INFLOW DESIGN FLOOD CONTROL PLAN

CFR 257.82

Primary Bottom Ash Pond

Flint Creek Plant
Gentry, Arkansas

September, 2016

Prepared for: Southwestern Electric Power Company

Prepared by: American Electric Power Service Corporation

1 Riverside Plaza

Columbus, OH 43215



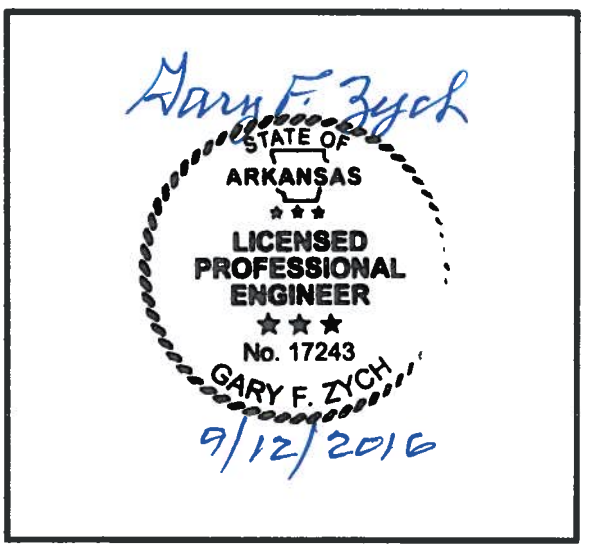
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INFLOW DESIGN FLOOD CONTROL PLAN
CFR 257.82
FLINT CREEK PLANT
PRIMARY BOTTOM ASH POND

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I certify to the best of my knowledge, information, and belief that the information contained in this inflow design flood control plan meets the requirements of 40 CFR § 257.82

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1.0 OBJECTIVE

This report was prepared by AEP- Geotechnical Engineering Services (GES) section to fulfill requirements of CCR 257.82 for the hydrologic and hydraulic evaluation of CCR surface impoundments.

2.0 DESCRIPTION OF THE CCR UNIT

The Flint Creek Power Plant is located near the City of Gentry, Benton County, Arkansas.
It is owned and operated by Southwestern Electric Power Company (SWEPCO). The facility operates one surface impoundment for storing CCRs, referenced as the Primary Bottom Ash Pond.

The Primary Ash Pond dam is a cross valley dam on a tributary to the Little Flint Creek. The dam is 45 feet high and has side slopes of 3H:1V. The downstream slope is partially submerged by the Little Flint Creek Reservoir.

3.0 INFLOW DESIGN FLOOD 257.82(a)(3)

The facility is classified as a Low Hazard Potential Dam. The Inflow Design Flood is the 100-year flood.

4.0 FLOOD CONTROL PLAN 257.82(c)

All storm water runoff from the watershed drains into the reservoir created by the Primary Bottom Ash Dam. The design to safely pass the inflow design flood without overtopping the crest of the dam is based on the spillway system and surcharge flood storage capacity above the maximum operating level. The analysis in Attachment A provides the description of the spillway system, flood storage capacity, inflow peak discharge and volume, peak discharge from the facility and maximum pool elevation.

The calculations show that the facility has the capacity to manage the inflow design flood, as well as large flood events.

ATTACHMENT A

Innovative approaches
Practical results
Outstanding service

Hydraulic Analysis of Flint Creek Power Plant Ash Ponds

American Electric Power Company

Prepared by:

FREESE AND NICHOLS, INC.
4055 International Plaza, Suite 200
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AEP10431

Innovative approaches
Practical results
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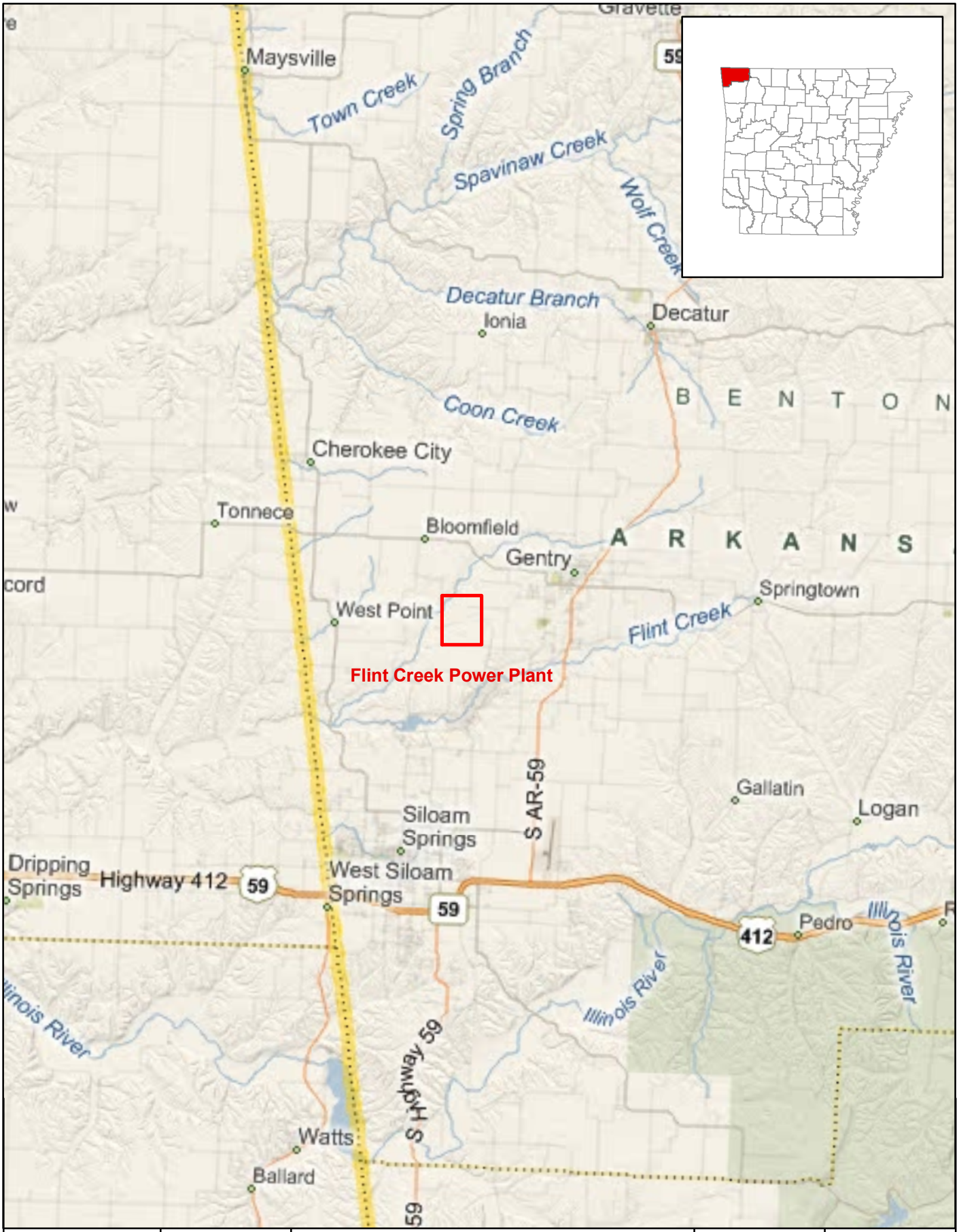
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Appendix A – References
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Appendix C – Pertinent Drawings

1.0 INTRODUCTION

In November of 2010, Freese and Nichols, Inc., (FNI) was retained by American Electric Power (AEP) to perform various hydrologic and hydraulic calculations to determine the hydraulic adequacy of the Primary Ash and Secondary Ash Ponds for the Flint Creek Power Plant located near Gentry, Arkansas. This report summarizes the results of the analysis for the 10-year, 25-year, 100-year, 25% PMF, 50% PMF, and 100% PMF events.

The two Ash Ponds are situated immediately south of the Flint Creek Power Plant on the east side of Little Flint Creek Reservoir. The general location of the power plant and associated reservoirs is shown in Figure 1.



FN PROJECT NO. AEP10431	FREESE AND NICHOLS	0 1.25 2.5 5 Miles		FIGURE 1
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DATUM & COORDINATE SYSTEM NAD83 STATE PLANE ARKANSAS NORTH (FT)		LOCATION MAP		
DATE CREATED DECEMBER 2010				
PREPARED BY JPM				

2.0 HYDROLOGIC MODEL DEVELOPMENT

2.1 BASIN DELINEATION & CONNECTIVITY

The hydrologic model for the Flint Creek Power Plant Ash Ponds was created in HEC-HMS[1] and consisted of two total drainage basins, as shown in Figure 2. The total drainage area modeled is approximately 1.82 square miles, or 1,167 acres. One basin represents the total area that drains directly into the Primary Ash Pond, and the other represents the area that drains only to the Secondary Ash Pond. The basins were delineated from the National Elevation Dataset (NED) 10-meter resolution Digital Elevation Model (DEM).

The Primary Ash Pond is connected to the Secondary Ash Pond via a wide open channel controlled by a currently silted over concrete sill and a small weir box at a slightly lower elevation. Discharges from the Secondary Ash Pond flow into Little Flint Creek Reservoir through a similar structure. The concrete sill, however, is visible and the weir box has recently been replaced. Spillway capacities are discussed in further detail in Section 2.4.

Both the Flint Creek Power Plant and the City of Gentry Wastewater Treatment Plant discharge directly into the Primary Ash Pond. Discharges from the power plant consist of low volume wastewater and stormwater. Based on data from AEP, these discharges were assumed constant at a flow rate of 8.08 MGD, or 12.5 cfs.



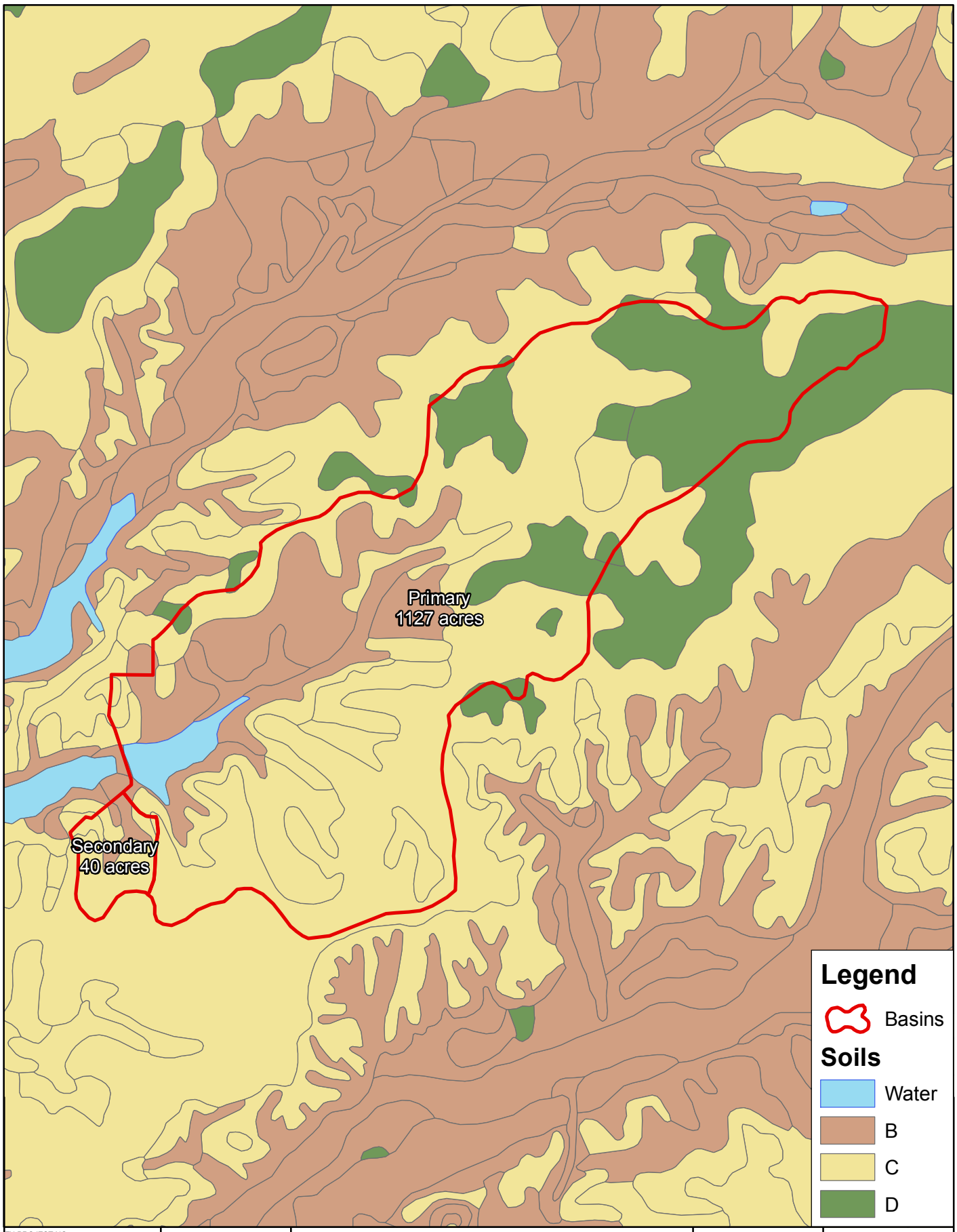
FN PROJECT NO. AEP10431	FREESE AND NICHOLS	0 1,000 2,000 4,000 Feet	N	FIGURE 2
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DATUM & COORDINATE SYSTEM NAD83 STATE PLANE ARKANSAS NORTH (FT)		DRAINAGE BASIN MAP		
DATE CREATED DECEMBER 2010				
PREPARED BY JPM				

2.2 HYDROLOGIC PARAMETERS

The HEC-HMS model incorporates the NRCS Curve Number and Unit Hydrograph methods for each basin. In this model, the curve numbers were based on hydrologic soil classifications and land cover. The instantaneous runoff effect of open water surfaces was accounted for in the development of the curve numbers. The soils dataset was obtained from the NRCS Soil Survey Geographic Database[2] (SSURGO), and land use dataset was obtained from the USGS Seamless Data Warehouse[3] in the form of the National Land Cover Dataset (NLCD) for 2001. Spatial information about soil types and land use classifications is presented in Figures 3 and 4, respectively. Table 1 provides the matrix used in determining the curve number for each basin. The curve numbers shown in Table 1 are for Antecedent Moisture Condition (AMC) II. These values were incorporated in the model for the frequency storm events, such as the 100-year storm event, and the PMP event. Typically, a higher curve number would be used to simulate a worst-case scenario with the ground fully saturated. However, because of the long duration of the PMP event and the timing of the rainfall distribution, the ground will be fully saturated prior to the peak of the storm and a higher curve number will have no significant impact on the results.

Table 1 – Curve Number Calculation Matrix

NLCD Classification		Curve Number (AMC II)					
#	Description	A	B	B/C	C	C/D	D
11	Open Water	100	100	100	100	100	100
21	Developed, Open Space	68	79	83	86	88	89
22	Developed, Low Intensity	51	68	74	79	82	84
23	Developed, Medium Intensity	77	85	88	90	91	92
24	Developed, High Intensity	89	92	93	94	95	95
31	Barren Land	77	86	89	91	93	94
41	Deciduous Forest	36	60	67	73	76	79
42	Evergreen Forest	36	60	67	73	76	79
43	Mixed Forest	36	60	67	73	76	79
52	Scrub/Shrub	35	56	63	70	74	77
71	Grassland/Herbaceous	39	61	68	74	77	80
81	Pasture/Hay	39	61	68	74	77	80
82	Cultivated Crops	67	78	82	85	87	89
90	Woody Wetlands	45	66	72	77	80	83



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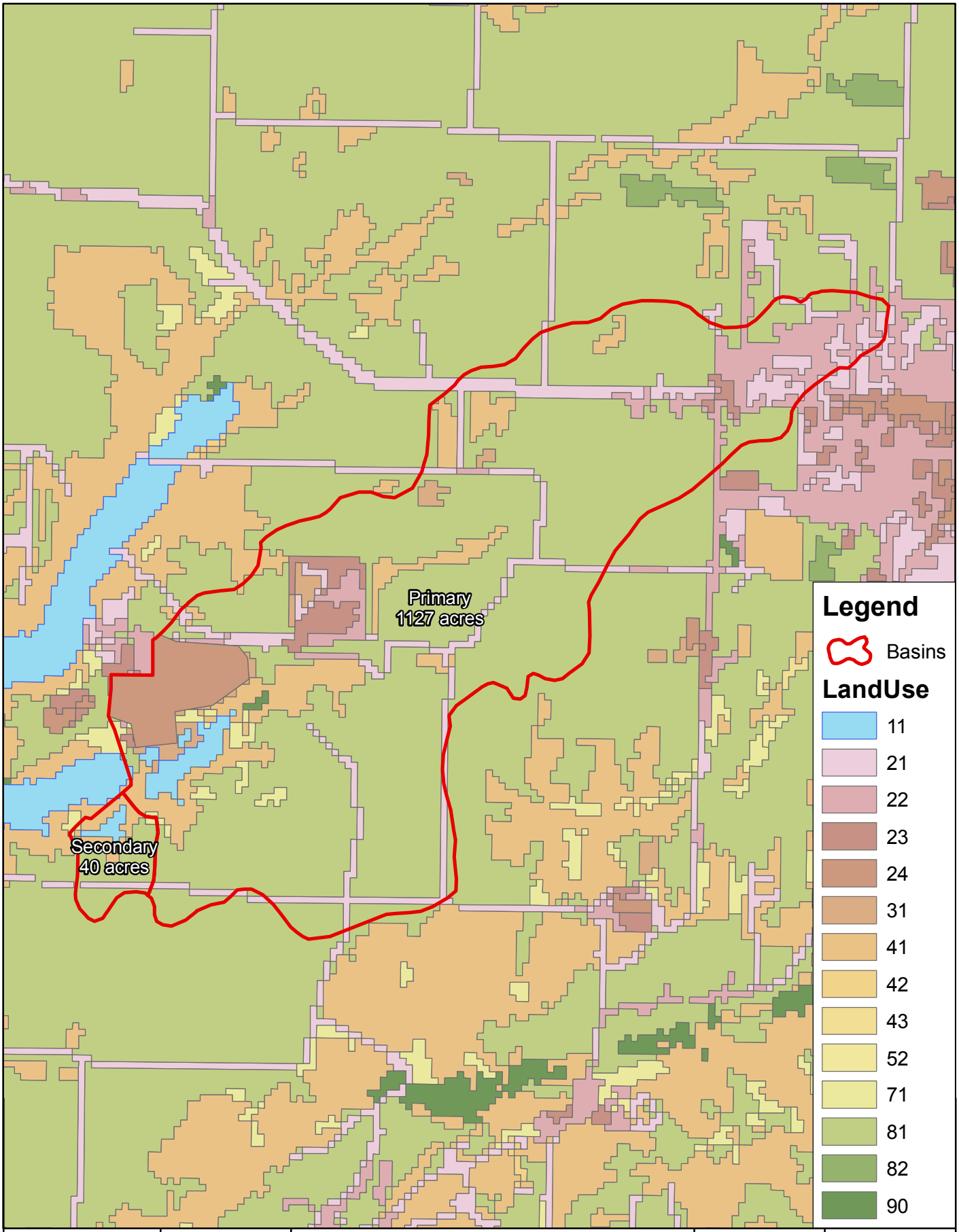
FLINT CREEK POWER PLANT ASH PONDS

HYDROLOGIC SOIL CLASSIFICATIONS

N

FIGURE

3



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FLINT CREEK POWER PLANT ASH PONDS

LAND COVER DATA

N

FIGURE

4

The only input into HEC-HMS for the NRCS Dimensionless Unit Hydrograph is a lag time, which is calculated based on basin conditions, such as hydraulic length and average slope, according to the NRCS TR-55 Method. Table 2 provides a summary of the hydrologic parameters for each basin.

Table 2 – Basin Parameters

Basin	Area (mi^2)	Lag Time (min)	Curve Number (AMC II)
Primary	1.76	46.58	76.6
Secondary	0.06	10.53	74.9

2.3 ELEVATION-STORAGE DATA

Elevation-storage data for each reservoir was obtained from a combination of two data sources. Volume calculations based on 5-foot contours were provided by AEP up to elevation 1145.0 ft-msl. The NED 10-meter DEM was utilized to calculate the available storage between this elevation and the top of dam elevation of 1155.0 ft-msl. These relationships were used in the hydrologic model for routing both frequency storm events and the PMF and are shown in Table 3 below.

Table 3 – Elevation-Storage Data

Primary	
Elevation (ft-msl)	**Storage (acre-ft)**
1115	0.00
1120	4.59
1125	23.05
1130	50.92
1135	86.32
1140	133.10
1144	182.55
1145	186.13
1146	190.47
1147	195.62
1148	201.66
1149	208.67
1150	222.59
1151	263.45
1152	312.36
1153	363.73
1154	417.40
1155	473.32

Secondary	
Elevation (ft-msl)	**Storage (acre-ft)**
1130	0.00
1135	2.71
1140	7.39
1142.5	10.79
1143	11.47
1144	12.83
1145	14.19
1146	20.54
1147	26.88
1148	33.23
1149	39.58
1150	45.93
1151	55.13
1152	64.71
1153	74.71
1154	85.10
1155	95.92

2.4 DISCHARGE RATING CURVES

Each dam has a single spillway structure with two components – a weir box acting as the principal spillway and a concrete sill acting as the emergency spillway. Information regarding the dimensions and elevations of each of these spillways was taken from a combination of original construction drawings and detailed descriptions from AEP personnel. Detailed calculations for the discharge rating curves of each spillway are included in Appendix B.

The principal spillway for the Primary Ash Pond consists of a weir box with a 4-foot wide weir with crest elevation of 1144.0 ft-msl. The weir equation used for this weir box was provided by AEP personnel. At elevation 1146.0 ft-msl, flow reaches the 228-foot long concrete sill, effectively the emergency spillway, and the weir box is assumed to be submerged, meaning flow is completely controlled by the emergency spillway. The sill is located relatively close to the flat natural grade and is currently covered with soil and light vegetation due to silting over the years. As such, the emergency spillway is modeled as a broad-crested weir, and the

discharge rating curve was developed with a steady-state HEC-RAS[4] model. The HEC-RAS model accounts for submergence of the tailwater from the downstream lake, which will significantly restrict flow through the spillway. The discharge rating curve for the combined spillway of the Primary Ash Pond is shown in Table 4. A photograph of the spillway is shown in Figure 5.



Figure 5 – Primary Ash Pond Spillway

The principal spillway for the Secondary Ash Pond consists of a recently reconstructed weir box with a 13-foot wide weir with crest elevation of 1142.5 ft-msl. Calculations at several critical discharges were given on the construction drawings for this modification. These values were interpolated between to obtain a discharge rating curve at even one-foot increments. At elevation 1145.0 ft-msl, flow reaches the 250-foot long concrete sill, effectively the emergency spillway, and the weir box is assumed to be submerged, meaning flow is completely controlled by the emergency spillway. While the concrete sill is more defined than the one at the Primary Ash Pond, the effects of submergence were still a concern due to the flat topography and Little Flint Creek Reservoir immediately downstream. Similar to the Primary Ash Pond spillway, this spillway was modeled in HEC-RAS. The discharge rating curve for the combined spillway of the Secondary Ash Pond is shown in Table 4. A photograph of the spillway is shown in Figure 6.



Figure 6 – Secondary Ash Pond Spillway

Table 4 – Discharge Rating Curves

Primary	
Elevation (ft-msl)	**Total Discharge (cfs)**
1144	0
1145	13
1146	34
1147	305
1148	1,071
1149	2,208
1150	3,603
1151	5,133
1152	6,873
1153	8,816
1154	10,978
1155	13,325

Secondary	
Elevation (ft-msl)	**Total Discharge (cfs)**
1142.5	0
1143	17
1144	78
1145	165
1146	536
1147	1,355
1148	2,419
1149	3,735
1150	5,310
1151	7,118
1152	9,174
1153	11,463
1154	13,974
1155	16,484

2.5 FREQUENCY MODEL RESULTS

Three frequency storm events were analyzed for the Flint Creek Ash Pond system – the 10-year, 25-year, and 100-year storm events. The hydrologic model described in the preceding sections was implemented in analyzing these events. Curve numbers were set to Antecedent Moisture Condition II, and initial abstractions were calculated automatically by HEC-HMS. These assumptions represent normal conditions, as would be expected prior to one of these storm events. The precipitation data was obtained from the National Oceanic and Atmospheric Administration's Technical Memorandum NWS HYDRO-35[5] and Technical Paper 40.[6] These values are presented in Table 5. Each storm event was assumed to have a duration of 24 hours.

Table 5 – Frequency Precipitation Depths

Frequency (yrs)	Precipitation (in)							
	5 min	15 min	60 min	2 hr	3 hr	6 hr	12 hr	24hr
1	0.38	0.82	1.53	1.87	2.06	2.32	2.82	3.30
2	0.46	0.98	1.78	2.24	2.39	2.75	3.53	4.11
5	0.54	1.16	2.29	2.83	3.17	3.71	4.03	5.22
10	0.61	1.30	2.67	3.24	3.58	4.38	5.23	6.08
25	0.70	1.50	3.09	3.73	4.14	5.08	6.08	7.10
50	0.78	1.66	3.48	4.20	4.62	5.62	6.78	7.91
100	0.85	1.82	3.86	4.68	5.19	6.21	7.45	8.79
500	1.10	2.35	4.99	6.05	6.71	8.03	9.64	11.37

These precipitation depths serve as input data into the hydrologic model, and were routed through the model as described previously. According to standard engineering practice, flood routings were started at the lowest spillway crest elevation for each dam. This corresponds to elevation 1144.0 ft-msl and 1142.5 ft-msl for the Primary and Secondary Ash Ponds, respectively. The results of the 10-year, 25-year, and 100-year storm events are shown in Table 6.

Table 6 – Frequency Model Results

	Peak Elevation (ft-msl)	Peak Inflow (cfs)	Peak Outflow (cfs)
10-Year Storm Results			
Primary	1148.55	1718.09	1700.04
Secondary	1147.33	1721.99	1706.83
25-Year Storm Results			
Primary	1148.94	2169.32	2149.13
Secondary	1147.75	2175.62	2156.64
100-Year Storm Results			
Primary	1149.48	2933.96	2862.69
Secondary	1148.35	2893.87	2874.07

2.6 PMF MODEL RESULTS

The Probable Maximum Flood (PMF) is defined as the greatest flood to be expected, and the Probable Maximum Precipitation (PMP) is theoretically the greatest depth of rainfall for a given duration that is physically possible over a given size storm area at a particular geographic location. Generally, the rainfall depth is calculated for the ten square miles of the watershed which receive the highest intensity rainfall.

Hydrometeorological Report No. 52 (HMR-52),[7] developed by the U.S. Army Corps of Engineers, was used to determine the rainfall for each basin. PMP estimates were taken from Hydrometeorological Report No. 51[8] and distributed according to HMR-52 to obtain average rainfall depths over the various drainage areas.

HMR-52 calculates rainfall depths for storm durations ranging from five minutes to seventy-two hours. Table 7 lists the point rainfall depths calculated by HMR-52 for storm durations from one hour to 72 hours. Because the total drainage area is less than ten square miles, the same rainfall depths were applied to both basins.HMR-52 also produces a 72-hour, critically stacked temporal distribution by arranging the incremental rainfall depths to produce the rainfall hyetograph shown in Figure 7.

Table 7 – HMR-52 Point Rainfall Depths

Storm Duration (hr)	Depth (in)
1	15.89
2	19.98
3	23.22
6	29.14
12	34.10
24	38.61
48	42.92
72	45.40

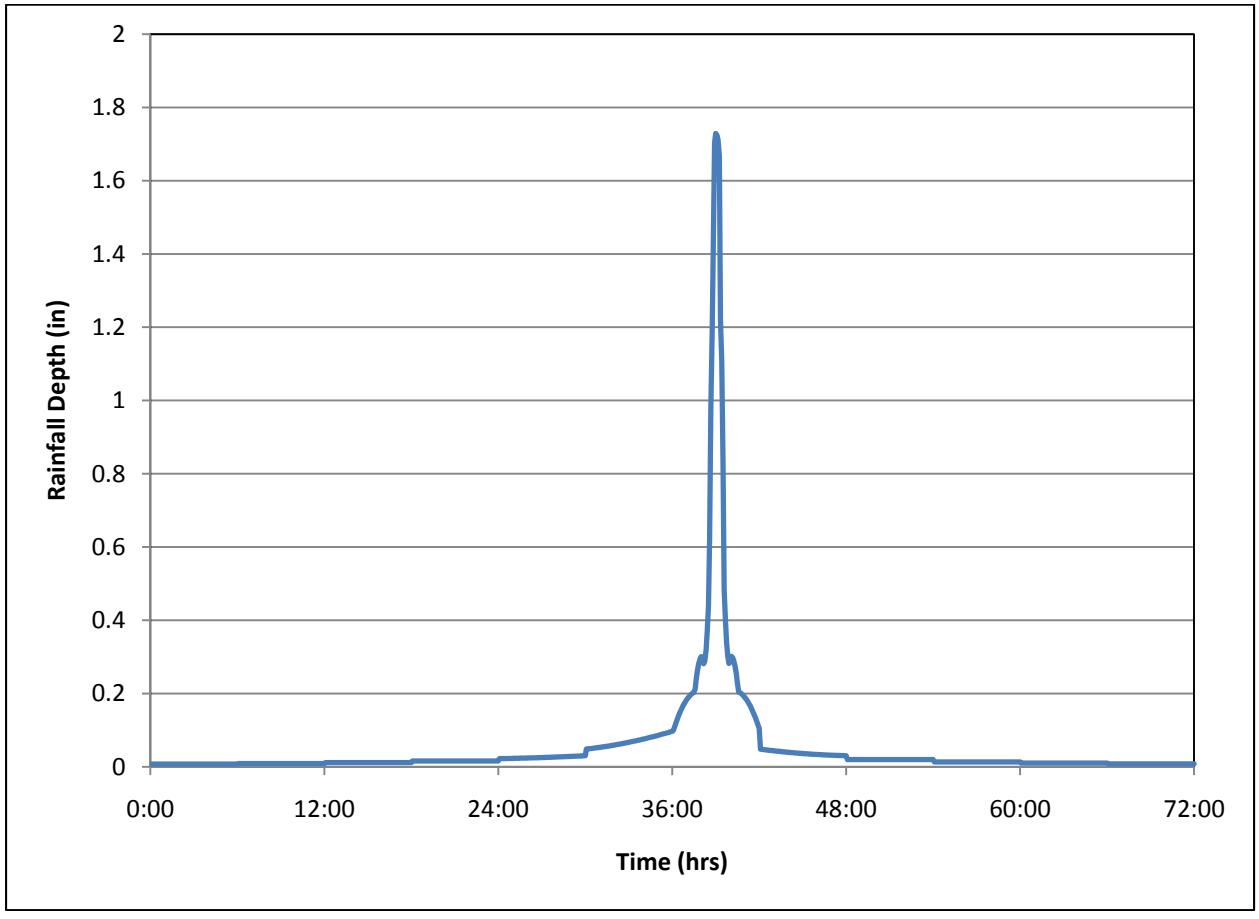


Figure 7 – PMP Rainfall Hyetograph

The PMF was modeled as described previously, with flood routing started at the lowest spillway crest elevation – 1144.0 ft-msl and 1142.5 ft-msl for the Primary and Secondary Ash Ponds, respectively. Additionally, the 25% and 50% PMF were calculated for the two Ponds. Table 8 contains the results of these PMF model runs – the 25% PMF, 50% PMF, and 100% PMF, respectively.

Table 8 –PMF Model Results

	Peak Elevation (ft-msl)	Peak Inflow (cfs)	Peak Outflow (cfs)
25% PMF Results			
Primary	1150.04	3757.22	3627.15
Secondary	1148.94	3670.68	3660.88
50% PMF Results			
Primary	1151.96	7501.95	6713.03
Secondary	1150.80	6787.60	6764.12
100% PMF Results			
Primary	1154.87	14991.39	12803.89
Secondary	1153.45	13008.71	12600.25

3.0 SUMMARY AND CONCLUSIONS

Based on the results of the hydraulic analysis, both dams are hydraulically adequate for the full range of storm events from the 10-year to the 100% PMF event. Table 9 lists the pertinent elevation data for each dam, including the top of dam elevation and principal and emergency spillway crest elevations. Comparing these elevations to the maximum water surface elevations shown in Table 10 indicates that each dam would safely contain all flood events up to, and including, the 100% PMF. Additionally, the emergency spillway for both dams is engaged somewhat frequently, even during a storm event as low as the 10-year storm. This should have no adverse affects on these structures, as they appear to be designed to withstand frequent engaging.

Table 9 – Pertinent Dam Information

	Top of Dam (ft-msl)	Principal Spillway (ft-msl)	Emergency Spillway (ft-msl)
Primary	1155.00	1144.00	1146.00
Secondary	1155.00	1142.50	1145.00

Table 10 – Summary of Results

	10-year	25-year	100-year	25% PMF	50% PMF	100% PMF
Primary	1148.55	1148.94	1149.48	1150.04	1151.96	1154.87
Secondary	1147.33	1147.75	1148.35	1148.94	1150.80	1153.45

It should be noted that these results reflect the best understanding of existing conditions and could be significantly affected by major changes to either of the reservoirs. The assumptions in this analysis represent average reservoir conditions. In their current conditions, the Primary Ash and Secondary Ash Ponds associated with the Flint Creek Power Plant are deemed to be hydraulically adequate for any storm event up to, and including, the 100% PMF. Pertinent drawings for existing conditions are included in Appendix C.

Appendix A
References

References

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7. U.S. Department of Commerce, National Oceanic and Atmospheric Administration and U.S. Department of the Army, Corps of Engineers: *Hydrometeorological Report No. 52, Application of Probable Maximum Precipitation Estimates, United States East of the 105th Meridian*, Washington, D.C., 1982.

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Appendix B
Discharge Rating Curve Calculations and Hydrologic Parameters

Primary Ash Pond

Weir Box

Elevation [ft-msl]	Discharge [cfs]
1144	0.00
1145	12.65
1146	33.91

Q = 3.33(L-0.2H)H^1.5

L 4 ft

Assumed rectangular, sharp-crested weir equation with end contractions accounted for; congruent with calculations made by AEP.

Secondary Ash Pond

Weir Box (from Plans)

Elevation [ft-msl]	Discharge [MGD]	Discharge [cfs]
1142.50	0.000	0.000
1142.70	2.495	3.860
1142.88	6.387	9.882
1143.95	47.806	73.967
1145.00	106.332	164.520

Values taken from plans for design of new spillway; linear interpolation between points.

HEC-RAS Plan: PrimarySpwy River: Primary Reach: Spwy

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Spwy	3045	PF 1	1.00	1144.00	1146.06		1146.06	0.000000	0.00	2396.65	1180.88	0.00
Spwy	3045	PF 2	10.00	1144.00	1146.19		1146.19	0.000000	0.00	2545.85	1183.29	0.00
Spwy	3045	PF 3	50.00	1144.00	1146.41		1146.41	0.000000	0.02	2801.38	1187.40	0.00
Spwy	3045	PF 4	100.00	1144.00	1146.57		1146.57	0.000000	0.03	2995.43	1190.52	0.00
Spwy	3045	PF 5	250.00	1144.00	1146.91		1146.91	0.000002	0.07	3400.39	1196.99	0.01
Spwy	3045	PF 6	500.00	1144.00	1147.32		1147.32	0.000004	0.13	3889.13	1204.76	0.01
Spwy	3045	PF 7	750.00	1144.00	1147.64		1147.64	0.000006	0.18	4282.36	1210.97	0.02
Spwy	3045	PF 8	1000.00	1144.00	1147.93		1147.93	0.000009	0.22	4629.79	1216.44	0.02
Spwy	3045	PF 9	1500.00	1144.00	1148.42		1148.42	0.000013	0.29	5229.47	1225.81	0.02
Spwy	3045	PF 10	2000.00	1144.00	1148.85		1148.85	0.000017	0.35	5757.49	1234.00	0.03
Spwy	3045	PF 11	2500.00	1144.00	1149.20		1149.21	0.000021	0.41	6196.28	1240.77	0.03
Spwy	3045	PF 12	3000.00	1144.00	1149.57		1149.57	0.000024	0.46	6653.47	1247.78	0.03
Spwy	3045	PF 13	3500.00	1144.00	1149.93		1149.93	0.000027	0.50	7100.37	1254.60	0.04
Spwy	3045	PF 14	4000.00	1144.00	1150.27		1150.27	0.000029	0.54	7531.30	1259.46	0.04
Spwy	3045	PF 15	5000.00	1144.00	1150.91		1150.92	0.000032	0.61	8344.34	1267.72	0.04
Spwy	3045	PF 16	6000.00	1144.00	1151.51		1151.52	0.000035	0.68	9101.64	1275.37	0.04
Spwy	3045	PF 17	7000.00	1144.00	1152.07		1152.07	0.000038	0.73	9813.08	1282.51	0.05
Spwy	3045	PF 18	8000.00	1144.00	1152.59		1152.60	0.000040	0.79	10485.21	1289.22	0.05
Spwy	3045	PF 19	9000.00	1144.00	1153.08		1153.09	0.000042	0.83	11123.51	1295.51	0.05
Spwy	3045	PF 20	10000.00	1144.00	1153.55		1153.56	0.000043	0.88	11734.40	1301.50	0.05
Spwy	3045	PF 21	11000.00	1144.00	1154.00		1154.01	0.000045	0.92	12321.14	1307.22	0.05
Spwy	3045	PF 22	12000.00	1144.00	1154.43		1154.45	0.000046	0.96	12886.09	1312.70	0.05
Spwy	3045	PF 23	13000.00	1144.00	1154.85		1154.87	0.000047	1.00	13436.67	1318.01	0.05
Spwy	3045	PF 24	14000.00	1144.00	1155.25		1155.27	0.000048	1.04	13967.30	1321.54	0.05
Spwy	3045	PF 25	15000.00	1144.00	1155.64		1155.66	0.000050	1.07	14482.41	1324.08	0.06
Spwy	2645	PF 1	1.00	1144.00	1146.06		1146.06	0.000000	0.00	1052.44	540.92	0.00
Spwy	2645	PF 2	10.00	1144.00	1146.19		1146.19	0.000000	0.01	1120.95	544.71	0.00
Spwy	2645	PF 3	50.00	1144.00	1146.41		1146.41	0.000001	0.04	1239.01	551.19	0.00
Spwy	2645	PF 4	100.00	1144.00	1146.57		1146.57	0.000002	0.08	1329.23	556.09	0.01
Spwy	2645	PF 5	250.00	1144.00	1146.91		1146.91	0.000008	0.17	1518.91	566.24	0.02
Spwy	2645	PF 6	500.00	1144.00	1147.31		1147.31	0.000021	0.30	1750.30	578.39	0.03
Spwy	2645	PF 7	750.00	1144.00	1147.63		1147.64	0.000034	0.41	1938.54	588.09	0.04
Spwy	2645	PF 8	1000.00	1144.00	1147.92		1147.92	0.000046	0.50	2106.30	596.60	0.04
Spwy	2645	PF 9	1500.00	1144.00	1148.40		1148.41	0.000069	0.66	2399.40	611.18	0.06
Spwy	2645	PF 10	2000.00	1144.00	1148.83		1148.84	0.000089	0.80	2661.06	623.92	0.06
Spwy	2645	PF 11	2500.00	1144.00	1149.17		1149.19	0.000109	0.93	2880.32	634.39	0.07
Spwy	2645	PF 12	3000.00	1144.00	1149.54		1149.55	0.000124	1.04	3112.38	645.29	0.08
Spwy	2645	PF 13	3500.00	1144.00	1149.89		1149.91	0.000136	1.13	3341.89	655.89	0.08
Spwy	2645	PF 14	4000.00	1144.00	1150.23		1150.25	0.000146	1.22	3565.68	664.73	0.09
Spwy	2645	PF 15	5000.00	1144.00	1150.87		1150.89	0.000162	1.36	3993.34	679.27	0.09
Spwy	2645	PF 16	6000.00	1144.00	1151.45		1151.49	0.000174	1.49	4397.45	692.66	0.10
Spwy	2645	PF 17	7000.00	1144.00	1152.01		1152.04	0.000183	1.61	4782.14	705.17	0.10
Spwy	2645	PF 18	8000.00	1144.00	1152.52		1152.56	0.000192	1.72	5151.01	722.17	0.10
Spwy	2645	PF 19	9000.00	1144.00	1153.01		1153.06	0.000199	1.82	5507.16	734.88	0.11
Spwy	2645	PF 20	10000.00	1144.00	1153.48		1153.53	0.000205	1.91	5852.04	746.26	0.11
Spwy	2645	PF 21	11000.00	1144.00	1153.92		1153.98	0.000211	1.99	6186.67	758.37	0.11
Spwy	2645	PF 22	12000.00	1144.00	1154.35		1154.41	0.000216	2.07	6513.57	773.21	0.11
Spwy	2645	PF 23	13000.00	1144.00	1154.76		1154.83	0.000220	2.15	6836.81	787.62	0.12
Spwy	2645	PF 24	14000.00	1144.00	1155.16		1155.23	0.000224	2.22	7152.83	800.63	0.12
Spwy	2645	PF 25	15000.00	1144.00	1155.55		1155.62	0.000228	2.29	7463.77	812.08	0.12
Spwy	2090	PF 1	1.00	1144.00	1146.06		1146.06	0.000000	0.00	439.34	223.25	0.00
Spwy	2090	PF 2	10.00	1144.00	1146.19		1146.19	0.000000	0.02	467.60	224.52	0.00
Spwy	2090	PF 3	50.00	1144.00	1146.41		1146.41	0.000003	0.10	516.01	226.69	0.01
Spwy	2090	PF 4	100.00	1144.00	1146.57		1146.57	0.000011	0.19	552.70	228.31	0.02
Spwy	2090	PF 5	250.00	1144.00	1146.90		1146.90	0.000046	0.41	628.44	231.63	0.04
Spwy	2090	PF 6	500.00	1144.00	1147.28		1147.29	0.000121	0.72	718.48	235.51	0.07
Spwy	2090	PF 7	750.00	1144.00	1147.58		1147.60	0.000202	0.99	790.00	238.55	0.09
Spwy	2090	PF 8	1000.00	1144.00	1147.84		1147.87	0.000282	1.22	852.81	241.18	0.11
Spwy	2090	PF 9	1500.00	1144.00	1148.29		1148.33	0.000436	1.64	960.49	245.64	0.14
Spwy	2090	PF 10	2000.00	1144.00	1148.67		1148.73	0.000578	2.00	1055.05	249.48	0.16
Spwy	2090	PF 11	2500.00	1144.00	1148.97		1149.05	0.000726	2.33	1131.50	252.55	0.18
Spwy	2090	PF 12	3000.00	1144.00	1149.30		1149.40	0.000840	2.62	1214.22	255.83	0.20
Spwy	2090	PF 13	3500.00	1144.00	1149.62		1149.74	0.000933	2.87	1296.46	259.04	0.21
Spwy	2090	PF 14	4000.00	1144.00	1149.93		1150.07	0.001013	3.10	1376.78	262.15	0.22
Spwy	2090	PF 15	5000.00	1144.00	1150.51		1150.69	0.001141	3.50	1530.63	266.97	0.24
Spwy	2090	PF 16	6000.00	1144.00	1151.05		1151.26	0.001243	3.85	1675.69	271.22	0.26
Spwy	2090	PF 17	7000.00	1144.00	1151.55		1151.80	0.001327	4.17	1813.49	275.19	0.27
Spwy	2090	PF 18	8000.00	1144.00	1152.02		1152.31	0.001400	4.46	1944.51	278.92	0.28
Spwy	2090	PF 19	9000.00	1144.00	1152.47		1152.79	0.001465	4.73	2069.87	282.44	0.29
Spwy	2090	PF 20	10000.00	1144.00	1152.90		1153.25	0.001521	4.98	2190.84	285.79	0.29
Spwy	2090	PF 21	11000.00	1144.00	1153.30		1153.69	0.001572	5.21	2307.63	288.99	0.30
Spwy	2090	PF 22	12000.00	1144.00	1153.69		1154.11	0.001618	5.43	2420.69	292.06	0.31
Spwy	2090	PF 23	13000.00	1144.00	1154.07		1154.53	0.001659	5.64	2531.70	295.04	0.31
Spwy	2090	PF 24	14000.00	1144.00	1154.43		1154.92	0.001697	5.85	2639.15	297.89	0.32
Spwy	2090	PF 25	15000.00	1144.00	1154.78		1155.30	0.001732	6.04	2744.33	300.66	0.32
Spwy	2040	PF 1	1.00	1146.00	1146.06		1146.06	0.000210	0.07	14.54	227.98	0.05

HEC-RAS Plan: PrimarySpwy River: Primary Reach: Spwy (Continued)

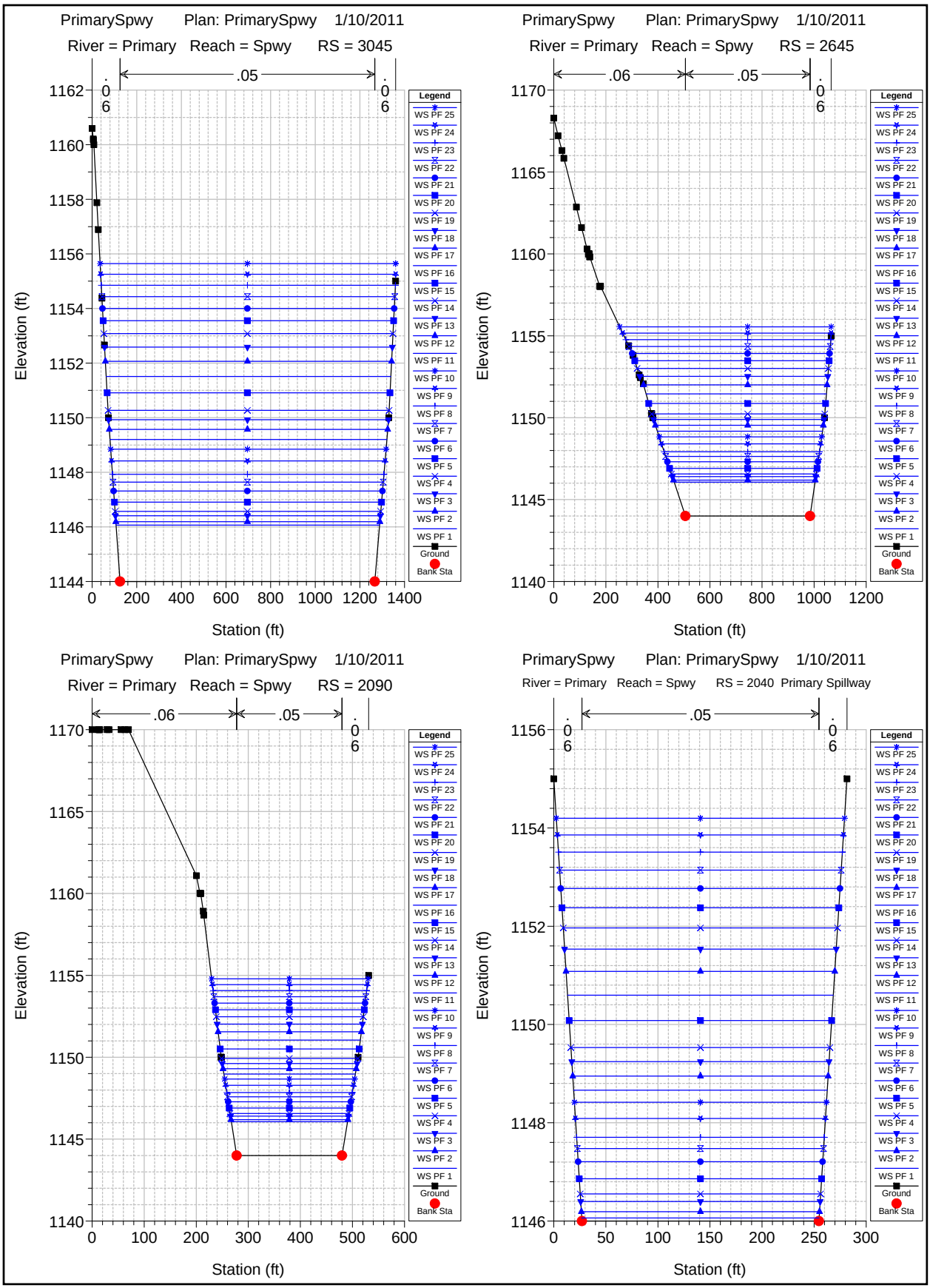
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Spwy	2040	PF 2	10.00	1146.00	1146.19	1146.03	1146.19	0.000561	0.23	43.17	228.74	0.09
Spwy	2040	PF 3	50.00	1146.00	1146.40	1146.11	1146.40	0.001164	0.55	91.24	229.99	0.15
Spwy	2040	PF 4	100.00	1146.00	1146.55	1146.18	1146.56	0.001564	0.79	126.75	230.92	0.19
Spwy	2040	PF 5	250.00	1146.00	1146.86	1146.34	1146.88	0.002238	1.27	197.81	232.76	0.24
Spwy	2040	PF 6	500.00	1146.00	1147.21	1146.53	1147.26	0.002869	1.80	279.18	234.84	0.29
Spwy	2040	PF 7	750.00	1146.00	1147.47	1146.69	1147.55	0.003307	2.21	342.03	236.44	0.32
Spwy	2040	PF 8	1000.00	1146.00	1147.70	1146.84	1147.80	0.003616	2.55	396.54	237.82	0.34
Spwy	2040	PF 9	1500.00	1146.00	1148.09	1147.10	1148.24	0.004114	3.11	488.22	240.13	0.38
Spwy	2040	PF 10	2000.00	1146.00	1148.42	1147.33	1148.61	0.004462	3.58	567.90	242.11	0.41
Spwy	2040	PF 11	2500.00	1146.00	1148.66		1148.92	0.005035	4.05	627.48	243.58	0.44
Spwy	2040	PF 12	3000.00	1146.00	1148.95		1149.25	0.005131	4.38	697.84	245.31	0.45
Spwy	2040	PF 13	3500.00	1146.00	1149.24		1149.57	0.005078	4.64	769.82	247.06	0.45
Spwy	2040	PF 14	4000.00	1146.00	1149.53		1149.89	0.004979	4.86	841.06	248.79	0.46
Spwy	2040	PF 15	5000.00	1146.00	1150.08		1150.50	0.004769	5.24	978.69	252.08	0.46
Spwy	2040	PF 16	6000.00	1146.00	1150.60		1151.07	0.004591	5.57	1109.28	255.17	0.46
Spwy	2040	PF 17	7000.00	1146.00	1151.08		1151.60	0.004447	5.86	1233.52	258.08	0.46
Spwy	2040	PF 18	8000.00	1146.00	1151.53		1152.10	0.004339	6.12	1351.53	260.81	0.46
Spwy	2040	PF 19	9000.00	1146.00	1151.96		1152.58	0.004255	6.38	1464.21	263.39	0.46
Spwy	2040	PF 20	10000.00	1146.00	1152.38		1153.03	0.004186	6.61	1572.90	265.85	0.46
Spwy	2040	PF 21	11000.00	1146.00	1152.77		1153.47	0.004131	6.83	1677.54	268.20	0.46
Spwy	2040	PF 22	12000.00	1146.00	1153.14		1153.89	0.004086	7.05	1778.63	270.45	0.46
Spwy	2040	PF 23	13000.00	1146.00	1153.51		1154.29	0.004041	7.24	1878.01	272.65	0.47
Spwy	2040	PF 24	14000.00	1146.00	1153.86		1154.69	0.004009	7.44	1973.80	274.75	0.47
Spwy	2040	PF 25	15000.00	1146.00	1154.20		1155.07	0.003979	7.62	2067.42	276.79	0.47
Spwy	1980	PF 1	1.00	1146.00	1146.03	1146.03	1146.03	0.003444	0.16	6.28	227.77	0.17
Spwy	1980	PF 2	10.00	1146.00	1146.03	1146.03	1146.07	0.344390	1.59	6.28	227.77	1.69
Spwy	1980	PF 3	50.00	1146.00	1146.11	1146.11	1146.17	0.084653	1.99	25.15	228.26	1.06
Spwy	1980	PF 4	100.00	1146.00	1146.18	1146.18	1146.27	0.064245	2.42	41.44	228.69	1.00
Spwy	1980	PF 5	250.00	1146.00	1146.34	1146.34	1146.50	0.052170	3.27	76.55	229.61	1.00
Spwy	1980	PF 6	500.00	1146.00	1146.53	1146.53	1146.79	0.045516	4.14	121.08	230.77	1.00
Spwy	1980	PF 7	750.00	1146.00	1146.69	1146.69	1147.04	0.041388	4.73	159.14	231.76	1.00
Spwy	1980	PF 8	1000.00	1146.00	1146.84	1146.84	1147.26	0.039052	5.22	192.70	232.62	1.00
Spwy	1980	PF 9	1500.00	1146.00	1147.10	1147.10	1147.65	0.035580	5.96	253.33	234.18	1.00
Spwy	1980	PF 10	2000.00	1146.00	1147.33	1147.33	1147.99	0.033347	6.56	307.60	235.57	1.00
Spwy	1980	PF 11	2500.00	1146.00	1147.83		1148.37	0.017832	5.93	426.22	238.57	0.77
Spwy	1980	PF 12	3000.00	1146.00	1148.25		1148.76	0.012783	5.77	527.41	241.10	0.68
Spwy	1980	PF 13	3500.00	1146.00	1148.63		1149.13	0.010361	5.76	618.18	243.35	0.63
Spwy	1980	PF 14	4000.00	1146.00	1148.97		1149.48	0.008942	5.80	702.13	245.41	0.59
Spwy	1980	PF 15	5000.00	1146.00	1149.59		1150.13	0.007361	5.98	855.59	249.14	0.56
Spwy	1980	PF 16	6000.00	1146.00	1150.15		1150.73	0.006504	6.19	995.35	252.48	0.54
Spwy	1980	PF 17	7000.00	1146.00	1150.66		1151.28	0.005964	6.40	1125.52	255.55	0.52
Spwy	1980	PF 18	8000.00	1146.00	1151.13		1151.80	0.005605	6.62	1247.33	258.40	0.51
Spwy	1980	PF 19	9000.00	1146.00	1151.58		1152.28	0.005352	6.84	1362.45	261.06	0.51
Spwy	1980	PF 20	10000.00	1146.00	1152.00		1152.75	0.005155	7.04	1472.96	263.59	0.51
Spwy	1980	PF 21	11000.00	1146.00	1152.40		1153.19	0.005005	7.25	1578.75	265.98	0.50
Spwy	1980	PF 22	12000.00	1146.00	1152.78		1153.61	0.004888	7.44	1680.58	268.27	0.50
Spwy	1980	PF 23	13000.00	1146.00	1153.15		1154.02	0.004778	7.62	1780.75	270.50	0.50
Spwy	1980	PF 24	14000.00	1146.00	1153.50		1154.42	0.004696	7.81	1876.85	272.62	0.50
Spwy	1980	PF 25	15000.00	1146.00	1153.85		1154.80	0.004624	7.98	1970.72	274.68	0.50
Spwy	1865	PF 1	1.00	1142.50	1145.03		1145.03	0.000000	0.00	590.46	242.39	0.00
Spwy	1865	PF 2	10.00	1142.50	1145.06		1145.06	0.000000	0.02	598.04	242.61	0.00
Spwy	1865	PF 3	50.00	1142.50	1145.17		1145.17	0.000002	0.08	625.80	243.39	0.01
Spwy	1865	PF 4	100.00	1142.50	1145.28		1145.28	0.000007	0.16	652.10	244.13	0.02
Spwy	1865	PF 5	250.00	1142.50	1145.55		1145.56	0.000032	0.36	719.08	246.00	0.04
Spwy	1865	PF 6	500.00	1142.50	1145.94		1145.95	0.000086	0.63	815.36	248.66	0.06
Spwy	1865	PF 7	750.00	1142.50	1146.28		1146.30	0.000140	0.86	900.88	251.00	0.08
Spwy	1865	PF 8	1000.00	1142.50	1146.59		1146.61	0.000192	1.05	978.04	253.10	0.09
Spwy	1865	PF 9	1500.00	1142.50	1147.13		1147.16	0.000283	1.39	1115.26	256.78	0.11
Spwy	1865	PF 10	2000.00	1142.50	1147.60		1147.64	0.000363	1.68	1236.37	259.99	0.13
Spwy	1865	PF 11	2500.00	1142.50	1148.02		1148.07	0.000433	1.93	1345.86	262.85	0.14
Spwy	1865	PF 12	3000.00	1142.50	1148.40		1148.47	0.000495	2.16	1447.21	265.48	0.16
Spwy	1865	PF 13	3500.00	1142.50	1148.75		1148.84	0.000553	2.37	1541.43	267.90	0.17
Spwy	1865	PF 14	4000.00	1142.50	1149.09		1149.18	0.000605	2.57	1630.75	270.17	0.18
Spwy	1865	PF 15	5000.00	1142.50	1149.69		1149.82	0.000697	2.92	1796.52	274.33	0.19
Spwy	1865	PF 16	6000.00	1142.50	1150.25		1150.40	0.000778	3.25	1949.23	278.15	0.21
Spwy	1865	PF 17	7000.00	1142.50	1150.76		1150.94	0.000850	3.54	2092.02	281.40	0.22
Spwy	1865	PF 18	8000.00	1142.50	1151.23		1151.45	0.000914	3.81	2226.56	284.42	0.23
Spwy	1865	PF 19	9000.00	1142.50	1151.68		1151.92	0.000974	4.07	2354.06	287.25	0.24
Spwy	1865	PF 20	10000.00	1142.50	1152.10		1152.38	0.001027	4.30	2476.62	289.95	0.24
Spwy	1865	PF 21	11000.00	1142.50	1152.51		1152.81	0.001077	4.53	2594.15	292.51	0.25
Spwy	1865	PF 22	12000.00	1142.50	1152.89		1153.22	0.001124	4.75	2707.35	294.96	0.26
Spwy	1865	PF 23	13000.00	1142.50	1153.27		1153.63	0.001166	4.95	2818.73	297.36	0.27
Spwy	1865	PF 24	14000.00	1142.50	1153.63		1154.01	0.001206	5.14	2925.72	299.65	0.27
Spwy	1865	PF 25	15000.00	1142.50	1153.97		1154.39	0.001244	5.33	3030.20	301.87	0.28
Spwy	1575	PF 1	1.00	1142.50	1145.03		1145.03	0.000000	0.00	924.26	390.65	0.00
Spwy	1575	PF 2	10.00	1142.50	1145.06		1145.06	0.000000	0.01	936.47	391.27	0.00

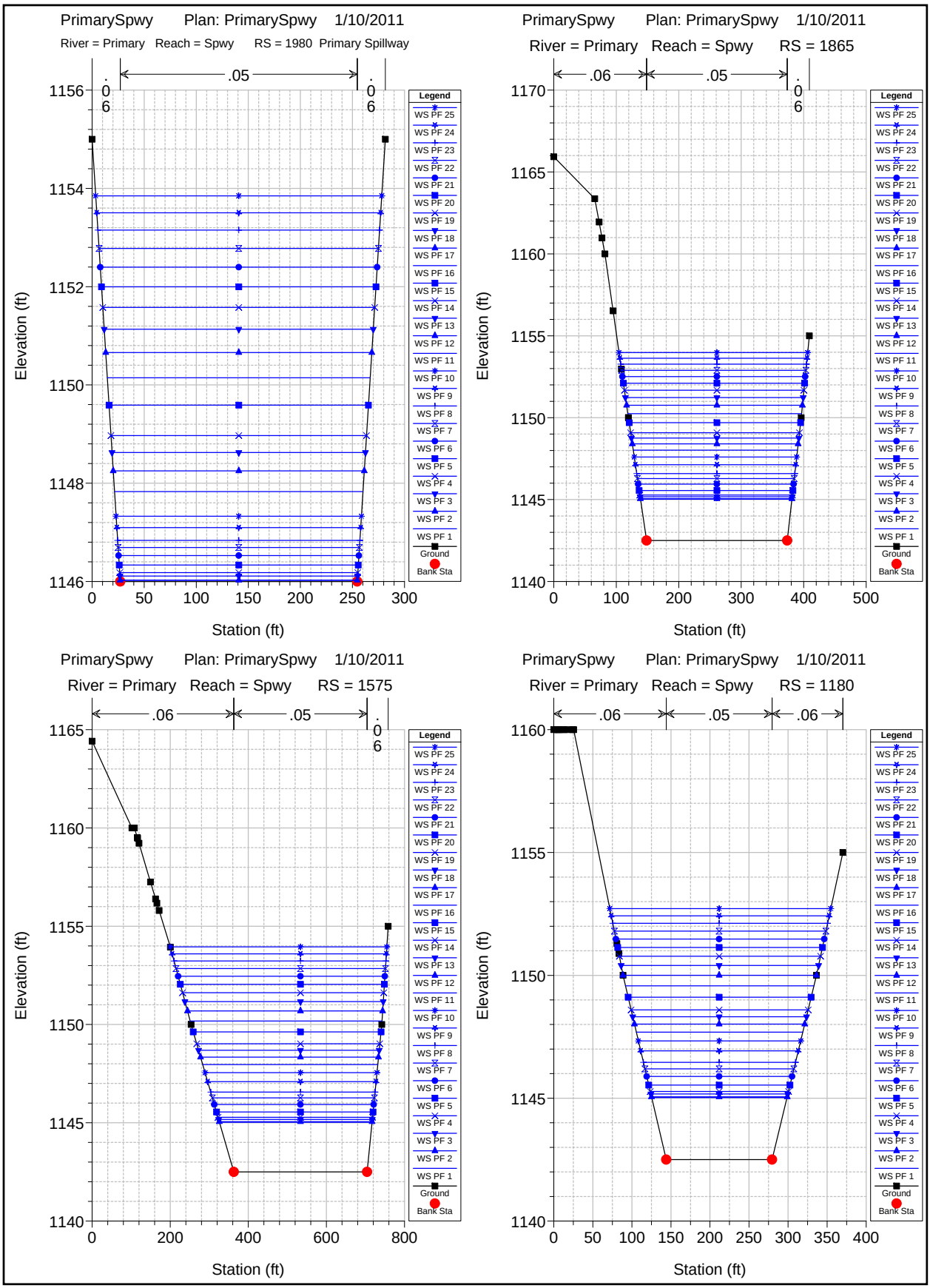
HEC-RAS Plan: PrimarySpwy River: Primary Reach: Spwy (Continued)

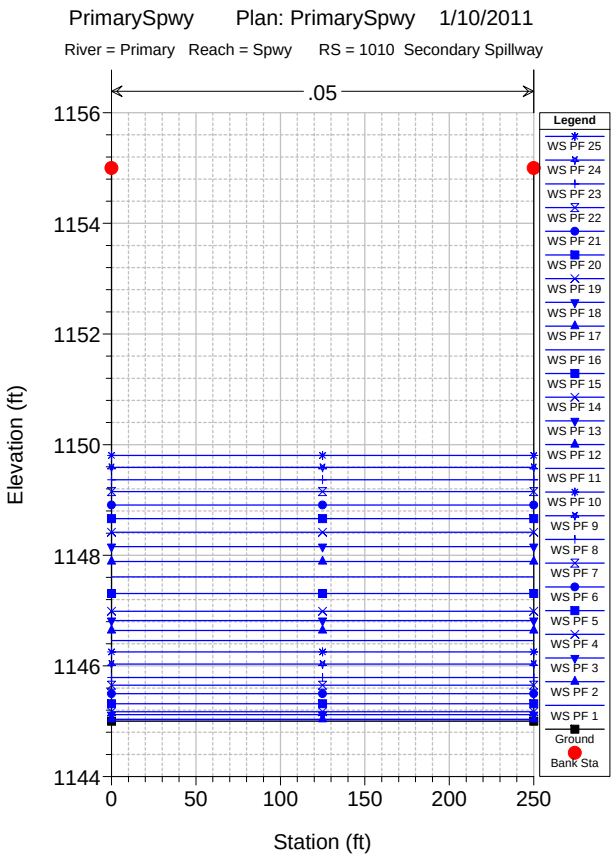
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Spwy	1575	PF 3	50.00	1142.50	1145.17		1145.17	0.000001	0.05	981.21	393.50	0.01
Spwy	1575	PF 4	100.00	1142.50	1145.28		1145.28	0.000003	0.10	1023.45	395.60	0.01
Spwy	1575	PF 5	250.00	1142.50	1145.55		1145.55	0.000014	0.23	1130.74	400.88	0.02
Spwy	1575	PF 6	500.00	1142.50	1145.93		1145.93	0.000036	0.41	1285.04	408.36	0.04
Spwy	1575	PF 7	750.00	1142.50	1146.26		1146.27	0.000059	0.55	1422.82	414.92	0.05
Spwy	1575	PF 8	1000.00	1142.50	1146.56		1146.57	0.000081	0.68	1547.84	420.78	0.06
Spwy	1575	PF 9	1500.00	1142.50	1147.09		1147.10	0.000119	0.90	1772.31	431.11	0.07
Spwy	1575	PF 10	2000.00	1142.50	1147.55		1147.57	0.000152	1.08	1972.73	440.13	0.08
Spwy	1575	PF 11	2500.00	1142.50	1147.96		1147.99	0.000181	1.24	2155.83	448.21	0.09
Spwy	1575	PF 12	3000.00	1142.50	1148.34		1148.37	0.000206	1.38	2326.95	455.63	0.10
Spwy	1575	PF 13	3500.00	1142.50	1148.69		1148.72	0.000229	1.52	2487.39	462.48	0.11
Spwy	1575	PF 14	4000.00	1142.50	1149.02		1149.06	0.000249	1.64	2640.71	468.94	0.11
Spwy	1575	PF 15	5000.00	1142.50	1149.63		1149.68	0.000285	1.86	2928.41	480.81	0.12
Spwy	1575	PF 16	6000.00	1142.50	1150.18		1150.24	0.000315	2.05	3196.82	491.14	0.13
Spwy	1575	PF 17	7000.00	1142.50	1150.69		1150.76	0.000341	2.23	3450.35	499.74	0.14
Spwy	1575	PF 18	8000.00	1142.50	1151.17		1151.25	0.000364	2.39	3691.22	507.78	0.14
Spwy	1575	PF 19	9000.00	1142.50	1151.62		1151.71	0.000384	2.54	3921.40	515.34	0.15
Spwy	1575	PF 20	10000.00	1142.50	1152.05		1152.15	0.000402	2.68	4144.25	522.56	0.15
Spwy	1575	PF 21	11000.00	1142.50	1152.46		1152.57	0.000419	2.81	4359.42	529.44	0.16
Spwy	1575	PF 22	12000.00	1142.50	1152.85		1152.97	0.000434	2.94	4568.04	536.02	0.16
Spwy	1575	PF 23	13000.00	1142.50	1153.23		1153.36	0.000447	3.06	4774.53	542.46	0.16
Spwy	1575	PF 24	14000.00	1142.50	1153.60		1153.74	0.000459	3.17	4974.04	548.60	0.17
Spwy	1575	PF 25	15000.00	1142.50	1153.95		1154.10	0.000470	3.27	5169.91	554.60	0.17
Spwy	1180	PF 1	1.00	1142.50	1145.03		1145.03	0.000000	0.00	390.05	173.31	0.00
Spwy	1180	PF 2	10.00	1142.50	1145.06		1145.06	0.000000	0.03	395.47	173.78	0.00
Spwy	1180	PF 3	50.00	1142.50	1145.17		1145.17	0.000005	0.13	415.21	175.47	0.01
Spwy	1180	PF 4	100.00	1142.50	1145.28		1145.28	0.000018	0.25	433.70	177.04	0.03
Spwy	1180	PF 5	250.00	1142.50	1145.53		1145.54	0.000081	0.56	479.83	180.89	0.06
Spwy	1180	PF 6	500.00	1142.50	1145.89		1145.90	0.000219	0.99	544.83	186.19	0.10
Spwy	1180	PF 7	750.00	1142.50	1146.19		1146.22	0.000364	1.35	602.33	190.76	0.12
Spwy	1180	PF 8	1000.00	1142.50	1146.46		1146.50	0.000505	1.67	654.19	194.78	0.15
Spwy	1180	PF 9	1500.00	1142.50	1146.93		1147.00	0.000765	2.22	746.99	201.78	0.19
Spwy	1180	PF 10	2000.00	1142.50	1147.33		1147.43	0.000996	2.68	829.61	207.82	0.21
Spwy	1180	PF 11	2500.00	1142.50	1147.69		1147.83	0.001204	3.09	904.92	213.17	0.24
Spwy	1180	PF 12	3000.00	1142.50	1148.02		1148.19	0.001392	3.46	975.38	218.06	0.26
Spwy	1180	PF 13	3500.00	1142.50	1148.32		1148.52	0.001566	3.80	1041.24	222.53	0.28
Spwy	1180	PF 14	4000.00	1142.50	1148.60		1148.83	0.001724	4.12	1104.34	226.73	0.29
Spwy	1180	PF 15	5000.00	1142.50	1149.11		1149.41	0.002006	4.69	1222.69	234.41	0.32
Spwy	1180	PF 16	6000.00	1142.50	1149.58		1149.94	0.002253	5.20	1333.24	241.36	0.34
Spwy	1180	PF 17	7000.00	1142.50	1150.00		1150.44	0.002469	5.66	1438.18	247.77	0.36
Spwy	1180	PF 18	8000.00	1142.50	1150.40		1150.90	0.002657	6.08	1538.34	252.83	0.38
Spwy	1180	PF 19	9000.00	1142.50	1150.78		1151.34	0.002828	6.47	1634.01	257.57	0.40
Spwy	1180	PF 20	10000.00	1142.50	1151.14		1151.76	0.002981	6.83	1726.93	262.23	0.41
Spwy	1180	PF 21	11000.00	1142.50	1151.48		1152.16	0.003123	7.17	1816.65	266.69	0.42
Spwy	1180	PF 22	12000.00	1142.50	1151.80		1152.54	0.003253	7.50	1903.74	270.94	0.43
Spwy	1180	PF 23	13000.00	1142.50	1152.12		1152.92	0.003362	7.79	1991.10	275.14	0.44
Spwy	1180	PF 24	14000.00	1142.50	1152.42		1153.28	0.003469	8.08	2075.19	279.12	0.45
Spwy	1180	PF 25	15000.00	1142.50	1152.72		1153.62	0.003565	8.36	2158.05	282.98	0.46
Spwy	1010	PF 1	1.00	1145.00	1145.03	1145.03	1145.03	0.003648	0.16	6.41	250.00	0.17
Spwy	1010	PF 2	10.00	1145.00	1145.04	1145.04	1145.06	0.120220	1.12	8.94	250.00	1.04
Spwy	1010	PF 3	50.00	1145.00	1145.12	1145.12	1145.16	0.054496	1.68	29.79	250.00	0.86
Spwy	1010	PF 4	100.00	1145.00	1145.17	1145.17	1145.26	0.065680	2.34	42.69	250.00	1.00
Spwy	1010	PF 5	250.00	1145.00	1145.32	1145.32	1145.47	0.053522	3.18	78.70	250.00	1.00
Spwy	1010	PF 6	500.00	1145.00	1145.50	1145.50	1145.75	0.046081	4.00	124.85	250.00	1.00
Spwy	1010	PF 7	750.00	1145.00	1145.65	1145.65	1145.98	0.042967	4.61	162.69	250.00	1.01
Spwy	1010	PF 8	1000.00	1145.00	1145.79	1145.79	1146.19	0.040015	5.06	197.60	250.00	1.00
Spwy	1010	PF 9	1500.00	1145.00	1146.04	1146.04	1146.56	0.036801	5.80	258.64	250.00	1.00
Spwy	1010	PF 10	2000.00	1145.00	1146.25	1146.25	1146.89	0.034722	6.39	312.99	250.00	1.01
Spwy	1010	PF 11	2500.00	1145.00	1146.46	1146.46	1147.19	0.032773	6.86	364.32	250.00	1.00
Spwy	1010	PF 12	3000.00	1145.00	1146.64	1146.64	1147.47	0.031783	7.31	410.43	250.00	1.01
Spwy	1010	PF 13	3500.00	1145.00	1146.82	1146.82	1147.74	0.030795	7.70	454.74	250.00	1.01
Spwy	1010	PF 14	4000.00	1145.00	1146.99	1146.99	1147.99	0.029938	8.05	497.13	250.00	1.01
Spwy	1010	PF 15	5000.00	1145.00	1147.31	1147.31	1148.47	0.028520	8.66	577.27	250.00	1.00
Spwy	1010	PF 16	6000.00	1145.00	1147.61	1147.61	1148.92	0.027434	9.20	652.16	250.00	1.00
Spwy	1010	PF 17	7000.00	1145.00	1147.89	1147.89	1149.35	0.026677	9.70	722.02	250.00	1.01
Spwy	1010	PF 18	8000.00	1145.00	1148.16	1148.16	1149.75	0.025989	10.14	789.06	250.00	1.01
Spwy	1010	PF 19	9000.00	1145.00	1148.42	1148.42	1150.14	0.025329	10.54	854.10	250.00	1.00
Spwy	1010	PF 20	10000.00	1145.00	1148.66	1148.66	1150.52	0.024854	10.92	915.71	250.00	1.01
Spwy	1010	PF 21	11000.00	1145.00	1148.91	1148.91	1150.88	0.024290	11.26	977.05	250.00	1.00
Spwy	1010	PF 22	12000.00	1145.00	1149.15	1149.15	1151.23	0.023703	11.56	1037.78	250.00	1.00
Spwy	1010	PF 23	13000.00	1145.00	1149.37	1149.37	1151.57	0.023587	11.91	1091.16	250.00	1.00
Spwy	1010	PF 24	14000.00	1145.00	1149.59	1149.59	1151.90	0.023226	12.21	1146.85	250.00	1.00
Spwy	1010	PF 25	15000.00	1145.00	1149.81	1149.81	1152.23	0.022894	12.49	1201.29	250.00	1.00
Spwy	980	PF 1	1.00	1138.41	1138.63		1138.64	0.012975	0.76	1.31	12.25	0.41
Spwy	980	PF 2	10.00	1138.41	1138.92		1138.96	0.012867	1.63	6.13	18.08	0.49
Spwy	980	PF 3	50.00	1138.41	1139.48		1139.61	0.012670	2.88	17.34	21.36	0.56

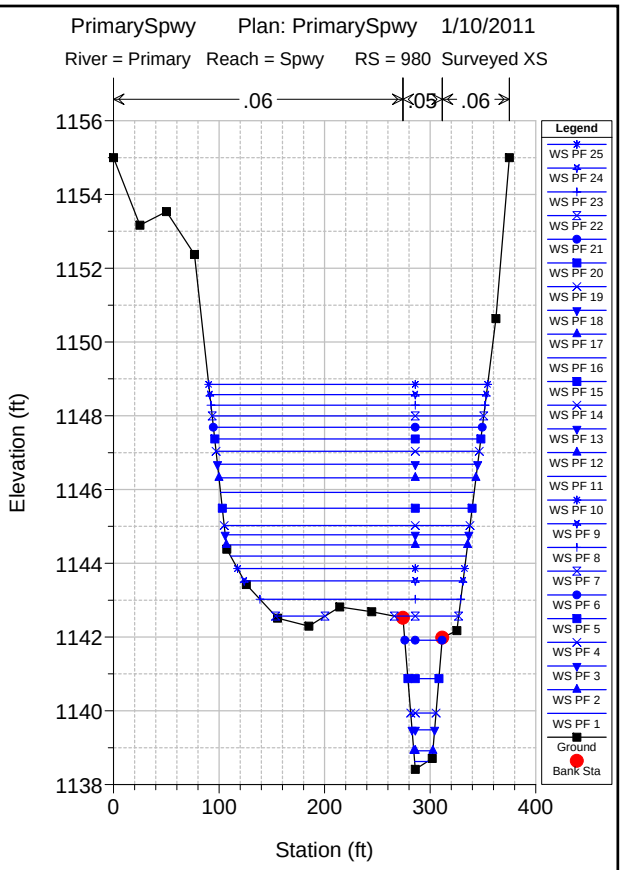
HEC-RAS Plan: PrimarySpwy River: Primary Reach: Spwy (Continued)

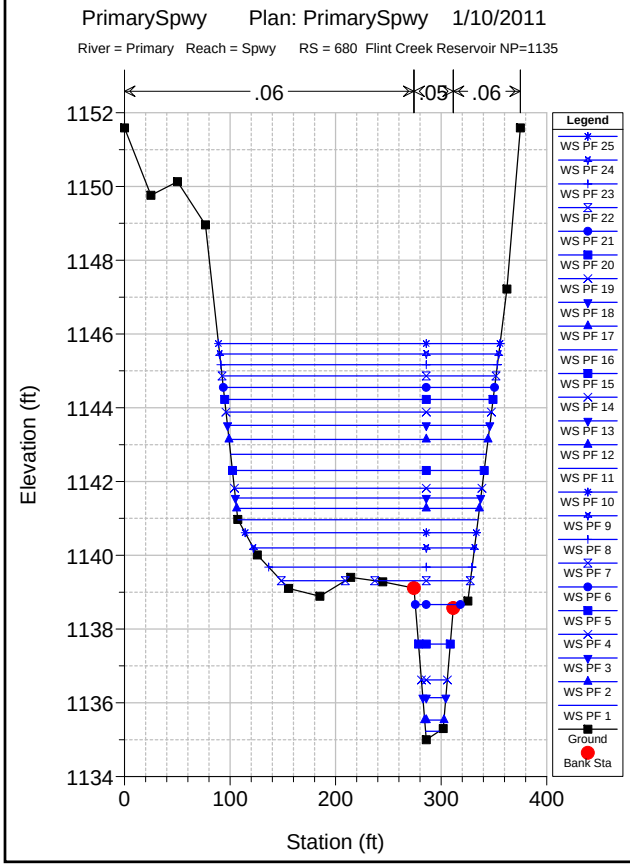
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Spwy	980	PF 4	100.00	1138.41	1139.94		1140.14	0.012492	3.61	27.71	23.99	0.59
Spwy	980	PF 5	250.00	1138.41	1140.87		1141.22	0.012257	4.76	52.49	29.35	0.63
Spwy	980	PF 6	500.00	1138.41	1141.91		1142.44	0.012095	5.80	86.24	35.37	0.65
Spwy	980	PF 7	750.00	1138.41	1142.57	1141.87	1143.24	0.012393	6.66	124.28	107.75	0.68
Spwy	980	PF 8	1000.00	1138.41	1143.02	1143.02	1143.69	0.011107	6.94	198.91	190.22	0.66
Spwy	980	PF 9	1500.00	1138.41	1143.52	1143.52	1144.24	0.011428	7.71	297.85	207.21	0.69
Spwy	980	PF 10	2000.00	1138.41	1143.86	1143.86	1144.66	0.012474	8.51	368.85	215.15	0.73
Spwy	980	PF 11	2500.00	1138.41	1144.20	1144.15	1145.03	0.012449	8.95	443.19	223.15	0.74
Spwy	980	PF 12	3000.00	1138.41	1144.50	1144.42	1145.37	0.012396	9.32	511.36	228.47	0.74
Spwy	980	PF 13	3500.00	1138.41	1144.77		1145.67	0.012316	9.63	574.02	230.71	0.75
Spwy	980	PF 14	4000.00	1138.41	1145.03		1145.96	0.012243	9.91	633.07	232.80	0.75
Spwy	980	PF 15	5000.00	1138.41	1145.49		1146.49	0.012123	10.43	742.92	236.65	0.76
Spwy	980	PF 16	6000.00	1138.41	1145.92		1146.99	0.012022	10.88	844.72	240.16	0.76
Spwy	980	PF 17	7000.00	1138.41	1146.32		1147.45	0.011945	11.29	940.23	243.40	0.77
Spwy	980	PF 18	8000.00	1138.41	1146.69		1147.89	0.011881	11.67	1030.88	246.44	0.77
Spwy	980	PF 19	9000.00	1138.41	1147.04		1148.31	0.011824	12.03	1117.69	249.32	0.78
Spwy	980	PF 20	10000.00	1138.41	1147.37		1148.72	0.011772	12.36	1201.29	252.06	0.78
Spwy	980	PF 21	11000.00	1138.41	1147.69		1149.10	0.011728	12.67	1282.05	254.67	0.79
Spwy	980	PF 22	12000.00	1138.41	1148.00		1149.47	0.011668	12.96	1361.15	257.21	0.79
Spwy	980	PF 23	13000.00	1138.41	1148.29		1149.83	0.011654	13.25	1436.48	259.61	0.79
Spwy	980	PF 24	14000.00	1138.41	1148.57		1150.18	0.011617	13.52	1510.97	261.95	0.80
Spwy	980	PF 25	15000.00	1138.41	1148.85		1150.52	0.011587	13.78	1583.58	264.22	0.80
Spwy	680	PF 1	1.00	1135.00	1135.23	1135.15	1135.23	0.009998	0.69	1.44	12.74	0.36
Spwy	680	PF 2	10.00	1135.00	1135.53	1135.37	1135.57	0.010009	1.51	6.63	18.24	0.44
Spwy	680	PF 3	50.00	1135.00	1136.14	1135.79	1136.25	0.010003	2.67	18.75	21.74	0.51
Spwy	680	PF 4	100.00	1135.00	1136.62	1136.14	1136.80	0.010019	3.35	29.87	24.51	0.53
Spwy	680	PF 5	250.00	1135.00	1137.59	1136.90	1137.90	0.010000	4.43	56.38	30.11	0.57
Spwy	680	PF 6	500.00	1135.00	1138.66	1137.78	1139.12	0.010009	5.44	92.27	42.73	0.60
Spwy	680	PF 7	750.00	1135.00	1139.31	1138.46	1139.88	0.010016	6.19	143.86	151.04	0.62
Spwy	680	PF 8	1000.00	1135.00	1139.68	1139.62	1140.28	0.010010	6.67	211.16	192.63	0.63
Spwy	680	PF 9	1500.00	1135.00	1140.20	1140.11	1140.83	0.010004	7.32	316.31	209.34	0.65
Spwy	680	PF 10	2000.00	1135.00	1140.61	1140.47	1141.27	0.010002	7.81	404.24	219.03	0.66
Spwy	680	PF 11	2500.00	1135.00	1140.96	1140.74	1141.65	0.010002	8.23	483.28	227.39	0.66
Spwy	680	PF 12	3000.00	1135.00	1141.27	1141.01	1141.99	0.010009	8.58	553.34	229.99	0.67
Spwy	680	PF 13	3500.00	1135.00	1141.55	1141.22	1142.31	0.010005	8.89	618.55	232.31	0.68
Spwy	680	PF 14	4000.00	1135.00	1141.82	1141.44	1142.60	0.010003	9.18	679.91	234.47	0.68
Spwy	680	PF 15	5000.00	1135.00	1142.30	1141.79	1143.15	0.010001	9.70	793.98	238.43	0.69
Spwy	680	PF 16	6000.00	1135.00	1142.74	1142.12	1143.66	0.010013	10.16	899.08	242.03	0.70
Spwy	680	PF 17	7000.00	1135.00	1143.14	1142.42	1144.14	0.010007	10.58	998.26	245.37	0.71
Spwy	680	PF 18	8000.00	1135.00	1143.52	1142.72	1144.59	0.010003	10.96	1092.37	248.50	0.71
Spwy	680	PF 19	9000.00	1135.00	1143.88	1142.98	1145.01	0.010003	11.32	1182.21	251.45	0.72
Spwy	680	PF 20	10000.00	1135.00	1144.23	1143.27	1145.42	0.010002	11.65	1268.66	254.26	0.72
Spwy	680	PF 21	11000.00	1135.00	1144.55	1143.55	1145.81	0.010001	11.96	1352.19	256.95	0.73
Spwy	680	PF 22	12000.00	1135.00	1144.86	1143.77	1146.19	0.010016	12.27	1432.41	259.50	0.73
Spwy	680	PF 23	13000.00	1135.00	1145.17	1144.01	1146.55	0.010012	12.55	1511.28	261.98	0.74
Spwy	680	PF 24	14000.00	1135.00	1145.46	1144.24	1146.90	0.010008	12.82	1588.16	264.38	0.74
Spwy	680	PF 25	15000.00	1135.00	1145.74	1144.47	1147.24	0.010005	13.08	1663.20	266.71	0.75

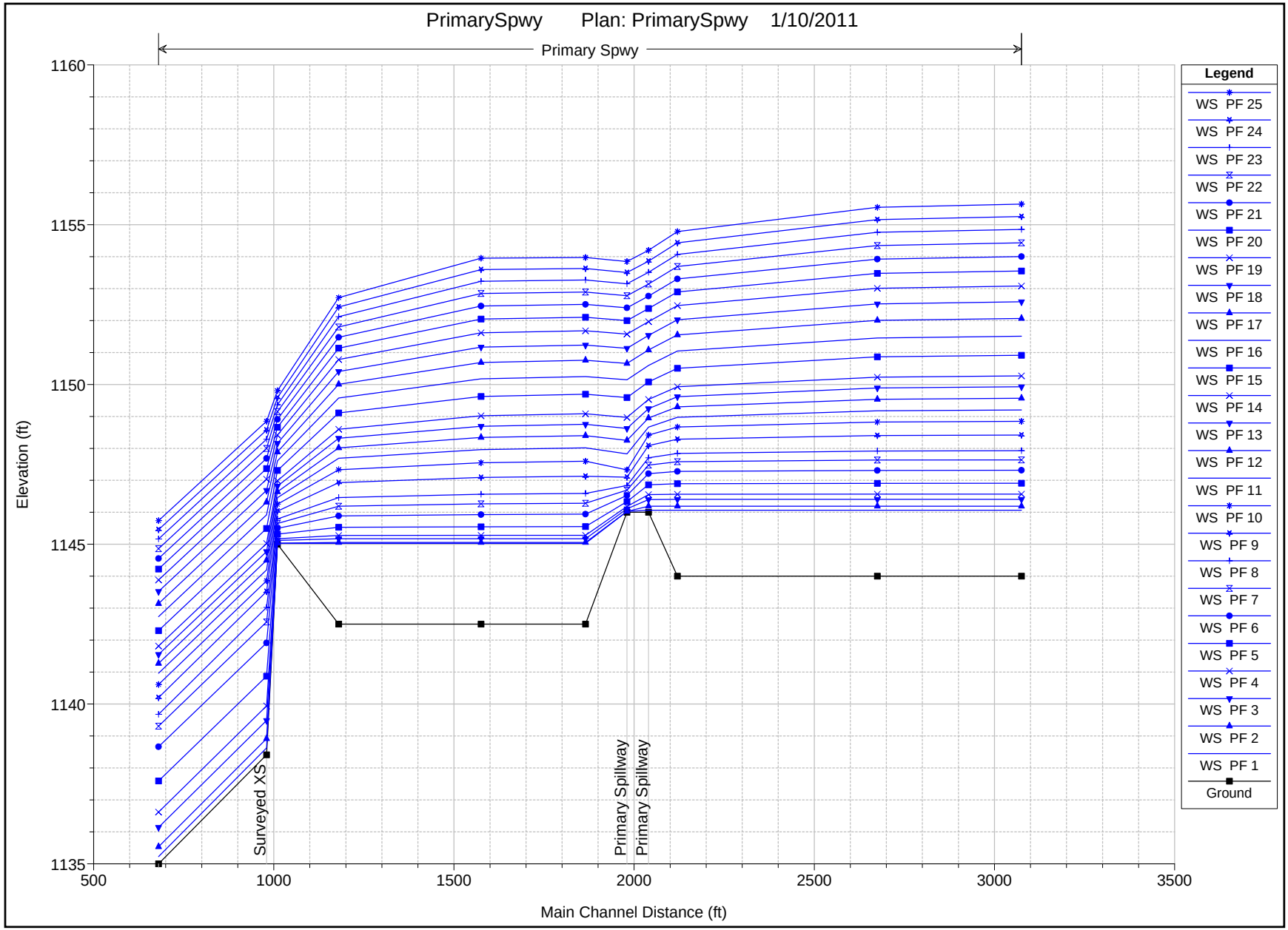

PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 3045
.06
.05
.06
Elevation (ft)
Station (ft)
Legend
WS PF 25
WS PF 24
WS PF 23
WS PF 22
WS PF 21
WS PF 20
WS PF 19
WS PF 18
WS PF 17
WS PF 16
WS PF 15
WS PF 14
WS PF 13
WS PF 12
WS PF 11
WS PF 10
WS PF 9
WS PF 8
WS PF 7
WS PF 6
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 2645
.06
.05
.06
Elevation (ft)
Station (ft)
PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 2090
.06
.05
.06
Elevation (ft)
Station (ft)
PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 2040 Primary Spillway
.05
.06
.06
Elevation (ft)
Station (ft)


PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 1980 Primary Spillway
.06
.05
.06
Elevation (ft)
Station (ft)
Legend
WS PF 25
WS PF 24
WS PF 23
WS PF 22
WS PF 21
WS PF 20
WS PF 19
WS PF 18
WS PF 17
WS PF 16
WS PF 15
WS PF 14
WS PF 13
WS PF 12
WS PF 11
WS PF 10
WS PF 9
WS PF 8
WS PF 7
WS PF 6
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 1865
.06
.05
.06
Elevation (ft)
Station (ft)
PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 1575
.06
.05
.06
Elevation (ft)
Station (ft)
PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 1180
.06
.05
.06
Elevation (ft)
Station (ft)


PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 1010 Secondary Spillway
.05
Elevation (ft)
Station (ft)
Legend
WS PF 25
WS PF 24
WS PF 23
WS PF 22
WS PF 21
WS PF 20
WS PF 19
WS PF 18
WS PF 17
WS PF 16
WS PF 15
WS PF 14
WS PF 13
WS PF 12
WS PF 11
WS PF 10
WS PF 9
WS PF 8
WS PF 7
WS PF 6
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta


PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 980 Surveyed XS
.06
.05
.06
Elevation (ft)
Station (ft)
Legend
WS PF 25
WS PF 24
WS PF 23
WS PF 22
WS PF 21
WS PF 20
WS PF 19
WS PF 18
WS PF 17
WS PF 16
WS PF 15
WS PF 14
WS PF 13
WS PF 12
WS PF 11
WS PF 10
WS PF 9
WS PF 8
WS PF 7
WS PF 6
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta


PrimarySpwy Plan: PrimarySpwy 1/10/2011
River = Primary Reach = Spwy RS = 680 Flint Creek Reservoir NP=1135
.06
.05
.06
Elevation (ft)
Station (ft)
Legend
WS PF 25
WS PF 24
WS PF 23
WS PF 22
WS PF 21
WS PF 20
WS PF 19
WS PF 18
WS PF 17
WS PF 16
WS PF 15
WS PF 14
WS PF 13
WS PF 12
WS PF 11
WS PF 10
WS PF 9
WS PF 8
WS PF 7
WS PF 6
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta


PrimarySpwy Plan: PrimarySpwy 1/10/2011
Primary Spwy
Elevation (ft)
1160
1155
1150
1145
1140
1135
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)
Surveyed XS
Primary Spillway
Primary Spillway
Legend
WS PF 25
WS PF 24
WS PF 23
WS PF 22
WS PF 21
WS PF 20
WS PF 19
WS PF 18
WS PF 17
WS PF 16
WS PF 15
WS PF 14
WS PF 13
WS PF 12
WS PF 11
WS PF 10
WS PF 9
WS PF 8
WS PF 7
WS PF 6
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground

BASIN LAG TIME CALCULATION

USING NRCS TR55 METHOD TO COMPUTE TIME OF CONCENTRATION

Existing Conditions

Project Data:		Comments:
PROJECT	AEP10412	
LOCATION	Welsh Power Plant	
DATE	Dec-10	
BASIN COND.		
BY:	JPM	
WSHED NAME	Primary	

SHEET FLOW: (100' MAX)

Land Use Undeveloped	n value	% Land use	Inc n
Conc.,gravel,asphalt,bare soil	0.015	0	0
Grass Short Prairie	0.15	0	0
Maintained Grass	0.03	0	0
Woods Light Underbrush	0.4	0	0
Woods Dense underbrush	0.8	0	0

based on information for imperviousness from Corps of Engineers

Land Use	% Conc	% Grass	n value	% Land Use	Inc n
Low D. Residential (1+ Acres)	25	75	0.21375	0	0
Med. D. Residential (1/3 Acres)	41	59	0.17135	100	0.17135
High D. Residential (1/4 Acres)	47	53	0.15545	0	0
Multifamily	70	30	0.0945	0	0
Mobile Home Parks	20	80	0.227	0	0
C.B.D.	95	5	0.02825	0	0
Strip Commercial	90	10	0.0415	0	0
Shopping Center	95	5	0.02825	0	0
Instutional-Schools	40	60	0.174	0	0
Industrial	90	10	0.0415	0	0
Highway ROW	35	65	0.18725	0	0
Public Utilities	60	40	0.121	0	0
Vacant urban land and	6	84	0.2361	0	0
Parks	0	0	0	0	
Other	0	0	0	0	0
		TOTAL		100	0.17135

LENGTH	100	FT.	MAX 100'
2 YR. 24 HOUR PRECIP	4.31	IN.	
SLOPE	0.010	FT/FT	

$$T_1 = 0.007 \times \frac{(n \times L)^{0.8}}{R^{0.5} \times S^{0.4}}$$

SHALLOW CONCENTRATED FLOW

1=PAVED 2=UNPAVED	1		
LENGTH	2362.91	FT	
SLOPE	0.006	FT/FT	
COMPUTED VELOCITY FROM FIGURE 3.1=	1.508		

$$T_2 = \frac{L}{60 \times V}$$

CHANNEL FLOW

		TOPWIDTH	35
XSECT AREA=	100.000 SQ FT	BOTTOM	5
		DEPTH	5
WETTED PERIMETER	36.623 FT		
SLOPE	0.008 FT/FT		
MANNINGS N	0.06		
COMPUTED VELOCITY	4.258 FT/S		
LENGTH	9995.43 FT		

$$V = \frac{1.49 \times \left(\frac{a}{p_w}\right)^{\frac{2}{3}} \times s^{\frac{1}{2}}}{n}$$

$$T_6 = \frac{L}{60 \times V}$$

	Conditions	Adjusted Tc (Min)	NRCS Method Tc (Min)	Selected Tc (Min)
WATERSHED NUMBER	Primary			
SHEET FLOW	Max 30 Min	30.0	12.39	12.39
SHALLOW CONCENTRATED FLOW			26.12	26.12
CHANNEL FLOW			39.12	39.12
TOTAL			77.63	77.63
			Lag (Hrs) =	0.78

$$T_c = T_1 + T_2 + T_3 + T_4 + T_5 + T_6$$

Lag(min) =	46.58

BASIN LAG TIME CALCULATION

USING NRCS TR55 METHOD TO COMPUTE TIME OF CONCENTRATION

Existing Conditions

Project Data:		Comments:
PROJECT	AEP10412	
LOCATION	Welsh Power Plant	
DATE	Dec-10	
BASIN COND.		
BY:	JPM	
WSHED NAME	Secondary	

SHEET FLOW: (100' MAX)

Land Use Undeveloped	n value	% Land use	Inc n
Conc.,gravel,asphalt,bare soil	0.015	0	0
Grass Short Prairie	0.15	100	0.15
Maintained Grass	0.03	0	0
Woods Light Underbrush	0.4	0	0
Woods Dense underbrush	0.8	0	0
TOTAL		100	0.15

LENGTH	100	FT.	MAX 100'	
2 YR. 24 HOUR PRECIP	4.31	IN.		
SLOPE	0.020	FT/FT		

$$T_1 = 0.007 \times \frac{(n \times L)^{0.8}}{R^{0.5} \times S^{0.4}}$$

SHALLOW CONCENTRATED FLOW

1=PAVED 2=UNPAVED	2			
LENGTH	1159.16	FT		
SLOPE	0.017	FT/FT		
COMPUTED VELOCITY FROM FIGURE 3.1=	2.119			

$$T_2 = \frac{L}{60 \times V}$$

	Conditions	Adjusted	NRCS Method	Selected	
WATERSHED NUMBER	Secondary	Tc (Min)	Tc (Min)	Tc (Min)	
SHEET FLOW	Max 30 Min	30.0	8.44	8.44	
SHALLOW CONCENTRATED FLOW			9.12	9.12	
TOTAL			17.56	17.56	$T_c = T_1 + T_2 + T_3 + T_4 + T_5 + T_6$
			Lag (Hrs) =	0.18	

Lag(min) =	10.53

Basin	Curve Number (AMC II)	Area_acre
Primary	76.6	1127.5
Secondary	74.9	39.9

Name	GRIDCODE	HSG	Area_ft^2	Area_acre	CN	Inc. CN
Primary	11	W	492113.109	11.297	100	1.002
Primary	23	W	6432.202	0.148	100	0.013
Primary	31	W	196628.865	4.514	100	0.400
Primary	41	W	151664.101	3.482	100	0.309
Primary	71	W	22148.379	0.508	100	0.045
Primary	81	W	58928.772	1.353	100	0.120
Primary	11	B	219057.220	5.029	100	0.446
Primary	21	B	412397.879	9.467	79	0.663
Primary	22	B	511234.844	11.736	68	0.708
Primary	23	B	656437.501	15.070	85	1.136
Primary	31	B	336825.792	7.732	86	0.590
Primary	41	B	1432215.235	32.879	60	1.750
Primary	71	B	192038.278	4.409	61	0.239
Primary	81	B	3304498.256	75.861	61	4.104
Primary	90	B	53877.802	1.237	66	0.072
Primary	11	C	10933.953	0.251	100	0.022
Primary	21	C	2381557.518	54.673	86	4.170
Primary	22	C	564650.628	12.963	79	0.908
Primary	23	C	173626.908	3.986	90	0.318
Primary	31	C	185483.243	4.258	91	0.344
Primary	41	C	1450486.842	33.299	73	2.156
Primary	71	C	335571.928	7.704	74	0.506
Primary	81	C	24105757.161	553.392	74	36.321
Primary	90	C	4267.451	0.098	77	0.007
Primary	21	D	1245218.812	28.586	89	2.257
Primary	22	D	1727655.376	39.662	84	2.955
Primary	23	D	164748.228	3.782	92	0.309
Primary	31	D	1950.419	0.045	94	0.004
Primary	41	D	733098.073	16.830	79	1.179
Primary	81	D	5876087.739	134.896	80	9.572
Primary	24	B	1488256.200	34.166	92	2.788
Primary	24	C	306439.480	7.035	94	0.587
Primary	24	C	310317.021	7.124	94	0.594
Secondary	11	B	60082.739	1.379	100	3.457
Secondary	41	B	192385.993	4.417	60	6.642

Basin	Area_acre
Primary	1127.47
Secondary	39.90

Name	GRIDCODE	HSG	Area_ft^2	Area_acre	CN	Inc. CN
Secondary	81	B	90951.376	2.088	61	3.192
Secondary	11	C	106317.260	2.441	100	6.117
Secondary	21	C	107888.311	2.477	86	5.339
Secondary	41	C	210068.421	4.823	73	8.824
Secondary	71	C	33928.559	0.779	74	1.445
Secondary	81	C	936337.296	21.495	74	39.868

			Curve Number						
GRIDCODE	**NLCD Description**	**TR-55 Description**	**A**	**B**	**B/C**	**C**	**C/D**	**D**	**W**
11	Open Water	Water	100	100	100	100	100	100	100
21	Developed, Open Space	Open Space - Poor	68	79	83	86	88	89	100
22	Developed, Low Intensity	Low Density Residential acre	51	68	74	79	82	84	100
23	Developed, Medium Intensity	High Density Residential	77	85	88	90	91	92	100
24	Developed, High Intensity	Commercial	89	92	93	94	95	95	100
31	Barren Land	Fallow - Bare	77	86	89	91	93	94	100
41	Deciduous Forest	Woods - Fair	36	60	67	73	76	79	100
42	Evergreen Gorest	Woods - Fair	36	60	67	73	76	79	100
43	Mixed Forest	Woods - Fair	36	60	67	73	76	79	100
52	Scrub/Shrub	Brush - Fair	35	56	63	70	74	77	100
71	Grassland/Herbaceous	Open Space - Good	39	61	68	74	77	80	100
81	Pasture/Hay	Open Space - Good	39	61	68	74	77	80	100
82	Cultivated Crops	Row Crops SR - Good	67	78	82	85	87	89	100
90	Woody Wetlands	Woods - Poor	45	66	72	77	80	83	100

Appendix C
Pertinent Drawings

UNIT-1

10+00 S
N-708639

20+00 S
N-707639

PRIMARY ASH SETTLING
BASIN EL. 1144'-0"

SECONDARY ASH SETTLING
BASIN - SURFACE EL. 1142'-0"
±30Ac.

TOPSOIL

TOP OF DIKE EL. 1155'-0"

4 DIKE

12"ø DRAIN PIPE W/12" GATE VALVE DIAPHRAGMS SPACED 25'C.C. EL'X 1139.0' PIPE AND VALVE BY SWEPCO SEE DETAIL-1 (FCX-3, SH.2)

36"ø CMP TO BE PLUGGED @ END OF CONSTRUCTION DIAPHRAGMS SPACED 25'± C.C.

24"ø CMP TO BE PLUGGED @ END OF CONSTRUCTION DIAPHRAGMS SPACED 25'± C.C.

8' WIDE DITCH SLOPE -0.61% INVERT EL. 1140.0'

PRIMARY CONTROL STRUCT. SEE FCX-29 SH.1

OUTLET EL 1137.3'

12" RIPRAP

T"x6" CONC. CREST EL. 1140.0'

SECONDARY CONTROL STRUCT. SEE FCX-29 SH.2

EXCAVATE TO EL. 1135'-0"

DETAIL A (FCX-3, SH-2) AND (FCX-28)

N-707999
E-1253515
N-707324
E-1255860

N.S. BASE LINE

NOTES

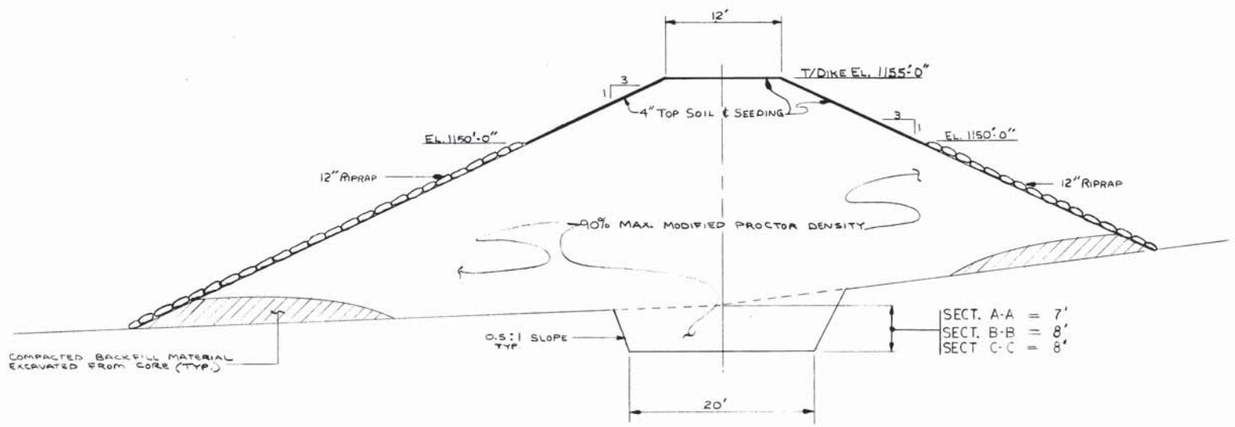
1. SECTIONS A-A THRU D-D } FCX-3, SH.2.
   SECTIONS H-H THRU L-L }
2. SECTIONS E-E THRU G-G - FCX-3, SH.3.
3. STOCKPILE TOPSOIL IN AREAS SHOWN AS REQUIRED.
4. IMPACT STRUCTURE FILL AND SETTLING BASIN CONTROL STRUCTURES NOT IN THE SCOPE OF EARTHWORK.
5. ASH BASIN CONTROL STRUCTURES - REF. DRAWING FCX-29, SH 1 & 2

REV	DATE	INT	DESCRIPTION
	8-14-75	MJM	FOR COMMENTS
	9-23-75	MJM	FOR CONSTRUCTION
A	11-7-75	PSM	8TH CONTROL STRUCT., REV. SPLITTER
			AS NOTED
B	3-17-76	MJM	ADD CO2 PIPING

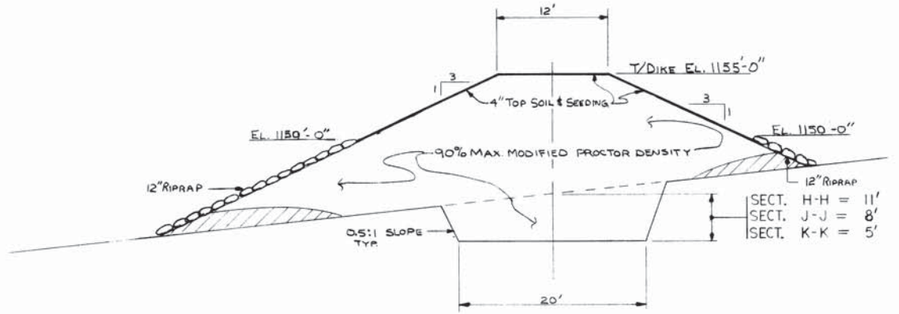
SOUTHWESTERN ELECTRIC POWER COMPANY
G.O. CONSTRUCTION DEPARTMENT
FLINT CREEK POWER PLANT
ASH BERM AND CONNECTING CANAL PLAN

DRWN BY: MJM
DATE: 8 - 14 - 75
SCALE: 1" = 100'-0"

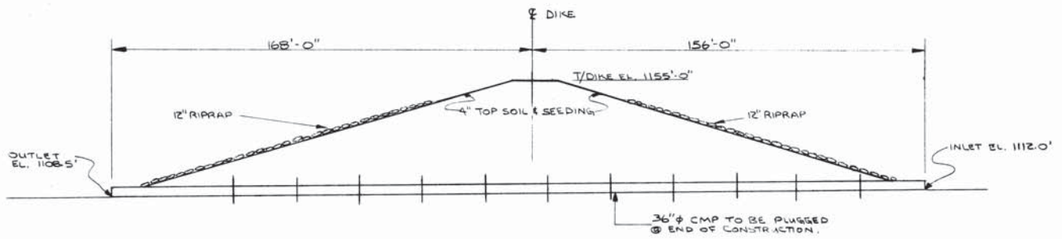
FCX - 3
SH. 1 OF 3



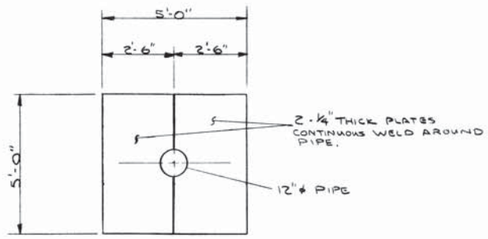
SECTION "A-A" THRU "C-C"
PRIMARY ASH POND DIKE



SECTION "H-H" THRU "K-K"
SECONDARY ASH POND DIKE



SECTION "D-D"
N.T.S.

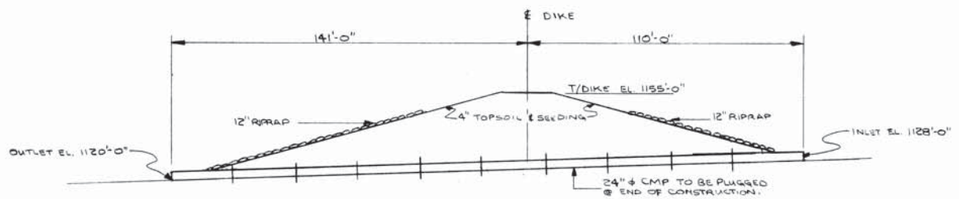


MATERIAL BY SWEPCO.

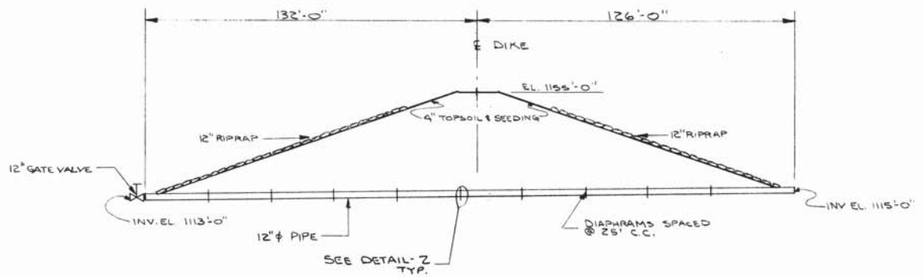
DETAIL 2
TYPICAL DIAPHRAM

NOTES

1- CONTRACTOR SHALL STRIP TOPSOIL FROM DIKE AND SPILLWAY AREA AND STOCKPILE AS SHOWN ON FCX-3, SH. 1.
2- EXCAVATED MATERIAL FROM CORE TO BE USED AS COMPACTED FILL IN TOE OF BERM.
3- CORE TO BE CUT TO DESIGN SECTIONS SHOWN. DEPTH OF CORE SHALL VARY BETWEEN SECTIONS. UPON COMPLETION OF CORE EXCAVATION, OWNER'S ENGINEER SHALL MAKE INSPECTION BEFORE BACKFILL BEGINS.
4- CONTRACTOR SHALL PROVIDE DRAINAGE OF ASH BASIN AREA DURING CONSTRUCTION. ASH BASIN CONNECTING CANAL AND SPILLWAY SHALL BE CUT TO ALLOW FOR DRAINAGE BEFORE BACKFILL BEGINS.
5- CONTRACTOR TO FURNISH (1) - 36" ϕ, AND (1) - 24" ϕ, 16 GA. CMP AS SHOWN WITH DIAPHRAMS SPACED AT 25' INTERVALS. ACTUAL CULVERT INVERT ELEVATIONS WILL VARY DUE TO FIELD CONDITIONS.
6- 12" ϕ PIPE AND 12" GATE VALVE FURNISHED BY SWEPCO.



SECTION "L-L"
N.T.S.



DETAIL -1

REV.	DATE	BY	SUBJECT
	7/12/74		FOR BID
	7/24/74	MJM	FOR CONSTRUCTION
B	8-17-78		

ASH POND DIKE
CROSS - SECTIONS

FLINT CREEK POWER PLANT

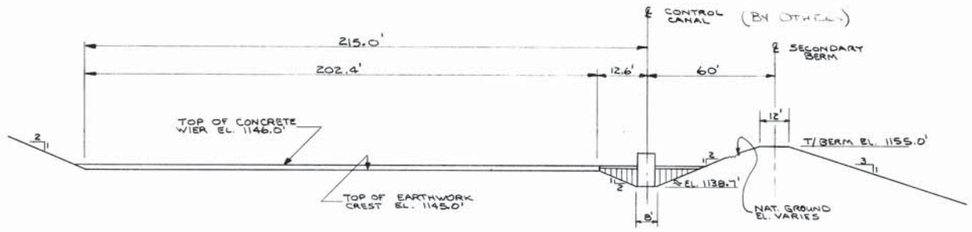
SOUTHWESTERN ELECTRIC POWER CO.
G.O. CONSTRUCTION DEPARTMENT
DIVISION

APPROVED ENGR. IN CHARGE
APPROVED DIV. SUPT.
APPROVED CHIEF ENGR.

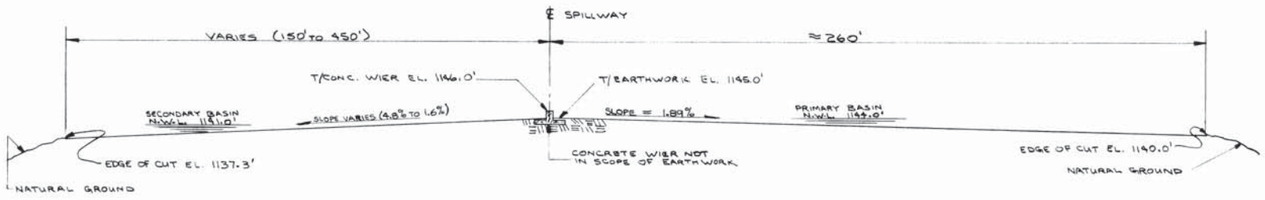
SHEET

DRWN. BY MJM
TRAC. BY
DATE: 7-10-74
SCALE: NONE

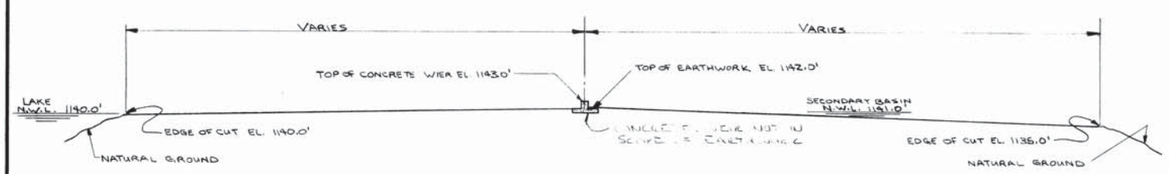
WORK ORDER
DRWG. NO. FCX - 3 SH 2



SECTION "E-E"
PRIMARY CONTROL CANAL AND SPILLWAY



SECTION "F-F"



SECTION "G-G"

REV.	DATE	BY	SUBJECT
	8-29-75	WSM	FOR CONSTRUCTION
B	3-17-78		

ASH POND SPILLWAY SECTIONS

FLINT CREEK POWER PLANT

SOUTHWESTERN ELECTRIC POWER CO.

G.O. CONSTRUCTION DEPARTMENT

DIVISION

APPROVED ENGR. IN CHARGE

APPROVED DIV. SUPT.

APPROVED CHIEF ENGR.

SHEET

DRWN. BY MJM

TRAC. BY

DATE: 8-18-75

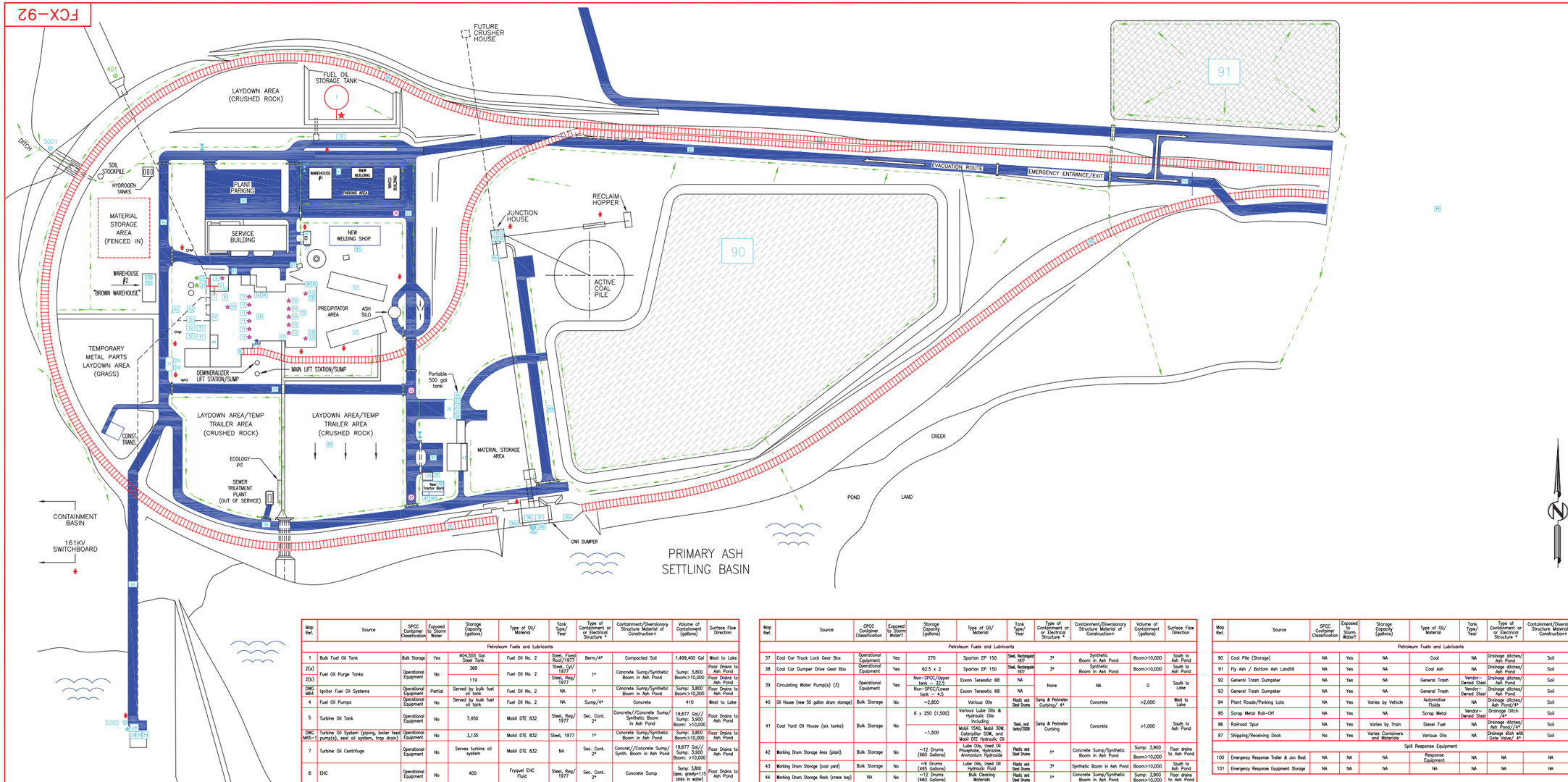
SCALE: 1" = 30'

WORK ORDER

DRWG. NO. FCX - 3 SH. 3

FILE

FCX-92



Map Ref.	Source	SPCC Container Classification	Exposed to Storm Water	Storage Capacity (gallons)	Type of Oil/ Material	Tank Type/ Year	Type of Containment or or Electrical Structure *	Containment/Diversionary Structure Material of Construction+	Volume of Containment (gallons)	Surface Flow Direction
	Petroleum Fuels and Lubricants									
1	Bulk Fuel Oil Tank	Bulk Storage	Yes	604,555 Gal Steel Tank	Fuel Oil No. 2	Steel, Fixed Roof/1977	Berm/4*	Compacted Soil	1,499,400 Gal	West to Lake
2(a)	Fuel Oil Purge Tanks	Operational Equipment	No	368	Fuel Oil No. 2	Steel, Cyl/ 1977	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
2(b)				119		Steel, Rec/ 1977				Floor Drains to Ash Pond
DWG M64	Ignitor Fuel Oil Systems	Operational Equipment	Partial	Served by bulk fuel oil tank	Fuel Oil No. 2	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
4	Fuel Oil Pumps	Operational Equipment	No	Served by bulk fuel oil tank	Fuel Oil No. 2	NA	Sump/4*	Concrete	410	West to Lake
5	Turbine Oil Tank	Operational Equipment	No	7,450	Mobil DTE 832	Steel, Reg/ 1977	Sec. Cont. 2*	Concrete/(Concrete Sump/ Synthetic Boom in Ash Pond	19,677 Gal// Sump: 3,800 Boom: >10,000	Floor Drains to Ash Pond
DWG M65-1	Turbine Oil System (piping, boiler feed pump(s), seal oil system, trap drain)	Operational Equipment	No	3,135	Mobil DTE 832	Steel, 1977	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
7	Turbine Oil Centrifuge	Operational Equipment	No	Serves turbine oil system	Mobil DTE 832	NA	Sec. Cont. 2*	Concrete/(Concrete Sump/ Synth. Boom in Ash Pond	19,677 Gal// Sump: 3,800 Boom: >10,000	Floor Drains to Ash Pond
8	EHC	Operational Equipment	No	400	Fryquel EHC Fluid	Steel, Reg/ 1977	Sec. Cont. 2*	Concrete Sump	Sump: 3,800 (spec. grvity=1.15 sinks in water)	Floor Drains to Ash Pond
9	Turbine Driven Boiler Feed Pump (mezzanine level)	Operational Equipment	No	230	Mobil DTE 832	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
10	Motor Driven Boiler Feed Pump	Operational Equipment	No	270	Mobil DTE 832	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
11	Pulverizers (6)	Operational Equipment	No	250 x 6	Sparton EP 460	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
12	FD Fans (2)	Operational Equipment	Yes	Non-SPCC/7	Mobil Rarus 826	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
13	ID Fans (2)	Operational Equipment	Yes	200	Mobil Rarus 827	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
14	Primary Air Fans (3)	Operational Equipment	Yes	100 x 3	Mobil Rarus 826	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
15	Air Heater Support Bearing Oil	Operational Equipment	Yes	Non-SPCC/42	Royal Purple Thermal Glide 1000	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
16	Bottom Ash Hydraulic System	Operational Equipment	No	Non-SPCC/45	Nuto H32	Steel, Rectangular 1977	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
17	Seal Oil System	Operational Equipment	No	425	Mobil DTE 832	Steel, Cylindrical 1977	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
18	ID Fan Hydraulic System (blade pitch, bearings) (2)	Operational Equipment	Yes	160 x 2	Mobil Rarus 827	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
19	Bulk Fuel Oil Unloading Area	NA	Yes	Various Tanker Truck Volume	No. 2 Fuel Oil	NA	Secondary Containment/ 4*	Concrete	2,283 Gal	West to Lake
20	Clean Turbine Oil Tank	Bulk Storage	Yes	11,500 Gal Steel Tank	Turbine Oil	Steel, Cylindrical 1977	Secondary Containment	Concrete	19,677 Gal	Demin. Sump to Ash Pond
21	Dirty Turbine Oil Tank	Bulk Storage	Yes	11,500 Gal Steel Tank	Turbine Oil	Steel, Cylindrical 1977	Secondary Containment	Concrete	19,677 Gal	Demin. Sump to Ash Pond
22	Off-Road Diesel Tank (Coal Yard)	Bulk Storage	Yes	15,000 Gal Steel Tank	Diesel	Steel, Cylindrical 1982	Secondary Containment	Concrete	15,648 Gal	South to Ash Pond
23	Unleaded Gasoline Tank (Coal Yard)	Bulk Storage	Yes	1,500 Gal Steel Tank	Gasoline	Steel, Cylindrical 1982	Secondary Containment	Concrete	15,648 Gal	South to Ash Pond
24	Kerosene Tank (Coal Yard)	Bulk Storage	Yes	560 Gal Steel Tank	Kerosene	Steel, Cylindrical 1982	Secondary Containment	Concrete	15,648 Gal	South to Ash Pond
25	Diesel/Kerosene/Gasoline Unloading Area (Coal Yard)	NA	Yes	Various Tanker Truck Volume	Diesel/Kerosene/ Gasoline	NA	Drainage Ditch with Gate Valve	Soil	0/>5,000	South to Ash Pond
26	Used Oil Tank (Coal Yard)	Bulk Storage	Yes	1,000 Gal Steel Tank	Used Oil	Steel, Cylindrical 1982	Secondary Containment	Concrete	15,648 Gal	South to Ash Pond
27	Used Oil Tank (Oil House)	Bulk Storage	No	500 Gal Steel Tank	Used Oil	Steel, Cylindrical 1982	Secondary Containment/ 4*	Concrete	1,588 Gal	West to Lake
28	Fire Pump Diesel Tank (Intake Structure)	Bulk Storage	Yes	200 Gal Steel Tank	Diesel	Steel, Cylindrical 1977	Secondary Containment	Steel	601 Gal	South to Lake
29	Diesel Fuel Tank (Onan Generator)	Bulk Storage	No	Non-SPCC/25 Gal Steel Tank	Diesel	Steel, Rectangular 1977	Secondary Containment	Steel	177 Gal	South to Ash Pond
30a	Hydraulic Fluid Tank (Coal Car Positioning System)	Operational Equipment	Yes	230 Gal Steel Tank	Hydraulic Fluid	Steel rectangular	Secondary Containment	Concrete	1,497 Gal	South to Ash Pond
30b	Hydraulic Fluid Tank (Coal Car Positioning System)	Operational Equipment	No	490 Gal Steel Tank	Hydraulic Fluid	Steel rectangular	Secondary Containment	Concrete	703 Gal	South to Ash Pond
30c	Hydraulic Fluid Tank (Coal Car Positioning System)	Operational Equipment	Yes	160 Gal Steel Tank	Hydraulic Fluid	Steel rectangular	Secondary Containment	Concrete	1,690 Gal	South to Ash Pond
31	Coal Conveyor Belt Motors	Operational Equipment	Yes	Non-SPCC/<55	Sparton EP 150	Steel, Rectangular 1977	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
32	Coal Conveyor Belt Gear Box – A Belt	Operational Equipment	Yes	86	Sparton EP 150	Steel, Rectangular 1977	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
33	Coal Conveyor Belt Gear Box – B Belt	Operational Equipment	Yes	52	Sparton EP 150	Steel, Rectangular 1977	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
34	Coal Conveyor Belt Gear Box – C Belt	Operational Equipment	Yes	Non-SPCC/30	Sparton EP 150	Steel, Rectangular 1977	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
35	Coal Conveyor Belt Gear Box – D Belt (Tripper Floor)	Operational Equipment	No	52 x 2	Sparton EP 150	Steel, Rectangular 1977	2*	Synthetic Boom in Ash Pond	Boom:>10,000	Floor drains to Ash Pond
36	Coal Conveyor Belt Gear Box – E Belt (Tripper Floor)	Operational Equipment	No	Non-SPCC/8.5 x 2	Sparton EP 150	Steel, Rectangular 1977	2*	Concrete Sump/Synthetic	Sump: 3,900	Floor drains to Ash Pond

Map Ref.	Source	SPCC Container Classification	Exposed to Storm Water?	Storage Capacity (gallons)	Type of Oil/ Material	Tank Type/ Year	Type of Containment or or Electrical Structure *	Containment/Diversionary Structure Material of Construction+	Volume of Containment (gallons)	Surface Flow Direction
	Petroleum Fuels and Lubricants									
37	Coal Car Truck Lock Gear Box	Operational Equipment	Yes	270	Sparton EP 150	Steel, Rectangular 1977	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
38	Coal Car Dumper Drive Gear Box	Operational Equipment	Yes	62.5 x 2	Sparton EP 150	Steel, Rectangular 1977	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
39	Circulating Water Pump(s) (3)	Operational Equipment	Yes	Non-SPCC/Upper tank – 32.5 Non-SPCC/Lower tank – 4.5	Exxon Terrestic 68	NA	None	NA	0	South to Lake
40	Oil House (see 55 gallon drum storage)	Bulk Storage	No	~2,800	Various Oils	Plastic and Steel Drums	Sump & Perimeter Curbing/ 4*	Concrete	>2,000	West to Lake
41	Coal Yard Oil House (six tanks)	Bulk Storage	No	6 x 250 (1,500)	Various Lube Oils & Hydraulic Oils Including	Steel, and tanks/2008	Sump & Perimeter Curbing	Concrete	>1,000	South to Ash Pond
				~1,500	Mobil 1540, Mobil 30W, Caterpillar 50W, and Mobil DTE Hydraulic Oil					
42	Working Drum Storage Area (plant)	Bulk Storage	No	~12 Drums (660 Gallons)	Lube Oils, Used Oil Phosphate, Hydraulic, Ammonium Hydroxide	Plastic and Steel Drums	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,900 Boom:>10,000	Floor drains to Ash Pond
43	Working Drum Storage (coal yard)	Bulk Storage	No	~9 Drums (495 Gallons)	Lube Oils, Used Oil Hydraulic Fluid	Plastic and Steel Drums	3*	Synthetic Boom in Ash Pond	Boom:>10,000	South to Ash Pond
44	Working Drum Storage Rack (crane bay)	NA	No	~12 Drums (660 Gallons)	Bulk Cleaning Materials	Plastic and Steel Drums	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,900 Boom:>10,000	Floor drains to Ash Pond
45	Portable Tank (Skid Tank)	Bulk Storage	Yes	500 Gal	Used Oil/Hydraulic Fluid	Steel	Steel Secondary Containment	Steel	500 Gal	Varies depending on location
46	Track Greaser for Rail Spur	Operational Equipment	Yes	~114	Track Grease	Steel/2008	None	NA	NA	Southwest to Ash Pond
47	Coal Yard–Product Storage Area	Bulk Storage	Yes	20 x 55 Gal Total =~1,100 Gal	Various Lube Oils & Hydraulic Oils	Plastic and Steel Drums	Concrete foundation and curbing	Concrete	>500 Gal	South to Ash Pond
48	Used oil tank–South side of Tractor Barn	Bulk Storage	Yes	500 Gal	Used Oils	Steel/2000	Concrete foundation and curbing	Concrete	>500 Gal	South to Ash Pond
49	New Tractor Barn	Bulk Storage	No	~1,100 Gal	Various Lube Oils & Hydraulic Oils	55-Gallon Plastic & Steel Drums	Concrete foundation and curbing	Concrete	>55 Gal	South to Ash Pond
	Oil-Filled Electrical Equipment									
50	Main Power Transformer (Phase A, B, C)	Operational Equipment	Yes	3 x 5,200 Gal	Dielectric Insulating Oil	Steel, Rectangular 1977	Secondary Containment/2*	Concrete Containment/Concrete Sump/Synth. Boom in Ash Pond	3x7,236 Gal/Sump 3,900 Boom>10,000	Demineralizer Sump to Ash Pond
51	Aux. Transformer (P.349, P.350)	Operational Equipment	Yes	2 x 2,913 Gal	Dielectric Insulating Oil	Steel, Rectangular 1977	Secondary Containment/2*	Concrete Containment/Concrete Sump/Synth. Boom in Ash Pond	2x2,884 Gal/Sump 3,900 Boom>10,000	Demineralizer Sump to Ash Pond
52	Reserve Auxiliary Transformer (P161.33)	Operational Equipment	Yes	7,578 Gal	Dielectric Insulating Oil	Steel, Rectangular 1977	Secondary Containment/2*	Concrete Containment/Concrete Sump/Synth. Boom in Ash Pond	3,188 Gal/Sump 3,900 Boom>10,000	Demineralizer Sump to Ash Pond
53	Spare Main Power Transformer (P161.23)	Operational Equipment	Yes	5,200 Gal	Dielectric Insulating Oil	Steel, Rectangular 1977	4*	Crushed Rock	0	Northwest to Lake
54	Pole-Mounted Transformers (150007I8, 100027I0, 100027I1) for Water Recovery Pumps (Located below SWEPCE Lake Dam)	Operational Equipment	Yes	#150007I8–60 gal Non-SPCC/ #100027I0 – 48 gal Non-SPCC/ #100027I1 – 48 gal	Dielectric Insulating Oil	Steel/ Cylindrical Steel/ Cylindrical Steel/ Cylindrical	Secondary Containment	Concrete	900	North to Little Flint Creek
55	Transformer/Rectifier Sets (Precipitator)	Operational Equipment	No	16 x 176 Gal	Dielectric Insulating Oil	Steel, Cylindrical	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	South to Ash Pond
	Above Ground Piping									
60	Fuel Oil Piping (Ref. Dwg. M54)	NA	Partial	NA	Fuel Oil No. 2	NA	1*/4*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	West to Lake/Floor Drains to Ash Pond
61	Turbine Oil Piping (Ref. Dwg. M65 sh.1)	Bulk Storage	Yes	NA	Mobil DTE 832	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
62	Emergency Fire Pump Piping	NA	Yes	NA	Diesel	NA	None	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	South to Lake
63	Emergency Generator Piping	NA	No	NA	Fuel Oil No. 2	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	South to Ash Pond
64	Lube Oil Piping (Ref. Dwg. M65 sh. 2)	NA	No	NA	Mobil Rarus	NA	1*	Concrete Sump/Synthetic Boom in Ash Pond	Sump: 3,800 Boom:>10,000	Floor Drains to Ash Pond
	Hazardous Materials / Chemicals									
75	Sulfuric Acid	NA	Yes	15,000 Gal Steel Tank	See Source Column	Steel/ Cylindrical/ 1977	Concrete Containment/ 17,897 Gal Combined w/ Caustic Containment)	Concrete	17,897	South to Ash Pond
76	Caustic–Sodium Hydroxide	NA	Yes	15,000 Gal Steel Tank	See Source Column	Steel/ Cylindrical/ 1977	Concrete Containment/ 17,897 Gal Combined w/ Acid Containment)	Concrete	17,897	South to Ash Pond
77	Acid/Caustic Unloading Area	NA	Yes	Various Tanker Truck Volume	See Source Column	NA	None	NA	0	South to Ash Pond
78	Coal Yard Drum Rack (various cleaners)	NA	No	5 – 10,55–Gal Drums	See Source Column	Plastic and Steel Drums	Containment	Concrete / 3*	105/Boom >10,000	South to Ash Pond
79(a)	Surfactant (AS–8896)	NA	Yes	1,550 Gal Insulated Plastic Tank	See Source Column	Double Wall Tank	Double Wall Tank	Plastic / 3*	>1,550/Boom >10,000	South to Ash Pond
79(b)	Surfactant (AS–8896)	NA	Yes	1,550 Gal Plastic Tank	See Source Column	Double Wall Tank	Double Wall Tank	Plastic / 3*	>1,550/Boom >10,000	South to Ash Pond
79(c)	Surfactant (AS–8896)	NA	Yes	1,550 Gal Plastic Tank	See Source Column	Double Wall Tank	Double Wall Tank	Plastic / 3*	>1,550/Boom >10,000	South to Ash Pond
80	Sodium Hypochlorite	NA	No	275 Gal Plastic Tote	See Source Column	Vendor-Owned Plastic Tote	None	NA/1*	280	Floor Drains to Ash Pond

Map Ref.	Source	SPCC Container Classification	Exposed to Storm Water?	Storage Capacity (gallons)	Type of Oil/ Material	Tank Type/ Year	Type of Containment or or Electrical Structure *	Containment/Diversionary Structure Material of Construction+	Volume of Containment (gallons)	Surface Flow Direction
	Petroleum Fuels and Lubricants									
90	Coal Pile (Storage)	NA	Yes	NA	Coal	NA	Drainage ditches/ Ash Pond	Soil	0/Boom >10,000	South to Ash Pond
91	Fly Ash / Bottom Ash Landfill	NA	Yes	NA	Coal Ash	NA	Drainage ditches/ Ash Pond	Soil	0/Boom >10,000	South to Ash Pond
92	General Trash Dumpster	NA	Yes	NA	General Trash	Vendor–Owned Steel	Drainage ditches/ Ash Pond	Soil	0/Boom >10,000	South to Ash Pond
93	General Trash Dumpster	NA	Yes	NA	General Trash	Vendor–Owned Steel	Drainage ditches/ Ash Pond	Soil	0/Boom >10,000	South to Ash Pond
94	Plant Roads/Parking Lots	NA	Yes	Varies by Vehicle	Automotive Fluids	NA	Drainage ditches/ Ash Pond/4*	Soil	0/Boom >10,000	Varies See Map
95	Scrap Metal Roll–Off	NA	Yes	NA	Scrap Metal	Vendor–Owned Steel	Drainage Ditch /4*	Soil	0	Northwest to Lake
96	Railroad Spur	NA	Yes	Varies by Train	Diesel Fuel	NA	Drainage ditches/ Ash Pond/4*	Soil	0/Boom >10,000	Varies See Map
97	Shipping/Receiving Dock	No	Yes	Varies Containers and Materials	Various Oils	NA	Drainage ditch with Gate Valve/ 4*	Soil	>5,000	Northwest to Lake
	Spill Response Equipment									
100	Emergency Response Trailer & Jon Boat	NA	NA	NA	Response Equipment	NA	NA	NA	NA	NA
101	Emergency Response Equipment Storage	NA	NA	NA	NA	NA	NA	NA	NA	NA

*1: The plant floor drains are routed to the "Main Lift Station" which is equipped with two sump pumps that are activated by float switches. The sump has approximately 3,800 gallon capacity which serves as a sort of oil/water separator. The water is pumped from the sump to the primary ash pond which is equipped with a permanent floating boom with a 9–inch skirt to retain any oil which enters the pond from discharging to the secondary ash pond and to SWEPCO Lake. The boom would be capable of retaining an oil spill to ash pond of at least 10,000 gallons.

*2: These sources are served by a drain system (tied in with the demineralizer floor drain system) that is routed to the "Demineralizer Lift Station" which is equipped with two sump pumps that are activated by float switches. The sump has approximately 3,900 gallon capacity which serves as a sort of oil/water separator. the water is pumped from the sump to the primary ash pond which is equipped with a permanent floating boom with a 9–inch skirt to retain any oil which enters the pond from discharging to the secondary ash pond and to SWEPCO Lake. The boom should be capable of retaining an oil spill to the ash pond of at least 10,000 gallons.

*3: These sources are located within the coal yard and are routed to the drainage ditch system that routes storm water and any spills that are not absorbed by materials (coal, soil) to the primary ash pond. The primary ash pond is equipped with a permanent floating boom with a 9–inch skirt to retain any oil which enters the pond from discharging to the secondary ash pond and to SWEPCO Lake. The boom would be capable of retaining an oil spill to the ash pond of at least 10,000 gallons.

*4: Sources which drain to Storm Water Outfall S001 which are not absorbed by local soil can be retained within the drainage ditches. The drainage ditch which serves the main plant road and the fuel oil unloading area is equipped with a gate valve. Another gate valve serves the drainage ditches which converge at the northwest corner of the Warehouse #1. The gate valves are kept closed and the accumulated storm water is visually inspected prior to opening the valves, allowing drainage to S001. In addition, a soil stockpile is located near S001 as a ready source to dam the drainage to Swepco Lake.

Communication systems: Radios in control room, managers office; telephones in each office throughout plant; Public adress (Galtronics) phones located through plant and offices.

STORM WATER OUTFALLS

S001

S002

WASTEWATER OUTFALL

401

DRAINAGE DITCH GATE VALVE

FIRE HYDRANT

EVACUATION RALLY POINT

SITE DRAINAGE

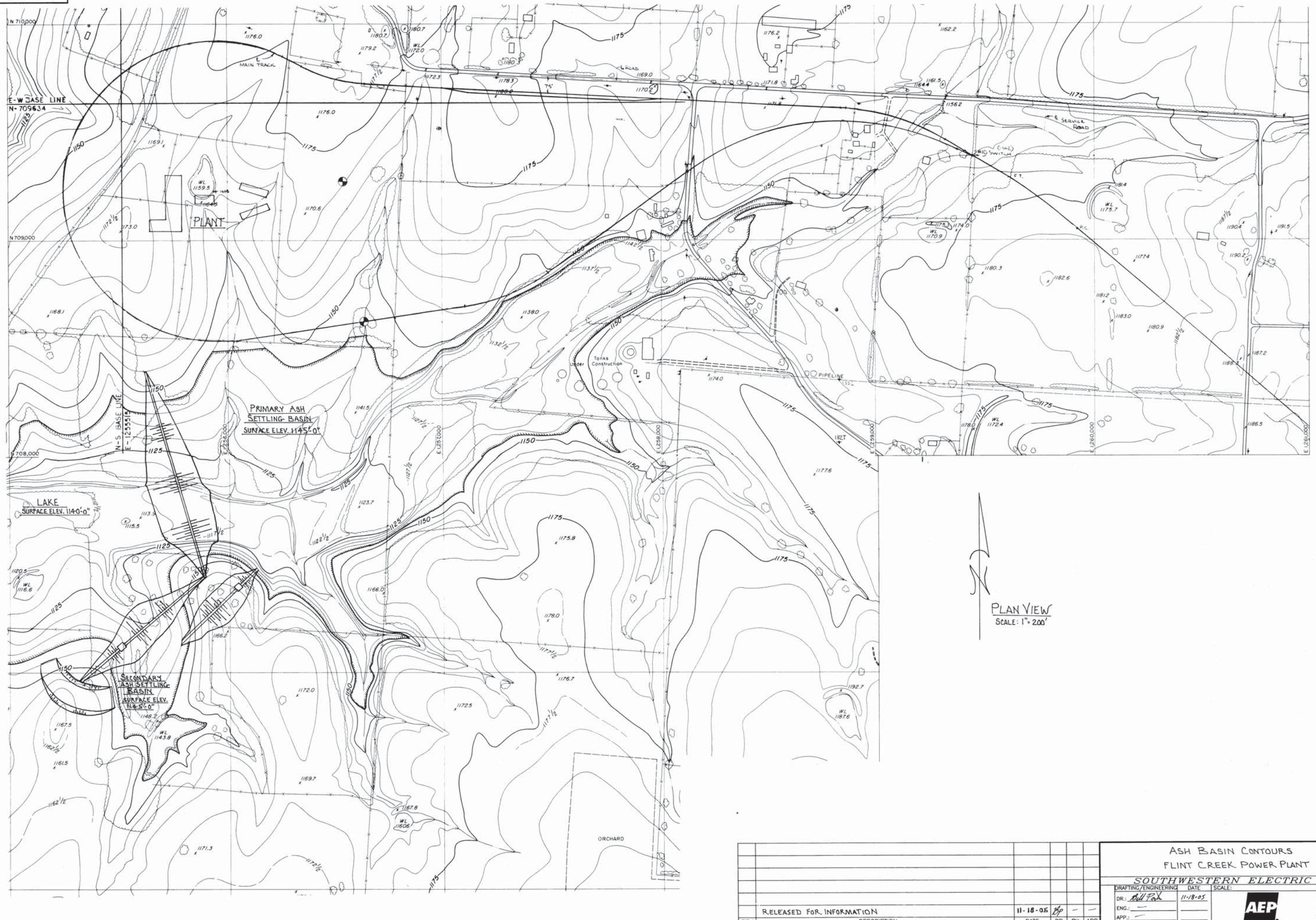
REV	DESCRIPTION	DATE	DR	BY	APP
D	FLD. AS–BUILT	6/30/10	ML	SC	SC
C	FLD. AS–BUILT	1/19/09	ML		SC

FRP, SPCC & STORM WATER SITE PLAN FLINT CREEK POWER PLANT GENTRY, ARKANSAS

SOUTHWESTERN ELECTRIC POWER CO.

DRAFTING/ENGINEERING	DATE	SCALE: N.I.S.	DWG. NO.	REV No.
DFT.: M. LONG	4/10/05	AEP	FCX–92	D
ENG.:			SHT.	
APP.: S. CARNEY	4/10/05			

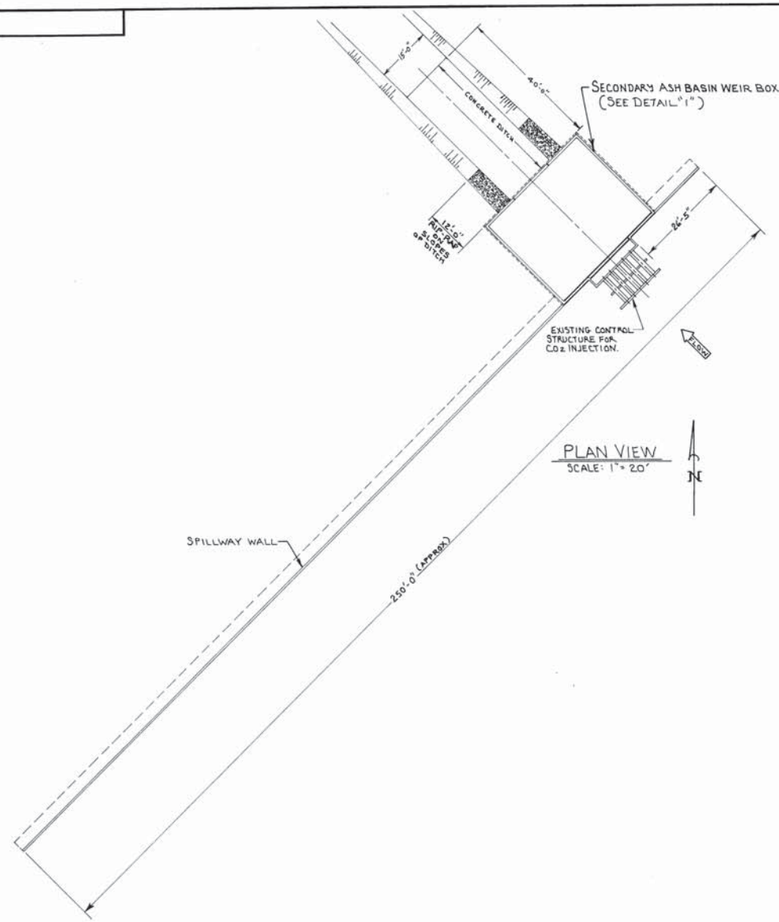
J:\CAD\Region V – SWEPCO\Flint Creek\internal drawings\fcx drawings\fcx-92.dwg 06/30/10 09:09



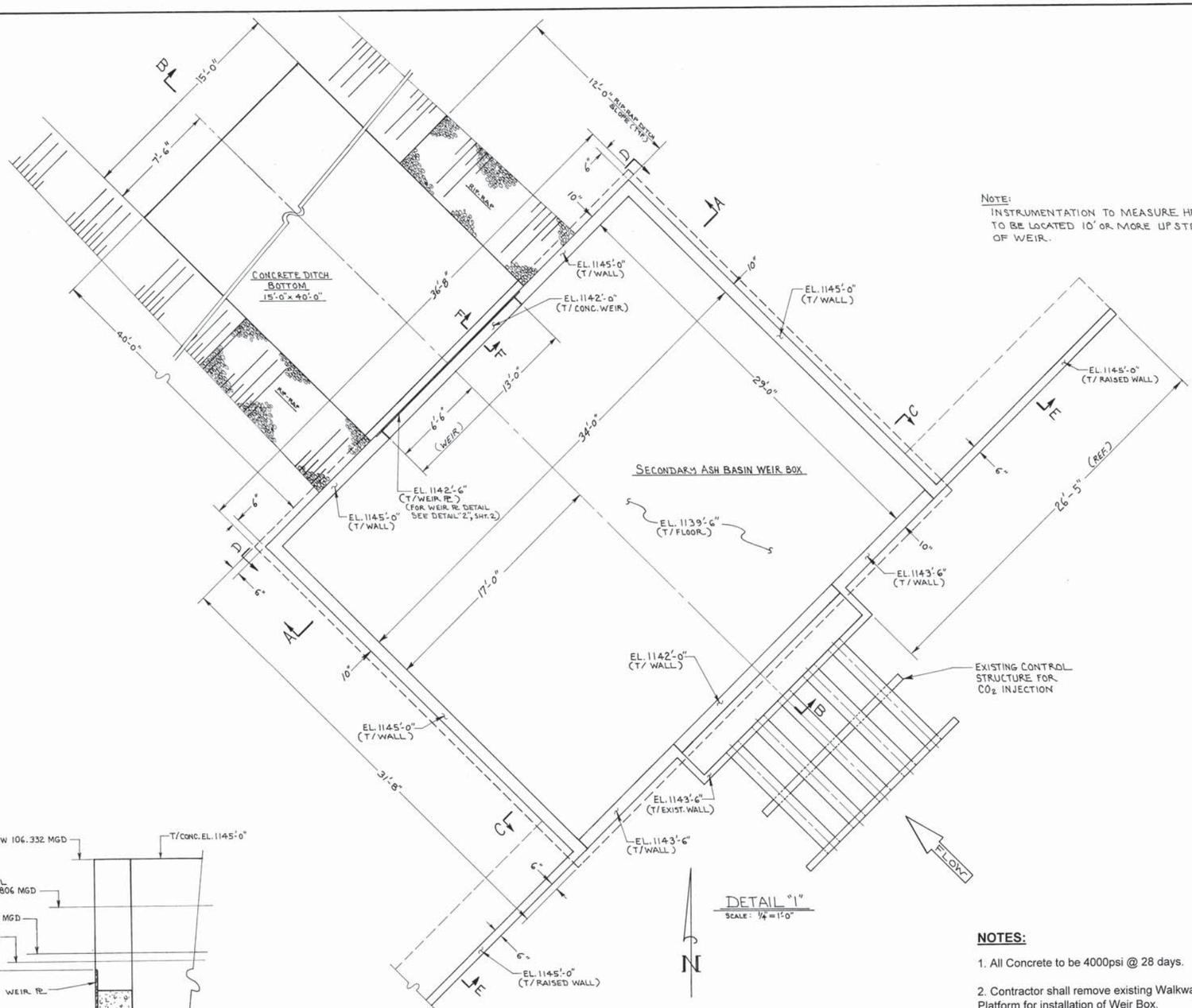
REV	DESCRIPTION	DATE	DR	BY	APP
	RELEASED FOR INFORMATION	11-18-05	BP	—	—

ASH BASIN CONTOURS
FLINT CREEK POWER PLANT
SOUTHWESTERN ELECTRIC POWER CO.

DRAFTING/ENGINEERING	DATE	SCALE:	DWG. NO.	REV No.
DR.: Bill Fox	11-18-05	AEP	FCX-96	—
ENG.: —			SHT. 1 of 1	
APP.: —				

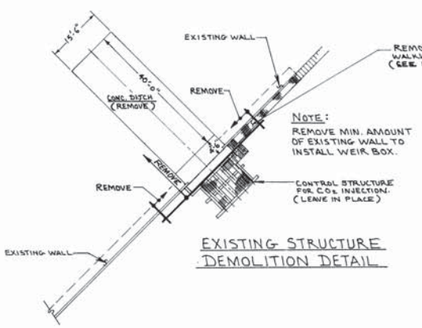


PLAN VIEW
SCALE: 1" = 20'

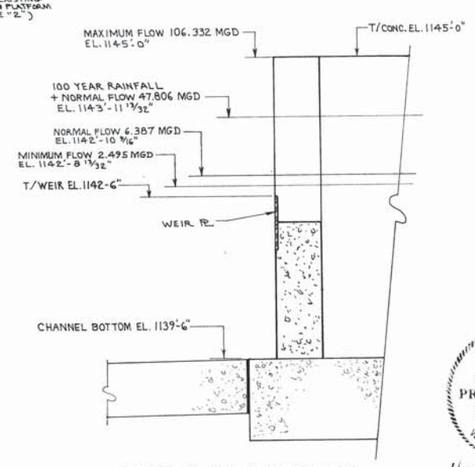


NOTE:
INSTRUMENTATION TO MEASURE HEAD TO BE LOCATED 10' OR MORE UP STREAM OF WEIR.

DETAIL "1"
SCALE: 1/4" = 1'-0"



EXISTING STRUCTURE DEMOLITION DETAIL



WEIR FLOW CAPABILITY

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 10093
WESLEY J. HULL
Wesley J. Hull, P.E.
9-22-2009

NOTES:

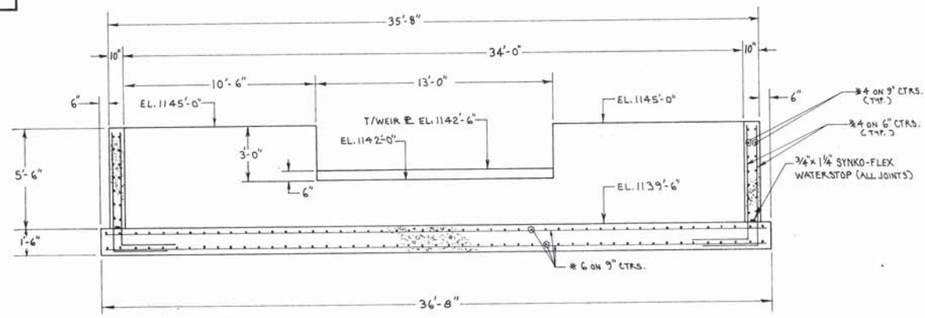
1. All Concrete to be 4000psi @ 28 days.

2. Contractor shall remove existing Walkway and Platform for installation of Weir Box. Contractor shall re-install the Walkway and Platform after installation of Weir Box is complete.

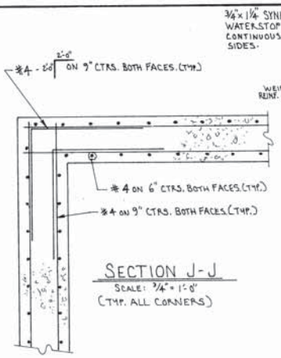
REV	DESCRIPTION	DATE	DR	BY	APP
A	RELEASED FOR QUOTES (NOT FOR CONSTRUCTION)		BP	WH	
	RELEASED FOR COMMENTS (NOT FOR CONSTRUCTION)	9-22-2009	BP	WH	

SECONDARY ASH SETTLING POND WEIR INSTALLATION
FLINT CREEK POWER PLANT
SOUTHWESTERN ELECTRIC POWER CO.

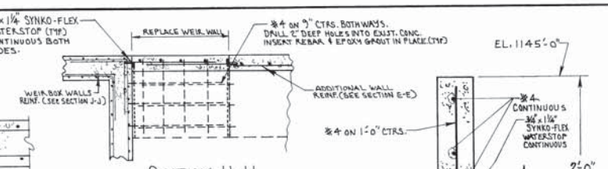
DRAFTING/ENGINEERING	DATE	SCALE:	DWG. NO.	REV
DR.: BILL FOSTER	9-21-2009	AEP	FCX-104	A
ENG.:				
APP.: WH	9-22-09		SHT. 1 of 2	



SECTION A-A
SCALE: 1/4" = 1'-0"

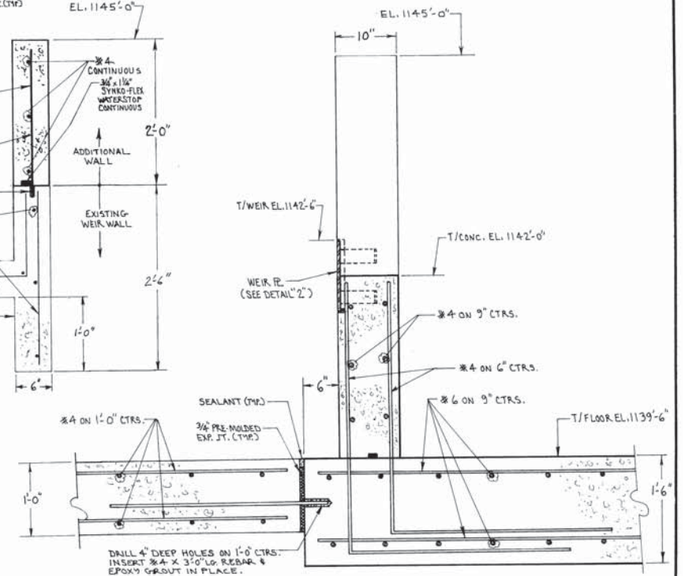


SECTION J-J
SCALE: 3/4" = 1'-0"
(TYP. ALL CORNERS)

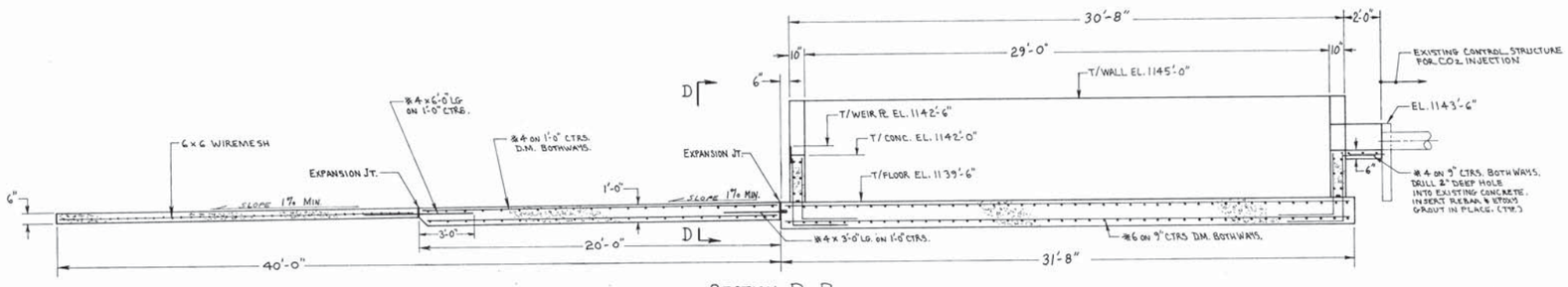


SECTION H-H
SCALE: 3/8" = 1'-0"
(TYPICAL BOTH SIDES OF WEIR BOX)

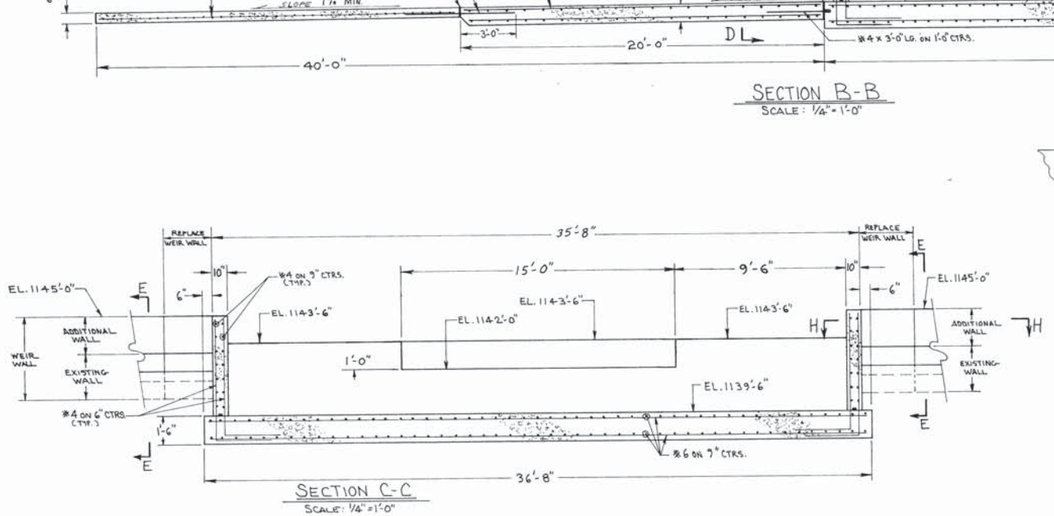
SECTION E-E
SCALE: 1" = 1'-0"



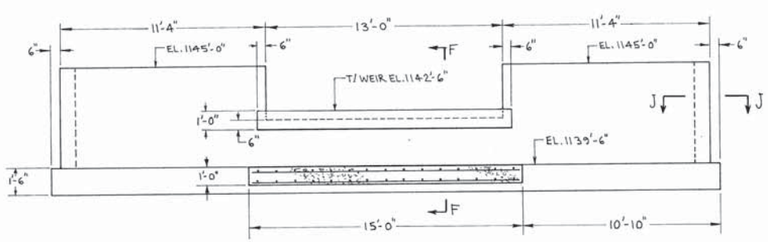
SECTION F-F
SCALE: 1" = 1'-0"



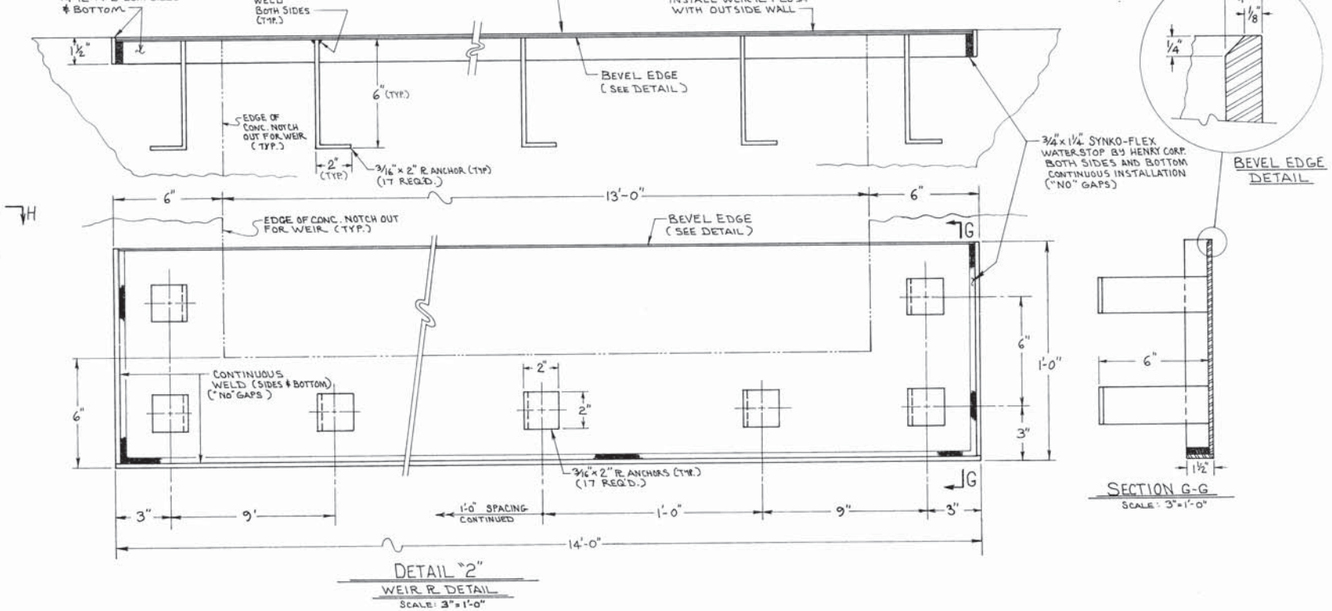
SECTION B-B
SCALE: 1/4" = 1'-0"



SECTION C-C
SCALE: 1/4" = 1'-0"



SECTION D-D
SCALE: 1/4" = 1'-0"



DETAIL "2"
WEIR R. DETAIL
SCALE: 3" = 1'-0"

BEVEL EDGE DETAIL

SECTION G-G
SCALE: 3" = 1'-0"

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 10123
WESLEY J. HULL

W. Lesley J. Hull, P.E.
9-22-2009

REV	DESCRIPTION	DATE	DR	BY	APP
A	RELEASED FOR QUOTES (NOT FOR CONSTRUCTION)		BP		WJH
	RELEASED FOR COMMENTS (NOT FOR CONSTRUCTION)	9-22-2009	BP		WJH

SECONDARY ASH SETTLING POND WEIR INSTALLATION
FLINT CREEK POWER PLANT
SOUTHWESTERN ELECTRIC POWER CO.

DRAFTING/ENGINEERING	DATE	SCALE:	DWG. NO.	REV
DR.: BILL PORTER	9-21-09	AEP	FCX-104	A
ENG.:				
APP.: Wes Hull	9-22-09		SHT. 2 of 2	