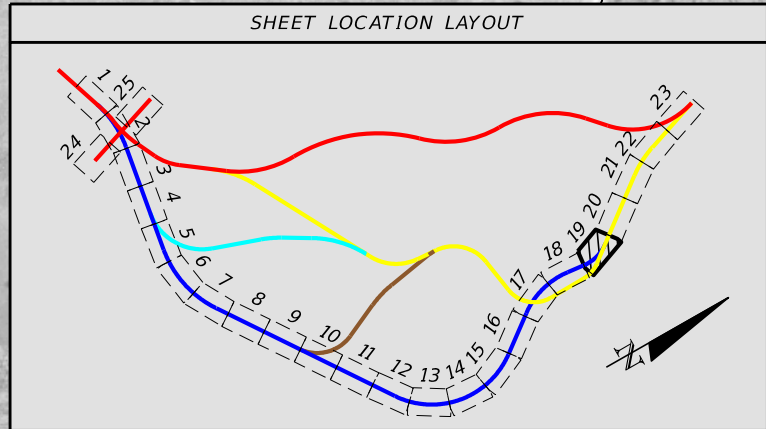
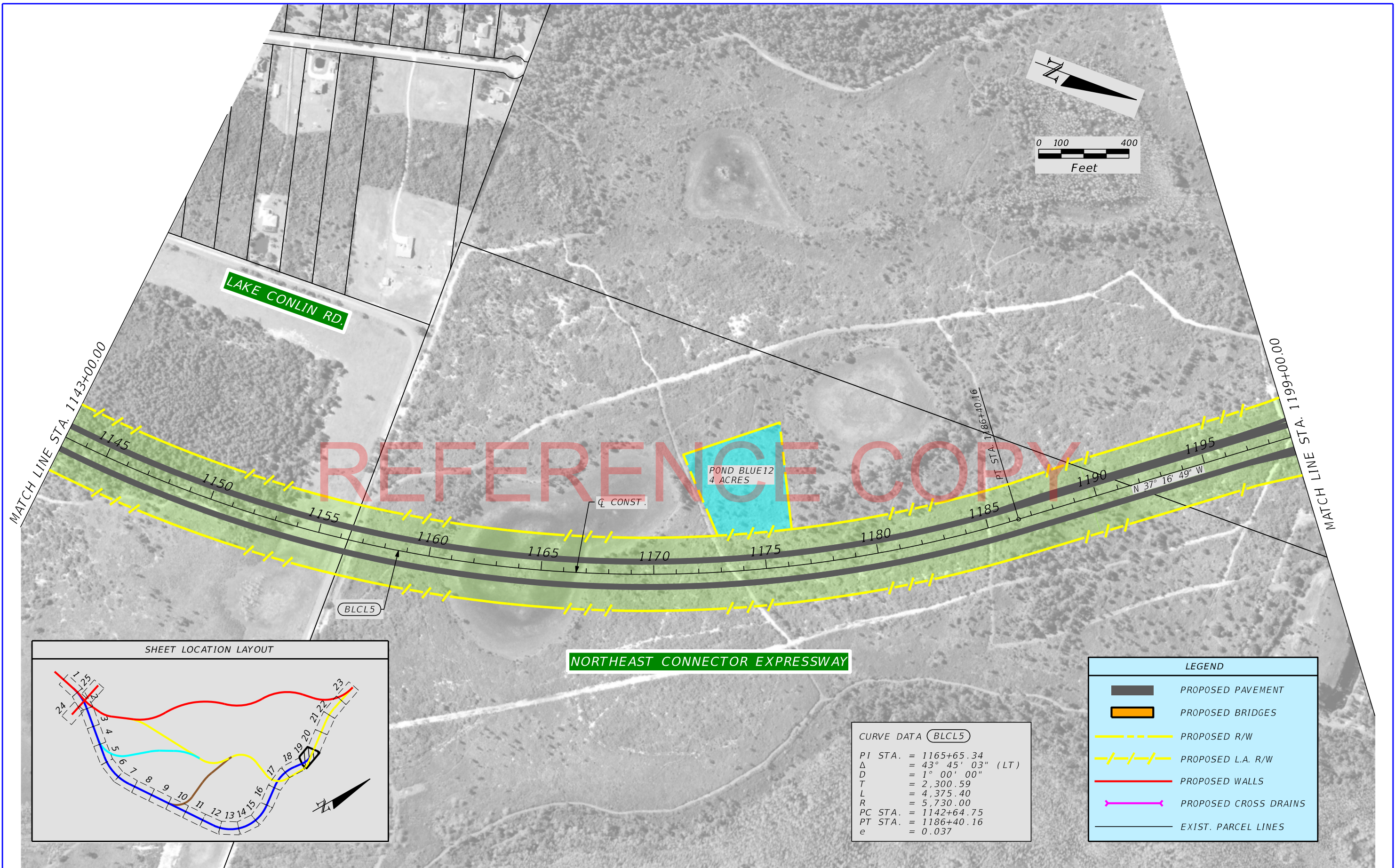


CURVE DATA (BLCL4)	
PI STA.	= 1078+97.30
Δ	= 43° 22' 18" (RT)
D	= 0° 31' 23"
T	= 4,356.40
L	= 8,292.72
R	= 10,955.00
PC STA.	= 1035+40.90
PT STA.	= 1118+33.62
e	= 0.021

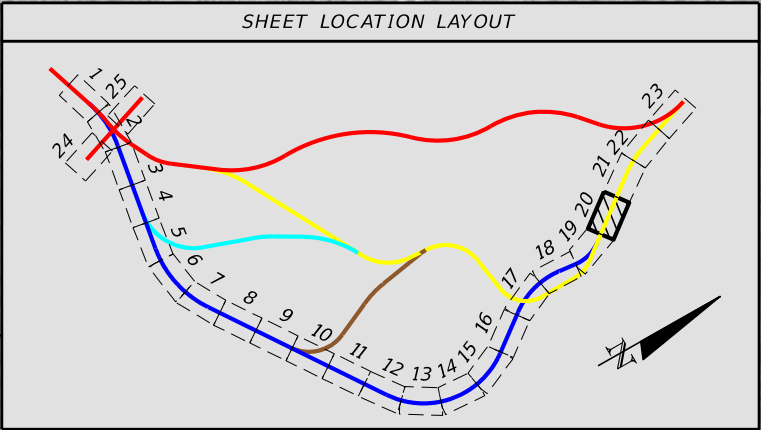
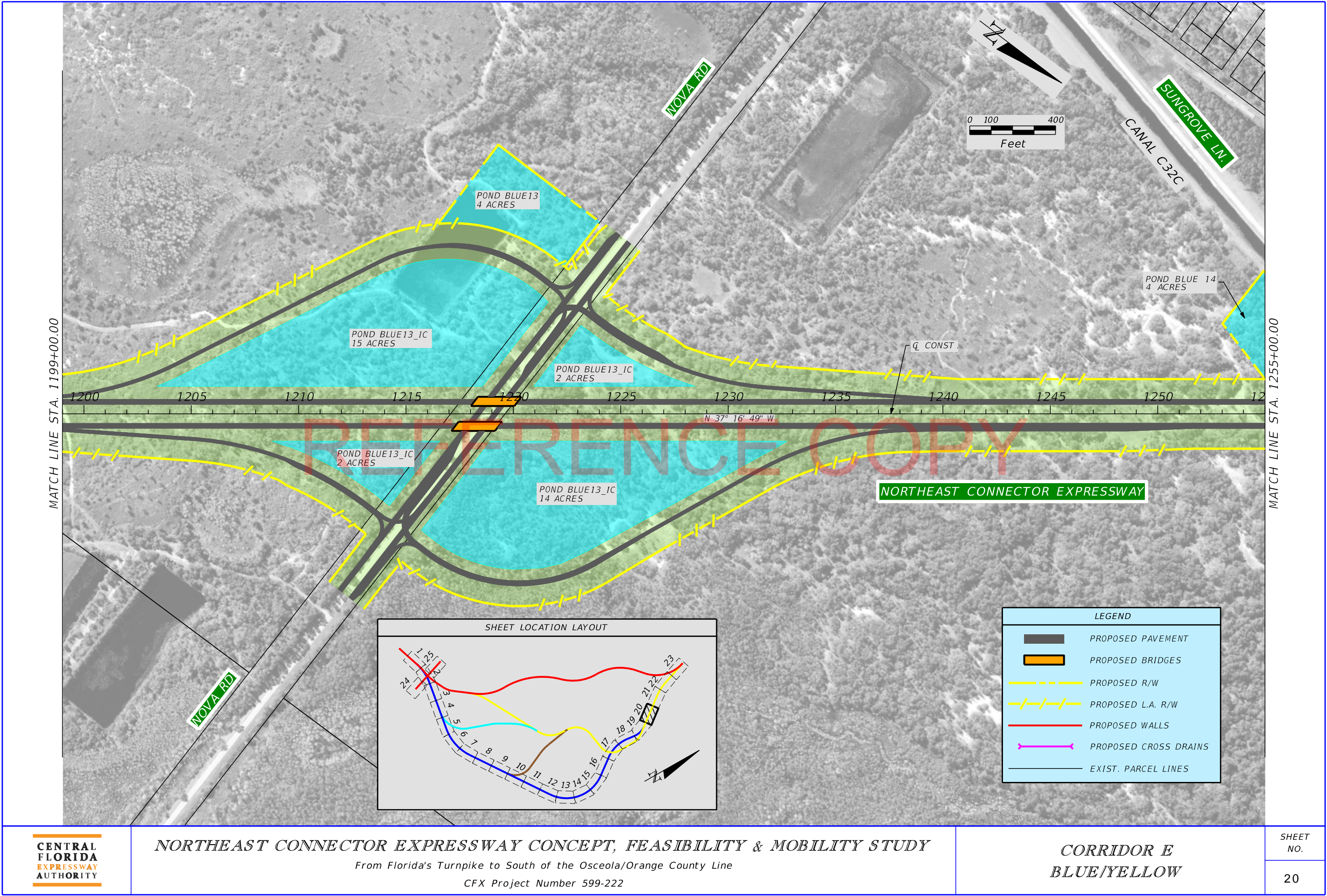
CURVE DATA (BLCL5)	
PI STA.	= 1165+65.34
Δ	= 43° 45' 03" (LT)
D	= 1° 00' 00"
T	= 2,300.59
L	= 4,375.40
R	= 5,730.00
PC STA.	= 1142+64.75
PT STA.	= 1186+40.16
e	= 0.037

LEGEND	
	PROPOSED PAVEMENT
	PROPOSED BRIDGES
	PROPOSED R/W
	PROPOSED L.A. R/W
	PROPOSED WALLS
	PROPOSED CROSS DRAINS
	EXIST. PARCEL LINES

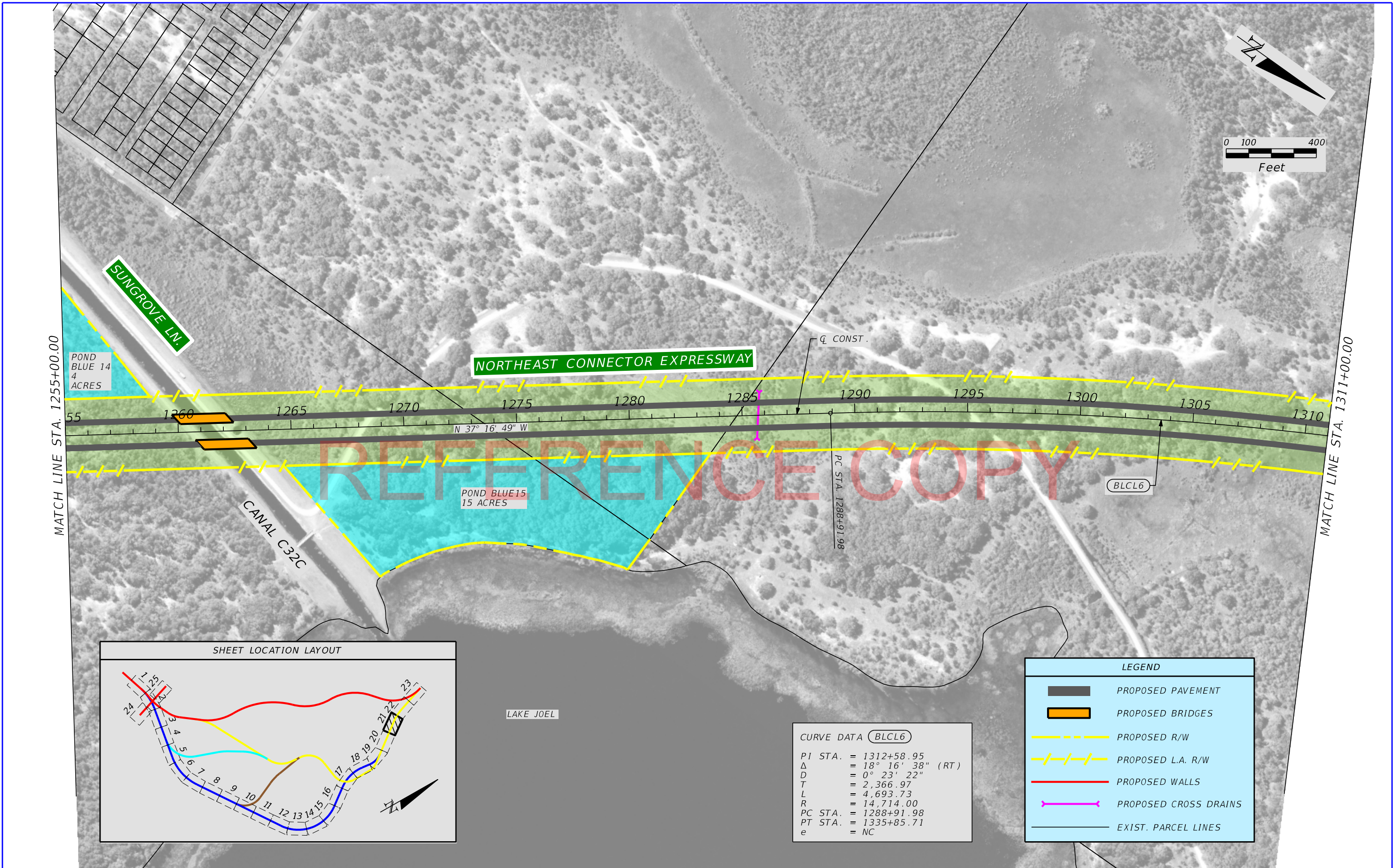


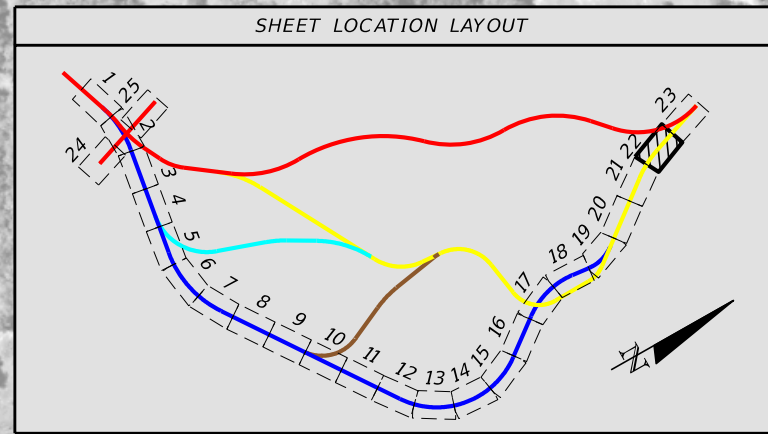
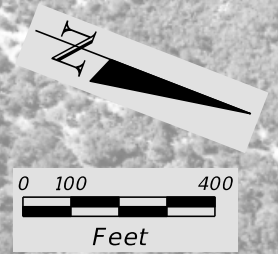
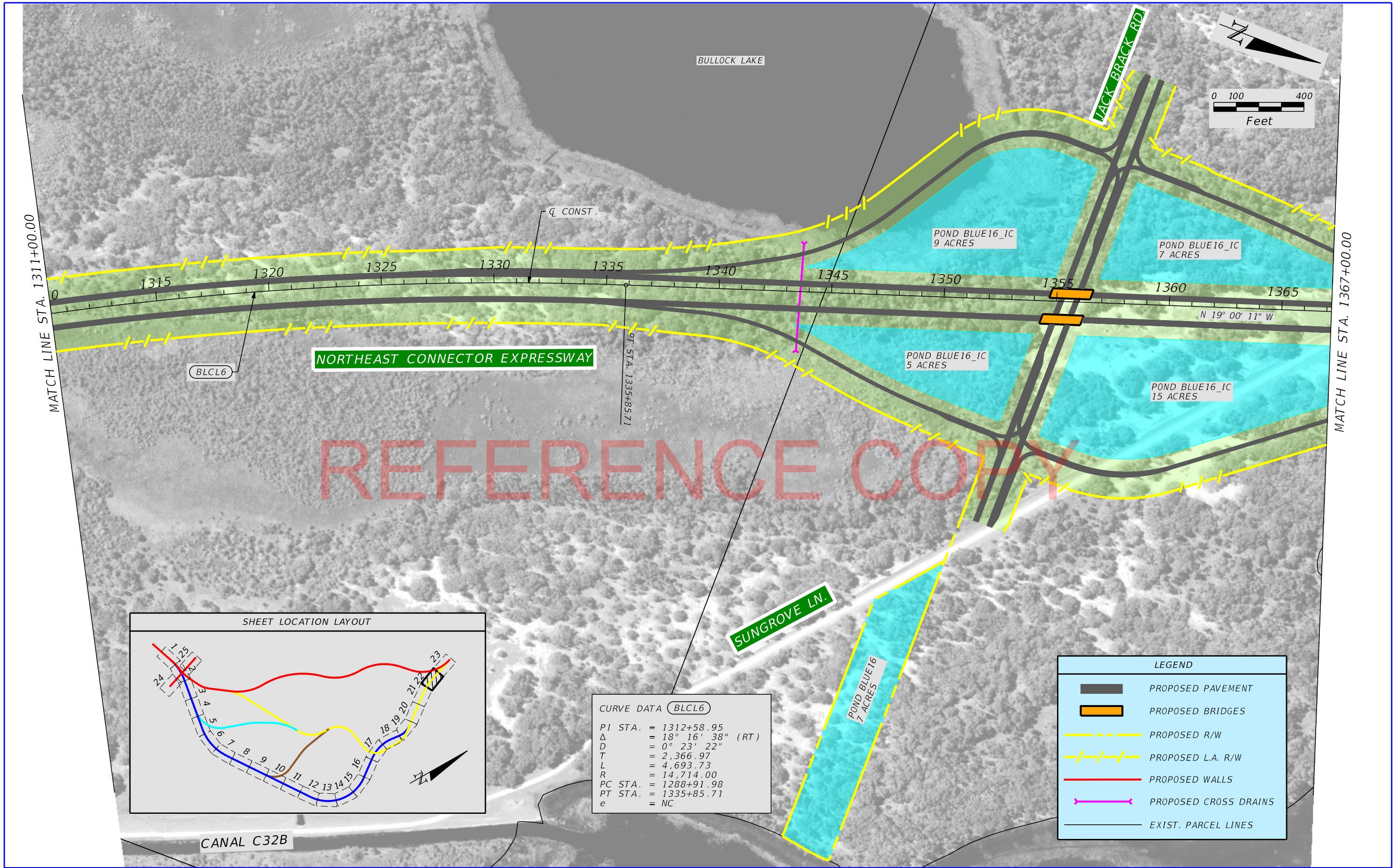
CURVE DATA (BLCL5)	
PI STA.	= 1165+65.34
Δ	= 43° 45' 03" (LT)
D	= 1° 00' 00"
T	= 2,300.59
L	= 4,375.40
R	= 5,730.00
PC STA.	= 1142+64.75
PT STA.	= 1186+40.16
e	= 0.037

LEGEND	
	PROPOSED PAVEMENT
	PROPOSED BRIDGES
	PROPOSED R/W
	PROPOSED L.A. R/W
	PROPOSED WALLS
	PROPOSED CROSS DRAINS
	EXIST. PARCEL LINES



LEGEND	
	PROPOSED PAVEMENT
	PROPOSED BRIDGES
	PROPOSED R/W
	PROPOSED L.A. R/W
	PROPOSED WALLS
	PROPOSED CROSS DRAINS
	EXIST. PARCEL LINES





CURVE DATA (BLCL6)	
PI STA.	= 1312+58.95
Δ	= 18° 16' 38" (RT)
D	= 0° 23' 22"
T	= 2,366.97
L	= 4,693.73
R	= 14,714.00
PC STA.	= 1288+91.98
PT STA.	= 1335+85.71
e	= NC

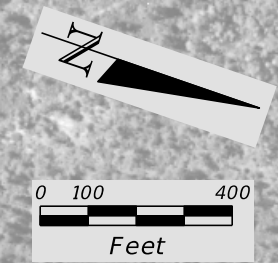
LEGEND	
	PROPOSED PAVEMENT
	PROPOSED BRIDGES
	PROPOSED R/W
	PROPOSED L.A. R/W
	PROPOSED WALLS
	PROPOSED CROSS DRAINS
	EXIST. PARCEL LINES



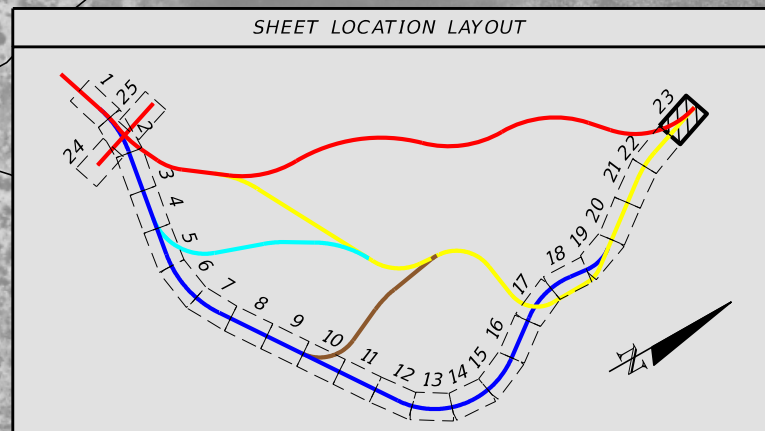
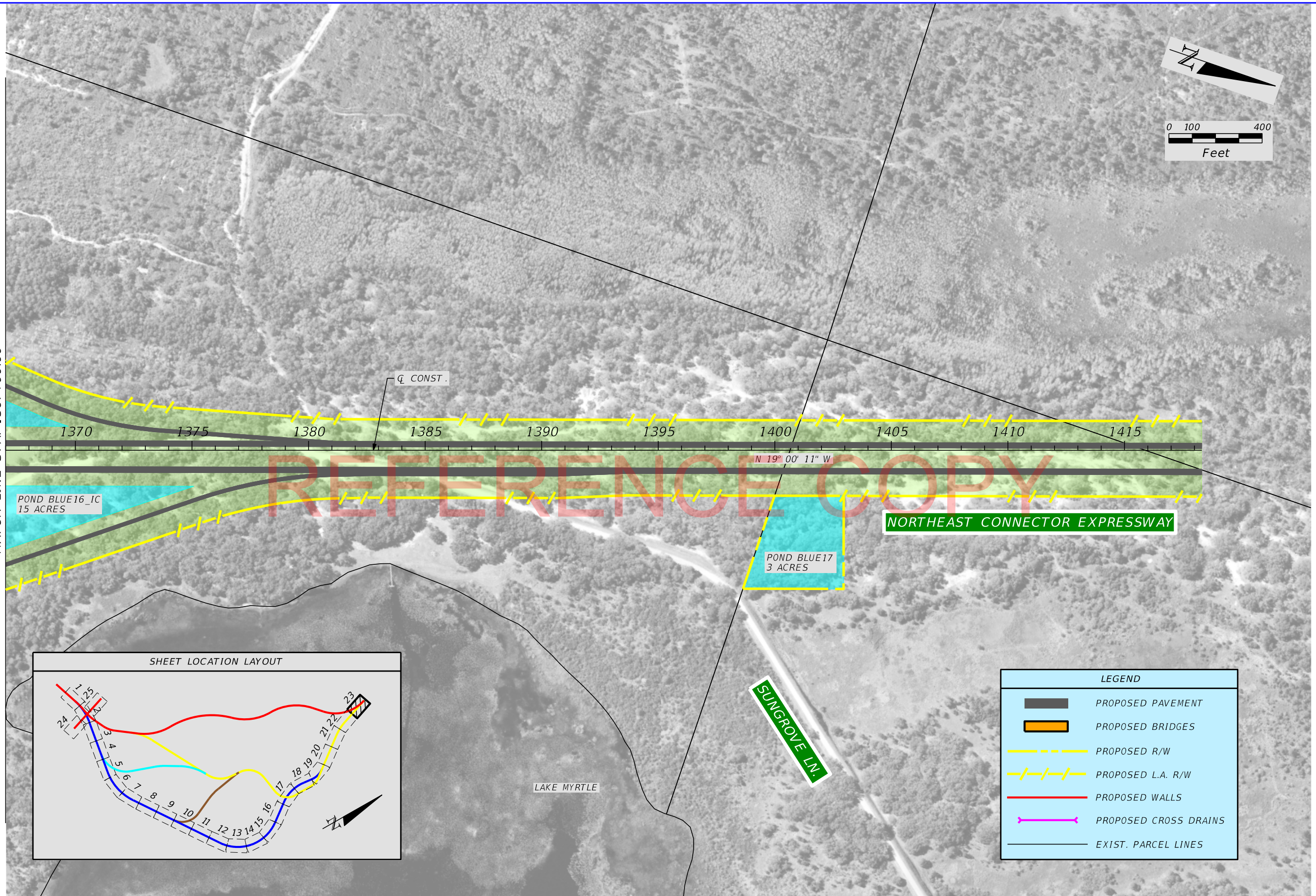
NORTHEAST CONNECTOR EXPRESSWAY CONCEPT, FEASIBILITY & MOBILITY STUDY
From Florida's Turnpike to South of the Osceola/Orange County Line
CFX Project Number 599-222

CORRIDOR E
BLUE/YELLOW

SHEET NO.
22

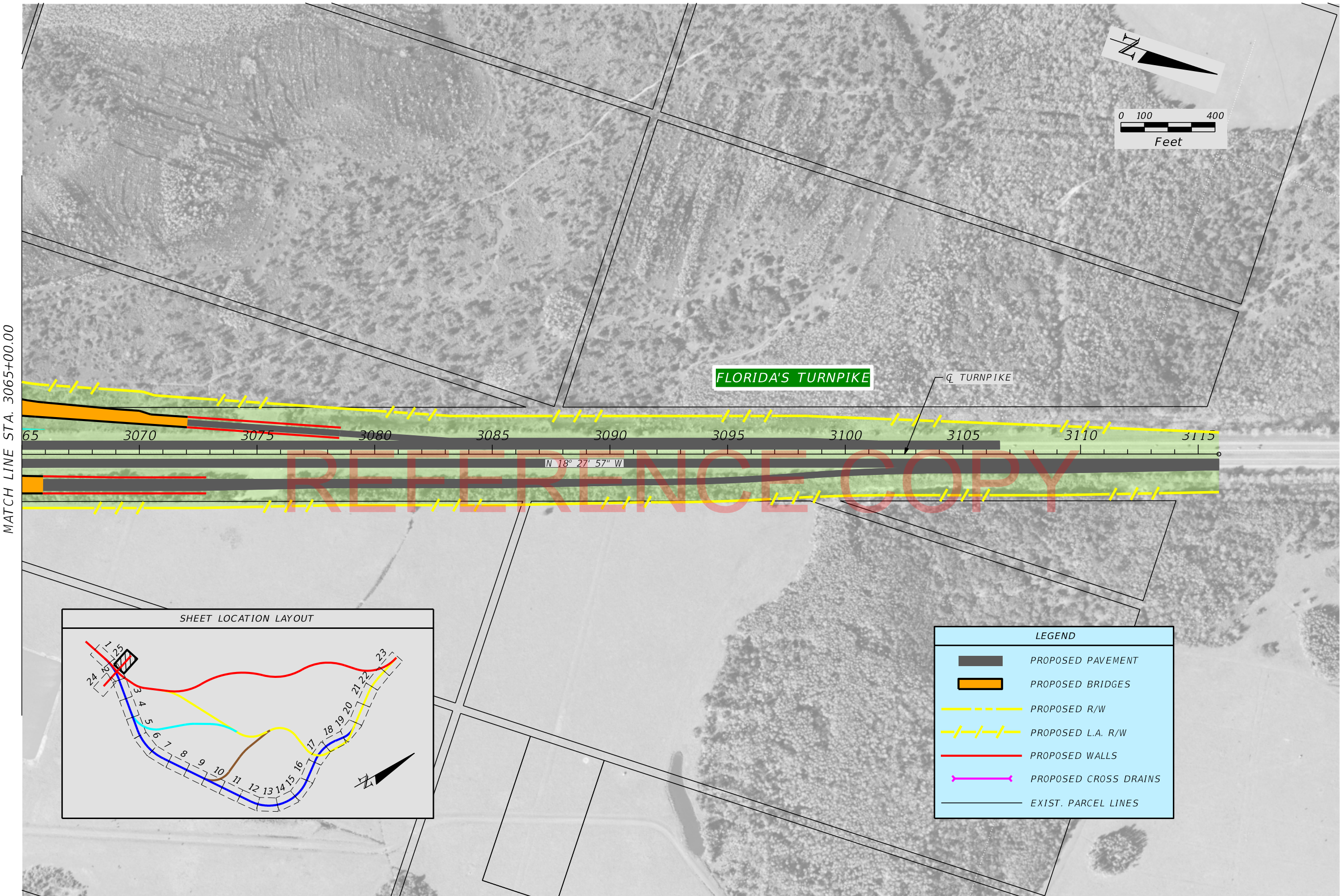


MATCH LINE STA. 1367+00.00



LEGEND	
	PROPOSED PAVEMENT
	PROPOSED BRIDGES
	PROPOSED R/W
	PROPOSED L.A. R/W
	PROPOSED WALLS
	PROPOSED CROSS DRAINS
	EXIST. PARCEL LINES





Appendix F
Pond Sizing Methodology

REFERENCE COPY

Project: CFX Feasibility Study: NE Connector
County: Osceola

Notes:

- (1) Attenuation volume zero if pre CN is greater than post CN (may occur due to existing water/wetland features)
- (2) Interchange CN does not account for wet infield ponds. Open Space CN is used for infield areas; this will need to be further refined in PD&E.

Rainfall
(25yr/72hr, in) 10

Table A.1 - Attenuation Volume Summary

Corridor A

Basin	Area (ac)	Existing					Proposed					Results
		Weighted CN	S	Ia	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	Ia	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)
Red01	107.31	78.7	2.71	0.54	7.35	65.72	91.5	0.93	0.19	8.96	80.14	14.4
Red01_IC	230.40	81.6	2.26	0.45	7.72	148.21	84.4	1.85	0.37	8.08	155.16	6.9
Red02	29.49	83.9	1.92	0.38	8.02	19.71	89.3	1.19	0.24	8.70	21.38	1.7
Red02_IC	83.91	84.1	1.90	0.38	8.04	56.20	82.2	2.16	0.43	7.81	54.58	0.0
Red03	91.51	79.7	2.55	0.51	7.48	57.01	85.8	1.65	0.33	8.26	62.96	6.0
Red04	48.84	77.6	2.88	0.58	7.22	29.38	87.5	1.43	0.29	8.47	34.46	5.1
Red04_IC	65.06	80.4	2.44	0.49	7.57	41.05	79.5	2.58	0.52	7.46	40.44	0.0
Red05	39.81	78.9	2.67	0.53	7.38	24.50	83.4	1.99	0.40	7.95	26.39	1.9
Red06	45.15	66.7	4.98	1.00	5.80	21.80	76.9	3.00	0.60	7.12	26.81	5.0
Red07	28.87	76.4	3.08	0.62	7.06	16.99	87.5	1.43	0.29	8.46	20.36	3.4
Red08	24.23	76.0	3.16	0.63	7.01	14.15	86.0	1.63	0.33	8.28	16.72	2.6
Red09	37.93	79.5	2.57	0.51	7.46	23.59	87.8	1.40	0.28	8.50	26.87	3.3
Red09_IC	70.06	78.7	2.71	0.54	7.35	42.92	77.6	2.89	0.58	7.21	42.09	0.0
Red10	31.33	67.1	4.90	0.98	5.85	15.27	77.4	2.92	0.58	7.19	18.77	3.5
Red11	46.64	74.3	3.46	0.69	6.78	26.37	82.9	2.06	0.41	7.89	30.67	4.3
Red12	57.07	66.9	4.95	0.99	5.82	27.66	81.7	2.23	0.45	7.74	36.82	9.2
Red13	35.11	76.7	3.04	0.61	7.10	20.76	84.4	1.85	0.37	8.08	23.64	2.9
Red14	30.94	73.7	3.57	0.71	6.70	17.29	85.1	1.76	0.35	8.16	21.05	3.8
Red14_IC	57.54	73.5	3.60	0.72	6.68	32.05	73.3	3.64	0.73	6.66	31.94	0.0
Red15	30.10	77.0	2.99	0.60	7.14	17.90	88.6	1.29	0.26	8.61	21.59	3.7

Corridor B

Basin	Area (ac)	Existing					Proposed					Results
		Weighted CN	S	la	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	la	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)
Yellow01	107.31	78.7	2.71	0.54	7.35	65.72	91.5	0.93	0.19	8.96	80.14	14.4
Yellow01_IC	230.40	81.6	2.26	0.45	7.72	148.21	84.4	1.85	0.37	8.08	155.14	6.9
Yellow02	29.49	83.9	1.92	0.38	8.02	19.70	89.3	1.20	0.24	8.69	21.36	1.7
Yellow02_IC	83.91	84.1	1.89	0.38	8.04	56.21	82.2	2.16	0.43	7.81	54.59	0.0
Yellow03	76.35	79.8	2.53	0.51	7.50	47.70	88.7	1.28	0.26	8.62	54.82	7.1
Yellow04	40.52	73.9	3.52	0.70	6.74	22.76	83.3	2.01	0.40	7.93	26.79	4.0
Yellow05	31.62	73.9	3.54	0.71	6.73	17.74	84.5	1.83	0.37	8.10	21.33	3.6
Yellow05_IC	43.49	74.7	3.39	0.68	6.84	24.77	76.3	3.10	0.62	7.05	25.54	0.8
Yellow06	16.92	74.8	3.37	0.67	6.85	9.66	81.3	2.29	0.46	7.69	10.85	1.2
Yellow07	36.63	74.6	3.40	0.68	6.83	20.84	86.8	1.53	0.31	8.38	25.57	4.7
Yellow08	43.38	73.5	3.61	0.72	6.68	24.16	78.5	2.73	0.55	7.33	26.51	2.4
Yellow09	39.15	76.5	3.08	0.62	7.07	23.06	81.9	2.20	0.44	7.77	25.35	2.3
Yellow10	42.25	64.3	5.55	1.11	5.47	19.26	80.8	2.38	0.48	7.62	26.84	7.6
Yellow10_IC	58.97	58.0	7.23	1.45	4.63	22.77	56.6	7.67	1.53	4.44	21.83	0.0
Yellow11	13.60	70.4	4.21	0.84	6.27	7.11	81.0	2.34	0.47	7.65	8.67	1.6
Yellow12	56.72	75.2	3.30	0.66	6.90	32.61	82.5	2.12	0.42	7.84	37.07	4.5
Yellow13	46.76	78.9	2.68	0.54	7.38	28.75	87.7	1.40	0.28	8.50	33.11	4.4
Yellow14	26.45	81.4	2.28	0.46	7.70	16.98	88.1	1.35	0.27	8.55	18.84	1.9
Yellow15	52.13	78.5	2.74	0.55	7.33	31.83	85.4	1.71	0.34	8.21	35.66	3.8
Yellow16	31.42	73.5	3.60	0.72	6.69	17.51	85.8	1.65	0.33	8.26	21.63	4.1
Yellow16_IC	58.58	79.1	2.64	0.53	7.41	36.16	80.9	2.36	0.47	7.64	37.30	1.1
Yellow17	16.07	77.6	2.89	0.58	7.21	9.66	88.7	1.28	0.26	8.61	11.54	1.9
Yellow18	54.58	82.6	2.11	0.42	7.85	35.69	88.7	1.28	0.26	8.62	39.19	3.5
Yellow19	34.62	78.1	2.80	0.56	7.28	21.01	89.4	1.18	0.24	8.71	25.12	4.1
Yellow19_IC	62.91	82.8	2.08	0.42	7.87	41.26	82.5	2.12	0.42	7.84	41.11	0.0
Yellow20	27.43	77.4	2.92	0.58	7.19	16.43	88.7	1.28	0.26	8.61	19.69	3.3

Corridor C

Basin	Area (ac)	Existing					Proposed					Results
		Weighted CN	S	la	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	la	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)
Cyan01	104.99	78.76	2.70	0.54	7.36	64.41	91.8	0.90	0.18	9.00	78.71	14.3
Cyan01_IC	200.15	81.94	2.20	0.44	7.77	129.56	85.3	1.73	0.35	8.19	136.56	7.0
Cyan02	38.68	70.75	4.13	0.83	6.32	20.38	87.0	1.50	0.30	8.41	27.09	6.7
Cyan02_IC	32.54	74.94	3.34	0.67	6.87	18.63	77.3	2.94	0.59	7.17	19.44	0.8
Cyan03	64.67	78.58	2.73	0.55	7.34	39.55	87.3	1.45	0.29	8.44	45.51	6.0
Cyan04	81.99	51.44	9.44	1.89	3.75	25.61	76.9	3.00	0.60	7.13	48.70	23.1
Cyan05	34.61	74.40	3.44	0.69	6.80	19.61	85.3	1.73	0.35	8.19	23.62	4.0
Cyan06A	23.49	70.95	4.09	0.82	6.35	12.43	85.9	1.64	0.33	8.27	16.19	3.8
Cyan06A_IC	50.47	76.40	3.09	0.62	7.06	29.69	80.0	2.51	0.50	7.51	31.61	1.9
Cyan06B	18.09	77.23	2.95	0.59	7.17	10.80	89.3	1.20	0.24	8.69	13.10	2.3
Cyan06B_IC	4.96	78.64	2.72	0.54	7.35	3.04	80.6	2.41	0.48	7.60	3.14	0.1
Cyan07	17.37	65.06	5.37	1.07	5.57	8.07	83.3	2.01	0.40	7.94	11.49	3.4
Cyan08	43.36	73.59	3.59	0.72	6.69	24.19	78.6	2.73	0.55	7.34	26.52	2.3
Cyan09	39.16	76.47	3.08	0.62	7.07	23.06	81.9	2.20	0.44	7.77	25.35	2.3
Cyan10	42.21	64.27	5.56	1.11	5.47	19.23	80.8	2.37	0.47	7.63	26.83	7.6
Cyan10_IC	58.98	58.04	7.23	1.45	4.64	22.78	56.6	7.67	1.53	4.44	21.84	0.0
Cyan11	13.60	70.37	4.21	0.84	6.27	7.11	81.0	2.35	0.47	7.65	8.67	1.6
Cyan12	56.72	75.17	3.30	0.66	6.90	32.61	82.5	2.12	0.42	7.84	37.08	4.5
Cyan13	46.76	78.89	2.68	0.54	7.38	28.75	87.7	1.40	0.28	8.50	33.11	4.4
Cyan14	26.45	81.43	2.28	0.46	7.70	16.98	88.1	1.35	0.27	8.55	18.84	1.9
Cyan15	52.13	78.49	2.74	0.55	7.33	31.83	85.4	1.71	0.34	8.21	35.66	3.8
Cyan16	31.42	73.54	3.60	0.72	6.69	17.51	85.8	1.65	0.33	8.26	21.63	4.1
Cyan16_IC	58.62	79.09	2.64	0.53	7.40	36.17	80.9	2.36	0.47	7.64	37.31	1.1
Cyan17	16.07	77.60	2.89	0.58	7.21	9.66	88.7	1.28	0.26	8.61	11.53	1.9
Cyan18	54.58	82.56	2.11	0.42	7.85	35.69	88.7	1.28	0.26	8.62	39.19	3.5
Cyan18_IC	62.90	82.75	2.08	0.42	7.87	41.26	82.5	2.12	0.42	7.84	41.10	0.0
Cyan19	34.63	78.13	2.80	0.56	7.28	21.01	89.4	1.18	0.24	8.71	25.13	4.1
Cyan20	27.43	77.41	2.92	0.58	7.19	16.43	88.7	1.28	0.26	8.61	19.69	3.3

Corridor D

Basin	Area (ac)	Existing					Proposed					Results
		Weighted CN	S	la	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	la	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)
Brown01	104.99	78.8	2.70	0.54	7.36	64.41	91.8	0.90	0.18	9.00	78.72	14.3
Brown01_IC	200.15	81.9	2.20	0.44	7.77	129.55	85.3	1.73	0.35	8.19	136.56	7.0
Brown02	38.62	70.7	4.14	0.83	6.32	20.35	87.0	1.49	0.30	8.41	27.06	6.7
Brown02_IC	32.55	74.9	3.35	0.67	6.87	18.63	77.2	2.95	0.59	7.17	19.44	0.8
Brown03	64.24	77.7	2.87	0.57	7.23	38.69	88.4	1.32	0.26	8.58	45.91	7.2
Brown04	172.90	71.0	4.08	0.82	6.36	91.60	85.0	1.77	0.35	8.15	117.46	25.9
Brown05	55.56	75.1	3.32	0.66	6.88	31.87	86.9	1.51	0.30	8.39	38.84	7.0
Brown06	47.10	77.9	2.84	0.57	7.25	28.45	87.1	1.48	0.30	8.42	33.03	4.6
Brown07	28.77	76.0	3.15	0.63	7.01	16.80	84.5	1.83	0.37	8.09	19.40	2.6
Brown08	38.93	79.4	2.60	0.52	7.44	24.14	85.2	1.73	0.35	8.18	26.55	2.4
Brown09	41.58	64.1	5.61	1.12	5.44	18.85	80.7	2.39	0.48	7.61	26.38	7.5
Brown09_IC	58.74	57.9	7.26	1.45	4.62	22.62	56.5	7.70	1.54	4.43	21.67	0.0
Brown10	13.60	70.4	4.21	0.84	6.27	7.11	81.0	2.35	0.47	7.64	8.66	1.6
Brown11	56.71	75.2	3.30	0.66	6.90	32.61	82.5	2.12	0.42	7.84	37.06	4.5
Brown12	46.75	78.9	2.68	0.54	7.38	28.75	87.7	1.40	0.28	8.50	33.10	4.4
Brown13	26.45	81.4	2.28	0.46	7.70	16.98	88.1	1.35	0.27	8.55	18.84	1.9
Brown14	52.12	78.5	2.74	0.55	7.33	31.83	85.4	1.71	0.34	8.21	35.65	3.8
Brown15	31.44	73.5	3.60	0.72	6.69	17.52	85.8	1.65	0.33	8.26	21.64	4.1
Brown15_IC	58.60	79.1	2.64	0.53	7.40	36.16	80.9	2.36	0.47	7.64	37.30	1.1
Brown16	16.08	77.6	2.89	0.58	7.21	9.66	88.7	1.28	0.26	8.61	11.54	1.9
Brown17	54.58	82.6	2.11	0.42	7.85	35.69	88.8	1.26	0.25	8.63	39.26	3.6
Brown18	34.63	78.1	2.80	0.56	7.28	21.01	89.4	1.19	0.24	8.70	25.10	4.1
Brown18_IC	62.90	82.8	2.08	0.42	7.87	41.26	82.6	2.11	0.42	7.85	41.13	0.0
Brown19	27.43	77.4	2.92	0.58	7.19	16.43	88.4	1.32	0.26	8.58	19.61	3.2

Corridor E

Basin	Area (ac)	Existing					Proposed					Results
		Weighted CN	S	Ia	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	Ia	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)
Blue01	104.99	78.8	2.69	0.54	7.37	64.46	91.8	0.90	0.18	9.00	78.72	14.3
Blue01_IC	200.15	81.9	2.21	0.44	7.76	129.48	85.3	1.73	0.35	8.19	136.56	7.1
Blue02	38.62	70.7	4.14	0.83	6.32	20.33	87.0	1.49	0.30	8.41	27.06	6.7
Blue02_IC	32.55	74.9	3.35	0.67	6.86	18.62	77.2	2.95	0.59	7.17	19.44	0.8
Blue03	64.24	77.7	2.87	0.57	7.23	38.68	88.4	1.32	0.26	8.58	45.91	7.2
Blue04	173.30	70.7	4.14	0.83	6.32	91.22	84.8	1.79	0.36	8.14	117.49	26.3
Blue05	53.94	64.3	5.55	1.11	5.47	24.60	82.6	2.11	0.42	7.85	35.29	10.7
Blue06	34.23	83.1	2.03	0.41	7.92	22.58	88.7	1.28	0.26	8.62	24.58	2.0
Blue07	32.80	71.5	3.99	0.80	6.42	17.55	85.9	1.64	0.33	8.27	22.61	5.1
Blue07_IC	59.56	74.0	3.51	0.70	6.75	33.49	76.7	3.03	0.61	7.10	35.24	1.8
Blue08	67.68	78.5	2.74	0.55	7.33	41.33	88.7	1.28	0.26	8.61	48.58	7.3
Blue09	38.68	77.3	2.94	0.59	7.17	23.13	87.9	1.37	0.27	8.52	27.48	4.4
Blue10	66.21	79.4	2.59	0.52	7.44	41.07	87.1	1.48	0.30	8.42	46.45	5.4
Blue11	74.51	70.5	4.18	0.84	6.29	39.06	84.4	1.85	0.37	8.08	50.19	11.1
Blue12	36.38	76.5	3.07	0.61	7.07	21.44	84.0	1.91	0.38	8.03	24.34	2.9
Blue13	31.44	73.5	3.61	0.72	6.68	17.51	85.8	1.65	0.33	8.26	21.64	4.1
Blue13_IC	58.60	79.1	2.64	0.53	7.41	36.16	80.9	2.36	0.47	7.64	37.30	1.1
Blue14	16.23	77.6	2.89	0.58	7.21	9.76	88.5	1.29	0.26	8.60	11.63	1.9
Blue15	54.58	82.6	2.11	0.42	7.85	35.71	88.7	1.28	0.26	8.62	39.19	3.5
Blue16	34.63	78.1	2.80	0.56	7.28	21.00	89.4	1.18	0.24	8.71	25.13	4.1
Blue16_IC	62.90	82.8	2.08	0.42	7.88	41.29	82.5	2.12	0.42	7.84	41.11	0.0
Blue17	27.43	77.4	2.92	0.58	7.19	16.43	88.7	1.28	0.26	8.61	19.69	3.3

Project: CFX Feasibility Study: NE Connector
County: Osceola

**Table A.2 - Treatment Volume Summary - Assumes Wet Detention Ponds
Corridor A**

Basin	Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	Treatment Volume - Basin (ac-ft)	Treatment Volume - Impervious Area (ac-ft)	Treatment Volume Required (ac-ft)	Treatment Volume with Additional 50% BMAP (ac-ft)
Red01	107.31	0.6	68.9	8.9	14.2	14.2	21.3
Red01_IC	230.40	30.0	62.5	19.2	6.8	19.2	28.8
Red02	29.49	0.2	16.5	2.5	3.4	3.4	5.1
Red02_IC	83.91	0.8	8.0	7.0	1.5	7.0	10.5
Red03	91.51	0.0	44.1	7.6	9.2	9.2	13.8
Red04	48.84	0.4	24.9	4.1	5.1	5.1	7.7
Red04_IC	65.06	2.1	6.0	5.4	0.8	5.4	8.1
Red05	39.81	0.0	19.2	3.3	4.0	4.0	6.0
Red06	45.15	0.0	21.7	3.8	4.5	4.5	6.8
Red07	28.87	0.0	15.8	2.4	3.3	3.3	4.9
Red08	24.23	0.0	11.7	2.0	2.4	2.4	3.6
Red09	37.93	0.6	19.5	3.2	3.9	3.9	5.9
Red09_IC	70.06	2.1	6.4	5.8	0.9	5.8	8.8
Red10	31.33	0.2	15.1	2.6	3.1	3.1	4.6
Red11	46.64	0.0	22.5	3.9	4.7	4.7	7.0
Red12	57.07	0.0	27.5	4.8	5.7	5.7	8.6
Red13	35.11	0.0	16.9	2.9	3.5	3.5	5.3
Red14	30.94	0.0	15.9	2.6	3.3	3.3	5.0
Red14_IC	57.54	0.0	5.7	4.8	1.2	4.8	7.2
Red15	30.10	0.0	14.4	2.5	3.0	3.0	4.5
Total	1191.30	37.2	443.2	99.3	84.6	115.7	173.5

Corridor B

Basin	Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	Treatment Volume - Basin (ac-ft)	Treatment Volume - Impervious Area (ac-ft)	Treatment Volume Required (ac-ft)	Treatment Volume with Additional 50% BMAP (ac-ft)
Yellow01	107.31	0.6	68.9	8.9	14.2	14.2	21.3
Yellow01_IC	230.40	30.0	62.5	19.2	6.8	19.2	28.8
Yellow02	29.49	0.2	16.4	2.5	3.4	3.4	5.1
Yellow02_IC	83.91	0.8	8.0	7.0	1.5	7.0	10.5
Yellow03	76.35	0.0	36.8	6.4	7.7	7.7	11.5
Yellow04	40.52	0.0	19.6	3.4	4.1	4.1	6.1
Yellow05	31.62	0.3	17.4	2.6	3.6	3.6	5.3
Yellow05_IC	43.49	0.7	5.4	3.6	1.0	3.6	5.4
Yellow06	16.92	0.0	8.3	1.4	1.7	1.7	2.6
Yellow07	36.63	0.3	17.8	3.1	3.7	3.7	5.5
Yellow08	43.38	0.1	24.0	3.6	5.0	5.0	7.5
Yellow09	39.15	0.1	18.8	3.3	3.9	3.9	5.9
Yellow10	42.25	0.6	22.0	3.5	4.4	4.4	6.7
Yellow10_IC	58.97	1.6	5.9	4.9	0.9	4.9	7.4
Yellow11	13.60	0.0	6.5	1.1	1.4	1.4	2.0
Yellow12	56.72	0.4	27.3	4.7	5.6	5.6	8.4
Yellow13	46.76	0.0	22.5	3.9	4.7	4.7	7.0
Yellow14	26.45	0.0	12.7	2.2	2.7	2.7	4.0
Yellow15	52.13	0.0	25.1	4.3	5.2	5.2	7.8
Yellow16	31.42	0.3	16.6	2.6	3.4	3.4	5.1
Yellow16_IC	58.58	0.7	5.7	4.9	1.0	4.9	7.3
Yellow17	16.07	0.0	7.7	1.3	1.6	1.6	2.4
Yellow18	54.58	0.3	26.3	4.5	5.4	5.4	8.1
Yellow19	34.62	1.4	18.1	2.9	3.5	3.5	5.2
Yellow19_IC	62.91	0.9	5.6	5.2	1.0	5.2	7.9
Yellow20	27.43	0.5	13.2	2.3	2.6	2.6	4.0
Total	1361.66	39.7	519.1	113.5	99.9	132.6	198.9

Corridor C

Basin	Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	Treatment Volume - Basin (ac-ft)	Treatment Volume - Impervious Area (ac-ft)	Treatment Volume Required (ac-ft)	Treatment Volume with Additional 50% BMAP (ac-ft)
Cyan01	104.99	0.7	69.2	8.7	14.3	14.3	21.4
Cyan01_IC	200.15	29.0	63.6	16.7	7.2	16.7	25.0
Cyan02	38.68	0.2	22.0	3.2	4.5	4.5	6.8
Cyan02_IC	32.54	0.9	3.9	2.7	0.6	2.7	4.1
Cyan03	64.67	0.0	31.1	5.4	6.5	6.5	9.7
Cyan04	81.99	0.0	39.5	6.8	8.2	8.2	12.3
Cyan05	34.61	0.0	16.7	2.9	3.5	3.5	5.2
Cyan06A	23.49	0.0	12.0	2.0	2.5	2.5	3.7
Cyan06A_IC	50.47	0.0	4.0	4.2	0.8	4.2	6.3
Cyan06B	18.09	0.0	9.3	1.5	1.9	1.9	2.9
Cyan06B_IC	4.96	0.0	0.4	0.4	0.1	0.4	0.6
Cyan07	17.37	0.0	8.4	1.4	1.7	1.7	2.6
Cyan08	43.36	0.1	20.9	3.6	4.3	4.3	6.5
Cyan09	39.16	0.1	18.8	3.3	3.9	3.9	5.9
Cyan10	42.21	0.6	22.0	3.5	4.4	4.4	6.7
Cyan10_IC	58.98	1.6	5.9	4.9	0.9	4.9	7.4
Cyan11	13.60	0.0	6.5	1.1	1.4	1.4	2.0
Cyan12	56.72	0.4	27.3	4.7	5.6	5.6	8.4
Cyan13	46.76	0.0	22.5	3.9	4.7	4.7	7.0
Cyan14	26.45	0.0	12.7	2.2	2.7	2.7	4.0
Cyan15	52.13	0.0	25.1	4.3	5.2	5.2	7.8
Cyan16	31.42	0.3	16.6	2.6	3.4	3.4	5.1
Cyan16_IC	58.62	0.7	5.7	4.9	1.0	4.9	7.3
Cyan17	16.07	0.0	7.7	1.3	1.6	1.6	2.4
Cyan18	54.58	0.3	26.3	4.5	5.4	5.4	8.1
Cyan18_IC	62.90	0.9	5.6	5.2	1.0	5.2	7.9
Cyan19	34.63	1.4	18.1	2.9	3.5	3.5	5.2
Cyan20	27.43	0.5	13.2	2.3	2.6	2.6	4.0
Total	1337.03	37.6	535.1	111.4	103.6	131.0	196.5

Corridor D

Basin	Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	Treatment Volume - Basin (ac-ft)	Treatment Volume - Impervious Area (ac-ft)	Treatment Volume Required (ac-ft)	Treatment Volume with Additional 50% BMAP (ac-ft)
Brown01	104.99	0.7	69.2	8.7	14.3	14.3	21.4
Brown01_IC	200.15	29.0	63.6	16.7	7.2	16.7	25.0
Brown02	38.62	0.2	22.0	3.2	4.5	4.5	6.8
Brown02_IC	32.55	0.9	3.9	2.7	0.6	2.7	4.1
Brown03	64.24	0.0	30.9	5.4	6.4	6.4	9.7
Brown04	172.90	0.0	83.3	14.4	17.4	17.4	26.0
Brown05	55.56	0.0	26.8	4.6	5.6	5.6	8.4
Brown06	47.10	0.0	22.7	3.9	4.7	4.7	7.1
Brown07	28.77	0.1	13.8	2.4	2.9	2.9	4.3
Brown08	38.93	0.1	18.8	3.2	3.9	3.9	5.8
Brown09	41.58	0.6	21.6	3.5	4.4	4.4	6.6
Brown09_IC	58.74	1.6	5.9	4.9	0.9	4.9	7.3
Brown10	13.60	0.0	6.5	1.1	1.4	1.4	2.0
Brown11	56.71	0.4	27.3	4.7	5.6	5.6	8.4
Brown12	46.75	0.0	22.5	3.9	4.7	4.7	7.0
Brown13	26.45	0.0	12.7	2.2	2.7	2.7	4.0
Brown14	52.12	0.0	25.1	4.3	5.2	5.2	7.8
Brown15	31.44	0.3	16.6	2.6	3.4	3.4	5.1
Brown15_IC	58.60	0.7	5.7	4.9	1.0	4.9	7.3
Brown16	16.08	0.0	7.7	1.3	1.6	1.6	2.4
Brown17	54.58	0.3	26.3	4.5	5.4	5.4	8.1
Brown18	34.63	1.4	18.1	2.9	3.5	3.5	5.2
Brown18_IC	62.90	0.9	5.6	5.2	1.0	5.2	7.9
Brown19	27.43	0.5	13.2	2.3	2.6	2.6	4.0
Total	1365.40	37.6	570.0	113.8	110.9	134.6	201.9

Corridor E

Basin	Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	Treatment Volume - Basin (ac-ft)	Treatment Volume - Impervious Area (ac-ft)	Treatment Volume Required (ac-ft)	Treatment Volume with Additional 50% BMAP (ac-ft)
Blue01	104.99	0.7	69.2	8.7	14.3	14.3	21.4
Blue01_IC	200.15	29.0	63.6	16.7	7.2	16.7	25.0
Blue02	38.62	0.2	22.0	3.2	4.5	4.5	6.8
Blue02_IC	32.55	0.9	3.9	2.7	0.6	2.7	4.1
Blue03	64.24	0.0	30.9	5.4	6.4	6.4	9.7
Blue04	173.30	0.0	83.4	14.4	17.4	17.4	26.1
Blue05	53.94	0.0	26.0	4.5	5.4	5.4	8.1
Blue06	34.23	0.0	16.5	2.9	3.4	3.4	5.2
Blue07	32.80	0.5	17.3	2.7	3.5	3.5	5.2
Blue07_IC	59.56	1.9	6.4	5.0	0.9	5.0	7.4
Blue08	67.68	0.0	32.6	5.6	6.8	6.8	10.2
Blue09	38.68	0.6	18.6	3.2	3.8	3.8	5.6
Blue10	66.21	3.4	31.9	5.5	5.9	5.9	8.9
Blue11	74.51	0.0	35.9	6.2	7.5	7.5	11.2
Blue12	36.38	0.0	17.5	3.0	3.6	3.6	5.5
Blue13	31.44	0.3	16.6	2.6	3.4	3.4	5.1
Blue13_IC	58.60	0.7	5.7	4.9	1.0	4.9	7.3
Blue14	16.23	0.0	7.7	1.4	1.6	1.6	2.4
Blue15	54.58	0.3	26.3	4.5	5.4	5.4	8.1
Blue16	34.63	1.4	18.1	2.9	3.5	3.5	5.2
Blue16_IC	62.90	0.9	5.6	5.2	1.0	5.2	7.9
Blue17	27.43	0.5	13.2	2.3	2.6	2.6	4.0
Total	1363.65	41.3	569.0	113.6	109.9	133.6	200.4

Project: CFX Feasibility Study: NE Connector

County: Osceola

Table A.3 - Floodplain Impacts

Corridor A

Basin	Floodplain Impact IDs	Floodplain Impacts Total (ac-ft)
Red01	2A, 50	14.5
Red01_IC	2A, 5A, 50, 51	159.6
Red02	2B, 4	15.8
Red02_IC	2B, 4	36.1
Red03	4B	153.8
Red04	8A	14.9
Red04_IC	8A	15.4
Red05	8, 9	7.3
Red06	--	0.0
Red07	11	22.2
Red08	11B	12.6
Red09	11C	19.7
Red09_IC	11C, 18	14.4
Red10	17	1.2
Red11	21A	29.6
Red12	21B	32.5
Red13	22A	23.8
Red14	22B, 27A	7.6
Red14_IC	22B, 27A	9.3
Red15	27	3.6

Total Volume Impact	594 ac-ft
Total 100-yr Area Impact	417 ac

Project: CFX Feasibility Study: NE Connector

County: Osceola

Corridor B

Basin	Floodplain Impact IDs	Floodplain Impacts Total (ac-ft)
Yellow01	2A, 50	14.5
Yellow01_IC	2A, 5A, 50, 51	159.6
Yellow02	2B, 4	15.8
Yellow02_IC	2B, 4	36.2
Yellow03	4B	196.6
Yellow04	--	0.0
Yellow05	--	0.0
Yellow05_IC	--	0.0
Yellow06	7B	6.9
Yellow07	13B, 7A	20.6
Yellow08	14	13.0
Yellow09	12	8.9
Yellow10	--	0.0
Yellow10_IC	--	0.0
Yellow11	--	0.0
Yellow12	--	0.0
Yellow13	19D, 25	8.4
Yellow14	19A, 25B	0.8
Yellow15	--	0.0
Yellow16	24A	0.6
Yellow16_IC	24A	3.8
Yellow17	23C	3.0
Yellow18	22, 23A	24.5
Yellow19	22B	6.2
Yellow19_IC	22B, 23D, 27A	34.0
Yellow20	--	0.0

Total Volume Impact	553 ac-ft
Total 100-yr Area Impact	344 ac

Project: CFX Feasibility Study: NE Connector

County: Osceola

Corridor C

Basin	Floodplain Impact IDs	Floodplain Impacts Total (ac-ft)
Cyan01	1, 50	14.5
Cyan01_IC	1, 5A, 50, 51	155.2
Cyan02	3B	46.8
Cyan02_IC	3B, 5B	14.9
Cyan03	3C, 5	271.2
Cyan04	4B, 6	71.7
Cyan05	7C	12.6
Cyan06A	7B	23.3
Cyan06A_IC	7B	39.7
Cyan06B	13C, 7A	16.1
Cyan06B_IC	7A	3.7
Cyan07	13B	11.1
Cyan08	14	13.0
Cyan09	12	8.9
Cyan10	--	0.0
Cyan10_IC	--	0.0
Cyan11	--	0.0
Cyan12	--	0.0
Cyan13	19D, 25	8.4
Cyan14	19A, 25B	0.8
Cyan15	--	0.0
Cyan16	24A	0.6
Cyan16_IC	24A	3.8
Cyan17	23C	3.0
Cyan18	22, 23A	25.2
Cyan18_IC	22B, 23D, 27A	34.0
Cyan19	22B	6.2
Cyan20	--	0.0

Total Volume Impact	785 ac-ft
Total 100-yr Area Impact	409 ac

Project: CFX Feasibility Study: NE Connector

County: Osceola

Corridor D

Basin	Floodplain Impact IDs	Floodplain Impacts Total (ac-ft)
Brown01	1, 50	14.5
Brown01_IC	1, 5A, 50, 51	155.2
Brown02	3B	46.8
Brown02_IC	3B, 5B	14.9
Brown03	5	345.0
Brown04	6	297.0
Brown05	16A	67.6
Brown06	15	18.8
Brown07	--	0.0
Brown08	12	7.1
Brown09	--	0.0
Brown09_IC	--	0.0
Brown10	--	0.0
Brown11	--	0.0
Brown12	19D, 25	8.4
Brown13	19A, 25B	0.8
Brown14	--	0.0
Brown15	24A	0.6
Brown15_IC	24A	3.8
Brown16	23C	3.0
Brown17	22, 23A	25.2
Brown18	22B, 27A	6.2
Brown18_IC	22B, 23D, 27A	34.0
Brown19	--	0.0

Total Volume Impact	1,049 ac-ft
Total 100-yr Area Impact	460 ac

Project: CFX Feasibility Study: NE Connector

County: Osceola

Corridor E

Basin	Floodplain Impact IDs	Floodplain Impacts Total (ac-ft)
Blue01	1, 50	14.5
Blue01_IC	1, 5A, 50, 51	155.2
Blue02	3B	46.8
Blue02_IC	3B, 5B	14.9
Blue03	5	345.0
Blue04	6	297.0
Blue05	16A	25.8
Blue06	16B	49.1
Blue07	20A	8.5
Blue07_IC	20A	12.9
Blue08	20B	29.0
Blue09	20C	11.5
Blue10	19B	9.7
Blue11	25, 25B	115.0
Blue12	--	0.0
Blue13	24A	0.6
Blue13_IC	24A	3.8
Blue14	23C	3.0
Blue15	22, 23A	25.2
Blue16	22B, 23D	6.2
Blue16_IC	22B, 23D, 27A	34.0
Blue17	--	0.0

Total Volume Impact	1,207 ac-ft
Total 100-yr Area Impact	613 ac

Project: CFX Feasibility Study: NE Connector

County: Osceola

Table A.4 - Pond Sizing Calculations

Corridor A Mainline

Basin	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*
	ac-ft	pct	ft	ac
Red01	50.2	20%	3	21.0
Red02	22.6	20%	3	9.7
Red03	173.6	20%	3	71.2
Red04	27.7	20%	3	11.8
Red05	15.2	20%	3	6.6
Red06	11.8	20%	3	5.2
Red07	30.5	20%	3	12.9
Red08	18.8	20%	3	8.1
Red09	28.9	20%	3	12.3
Red10	9.3	20%	3	4.1
Red11	40.9	20%	3	17.2
Red12	50.3	20%	3	21.1
Red13	32.0	20%	3	13.6
Red14	16.4	20%	3	7.1
Red15	11.8	20%	3	5.2
Total	540.0			227.1

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor A Interchange

Basin	Interchange Location	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*	Available Infield Pond Area	Required Pond Area Outside of Infield
		ac-ft	pct	ft	ac		
Red01_IC	FL Turnpike	195.3	20%	3	80.0	29.3	50.7
Red02_IC	Canoe Creek Rd	46.6	20%	3	19.6	49.4	0.0
Red04_IC	Hickory Tree Rd	23.5	20%	3	10.1	37.3	0.0
Red09_IC	SR 500/US 192	23.2	20%	3	9.9	40.8	0.0
Red14_IC	Lake Myrtle	16.5	20%	3	7.2	32.3	0.0
Total		305.1			126.7	189.0	50.7

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor B Mainline

Basin	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*
	ac-ft	pct	ft	ac
Yellow01	50.2	20%	3	21.0
Yellow02	22.6	20%	3	9.7
Yellow03	215.2	20%	3	88.0
Yellow04	10.1	20%	3	4.5
Yellow05	8.9	20%	3	4.0
Yellow06	10.7	20%	3	4.7
Yellow07	30.8	20%	3	13.1
Yellow08	22.9	20%	3	9.8
Yellow09	17.1	20%	3	7.4
Yellow10	14.3	20%	3	6.2
Yellow11	3.6	20%	3	1.7
Yellow12	12.9	20%	3	5.6
Yellow13	19.8	20%	3	8.5
Yellow14	6.7	20%	3	3.0
Yellow15	11.6	20%	3	5.1
Yellow16	9.8	20%	3	4.3
Yellow17	7.3	20%	3	3.3
Yellow18	36.1	20%	3	15.2
Yellow19	15.5	20%	3	6.7
Yellow20	7.3	20%	3	3.3
Total	533.4			225.3

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor B Interchange

Basin	Interchange Location	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*	Available Infield Pond Area	Required Pond Area Outside of Infield
		ac-ft	pct	ft	ac	ac	ac
Yellow01_IC	FL Turnpike	195.3	20%	3	80.0	29.3	50.7
Yellow02_IC	Canoe Creek Rd	46.7	20%	3	19.6	49.4	0.0
Yellow05_IC	Hickory Tree Rd	6.2	20%	3	2.8	15.6	0.0
Yellow10_IC	SR 500/US 192	7.4	20%	3	3.3	33.1	0.0
Yellow16_IC	Nova Rd	12.2	20%	3	5.4	32.8	0.0
Yellow19_IC	Lake Myrtle	41.9	20%	3	17.6	35.7	0.0
Total		309.7			128.7	195.8	50.7

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor C Mainline

Basin	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*
	ac-ft	pct	ft	ac
Cyan01	50.2	20%	3	21.0
Cyan02	60.3	20%	3	25.2
Cyan03	286.9	20%	3	117.0
Cyan04	107.1	20%	3	44.2
Cyan05	21.8	20%	3	9.4
Cyan06A	30.8	20%	3	13.1
Cyan06B	21.3	20%	3	9.1
Cyan07	17.1	20%	3	7.4
Cyan08	21.8	20%	3	9.4
Cyan09	17.1	20%	3	7.4
Cyan10	14.3	20%	3	6.2
Cyan11	3.6	20%	3	1.7
Cyan12	12.9	20%	3	5.6
Cyan13	19.8	20%	3	8.5
Cyan14	6.7	20%	3	3.0
Cyan15	11.6	20%	3	5.1
Cyan16	9.8	20%	3	4.3
Cyan17	7.3	20%	3	3.3
Cyan18	36.8	20%	3	15.5
Cyan19	15.5	20%	3	6.7
Cyan20	7.3	20%	3	3.3
Total	780.0			326.6

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor C Interchange

Basin	Interchange Location	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*	Available Infield Pond Area	Required Pond Area Outside of Infield
		ac-ft	pct	ft	ac	ac	ac
Cyan01_IC	FL Turnpike	187.2	20%	3	76.7	14.9	61.8
Cyan02_IC	Canoe Creek Rd	19.8	20%	3	8.5	14.9	0.0
Cyan06A_IC	Hickory Tree Rd	47.9	20%	3	20.1	31.0	0.0
Cyan06B_IC		4.4	20%	3	2.0	0.0	2.0
Cyan10_IC	SR 500/US 192	7.4	20%	3	3.3	33.1	0.0
Cyan16_IC	Nova Rd	12.2	20%	3	5.4	32.8	0.0
Cyan18_IC	Lake Myrtle	41.9	20%	3	17.6	35.7	0.0
Total		320.8			133.7	162.4	63.8

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor D Mainline

Basin	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*
	ac-ft	pct	ft	ac
Brown01	50.2	20%	3	21.0
Brown02	60.3	20%	3	25.2
Brown03	361.9	20%	3	147.3
Brown04	348.9	20%	3	142.1
Brown05	83.0	20%	3	34.4
Brown06	30.5	20%	3	12.9
Brown07	6.9	20%	3	3.1
Brown08	15.3	20%	3	6.7
Brown09	14.1	20%	3	6.1
Brown10	3.6	20%	3	1.7
Brown11	12.9	20%	3	5.6
Brown12	19.8	20%	3	8.5
Brown13	6.7	20%	3	3.0
Brown14	11.6	20%	3	5.1
Brown15	9.8	20%	3	4.3
Brown16	7.3	20%	3	3.3
Brown17	36.9	20%	3	15.6
Brown18	15.5	20%	3	6.7
Brown19	7.2	20%	3	3.2
Total	1102.4			456.0

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor D Interchange

Basin	Interchange Location	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*	Available Infield Pond Area	Required Pond Area Outside of Infield
		ac-ft	pct	ft	ac		
Brown01_IC	FL Turnpike	187.2	20%	3	76.7	14.9	61.8
Brown02_IC	Canoe Creek Rd	19.8	20%	3	8.5	14.9	0.0
Brown09_IC	SR 500/US 192	7.3	20%	3	3.3	33.1	0.0
Brown15_IC	Nova Rd	12.2	20%	3	5.4	32.8	0.0
Brown18_IC	Lake Myrtle	41.9	20%	3	17.6	35.7	0.0
Total		268.4			111.5	131.4	61.8

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor E Mainline

Basin	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*
	ac-ft	pct	ft	ac
Blue01	50.2	20%	3	21.0
Blue02	60.3	20%	3	25.2
Blue03	361.9	20%	3	147.3
Blue04	349.4	20%	3	142.3
Blue05	44.6	20%	3	18.7
Blue06	56.3	20%	3	23.5
Blue07	18.8	20%	3	8.1
Blue08	46.5	20%	3	19.5
Blue09	21.5	20%	3	9.2
Blue10	24.0	20%	3	10.3
Blue11	137.3	20%	3	56.5
Blue12	8.4	20%	3	3.8
Blue13	9.8	20%	3	4.3
Blue14	7.3	20%	3	3.3
Blue15	36.8	20%	3	15.5
Blue16	15.5	20%	3	6.7
Blue17	7.3	20%	3	3.3
Total	1255.9			518.6

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Corridor E Interchange

Basin	Interchange Location	Required Volume	Additional Percent for Landscaping / Maintenance Berm	Design Depth	Required Pond Area*	Available Infield Pond Area	Required Pond Area Outside of Infield
		ac-ft	pct	ft	ac		
Blue01_IC	FL Turnpike	187.3	20%	3	76.7	14.9	61.8
Blue02_IC	Canoe Creek Rd	19.8	20%	3	8.5	14.9	0.0
Blue07_IC	SR 500/US 192	22.1	20%	3	9.5	32.7	0.0
Blue13_IC	Nova Rd	12.2	20%	3	5.4	32.8	0.0
Blue16_IC	Lake Myrtle	41.9	20%	3	17.6	35.7	0.0
Total		283.3			117.7	131.0	61.8

*Top of pond bank, Assumes 1 foot of freeboard, Assumes square shape, 4:1 slopes

Project: CFX Feasibility Study: NE Connector

County: Osceola

Table A.5 - Pond Quantities

Corridor A Mainline

Basin	Required Volume	Pond Area	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
	ac-ft	ac	ac-ft	ac-ft	CY	SY
Red01	50.2	21.0	174.2	224.4	362,037	23,065
Red02	22.6	9.7	73.1	95.7	154,379	11,912
Red03	173.6	71.2	643.5	817.1	1,318,322	68,754
Red04	27.7	11.8	91.5	119.2	192,247	14,049
Red05	15.2	6.6	46.9	62.1	100,182	8,700
Red06	11.8	5.2	35.1	46.9	75,735	7,156
Red07	30.5	12.9	101.6	132.1	213,165	15,202
Red08	18.8	8.1	59.6	78.4	126,412	10,283
Red09	28.9	12.3	95.8	124.7	201,202	14,545
Red10	9.3	4.1	26.7	36.0	58,045	5,978
Red11	40.9	17.2	139.8	180.7	291,450	19,399
Red12	50.3	21.1	174.6	224.9	362,798	23,104
Red13	32.0	13.6	107.1	139.1	224,403	15,816
Red14	16.4	7.1	51.1	67.5	108,892	9,233
Red15	11.8	5.2	35.1	46.9	75,735	7,156

Corridor A Interchange

Basin	Interchange Location	Total Required Volume	Total Pond Area*	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
		ac-ft	ac	ac-ft	ac-ft	CY	SY
Red01_IC	FL Turnpike	195.3	80.0	727.2	922.5	1,488,232	76,526
Red02_IC	Canoe Creek Rd	46.6	19.6	160.8	207.4	334,660	21,654
Red04_IC	Hickory Tree Rd	23.5	10.1	76.3	99.8	161,037	12,293
Red09_IC	SR 500/US 192	23.2	9.9	75.2	98.4	158,816	12,166
Red14_IC	Lake Myrtle	16.5	7.2	51.4	67.9	109,619	9,277

* Pond Area includes all ponds, infield ponds and ponds requiring additional R/W, associated with the interchange.

Corridor B Mainline

Basin	Required Volume	Pond Area	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
	ac-ft	ac	ac-ft	ac-ft	CY	SY
Yellow01	50.2	21.0	174.2	224.4	362,037	23,065
Yellow02	22.6	9.7	73.1	95.7	154,379	11,912
Yellow03	215.2	88.0	804.0	1019.2	1,644,294	83,617
Yellow04	10.1	4.5	29.4	39.5	63,673	6,360
Yellow05	8.9	4.0	25.3	34.2	55,245	5,785
Yellow06	10.7	4.7	31.4	42.1	67,915	6,643
Yellow07	30.8	13.1	102.7	133.5	215,411	15,325
Yellow08	22.9	9.8	74.2	97.1	156,597	12,039
Yellow09	17.1	7.4	53.6	70.7	113,989	9,541
Yellow10	14.3	6.2	43.8	58.1	93,675	8,297
Yellow11	3.6	1.7	8.5	12.1	19,470	3,028
Yellow12	12.9	5.6	38.9	51.8	83,602	7,662
Yellow13	19.8	8.5	63.1	82.9	133,747	10,716
Yellow14	6.7	3.0	18.1	24.8	40,036	4,694
Yellow15	11.6	5.1	34.5	46.1	74,309	7,064
Yellow16	9.8	4.3	28.4	38.2	61,559	6,217
Yellow17	7.3	3.3	20.1	27.4	44,147	4,997
Yellow18	36.1	15.2	122.1	158.2	255,217	17,478
Yellow19	15.5	6.7	47.9	63.4	102,356	8,834
Yellow20	7.3	3.3	20.1	27.4	44,147	4,997

Corridor B Interchange

Basin	Interchange Location	Total Required Volume	Total Pond Area*	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
		ac-ft	ac	ac-ft	ac-ft	CY	SY
Yellow01_IC	FL Turnpike	195.3	80.0	727.2	922.5	1,488,232	76,526
Yellow02_IC	Canoe Creek Rd	46.7	19.6	161.2	207.9	335,420	21,694
Yellow05_IC	Hickory Tree Rd	6.2	2.8	16.5	22.7	36,635	4,438
Yellow10_IC	SR 500/US 192	7.4	3.3	20.4	27.8	44,835	5,047
Yellow16_IC	Nova Rd	12.2	5.4	36.5	48.7	78,590	7,341
Yellow19_IC	Lake Myrtle	41.9	17.6	143.4	185.3	299,018	19,797

* Pond Area includes all ponds, infield ponds and ponds requiring additional R/W, associated with the interchange.

Corridor C Mainline

Basin	Required Volume	Pond Area	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
	ac-ft	ac	ac-ft	ac-ft	CY	SY
Cyan01	50.2	21.0	174.2	224.4	362,037	23,065
Cyan02	60.3	25.2	211.9	272.2	439,139	26,980
Cyan03	286.9	117.0	1081.8	1368.7	2,208,096	108,939
Cyan04	107.1	44.2	388.8	495.9	800,056	44,571
Cyan05	21.8	9.4	70.2	92.0	148,471	11,572
Cyan06A	30.8	13.1	102.7	133.5	215,411	15,325
Cyan06B	21.3	9.1	68.4	89.7	144,784	11,359
Cyan07	17.1	7.4	53.6	70.7	113,989	9,541
Cyan08	21.8	9.4	70.2	92.0	148,471	11,572
Cyan09	17.1	7.4	53.6	70.7	113,989	9,541
Cyan10	14.3	6.2	43.8	58.1	93,675	8,297
Cyan11	3.6	1.7	8.5	12.1	19,470	3,028
Cyan12	12.9	5.6	38.9	51.8	83,602	7,662
Cyan13	19.8	8.5	63.1	82.9	133,747	10,716
Cyan14	6.7	3.0	18.1	24.8	40,036	4,694
Cyan15	11.6	5.1	34.5	46.1	74,309	7,064
Cyan16	9.8	4.3	28.4	38.2	61,559	6,217
Cyan17	7.3	3.3	20.1	27.4	44,147	4,997
Cyan18	36.8	15.5	124.7	161.5	260,492	17,759
Cyan19	15.5	6.7	47.9	63.4	102,356	8,834
Cyan20	7.3	3.3	20.1	27.4	44,147	4,997

Corridor C Interchange

Basin	Interchange Location	Total Required Volume	Total Pond Area*	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
		ac-ft	ac	ac-ft	ac-ft	CY	SY
Cyan01_IC	FL Turnpike	187.2	76.7	695.9	883.1	1,424,774	73,630
Cyan02_IC	Canoe Creek Rd	19.8	8.5	63.1	82.9	133,747	10,716
Cyan06A_IC	Hickory Tree Rd	47.9	20.1	165.7	213.6	344,539	22,165
Cyan06B_IC		4.4	2.0	10.9	15.3	24,637	3,479
Cyan10_IC	SR 500/US 192	7.4	3.3	20.4	27.8	44,835	5,047
Cyan16_IC	Nova Rd	12.2	5.4	36.5	48.7	78,590	7,341
Cyan18_IC	Lake Myrtle	41.9	17.6	143.4	185.3	299,018	19,797

* Pond Area includes all ponds, infield ponds and ponds requiring additional R/W, associated with the interchange.

Corridor D Mainline

Basin	Required Volume	Pond Area	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
	ac-ft	ac	ac-ft	ac-ft	CY	SY
Brown01	50.2	21.0	174.2	224.4	362,037	23,065
Brown02	60.3	25.2	211.9	272.2	439,139	26,980
Brown03	361.9	147.3	1373.4	1735.3	2,799,693	135,149
Brown04	348.9	142.1	1322.8	1671.7	2,697,042	130,622
Brown05	83.0	34.4	297.3	380.3	613,608	35,601
Brown06	30.5	12.9	101.6	132.1	213,165	15,202
Brown07	6.9	3.1	18.8	25.7	41,403	4,796
Brown08	15.3	6.7	47.2	62.5	100,906	8,745
Brown09	14.1	6.1	43.1	57.2	92,232	8,207
Brown10	3.6	1.7	8.5	12.1	19,470	3,028
Brown11	12.9	5.6	38.9	51.8	83,602	7,662
Brown12	19.8	8.5	63.1	82.9	133,747	10,716
Brown13	6.7	3.0	18.1	24.8	40,036	4,694
Brown14	11.6	5.1	34.5	46.1	74,309	7,064
Brown15	9.8	4.3	28.4	38.2	61,559	6,217
Brown16	7.3	3.3	20.1	27.4	44,147	4,997
Brown17	36.9	15.6	125.0	161.9	261,245	17,800
Brown18	15.5	6.7	47.9	63.4	102,356	8,834
Brown19	7.2	3.2	19.7	26.9	43,460	4,947

Corridor D Interchange

Basin	Interchange Location	Total Required Volume	Total Pond Area*	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
		ac-ft	ac	ac-ft	ac-ft	CY	SY
Brown01_IC	FL Turnpike	187.2	76.7	695.9	883.1	1,424,774	73,630
Brown02_IC	Canoe Creek Rd	19.8	8.5	63.1	82.9	133,747	10,716
Brown09_IC	SR 500/US 192	7.3	3.3	20.1	27.4	44,147	4,997
Brown15_IC	Nova Rd	12.2	5.4	36.5	48.7	78,590	7,341
Brown18_IC	Lake Myrtle	41.9	17.6	143.4	185.3	299,018	19,797

* Pond Area includes all ponds, infield ponds and ponds requiring additional R/W, associated with the interchange.

Corridor E Mainline

Basin	Required Volume	Pond Area	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
	ac-ft	ac	ac-ft	ac-ft	CY	SY
Blue01	50.2	21.0	174.2	224.4	362,037	23,065
Blue02	60.3	25.2	211.9	272.2	439,139	26,980
Blue03	361.9	147.3	1373.4	1735.3	2,799,693	135,149
Blue04	349.4	142.3	1324.8	1674.2	2,700,990	130,796
Blue05	44.6	18.7	153.4	198.0	319,478	20,866
Blue06	56.3	23.5	196.9	253.2	408,556	25,437
Blue07	18.8	8.1	59.6	78.4	126,412	10,283
Blue08	46.5	19.5	160.5	207.0	333,900	21,615
Blue09	21.5	9.2	69.2	90.7	146,258	11,445
Blue10	24.0	10.3	78.1	102.1	164,740	12,504
Blue11	137.3	56.5	504.2	641.5	1,034,873	55,635
Blue12	8.4	3.8	23.7	32.1	51,758	5,542
Blue13	9.8	4.3	28.4	38.2	61,559	6,217
Blue14	7.3	3.3	20.1	27.4	44,147	4,997
Blue15	36.8	15.5	124.7	161.5	260,492	17,759
Blue16	15.5	6.7	47.9	63.4	102,356	8,834
Blue17	7.3	3.3	20.1	27.4	44,147	4,997

Corridor E Interchange

Basin	Interchange Location	Total Required Volume	Total Pond Area*	PPV	Total Excavation Volume	Total Excavation Volume	Total Sodding
		ac-ft	ac	ac-ft	ac-ft	CY	SY
Blue01_IC	FL Turnpike	187.3	76.7	696.3	883.6	1,425,558	73,666
Blue02_IC	Canoe Creek Rd	19.8	8.5	63.1	82.9	133,747	10,716
Blue07_IC	SR 500/US 192	22.1	9.5	71.3	93.4	150,685	11,700
Blue13_IC	Nova Rd	12.2	5.4	36.5	48.7	78,590	7,341
Blue16_IC	Lake Myrtle	41.9	17.6	143.4	185.3	299,018	19,797

* Pond Area includes all ponds, infield ponds and ponds requiring additional R/W, associated with the interchange.

REFERENCE COPY

Project: CFX Feasibility Study: NE Connector

County: Osceola

Table A.6 - Pond Right-of-way Area Summary

Alignment	Corridor A	Corridor B	Corridor C	Corridor D	Corridor E
Alignment Length (miles)	17.6	22.1	22.1	24.3	24.2
Number of Mainline Ponds	15	20	21	19	17
Total Mainline Pond Area (ac)	227.12	225.35	326.59	456.03	518.6
Mainline Pond Size per Mile (ac/mi)	12.9	10.2	14.8	18.8	21.4
Number of Interchanges	5	6	6	5	5
Total Available Interchange Pond Area (ac)	189.0	195.8	162.4	131.4	131.0
Interchange Pond Area Outside of Infield (ac)	50.7	50.7	63.8	61.8	61.8

Table A.7 - Pond Construction Quantity Summary

Pay Item	Corridor A (Mainline)	Corridor A (IC)	Corridor B (Mainline)	Corridor B (IC)	Corridor C (Mainline)	Corridor C (IC)	Corridor D (Mainline)	Corridor D (IC)	Corridor E (Mainline)	Corridor E (IC)
120-1: Regular Excavation (Pond)	3,865,004	2,252,364	3,785,805	2,282,730	5,651,982	2,350,140	8,223,157	1,980,277	9,400,536	2,087,598
570-1-2: Performance Sod	254,353	131,917	258,272	134,843	356,732	142,175	464,326	116,481	522,122	123,219

PROJECT: CFX Feasibility Study:
NE Connector Expressway
LOCATION: Osceola County, Florida

PREPARED: ALE
CHECKED: JAN

DATE: 12/07/17
DATE: 02/14/18

Table B.1 - Offsite Conveyance Summary of Quantities

Pay item	Description	Unit	Quantity				
			Corridor A	Corridor B	Corridor C	Corridor D	Corridor E
400-1-2	Concrete Class I, Endwalls	CY	63.1	41.7			
400-2-2	Concrete Class II, Endwalls	CY	45.2	45.2	22.6	22.6	22.6
400-4-1	Concrete Class IV, Culverts	CY	5,582.8	4,669.8	5,069.1	6,773.7	7,048.6
415-1-1	Reinforcing Steel - Roadway	LB	1,482,225	1,240,281	1,344,706	1,796,424	1,869,273
430-175-142	Pipe Culvert, Round, 42" CD	LF		588			
430-175-148	Pipe Culvert, Round, 48" CD	LF	294	294			
430-175-154	Pipe Culvert, Round, 54" CD	LF	588				
430-175-160	Pipe Culvert, Round, 60" CD	LF	710	710	294	294	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	356.2	291.8	268.1	357.9	362.5

REFERENCE COPY

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 02/14/18

DATE: 02/14/18

Table B.2 - Proposed Offsite Conveyance Summary

Cross Drain Name	Size	Basin Area	Method
CD-TP01_PR	7 ft x 5 ft CBC	264.90 acres	Rational
CD-TP02_PR	3 - 8 ft x 4 ft CBC	382.90 acres	Rational
CD-100_PR	60 inch Pipe	68.90 acres	Rational
CD-101_PR	48 inch Pipe	40.40 acres	Rational
CD-102_PR	10 ft x 5 ft CBC	435.60 acres	Rational
CD-103_PR	7 ft x 4 ft CBC	171.90 acres	Rational
CD-104_PR	8 ft x 5 ft CBC	1.18 sq mi	Regression
CD-105_PR	7 ft x 6 ft CBC	193.90 acres	Rational
CD-106_PR	9 ft x 8 ft CBC	246.70 acres	Rational
CD-107_PR	8 ft x 6 ft CBC	2.17 sq mi	Regression
CD-108_PR	8 ft x 5 ft CBC	234.60 acres	Rational
CD-109_PR	54 inch Pipe	180.30 acres	Rational
CD-110_PR	7 ft x 5 ft CBC	3.17 sq mi	Regression
CD-111_PR	54 inch Pipe	41.20 acres	Rational
CD-112_PR	8 ft x 6 ft CBC	364.90 acres	Rational
CD-113_PR	8 ft x 5 ft CBC	2.08 sq mi	Regression
CD-114_PR	7 ft x 4 ft CBC	1.60 sq mi	Regression
CD-115_PR	8 ft x 5 ft CBC	379.50 acres	Rational
CD-116_PR	10 ft x 9 ft CBC	4.31 sq mi	Regression
CD-117_PR	6 ft x 5 ft CBC	2.28 sq mi	Regression
CD-118_PR	60 inch Pipe	1.09 sq mi	Regression
CD-201_PR	42 inch Pipe	53.20 acres	Rational
CD-202_PR	42 inch Pipe	26.50 acres	Rational
CD-206_PR	10 ft x 3 ft CBC	--	Match Exist.
CD-207_PR	6 ft x 4 ft CBC	140.10 acres	Rational
CD-208_PR	6 ft x 4 ft CBC	156.00 acres	Rational
CD-209_PR	6 ft x 4 ft CBC	87.40 acres	Rational
CD-211_PR	8 ft x 4 ft CBC	258.90 acres	Rational
CD-212_PR	8 ft x 5 ft CBC	4.08 sq mi	Regression
CD-300_PR	6 ft x 4 ft CBC	109.50 acres	Rational

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 02/14/18

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Table B.2 - Proposed Offsite Conveyance Summary

Cross Drain Name	Size	Basin Area	Method
CD-301_PR	7 ft x 4 ft CBC	161.40 acres	Rational
CD-305_PR	7 ft x 5 ft CBC	401.90 acres	Rational
CD-306_PR	6 ft x 4 ft CBC	61.60 acres	Rational
CD-307_PR	6 ft x 5 ft CBC	219.30 acres	Rational
CD-308_PR	7 ft x 5 ft CBC	1.50 sq mi	Regression
CD-309_PR	10 ft x 5 ft CBC	--	Match Exist.
CD-400_PR	7 ft x 5 ft CBC	196.80 acres	Rational
CD-401_PR	7 ft x 4 ft CBC	165.30 acres	Rational
CD-404_PR	7 ft x 5 ft CBC	349.60 acres	Rational
CD-406_PR	6 - 10 ft x 7 ft CBC	25.84 sq mi	Regression
CD-407_PR	9 ft x 5 ft CBC	227.90 acres	Rational
CD-500_PR	6 ft x 4 ft CBC	113.40 acres	Rational
CD-500B_PR	6 - 9 ft x 5 ft CBC	22.50 sq mi	Regression
CD-501_PR	7 ft x 5 ft CBC	446.10 acres	Rational
CD-502_PR	8 ft x 4 ft CBC	2.08 sq mi	Regression
CD-504_PR	2 - 9 ft x 4 ft CBC	10.79 sq mi	Regression
CD-505_PR	9 ft x 6 ft CBC	251.90 acres	Rational

Mile wide floodplain

Mile wide floodplain

PROJECT: CFX Feasibility Study:
 Northeast Connector Expressway
LOCATION Osceola County, Florida

PREPARED: ALE
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DATE: 12/07/17
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Table B.3 - Existing Offsite Conveyance Quantities

CD-206_PR Exist. 10'x3' CBC at SR 500
 Affected Corridor(s): B, C, and D

SHWT below US Ground Elevation
 Recommended Culvert Size Total

10' x 3' CBC

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.0

CD-309_PR Exist. 10'x4' CBC at SR 500
 Affected Corridor(s): B and C

Upstream Est. SHWL Elev (ft-NAVD88) 63.5 ft
 Upstream Est. Ground Elev (ft-NAVD88) 63 ft
 Additional Culvert Height Required 0.5 ft
 Recommended Culvert Size Total

10' x 5' CBC

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	408.1
415-1-1	Reinforcing Steel - Roadway	LB	108,147
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	18.2

PROJECT: CFX Feasibility Study: _____
 Northeast Connector Expressway _____
LOCATION: Osceola County, Florida _____

PREPARED: ALE _____
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DATE: 09/18/17 _____
DATE: 02/14/18 _____

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-TP01_PR
Affected Corridor(s)	A, B, C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	221.3

Basin Runoff Calculations

Total Contributing Area (acres)	264.90
Pervious Contributing Area (acres)	264.90
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.60
Design Peak Flow (cfs)	152.58

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	25.43
Recommended Culvert Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	65.5
Upstream Est. Ground Elev (ft-NAVD88)	65.2
Additional Culvert Height Required	0.3
Recommended Culvert Size Total	7 ft x 5 ft

Cost Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	352.7
415-1-1	Reinforcing Steel - Roadway	LB	93,466
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway
LOCATION: Osceola County, Florida

PREPARED: ALE
CHECKED: JAN

DATE: 09/14/17
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-TP02_PR
Affected Corridor(s)	A, B, C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	147.3

Basin Runoff Calculations

Total Contributing Area (acres)	72.90
Pervious Contributing Area (acres)	72.90
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.17
Design Peak Flow (cfs)	56.83
Flow from FL Turnpike CD (cfs) ⁴	330.84
Total Design Peak Flow (cfs)	387.7

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	64.7
Recommended Culvert Size	3 - 8 ft x 3 ft
Provided Cross Sectional Area (ft ²)	72
Upstream Est. SHWL Elev (ft-NAVD88)	65.5
Upstream Est. Ground Elev (ft-NAVD88)	65.1
Additional Culvert Height Required	0.4
Recommended Culvert Size Total	3 - 8 ft x 4 ft

Matches Existing CD along Turnpike (SR 91)

Cost Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	846.4
415-1-1	Reinforcing Steel - Roadway	LB	224,296
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	31.0

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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.

⁴ Additional flow calculated from Manning's Equation ($Q=1.49 \cdot A \cdot R^{2/3} \cdot S^{1/2} / n$). Size, material, and slope from FL Turnpike As-Build Plans (Contract 10.3, dated 1962). Assumed full flow.

PROJECT: CFX Feasibility Study:

PREPARED: ALE

DATE: 09/14/17

Southport Connector Expressway

LOCATION: Osceola County, Florida

CHECKED: JAN

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Upstream Flow from Cross Drain at Florida's Turnpike

From Florida's Turnpike As-Built Plans (Contract 10.3), dated 1962

Cross Drain Name	STA 4165+00
Size	3 - 8-ft x 3-ft CBC
Length (ft)	123
Upstream Invert (ft-NGVD)	65.10
Downstream Invert (ft-NGVD)	64.95
Slope (ft/ft)	0.0012

Calculated Full Flow Using Manning's Equation

Area (sf)	72
Wetted Perimeter (ft)	66
Hydraulic Radius (ft)	1.09
Manning's Roughness Coefficient	0.012
Full Flow (cfs)	330.84

REFERENCE COPY

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Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/10/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-100_PR
Affected Corridor(s)	A and B
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	126.3

Basin Runoff Calculations

Total Contributing Area (acres)	68.9
Pervious Contributing Area (acres)	68.9
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.45
Design Peak Flow (cfs)	60.77

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	10.13
Recommended Culvert Conveyance Size	48 inch
Provided Cross Sectional Area (ft ²)	12.57
Upstream Est. SHWL Elev (ft-NAVD88)	67.5
Upstream Est. Ground Elev (ft-NAVD88)	66.5
Additional Culvert Height Required (ft)	1.0
Recommended Culvert Size Total	60 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-2-2	Concrete Class II, Endwalls	CY	22.6
415-1-1	Reinforcing Steel - Roadway	LB	1,390
430-175-160	Pipe Culvert, Round, 60" CD	LF	416
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	18.2

Assumed CD at a 45 degree angle.

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/10/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-101_PR
Affected Corridor(s)	A and B
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	78.5

Basin Runoff Calculations

Total Contributing Area (acres)	40.4
Pervious Contributing Area (acres)	40.4
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	3.46
Design Peak Flow (cfs)	50.28

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	8.38
Recommended Culvert Conveyance Size	42 inch
Provided Cross Sectional Area (ft ²)	9.62
Upstream Est. SHWL Elev (ft-NAVD88)	67.5
Upstream Est. Ground Elev (ft-NAVD88)	67.0
Additional Culvert Height Required (ft)	0.5
Recommended Culvert Size Total	48 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-1-2	Concrete Class I, Endwalls	CY	16.3
430-175-148	Pipe Culvert, Round, 48" CD	LF	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	10.5

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/11/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-102_PR
Affected Corridor(s)	A and B
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	225.8

Basin Runoff Calculations

Total Contributing Area (acres)	435.60
Pervious Contributing Area (acres)	430.60
Impervious Contributing Area (acres)	5.00
Weighted Runoff Coefficient ¹	0.37
Design Event ²	50-year
Design Intensity (in/hr) ³	1.70
Design Peak Flow (cfs)	271.60

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	45.27
Recommended Culvert Size	10 ft x 5 ft
Provided Cross Sectional Area (ft ²)	50
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required (ft)	
Recommended Culvert Size Total	10 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	344.1
415-1-1	Reinforcing Steel - Roadway	LB	91,187
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	18.2

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/12/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-103_PR
Affected Corridor(s)	A and B
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	150.9

Basin Runoff Calculations

Total Contributing Area (acres)	171.90
Pervious Contributing Area (acres)	154.71
Impervious Contributing Area (acres)	17.19
Weighted Runoff Coefficient ¹	0.42
Design Event ²	50-year
Design Intensity (in/hr) ³	2.12
Design Peak Flow (cfs)	152.90

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	25.48
Recommended Culvert Conveyance Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	7 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	261.5
415-1-1	Reinforcing Steel - Roadway	LB	69,298
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	14.2

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 12/06/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-104_PR
Affected Corridor(s)	A and B
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	1.18
Estimated Storage (%) ¹	5.66
Design Event ²	50-year
Design Peak Flow (cfs)	182.34

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	30.39
Recommended Culvert Conveyance Size	8 ft x 4 ft
Provided Cross Sectional Area (ft ²)	32
Upstream Est. SHWL Elev (ft-NAVD88)	60
Upstream Est. Ground Elev (ft-NAVD88)	59
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	8 ft x 5 ft

Assumed ditch bottom

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	16.6

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study: _____
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-105_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	148.9

Basin Runoff Calculations

Total Contributing Area (acres)	193.90
Pervious Contributing Area (acres)	155.10
Impervious Contributing Area (acres)	38.80
Weighted Runoff Coefficient ¹	0.48
Design Event ²	50-year
Design Intensity (in/hr) ³	2.15
Design Peak Flow (cfs)	198.96

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	33.16
Recommended Culvert Size	7 ft x 5 ft
Provided Cross Sectional Area (ft ²)	35
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	63
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	7 ft x 6 ft

Assumed ditch bottom

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	17.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/13/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-106_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	100.1

Basin Runoff Calculations

Total Contributing Area (acres)	246.70
Pervious Contributing Area (acres)	222.00
Impervious Contributing Area (acres)	24.70
Weighted Runoff Coefficient ¹	0.42
Design Event ²	50-year
Design Intensity (in/hr) ³	2.92
Design Peak Flow (cfs)	301.89

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	50.31
Recommended Culvert Size	9 ft x 6 ft
Provided Cross Sectional Area (ft ²)	54
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	61.5
Additional Culvert Height Required	2.0
Recommended Culvert Size Total	9 ft x 8 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	385.4
415-1-1	Reinforcing Steel - Roadway	LB	102,131
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	22.2

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 12/06/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-107_PR
Affected Corridor(s)	A
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	2.17
Estimated Storage (%) ¹	9.73
Design Event ²	50-year
Design Peak Flow (cfs)	203.01

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	33.84
Recommended Culvert Conveyance Size	8 ft x 5 ft
Provided Cross Sectional Area (ft ²)	40
Upstream Est. SHWL Elev (ft-NAVD88)	63
Upstream Est. Ground Elev (ft-NAVD88)	62.5
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	8 ft x 6 ft

Assumed ditch bottom

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	323.4
415-1-1	Reinforcing Steel - Roadway	LB	85,701
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	18.2

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/13/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-108_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	132.9

Basin Runoff Calculations

Total Contributing Area (acres)	234.60
Pervious Contributing Area (acres)	205.20
Impervious Contributing Area (acres)	29.40
Weighted Runoff Coefficient ¹	0.43
Design Event ²	50-year
Design Intensity (in/hr) ³	2.35
Design Peak Flow (cfs)	239.58

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	39.9
Recommended Culvert Size	8 ft x 5 ft
Provided Cross Sectional Area (ft ²)	40
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	8 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	16.6

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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: _____
 Northeast Connector Expressway _____
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CHECKED: JAN _____

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-109_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	257

Basin Runoff Calculations

Total Contributing Area (acres)	180.30
Pervious Contributing Area (acres)	180.30
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.40
Design Peak Flow (cfs)	90.87

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	15.15
Recommended Culvert Size	54 inch
Provided Cross Sectional Area (ft ²)	15.90
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	54 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-1-2	Concrete Class I, Endwalls	CY	23.42
430-175-154	Pipe Culvert, Round, 54" CD	LF	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	11.7

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

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CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-110_PR
Affected Corridor(s)	A
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	3.17
Estimated Storage (%) ¹	22.84
Design Event ²	50-year
Design Peak Flow (cfs)	160.22

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	26.70
Recommended Culvert Conveyance Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	63.0
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	7 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
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LOCATION: Osceola County, Florida

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-111_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	100.3

Basin Runoff Calculations

Total Contributing Area (acres)	41.20
Pervious Contributing Area (acres)	41.20
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.92
Design Peak Flow (cfs)	43.25

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	7.21
Recommended Culvert Conveyance Size	42 inch
Provided Cross Sectional Area (ft ²)	9.62
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	62.5
Additional Culvert Height Required (ft)	1.0
Recommended Culvert Size Total	54 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-1-2	Concrete Class I, Endwalls	CY	23.42
430-175-154	Pipe Culvert, Round, 54" CD	LF	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	11.7

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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.

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-112_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	189.8

Basin Runoff Calculations

Total Contributing Area (acres)	364.90
Pervious Contributing Area (acres)	364.90
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.75
Design Peak Flow (cfs)	229.89

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	38.31
Recommended Culvert Size	8 ft x 5 ft
Provided Cross Sectional Area (ft ²)	40
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	62.5
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	8 ft x 6 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	323.4
415-1-1	Reinforcing Steel - Roadway	LB	85,701
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	18.2

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-113_PR
Affected Corridor(s)	A
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	2.08
Estimated Storage (%) ¹	10.83
Design Event ²	50-year
Design Peak Flow (cfs)	186.03

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	31.00
Recommended Culvert Conveyance Size	8 ft x 4 ft
Provided Cross Sectional Area (ft ²)	32
Upstream Est. SHWL Elev (ft-NAVD88)	63.7
Upstream Est. Ground Elev (ft-NAVD88)	63.0
Additional Culvert Height Required	0.7
Recommended Culvert Size Total	8 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	16.6

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-114_PR
Affected Corridor(s)	A
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	1.60
Estimated Storage (%) ¹	19.45
Design Event ²	50-year
Design Peak Flow (cfs)	112.44

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	18.74
Recommended Culvert Conveyance Size	7 ft x 3 ft
Provided Cross Sectional Area (ft ²)	21
Upstream Est. SHWL Elev (ft-NAVD88)	63.7
Upstream Est. Ground Elev (ft-NAVD88)	62.7
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	7 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	261.5
415-1-1	Reinforcing Steel - Roadway	LB	69,298
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	14.2

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-115_PR
Affected Corridor(s)	A
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	288.1

Basin Runoff Calculations

Total Contributing Area (acres)	379.50
Pervious Contributing Area (acres)	379.50
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.25
Design Peak Flow (cfs)	170.78

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	28.46
Recommended Culvert Size	8 ft x 4 ft
Provided Cross Sectional Area (ft ²)	32
Upstream Est. SHWL Elev (ft-NAVD88)	63.7
Upstream Est. Ground Elev (ft-NAVD88)	62.7
Additional Culvert Height Required (ft)	1.0
Recommended Culvert Size Total	8 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	16.6

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-116_PR
Affected Corridor(s)	A
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	4.31
Estimated Storage (%) ¹	5.14
Design Event ²	50-year
Design Peak Flow (cfs)	447.15

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	74.52
Recommended Culvert Conveyance Size	10 ft x 8 ft
Provided Cross Sectional Area (ft ²)	80
Upstream Est. SHWL Elev (ft-NAVD88)	63.7
Upstream Est. Ground Elev (ft-NAVD88)	62.7
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	10 ft x 9 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	426.7
415-1-1	Reinforcing Steel - Roadway	LB	113,076
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	24.6

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-117_PR
Affected Corridor(s)	A
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	2.28
Estimated Storage (%) ¹	20.37
Design Event ²	50-year
Design Peak Flow (cfs)	137.97

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	22.99
Recommended Culvert Conveyance Size	6 ft x 4 ft
Provided Cross Sectional Area (ft ²)	24
Upstream Est. SHWL Elev (ft-NAVD88)	63.7
Upstream Est. Ground Elev (ft-NAVD88)	63.2
Additional Culvert Height Required (ft)	0.5
Recommended Culvert Size Total	6 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	261.5
415-1-1	Reinforcing Steel - Roadway	LB	69,298
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.0

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-118_PR
Affected Corridor(s)	A, B, C, D, and E
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	1.09
Estimated Storage (%) ¹	12.85
Design Event ²	50-year
Design Peak Flow (cfs)	110.54

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	18.42
Recommended Culvert Conveyance Size	60 inch
Provided Cross Sectional Area (ft ²)	19.63
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	60 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-2-2	Concrete Class II, Endwalls	CY	22.6
415-1-1	Reinforcing Steel - Roadway	LB	1,390
430-175-160	Pipe Culvert, Round, 60" CD	LF	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	12.9

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-201_PR
Affected Corridor(s)	B
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	139.5

Basin Runoff Calculations

Total Contributing Area (acres)	53.20
Pervious Contributing Area (acres)	52.70
Impervious Contributing Area (acres)	0.50
Weighted Runoff Coefficient ¹	0.37
Design Event ²	50-year
Design Intensity (in/hr) ³	2.26
Design Peak Flow (cfs)	44.02

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	7.34
Recommended Culvert Conveyance Size	42 inch
Provided Cross Sectional Area (ft ²)	9.62
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	42 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-1-2	Concrete Class I, Endwalls	CY	12.7
430-175-142	Pipe Culvert, Round, 42" CD	LF	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	9.3

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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.

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CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-202_PR
Affected Corridor(s)	B
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	39

Basin Runoff Calculations

Total Contributing Area (acres)	26.50
Pervious Contributing Area (acres)	26.50
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	5.20
Design Peak Flow (cfs)	49.61

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	8.27
Recommended Culvert Conveyance Size	42 inch
Provided Cross Sectional Area (ft ²)	9.62
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	42 inch

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-1-2	Concrete Class I, Endwalls	CY	12.7
430-175-142	Pipe Culvert, Round, 42" CD	LF	294
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	9.3

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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.

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CYEL_CD14A_PR
Affected Corridor(s)	B, C, and D
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	109.3

Basin Runoff Calculations

Total Contributing Area (acres)	140.10
Pervious Contributing Area (acres)	140.10
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.74
Design Peak Flow (cfs)	138.04

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	23.01
Recommended Culvert Conveyance Size	6 ft x 4 ft
Provided Cross Sectional Area (ft ²)	24
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	6 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	240.9
415-1-1	Reinforcing Steel - Roadway	LB	63,839
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	13.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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: _____
 Northeast Connector Expressway _____
LOCATION: Osceola County, Florida _____

PREPARED: ALE _____
CHECKED: JAN _____

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-208_PR
Affected Corridor(s)	B, C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	123.5

Basin Runoff Calculations

Total Contributing Area (acres)	156.00
Pervious Contributing Area (acres)	154.40
Impervious Contributing Area (acres)	1.60
Weighted Runoff Coefficient ¹	0.37
Design Event ²	50-year
Design Intensity (in/hr) ³	2.49
Design Peak Flow (cfs)	142.38

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	23.73
Recommended Culvert Conveyance Size	6 ft x 4 ft
Provided Cross Sectional Area (ft ²)	24
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	6 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	240.9
415-1-1	Reinforcing Steel - Roadway	LB	63,839
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	13.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/12/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-209_PR
Affected Corridor(s)	B, C, and D
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	58.7

Basin Runoff Calculations

Total Contributing Area (acres)	87.40
Pervious Contributing Area (acres)	87.40
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	4.15
Design Peak Flow (cfs)	130.60

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	21.77
Recommended Culvert Size	6 ft x 4 ft
Provided Cross Sectional Area (ft ²)	24
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	6 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	240.9
415-1-1	Reinforcing Steel - Roadway	LB	63,839
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	13.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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: _____
 Northeast Connector Expressway _____
LOCATION: Osceola County, Florida _____

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CHECKED: JAN _____

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-211_PR
Affected Corridor(s)	B, C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	176

Basin Runoff Calculations

Total Contributing Area (acres)	258.90
Pervious Contributing Area (acres)	258.90
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.87
Design Peak Flow (cfs)	173.83

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	28.97
Recommended Culvert Size	8 ft x 4 ft
Provided Cross Sectional Area (ft ²)	32
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	8 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.0

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 12/06/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-212_PR
Affected Corridor(s)	B, C, D, and E
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	4.08
Estimated Storage (%) ¹	23.31
Design Event ²	50-year
Design Peak Flow (cfs)	186.86

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	31.14
Recommended Culvert Conveyance Size	8 ft x 4 ft
Provided Cross Sectional Area (ft ²)	32
Upstream Est. SHWL Elev (ft-NAVD88)	63.7
Upstream Est. Ground Elev (ft-NAVD88)	63.2
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	8 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	302.8
415-1-1	Reinforcing Steel - Roadway	LB	80,242
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	16.6

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-300_PR
Affected Corridor(s)	C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	127.2

Basin Runoff Calculations

Total Contributing Area (acres)	109.5
Pervious Contributing Area (acres)	109.5
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.44
Design Peak Flow (cfs)	96.04

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	16.01
Recommended Culvert Conveyance Size	60 inch
Provided Cross Sectional Area (ft ²)	19.63
Upstream Est. SHWL Elev (ft-NAVD88)	66.0
Upstream Est. Ground Elev (ft-NAVD88)	65.5
Additional Culvert Height Required	0.5
Equilvent Recommended Culvert Size (CBC)	6 ft x 3 ft
Provided Cross Sectional Area (ft ²)	18.00
Recommended Culvert Size Total	6 ft x 4 ft

Would require a pipe > 60" pipe, convert to CBC.

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	240.9
415-1-1	Reinforcing Steel - Roadway	LB	63,839
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	13.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-301_PR
Affected Corridor(s)	C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	152

Basin Runoff Calculations

Total Contributing Area (acres)	161.4
Pervious Contributing Area (acres)	161.4
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.11
Design Peak Flow (cfs)	122.61

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	20.43
Recommended Culvert Conveyance Size	7 ft x 3 ft
Provided Cross Sectional Area (ft ²)	21
Upstream Est. SHWL Elev (ft-NAVD88)	66
Upstream Est. Ground Elev (ft-NAVD88)	65.5
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	7 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	261.5
415-1-1	Reinforcing Steel - Roadway	LB	69,298
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	14.2

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
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LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/12/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-305_PR
Affected Corridor(s)	C
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	303.2

Basin Runoff Calculations

Total Contributing Area (acres)	401.90
Pervious Contributing Area (acres)	401.00
Impervious Contributing Area (acres)	0.90
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.20
Design Peak Flow (cfs)	174.26

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	29.04
Recommended Culvert Size	7 ft x 5 ft
Provided Cross Sectional Area (ft ²)	35
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	7 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-306_PR
Affected Corridor(s)	C
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	48

Basin Runoff Calculations

Total Contributing Area (acres)	61.60
Pervious Contributing Area (acres)	61.60
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	4.66
Design Peak Flow (cfs)	103.30

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	17.22
Recommended Culvert Conveyance Size	60 inch
Provided Cross Sectional Area (ft ²)	19.63
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	62.5
Additional Culvert Height Required	1.0
Equilvent Recommended Culvert Size (CBC)	6 ft x 3 ft
Provided Cross Sectional Area (ft ²)	18.00
Recommended Culvert Size Total	6 ft x 4 ft

Would require a pipe > 60" pipe, convert to CBC.

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	240.9
415-1-1	Reinforcing Steel - Roadway	LB	63,839
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	13.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-307_PR
Affected Corridor(s)	B and C
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	211.8

Basin Runoff Calculations

Total Contributing Area (acres)	219.30
Pervious Contributing Area (acres)	219.30
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.60
Design Peak Flow (cfs)	126.32

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	21.05
Recommended Culvert Conveyance Size	6 ft x 4 ft
Provided Cross Sectional Area (ft ²)	24
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	62.5
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	6 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	261.5
415-1-1	Reinforcing Steel - Roadway	LB	69,298
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.0

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-303_PR
Affected Corridor(s)	B and C
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	1.50
Estimated Storage (%) ¹	10.29
Design Event ²	50-year
Design Peak Flow (cfs)	154.51

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	25.75
Recommended Culvert Conveyance Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	63.5
Upstream Est. Ground Elev (ft-NAVD88)	62.5
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	7 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-400_PR
Affected Corridor(s)	C, D, and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	148.9

Basin Runoff Calculations

Total Contributing Area (acres)	196.8
Pervious Contributing Area (acres)	196.8
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.15
Design Peak Flow (cfs)	152.07

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	25.34
Recommended Culvert Conveyance Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	58
Upstream Est. Ground Elev (ft-NAVD88)	57
Additional Culvert Height Required	1.0
Recommended Culvert Size Total	7 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-401_PR
Affected Corridor(s)	D and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	178.7

Basin Runoff Calculations

Total Contributing Area (acres)	165.3
Pervious Contributing Area (acres)	165.3
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.84
Design Peak Flow (cfs)	109.54

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	18.26
Recommended Culvert Conveyance Size	60 inch
Provided Cross Sectional Area (ft ²)	19.63
Upstream Est. SHWL Elev (ft-NAVD88)	58
Upstream Est. Ground Elev (ft-NAVD88)	57
Additional Culvert Height Required	1.0
Equilvent Recommended Culvert Size (CBC)	7 ft x 3 ft
Provided Cross Sectional Area (ft ²)	21.00
Recommended Culvert Size Total	7 ft x 4 ft

Would require a pipe > 60" pipe, convert to CBC.

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	261.5
415-1-1	Reinforcing Steel - Roadway	LB	69,298
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	14.2

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-404_PR
Affected Corridor(s)	D and E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	318.5

Basin Runoff Calculations

Total Contributing Area (acres)	349.6
Pervious Contributing Area (acres)	349.6
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	1.25
Design Peak Flow (cfs)	157.32

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	26.22
Recommended Culvert Conveyance Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	62
Upstream Est. Ground Elev (ft-NAVD88)	61.5
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	7 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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: Northeast Connector Expressway **PREPARED:** PREPARED: **DATE:** DATE: 12/06/17
LOCATION: Osceola County, Florida **CHECKED:** CHECKED: **DATE:** DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-406_PR
Affected Corridor(s)	D
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	25.84
Estimated Storage (%) ¹	5.96
Design Event ²	50-year
Design Peak Flow (cfs)	1,342

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	223.59
Recommended Culvert Conveyance Size	6 - 10 ft x 4 ft
Provided Cross Sectional Area (ft ²)	240
Upstream Est. SHWL Elev (ft-NAVD88)	67.5
Upstream Est. Ground Elev (ft-NAVD88)	65.3
Additional Culvert Height Required	2.2
Recommended Culvert Size Total	6 - 10 ft x 7 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	2,312.4
415-1-1	Reinforcing Steel - Roadway	LB	612,786
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	120.6

Quantified as individual cross drains.

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/11/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-407_PR
Affected Corridor(s)	D
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	88.6

Basin Runoff Calculations

Total Contributing Area (acres)	227.9
Pervious Contributing Area (acres)	227.9
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	3.18
Design Peak Flow (cfs)	261.25

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	43.54
Recommended Culvert Conveyance Size	9 ft x 5 ft
Provided Cross Sectional Area (ft ²)	45
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	9 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	323.4
415-1-1	Reinforcing Steel - Roadway	LB	85,701
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	17.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/10/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-500_PR
Affected Corridor(s)	E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	81.7

Basin Runoff Calculations

Total Contributing Area (acres)	113.4
Pervious Contributing Area (acres)	113.4
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	3.37
Design Peak Flow (cfs)	137.40

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	22.90
Recommended Culvert Conveyance Size	6 ft x 4 ft
Provided Cross Sectional Area (ft ²)	24
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	6 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	240.9
415-1-1	Reinforcing Steel - Roadway	LB	63,839
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	13.4

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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: Northeast Connector Expressway **PREPARED:** PREPARED: **DATE:** DATE: 12/06/17
LOCATION: Osceola County, Florida **CHECKED:** CHECKED: **DATE:** DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-500B_PR
Affected Corridor(s)	E
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656} \left(\frac{ST}{ST-1} \right)^{-0.008A} \left(\frac{A}{ST} \right)^{-0.008A}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	22.50
Estimated Storage (%) ¹	5.97
Design Event ²	50-year
Design Peak Flow (cfs)	1,224

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	204
Recommended Culvert Conveyance Size	6 - 9 ft x 4 ft
Provided Cross Sectional Area (ft ²)	216
Upstream Est. SHWL Elev (ft-NAVD88)	67.5
Upstream Est. Ground Elev (ft-NAVD88)	67.0
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	6 - 9 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	1,940.4
415-1-1	Reinforcing Steel - Roadway	LB	514,206
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	96.6

Quantified as individual cross drains.

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/11/17

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Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-501_PR
Affected Corridor(s)	E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	327.4

Basin Runoff Calculations

Total Contributing Area (acres)	446.1
Pervious Contributing Area (acres)	446.1
Impervious Contributing Area (acres)	0.0
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	0.95
Design Peak Flow (cfs)	153

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	25.43
Recommended Culvert Conveyance Size	7 ft x 4 ft
Provided Cross Sectional Area (ft ²)	28
Upstream Est. SHWL Elev (ft-NAVD88)	69
Upstream Est. Ground Elev (ft-NAVD88)	68.5
Additional Culvert Height Required	0.5
Recommended Culvert Size Total	7 ft x 5 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.8

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:

PREPARED: ALE

DATE: 12/06/17

Northeast Connector Expressway

LOCATION: Osceola County, Florida

CHECKED: JAN

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-502_PR
Affected Corridor(s)	E
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

A = Drainage area (sq. mi.)
ST = Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	2.08
Estimated Storage (%) ¹	10.48
Design Event ²	50-year
Design Peak Flow (cfs)	190

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	31.59
Recommended Culvert Conveyance Size	8 ft x 4 ft
Provided Cross Sectional Area (ft ²)	32
Upstream Est. SHWL Elev (ft-NAVD88)	69
Upstream Est. Ground Elev (ft-NAVD88)	69
Additional Culvert Height Required	0.0
Recommended Culvert Size Total	8 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	282.2
415-1-1	Reinforcing Steel - Roadway	LB	74,783
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	15.0

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study: **PREPARED:** PREPARED: **DATE:** DATE: 12/07/17
 Northeast Connector Expressway
LOCATION: Osceola County, Florida **CHECKED:** CHECKED: **DATE:** DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-504_PR
Affected Corridor(s)	E
USGS Region	3

**Magnitude and Frequency of Floods for Rural Streams in Florida, 2006
SIR 2011-5034**

For the 50-year storm (2% exceedance probability):

$$Q = 517A^{0.656}(ST + 1)^{-0.608}$$

$A =$ Drainage area (sq. mi.)
 $ST =$ Storage (percent)

Basin Runoff Calculations

Total Contributing Area (sq. mi.)	10.79
Estimated Storage (%) ¹	17.96
Design Event ²	50-year
Design Peak Flow (cfs)	411.48

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	68.58
Recommended Culvert Conveyance Size	2 - 9 ft x 4 ft
Provided Cross Sectional Area (ft ²)	72
Upstream Est. SHWL Elev (ft-NAVD88)	N/A; SHWT below US Ground Elevation
Upstream Est. Ground Elev (ft-NAVD88)	
Additional Culvert Height Required	
Recommended Culvert Size Total	2 - 9 ft x 4 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	605.5
415-1-1	Reinforcing Steel - Roadway	LB	160,458
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	24.6

Notes:

¹ Using National Hydrology Dataset (Resolution 24) and National Wetland Inventory. Removed shapes that have been hydraulically drained from agricultural development.

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

PROJECT: CFX Feasibility Study:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/12/17

DATE: 02/14/18

Table B.4 - Proposed Offsite Conveyance Calculations

Proposed Cross Drain at Northeast Connector Expressway

Cross Drain Name	CD-505_PR
Affected Corridor(s)	E
Precipitation Zone	7
Pervious C-Value	0.3
Impervious C-value	0.95
Time of Concentration (min)	110.8

Basin Runoff Calculations

Total Contributing Area (acres)	251.90
Pervious Contributing Area (acres)	251.90
Impervious Contributing Area (acres)	0.00
Weighted Runoff Coefficient ¹	0.36
Design Event ²	50-year
Design Intensity (in/hr) ³	2.71
Design Peak Flow (cfs)	245.68

Cross Drain Sizing Calculations

Assumed Velocity (ft/s)	6
Cross-sectional Area Required (ft ²)	40.95
Recommended Culvert Conveyance Size	9 ft x 5 ft
Provided Cross Sectional Area (ft ²)	45
Upstream Est. SHWL Elev (ft-NAVD88)	67
Upstream Est. Ground Elev (ft-NAVD88)	66.3
Additional Culvert Height Required	0.7
Recommended Culvert Size Total	9 ft x 6 ft

Quantity Estimate Calculations

Pay Item No.	Description	Unit	Quantity
400-4-1	Concrete Class IV, Culverts	CY	344.1
415-1-1	Reinforcing Steel - Roadway	LB	91,187
530-3-4	Riprap, Rubble, F&I, Ditch Lining	TN	19.0

Notes:

¹ Frequency Factor for Pervious Area Runoff Coefficients will be applied per Design Storm Event (Table 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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/10/17

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Table B.5 - Proposed Time of Concentration Summary

Cross Drain ID	Time of Concentration (min)
CD-TP01	221.3
CD-TC02	147.3
CD-100_PR	126.3
CD-101_PR	78.5
CD-102_PR	225.8
CD-103_PR	150.9
CD-105_PR	148.9
CD-106_PR	100.1
CD-108_PR	257.7
CD-109_PR	257.0
CD-111_PR	100.3
CD-112_PR	189.8
CD-115_PR	288.1
CD-201_PR	139.5
CD-202_PR	39.0
CD-207_PR	109.3
CD-208_PR	123.5
CD-209_PR	58.7
CD-211_PR	176.0
CD-300_PR	127.2
CD-301_PR	152.0
CD-305_PR	303.2
CD-306_PR	48.0
CD-307_PR	211.8
CD-400_PR	148.9
CD-401_PR	178.7
CD-404_PR	318.5
CD-407_PR	88.6
CD-500_PR	81.7
CD-501_PR	327.4
CD-505_PR	110.8

REFERENCE COPY

PROJECT: CFX Feasibility Study: **PREPARED:** ALE **DATE:** 9/14/2017
 Northeast Connector Expressway
LOCATION: Osceola County, Florida **CHECKED:** JAN **DATE:** 02/14/18

Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or DEVELOPED / UNDEVELOPED **BASIN:** CD-TP01

Tc or Tt (through subarea)

L = 5,915 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.003
0.294
0.29

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $T_t = L/3600V$
- Subtotal

BC	CD
Unpaved	Unpaved
2,815	3,000
0.002	0.001
0.72	0.36
1.08	2.31
3.39	

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $T_t = L/3600V$
 22. Subtotal

0.00

Time of Concentration, hr. (summation of subtotals)

Hours	3.69
Minutes	221.3
Total	221.3

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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 9/14/2017

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING	or	DEVELOPED / UNDEVELOPED	BASIN:	CD-TC02
Tc	or	Tt (through subarea)		

L = 4,102 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.003
0.277
0.28

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
4,002
0.001
0.51
2.18
2.18

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

Time of Concentration, hr. (summation of subtotals)

Hours	2.46
Minutes	147.3
Total	147.3

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:
Northeast Connector Expressway
LOCATION: Osceola County, Florida

PREPARED: ALE
CHECKED: JAN

DATE: 10/10/17
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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** **BASIN:** CD-100_PR

Tc or **Tt (through subarea)**

L = 1,762 ft

Sheet flow (Applicable to Tc only)

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

AB
Woods
0.4
100
4.5
0.001
1.094
1.09

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
8. Flow length, L (ft)
9. Watercourse slope, s (ft/ft)
10. Average velocity^{†††}, V = $kS^{0.5}$ (fps)
11. Compute Tt in hr, $Tt = L/3600V$
Subtotal

BC
Unpaved
1,662
0.001
0.46
1.01
1.01

Channel & Pipe Flow

- Segment ID
12. Segment Type
13. Pipe Diameter (in.)
14. Cross sectional flow area, a (assumed d=0.5 ft)
15. Wetted perimeter, Pw
16. Hydraulic radius (ft), $r = a/Pw$, Compute r
17. Channel/Pipe slope, s (ft./ft.)
18. Manning's roughness coeff., n
19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
20. Flow length, L
21. Compute Tt in hr, $Tt = L/3600V$
22. Subtotal

Time of Concentration, hr. (summation of subtotals)

Hours	2.11
Minutes	126.3
Total	126.3

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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/10/17

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: **CD-101_PR**

Tc or **Tt (through subarea)**

L = 1,878 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.001
0.424
0.42

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
1,778
0.001
0.56
0.88
0.88

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

Time of Concentration, hr. (summation of subtotals)

Hours	1.31
Minutes	78.5
Total	78.5

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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/11/17

DATE: 02/14/18

Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: **CD-102_PR**

Tc or **Tt (through subarea)**

L = 5,447 ft

Sheet flow (Applicable to Tc only)

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

AB
Woods
0.4
100
4.5
0.010
0.398
0.40

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
5,347
0.001
0.44
3.37
3.37

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

Time of Concentration, hr. (summation of subtotals)

Hours	3.76
Minutes	225.8
Total	225.8

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:
Northeast Connector Expressway
LOCATION: Osceola County, Florida

PREPARED: ALE
CHECKED: JAN

DATE: 10/12/17
DATE: 02/14/18

Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** **BASIN:** CD-103_PR

Tc or **Tt (through subarea)**

L = 4,179 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.010
0.182
0.18

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

CD
Channel
--
3.5
9.12
0.38
0.002
0.08
0.49
4,079
2.33
2.33

Time of Concentration, hr. (summation of subtotals)

Hours	2.52
Minutes	150.9
Total	150.9

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:
Northeast Connector Expressway
LOCATION: Osceola County, Florida

PREPARED: ALE
CHECKED: JAN

DATE: 10/13/17
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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: **CD-105_PR**

Tc or **Tt (through subarea)**

L = 5,059 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.003
0.316
0.32

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
8. Flow length, L (ft)
9. Watercourse slope, s (ft/ft)
10. Average velocity^{†††}, V = $kS^{0.5}$ (fps)
11. Compute Tt in hr, $Tt = L/3600V$
Subtotal

BC
Unpaved
2,899
0.003
0.81
1.00
1.00

Channel & Pipe Flow

- Segment ID
12. Segment Type
13. Pipe Diameter (in.)
14. Cross sectional flow area, a (assumed d=0.5 ft)
15. Wetted perimeter, Pw
16. Hydraulic radius (ft), $r = a/Pw$, Compute r
17. Channel/Pipe slope, s (ft./ft.)
18. Manning's roughness coeff., n
19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
20. Flow length, L
21. Compute Tt in hr, $Tt = L/3600V$
22. Subtotal

CD
Channel
--
3.5
9.12
0.38
0.003
0.08
0.49
2,060
1.17
1.17

Time of Concentration, hr. (summation of subtotals)

Hours	2.48
Minutes	148.9
Total	148.9

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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/13/17

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: CD-106_PR

T_c or T_t (through subarea)

L = 3,275 ft

Sheet flow (Applicable to T_c only)

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

AB
Grass
0.15
100
4.5
0.004
0.262
0.26

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, V = kS^{0.5} (fps)
 11. Compute T_t in hr, $T_t = L/3600V$
- Subtotal

BC
Unpaved
1,525
0.003
0.91
0.47
0.47

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, P_w
 16. Hydraulic radius (ft), $r = a/P_w$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute T_t in hr, $T_t = L/3600V$
 22. Subtotal

CD
Channel
--
3.5
9.12
0.38
0.002
0.08
0.49
1,650
0.94
0.94

Time of Concentration, hr. (summation of subtotals)

Hours	1.67
Minutes	100.1
Total	100.1

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:
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LOCATION: Osceola County, Florida

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** **BASIN:** CD-108_PR

Tc or **Tt (through subarea)**

L = 7,396 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.005
0.240
0.24

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
7,296
0.001
0.50
4.06
4.06

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

Time of Concentration, hr. (summation of subtotals)

Hours	4.30
Minutes	257.7
Total	257.7

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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/23/17

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: **CD-109_PR**

Tc or **Tt (through subarea)**

L = 5,632 ft

Sheet flow (Applicable to Tc only)

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

AB
Woods
0.4
100
4.5
0.010
0.398
0.40

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
962
0.002
0.74
0.36
0.36

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

CD
Channel
--
5.5
12.24
0.45
0.001
0.08
0.36
4,570
3.52
3.52

Time of Concentration, hr. (summation of subtotals)

Hours	4.28
Minutes	257.0
Total	257.0

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:
Northeast Connector Expressway

LOCATION: Osceola County, Florida

PREPARED: ALE

CHECKED: JAN

DATE: 10/23/17

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: **CD-111_PR**

Tc or **Tt (through subarea)**

L = 2,304 ft

Sheet flow (Applicable to Tc only)

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

AB
Woods
0.4
100
4.5
0.010
0.398
0.40

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
1,229
0.004
0.99
0.35
0.35

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

CD
Channel
--
5.5
12.24
0.45
0.0007
0.08
0.29
975
0.93
0.93

Time of Concentration, hr. (summation of subtotals)

Hours	1.67
Minutes	100.3
Total	100.3

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:
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PREPARED: ALE
CHECKED: JAN

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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** BASIN: **CD-112_PR**

Tc or **Tt (through subarea)**

L = 4,467 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.003
0.316
0.32

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
8. Flow length, L (ft)
9. Watercourse slope, s (ft/ft)
10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
11. Compute Tt in hr, $Tt = L/3600V$
Subtotal

BC
Unpaved
1,195
0.005
1.14
0.29
0.29

Channel & Pipe Flow

- Segment ID
12. Segment Type
13. Pipe Diameter (in.)
14. Cross sectional flow area, a (assumed d=0.5 ft)
15. Wetted perimeter, Pw
16. Hydraulic radius (ft), $r = a/Pw$, Compute r
17. Channel/Pipe slope, s (ft./ft.)
18. Manning's roughness coeff., n
19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
20. Flow length, L
21. Compute Tt in hr, $Tt = L/3600V$
22. Subtotal

CD
Channel
--
5.5
12.24
0.45
0.001
0.08
0.34
3,172
2.56
2.56

Time of Concentration, hr. (summation of subtotals)

Hours	3.16
Minutes	189.8
Total	189.8

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:
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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** **BASIN:** CD-115_PR

Tc or **Tt (through subarea)**

L = 6,743 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.008
0.199
0.20

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $Tt = L/3600V$
- Subtotal

BC
Unpaved
5,143
0.001
0.42
3.39
3.39

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $Tt = L/3600V$
 22. Subtotal

CD
Channel
--
5.5
12.24
0.45
0.001
0.08
0.34
1,500
1.21
1.21

Time of Concentration, hr. (summation of subtotals)

Hours	4.80
Minutes	288.1
Total	288.1

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:
Northeast Connector Expressway
LOCATION: Osceola County, Florida

PREPARED: ALE
CHECKED: JAN

DATE: 10/12/17
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Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or **DEVELOPED / UNDEVELOPED** **BASIN:** CD-201_PR

Tc or **Tt (through subarea)**

L = 2,633 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.003
0.316
0.32

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
8. Flow length, L (ft)
9. Watercourse slope, s (ft/ft)
10. Average velocity^{†††}, V = $kS^{0.5}$ (fps)
11. Compute Tt in hr, $Tt = L/3600V$
Subtotal

BC
Unpaved
493
0.009
1.49
0.09
0.09

Channel & Pipe Flow

- Segment ID
12. Segment Type
13. Pipe Diameter (in.)
14. Cross sectional flow area, a (assumed d=0.5 ft)
15. Wetted perimeter, Pw
16. Hydraulic radius (ft), $r = a/Pw$, Compute r
17. Channel/Pipe slope, s (ft./ft.)
18. Manning's roughness coeff., n
19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
20. Flow length, L
21. Compute Tt in hr, $Tt = L/3600V$
22. Subtotal

CD
Channel
--
5.5
12.24
0.45
0.001
0.08
0.30
2,040
1.92
1.92

Time of Concentration, hr. (summation of subtotals)

Hours	2.33
Minutes	139.5
Total	139.5

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:** ALE **DATE:** 10/12/17
 Northeast Connector Expressway
LOCATION: Osceola County, Florida **CHECKED:** JAN **DATE:** 02/14/18

Table B.6 - Proposed Offsite Time of Concentration Calculations

EXISTING or DEVELOPED / UNDEVELOPED BASIN: CD-202_PR

Tc or Tt (through subarea)

L = 1,416 ft

Sheet flow (Applicable to Tc only)

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

AB
Grass
0.15
100
4.5
0.005
0.240
0.24

Shallow Concentrated Flow

- Segment ID
7. Surface description (Paved or Unpaved)
 8. Flow length, L (ft)
 9. Watercourse slope, s (ft/ft)
 10. Average velocity^{†††}, $V = kS^{0.5}$ (fps)
 11. Compute Tt in hr, $T_t = L/3600V$
- Subtotal

BC
Unpaved
1,316
0.003
0.89
0.41
0.41

Channel & Pipe Flow

- Segment ID
12. Segment Type
 13. Pipe Diameter (in.)
 14. Cross sectional flow area, a (assumed d=0.5 ft)
 15. Wetted perimeter, Pw
 16. Hydraulic radius (ft), $r = a/Pw$, Compute r
 17. Channel/Pipe slope, s (ft./ft.)
 18. Manning's roughness coeff., n
 19. $V = 1.486(r^{0.667})(s^{0.50})/n$, Compute V
 20. Flow length, L
 21. Compute Tt in hr, $T_t = L/3600V$
 22. Subtotal

Time of Concentration, hr. (summation of subtotals)

Hours	0.65
Minutes	39.0
Total	39.0

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