	4.11	15
88.07	Overtopping	126.70	126.70	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-06 POST

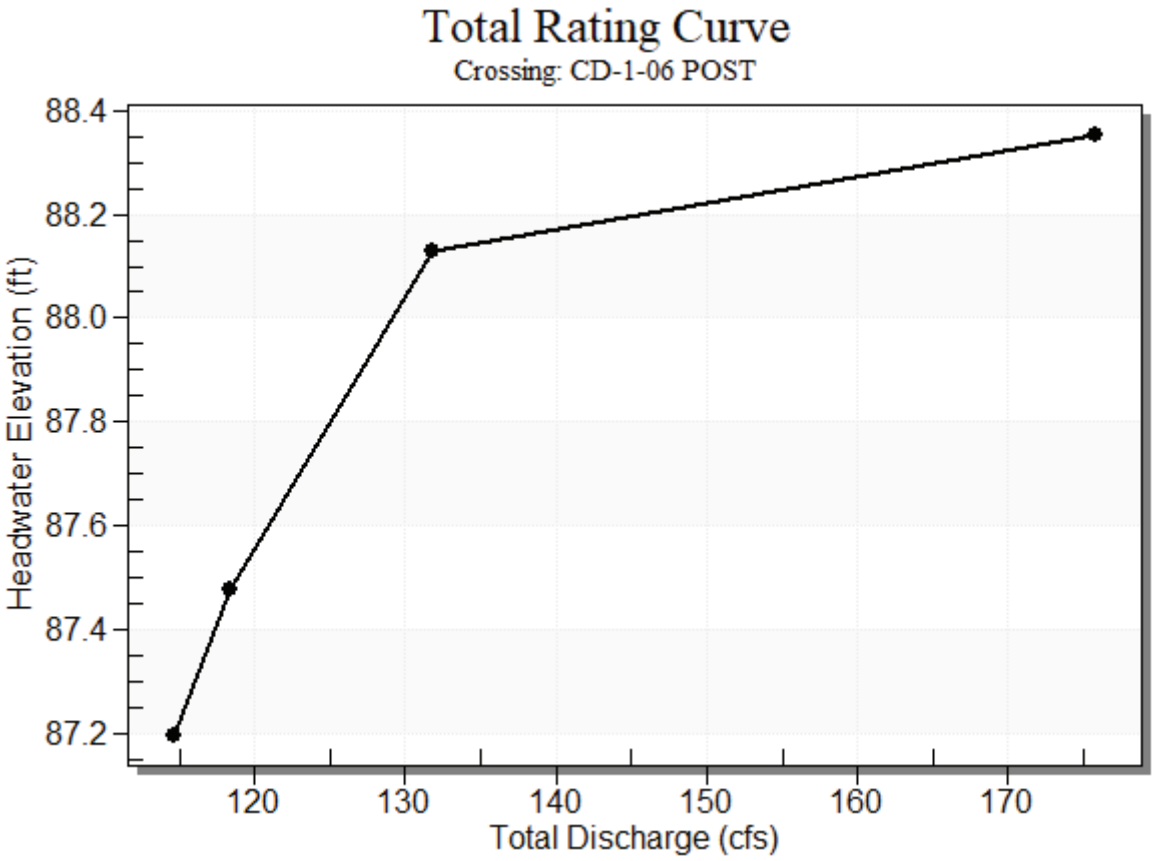


Table 17 - Culvert Summary Table: CD-1-06 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	114.59	114.59	87.20	4.605	6.198	7-M2c	3.000	2.449	2.449	0.570	9.273
100 year	118.37	118.37	87.48	4.776	6.476	7-M2c	3.000	2.485	2.485	0.570	9.454
500 year	131.80	127.48	88.13	5.215	7.128	7-M2c	3.000	2.564	2.564	0.570	9.907

****

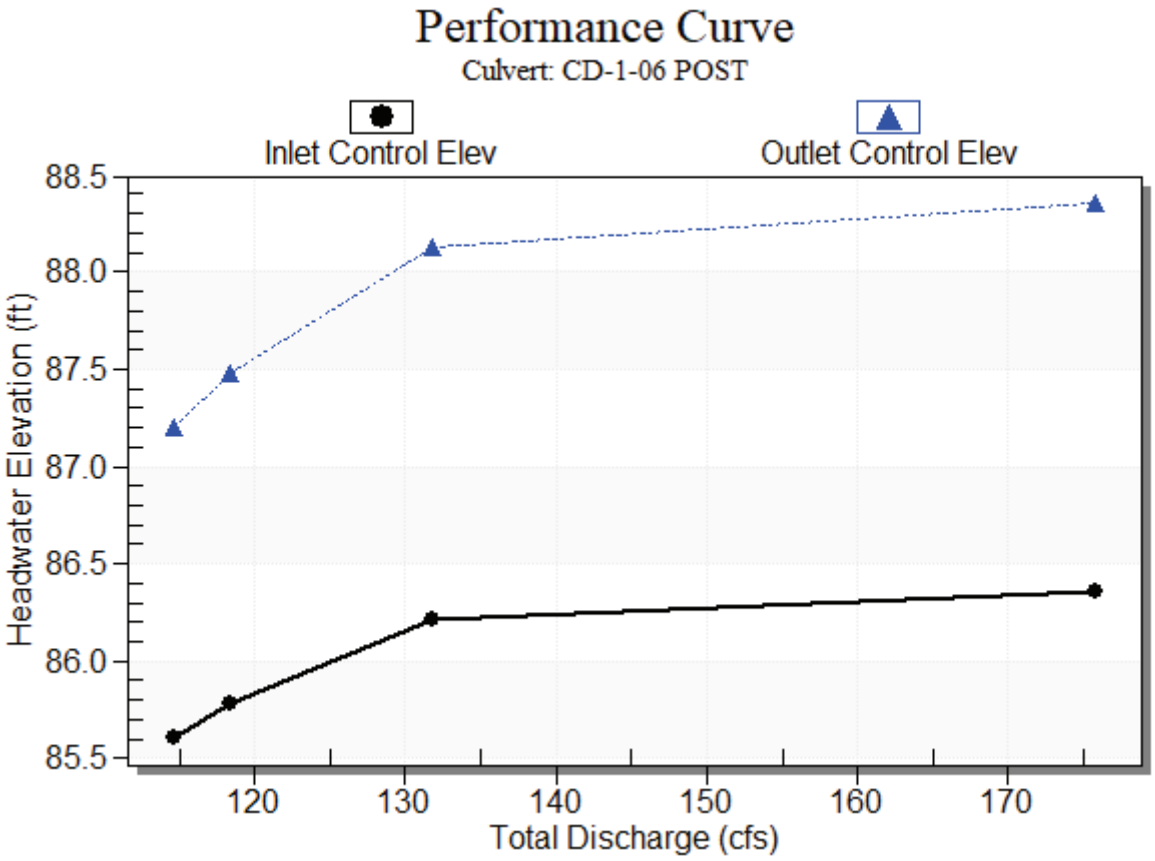
Straight Culvert

Inlet Elevation (invert): 81.00 ft, Outlet Elevation (invert): 80.83 ft

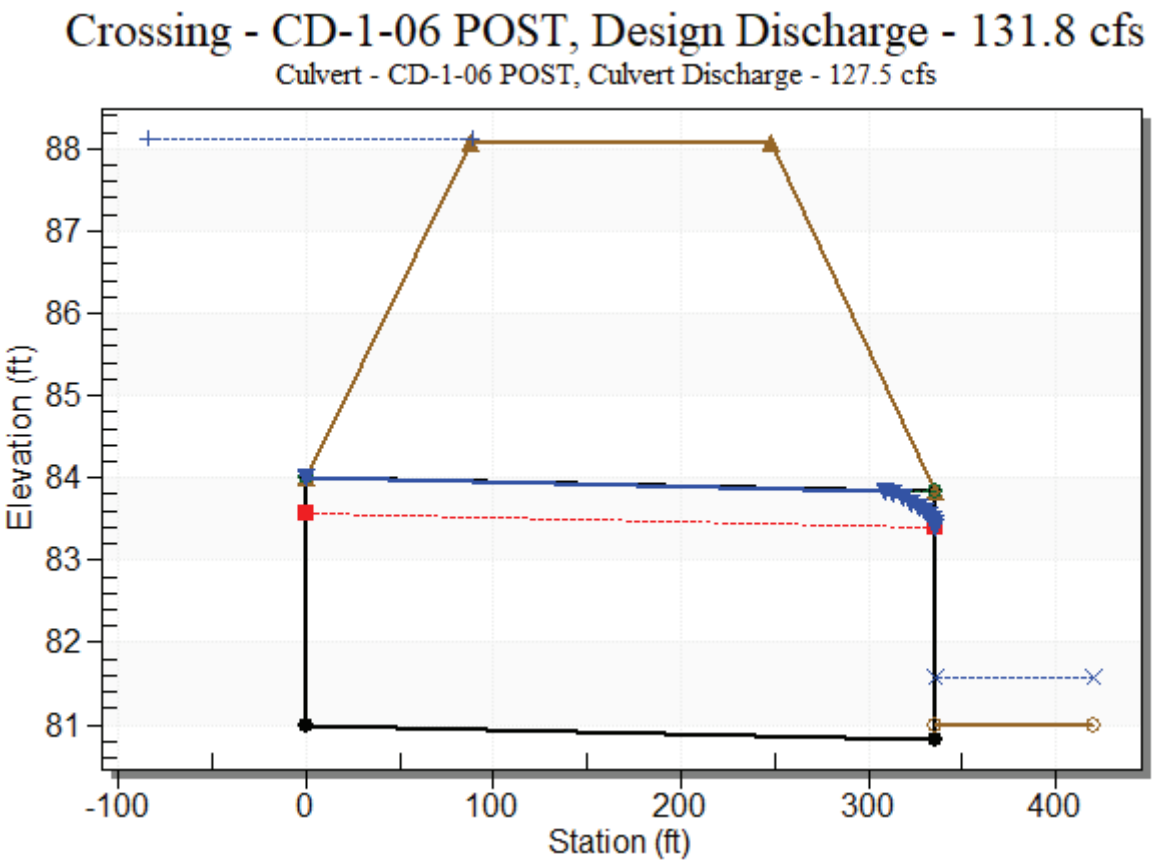
Culvert Length: 336.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-1-06 POST



Water Surface Profile Plot for Culvert: CD-1-06 POST



Site Data - CD-1-06 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 81.00 ft

Outlet Station: 336.00 ft

Outlet Elevation: 80.83 ft

Number of Barrels: 2

Culvert Data Summary - CD-1-06 POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 18 - Downstream Channel Rating Curve (Crossing: CD-1-06 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
114.59	81.57	0.57
118.37	81.57	0.57
131.80	81.57	0.57

Tailwater Channel Data - CD-1-06 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 81.57 ft

Roadway Data for Crossing: CD-1-06 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 88.07 ft

Roadway Surface: Paved

Roadway Top Width: 160.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 19 - Summary of Culvert Flows at Crossing: CD-1-07 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-07 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
86.36	50 year	264.98	264.98	0.00	1
87.24	100 year	294.19	294.19	0.00	1
88.71	500 year	398.06	339.39	58.36	7
88.37	Overtopping	329.73	329.73	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-07 POST

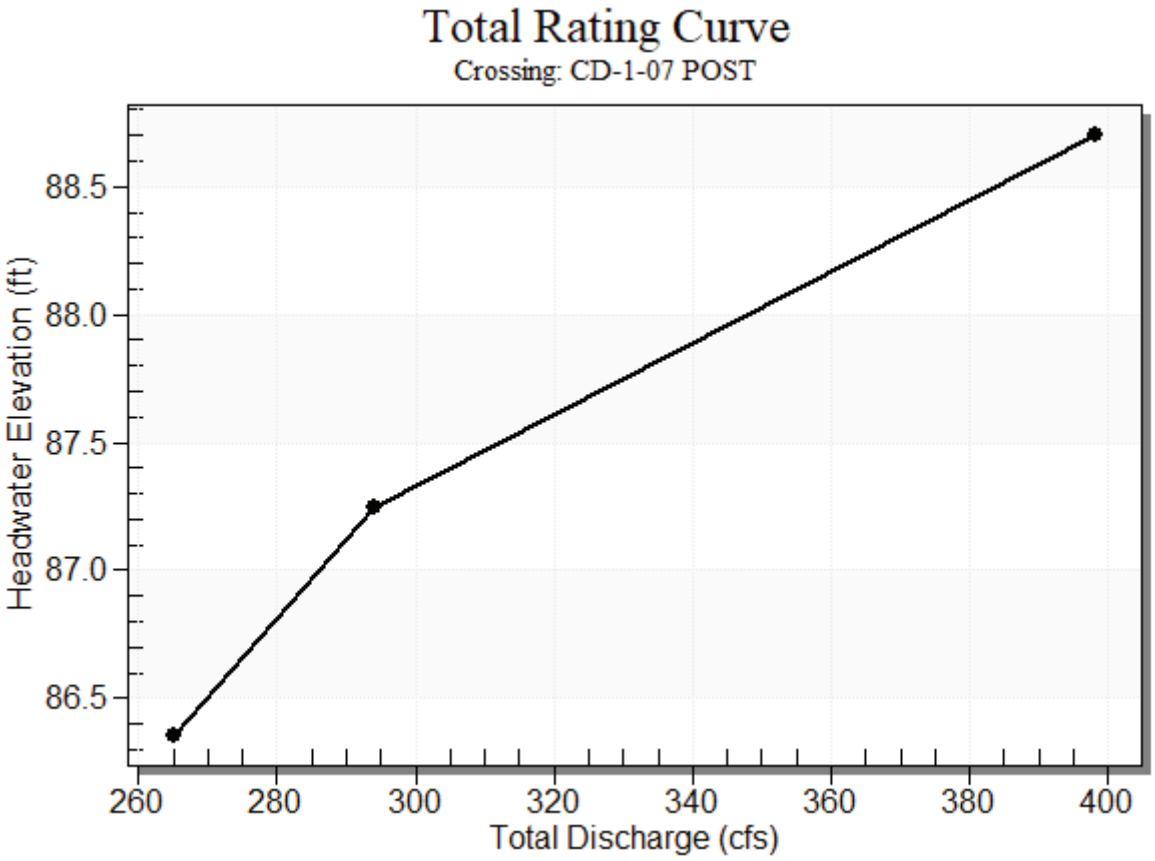


Table 20 - Culvert Summary Table: CD-1-07 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	264.98	264.98	86.36	4.238	5.988	7-M2c	3.000	2.363	2.363	0.100	8.874
100 year	294.19	294.19	87.24	4.744	6.873	7-M2c	3.000	2.478	2.478	0.100	9.421
500 year	398.06	339.39	88.71	5.646	8.335	7-M2c	3.000	2.628	2.628	0.100	10.341

****

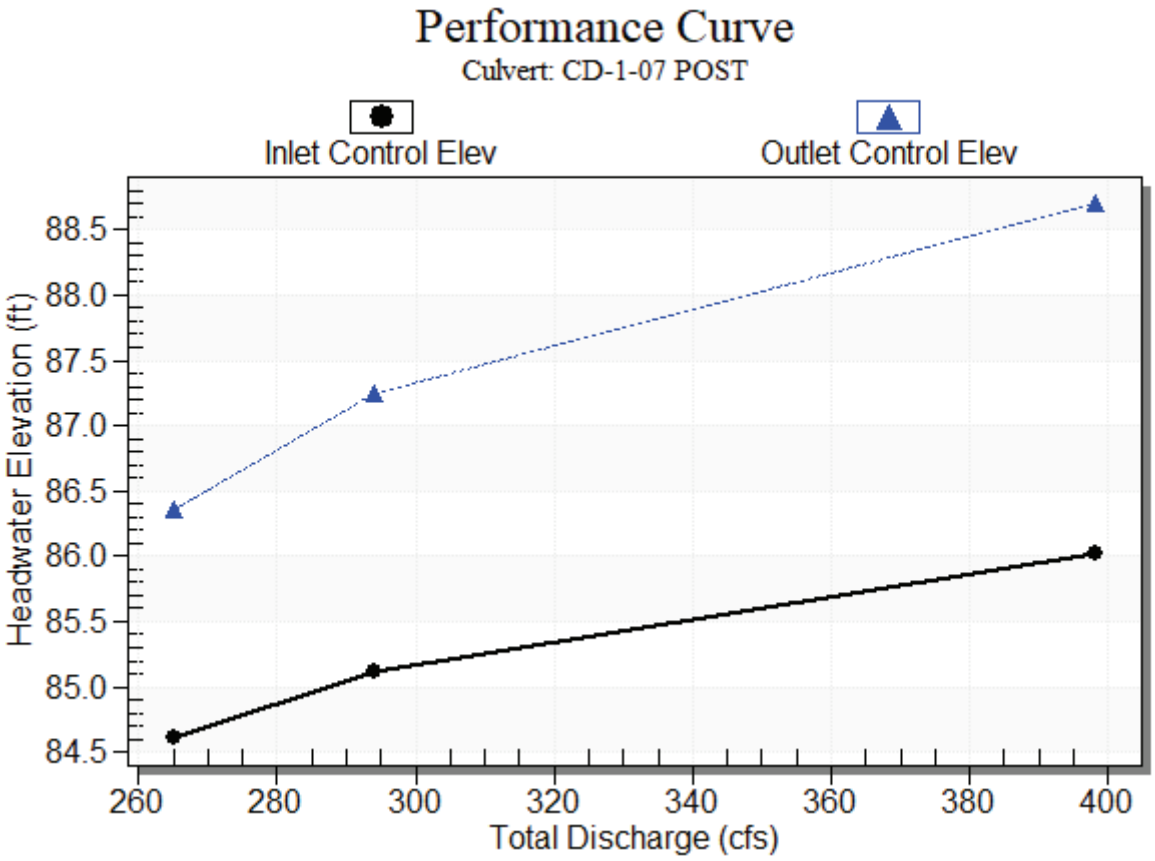
Straight Culvert

Inlet Elevation (invert): 80.37 ft, Outlet Elevation (invert): 80.27 ft

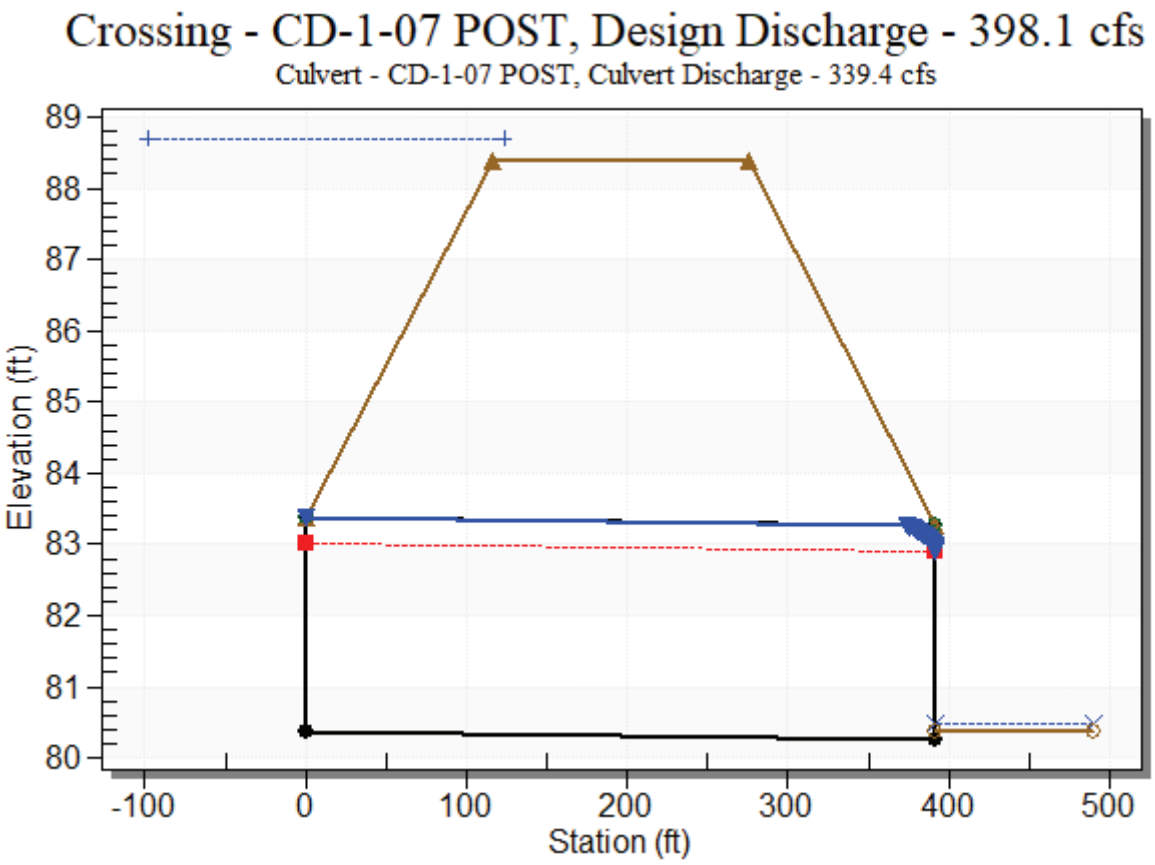
Culvert Length: 392.00 ft, Culvert Slope: 0.0003

****

Culvert Performance Curve Plot: CD-1-07 POST



Water Surface Profile Plot for Culvert: CD-1-07 POST



Site Data - CD-1-07 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 80.37 ft

Outlet Station: 392.00 ft

Outlet Elevation: 80.27 ft

Number of Barrels: 5

Culvert Data Summary - CD-1-07 POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 21 - Downstream Channel Rating Curve (Crossing: CD-1-07 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
264.98	80.47	0.10
294.19	80.47	0.10
398.06	80.47	0.10

Tailwater Channel Data - CD-1-07 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 80.47 ft

Roadway Data for Crossing: CD-1-07 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 88.37 ft

Roadway Surface: Paved

Roadway Top Width: 160.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 22 - Summary of Culvert Flows at Crossing: CD-1-08 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-1-08 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
76.98	50 year	106.69	106.69	0.00	1
77.22	100 year	119.51	119.51	0.00	1
78.28	500 year	165.91	165.91	0.00	1
79.77	Overtopping	214.66	214.66	0.00	Overtopping

Rating Curve Plot for Crossing: CD-1-08 POST

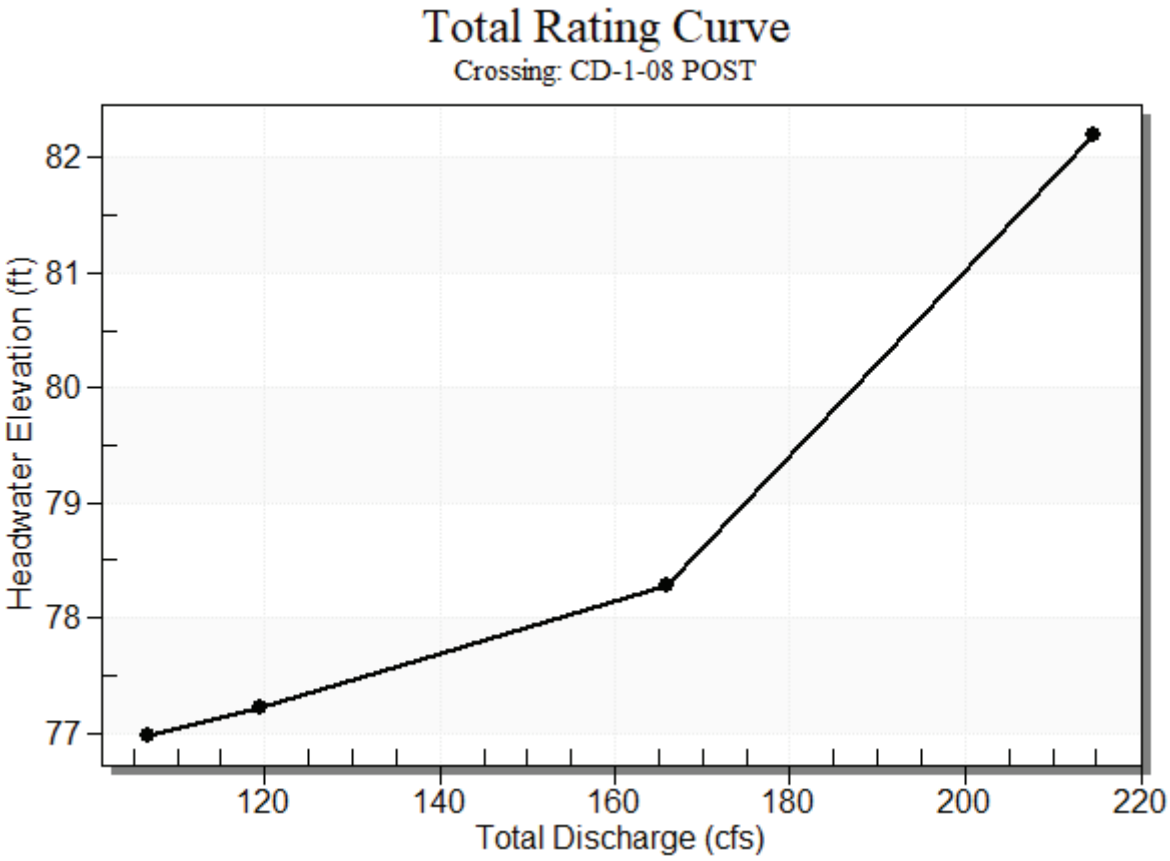


Table 23 - Culvert Summary Table: CD-1-08 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	106.69	106.69	76.98	2.711	6.984	4-FFf	3.167	1.816	3.167	6.070	4.177
100 year	119.51	119.51	77.22	2.930	7.217	4-FFf	3.167	1.933	3.167	6.070	4.679
500 year	165.91	165.91	78.28	3.784	8.280	4-FFf	3.167	2.305	3.167	6.070	6.496

****

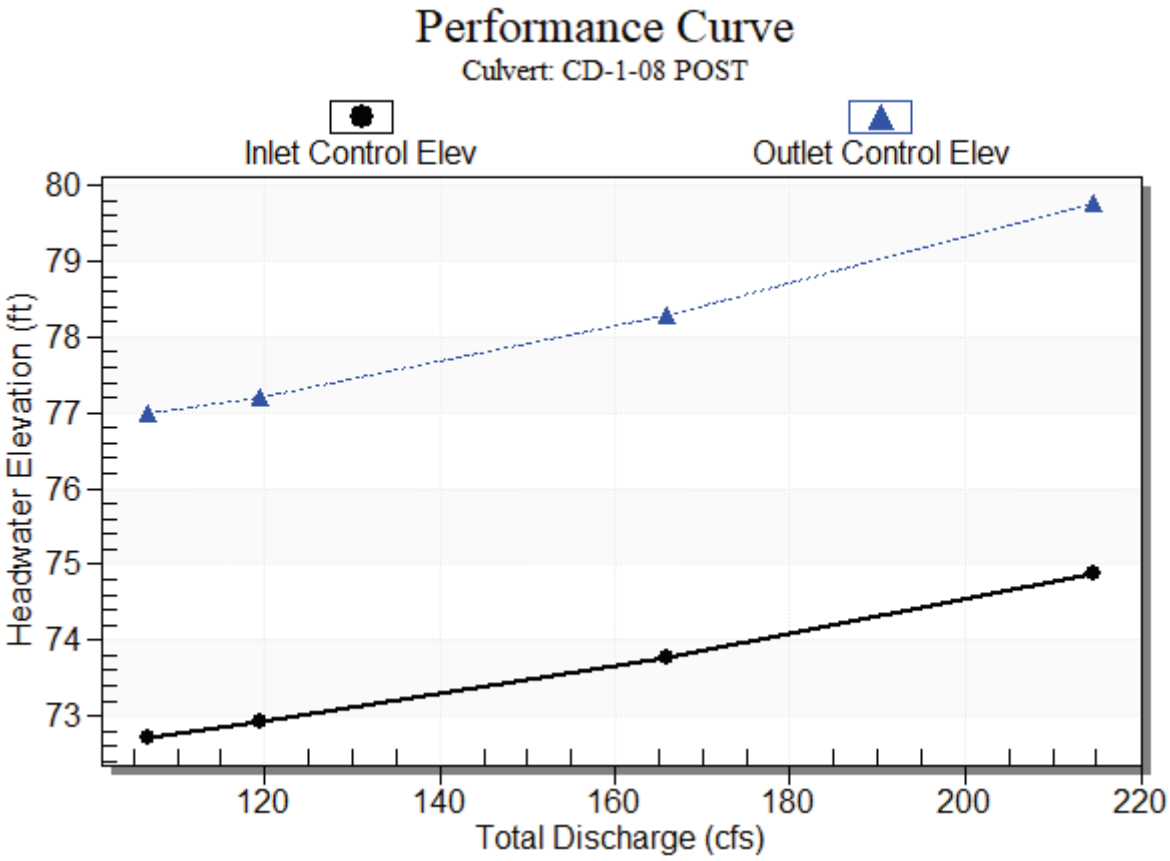
Straight Culvert

Inlet Elevation (invert): 70.00 ft, Outlet Elevation (invert): 69.79 ft

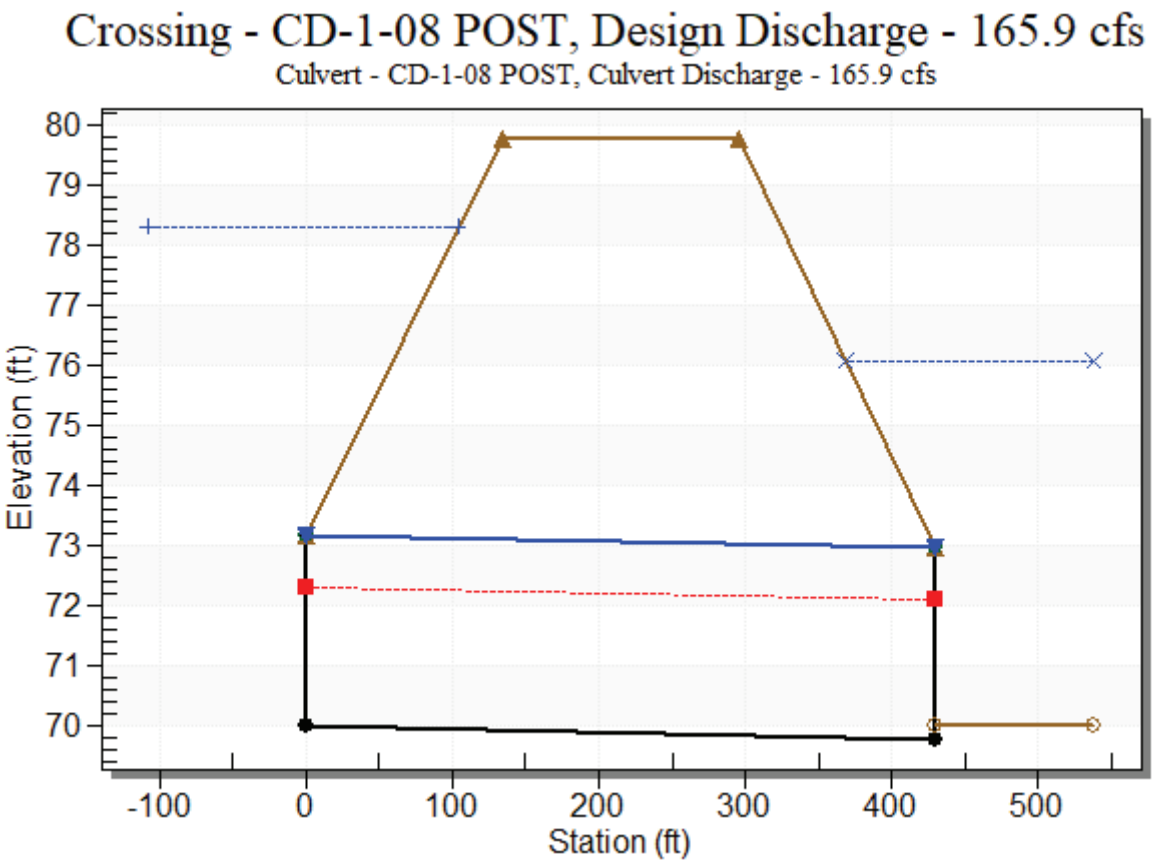
Culvert Length: 430.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-1-08 POST



Water Surface Profile Plot for Culvert: CD-1-08 POST



Site Data - CD-1-08 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 70.00 ft

Outlet Station: 430.00 ft

Outlet Elevation: 69.79 ft

Number of Barrels: 2

Culvert Data Summary - CD-1-08 POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 24 - Downstream Channel Rating Curve (Crossing: CD-1-08 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
106.69	76.07	6.07
119.51	76.07	6.07
165.91	76.07	6.07

Tailwater Channel Data - CD-1-08 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 76.07 ft

Roadway Data for Crossing: CD-1-08 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 79.77 ft

Roadway Surface: Paved

Roadway Top Width: 160.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 25 - Summary of Culvert Flows at Crossing: CD-4-01 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-4-01 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
81.07	EAST5WET	554.47	554.47	0.00	1
81.30	RRNORTH	584.05	584.05	0.00	1
84.00	Overtopping	860.72	860.72	0.00	Overtopping

Rating Curve Plot for Crossing: CD-4-01 POST

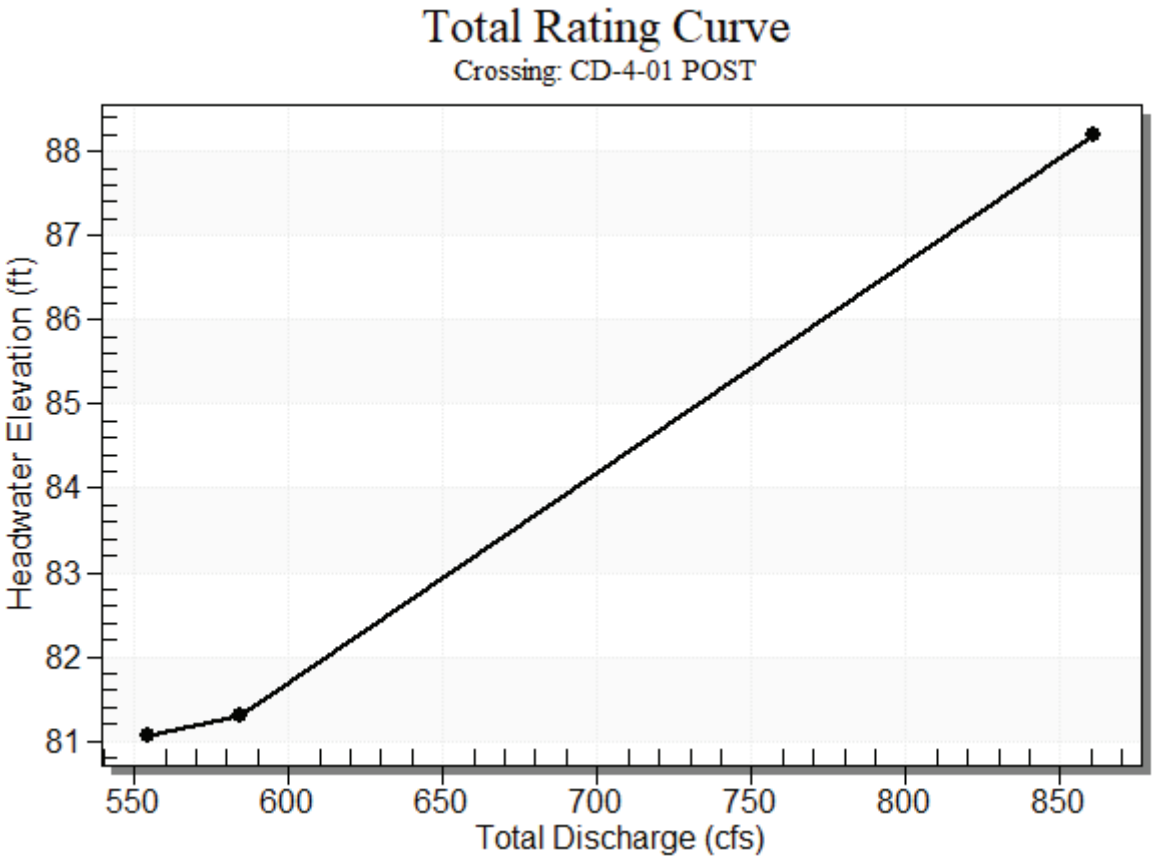


Table 26 - Culvert Summary Table: CD-4-01 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
EAST5WET	554.47	554.47	81.07	3.636	5.845	4-FFf	3.167	2.250	3.167	4.000	6.203
RRNORTH	584.05	584.05	81.30	3.803	6.072	4-FFf	3.167	2.312	3.167	4.000	6.534

****

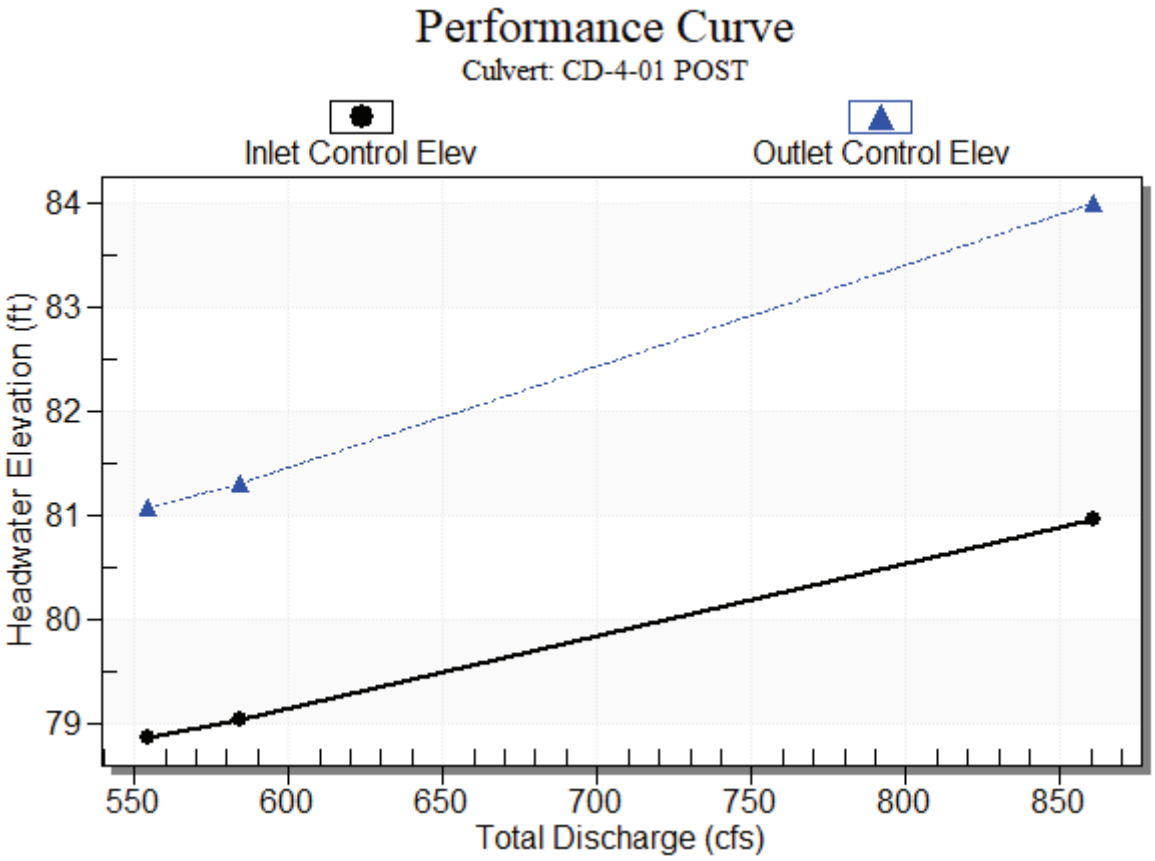
Straight Culvert

Inlet Elevation (invert): 75.23 ft, Outlet Elevation (invert): 75.00 ft

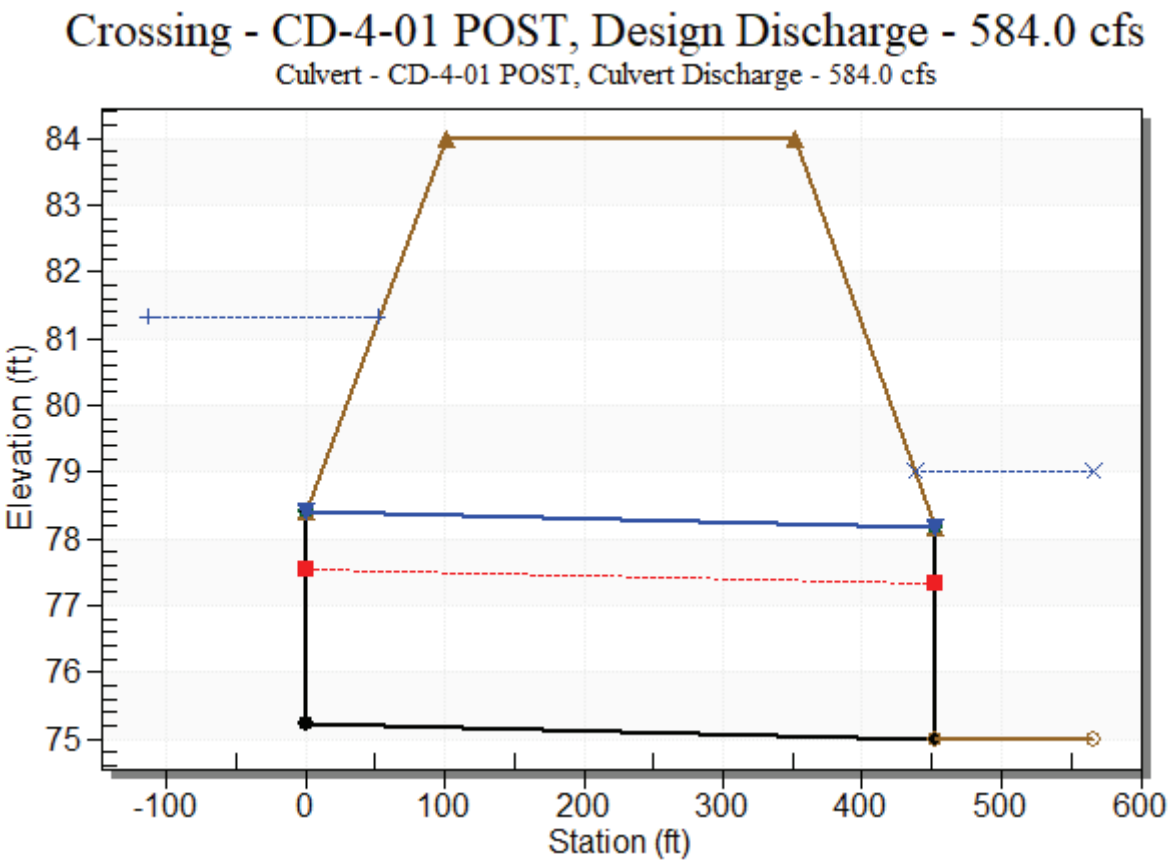
Culvert Length: 453.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-4-01 POST



Water Surface Profile Plot for Culvert: CD-4-01 POST



Site Data - CD-4-01 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 75.23 ft

Outlet Station: 453.00 ft

Outlet Elevation: 75.00 ft

Number of Barrels: 7

Culvert Data Summary - CD-4-01 POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 27 - Downstream Channel Rating Curve (Crossing: CD-4-01 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
554.47	79.00	4.00
584.05	79.00	4.00

Tailwater Channel Data - CD-4-01 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 79.00 ft

Roadway Data for Crossing: CD-4-01 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 84.00 ft

Roadway Surface: Paved

Roadway Top Width: 250.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 28 - Summary of Culvert Flows at Crossing: CD-4-02 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-4-02 POST Discharge (cfs)	CD-4-02B POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
73.74	17-92SE	158.85	118.62	40.39	0.00	11
73.74	17-92SE	158.85	118.62	40.39	0.00	2
79.00	Overtopping	501.84	355.48	146.36	0.00	Overtopping

Rating Curve Plot for Crossing: CD-4-02 POST

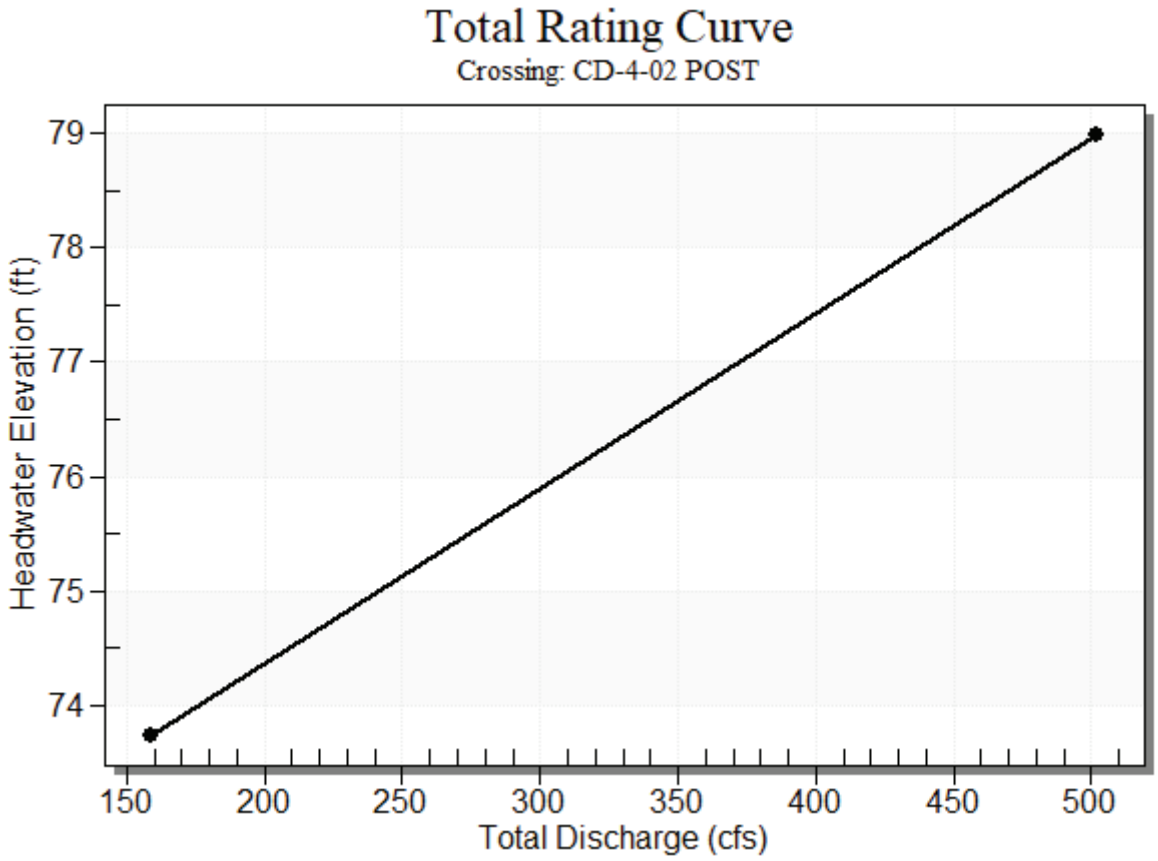


Table 29 - Culvert Summary Table: CD-4-02 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
17-92SE	158.85	118.62	73.74	2.742	2.473	1-JS1f	0.864	1.635	3.000	2.000	3.954
17-92SE	158.85	118.62	73.74	2.742	2.473	1-JS1f	0.864	1.635	3.000	2.000	3.954

****

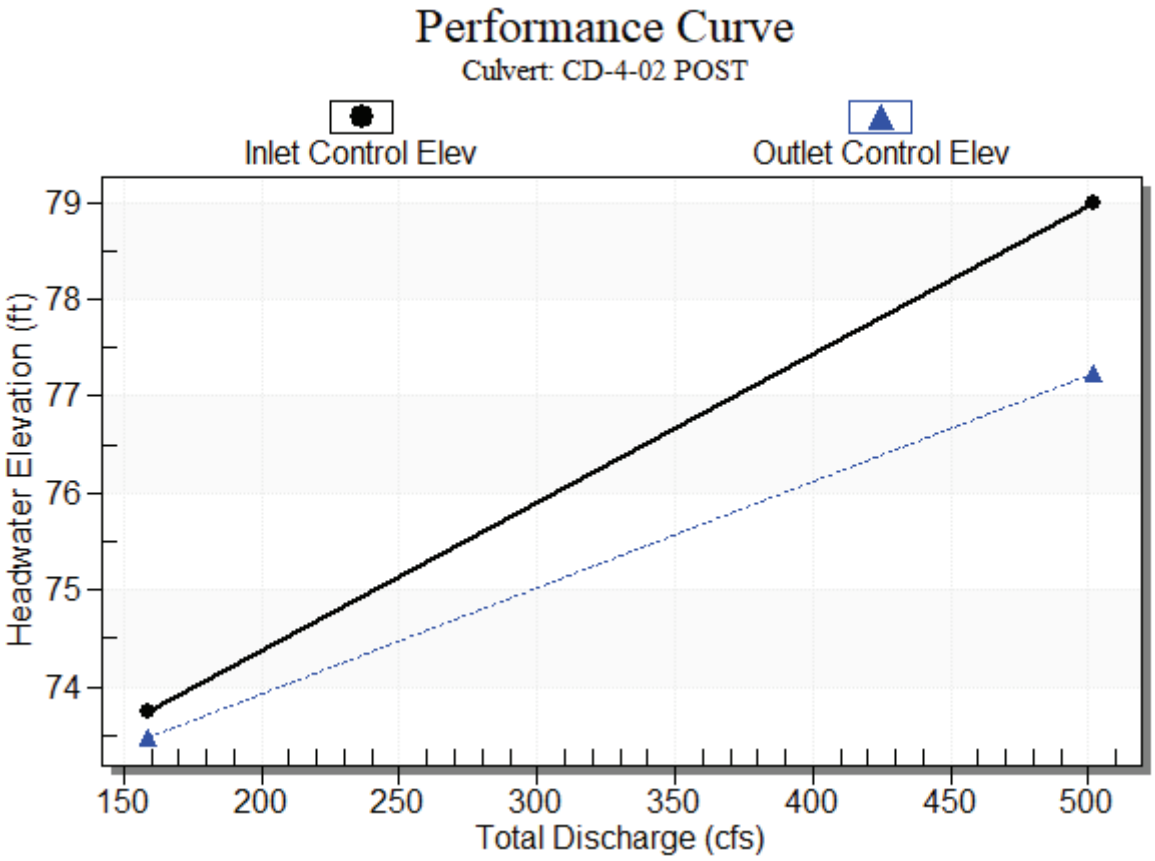
Straight Culvert

Inlet Elevation (invert): 71.00 ft, Outlet Elevation (invert): 68.80 ft

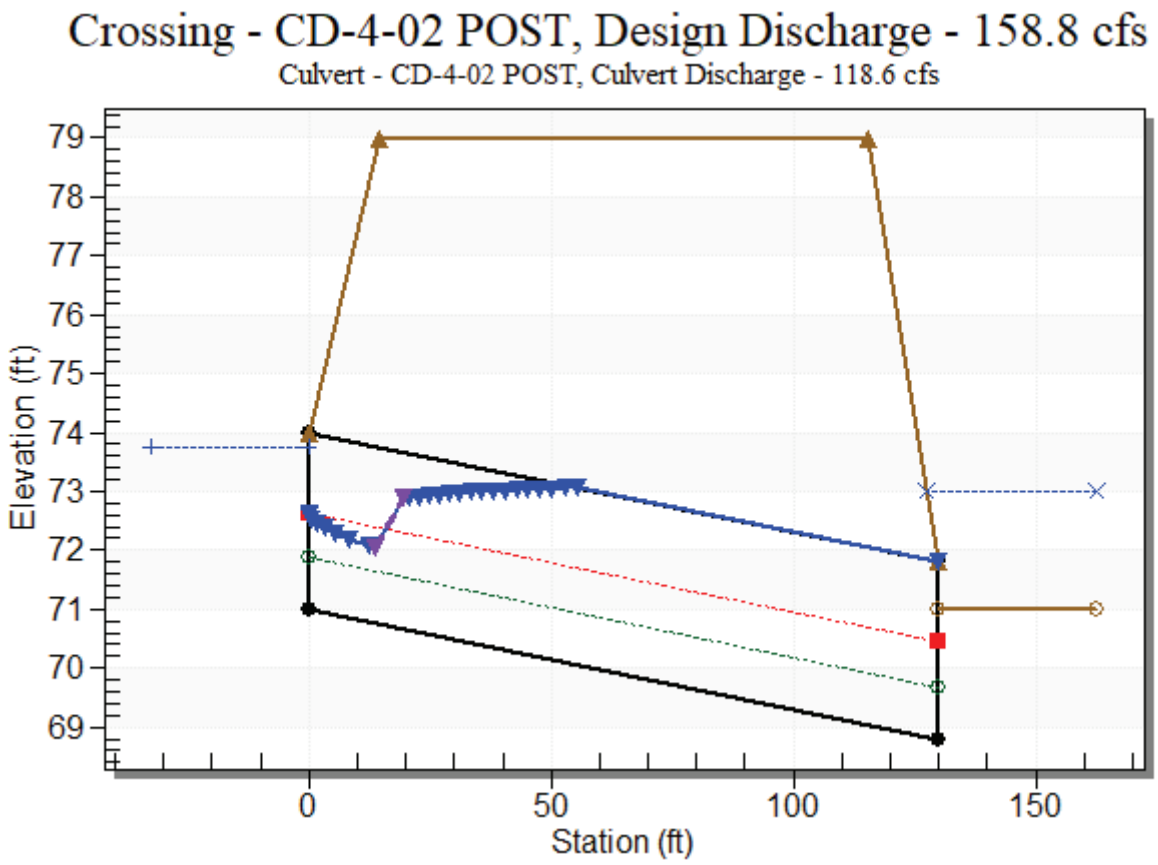
Culvert Length: 130.02 ft, Culvert Slope: 0.0169

****

Culvert Performance Curve Plot: CD-4-02 POST



Water Surface Profile Plot for Culvert: CD-4-02 POST



Site Data - CD-4-02 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 71.00 ft

Outlet Station: 130.00 ft

Outlet Elevation: 68.80 ft

Number of Barrels: 1

Culvert Data Summary - CD-4-02 POST

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

Table 30 - Culvert Summary Table: CD-4-02B POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
17-92SE	158.85	40.39	73.74	2.742	2.327	1-JS1f	1.178	1.898	4.000	2.000	3.214
17-92SE	158.85	40.39	73.74	2.742	2.327	1-JS1f	1.178	1.898	4.000	2.000	3.214

****

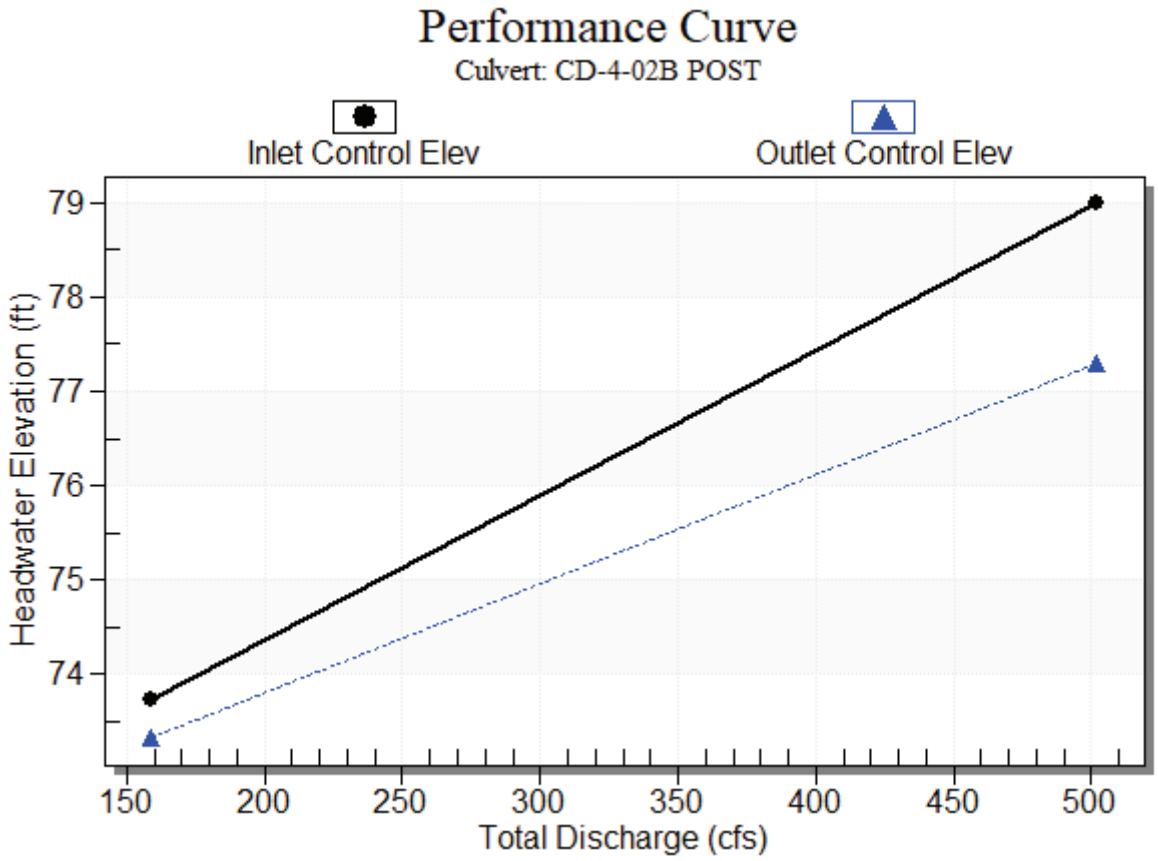
Straight Culvert

Inlet Elevation (invert): 71.00 ft, Outlet Elevation (invert): 68.80 ft

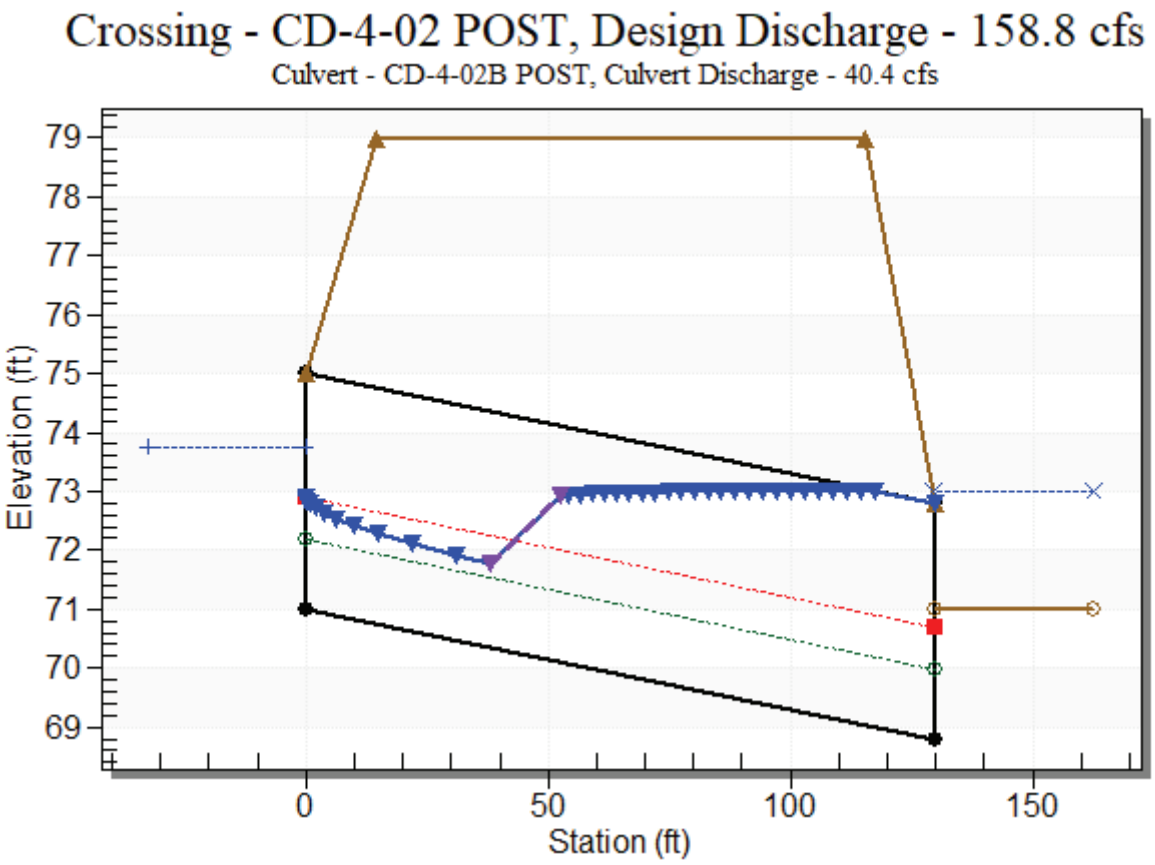
Culvert Length: 130.02 ft, Culvert Slope: 0.0169

****

Culvert Performance Curve Plot: CD-4-02B POST



Water Surface Profile Plot for Culvert: CD-4-02B POST



Site Data - CD-4-02B POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 71.00 ft

Outlet Station: 130.00 ft

Outlet Elevation: 68.80 ft

Number of Barrels: 1

Culvert Data Summary - CD-4-02B POST

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 31 - Downstream Channel Rating Curve (Crossing: CD-4-02 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
158.85	73.00	2.00
158.85	73.00	2.00

Tailwater Channel Data - CD-4-02 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 73.00 ft

Roadway Data for Crossing: CD-4-02 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 79.00 ft

Roadway Surface: Paved

Roadway Top Width: 101.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 32 - Summary of Culvert Flows at Crossing: CD-4-03 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-4-03 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
68.71	17-92NE	613.05	613.05	0.00	1
68.71	17-92NE	613.05	613.05	0.00	1
72.50	Overtopping	1109.36	1109.36	0.00	Overtopping

Rating Curve Plot for Crossing: CD-4-03 POST

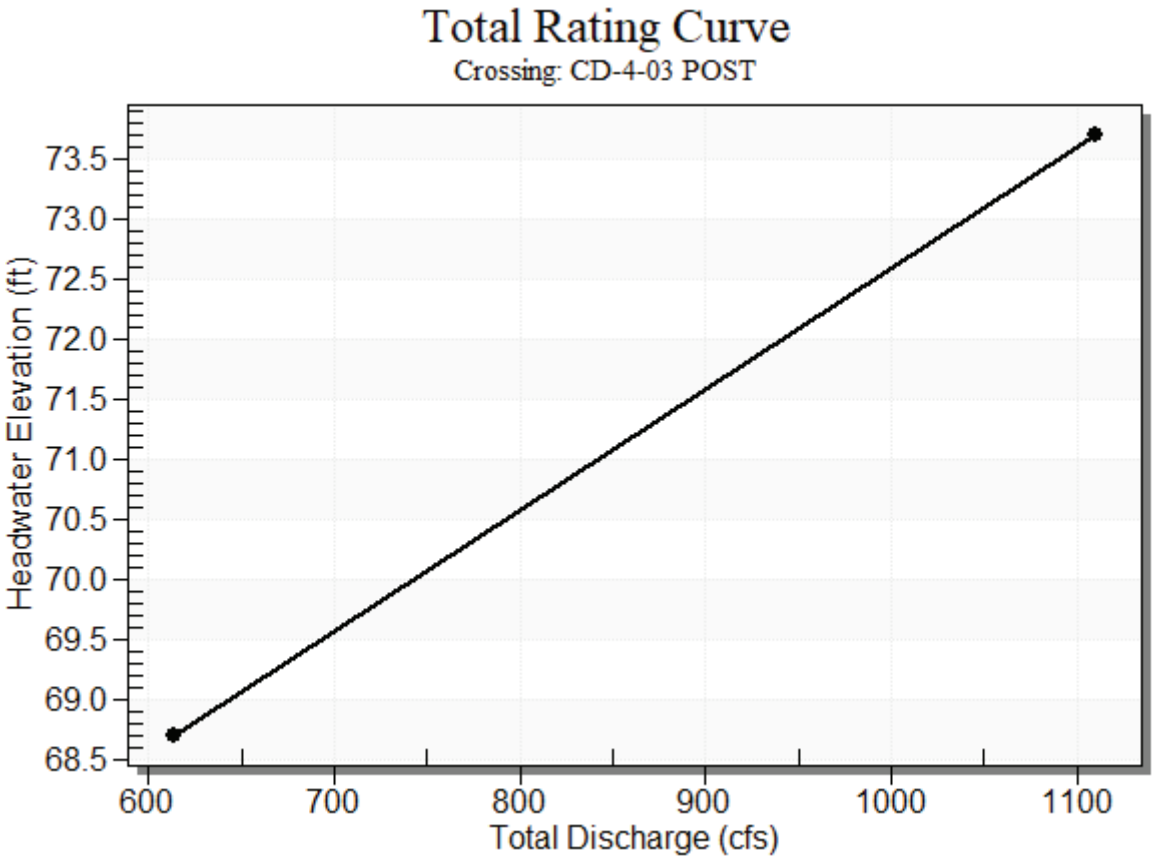


Table 33 - Culvert Summary Table: CD-4-03 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
17-92NE	613.05	613.05	68.71	4.698	4.712	7-M2c	4.000	2.726	2.726	2.500	9.369
17-92NE	613.05	613.05	68.71	4.698	4.712	7-M2c	4.000	2.726	2.726	2.500	9.369

****

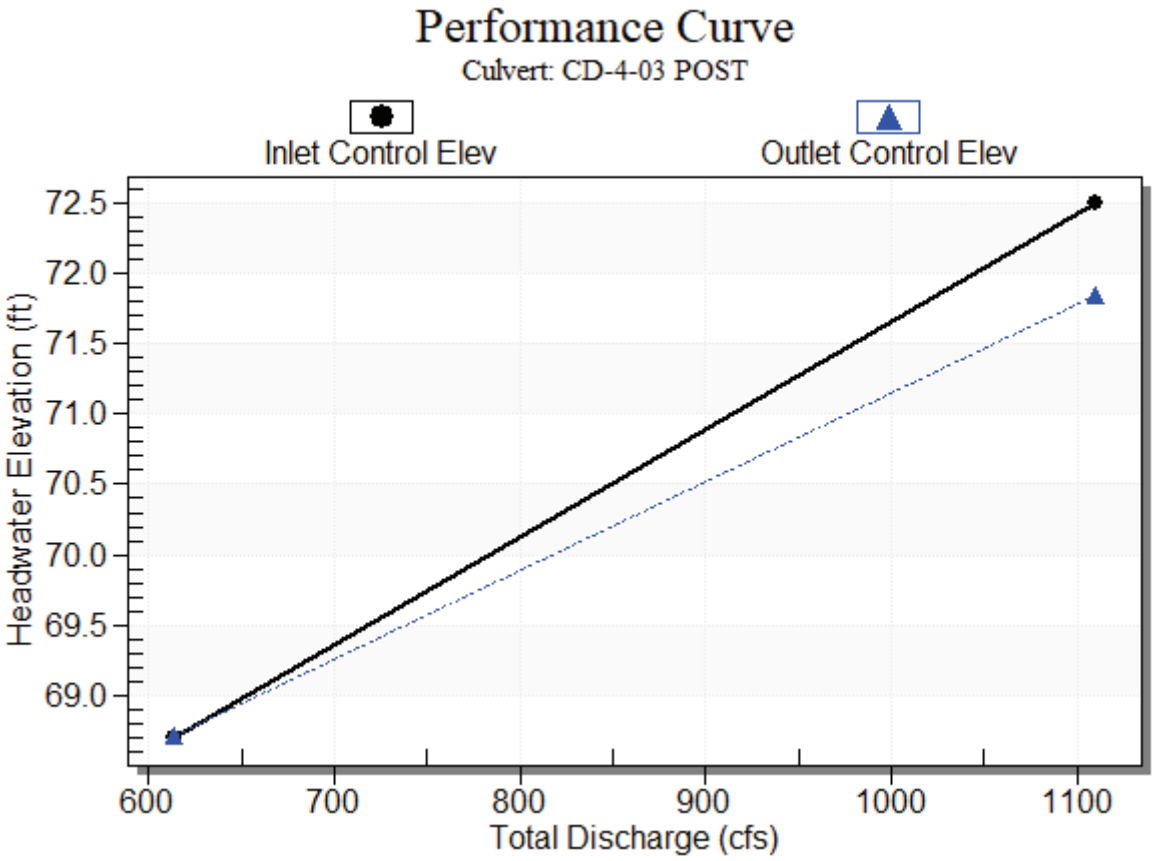
Straight Culvert

Inlet Elevation (invert): 64.00 ft, Outlet Elevation (invert): 63.90 ft

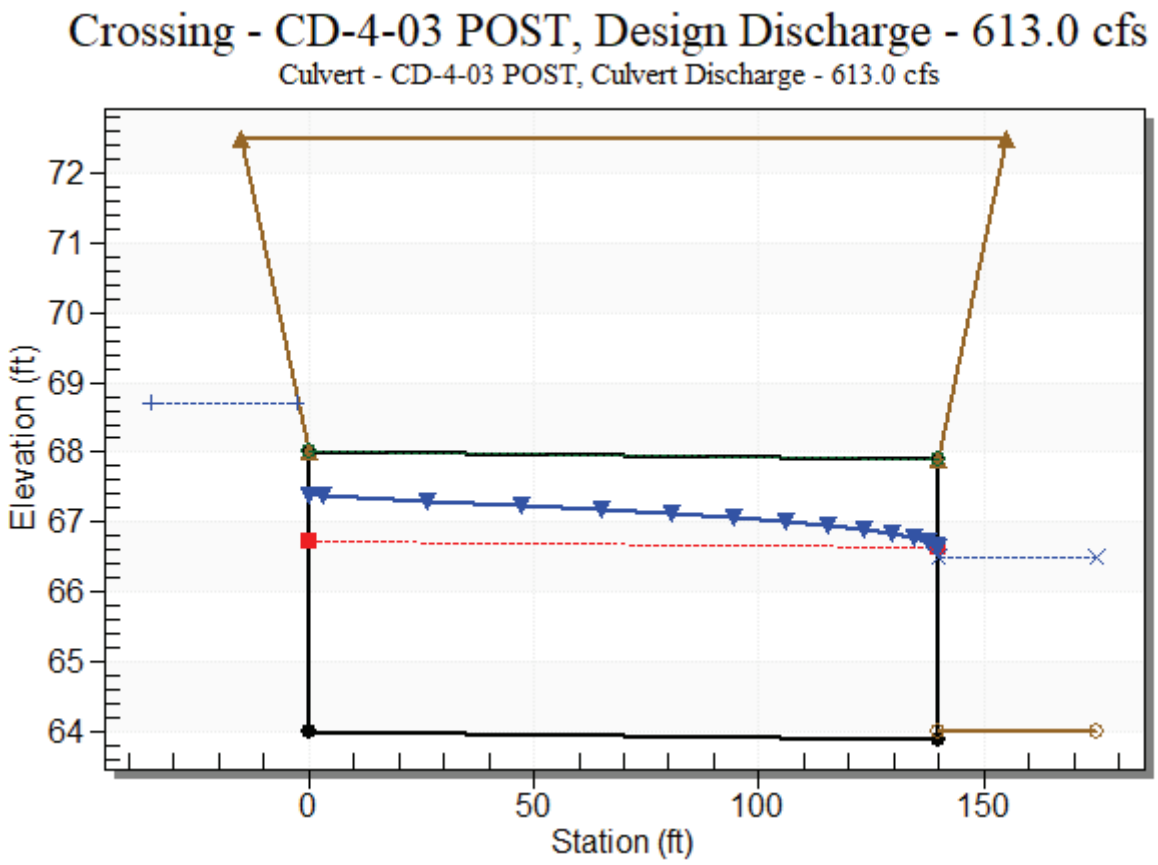
Culvert Length: 140.00 ft, Culvert Slope: 0.0007

****

Culvert Performance Curve Plot: CD-4-03 POST



Water Surface Profile Plot for Culvert: CD-4-03 POST



Site Data - CD-4-03 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 64.00 ft

Outlet Station: 140.00 ft

Outlet Elevation: 63.90 ft

Number of Barrels: 3

Culvert Data Summary - CD-4-03 POST

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

Table 34 - Downstream Channel Rating Curve (Crossing: CD-4-03 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
613.05	66.50	2.50
613.05	66.50	2.50

Tailwater Channel Data - CD-4-03 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 66.50 ft

Roadway Data for Crossing: CD-4-03 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 400.00 ft

Crest Elevation: 72.50 ft

Roadway Surface: Paved

Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 35 - Summary of Culvert Flows at Crossing: CD-4-05A POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-4-05A POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
86.06	50 year	276.49	276.49	0.00	1
86.86	100 year	305.84	305.84	0.00	1
88.65	500 year	408.92	364.97	43.67	6
88.37	Overtopping	355.95	355.95	0.00	Overtopping

Rating Curve Plot for Crossing: CD-4-05A POST

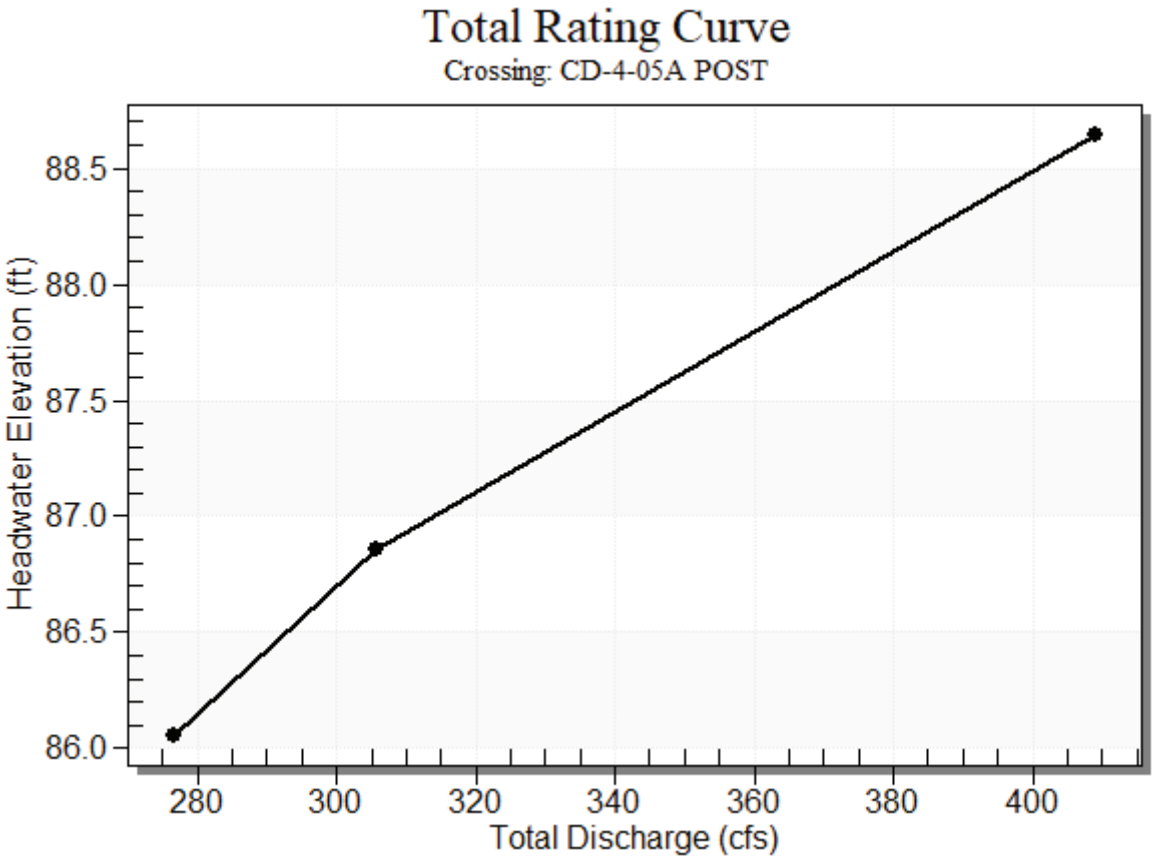


Table 36 - Culvert Summary Table: CD-4-05A POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	276.49	276.49	86.06	3.711	5.689	7-M2c	3.000	2.209	2.209	0.100	8.261
100 year	305.84	305.84	86.86	4.076	6.486	7-M2c	3.000	2.320	2.320	0.100	8.691
500 year	408.92	364.97	88.65	4.930	8.278	7-M2c	3.000	2.514	2.514	0.100	9.615

****

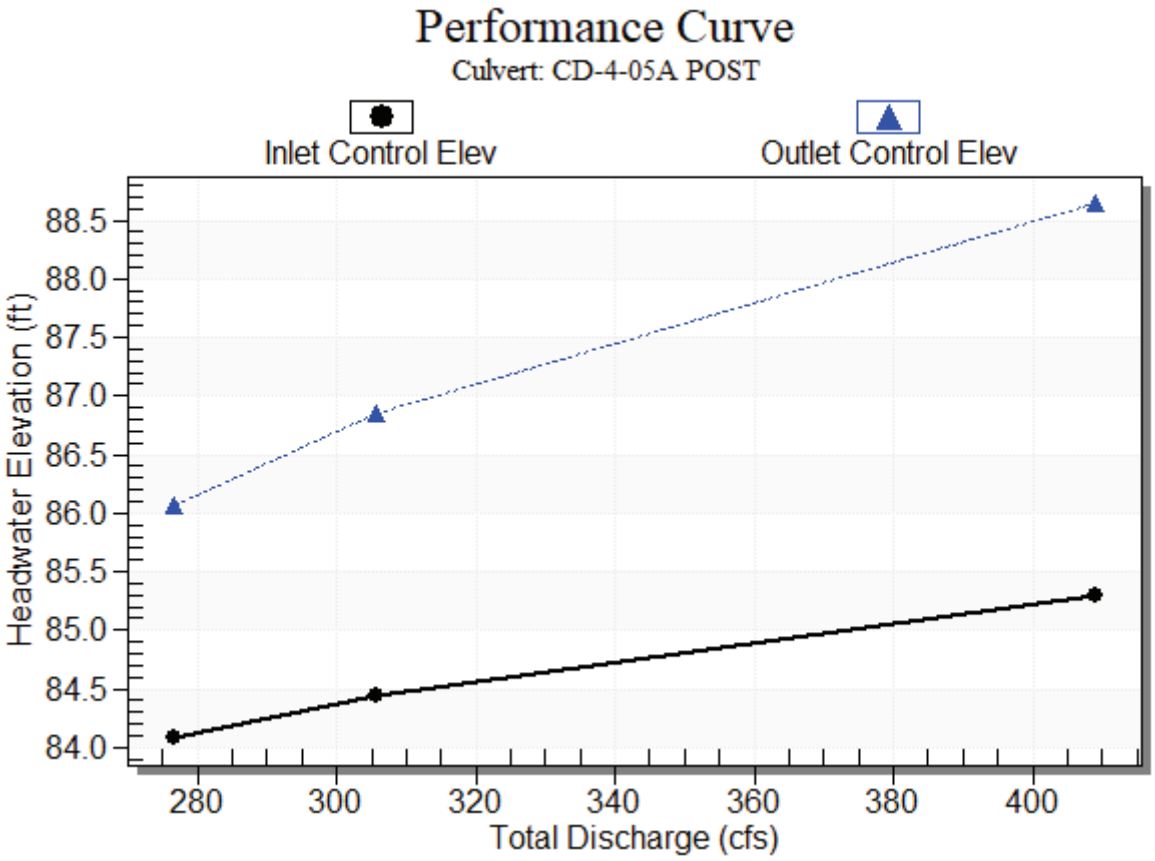
Straight Culvert

Inlet Elevation (invert): 80.37 ft, Outlet Elevation (invert): 80.27 ft

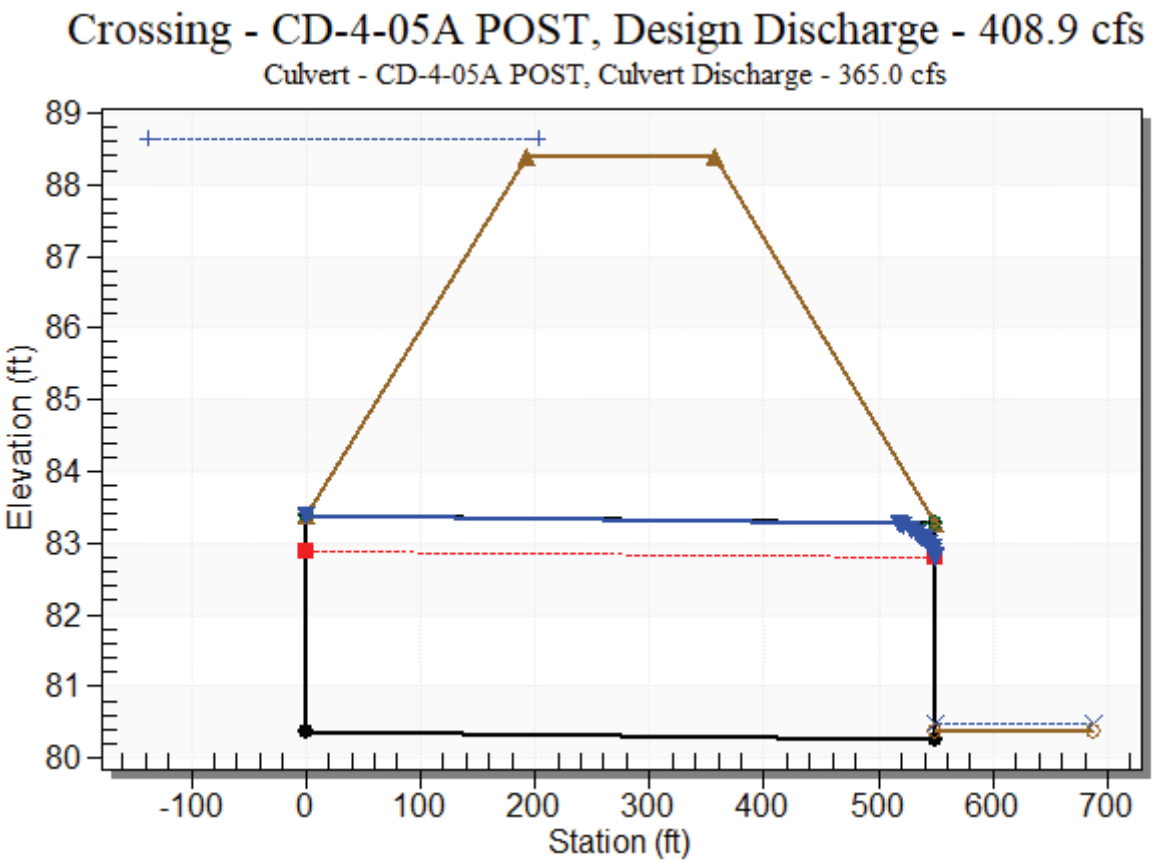
Culvert Length: 550.00 ft, Culvert Slope: 0.0002

****

Culvert Performance Curve Plot: CD-4-05A POST



Water Surface Profile Plot for Culvert: CD-4-05A POST



Site Data - CD-4-05A POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 80.37 ft

Outlet Station: 550.00 ft

Outlet Elevation: 80.27 ft

Number of Barrels: 6

Culvert Data Summary - CD-4-05A POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 37 - Downstream Channel Rating Curve (Crossing: CD-4-05A POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
276.49	80.47	0.10
305.84	80.47	0.10
408.92	80.47	0.10

Tailwater Channel Data - CD-4-05A POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 80.47 ft

Roadway Data for Crossing: CD-4-05A POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 88.37 ft

Roadway Surface: Paved

Roadway Top Width: 164.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 38 - Summary of Culvert Flows at Crossing: CD-4-05B POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-4-05B POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
84.04	50 year	302.16	302.16	0.00	1
84.78	100 year	335.55	335.55	0.00	1
87.18	500 year	452.27	430.15	21.81	10
87.00	Overtopping	424.03	424.03	0.00	Overtopping

Rating Curve Plot for Crossing: CD-4-05B POST

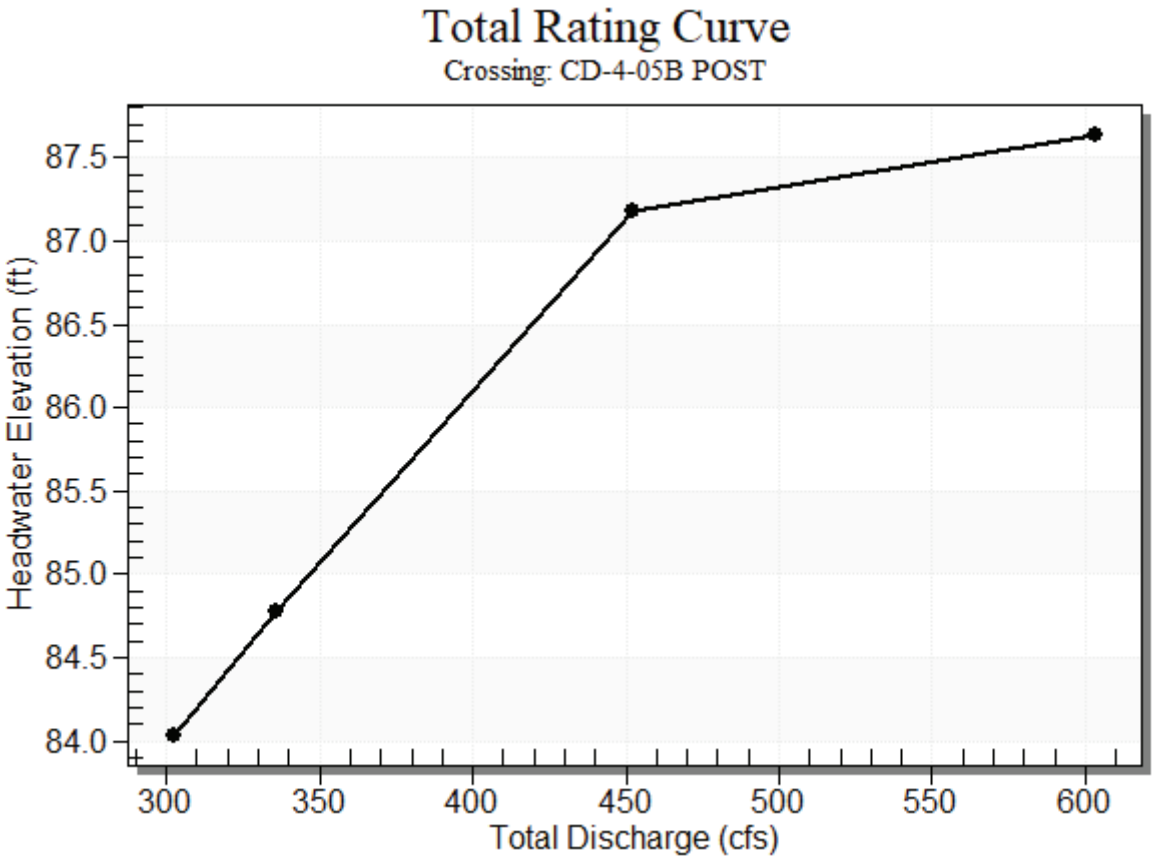


Table 39 - Culvert Summary Table: CD-4-05B POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	302.16	302.16	84.04	4.027	5.037	7-M2c	3.000	2.306	2.306	1.470	8.636
100 year	335.55	335.55	84.78	4.483	5.776	7-M2c	3.000	2.423	2.423	1.470	9.144
500 year	452.27	430.15	87.18	6.069	8.176	7-M2c	3.000	2.679	2.679	1.470	10.759

****

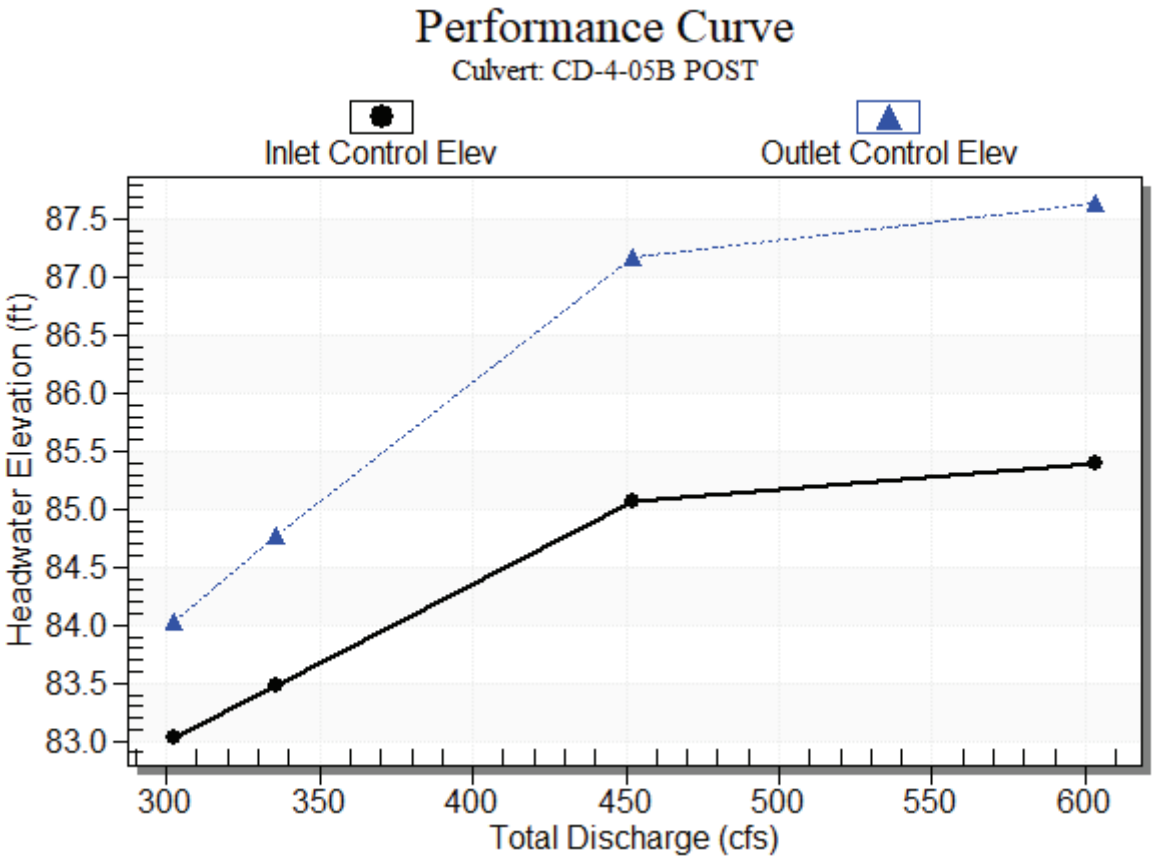
Straight Culvert

Inlet Elevation (invert): 79.00 ft, Outlet Elevation (invert): 78.58 ft

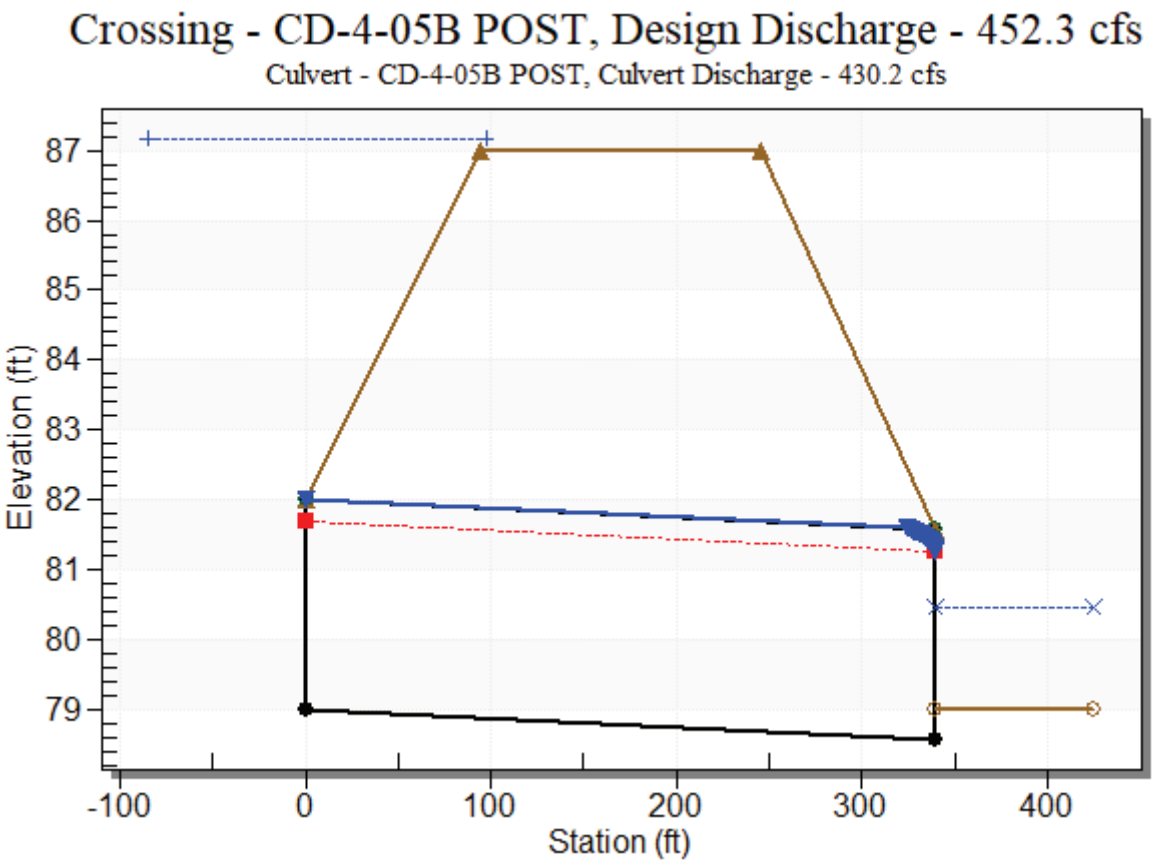
Culvert Length: 340.00 ft, Culvert Slope: 0.0012

****

Culvert Performance Curve Plot: CD-4-05B POST



Water Surface Profile Plot for Culvert: CD-4-05B POST



Site Data - CD-4-05B POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 79.00 ft

Outlet Station: 340.00 ft

Outlet Elevation: 78.58 ft

Number of Barrels: 6

Culvert Data Summary - CD-4-05B POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 40 - Downstream Channel Rating Curve (Crossing: CD-4-05B POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
302.16	80.47	1.47
335.55	80.47	1.47
452.27	80.47	1.47

Tailwater Channel Data - CD-4-05B POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 80.47 ft

Roadway Data for Crossing: CD-4-05B POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 87.00 ft

Roadway Surface: Paved

Roadway Top Width: 152.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 41 - Summary of Culvert Flows at Crossing: CD-4-06 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-4-06 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
77.08	50 year	109.72	109.72	0.00	1
77.32	100 year	121.35	121.35	0.00	1
78.43	500 year	166.07	166.07	0.00	1
79.77	Overtopping	208.04	208.04	0.00	Overtopping

Rating Curve Plot for Crossing: CD-4-06 POST

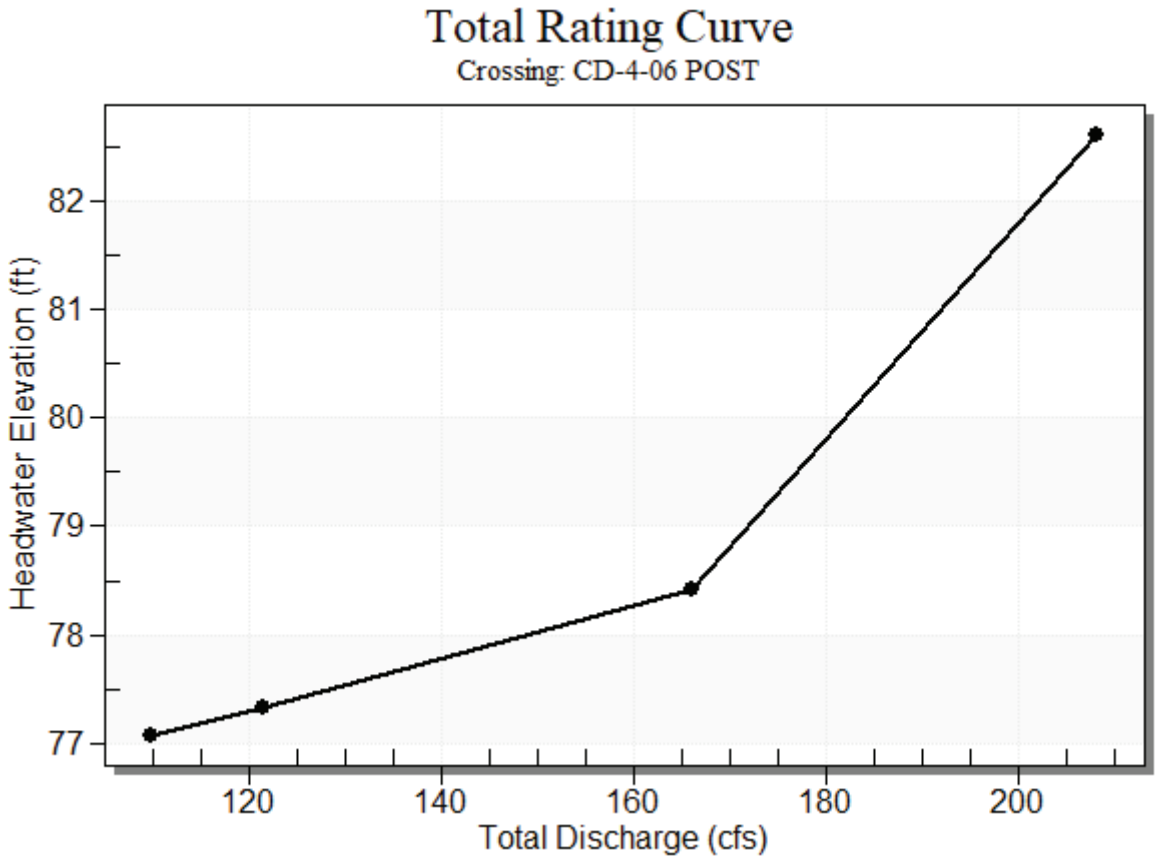


Table 42 - Culvert Summary Table: CD-4-06 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	109.72	109.72	77.08	2.759	3.370	3-M1f	1.947	1.847	3.167	2.360	4.296
100 year	121.35	121.35	77.32	2.959	3.612	3-M1f	2.083	1.949	3.167	2.360	4.751
500 year	166.07	166.07	78.43	3.784	4.717	4-FFf	3.167	2.307	3.167	2.360	6.502

****

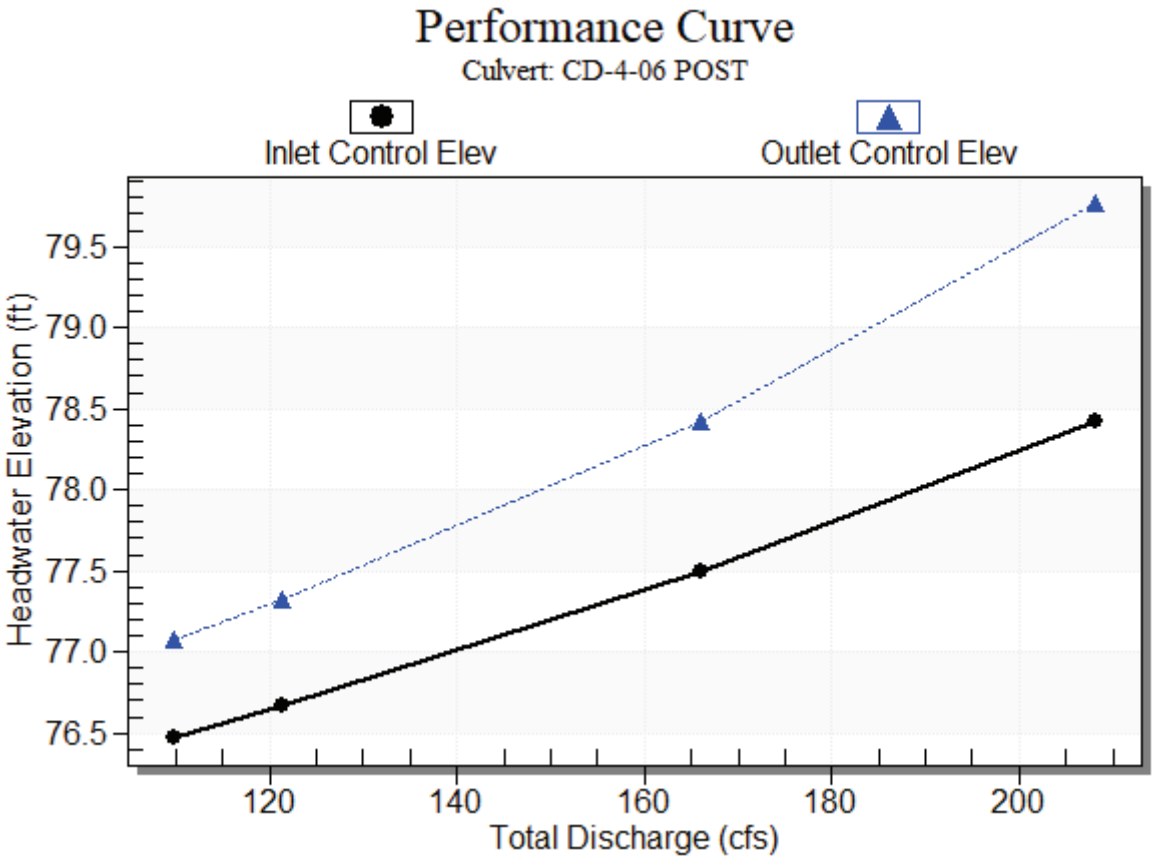
Straight Culvert

Inlet Elevation (invert): 73.71 ft, Outlet Elevation (invert): 72.59 ft

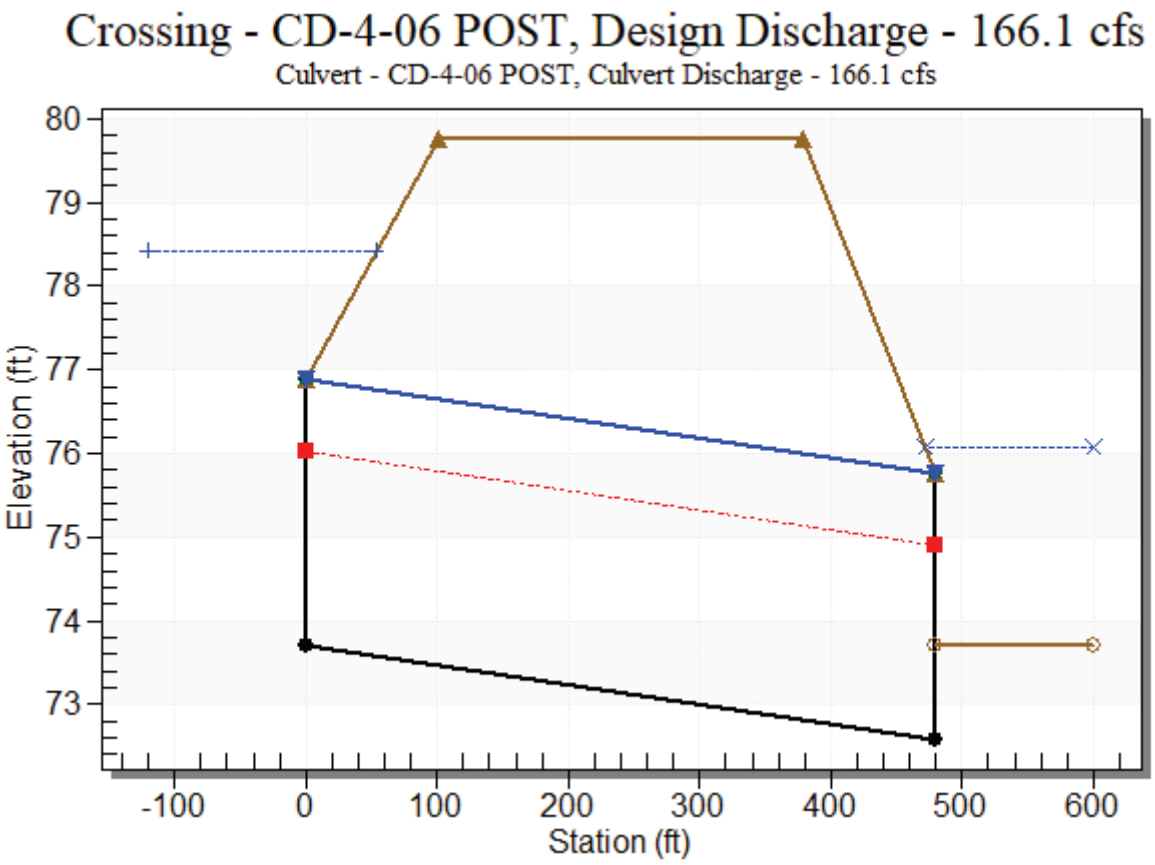
Culvert Length: 480.00 ft, Culvert Slope: 0.0023

****

Culvert Performance Curve Plot: CD-4-06 POST



Water Surface Profile Plot for Culvert: CD-4-06 POST



Site Data - CD-4-06 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 73.71 ft

Outlet Station: 480.00 ft

Outlet Elevation: 72.59 ft

Number of Barrels: 2

Culvert Data Summary - CD-4-06 POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 43 - Downstream Channel Rating Curve (Crossing: CD-4-06 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
109.72	76.07	2.36
121.35	76.07	2.36
166.07	76.07	2.36

Tailwater Channel Data - CD-4-06 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 76.07 ft

Roadway Data for Crossing: CD-4-06 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 79.77 ft

Roadway Surface: Paved

Roadway Top Width: 278.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 44 - Summary of Culvert Flows at Crossing: CD-5-01 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5-01 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
81.07	EAST5WET	554.47	554.47	0.00	1
81.30	RRNORTH	584.05	584.05	0.00	1
84.00	Overtopping	860.72	860.72	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5-01 POST

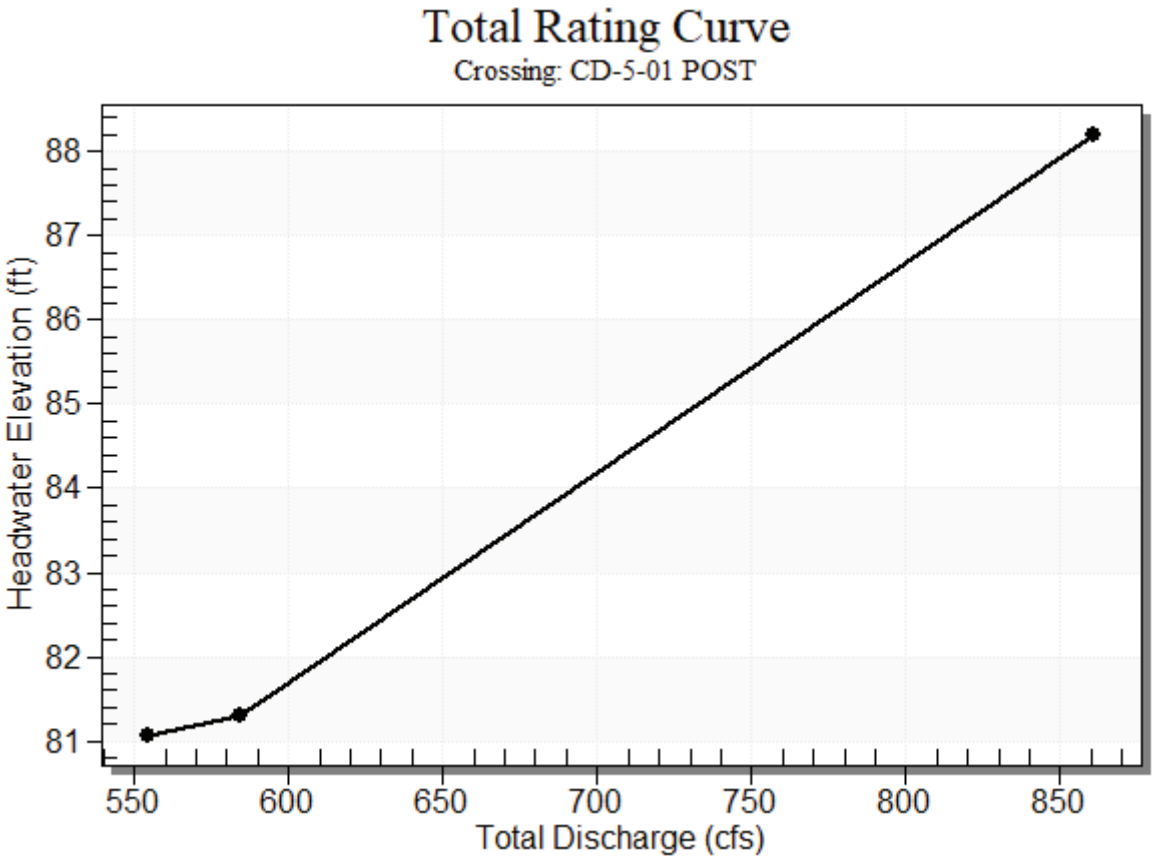


Table 45 - Culvert Summary Table: CD-5-01 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
EAST5WET	554.47	554.47	81.07	3.636	5.845	4-FFf	3.167	2.250	3.167	4.000	6.203
RRNORTH	584.05	584.05	81.30	3.803	6.072	4-FFf	3.167	2.312	3.167	4.000	6.534

****

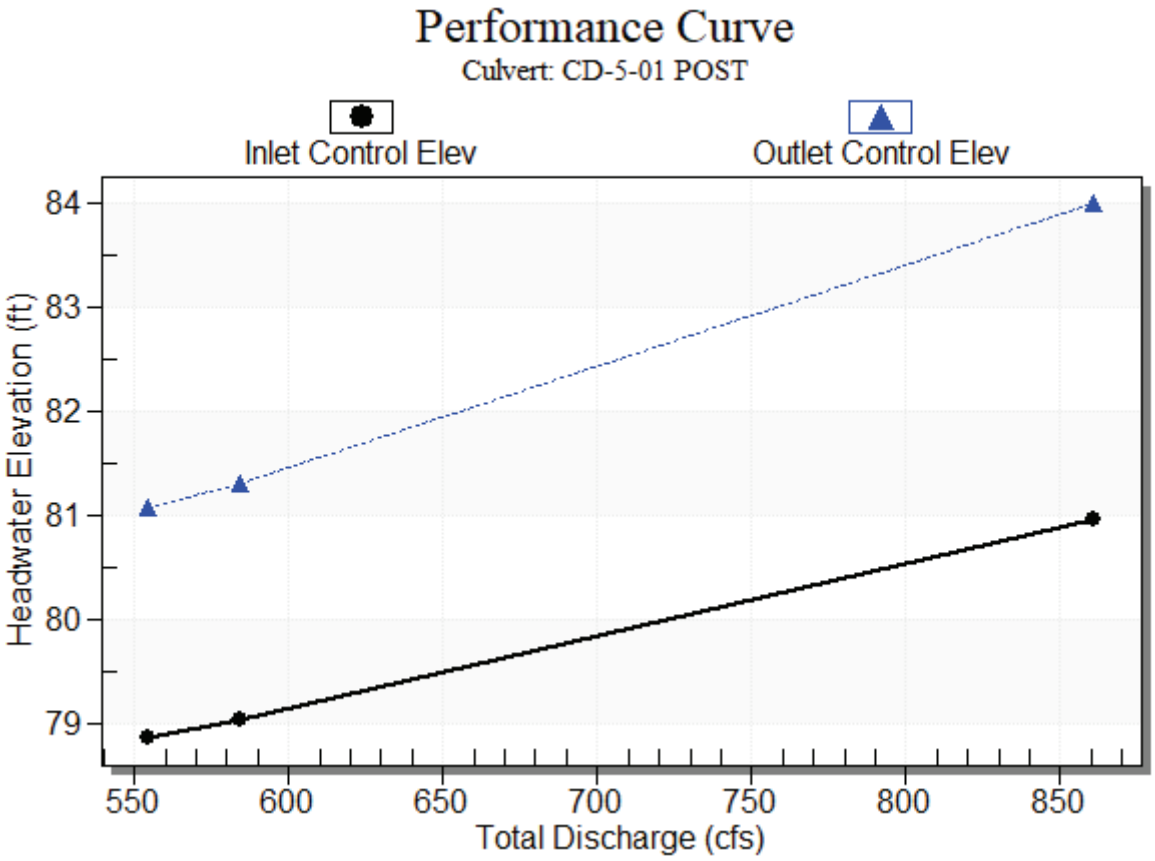
Straight Culvert

Inlet Elevation (invert): 75.23 ft, Outlet Elevation (invert): 75.00 ft

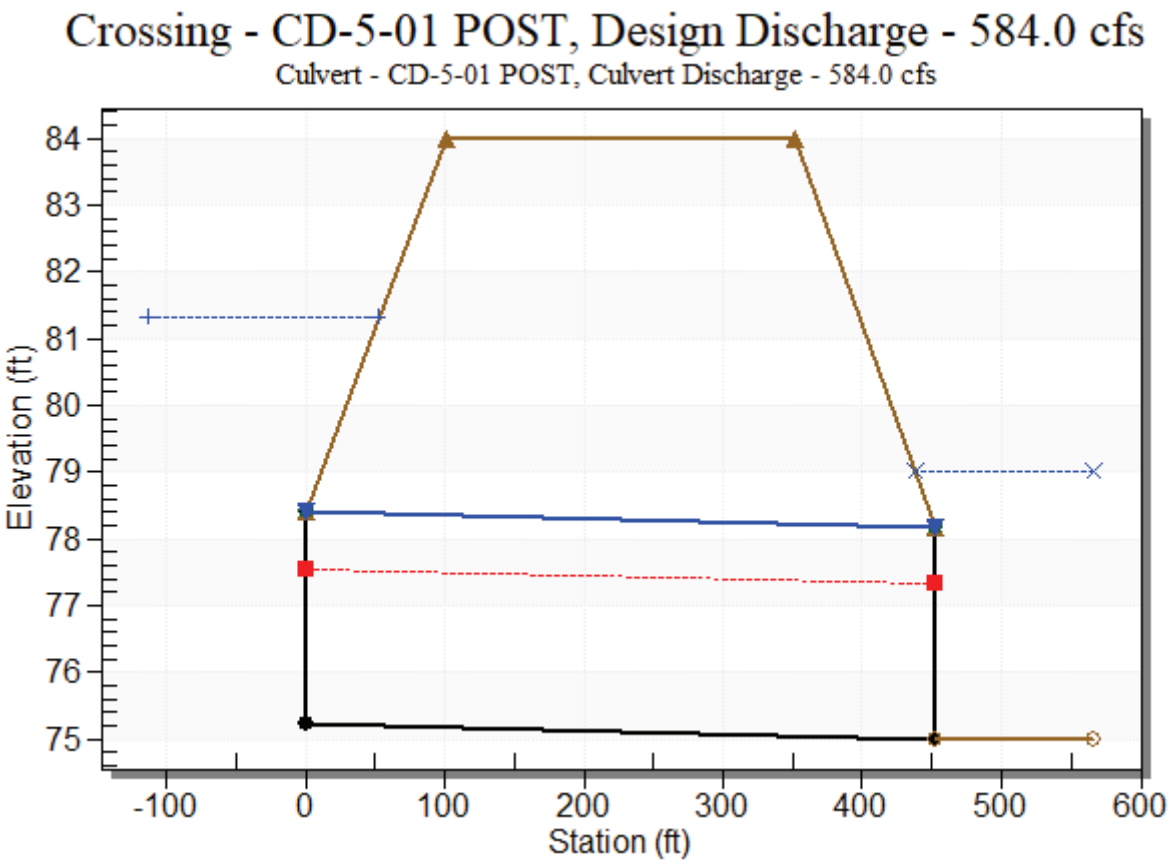
Culvert Length: 453.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-5-01 POST



Water Surface Profile Plot for Culvert: CD-5-01 POST



Site Data - CD-5-01 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 75.23 ft

Outlet Station: 453.00 ft

Outlet Elevation: 75.00 ft

Number of Barrels: 7

Culvert Data Summary - CD-5-01 POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 46 - Downstream Channel Rating Curve (Crossing: CD-5-01 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
554.47	79.00	4.00
584.05	79.00	4.00

Tailwater Channel Data - CD-5-01 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 79.00 ft

Roadway Data for Crossing: CD-5-01 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 84.00 ft

Roadway Surface: Paved

Roadway Top Width: 250.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 47 - Summary of Culvert Flows at Crossing: CD-5-02 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5-02 POST Discharge (cfs)	CD-5-02B POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
73.74	17-92SE	158.85	118.62	40.39	0.00	11
73.74	17-92SE	158.85	118.62	40.39	0.00	2
79.00	Overtopping	501.84	355.48	146.36	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5-02 POST

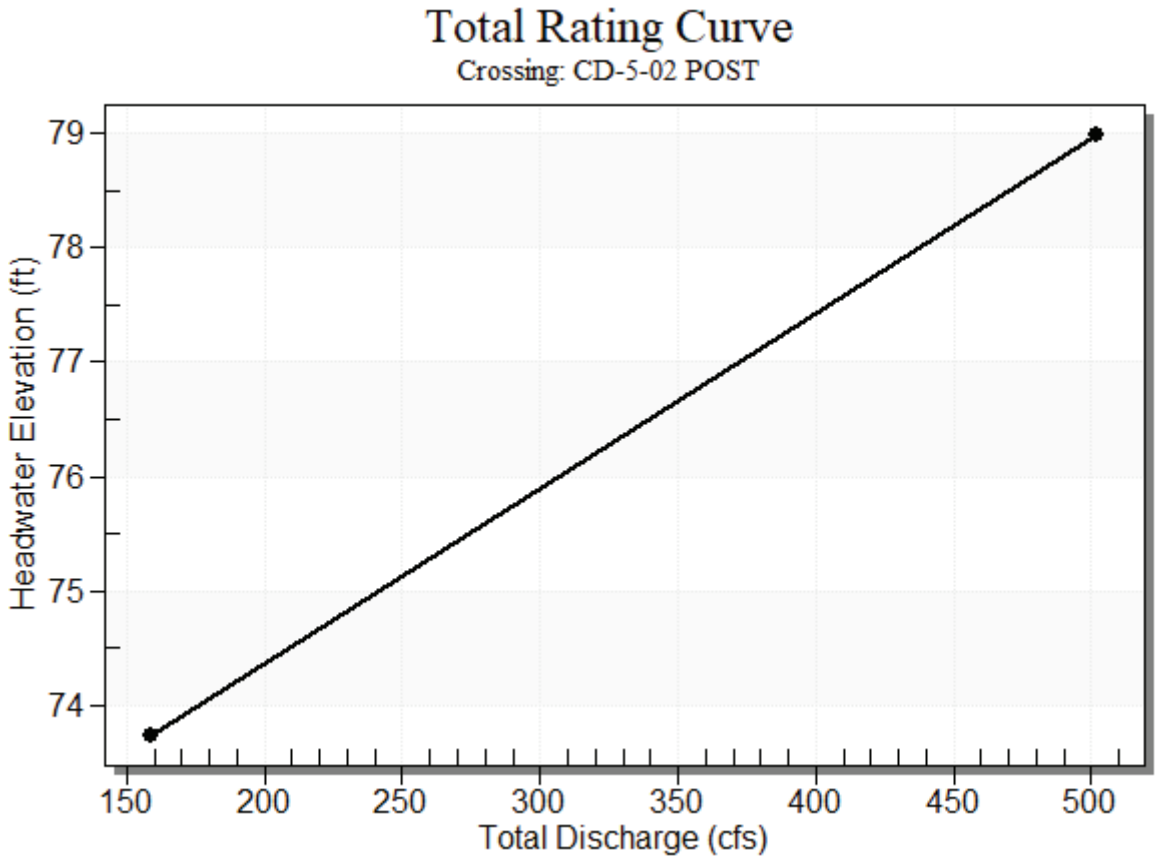


Table 48 - Culvert Summary Table: CD-5-02 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
17-92SE	158.85	118.62	73.74	2.742	2.473	1-JS1f	0.864	1.635	3.000	2.000	3.954
17-92SE	158.85	118.62	73.74	2.742	2.473	1-JS1f	0.864	1.635	3.000	2.000	3.954

****

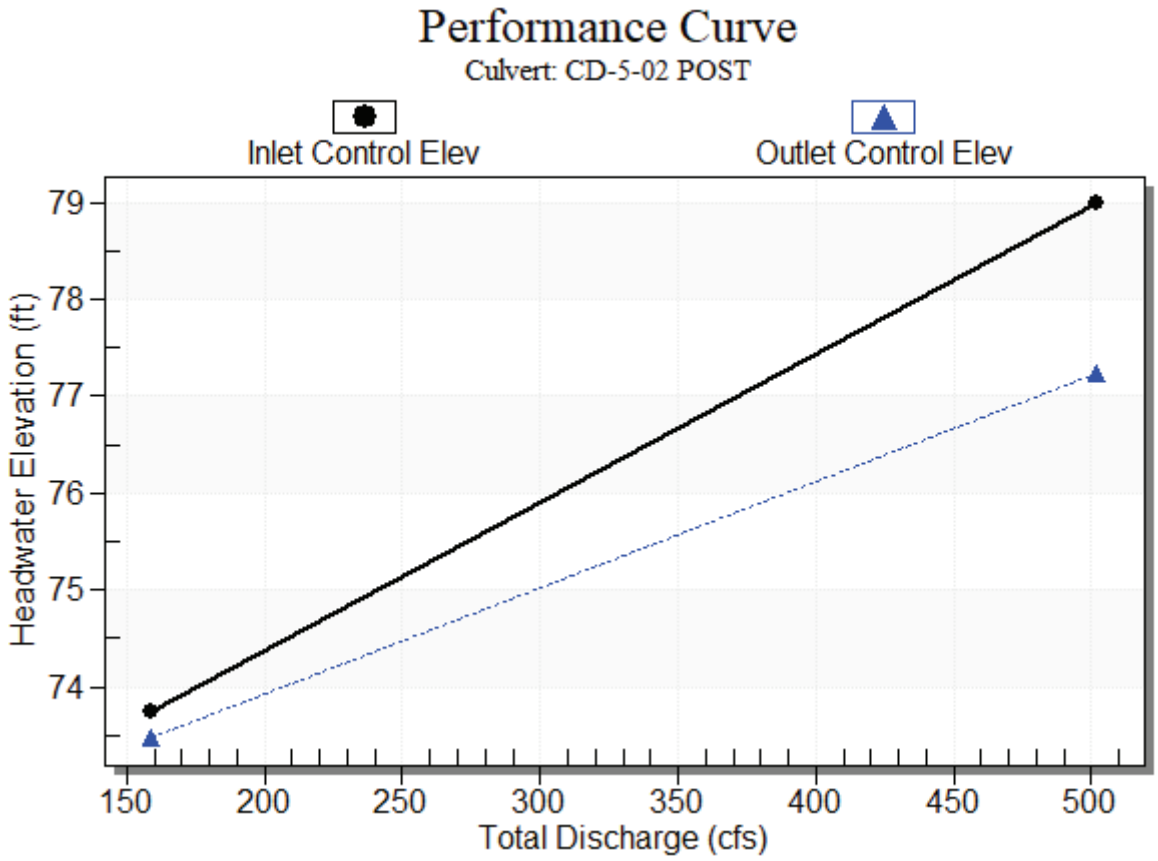
Straight Culvert

Inlet Elevation (invert): 71.00 ft, Outlet Elevation (invert): 68.80 ft

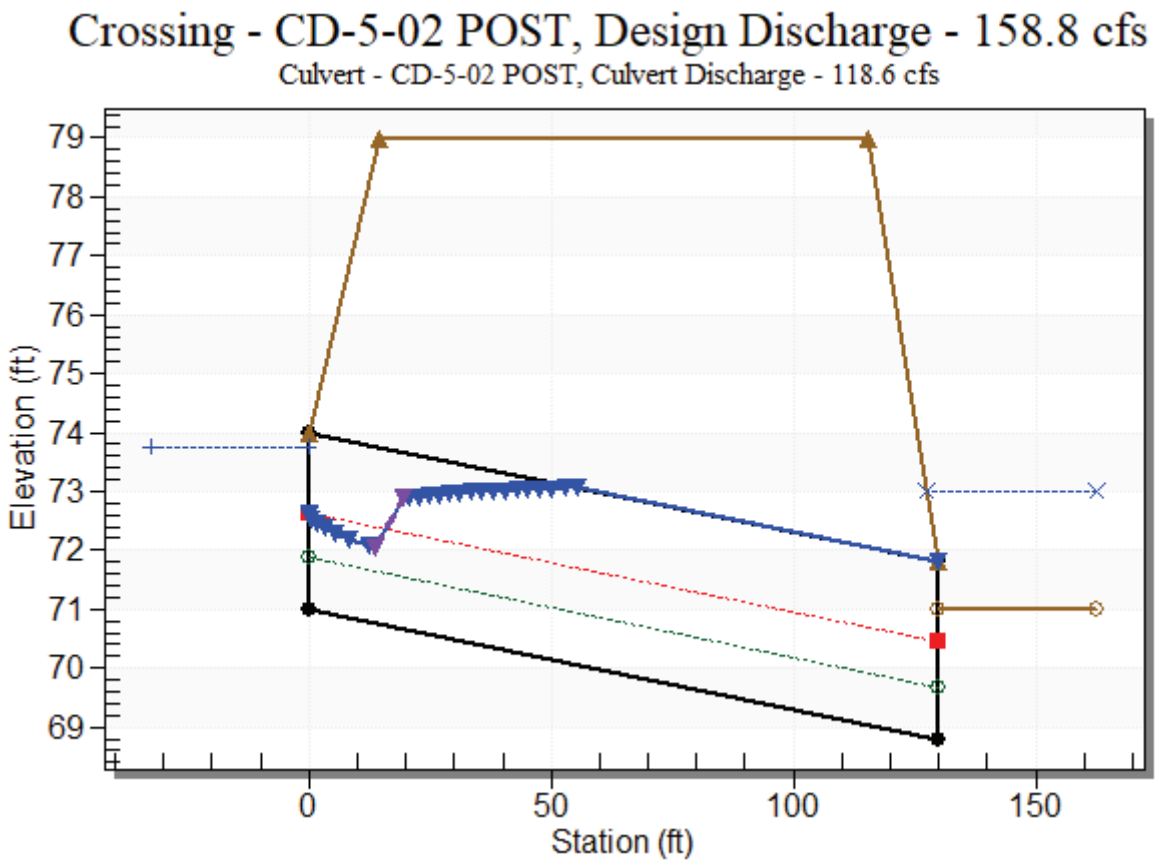
Culvert Length: 130.02 ft, Culvert Slope: 0.0169

****

Culvert Performance Curve Plot: CD-5-02 POST



Water Surface Profile Plot for Culvert: CD-5-02 POST



Site Data - CD-5-02 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 71.00 ft

Outlet Station: 130.00 ft

Outlet Elevation: 68.80 ft

Number of Barrels: 1

Culvert Data Summary - CD-5-02 POST

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

Table 49 - Culvert Summary Table: CD-5-02B POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
17-92SE	158.85	40.39	73.74	2.742	2.327	1-JS1f	1.178	1.898	4.000	2.000	3.214
17-92SE	158.85	40.39	73.74	2.742	2.327	1-JS1f	1.178	1.898	4.000	2.000	3.214

****

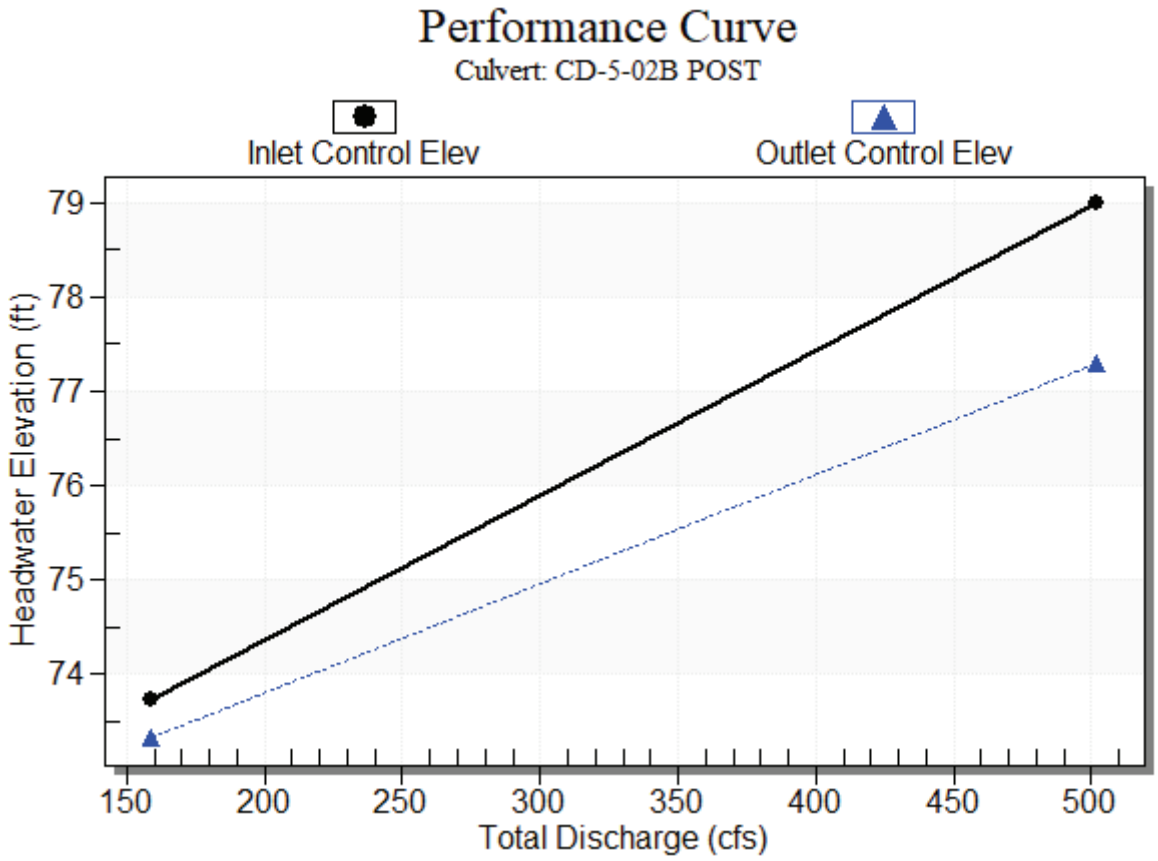
Straight Culvert

Inlet Elevation (invert): 71.00 ft, Outlet Elevation (invert): 68.80 ft

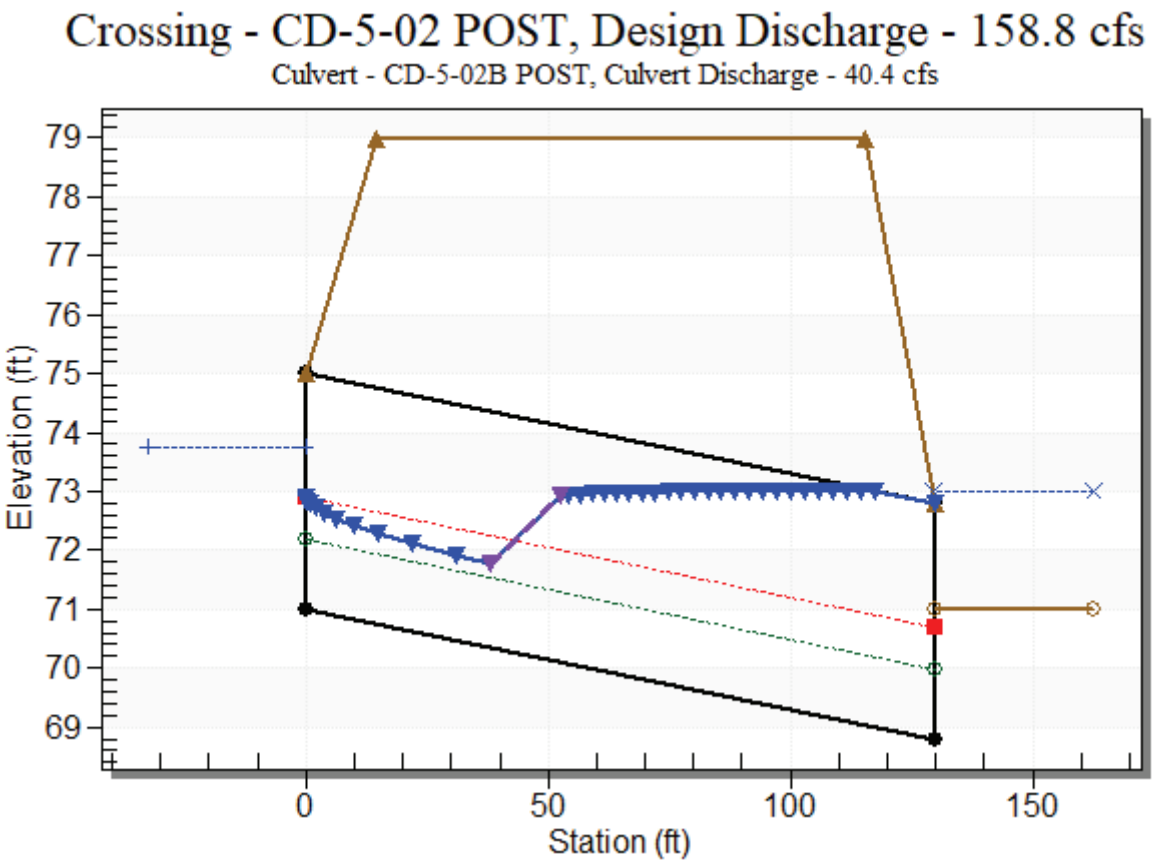
Culvert Length: 130.02 ft, Culvert Slope: 0.0169

****

Culvert Performance Curve Plot: CD-5-02B POST



Water Surface Profile Plot for Culvert: CD-5-02B POST



Site Data - CD-5-02B POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 71.00 ft

Outlet Station: 130.00 ft

Outlet Elevation: 68.80 ft

Number of Barrels: 1

Culvert Data Summary - CD-5-02B POST

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 50 - Downstream Channel Rating Curve (Crossing: CD-5-02 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
158.85	73.00	2.00
158.85	73.00	2.00

Tailwater Channel Data - CD-5-02 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 73.00 ft

Roadway Data for Crossing: CD-5-02 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 79.00 ft

Roadway Surface: Paved

Roadway Top Width: 101.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 51 - Summary of Culvert Flows at Crossing: CD-5-03 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5-03 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
68.71	17-92NE	613.05	613.05	0.00	1
68.71	17-92NE	613.05	613.05	0.00	1
72.50	Overtopping	1109.36	1109.36	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5-03 POST

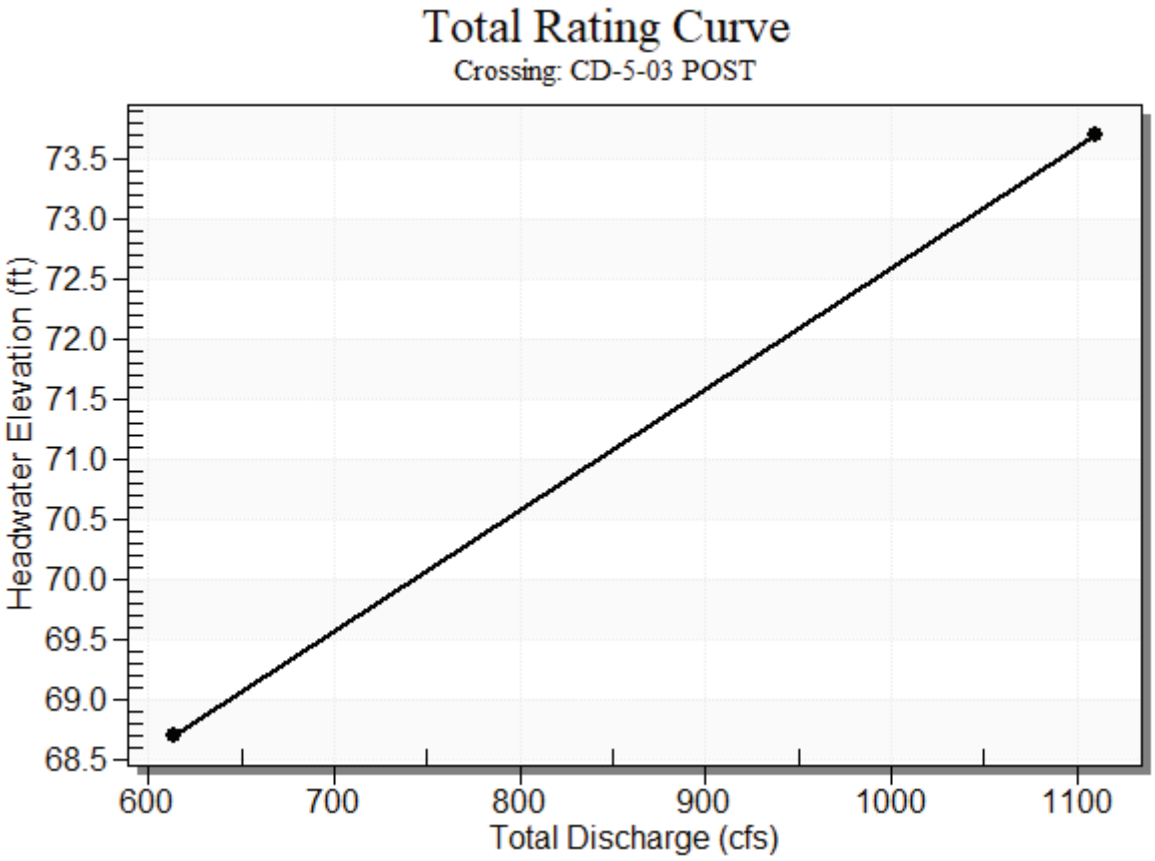


Table 52 - Culvert Summary Table: CD-5-03 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
17-92NE	613.05	613.05	68.71	4.698	4.712	7-M2c	4.000	2.726	2.726	2.500	9.369
17-92NE	613.05	613.05	68.71	4.698	4.712	7-M2c	4.000	2.726	2.726	2.500	9.369

****

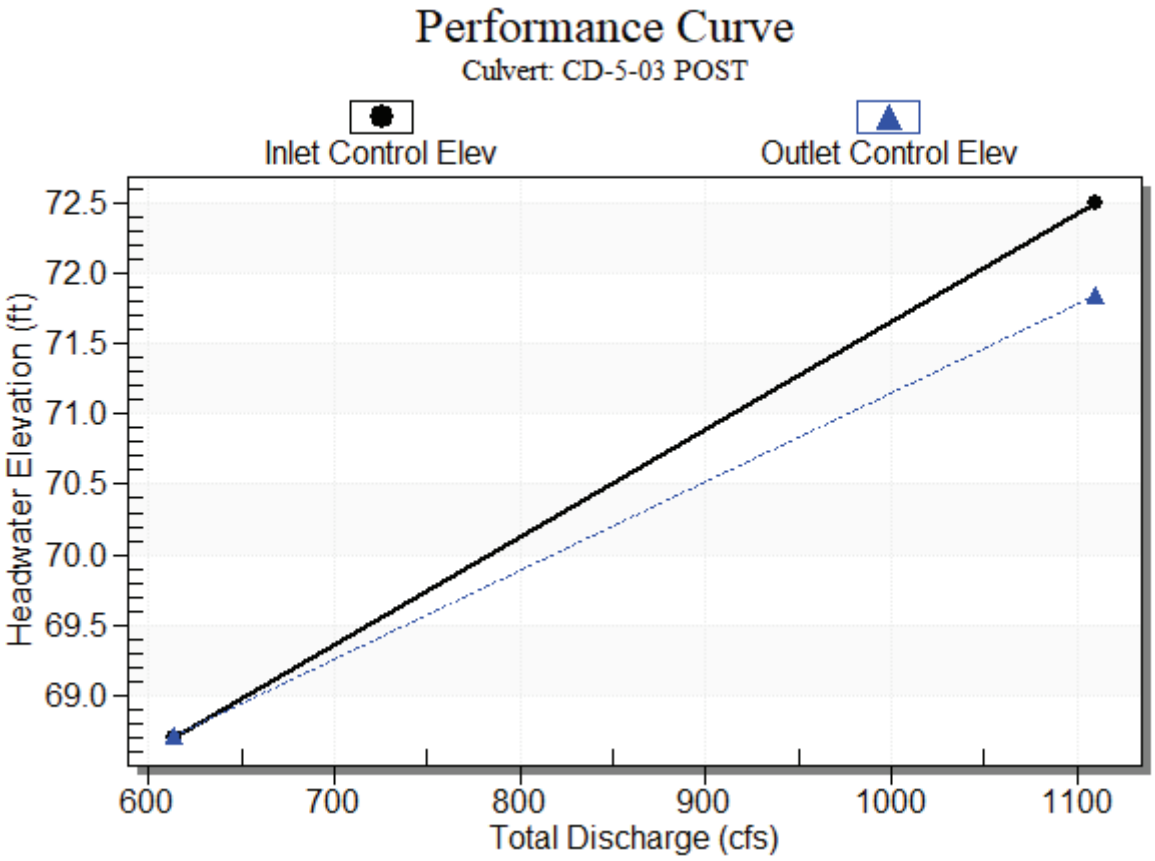
Straight Culvert

Inlet Elevation (invert): 64.00 ft, Outlet Elevation (invert): 63.90 ft

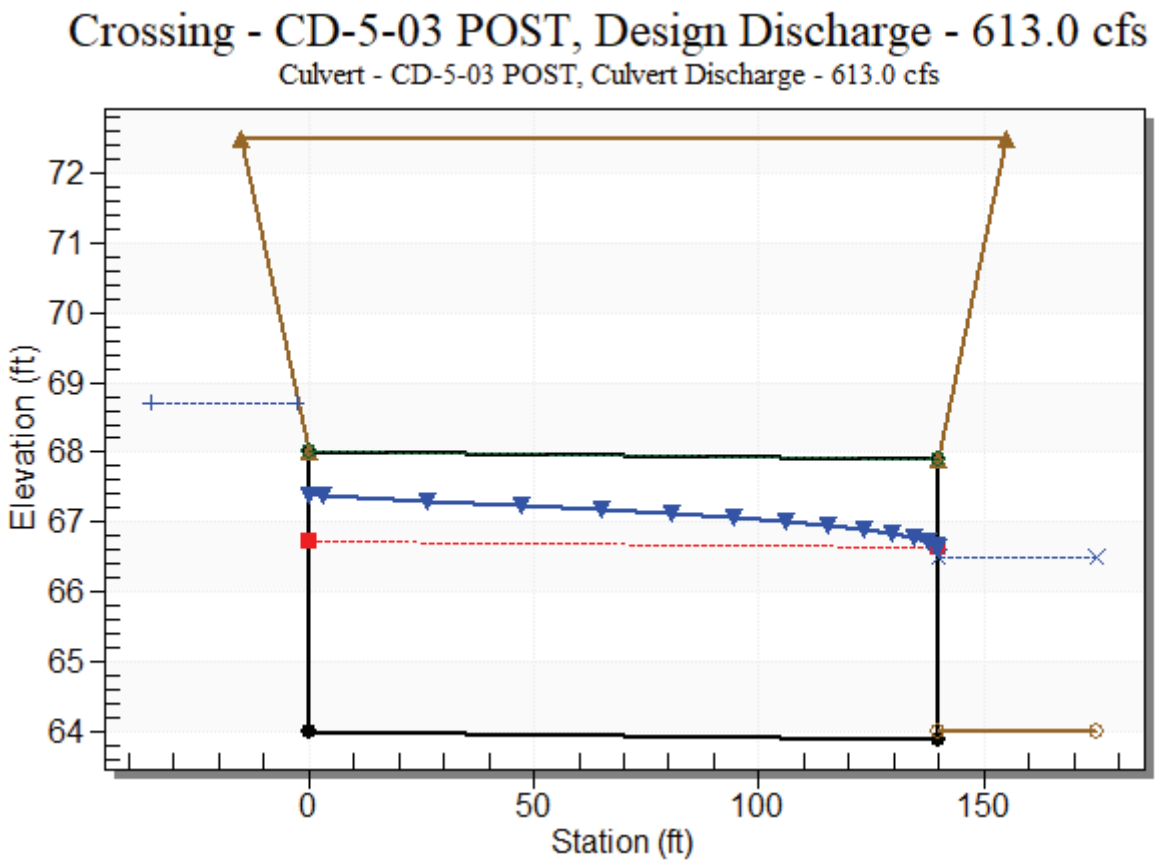
Culvert Length: 140.00 ft, Culvert Slope: 0.0007

****

Culvert Performance Curve Plot: CD-5-03 POST



Water Surface Profile Plot for Culvert: CD-5-03 POST



Site Data - CD-5-03 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 64.00 ft

Outlet Station: 140.00 ft

Outlet Elevation: 63.90 ft

Number of Barrels: 3

Culvert Data Summary - CD-5-03 POST

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: None

Table 53 - Downstream Channel Rating Curve (Crossing: CD-5-03 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
613.05	66.50	2.50
613.05	66.50	2.50

Tailwater Channel Data - CD-5-03 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 66.50 ft

Roadway Data for Crossing: CD-5-03 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 400.00 ft

Crest Elevation: 72.50 ft

Roadway Surface: Paved

Roadway Top Width: 170.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 54 - Summary of Culvert Flows at Crossing: CD-5-05A POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5-05A POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
86.75	50 year	276.39	276.39	0.00	1
87.66	100 year	303.37	303.37	0.00	1
88.74	500 year	401.83	333.14	68.52	6
88.37	Overtopping	323.23	323.23	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5-05A POST

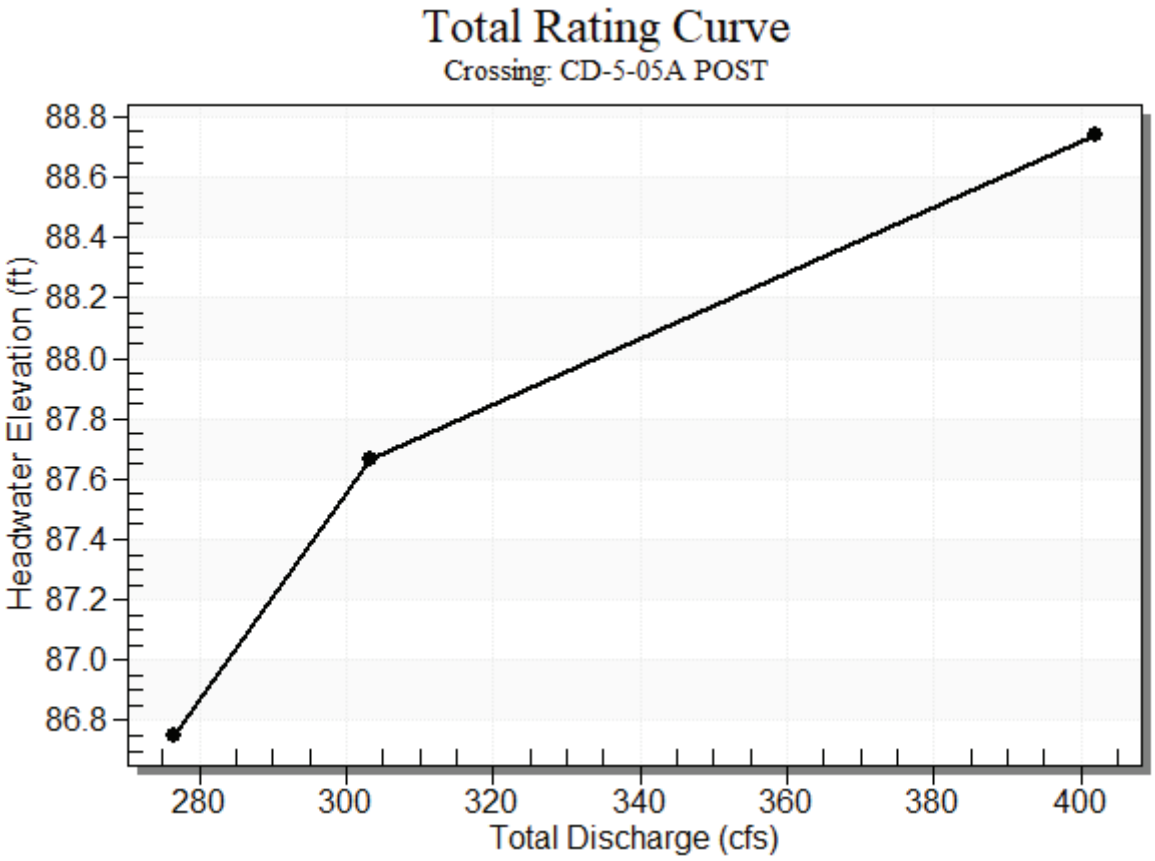


Table 55 - Culvert Summary Table: CD-5-05A POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	276.39	276.39	86.75	5.774	6.383	7-M2c	3.000	2.645	2.645	0.100	10.473
100 year	303.37	303.37	87.66	6.556	7.293	7-M2c	3.000	2.729	2.729	0.100	11.233
500 year	401.83	333.14	88.74	7.509	8.374	7-M2c	3.000	2.801	2.801	0.100	12.128

****

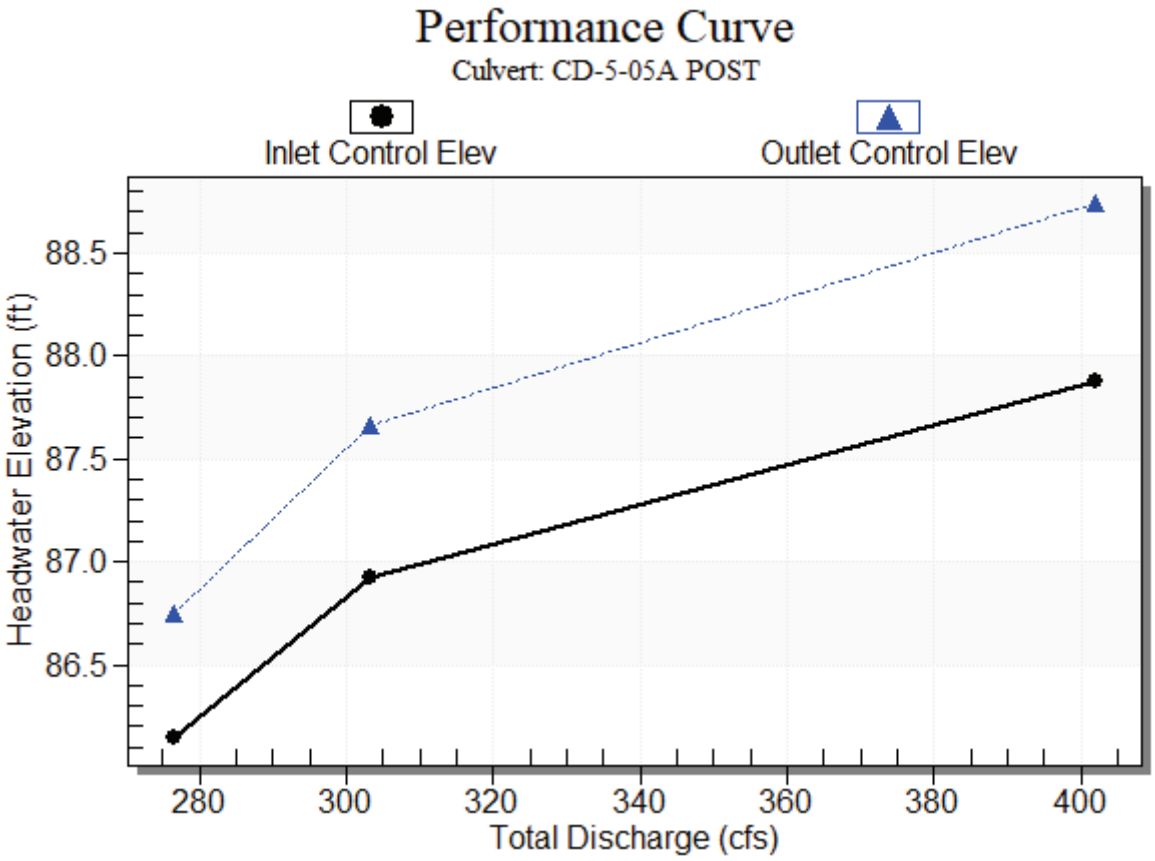
Straight Culvert

Inlet Elevation (invert): 80.37 ft, Outlet Elevation (invert): 79.68 ft

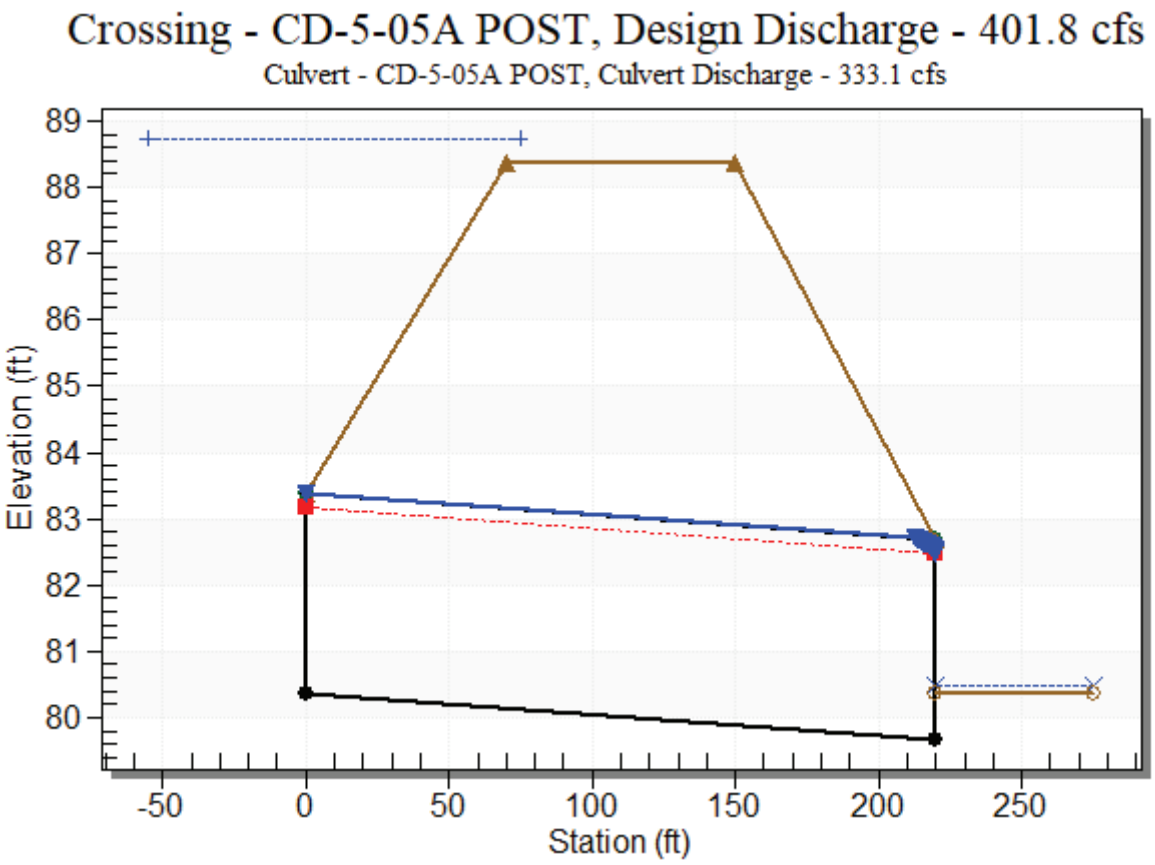
Culvert Length: 220.00 ft, Culvert Slope: 0.0031

****

Culvert Performance Curve Plot: CD-5-05A POST



Water Surface Profile Plot for Culvert: CD-5-05A POST



Site Data - CD-5-05A POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 80.37 ft

Outlet Station: 220.00 ft

Outlet Elevation: 79.68 ft

Number of Barrels: 4

Culvert Data Summary - CD-5-05A POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 56 - Downstream Channel Rating Curve (Crossing: CD-5-05A POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
276.39	80.47	0.10
303.37	80.47	0.10
401.83	80.47	0.10

Tailwater Channel Data - CD-5-05A POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 80.47 ft

Roadway Data for Crossing: CD-5-05A POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 88.37 ft

Roadway Surface: Paved

Roadway Top Width: 80.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 57 - Summary of Culvert Flows at Crossing: CD-5-05B POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5-05B POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
85.54	50 year	355.42	355.42	0.00	1
86.51	100 year	394.84	394.84	0.00	1
87.49	500 year	536.62	431.15	105.20	3
87.00	Overtopping	413.09	413.09	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5-05B POST

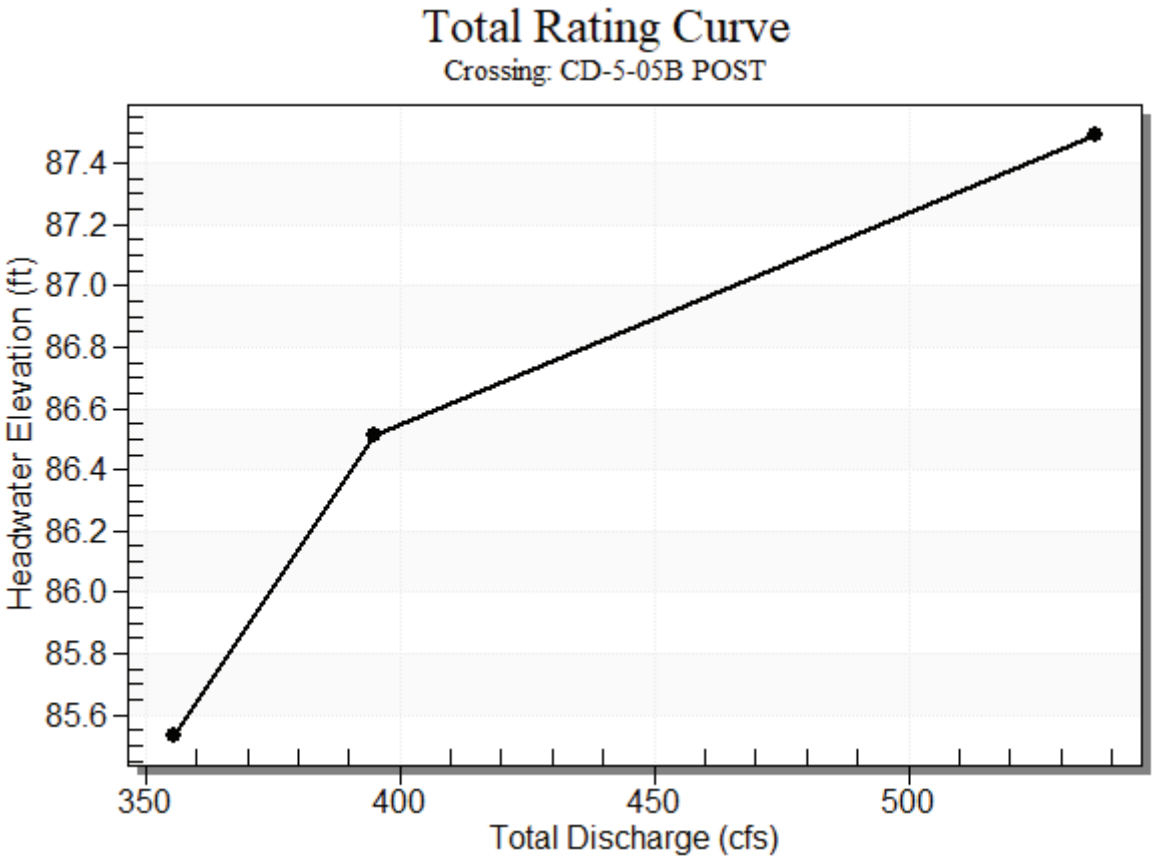


Table 58 - Culvert Summary Table: CD-5-05B POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	355.42	355.42	85.54	4.781	6.536	7-M2c	3.000	2.486	2.486	1.470	9.459
100 year	394.84	394.84	86.51	5.426	7.511	7-M2c	3.000	2.597	2.597	1.470	10.121
500 year	536.62	431.15	87.49	6.089	8.494	7-M2c	3.000	2.682	2.682	1.470	10.778

****

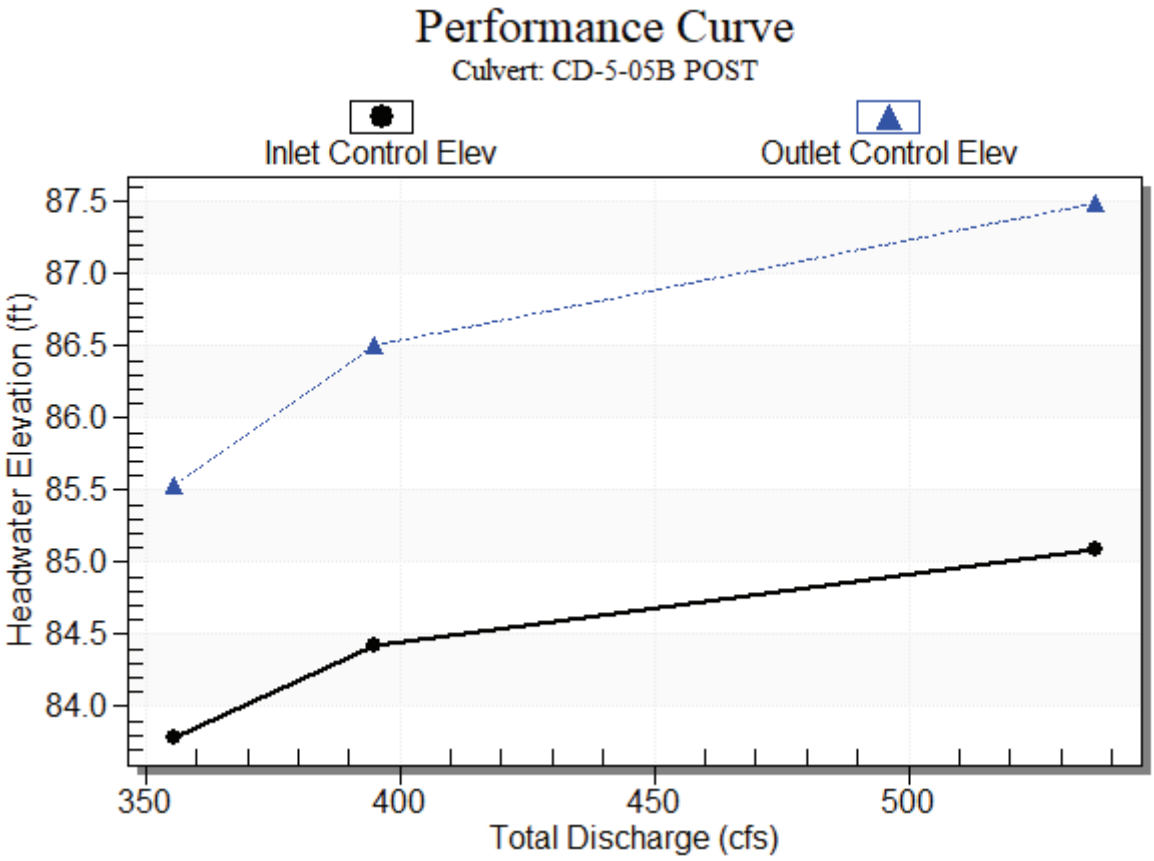
Straight Culvert

Inlet Elevation (invert): 79.00 ft, Outlet Elevation (invert): 78.83 ft

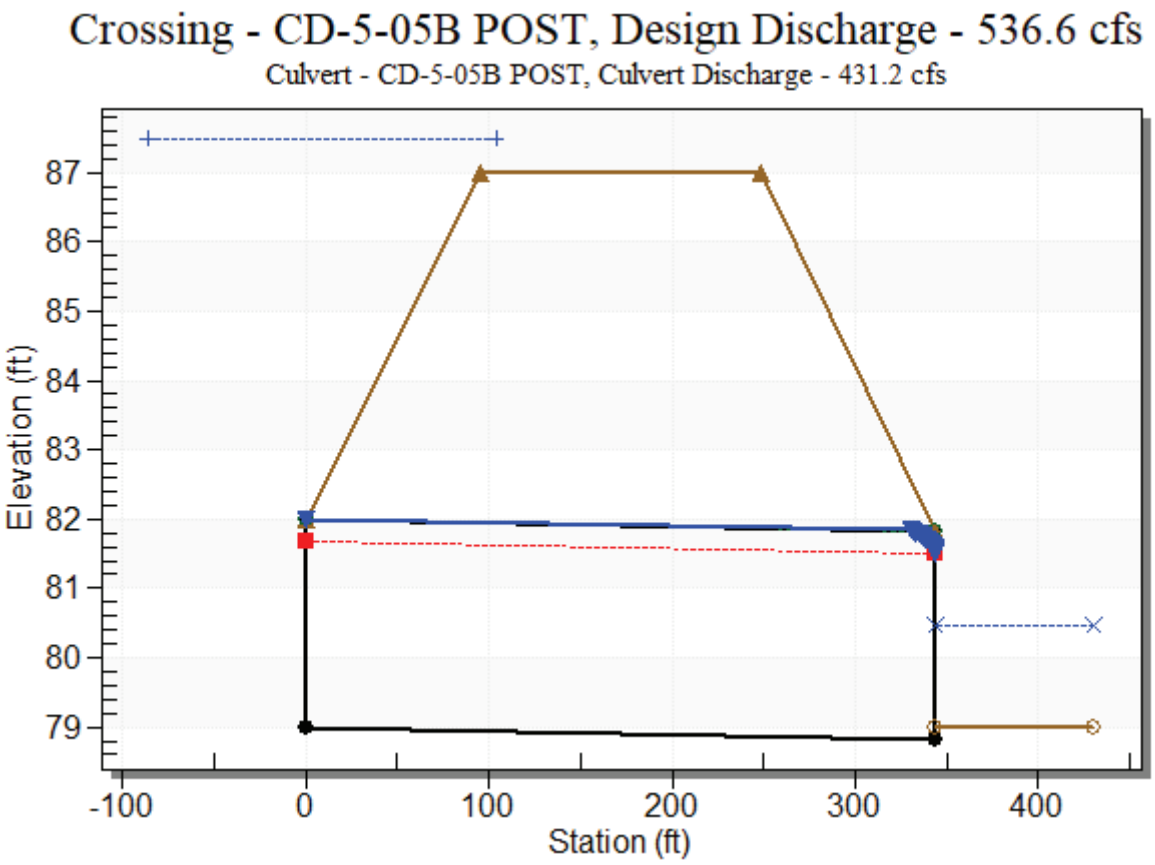
Culvert Length: 344.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: CD-5-05B POST



Water Surface Profile Plot for Culvert: CD-5-05B POST



Site Data - CD-5-05B POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 79.00 ft

Outlet Station: 344.00 ft

Outlet Elevation: 78.83 ft

Number of Barrels: 6

Culvert Data Summary - CD-5-05B POST

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 59 - Downstream Channel Rating Curve (Crossing: CD-5-05B POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
355.42	80.47	1.47
394.84	80.47	1.47
536.62	80.47	1.47

Tailwater Channel Data - CD-5-05B POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 80.47 ft

Roadway Data for Crossing: CD-5-05B POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 87.00 ft

Roadway Surface: Paved

Roadway Top Width: 154.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 60 - Summary of Culvert Flows at Crossing: CD-5-06 POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5-06 POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
77.58	50 year	110.32	110.32	0.00	1
77.58	100 year	110.32	110.32	0.00	1
79.75	500 year	172.55	172.55	0.00	1
79.77	Overtopping	172.92	172.92	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5-06 POST

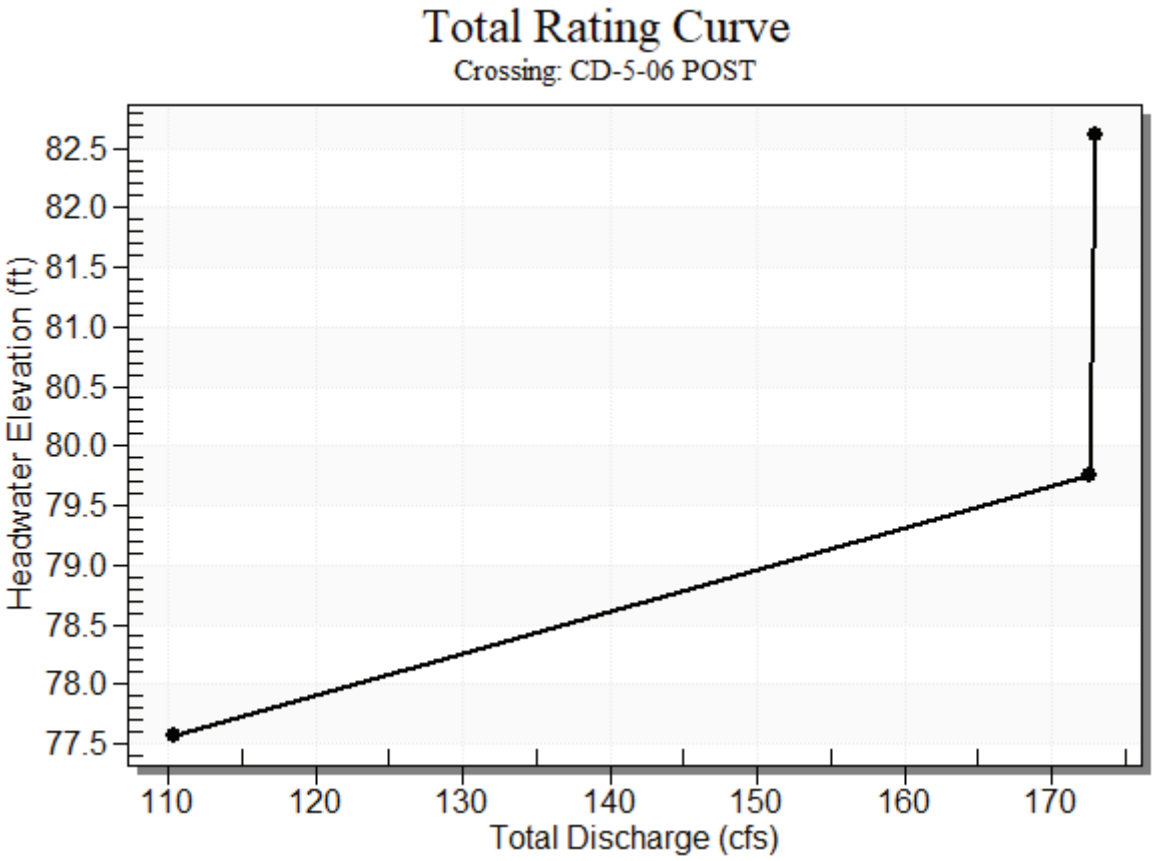


Table 61 - Culvert Summary Table: CD-5-06 POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	110.32	110.32	77.58	2.771	3.866	4-FFf	2.405	1.852	3.167	2.360	4.319
100 year	110.32	110.32	77.58	2.771	3.866	4-FFf	2.405	1.852	3.167	2.360	4.319
500 year	172.55	172.55	79.75	3.917	6.044	4-FFf	3.167	2.353	3.167	2.360	6.756

****

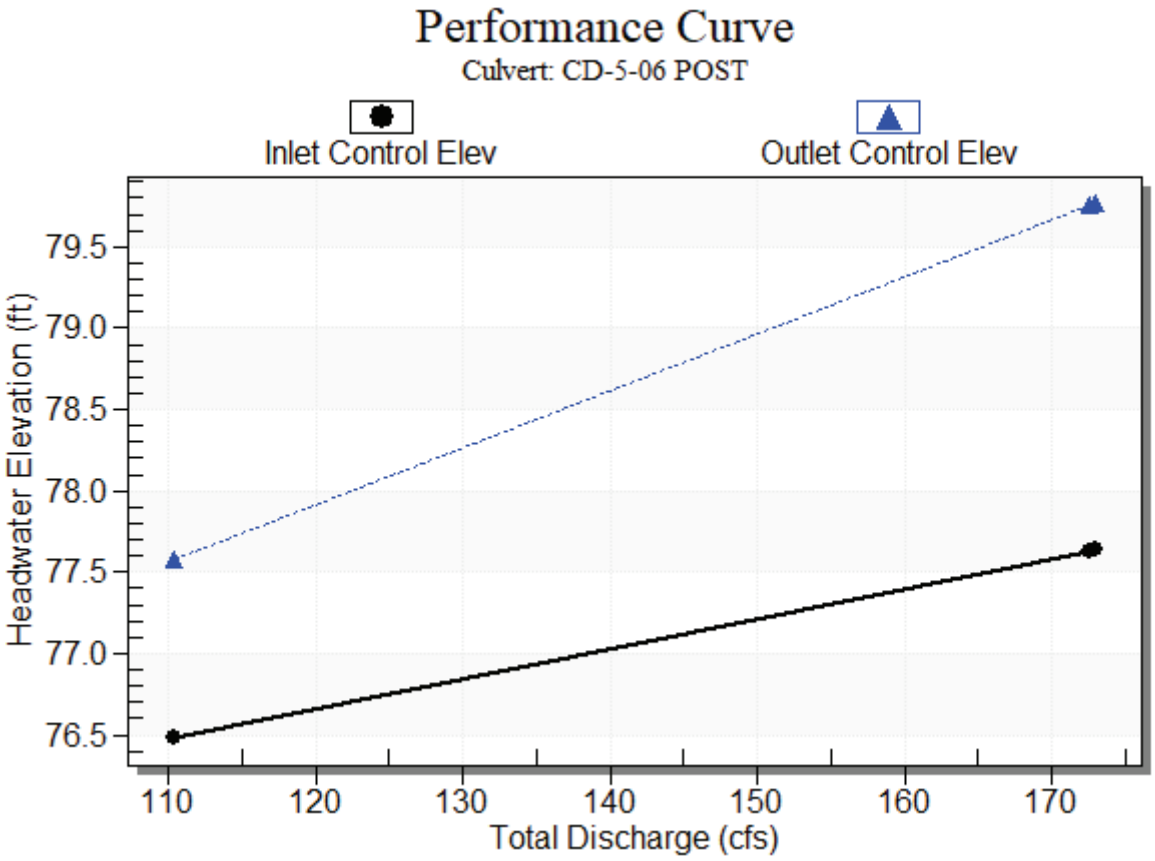
Straight Culvert

Inlet Elevation (invert): 73.71 ft, Outlet Elevation (invert): 72.59 ft

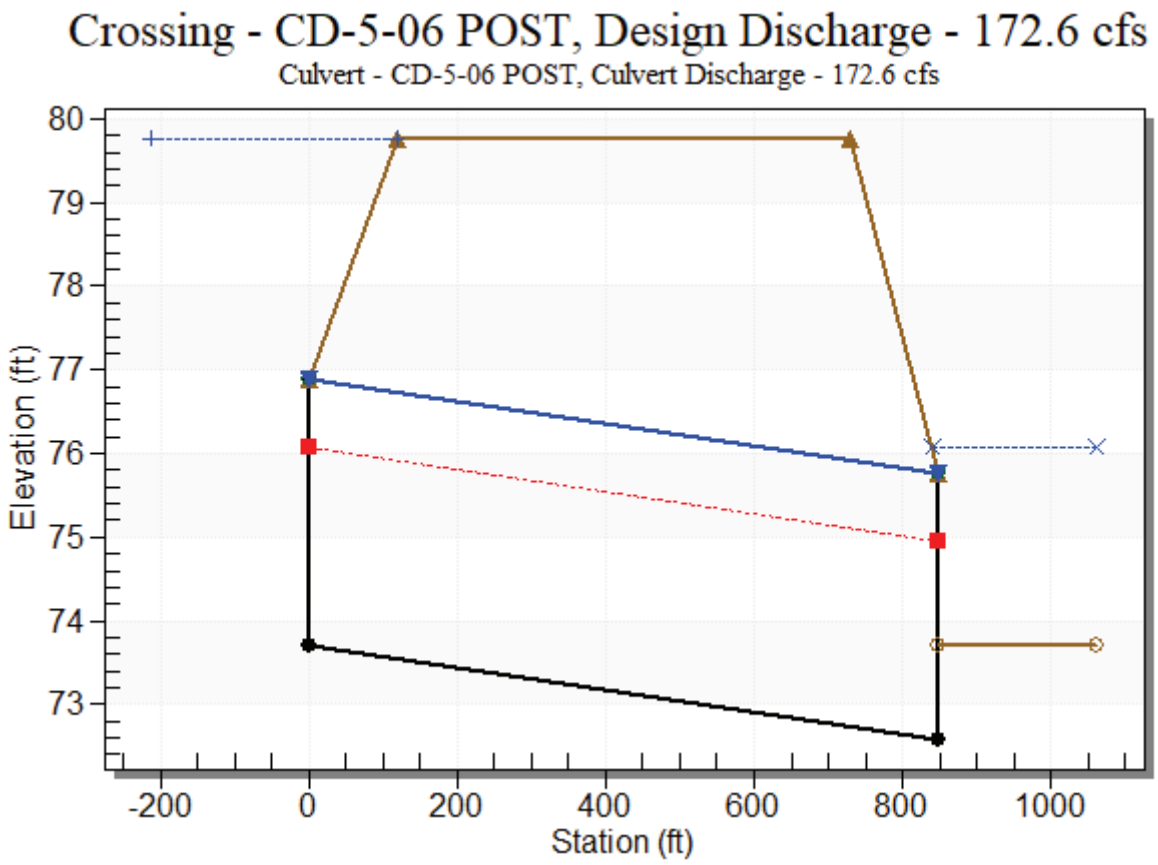
Culvert Length: 849.00 ft, Culvert Slope: 0.0013

****

Culvert Performance Curve Plot: CD-5-06 POST



Water Surface Profile Plot for Culvert: CD-5-06 POST



Site Data - CD-5-06 POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 73.71 ft

Outlet Station: 849.00 ft

Outlet Elevation: 72.59 ft

Number of Barrels: 2

Culvert Data Summary - CD-5-06 POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 62 - Downstream Channel Rating Curve (Crossing: CD-5-06 POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
110.32	76.07	2.36
110.32	76.07	2.36
172.55	76.07	2.36

Tailwater Channel Data - CD-5-06 POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 76.07 ft

Roadway Data for Crossing: CD-5-06 POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 79.77 ft

Roadway Surface: Paved

Roadway Top Width: 610.00 ft

Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 63 - Summary of Culvert Flows at Crossing: CD-5B-05B POST

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CD-5B-05B POST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
77.33	50 year	134.26	134.26	0.00	1
77.55	100 year	145.21	145.21	0.00	1
78.76	500 year	195.45	195.45	0.00	1
79.77	Overtopping	229.18	229.18	0.00	Overtopping

Rating Curve Plot for Crossing: CD-5B-05B POST

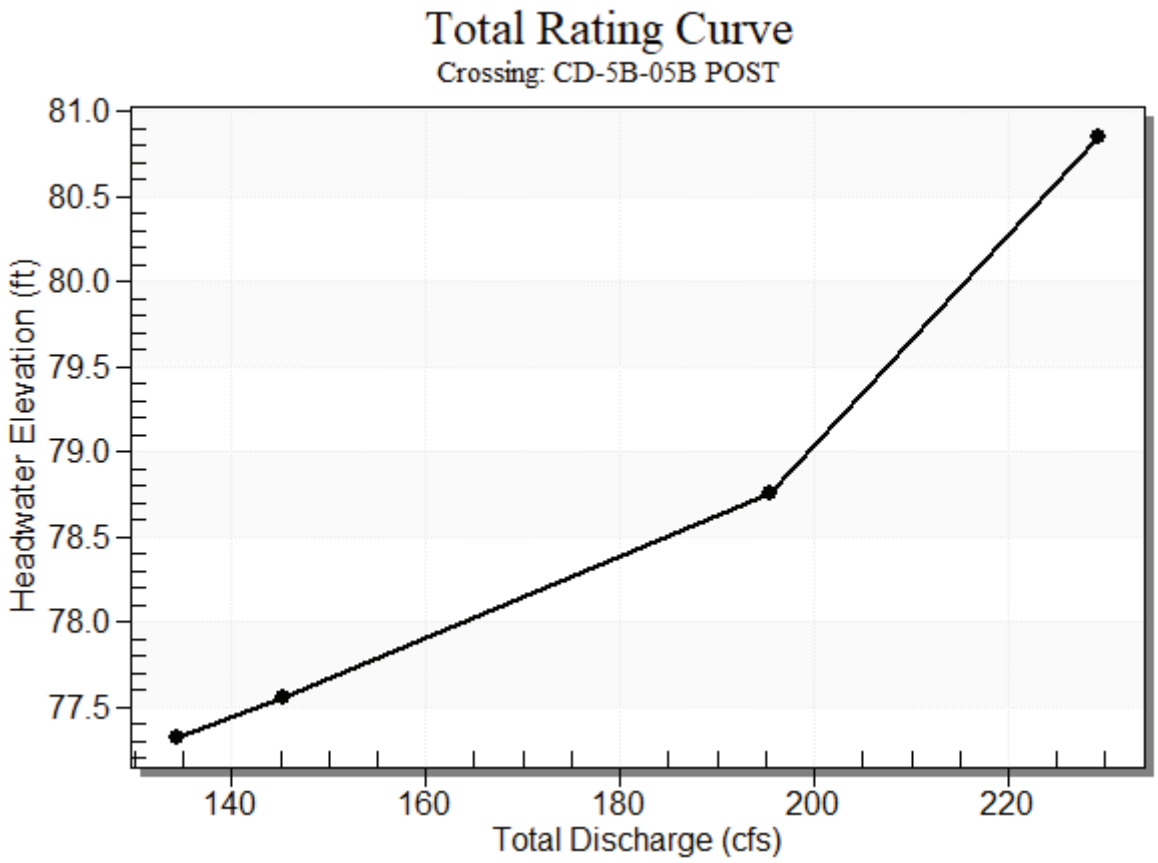


Table 64 - Culvert Summary Table: CD-5B-05B POST

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
50 year	134.26	134.26	77.33	3.184	3.628	1-S1f	1.981	2.057	3.167	2.370	5.257
100 year	145.21	145.21	77.55	3.382	3.852	1-S1f	2.089	2.149	3.167	2.370	5.686
500 year	195.45	195.45	78.76	4.412	5.061	4-FFf	3.167	2.507	3.167	2.370	7.653

****

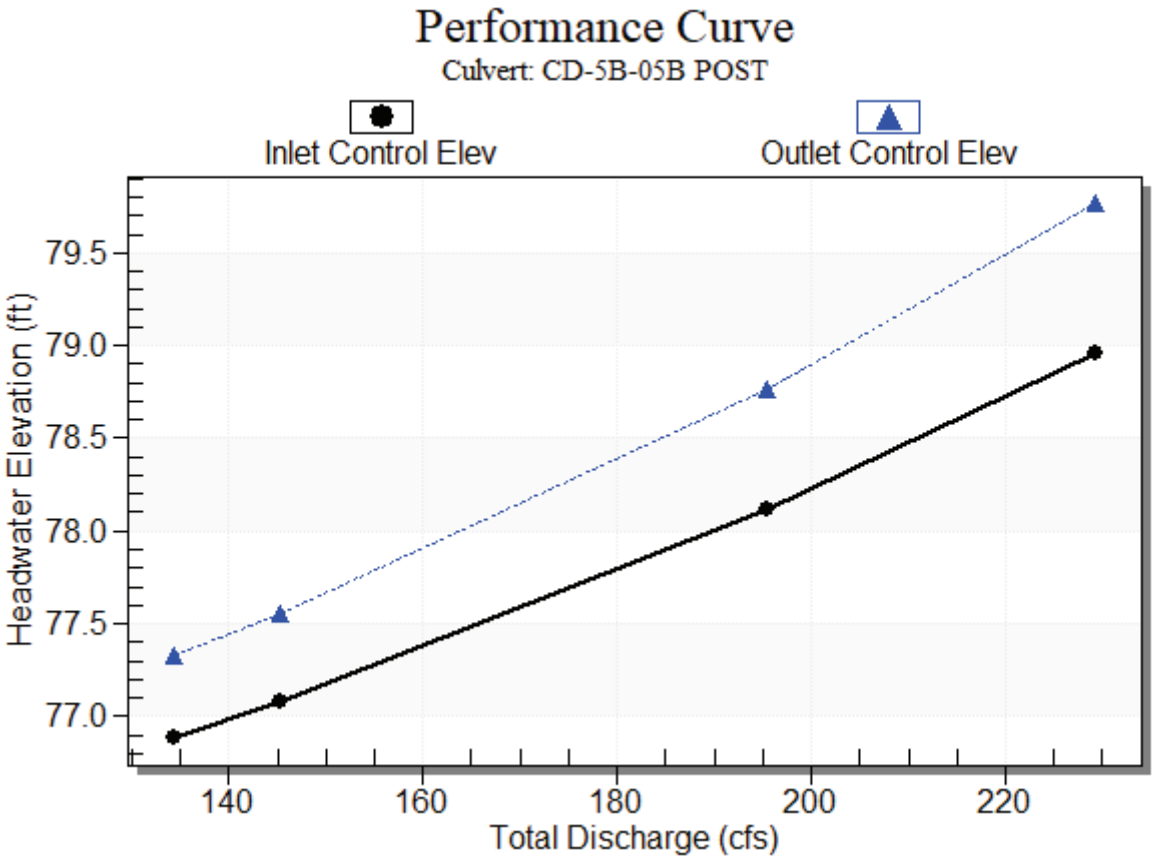
Straight Culvert

Inlet Elevation (invert): 73.70 ft, Outlet Elevation (invert): 72.59 ft

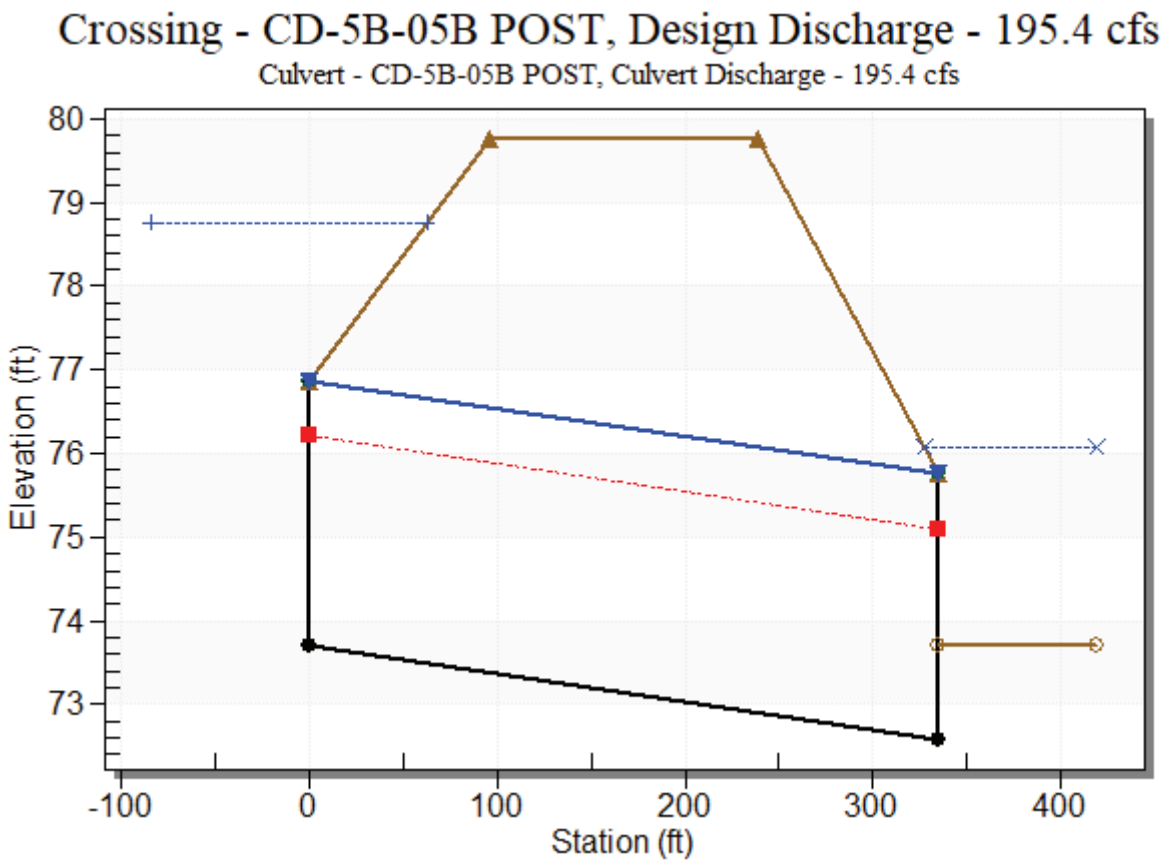
Culvert Length: 335.00 ft, Culvert Slope: 0.0033

****

Culvert Performance Curve Plot: CD-5B-05B POST



Water Surface Profile Plot for Culvert: CD-5B-05B POST



Site Data - CD-5B-05B POST

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 73.70 ft

Outlet Station: 335.00 ft

Outlet Elevation: 72.59 ft

Number of Barrels: 2

Culvert Data Summary - CD-5B-05B POST

Barrel Shape: Elliptical

Barrel Span: 60.00 in

Barrel Rise: 38.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 65 - Downstream Channel Rating Curve (Crossing: CD-5B-05B POST)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
134.26	76.07	2.37
145.21	76.07	2.37
195.45	76.07	2.37

Tailwater Channel Data - CD-5B-05B POST

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 76.07 ft

Roadway Data for Crossing: CD-5B-05B POST

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 79.77 ft

Roadway Surface: Paved

Roadway Top Width: 142.00 ft