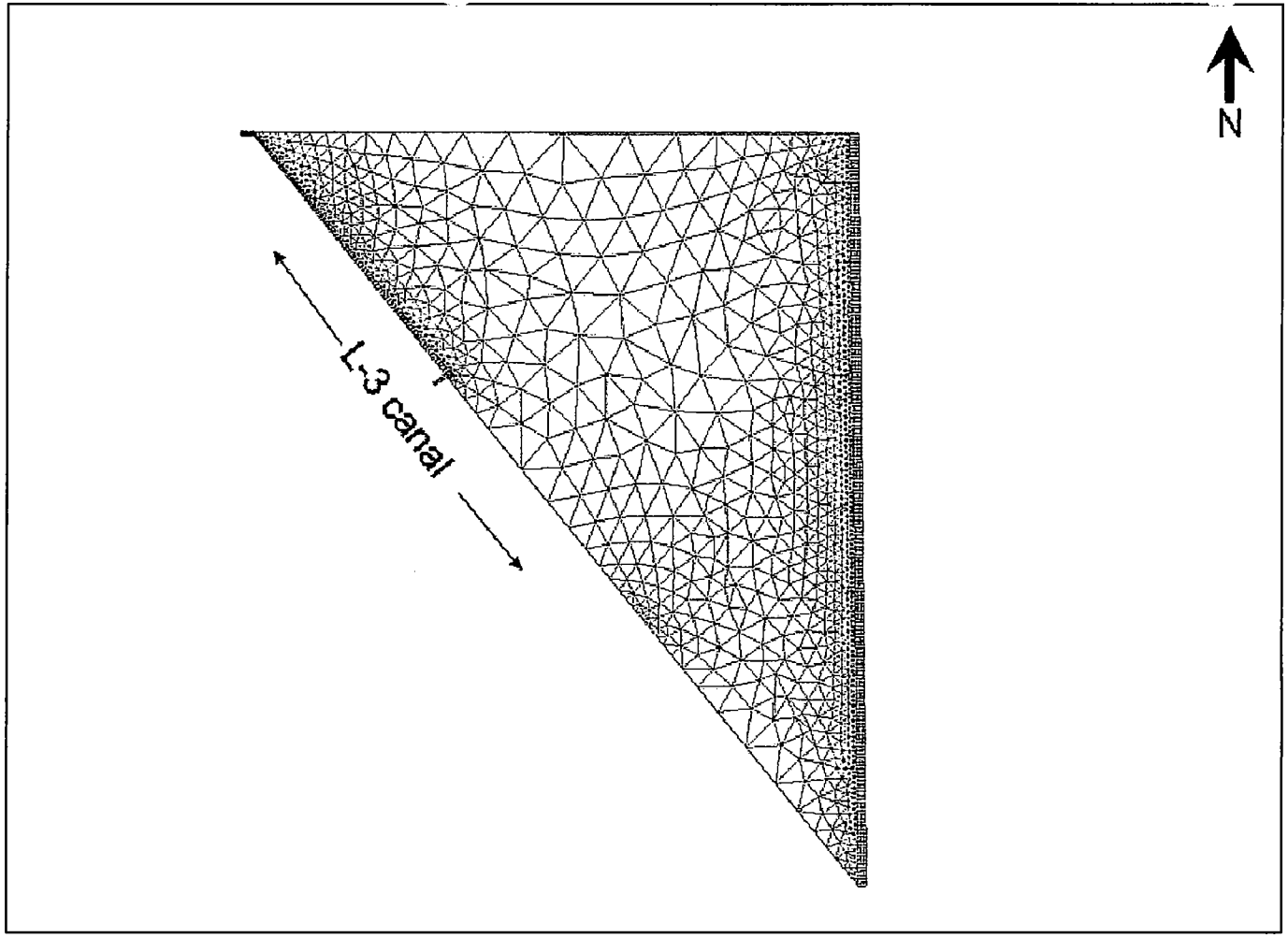
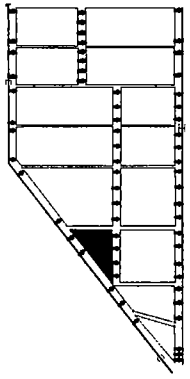
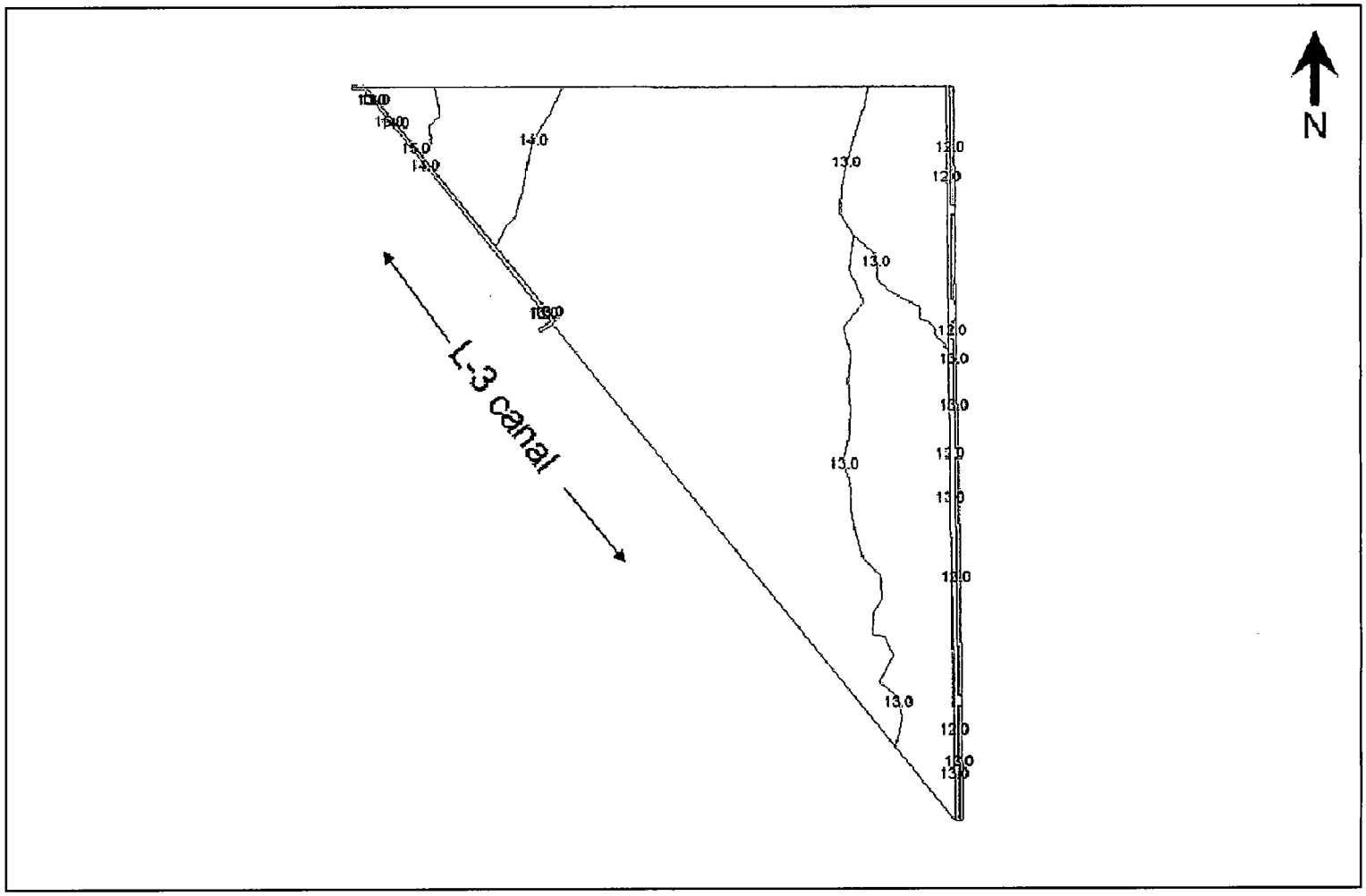


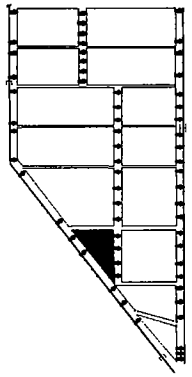


KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-6 SECTION 4 MODEL MESH	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 23

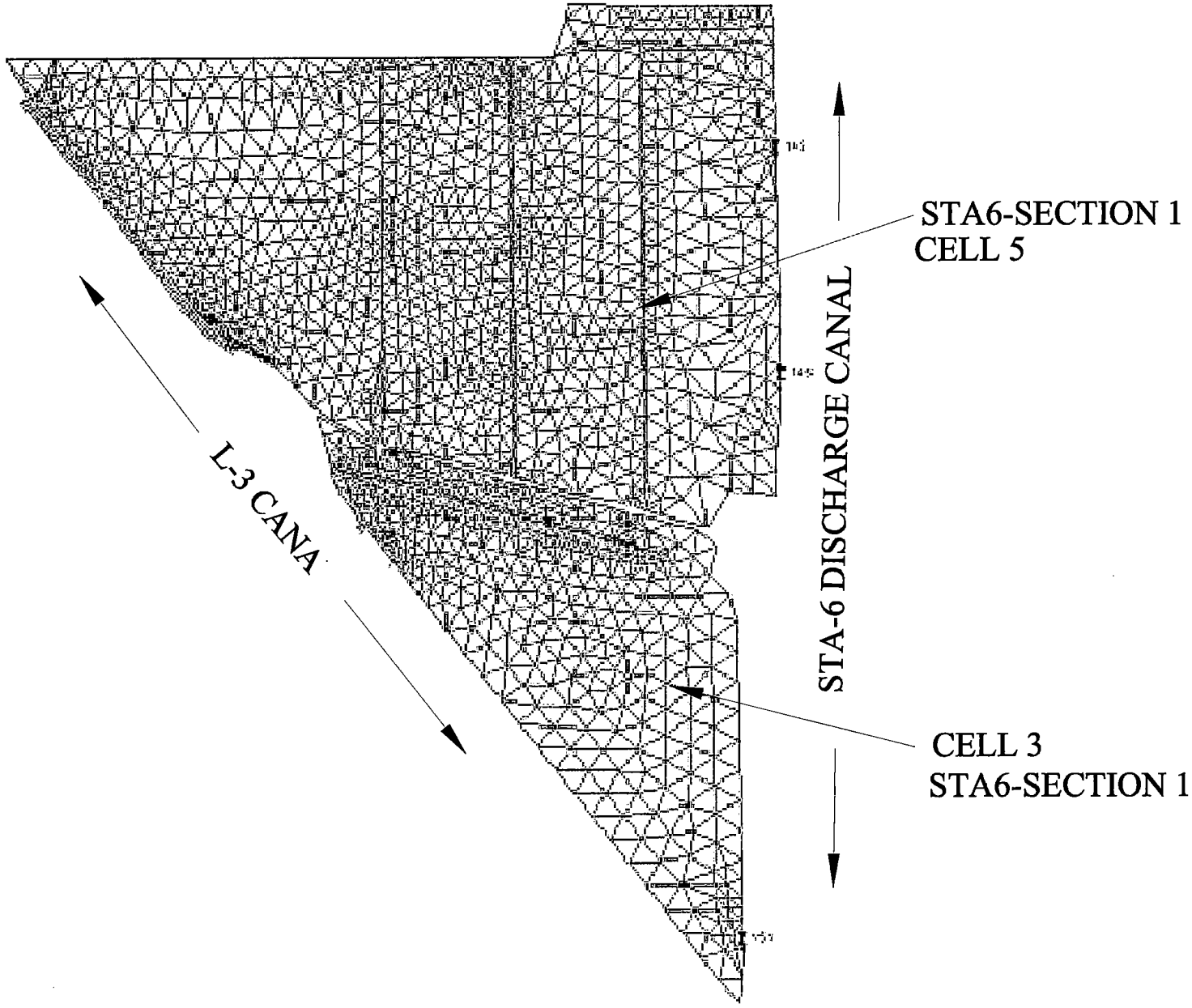
G:\296\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-023.dwg 3/12/2005 6:38:49 PM EST

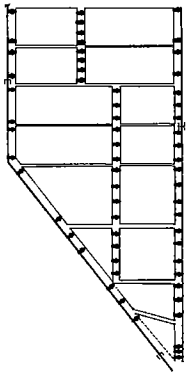




KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-6 SECTION 4 MODEL TOPOGRAPHY	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 24
	G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-024.dwg 3/12/2005 6:39:27 PM EST		





KEY PLAN

SFWMD
COMPARTMENT C

URS
Boca Raton, Florida

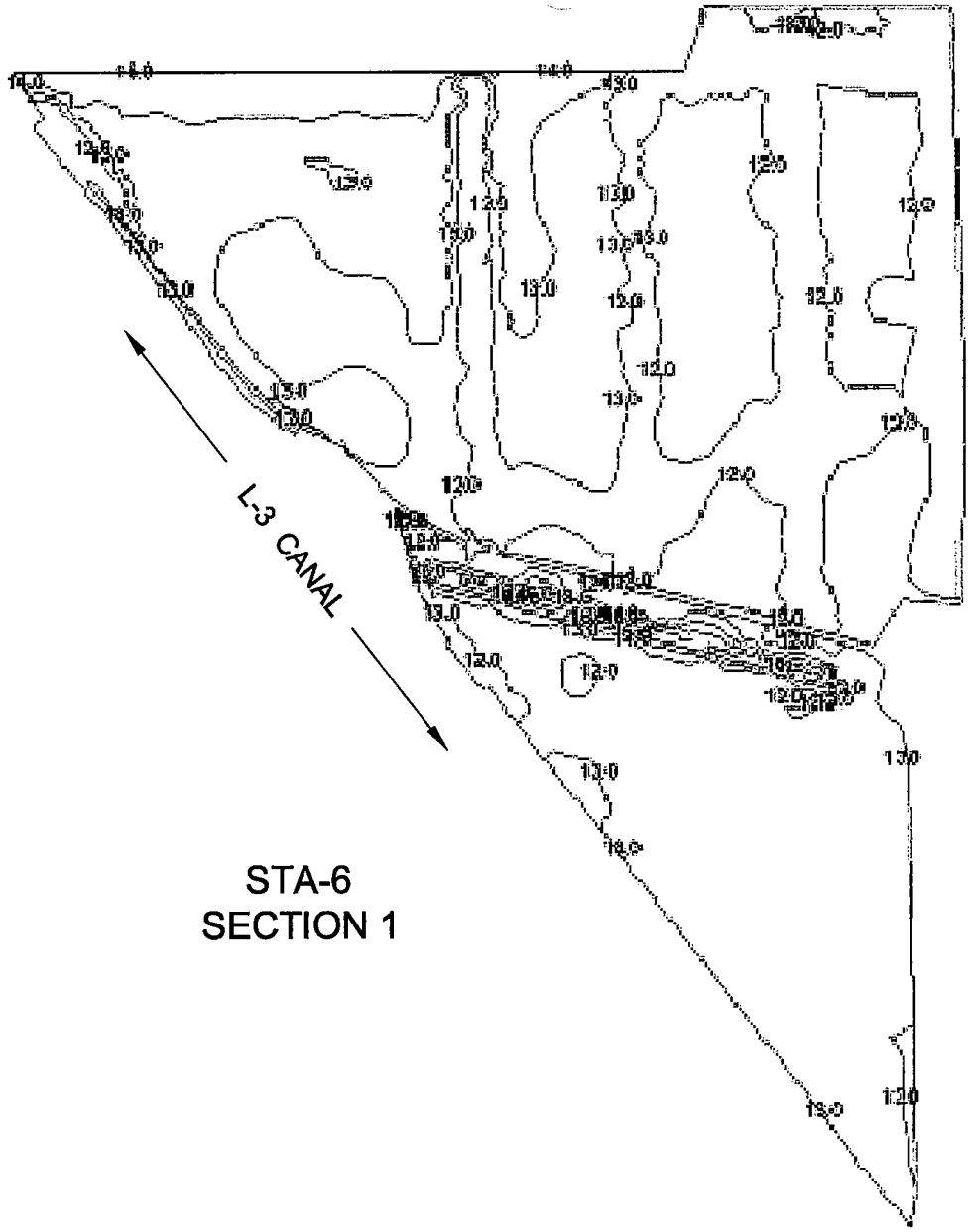
SCALE:	DRAWN BY: MV	DATE: 03/11/05
N.T.S.	CHECKED BY: CV	

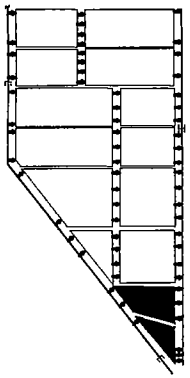
G:\296\38615215 SFWMD\CADD\PRESENTATION\plot\TM\ULLINTM-025.dwg 3/12/2005 6:40:03 PM EST

STA-6 SECTION 1, CELLS 3 AND 5
MODEL MESH

PROJ NO
38615215

FIG NO
25





KEY PLAN

SFWMD
COMPARTMENT C

URS
Boca Raton, Florida

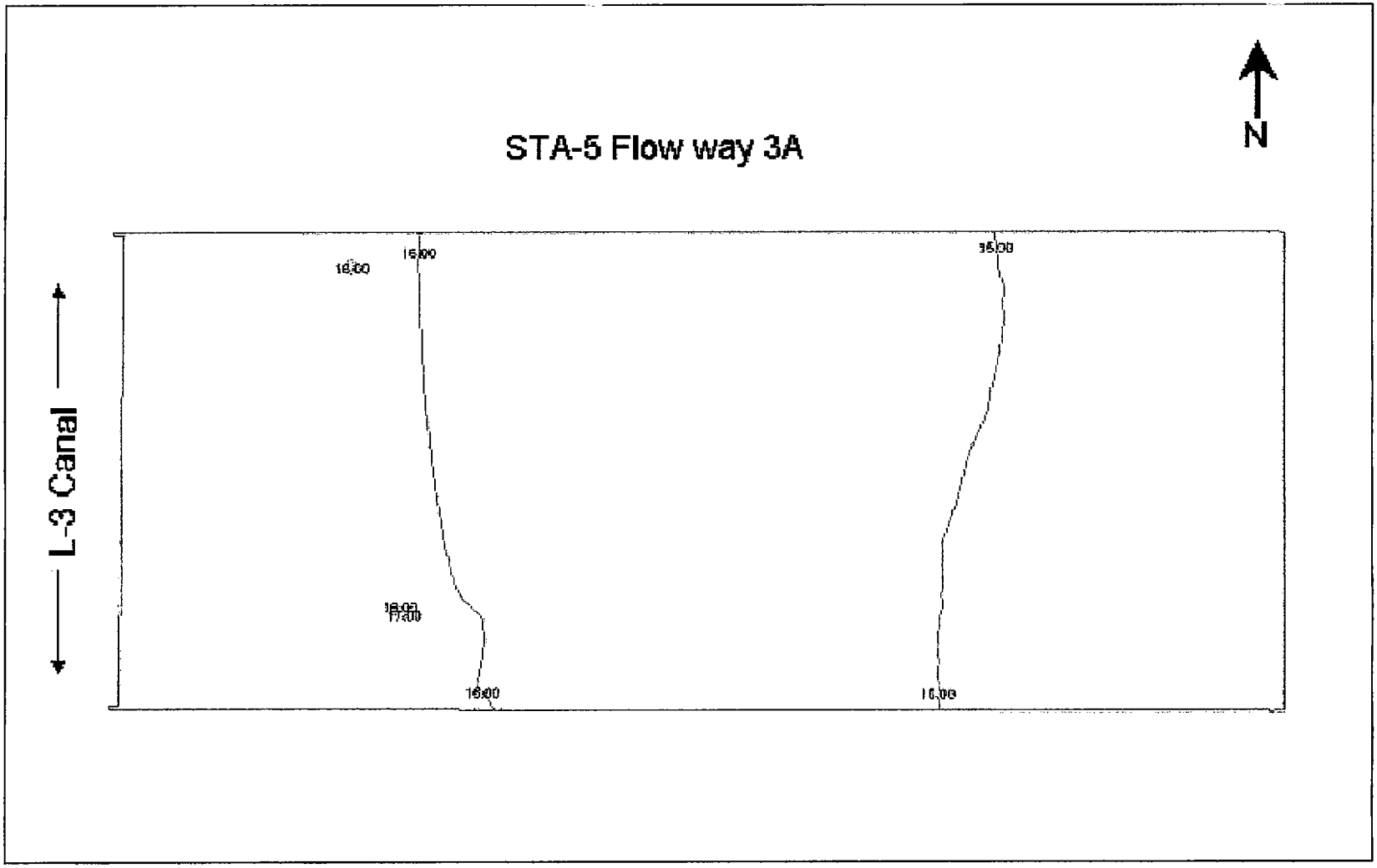
SCALE: N.T.S.	DRAWN BY: JC	DATE: 03/14/05
	CHECKED BY: CV	

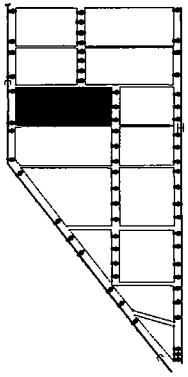
G:\29\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-026.dwg 3/12/2005 6:40:42 PM EST

STA-6 SECTION 1 CELLS 3 AND 5
MODEL TOPOGRAPHY

PROJ NO
38615215

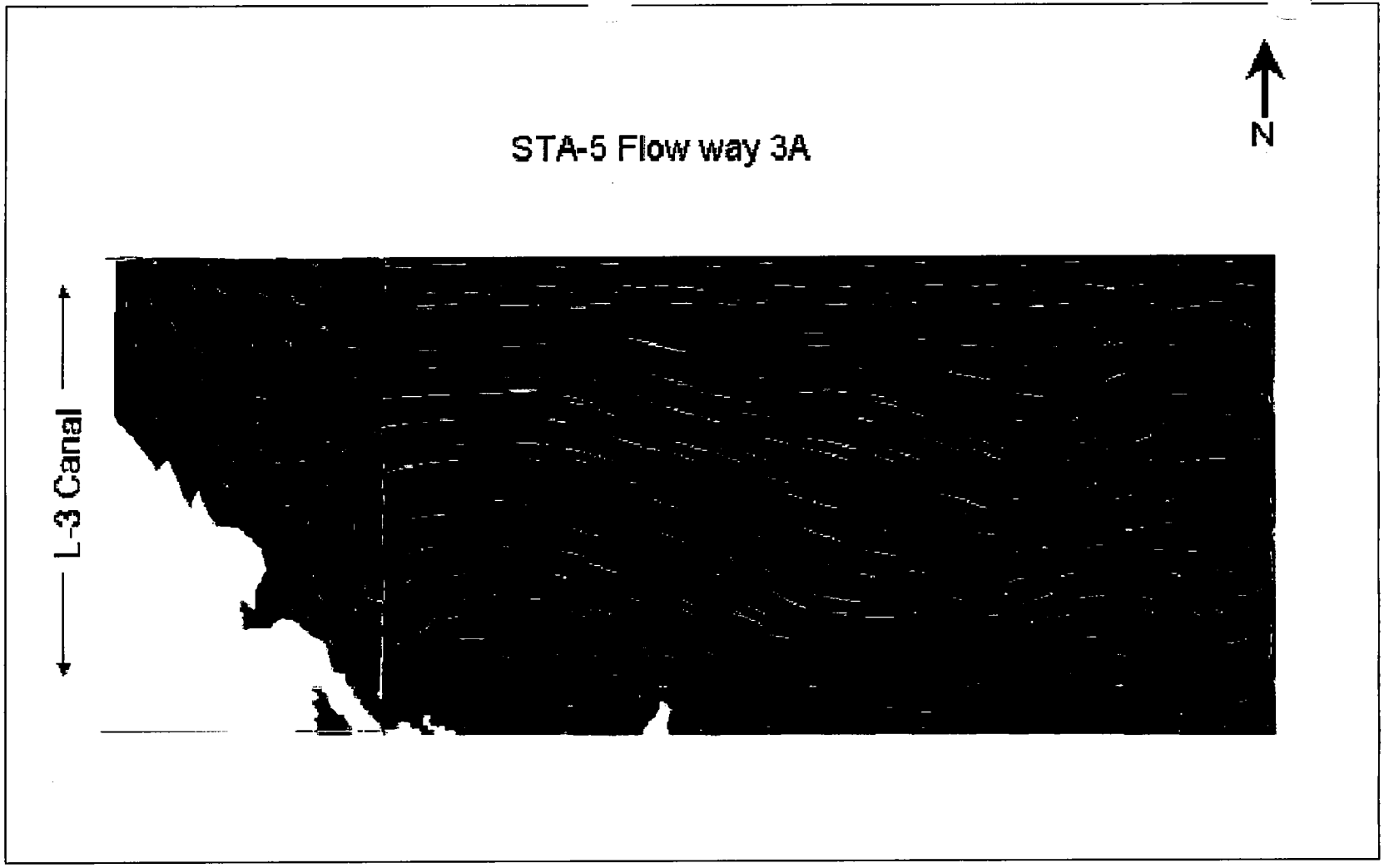
FIG NO
26

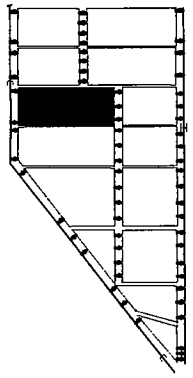




KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 3A SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 27
	G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TM\ULLIN\TM-027.dwg 3/12/2005 6:41:28 PM EST		

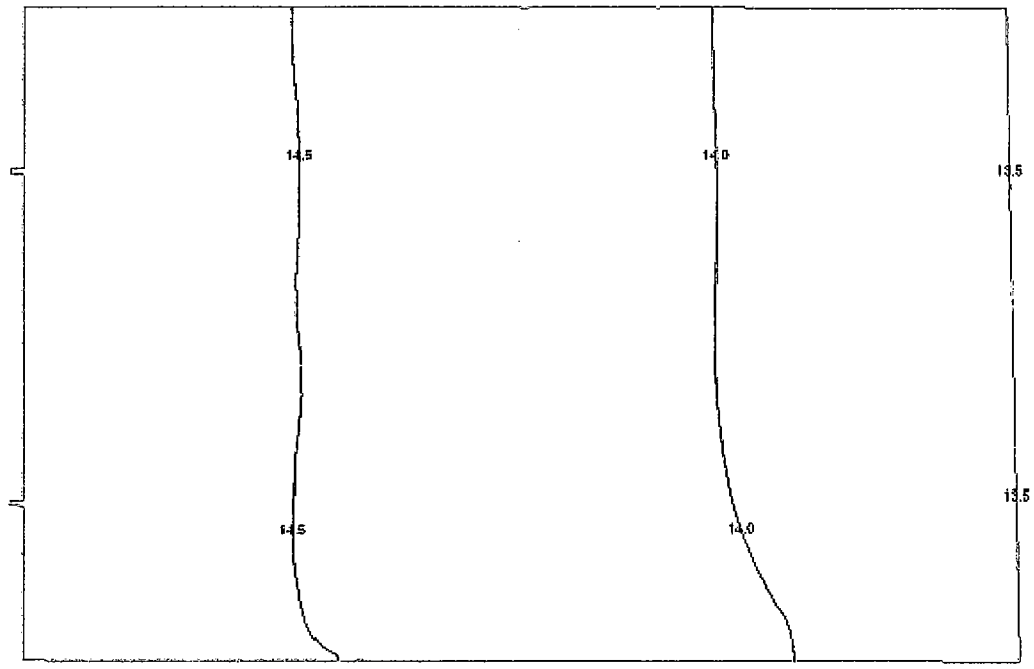




KEY PLAN

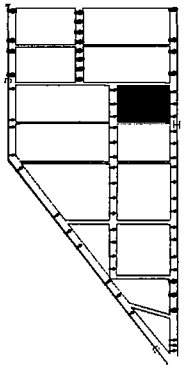
SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 3A SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 28
	G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-028.dwg 3/12/2005 6:42:08 PM EST		

STA-5 Flow way 3B



N

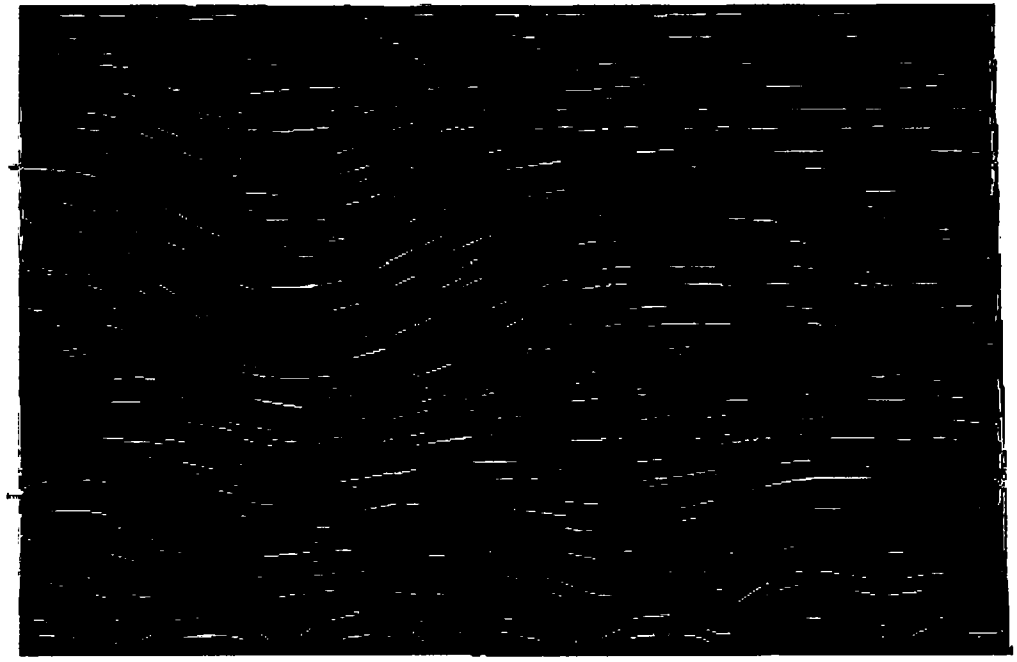
STA –5 Discharge Canal



KEY PLAN

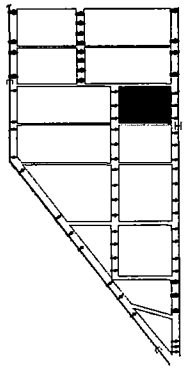
SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 3B SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 29
	G:\296\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLINTM-029.dwg 3/12/2005 5:42:24 PM EST		

STA-5 Flow way 3B



N

STA-5 Discharge Canal

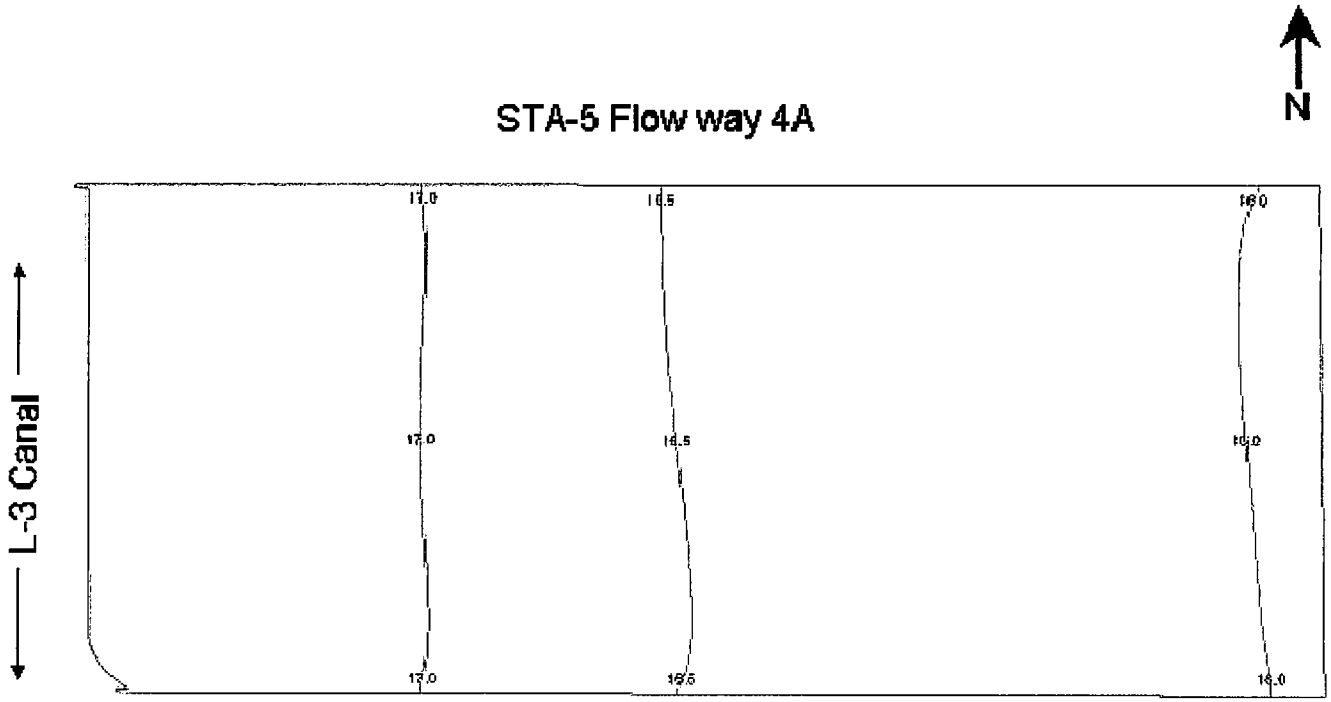


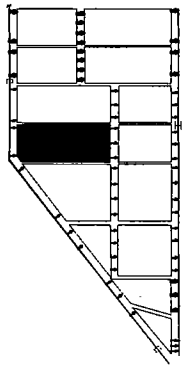
KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 3B SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 30

G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TM\ULLINTM-030.dwg 3/12/2005 6:41:43 PM EST

STA-5 Flow way 4A





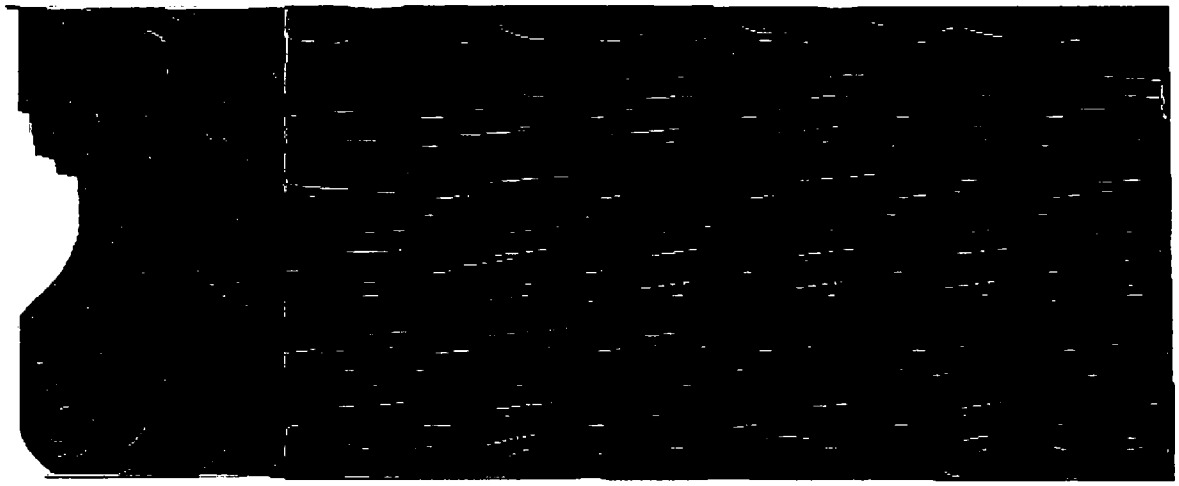
KEY PLAN

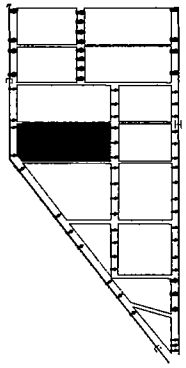
SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 4A SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 31
	G:\206\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-031.dwg 3/12/2005 5:40:59 PM EST		

STA-5 Flow way 4A

N

L-3 Canal

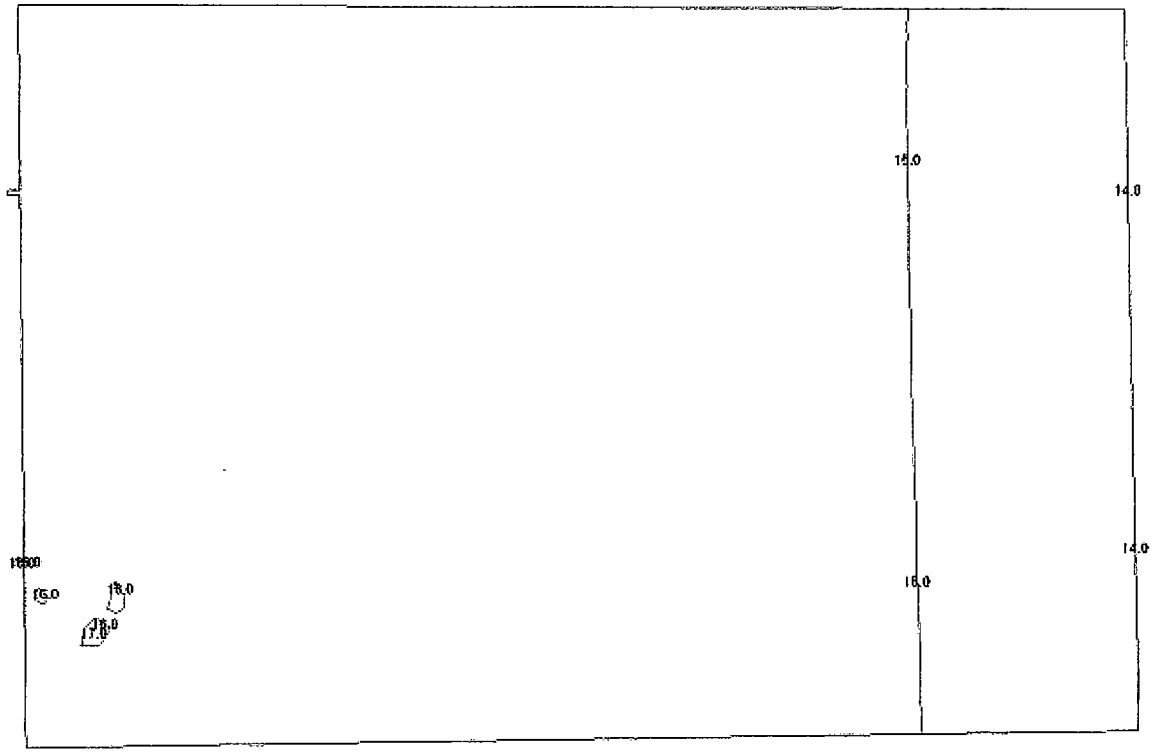




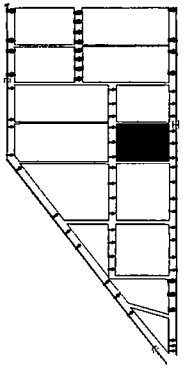
KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 4A SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 32
	G:\206\38615216 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-032.dwg 3/12/2005 6:40:15 PM EST		

STA-5 Flow way 4B



SIMULATED WSE



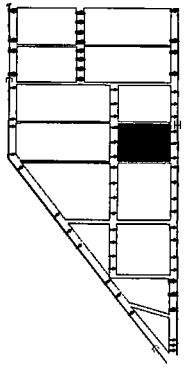
KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 4B SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 33
	G:\2061\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-033.dwg 3/12/2005 8:36:49 PM EST		

STA-5 Flow way 4B

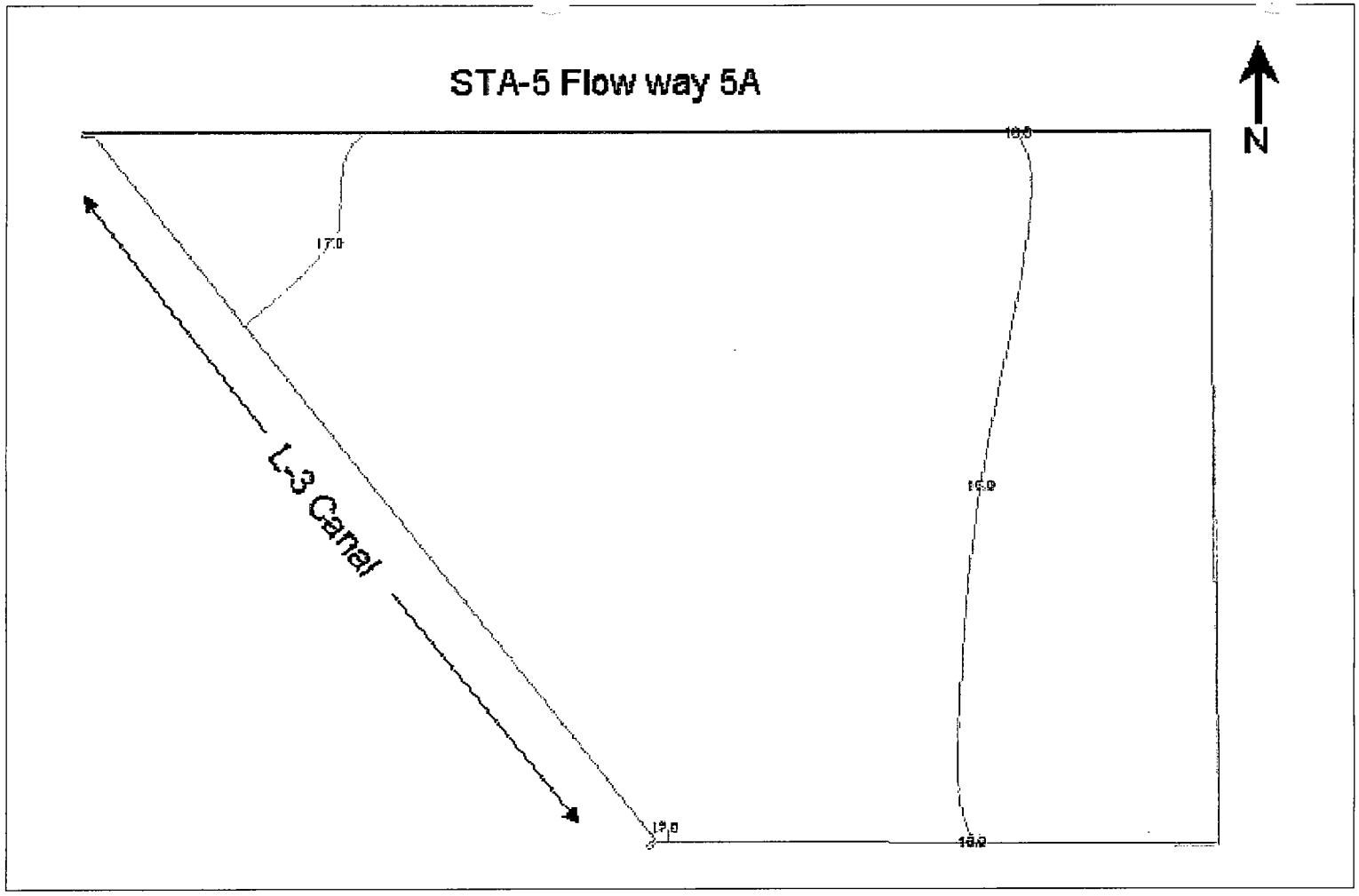
STA-5 Discharge Canal

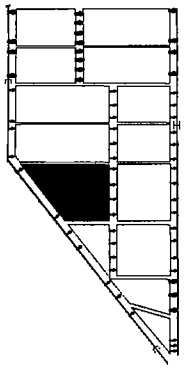
N



KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 4B SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 34
	G:\2961\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLINTM-034.dwg 3/12/2005 6:37:31 PM EST		



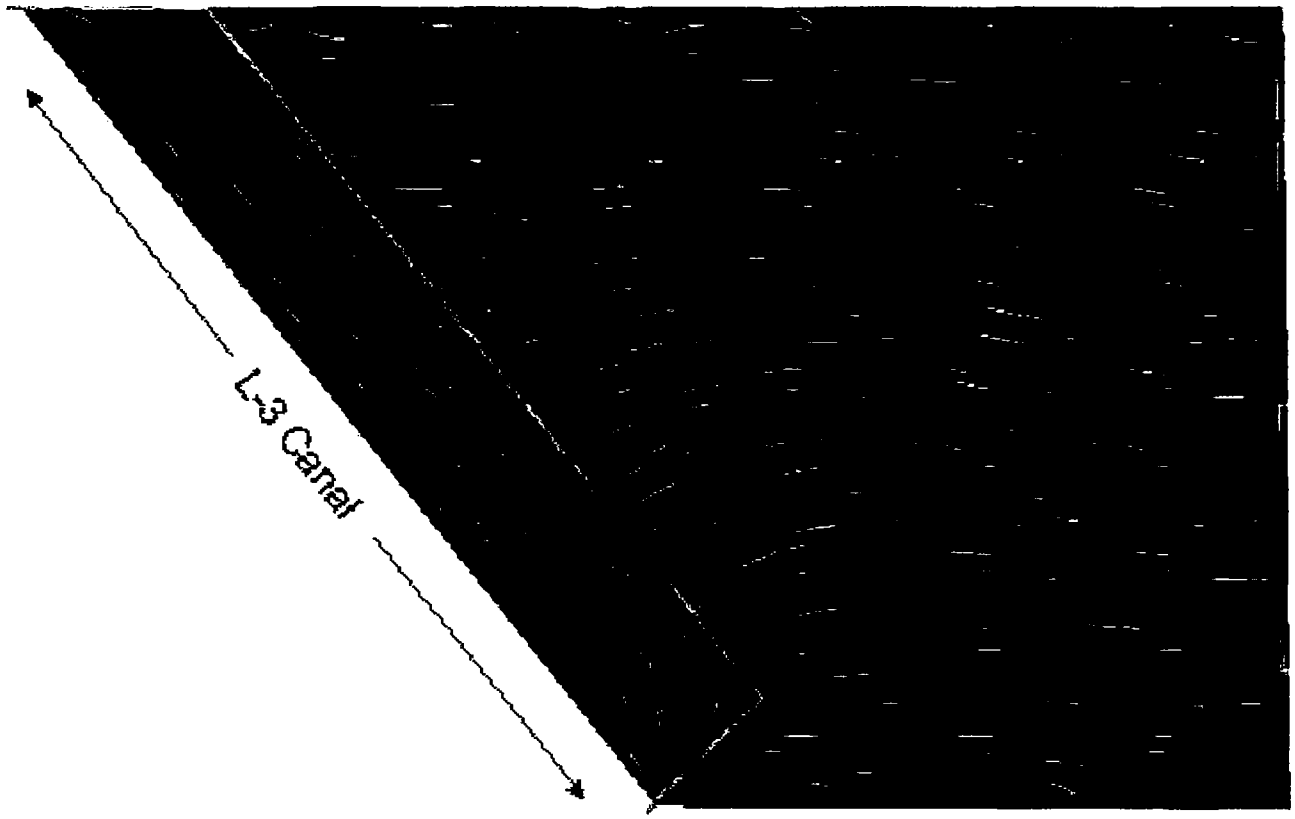


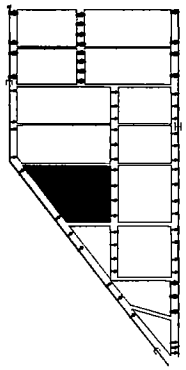
KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 5A SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 35

G:\29\38615215 SFWMD\CADD\PRESENTATION\plot\TNULLINTN-035.dwg 3/12/2005 6:38:26 PM EST

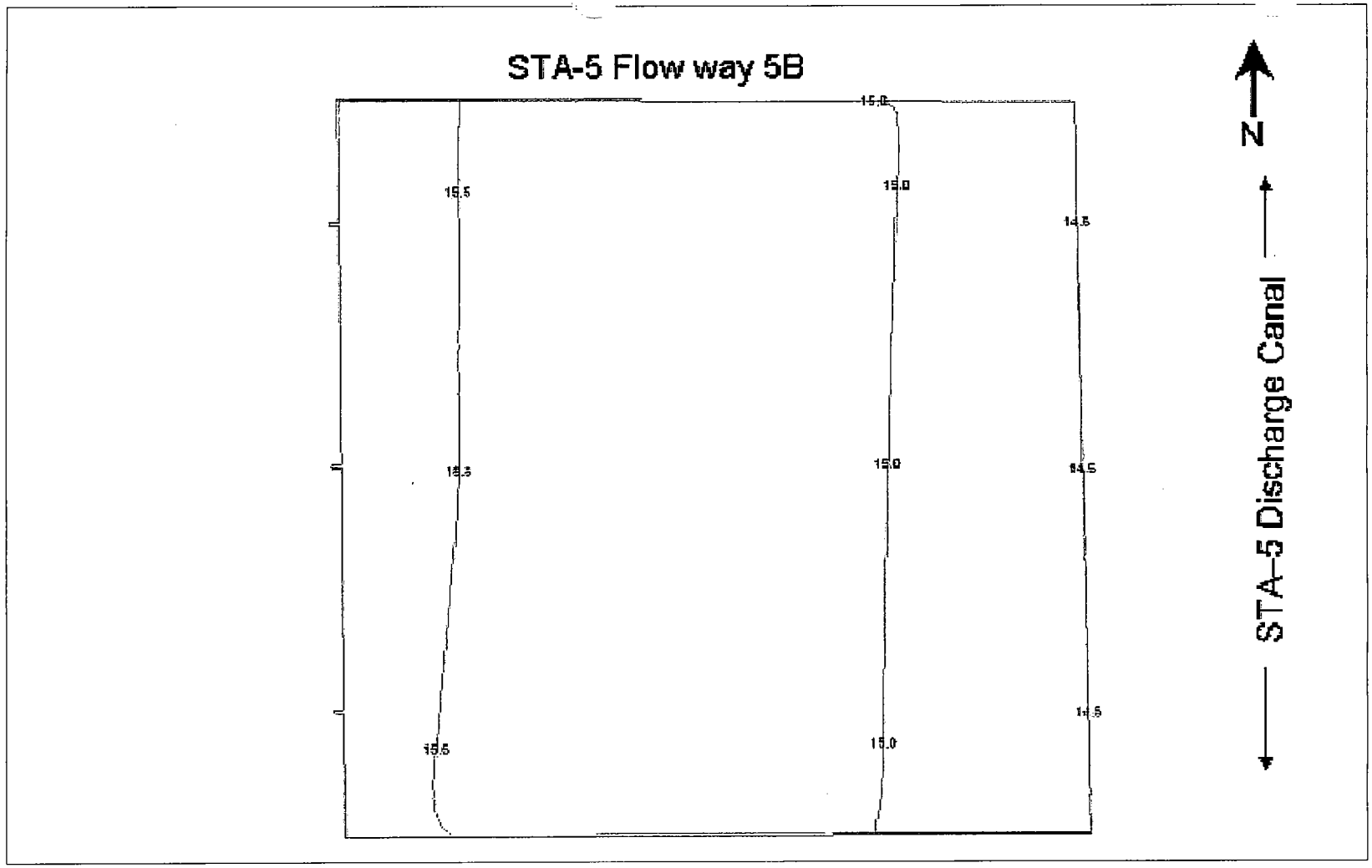
STA-5 Flow way 5A

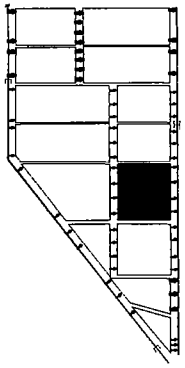




KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 5A SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 36
	G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-038.dwg 3/12/2005 8:36:00 PM EST		

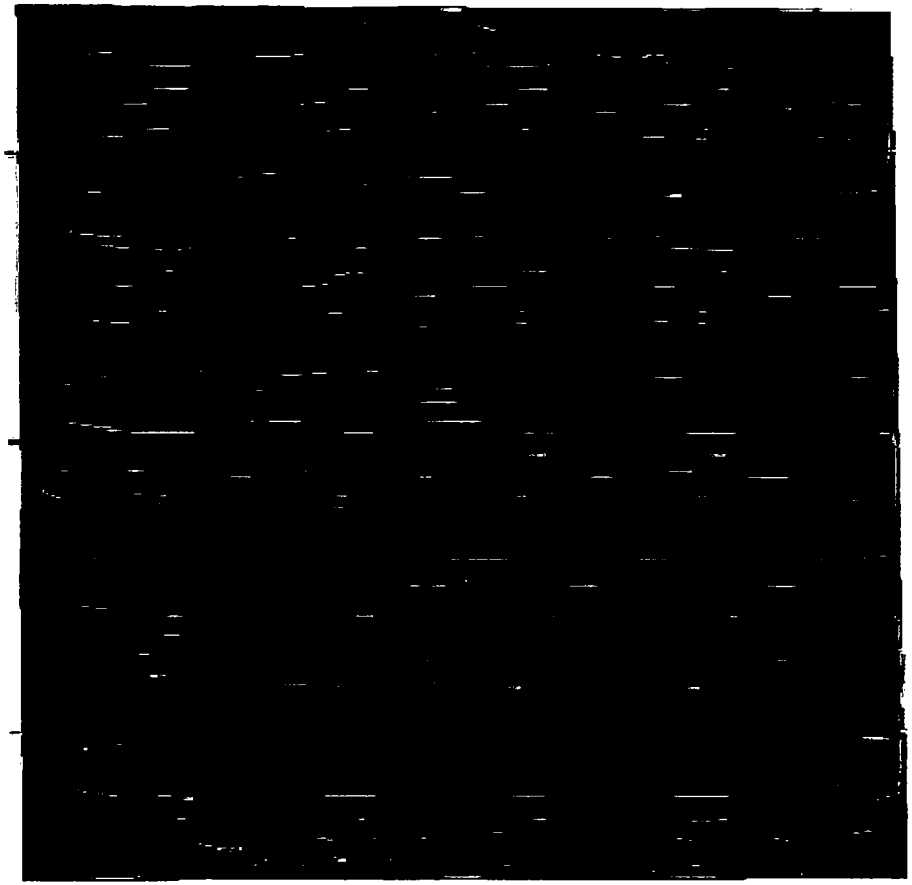




KEY PLAN

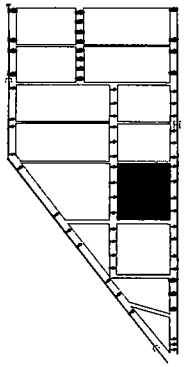
SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 5B SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 37
	G:\296\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-037.dwg 3/12/2005 6:34:14 PM EST		

STA-5 Flow way 5B



STA-5 Discharge Canal

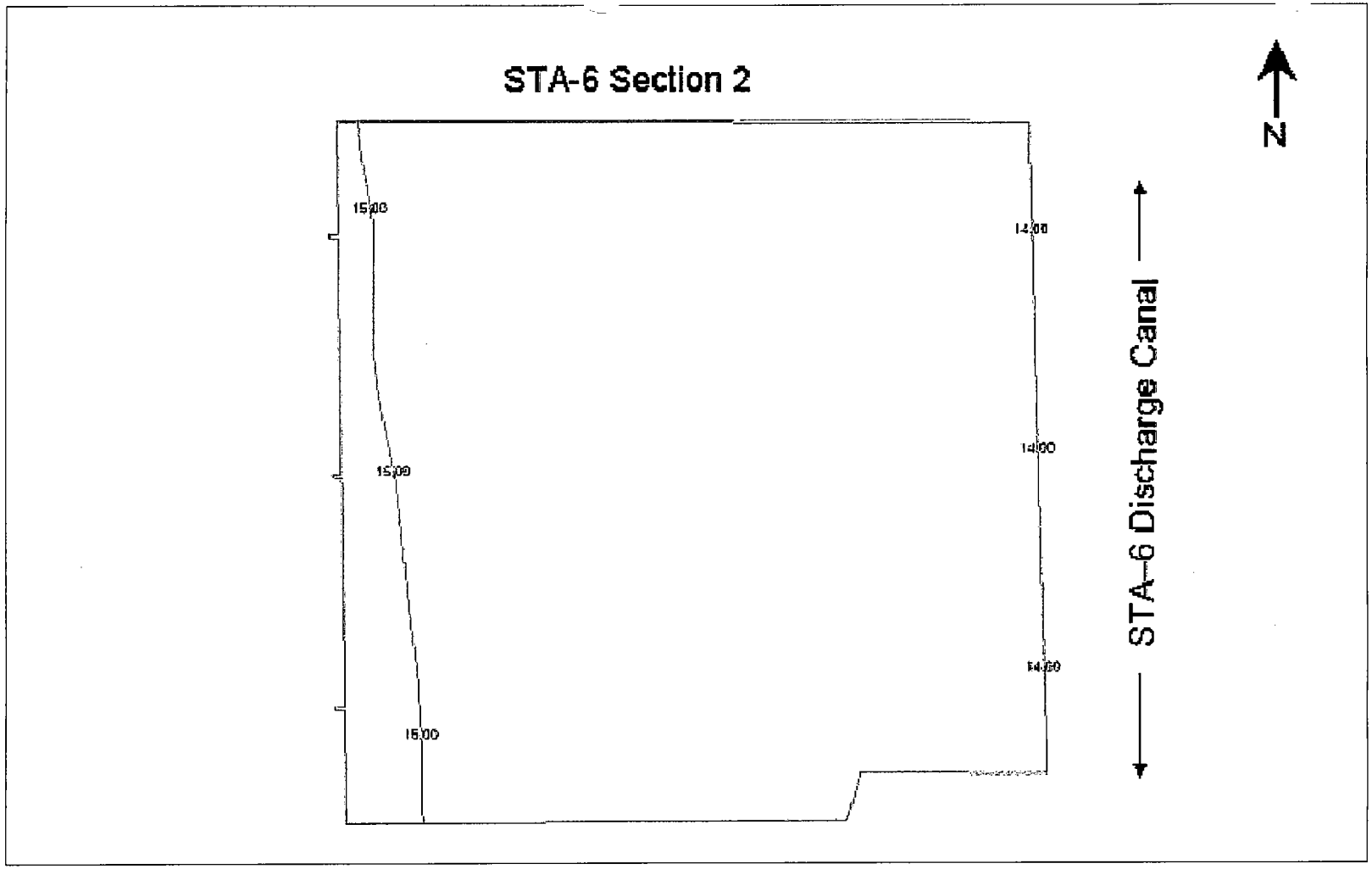
N

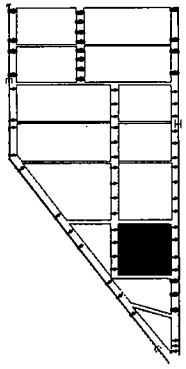


KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-5 FLOW WAY 5B SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 38

G:\298\38615216 SFWMD\CADD\PRESENTATION\plot\TM\ULLIN\TM-038.dwg 3/12/2005 5:32:50 PM EST

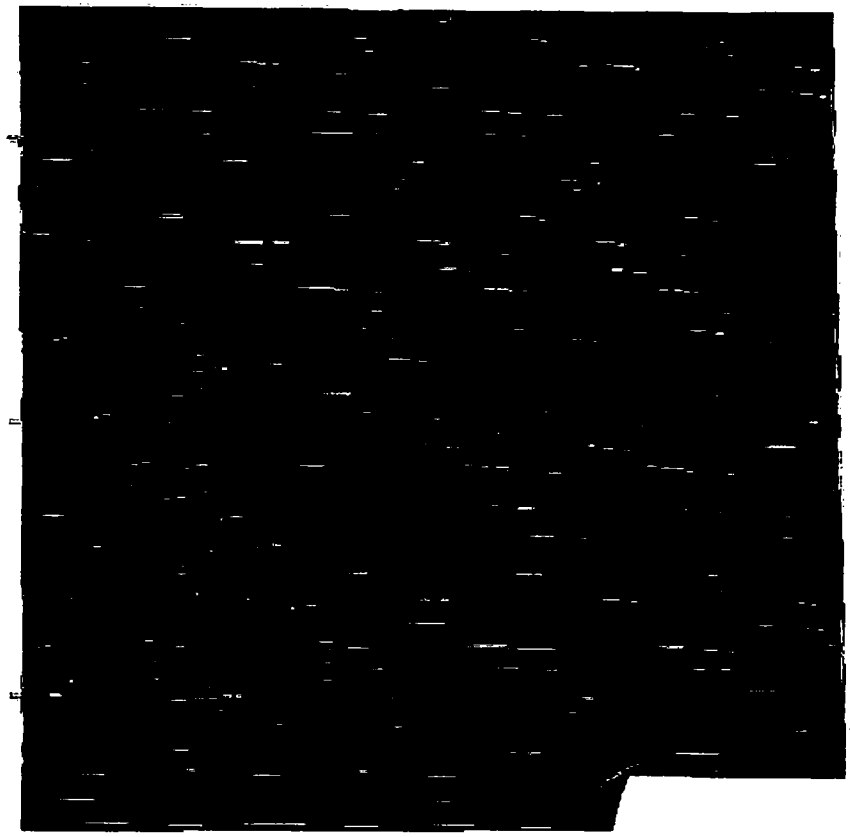




KEY PLAN

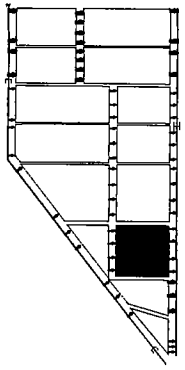
SFWMD	URS Boca Raton, Florida	STA-6 FLOW SECTION 2 SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 39
	G:\2961\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-039.dwg 3/12/2005 8:32:18 PM EST		

STA-6 Section 2



STA–5 Discharge Canal

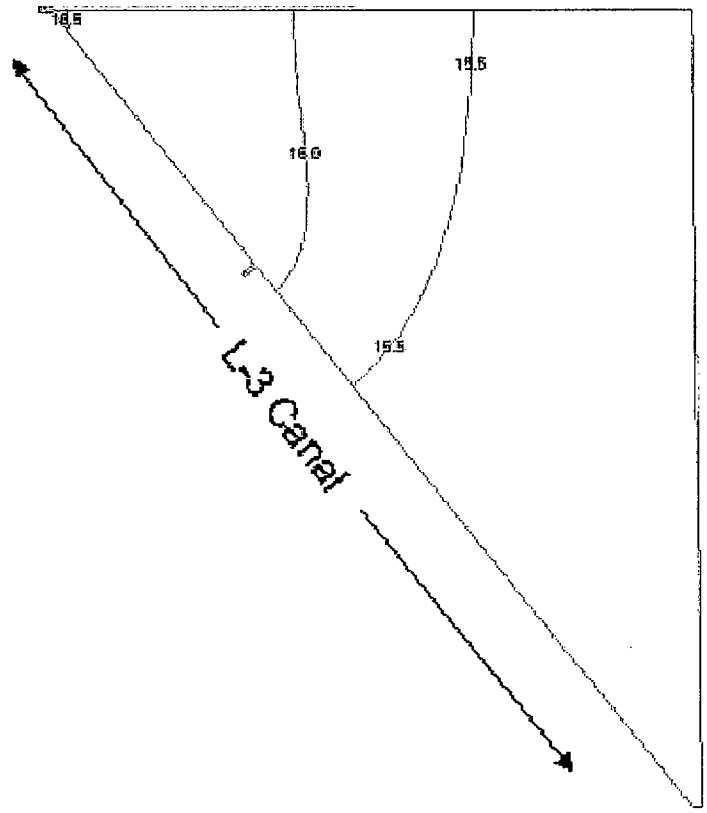
N



KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-6 FLOW SECTION 2 SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 40
	G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLINTM-040.dwg 3/12/2005 8:31:49 PM EST		

STA-6 Section 4



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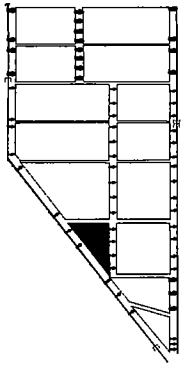
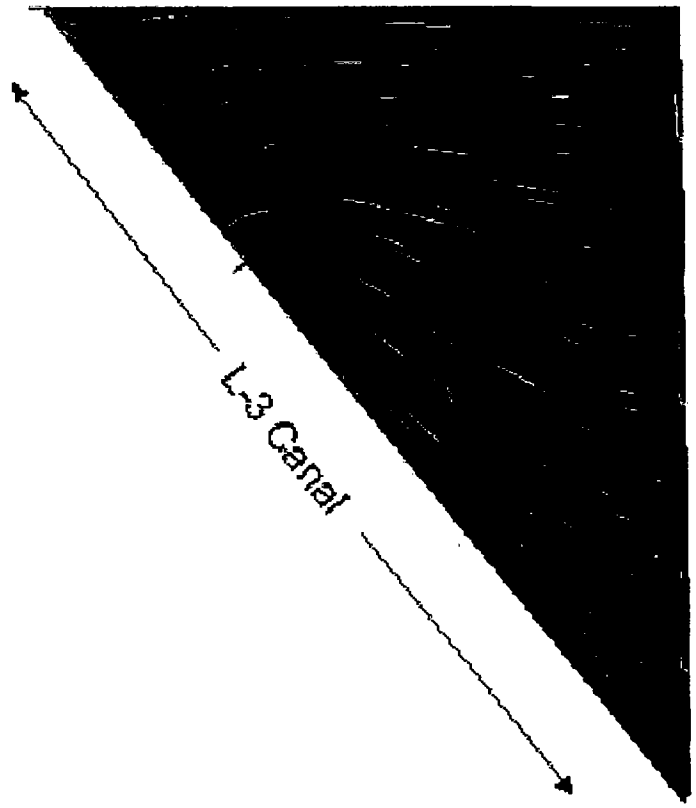


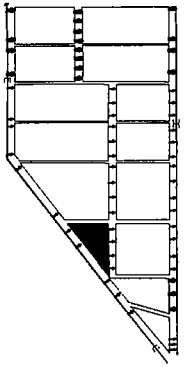
KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-6 FLOW SECTION 4 SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 41
	G:\29615\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-041.dwg 3/12/2005 8:31:11 PM EST		

STA-6 Section 4

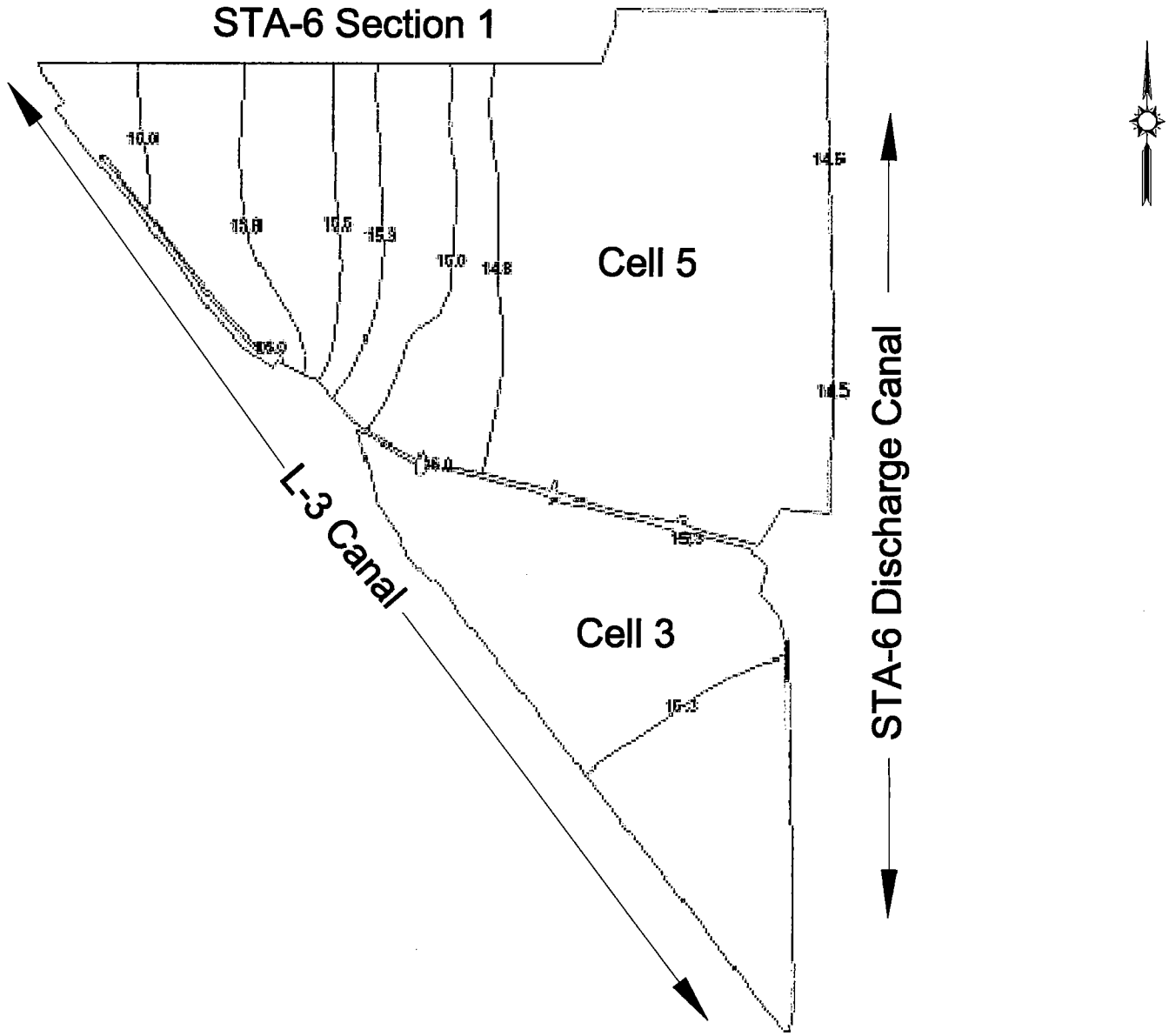


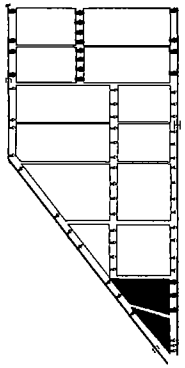
N



KEY PLAN

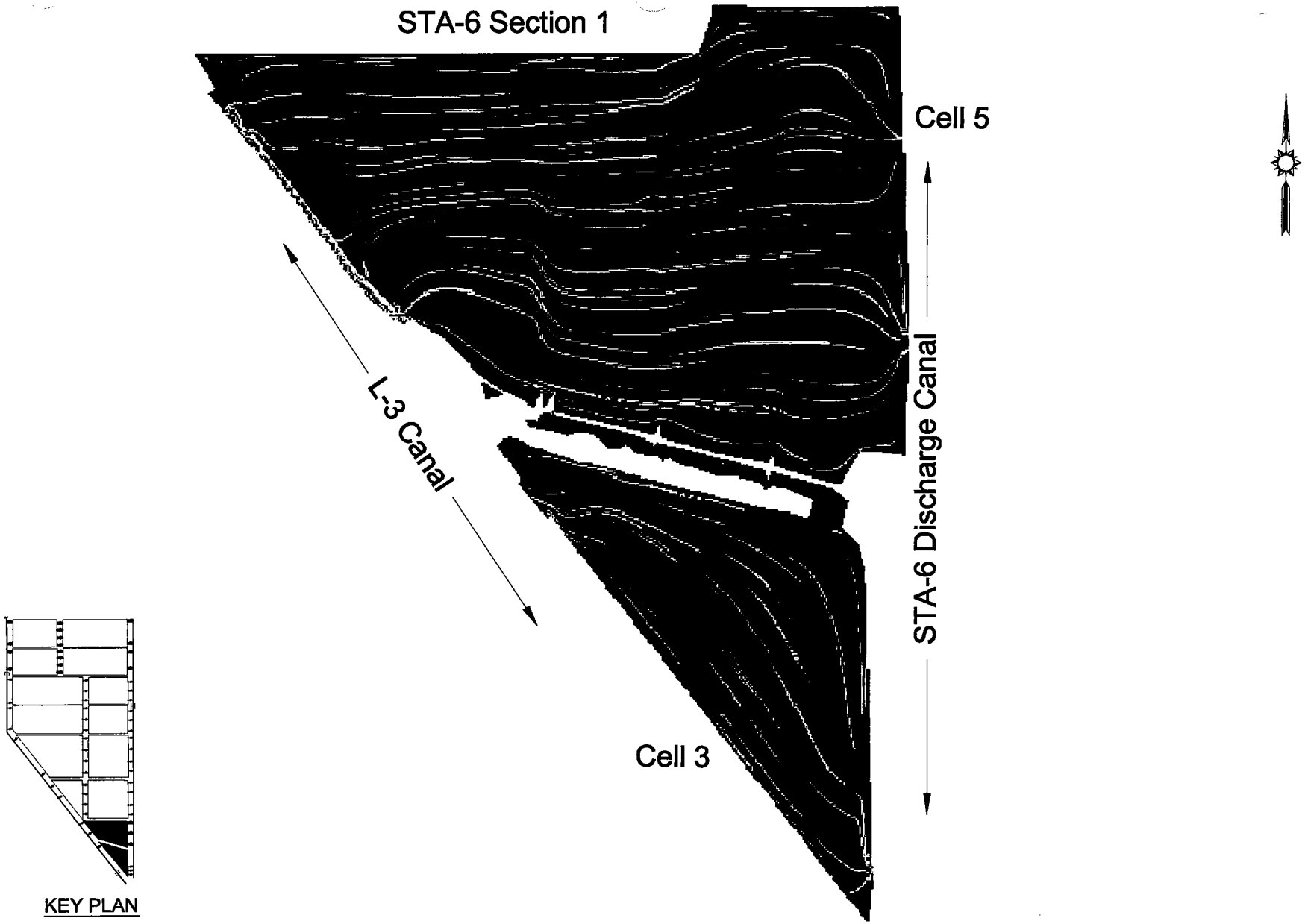
SFWMD	URS Boca Raton, Florida	STA-6 SECTION 4 SIMULATED FLOW PATTERNS	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 42
	G:\296\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-042.dwg 3/12/2005 6:30:44 PM EST		





KEY PLAN

SFWMD	URS Boca Raton, Florida	STA-6 SECTION 1 SIMULATED WSE	PROJ NO 38615215
	SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05		FIG NO 43
	G:\296\38615215 SFWMD\CADD\PRESENTATION\plot\TM\ULLIN\TM-043.dwg 3/12/2005 6:29:57 PM EST		



SFWMD	URS Boca Raton, Florida SCALE: N.T.S. / DRAWN BY: JC / CHECKED BY: CV / DATE: 03/14/05 G:\298\38615215 SFWMD\CADD\PRESENTATION\plot\TMULLIN\TM-044.dwg 3/12/2005 6:28:48 PM EST	STA-6 SECTION 1 SIMULATED FLOW PATTERNS	PROJ NO 38615215 FIG NO 44

Appendix A
HEC-RAS Calibration Results

Miami Canal Calibration

SFWMD Compartment C
Miami Canal
June 26, 2002 Calibration Results
By M. Brungard 1/14/05

River Sta 9 = STA5 Discharge Canal Intersection
River Sta 8 = G402D Tailwater
River Sta 6 = G200 Headwater
River Sta 5 = G402C Tailwater
River Sta 3 = G402B Tailwater
River Sta 2 = G402A Tailwater
River Sta 1 = Pump Station S8

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1	9	PF 1	2510	11.76		0.000027	1.57	1599.04	92.34
1	8	PF 1	2510	11.71		0.000026	1.55	1617.25	92.28
1	7	PF 1	2510	11.6		0.000025	1.53	1642.38	92.13
1	6	PF 1	2510	11.32	11.34	0.000026	1.54	1630.45	91.76
1	5	PF 1	2510	11.24	11.26	0.000025	1.54	1632.34	91.66
1	4	PF 1	2510	11.05		0.000024	1.5	1678.78	91.56
1	3	PF 1	2510	10.93	11.04	0.000024	1.5	1667.89	91.41
1	2	PF 1	2510	10.62	10.67	0.000025	1.53	1639.72	91.02
1	1	PF 1	2510	10.31	10.31	0.000032	1.65	1518.55	95.67

SFWMD Compartment C
Miami Canal
July 12, 2002 Calibration Results
By M. Brungard 1/14/05

River Sta 9 = STA5 Discharge Canal Intersection
River Sta 8 = G402D Tailwater
River Sta 6 = G200 Headwater
River Sta 5 = G402C Tailwater
River Sta 3 = G402B Tailwater
River Sta 2 = G402A Tailwater
River Sta 1 = Pump Station S8

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1	9	PF 1	2777	11.49		0.000035	1.76	1574.97	91.99
1	8	PF 1	2777	11.43		0.000034	1.74	1592.01	91.91
1	7	PF 1	2777	11.29		0.000032	1.72	1614.25	91.72
1	6	PF 1	2777	10.93	10.91	0.000033	1.74	1594.97	91.24
1	5	PF 1	2777	10.83	10.81	0.000033	1.74	1594.75	91.11
1	4	PF 1	2777	10.57		0.000031	1.7	1635.64	90.97
1	3	PF 1	2777	10.42	10.52	0.000032	1.71	1621.33	90.77
1	2	PF 1	2777	10	10.08	0.000034	1.75	1583.89	90.25
1	1	PF 1	2777	9.58	9.58	0.000044	1.92	1449.61	93.46

SFWMD Compartment C
Miami Canal
Jun3 5, 2003 Calibration Results
By M. Brungard 1/14/05

River Sta 9 = STA5 Discharge Canal Intersection
River Sta 8 = G402D Tailwater
River Sta 6 = G200 Headwater
River Sta 5 = G402C Tailwater
River Sta 3 = G402B Tailwater
River Sta 2 = G402A Tailwater
River Sta 1 = Pump Station S8

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1	9	PF 1	1000	10.79		0.000005	0.66	1510.78	91.06
1	8	PF 1	1000	10.78	10.77	0.000005	0.65	1532.5	91.05
1	7	PF 1	1000	10.76		0.000005	0.64	1566.12	91.02
1	6	PF 1	1000	10.71	10.73	0.000004	0.63	1575.15	90.95
1	5	PF 1	1000	10.7	10.7	0.000004	0.63	1582.93	90.93
1	4	PF 1	1000	10.67		0.000004	0.61	1644.18	91.08
1	3	PF 1	1000	10.65	10.66	0.000004	0.61	1642.37	91.06
1	2	PF 1	1000	10.6	10.58	0.000004	0.61	1637.82	91
1	1	PF 1	1000	10.55	10.55	0.000005	0.65	1541.62	96.6

SFWMD Compartment C
Miami Canal
June 23, 2003 Calibration Results
By M. Brungard 1/14/05

River Sta 9 = STA5 Discharge Canal Intersection
River Sta 8 = G402D Tailwater
River Sta 6 = G200 Headwater
River Sta 5 = G402C Tailwater
River Sta 3 = G402B Tailwater
River Sta 2 = G402A Tailwater
River Sta 1 = Pump Station S8

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1	9	PF 1	2950	11.81		0.000037	1.84	1604.12	92.41
1	8	PF 1	2950	11.75	11.8	0.000036	1.82	1620.74	92.33
1	7	PF 1	2950	11.59		0.000035	1.8	1641.93	92.12
1	6	PF 1	2950	11.21	11.28	0.000036	1.82	1619.93	91.61
1	5	PF 1	2950	11.1	11.11	0.000036	1.82	1618.91	91.46
1	4	PF 1	2950	10.82		0.000034	1.78	1657.79	91.27
1	3	PF 1	2950	10.65	10.59	0.000035	1.8	1642.16	91.06
1	2	PF 1	2950	10.19	10.21	0.000037	1.84	1601.16	90.49
1	1	PF 1	2950	9.73	9.73	0.000049	2.02	1463.66	93.82

SFWMD Compartment C
Miami Canal
June 29, 2002 Calibration Results
By M. Brungard 1/14/05

River Sta 9 = STA5 Discharge Canal Intersection
River Sta 8 = G402D Tailwater
River Sta 6 = G200 Headwater
River Sta 5 = G402C Tailwater
River Sta 3 = G402B Tailwater
River Sta 2 = G402A Tailwater
River Sta 1 = Pump Station S8

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1	9	PF 1	1000	11.04		0.000005	0.65	1533.61	91.39
1	8	PF 1	1000	11.03		0.000005	0.64	1555.36	91.38
1	7	PF 1	1000	11.02		0.000004	0.63	1589.06	91.35
1	6	PF 1	1000	10.97	10.96	0.000004	0.63	1598.25	91.29
1	5	PF 1	1000	10.96	10.93	0.000004	0.62	1606.07	91.27
1	4	PF 1	1000	10.92		0.000004	0.6	1667.48	91.4
1	3	PF 1	1000	10.9	10.92	0.000004	0.6	1665.73	91.38
1	2	PF 1	1000	10.86	10.85	0.000004	0.6	1661.35	91.32
1	1	PF 1	1000	10.81	10.8	0.000005	0.64	1566.87	97.61

SFWMD Compartment C
Miami Canal
Jun3 5, 2003 Calibration Results
By M. Brungard 1/14/05

River Sta 9 = STA5 Discharge Canal Intersection
River Sta 8 = G402D Tailwater
River Sta 6 = G200 Headwater
River Sta 5 = G402C Tailwater
River Sta 3 = G402B Tailwater
River Sta 2 = G402A Tailwater
River Sta 1 = Pump Station S8

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1	9	PF 1	1000	10.79		0.000005	0.66	1510.78	91.06
1	8	PF 1	1000	10.78	10.77	0.000005	0.65	1532.5	91.05
1	7	PF 1	1000	10.76		0.000005	0.64	1566.12	91.02
1	6	PF 1	1000	10.71	10.73	0.000004	0.63	1575.15	90.95
1	5	PF 1	1000	10.7	10.7	0.000004	0.63	1582.93	90.93
1	4	PF 1	1000	10.67		0.000004	0.61	1644.18	91.08
1	3	PF 1	1000	10.65	10.66	0.000004	0.61	1642.37	91.06
1	2	PF 1	1000	10.6	10.58	0.000004	0.61	1637.82	91
1	1	PF 1	1000	10.55	10.55	0.000005	0.65	1541.62	96.6

Southern Model Calibration

SFWMD Compartment C
Southern Outlet Water Surface Model
August 14, 2002 Calibration Results
By M. Brungard 1/17/05

River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
STA6 Discharge	STA6 OUTLET	2	PF 1	80	14.05	14	0	0.08	1003.31	140.24
STA6 Discharge	STA6 OUTLET	1.1		Lat Struct						
STA6 Discharge	STA6 OUTLET	1	PF 1	80	14.05		0	0.08	1003.31	140.24
L4 Gap	L4 GAP	2	PF 1	524	14.05		0.000001	0.28	1902.02	194.21
L4 Gap	L4 GAP	1	PF 1	524	14.05		0.000001	0.28	1901.99	194.21
L4 Canal	L4 EAST	34	PF 1	500	14.17		0.000005	0.61	976.15	171.92
L4 Canal	L4 EAST	33	PF 1	500	14.16		0.000006	0.69	884.47	169.31
L4 Canal	L4 EAST	32	PF 1	500	14.16		0.000007	0.73	838.61	169.25
L4 Canal	L4 EAST	31	PF 1	500	14.15		0.000006	0.69	916.42	171.77
L4 Canal	L4 EAST	30	PF 1	500	14.14		0.000007	0.72	880.67	171.72
L4 Canal	L4 EAST	29	PF 1	500	14.14		0.000006	0.69	897.61	171.67
L4 Canal	L4 EAST	28	PF 1	500	14.13		0.000008	0.77	778.29	169.02
L4 Canal	L4 EAST	27	PF 1	500	14.12		0.000007	0.75	816.38	168.96
L4 Canal	L4 EAST	26	PF 1	500	14.11		0.000007	0.75	805.28	168.9
L4 Canal	L4 EAST	25	PF 1	500	14.11		0.000007	0.71	881.91	171.45
L4 Canal	L4 EAST	24	PF 1	500	14.1		0.000008	0.74	792.58	168.79
L4 Canal	L4 EAST	23	PF 1	500	14.09		0.000005	0.61	966.83	171.36
L4 Canal	L4 EAST	22	PF 1	500	14.09		0.000006	0.65	918.31	171.32
L4 Canal	L4 EAST	21	PF 1	500	14.08		0.000008	0.76	829.23	171.25
L4 Canal	L4 EAST	20	PF 1	500	14.07		0.000009	0.77	774.02	168.56
L4 Canal	L4 EAST	19	PF 1	500	14.06		0.000009	0.75	772.69	168.5
L4 Canal	L4 EAST	18	PF 1	500	14.06		0.000006	0.66	918.82	171.08
L4 Canal	L4 EAST	17	PF 1	500	14.05		0.000009	0.77	724.68	137.25
L4 Canal	L4 WEST	16	PF 1	24	14.05		0	0.04	770.36	171.06
L4 Canal	L4 WEST	15	PF 1	24	14.05		0	0.04	750.46	171.06
L4 Canal	L4 WEST	14	PF 1	24	14.05		0	0.04	779.9	171.06
L4 Canal	L4 WEST	13	PF 1	24	14.05		0	0.04	769.8	171.06
L4 Canal	L4 WEST	12	PF 1	24	14.05		0	0.04	714.49	168.43
L4 Canal	L4 WEST	11	PF 1	24	14.05		0	0.03	828.98	168.43
L4 Canal	L4 WEST	10	PF 1	24	14.05		0	0.04	713.53	168.43
L4 Canal	L4 WEST	9	PF 1	24	14.05		0	0.05	667.97	168.43
L4 Canal	L4 WEST	8	PF 1	24	14.05		0	0.04	766.98	171.06
L4 Canal	L4 WEST	7	PF 1	24	14.05		0	0.05	660.16	168.43
L4 Canal	L4 WEST	6	PF 1	24	14.05		0	0.06	596.45	168.43
L4 Canal	L4 WEST	5	PF 1	24	14.05		0	0.06	590.69	168.43
L4 Canal	L4 WEST	4	PF 1	24	14.05		0	0.06	603.24	171.06
L4 Canal	L4 WEST	3	PF 1	24	14.05		0	0.06	570.82	168.42
L4 Canal	L4 WEST	2	PF 1	24	14.05		0	0.06	539.96	168.42
L4 Canal	L4 WEST	1.5	PF 1	24	14.05		0	0.06	539.95	168.42
L3 Ext	L3 Ext WEST	17	PF 1	56	14.05		0	0.07	814.33	160.29
L3 Ext	L3 Ext WEST	16	PF 1	56	14.05		0	0.07	814.32	160.29
L3 Ext	L3 Ext WEST	15	PF 1	56	14.05		0	0.08	761.58	158.67
L3 Ext	L3 Ext WEST	14	PF 1	56	14.05		0	0.07	874.98	173.79
L3 Ext	L3 Ext WEST	13	PF 1	56	14.05		0	0.07	868.56	173.27
L3 Ext	L3 Ext WEST	12	PF 1	56	14.05		0	0.06	933.06	174.07
L3 Ext	L3 Ext WEST	11	PF 1	56	14.05		0	0.07	907.11	165.34
L3 Ext	L3 Ext WEST	10	PF 1	56	14.05		0	0.06	916.8	175.49
L3 Ext	L3 Ext WEST	9	PF 1	56	14.05		0	0.06	980.21	175.52
L3 Ext	L3 Ext WEST	8	PF 1	56	14.05		0	0.06	955.91	177.19
L3 Ext	L3 Ext WEST	7	PF 1	56	14.05		0	0.06	932.47	175.99
L3 Ext	L3 Ext WEST	6	PF 1	56	14.05		0	0.06	941.53	172.27
L3 Ext	L3 Ext WEST	5	PF 1	56	14.05		0	0.06	941.47	173.4
L3 Ext	L3 Ext WEST	4	PF 1	56	14.05		0	0.06	942.8	172.41
L3 Ext	L3 Ext WEST	3	PF 1	56	14.05		0	0.07	946.5	169.17
L3 Ext	L3 Ext WEST	2	PF 1	56	14.05		0	0.07	871.93	163.66
L3 Ext	L3 Ext WEST	1	PF 1	56	14.05		0	0.06	963.59	169.51
L3 Ext	WCA 3	6	PF 1	580	14.05		0.000007	0.69	3023.53	2222.23
L3 Ext	WCA 3	5	PF 1	580	14.01		0.000006	0.64	11055.65	10224.01
L3 Ext	WCA 3	4	PF 1	580	14		0.000002	0.15	22813.82	20236.01
L3 Ext	WCA 3	3	PF 1	580	14		0.000077	0.01	44141.18	40100
L3 Ext	WCA 3	2.5	PF 1	580	13.26		0.000076	0.01	44342.64	40100
L3 Ext	WCA 3	2	PF 1	580	12.48	12.6	0.000084	0.01	43202.41	40100
L3 Ext	WCA 3	1	PF 1	580	11.7	11.7	0.000055	0.01	48119.99	40100

SFWMD Compartment C
Southern Outlet Water Surface Model
October 15, 2003 Calibration Results
By M. Brungard 1/17/05

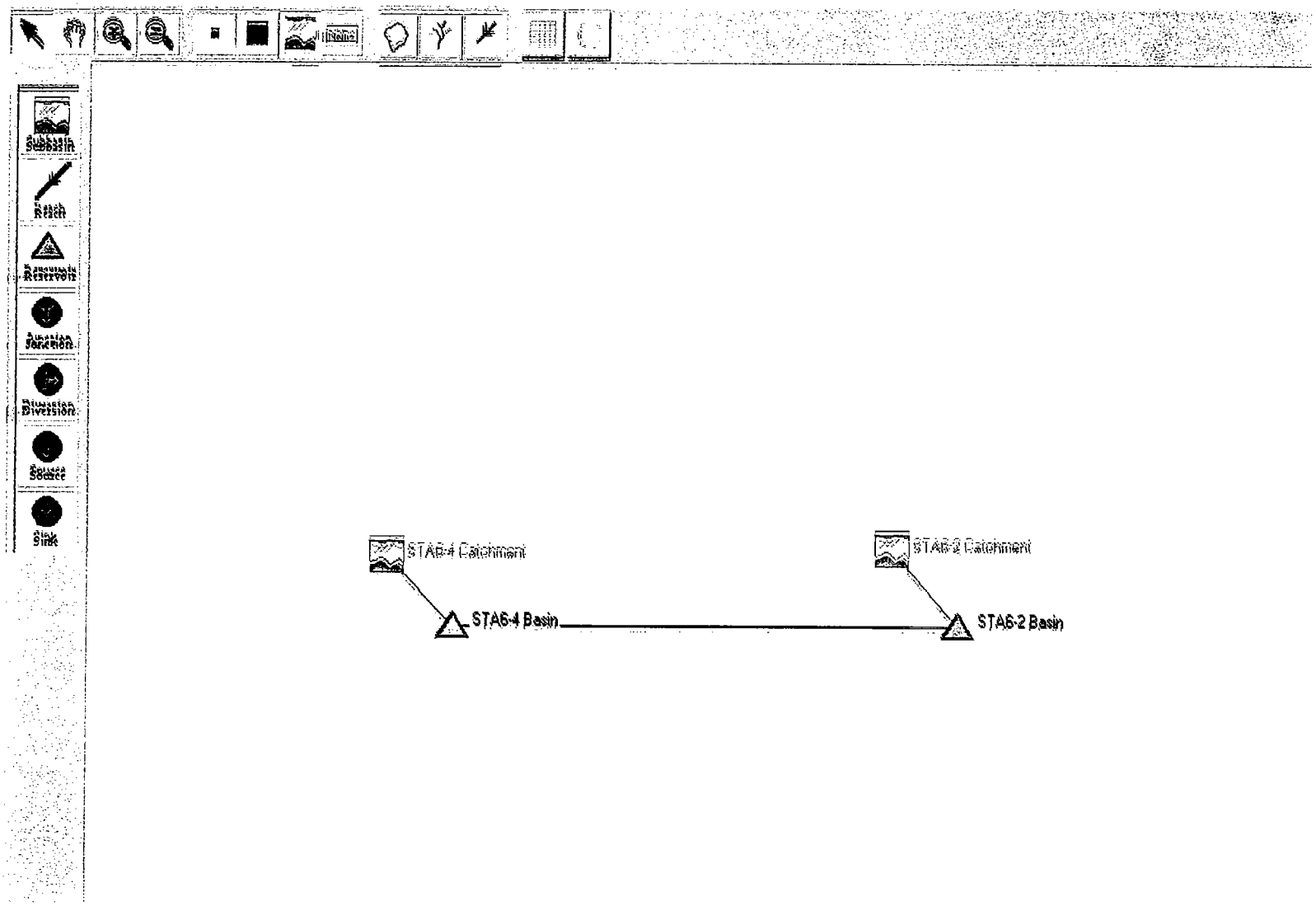
River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
STA6 Discharge	STA6 OUTLET	2	PF 1	10	13.99	14.2	0	0.01	993.91	139.82
STA6 Discharge	STA6 OUTLET	1.1		Lat Struct						
STA6 Discharge	STA6 OUTLET	1	PF 1	10	13.99		0	0.01	993.91	139.82
L4 Gap	L4 GAP	2	PF 1	513	13.99		0.000001	0.28	1889.09	193.94
L4 Gap	L4 GAP	1	PF 1	513	13.98		0.000001	0.28	1889.07	193.94
L4 Canal	L4 EAST	34	PF 1	510	14.11		0.000005	0.63	966.07	171.49
L4 Canal	L4 EAST	33	PF 1	510	14.1		0.000006	0.71	874.47	168.84
L4 Canal	L4 EAST	32	PF 1	510	14.1		0.000008	0.75	828.54	168.77
L4 Canal	L4 EAST	31	PF 1	510	14.09		0.000007	0.71	906.13	171.33
L4 Canal	L4 EAST	30	PF 1	510	14.08		0.000008	0.74	870.3	171.27
L4 Canal	L4 EAST	29	PF 1	510	14.08		0.000007	0.71	887.18	171.22
L4 Canal	L4 EAST	28	PF 1	510	14.07		0.000009	0.79	767.91	168.53
L4 Canal	L4 EAST	27	PF 1	510	14.06		0.000008	0.77	805.92	168.47
L4 Canal	L4 EAST	26	PF 1	510	14.05		0.000008	0.77	794.75	168.4
L4 Canal	L4 EAST	25	PF 1	510	14.04		0.000007	0.73	871.14	170.99
L4 Canal	L4 EAST	24	PF 1	510	14.04		0.000008	0.77	781.9	168.28
L4 Canal	L4 EAST	23	PF 1	510	14.03		0.000005	0.63	955.93	170.89
L4 Canal	L4 EAST	22	PF 1	510	14.02		0.000006	0.67	907.34	170.85
L4 Canal	L4 EAST	21	PF 1	510	14.01		0.000009	0.78	818.16	170.77
L4 Canal	L4 EAST	20	PF 1	510	14.01		0.000009	0.79	763.03	168.04
L4 Canal	L4 EAST	19	PF 1	510	14		0.00001	0.77	761.6	167.97
L4 Canal	L4 EAST	18	PF 1	510	13.99		0.000006	0.68	907.49	170.59
L4 Canal	L4 EAST	17	PF 1	510	13.98		0.00001	0.79	715.86	128.55
L4 Canal	L4 WEST	16	PF 1	3	13.99		0	0.01	758.89	170.57
L4 Canal	L4 WEST	15	PF 1	3	13.99		0	0.01	738.99	170.57
L4 Canal	L4 WEST	14	PF 1	3	13.99		0	0	768.43	170.57
L4 Canal	L4 WEST	13	PF 1	3	13.99		0	0.01	758.34	170.57
L4 Canal	L4 WEST	12	PF 1	3	13.99		0	0.01	703.2	167.89
L4 Canal	L4 WEST	11	PF 1	3	13.99		0	0	817.7	167.89
L4 Canal	L4 WEST	10	PF 1	3	13.99		0	0.01	702.25	167.89
L4 Canal	L4 WEST	9	PF 1	3	13.99		0	0.01	656.7	167.89
L4 Canal	L4 WEST	8	PF 1	3	13.99		0	0.01	755.53	170.57
L4 Canal	L4 WEST	7	PF 1	3	13.99		0	0.01	648.9	167.89
L4 Canal	L4 WEST	6	PF 1	3	13.99		0	0.01	585.2	167.89
L4 Canal	L4 WEST	5	PF 1	3	13.99		0	0.01	579.45	167.89
L4 Canal	L4 WEST	4	PF 1	3	13.99		0	0.01	591.83	170.57
L4 Canal	L4 WEST	3	PF 1	3	13.99		0	0.01	559.6	167.89
L4 Canal	L4 WEST	2	PF 1	3	13.99		0	0.01	528.75	167.89
L4 Canal	L4 WEST	1.5	PF 1	3	13.99		0	0.01	528.75	167.89
L3 Ext	L3 Ext WEST	17	PF 1	7	13.99		0	0.01	803.5	159.79
L3 Ext	L3 Ext WEST	16	PF 1	7	13.99		0	0.01	803.5	159.79
L3 Ext	L3 Ext WEST	15	PF 1	7	13.99		0	0.01	750.97	155.77
L3 Ext	L3 Ext WEST	14	PF 1	7	13.99		0	0.01	863.29	173.26
L3 Ext	L3 Ext WEST	13	PF 1	7	13.99		0	0.01	856.91	172.87
L3 Ext	L3 Ext WEST	12	PF 1	7	13.99		0	0.01	921.37	173.54
L3 Ext	L3 Ext WEST	11	PF 1	7	13.99		0	0.01	896.01	164.93
L3 Ext	L3 Ext WEST	10	PF 1	7	13.99		0	0.01	905.04	175.06
L3 Ext	L3 Ext WEST	9	PF 1	7	13.99		0	0.01	968.45	175.07
L3 Ext	L3 Ext WEST	8	PF 1	7	13.99		0	0.01	944.06	176.68
L3 Ext	L3 Ext WEST	7	PF 1	7	13.99		0	0.01	920.7	175.55
L3 Ext	L3 Ext WEST	6	PF 1	7	13.99		0	0.01	930.02	171.85
L3 Ext	L3 Ext WEST	5	PF 1	7	13.99		0	0.01	929.9	172.94
L3 Ext	L3 Ext WEST	4	PF 1	7	13.99		0	0.01	931.31	172.01
L3 Ext	L3 Ext WEST	3	PF 1	7	13.99		0	0.01	935.24	168.72
L3 Ext	L3 Ext WEST	2	PF 1	7	13.99		0	0.01	861.04	163.23
L3 Ext	L3 Ext WEST	1	PF 1	7	13.99		0	0.01	952.32	169.08
L3 Ext	WCA 3	6	PF 1	520	13.98		0.000005	0.62	2878.58	2220.85
L3 Ext	WCA 3	5	PF 1	520	13.95		0.000005	0.58	10442.09	10221.67
L3 Ext	WCA 3	4	PF 1	520	13.94		0.000002	0.15	21617.04	20231.93
L3 Ext	WCA 3	3	PF 1	520	13.94		0.000078	0.01	41771.54	40100
L3 Ext	WCA 3	2.5	PF 1	520	13.2		0.000075	0.01	42180.04	40100
L3 Ext	WCA 3	2	PF 1	520	12.4	12.5	0.000093	0.01	39992.73	40100
L3 Ext	WCA 3	1	PF 1	520	12	12	0.000018	0.01	60150	40100

SFWMD Compartment C
Southern Outlet Water Surface Model
September 16, 2003 Calibration Results
By M. Brungard 1/17/05

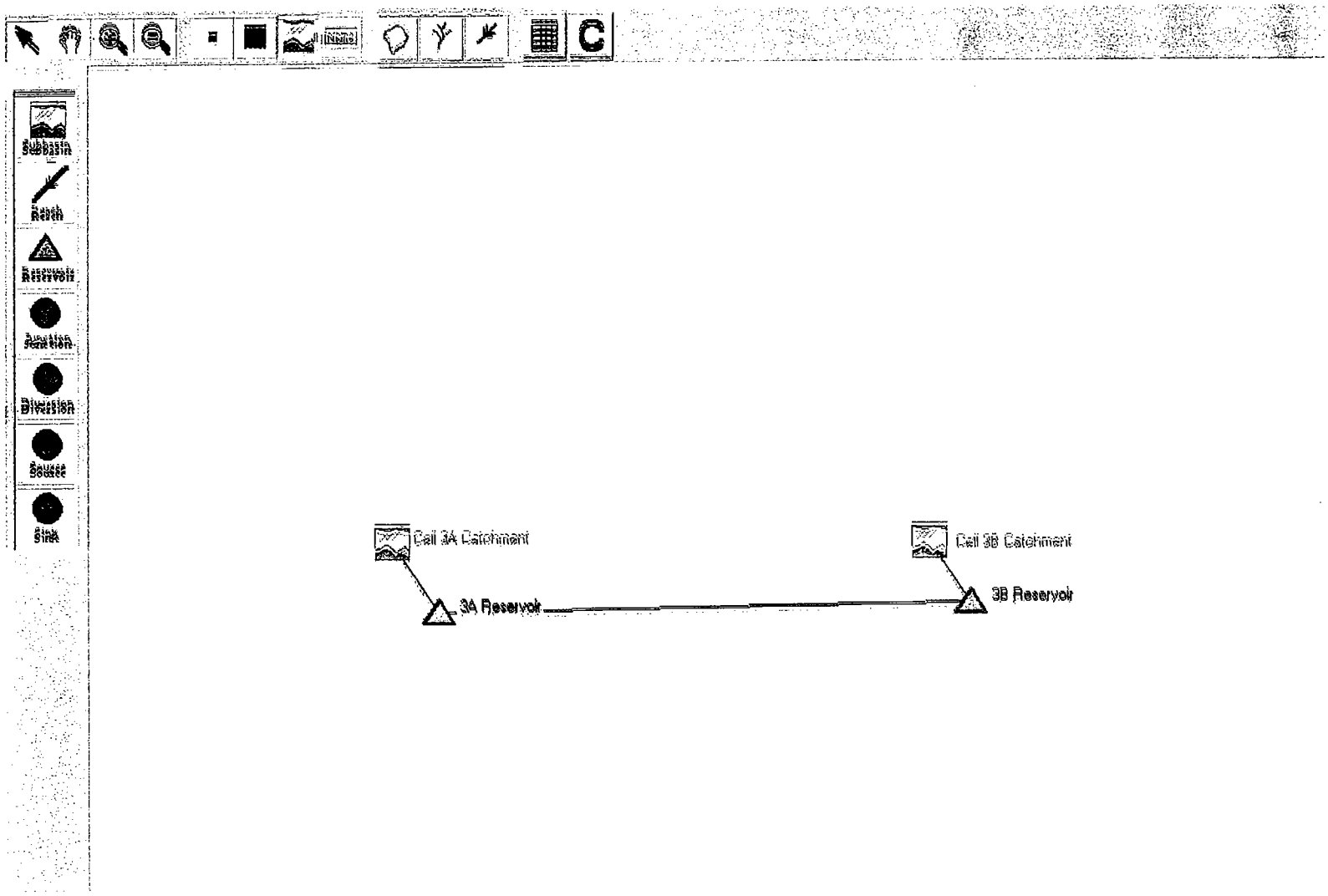
River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
STA6 Discharge	STA6 OUTLET	2	PF 1	500	14.03	14	0.000005	0.52	1000.37	140.11
STA6 Discharge	STA6 OUTLET	1.1		Lat Struct						
STA6 Discharge	STA6 OUTLET	1	PF 1	438.14	14.03		0.000004	0.45	1000.4	140.11
L4 Gap	L4 GAP	2	PF 1	143.92	13.98		0	0.08	1888.28	193.92
L4 Gap	L4 GAP	1	PF 1	143.92	13.98		0	0.08	1888.28	193.92
L4 Canal	L4 EAST	34	PF 1	10	13.98		0	0.01	943.67	170.53
L4 Canal	L4 EAST	33	PF 1	10	13.98		0	0.01	853.65	167.85
L4 Canal	L4 EAST	32	PF 1	10	13.98		0	0.01	809.05	167.85
L4 Canal	L4 EAST	31	PF 1	10	13.98		0	0.01	887.42	170.53
L4 Canal	L4 EAST	30	PF 1	10	13.98		0	0.01	852.92	170.53
L4 Canal	L4 EAST	29	PF 1	10	13.98		0	0.01	870.92	170.53
L4 Canal	L4 EAST	28	PF 1	10	13.98		0	0.02	753.55	167.85
L4 Canal	L4 EAST	27	PF 1	10	13.98		0	0.02	792.9	167.85
L4 Canal	L4 EAST	26	PF 1	10	13.98		0	0.02	783.05	167.85
L4 Canal	L4 EAST	25	PF 1	10	13.98		0	0.01	860.42	170.53
L4 Canal	L4 EAST	24	PF 1	10	13.98		0	0.02	772.8	167.85
L4 Canal	L4 EAST	23	PF 1	10	13.98		0	0.01	947.42	170.53
L4 Canal	L4 EAST	22	PF 1	10	13.98		0	0.01	899.91	170.53
L4 Canal	L4 EAST	21	PF 1	10	13.98		0	0.02	812.41	170.53
L4 Canal	L4 EAST	20	PF 1	10	13.98		0	0.02	758.95	167.85
L4 Canal	L4 EAST	19	PF 1	10	13.98		0	0.02	759.05	167.85
L4 Canal	L4 EAST	18	PF 1	10	13.98		0	0.01	905.96	170.53
L4 Canal	L4 EAST	17	PF 1	10	13.98		0	0.02	716.08	128.56
L4 Canal	L4 WEST	16	PF 1	113.92	13.99		0.000001	0.19	760.31	170.63
L4 Canal	L4 WEST	15	PF 1	113.92	13.99		0.000001	0.2	740.31	170.62
L4 Canal	L4 WEST	14	PF 1	113.92	13.99		0.000001	0.19	769.67	170.62
L4 Canal	L4 WEST	13	PF 1	113.92	13.99		0.000001	0.19	759.48	170.62
L4 Canal	L4 WEST	12	PF 1	113.92	13.99		0.000001	0.19	704.23	167.94
L4 Canal	L4 WEST	11	PF 1	113.92	13.99		0	0.16	818.67	167.94
L4 Canal	L4 WEST	10	PF 1	113.92	13.99		0.000001	0.2	703.11	167.93
L4 Canal	L4 WEST	9	PF 1	113.92	13.99		0.000001	0.23	657.41	167.92
L4 Canal	L4 WEST	8	PF 1	113.92	13.99		0.000001	0.2	756.16	170.59
L4 Canal	L4 WEST	7	PF 1	113.92	13.99		0.000001	0.22	649.36	167.91
L4 Canal	L4 WEST	6	PF 1	113.92	13.99		0.000001	0.27	585.44	167.9
L4 Canal	L4 WEST	5	PF 1	113.92	13.99		0.000001	0.28	579.46	167.89
L4 Canal	L4 WEST	4	PF 1	113.92	13.98		0.000001	0.28	591.61	170.56
L4 Canal	L4 WEST	3	PF 1	113.92	13.98		0.000001	0.28	559.13	167.87
L4 Canal	L4 WEST	2	PF 1	113.92	13.98		0.000002	0.3	527.98	167.85
L4 Canal	L4 WEST	1.5	PF 1	113.92	13.98		0.000002	0.3	527.69	167.84
L3 Ext	L3 Ext WEST	17	PF 1	324.22	14.03		0.000003	0.43	810.97	160.13
L3 Ext	L3 Ext WEST	16	PF 1	386.08	14.03		0.000005	0.52	810.44	160.11
L3 Ext	L3 Ext WEST	15	PF 1	386.08	14.02		0.000006	0.55	756.86	157.46
L3 Ext	L3 Ext WEST	14	PF 1	386.08	14.02		0.000004	0.47	869.17	173.53
L3 Ext	L3 Ext WEST	13	PF 1	386.08	14.02		0.000004	0.48	862.08	173.05
L3 Ext	L3 Ext WEST	12	PF 1	386.08	14.01		0.000003	0.45	925.99	173.75
L3 Ext	L3 Ext WEST	11	PF 1	386.08	14.01		0.000003	0.46	899.82	165.07
L3 Ext	L3 Ext WEST	10	PF 1	386.08	14.01		0.000003	0.45	908.55	175.19
L3 Ext	L3 Ext WEST	9	PF 1	386.08	14		0.000003	0.42	971.5	175.19
L3 Ext	L3 Ext WEST	8	PF 1	386.08	14		0.000003	0.44	946.57	176.79
L3 Ext	L3 Ext WEST	7	PF 1	386.08	14		0.000003	0.45	922.58	175.62
L3 Ext	L3 Ext WEST	6	PF 1	386.08	13.99		0.000003	0.44	931.33	171.9
L3 Ext	L3 Ext WEST	5	PF 1	386.08	13.99		0.000003	0.45	930.68	172.97
L3 Ext	L3 Ext WEST	4	PF 1	386.08	13.99		0.000003	0.45	931.53	172.02
L3 Ext	L3 Ext WEST	3	PF 1	386.08	13.98		0.000003	0.45	934.92	168.71
L3 Ext	L3 Ext WEST	2	PF 1	386.08	13.98		0.000004	0.48	860.14	163.2
L3 Ext	L3 Ext WEST	1	PF 1	386.08	13.98		0.000003	0.43	950.89	169.02
L3 Ext	WCA 3	6	PF 1	510	13.97		0.000005	0.61	2867.38	2220.56
L3 Ext	WCA 3	5	PF 1	510	13.95		0.000005	0.57	10400.19	10221.51
L3 Ext	WCA 3	4	PF 1	510	13.94		0.000002	0.14	21540.35	20231.66
L3 Ext	WCA 3	3	PF 1	510	13.94		0.000076	0.01	41620.59	40100
L3 Ext	WCA 3	2.5	PF 1	510	13.17		0.000081	0.01	40972.65	40100
L3 Ext	WCA 3	2	PF 1	510	12.5	12.5	0.000059	0.01	44189.06	40100
L3 Ext	WCA 3	1	PF 1	510	12.3	12.3	0.000008	0.01	72180.01	40100

SFWMD Compartment C
Southern Outlet Water Surface Model
September 17, 2002 Calibration Results
By M. Brungard 1/17/05

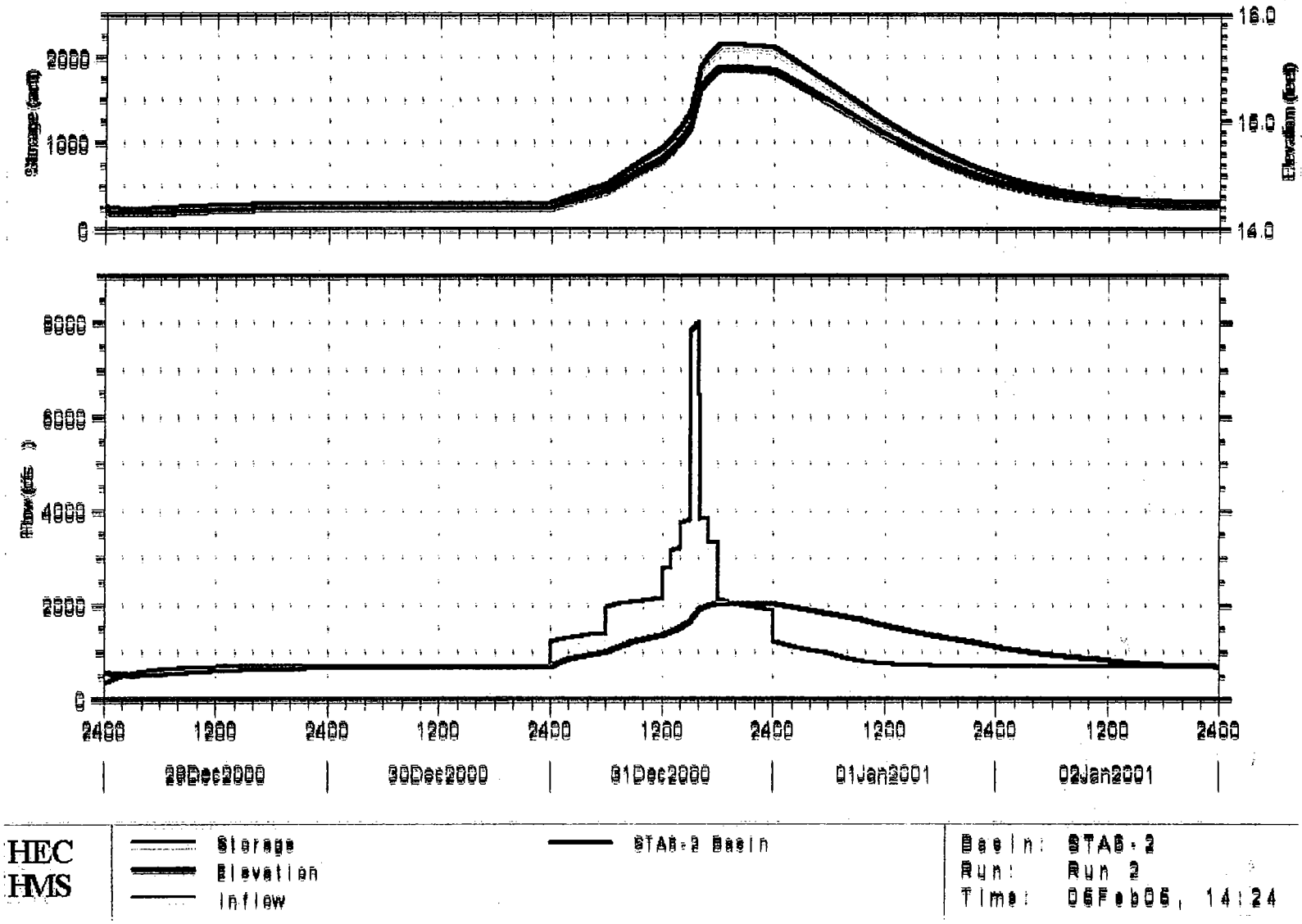
River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Obs WS (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
STA6 Discharge	STA6 OUTLET	2	PF 1	190	14.26	14.4	0.000001	0.19	1032.01	141.54
STA6 Discharge	STA6 OUTLET	1.1		Lat Struct						
STA6 Discharge	STA6 OUTLET	1	PF 1	190	14.26		0.000001	0.19	1032	141.54
L4 Gap	L4 GAP	2	PF 1	660	14.25		0.000001	0.35	1940.81	195
L4 Gap	L4 GAP	1	PF 1	660	14.25		0.000001	0.35	1940.77	195
L4 Canal	L4 EAST	34	PF 1	590	14.4		0.000006	0.7	1016.35	173.62
L4 Canal	L4 EAST	33	PF 1	590	14.39		0.000008	0.79	923.75	171.16
L4 Canal	L4 EAST	32	PF 1	590	14.39		0.000009	0.83	877.54	171.08
L4 Canal	L4 EAST	31	PF 1	590	14.38		0.000008	0.79	955.63	173.44
L4 Canal	L4 EAST	30	PF 1	590	14.37		0.000009	0.83	919.52	173.37
L4 Canal	L4 EAST	29	PF 1	590	14.36		0.000008	0.79	936.16	173.31
L4 Canal	L4 EAST	28	PF 1	590	14.35		0.00001	0.88	815.81	170.79
L4 Canal	L4 EAST	27	PF 1	590	14.34		0.00001	0.86	853.54	170.71
L4 Canal	L4 EAST	26	PF 1	590	14.33		0.00001	0.86	842.07	170.64
L4 Canal	L4 EAST	25	PF 1	590	14.32		0.000008	0.81	918.94	173.03
L4 Canal	L4 EAST	24	PF 1	590	14.31		0.00001	0.85	828.66	170.49
L4 Canal	L4 EAST	23	PF 1	590	14.31		0.000006	0.71	1003.24	172.91
L4 Canal	L4 EAST	22	PF 1	590	14.3		0.000008	0.75	954.42	172.85
L4 Canal	L4 EAST	21	PF 1	590	14.29		0.00001	0.87	864.88	172.77
L4 Canal	L4 EAST	20	PF 1	590	14.28		0.000011	0.88	808.7	170.2
L4 Canal	L4 EAST	19	PF 1	590	14.26		0.000011	0.86	806.96	170.12
L4 Canal	L4 EAST	18	PF 1	590	14.26		0.000008	0.76	953.32	172.55
L4 Canal	L4 EAST	17	PF 1	590	14.24		0.000012	0.88	755.29	166.2
L4 Canal	L4 WEST	16	PF 1	70	14.26		0	0.11	805.38	172.55
L4 Canal	L4 WEST	15	PF 1	70	14.26		0	0.12	785.45	172.55
L4 Canal	L4 WEST	14	PF 1	70	14.26		0	0.11	814.87	172.55
L4 Canal	L4 WEST	13	PF 1	70	14.26		0	0.11	804.74	172.55
L4 Canal	L4 WEST	12	PF 1	70	14.26		0	0.11	748.87	170.05
L4 Canal	L4 WEST	11	PF 1	70	14.26		0	0.09	863.35	170.05
L4 Canal	L4 WEST	10	PF 1	70	14.26		0	0.12	747.87	170.05
L4 Canal	L4 WEST	9	PF 1	70	14.26		0	0.13	702.27	170.05
L4 Canal	L4 WEST	8	PF 1	70	14.26		0	0.12	801.76	172.54
L4 Canal	L4 WEST	7	PF 1	70	14.26		0	0.13	694.38	170.04
L4 Canal	L4 WEST	6	PF 1	70	14.26		0	0.16	630.61	170.04
L4 Canal	L4 WEST	5	PF 1	70	14.25		0	0.16	624.78	170.04
L4 Canal	L4 WEST	4	PF 1	70	14.25		0	0.16	637.78	172.53
L4 Canal	L4 WEST	3	PF 1	70	14.25		0	0.16	604.77	170.03
L4 Canal	L4 WEST	2	PF 1	70	14.25		0.000001	0.18	573.83	170.02
L4 Canal	L4 WEST	1.5	PF 1	70	14.25		0.000001	0.18	573.73	170.02
L3 Ext	L3 Ext WEST	17	PF 1	120	14.26		0	0.16	847.07	161.79
L3 Ext	L3 Ext WEST	16	PF 1	120	14.26		0	0.16	847.04	161.78
L3 Ext	L3 Ext WEST	15	PF 1	120	14.26		0	0.17	794.59	166.85
L3 Ext	L3 Ext WEST	14	PF 1	120	14.26		0	0.14	910.35	175.41
L3 Ext	L3 Ext WEST	13	PF 1	120	14.26		0	0.14	903.74	174.48
L3 Ext	L3 Ext WEST	12	PF 1	120	14.26		0	0.13	968.4	175.66
L3 Ext	L3 Ext WEST	11	PF 1	120	14.26		0	0.14	940.61	166.57
L3 Ext	L3 Ext WEST	10	PF 1	120	14.25		0	0.14	952.32	176.79
L3 Ext	L3 Ext WEST	9	PF 1	120	14.25		0	0.13	1015.71	176.88
L3 Ext	L3 Ext WEST	8	PF 1	120	14.25		0	0.13	991.73	178.71
L3 Ext	L3 Ext WEST	7	PF 1	120	14.25		0	0.14	967.98	177.32
L3 Ext	L3 Ext WEST	6	PF 1	120	14.25		0	0.13	976.25	173.52
L3 Ext	L3 Ext WEST	5	PF 1	120	14.25		0	0.13	976.39	174.77
L3 Ext	L3 Ext WEST	4	PF 1	120	14.25		0	0.14	977.48	173.61
L3 Ext	L3 Ext WEST	3	PF 1	120	14.25		0	0.14	980.51	170.53
L3 Ext	L3 Ext WEST	2	PF 1	120	14.25		0	0.14	904.78	164.93
L3 Ext	L3 Ext WEST	1	PF 1	120	14.25		0	0.13	997.58	170.79
L3 Ext	WCA 3	6	PF 1	780	14.24		0.000011	0.89	3456.2	2223.2
L3 Ext	WCA 3	5	PF 1	780	14.19		0.000009	0.81	12847.94	10230.85
L3 Ext	WCA 3	4	PF 1	780	14.17		0.000002	0.17	26310.27	20236.52
L3 Ext	WCA 3	3	PF 1	780	14.17		0.000076	0.02	51063.39	40100
L3 Ext	WCA 3	2.5	PF 1	780	13.42		0.000078	0.02	50734.05	40100
L3 Ext	WCA 3	2	PF 1	780	12.68	12.3	0.000074	0.02	51413.12	40100
L3 Ext	WCA 3	1	PF 1	780	11.7	11.7	0.0001	0.02	48119.99	40100



STA6-2 HEC-HMS Model Configuration

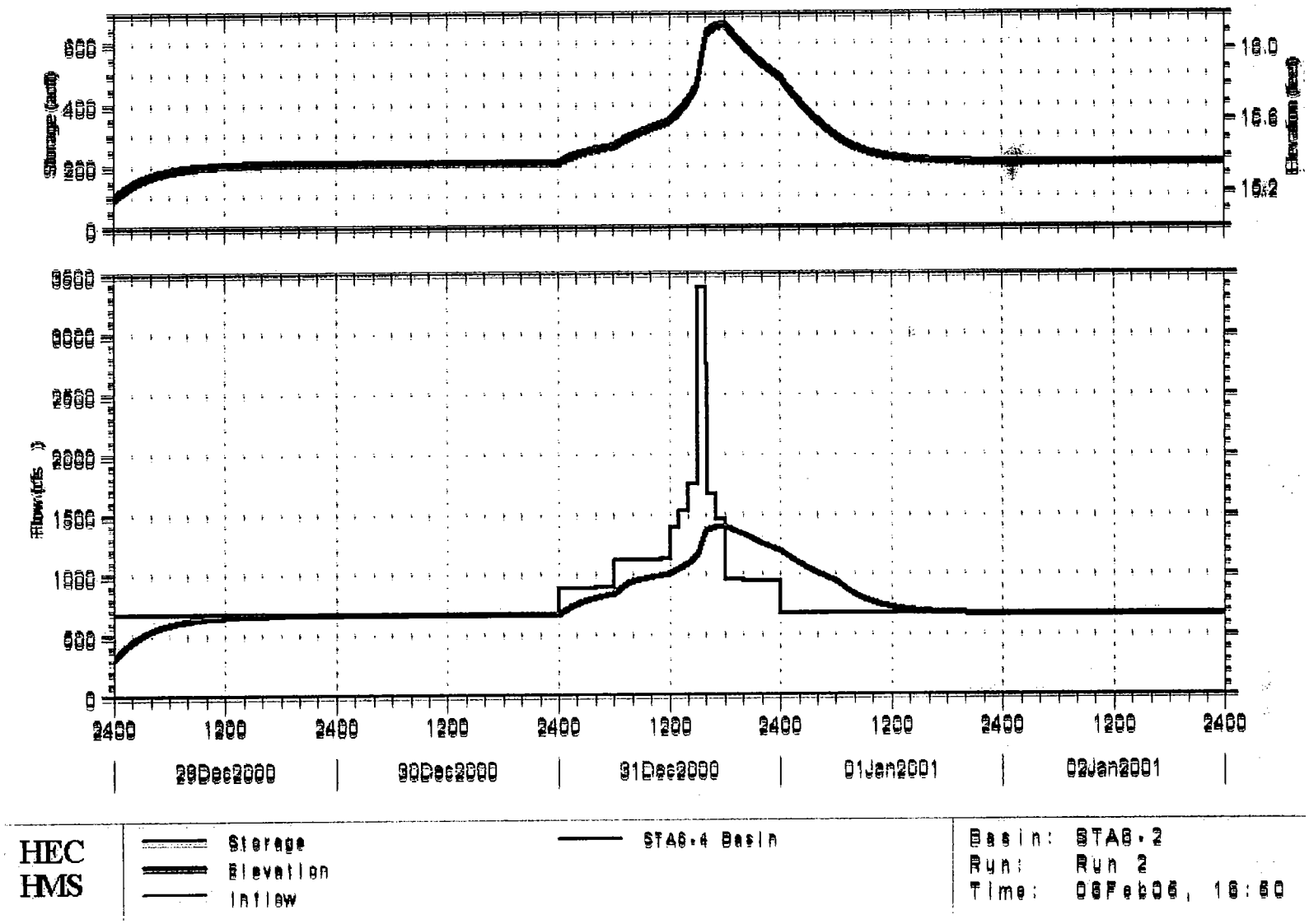


STA5-3 HEC-HMS Model Configuration



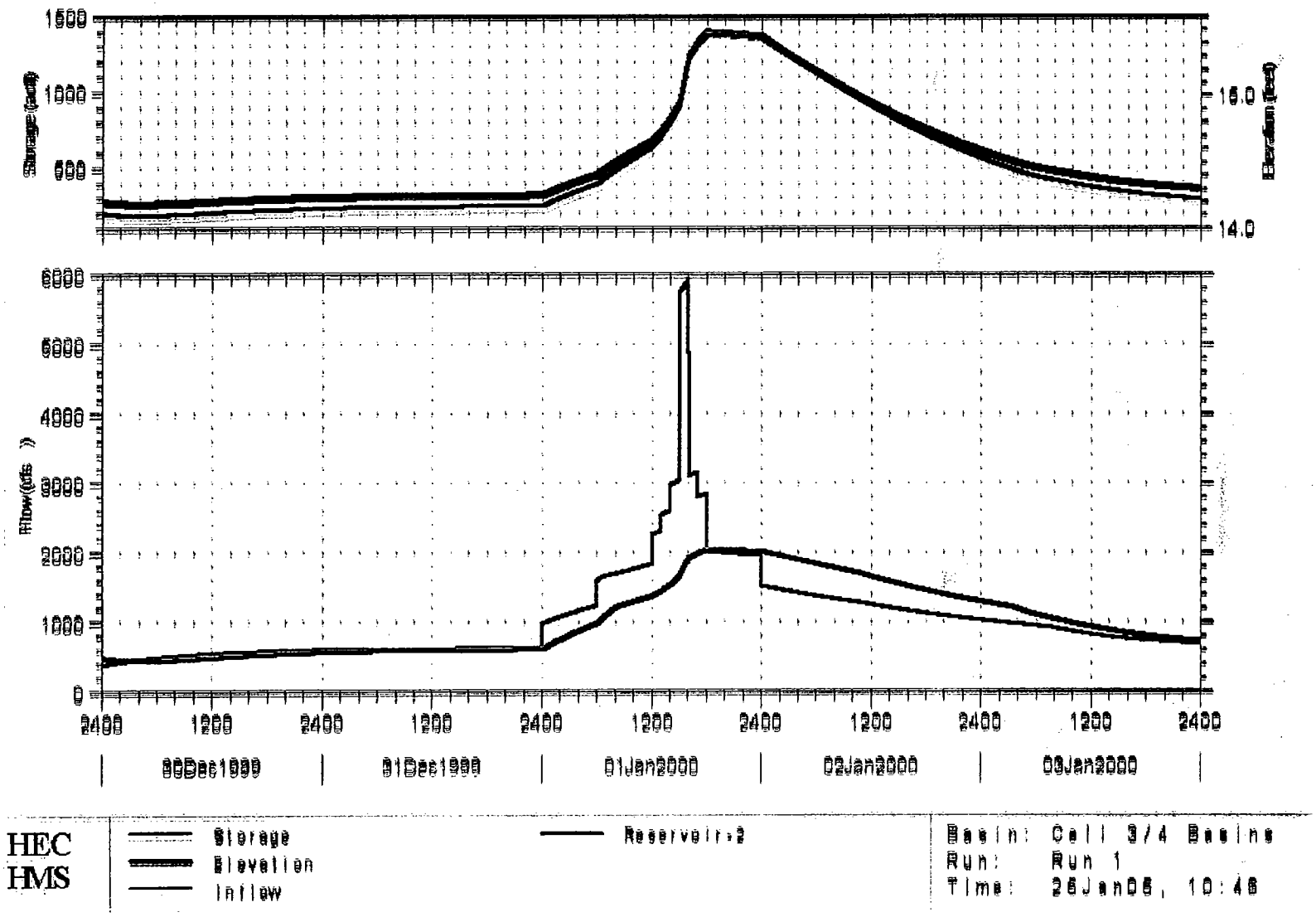
STA6-2 Outflow Performance During SPS Event

with (4) 10' by 6' Box Culvert Outlets



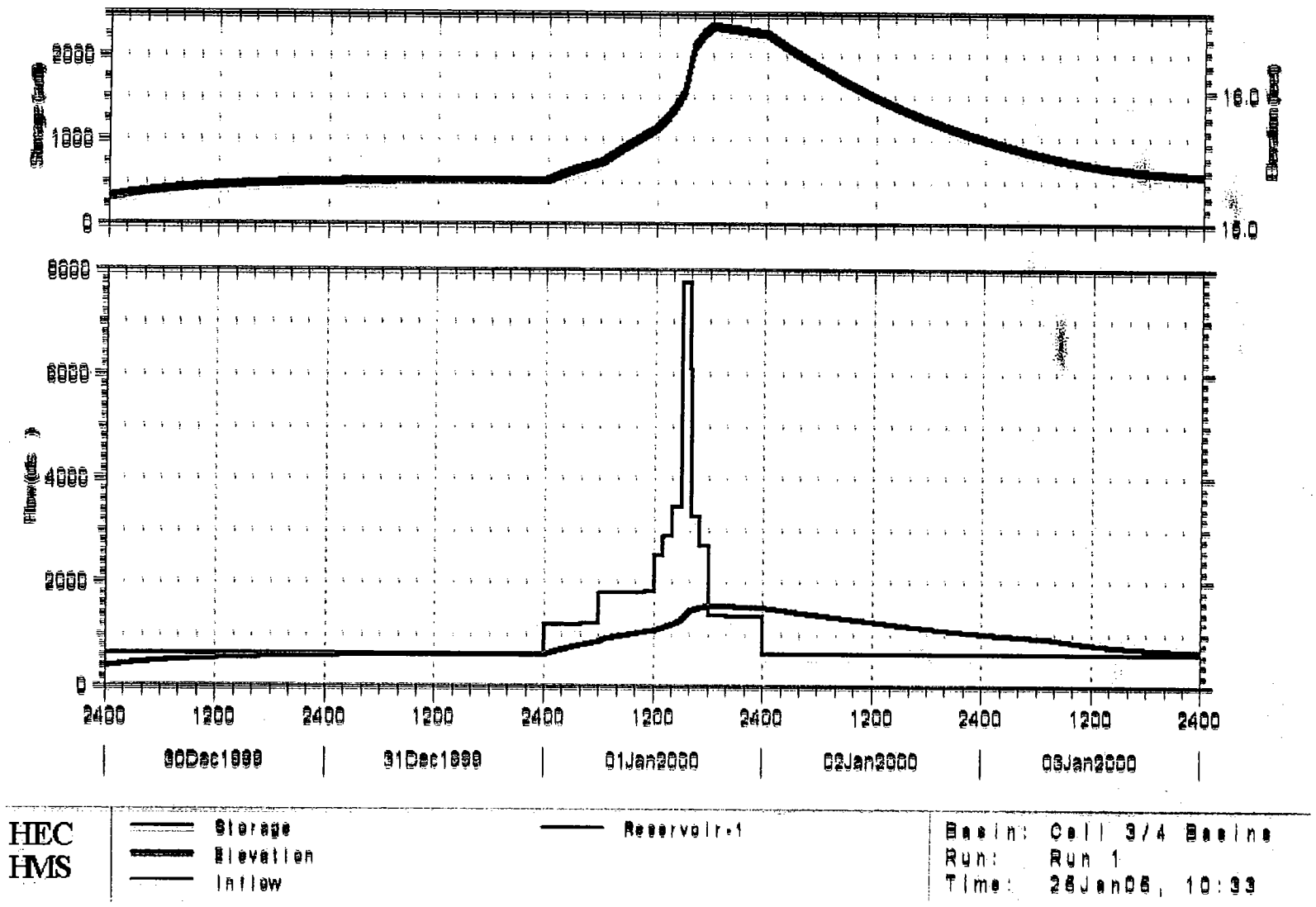
STA6-4 Outflow Performance During SPS Event

with (4) 8' by 6' Box Culvert Outlets



STA5-3b Outflow Performance During SPS Event

with (3) 10' by 8' Box Culvert Outlets



STA5-3a Outflow Performance During SPS Event

with (3) 10' by 6' Box Culvert Outlets

Appendix B
Control Structure Data and Rating Tables

Culvert Calculator Report
Existing STA5 Middle Structures

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	18.00 ft	Headwater Depth/Height	1.88
Computed Headwater Elev:	15.05 ft	Discharge	500.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.05 ft	Control Type	Outlet Control

Grades			
Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	57.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	1.69 ft
Velocity Downstream	1.56 ft/s	Critical Slope	0.003048 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 8 ft	Rise	8.00 ft
Number Sections	4		

Outlet Control Properties			
Outlet Control HW Elev.	15.05 ft	Upstream Velocity Head	0.04 ft
Ke	0.20	Entrance Loss	0.01 ft

Inlet Control Properties			
Inlet Control HW Elev.	15.00 ft	Flow Control	Unsubmerged
Inlet Type	headwall w 3/4 inch chamfers	Area Full	320.0 ft²
K	0.51500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	1
C	0.03750	Equation Form	2
Y	0.79000		

Rating Table Report
Existing STA5 Middle Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	2,000.00	100.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.00
200.00	15.01
300.00	15.02
400.00	15.03
500.00	15.05
600.00	15.07
700.00	15.10
800.00	15.13
900.00	15.16
1,000.00	15.20
1,100.00	15.24
1,200.00	15.28
1,300.00	15.33
1,400.00	15.39
1,500.00	15.44
1,600.00	15.50
1,700.00	15.57
1,800.00	15.64
1,900.00	15.71
2,000.00	15.79

Culvert Calculator Report
Existing STA5 Outlet Structures

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	18.00 ft	Headwater Depth/Height	1.51
Computed Headwater Elev:	15.12 ft	Discharge	500.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.12 ft	Control Type	Outlet Control

Grades			
Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	55.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.69 ft
Velocity Downstream	2.50 ft/s	Critical Slope	0.003143 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 10 ft	Rise	10.00 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev.	15.12 ft	Upstream Velocity Head	0.10 ft
Ke	0.20	Entrance Loss	0.02 ft

Inlet Control Properties			
Inlet Control HW Elev.	15.00 ft	Flow Control	Unsubmerged
Inlet Type	90° headwall w 45° bevels	Area Full	200.0 ft²
K	0.49500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	2
C	0.03140	Equation Form	2
Y	0.82000		

Rating Table Report
Existing STA5 Outlet Structures

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	2,000.00	100.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.00
200.00	15.02
300.00	15.04
400.00	15.08
500.00	15.12
600.00	15.18
700.00	15.24
800.00	15.32
900.00	15.40
1,000.00	15.50
1,100.00	15.60
1,200.00	15.72
1,300.00	15.84
1,400.00	15.97
1,500.00	16.12
1,600.00	16.27
1,700.00	16.44
1,800.00	16.61
1,900.00	16.80
2,000.00	16.99

Culvert Calculator Report
STA6-2 Inlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	2.64	
Computed Headwater Elev:	15.82	ft	Discharge	1,200.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.82	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	66.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	3.52	ft
Velocity Downstream	6.25	ft/s	Critical Slope	0.003757	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	15.82	ft	Upstream Velocity Head	0.61	ft
Ke	0.20		Entrance Loss	0.12	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	90° headwall w 45° bevels		Area Full	192.0	ft²
K	0.49500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	2	
C	0.03140		Equation Form	2	
Y	0.82000				

Rating Table Report
STA6-2 Inlet Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	2,400.00	100.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.01
200.00	15.02
300.00	15.05
400.00	15.09
500.00	15.14
600.00	15.21
700.00	15.28
800.00	15.37
900.00	15.46
1,000.00	15.57
1,100.00	15.69
1,200.00	15.82
1,300.00	15.97
1,400.00	16.12
1,500.00	16.29
1,600.00	16.47
1,700.00	16.66
1,800.00	16.86
1,900.00	17.07
2,000.00	17.29
2,100.00	17.53
2,200.00	17.77
2,300.00	18.03
2,400.00	18.30

Culvert Calculator Report
STA6 Outlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	2.51	
Computed Headwater Elev	15.09	ft	Discharge	500.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.09	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	55.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	1.69	ft
Velocity Downstream	2.08	ft/s	Critical Slope	0.003048	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 6 ft		Rise	6.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	15.09	ft	Upstream Velocity Head	0.07	ft
Ke	0.20		Entrance Loss	0.01	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	headwall w 3/4 inch chamfers		Area Full	240.0	ft²
K	0.51500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	1	
C	0.03750		Equation Form	2	
Y	0.79000				

Rating Table Report
STA6 Outlet Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	3,000.00	100.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.00
200.00	15.01
300.00	15.03
400.00	15.06
500.00	15.09
600.00	15.13
700.00	15.17
800.00	15.23
900.00	15.29
1,000.00	15.36
1,100.00	15.43
1,200.00	15.51
1,300.00	15.60
1,400.00	15.70
1,500.00	15.80
1,600.00	15.91
1,700.00	16.03
1,800.00	16.15
1,900.00	16.28
2,000.00	16.42
2,100.00	16.57
2,200.00	16.72
2,300.00	16.88
2,400.00	17.05
2,500.00	17.22
2,600.00	17.40
2,700.00	17.59
2,800.00	17.79
2,900.00	17.99
3,000.00	18.20

Culvert Calculator Report
STA5 Inlet Structures

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	18.00 ft	Headwater Depth/Height	2.56
Computed Headwater Elev:	15.36 ft	Discharge	500.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.36 ft	Control Type	Outlet Control

Grades			
Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	66.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.69 ft
Velocity Downstream	4.17 ft/s	Critical Slope	0.003143 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 6 ft	Rise	6.00 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev.	15.36 ft	Upstream Velocity Head	0.27 ft
Ke	0.20	Entrance Loss	0.05 ft

Inlet Control Properties			
Inlet Control HW Elev.	15.00 ft	Flow Control	Unsubmerged
Inlet Type	90° headwall w 45° bevels	Area Full	120.0 ft²
K	0.49500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	2
C	0.03140	Equation Form	2
Y	0.82000		

Rating Table Report
STA5 Inlet Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	1,000.00	50.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
50.00	15.00
100.00	15.01
150.00	15.03
200.00	15.06
250.00	15.09
300.00	15.13
350.00	15.18
400.00	15.23
450.00	15.29
500.00	15.36
550.00	15.44
600.00	15.52
650.00	15.61
700.00	15.71
750.00	15.81
800.00	15.93
850.00	16.05
900.00	16.17
950.00	16.31
1,000.00	16.45

Culvert Calculator Report
STA5 Middle Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	2.53	
Computed Headwater Elev	15.16	ft	Discharge	500.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.16	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	48.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.05	ft
Velocity Downstream	2.78	ft/s	Critical Slope	0.003065	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 6 ft		Rise	6.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	15.16	ft	Upstream Velocity Head	0.12	ft
Ke	0.20		Entrance Loss	0.02	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	headwall w 3/4 inch chamfers		Area Full	180.0	ft²
K	0.51500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	1	
C	0.03750		Equation Form	2	
Y	0.79000				

Rating Table Report
STA5 Middle Structures

Range Data:

	Minimum	Maximum	Increment	
Discharge	0.00	2,000.00	50.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
50.00	15.00
100.00	15.01
150.00	15.01
200.00	15.02
250.00	15.04
300.00	15.06
350.00	15.08
400.00	15.10
450.00	15.13
500.00	15.16
550.00	15.19
600.00	15.22
650.00	15.26
700.00	15.31
750.00	15.35
800.00	15.40
850.00	15.45
900.00	15.51
950.00	15.56
1,000.00	15.62
1,050.00	15.69
1,100.00	15.76
1,150.00	15.83
1,200.00	15.90
1,250.00	15.98
1,300.00	16.06
1,350.00	16.14
1,400.00	16.22
1,450.00	16.31
1,500.00	16.41
1,550.00	16.50
1,600.00	16.60
1,650.00	16.70
1,700.00	16.81
1,750.00	16.91
1,800.00	17.02
1,850.00	17.14
1,900.00	17.25
1,950.00	17.38
2,000.00	17.50

Culvert Calculator Report
STA5 Outlet Structures

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	18.00 ft	Headwater Depth/Height	1.89
Computed Headwater Elev	15.09 ft	Discharge	500.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.09 ft	Control Type	Outlet Control

Grades			
Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	55.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.05 ft
Velocity Downstream	2.08 ft/s	Critical Slope	0.003065 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 8 ft	Rise	8.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev.	15.09 ft	Upstream Velocity Head	0.07 ft
Ke	0.20	Entrance Loss	0.01 ft

Inlet Control Properties			
Inlet Control HW Elev.	15.00 ft	Flow Control	Unsubmerged
Inlet Type	headwall w 3/4 inch chamfers	Area Full	240.0 ft²
K	0.51500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	1
C	0.03750	Equation Form	2
Y	0.79000		

Culvert Calculator Report
STA6-3 Outlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	16.00	ft	Headwater Depth/Height	2.06	
Computed Headwater Elev	12.36	ft	Discharge	200.00	cfs
Inlet Control HW Elev.	12.00	ft	Tailwater Elevation	12.00	ft
Outlet Control HW Elev.	12.36	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	50.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	12.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.69	ft
Velocity Downstream	4.17	ft/s	Critical Slope	0.003515	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	12.36	ft	Upstream Velocity Head	0.27	ft
Ke	0.20		Entrance Loss	0.05	ft

Inlet Control Properties					
Inlet Control HW Elev.	12.00	ft	Flow Control	Unsubmerged	
Inlet Type	headwall w 3/4 inch chamfers		Area Full	48.0	ft²
K	0.51500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	1	
C	0.03750		Equation Form	2	
Y	0.79000				

Rating Table Report
STA6-3 Outlet Structures

Range Data:

	Minimum	Maximum	Increment	
Discharge	0.00	400.00	50.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	12.00
50.00	12.02
100.00	12.09
150.00	12.20
200.00	12.36
250.00	12.56
300.00	12.80
350.00	13.09
400.00	13.42

Culvert Calculator Report
STA6-5 Outlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	16.00	ft	Headwater Depth/Height	2.08	
Computed Headwater Elev	12.46	ft	Discharge	454.00	cfs
Inlet Control HW Elev.	12.00	ft	Tailwater Elevation	12.00	ft
Outlet Control HW Elev.	12.46	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	55.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	12.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.92	ft
Velocity Downstream	4.73	ft/s	Critical Slope	0.003580	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	12.46	ft	Upstream Velocity Head	0.35	ft
Ke	0.20		Entrance Loss	0.07	ft

Inlet Control Properties					
Inlet Control HW Elev.	12.00	ft	Flow Control	Unsubmerged	
Inlet Type	headwall w 3/4 inch chamfers		Area Full	96.0	ft^2
K	0.51500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	1	
C	0.03750		Equation Form	2	
Y	0.79000				

Rating Table Report
STA6-5 Outlet Structures

Range Data:

	Minimum	Maximum	Increment	
Discharge	0.00	500.00	50.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	12.00
50.00	12.01
100.00	12.02
150.00	12.05
200.00	12.09
250.00	12.14
300.00	12.20
350.00	12.28
400.00	12.36
450.00	12.45
500.00	12.56

Culvert Calculator Report
STA6-3 Inlet Structure

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	18.00 ft	Headwater Depth/Height	2.56
Computed Headwater Elev	15.37 ft	Discharge	200.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.37 ft	Control Type	Outlet Control

Grades			
Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	75.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.69 ft
Velocity Downstream	4.17 ft/s	Critical Slope	0.003515 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	8.00 ft
Section Size	8 x 6 ft	Rise	6.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	15.37 ft	Upstream Velocity Head	0.27 ft
Ke	0.20	Entrance Loss	0.05 ft

Inlet Control Properties			
Inlet Control HW Elev.	15.00 ft	Flow Control	Unsubmerged
Inlet Type	90° headwall w 45° bevels	Area Full	48.0 ft²
K	0.49500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	2
C	0.03140	Equation Form	2
Y	0.82000		

Rating Table Report
STA6-3 Inlet Structure

Range Data:

	Minimum	Maximum	Increment	
Discharge	0.00	400.00	50.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
50.00	15.02
100.00	15.09
150.00	15.21
200.00	15.37
250.00	15.58
300.00	15.84
350.00	16.14
400.00	16.49

Culvert Calculator Report
STA6-5 Inlet Structures

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	18.00 ft	Headwater Depth/Height	2.60
Computed Headwater Elev	15.58 ft	Discharge	500.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.58 ft	Control Type	Outlet Control

Grades

Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	75.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	3.12 ft
Velocity Downstream	5.21 ft/s	Critical Slope	0.003635 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	8.00 ft
Section Size	8 x 6 ft	Rise	6.00 ft
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev.	15.58 ft	Upstream Velocity Head	0.42 ft
Ke	0.20	Entrance Loss	0.08 ft

Inlet Control Properties

Inlet Control HW Elev.	15.00 ft	Flow Control	N/A
Inlet Type	headwall w 3/4 inch chamfers	Area Full	96.0 ft²
K	0.51500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	1
C	0.03750	Equation Form	2
Y	0.79000		

Rating Table Report
STA6-5 Inlet Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	1,000.00	100.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.02
200.00	15.09
300.00	15.21
400.00	15.37
500.00	15.58
600.00	15.84
700.00	16.14
800.00	16.49
900.00	16.88
1,000.00	17.33

Appendix B

Control Structure Data and Rating Tables

Culvert Calculator Report
STA5 Inlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	2.56	
Computed Headwater Elev:	15.36	ft	Discharge	500.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.36	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	66.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.69	ft
Velocity Downstream	4.17	ft/s	Critical Slope	0.003143	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 6 ft		Rise	6.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	15.36	ft	Upstream Velocity Head	0.27	ft
Ke	0.20		Entrance Loss	0.05	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	90° headwall w 45° bevels		Area Full	120.0	ft²
K	0.49500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	2	
C	0.03140		Equation Form	2	
Y	0.82000				

Rating Table Report
STA5 Inlet Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	1,000.00	50.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
50.00	15.00
100.00	15.01
150.00	15.03
200.00	15.06
250.00	15.09
300.00	15.13
350.00	15.18
400.00	15.23
450.00	15.29
500.00	15.36
550.00	15.44
600.00	15.52
650.00	15.61
700.00	15.71
750.00	15.81
800.00	15.93
850.00	16.05
900.00	16.17
950.00	16.31
1,000.00	16.45

Culvert Calculator Report
(2) STA5 Middle Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	1.90	
Computed Headwater Elev	15.19	ft	Discharge	500.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.19	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	48.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.69	ft
Velocity Downstream	3.13	ft/s	Critical Slope	0.003143	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 8 ft		Rise	8.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	15.19	ft	Upstream Velocity Head	0.15	ft
Ke	0.20		Entrance Loss	0.03	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	headwall w 3/4 inch chamfers		Area Full	160.0	ft²
K	0.51500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	1	
C	0.03750		Equation Form	2	
Y	0.79000				

Rating Table Report
(2) STA5 Middle Structures

Range Data:				
	Minimum	Maximum	Increment	
Discharge	0.00	1,000.00	100.00	cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.01
200.00	15.03
300.00	15.07
400.00	15.12
500.00	15.19
600.00	15.28
700.00	15.38
800.00	15.50
900.00	15.63
1,000.00	15.78

Culvert Calculator Report
(2) STA5 Outlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	1.51	
Computed Headwater Elev	15.12	ft	Discharge	500.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.12	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	55.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.69	ft
Velocity Downstream	2.50	ft/s	Critical Slope	0.003143	ft/ft

Section				
Section Shape	Box	Mannings Coefficient	0.013	
Section Material	Concrete	Span	10.00	ft
Section Size	10 x 10 ft	Rise	10.00	ft
Number Sections	2			

Outlet Control Properties					
Outlet Control HW Elev.	15.12	ft	Upstream Velocity Head	0.10	ft
Ke	0.20		Entrance Loss	0.02	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	headwall w 3/4 inch chamfers		Area Full	200.0	ft²
K	0.51500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	1	
C	0.03750		Equation Form	2	
Y	0.79000				

Rating Table Report
(2) STA5 Outlet Structures

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	1,000.00	100.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
100.00	15.00
200.00	15.02
300.00	15.04
400.00	15.08
500.00	15.12
600.00	15.18
700.00	15.24
800.00	15.32
900.00	15.40
1,000.00	15.50

Culvert Calculator Report
(2) STA5-5 Inlet Structures

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	18.00	ft	Headwater Depth/Height	1.90	
Computed Headwater Elev:	15.20	ft	Discharge	500.00	cfs
Inlet Control HW Elev.	15.00	ft	Tailwater Elevation	15.00	ft
Outlet Control HW Elev.	15.20	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	0.00	ft	Downstream Invert	0.00	ft
Length	66.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	15.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.69	ft
Velocity Downstream	3.13	ft/s	Critical Slope	0.003143	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 8 ft		Rise	8.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	15.20	ft	Upstream Velocity Head	0.15	ft
Ke	0.20		Entrance Loss	0.03	ft

Inlet Control Properties					
Inlet Control HW Elev.	15.00	ft	Flow Control	Unsubmerged	
Inlet Type	90° headwall w 45° bevels		Area Full	160.0	ft²
K	0.49500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	2	
C	0.03140		Equation Form	2	
Y	0.82000				

Rating Table Report
(2) STA5-5 Inlet Structures

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	1,500.00	50.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	15.00
50.00	15.00
100.00	15.01
150.00	15.02
200.00	15.03
250.00	15.05
300.00	15.07
350.00	15.10
400.00	15.13
450.00	15.16
500.00	15.20
550.00	15.24
600.00	15.29
650.00	15.34
700.00	15.39
750.00	15.45
800.00	15.51
850.00	15.58
900.00	15.65
950.00	15.72
1,000.00	15.80
1,050.00	15.88
1,100.00	15.96
1,150.00	16.05
1,200.00	16.15
1,250.00	16.24
1,300.00	16.35
1,350.00	16.45
1,400.00	16.56
1,450.00	16.67
1,500.00	16.79

Culvert Calculator Report
STA6-3 Inlet Structure

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	18.00 ft	Headwater Depth/Height	2.56
Computed Headwater Elev:	15.37 ft	Discharge	200.00 cfs
Inlet Control HW Elev.	15.00 ft	Tailwater Elevation	15.00 ft
Outlet Control HW Elev.	15.37 ft	Control Type	Outlet Control

Grades			
Upstream Invert	0.00 ft	Downstream Invert	0.00 ft
Length	75.00 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	15.00 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.69 ft
Velocity Downstream	4.17 ft/s	Critical Slope	0.003515 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	8.00 ft
Section Size	8 x 6 ft	Rise	6.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	15.37 ft	Upstream Velocity Head	0.27 ft
Ke	0.20	Entrance Loss	0.05 ft

Inlet Control Properties			
Inlet Control HW Elev.	15.00 ft	Flow Control	Unsubmerged
Inlet Type	90° headwall w 45° bevels	Area Full	48.0 ft²
K	0.49500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	2
C	0.03140	Equation Form	2
Y	0.82000		