POST CONSTRUCTION CERTIFICATION:
RETENTION POND MODIFICATION & ADDITION OF ROCK AROUND ADMIN BUILDING

88.15.81

SEMINOLE COMBINED-CYCLE FACILITY
PALATKA, FLORIDA

KIEWIT PROJECT NO. 20015690

ISSUED: OCTOBER 20, 2022

REVISION 3 – ISSUED FOR INFORMATION

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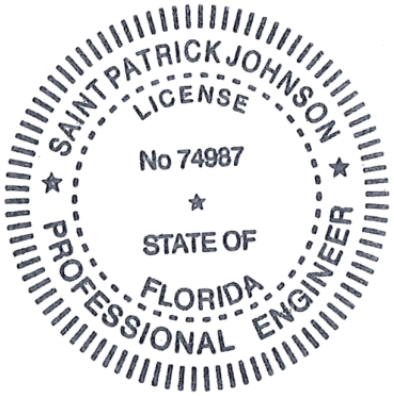

Saint P. Johnson Jr.

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SEMINOLE COMBINED-CYCLE FACILITY
RETENTION POND MODIFICATION & ADDITION OF ROCK AROUND ADMIN BUILDING

1.0 OBJECTIVES

1. Determine the impacts on the drainage area characteristics of SB-5 (pg. 39 of ***20015690-CA-CW-001)*** due to the replacement of approximately 0.58-acres of grassed area with aggregate surfacing along with the addition of a 0.09-acre asphalt walkway.

2. Determine the impacts on the stormwater drainage system related to the loss of approximately 25,000 cubic feet of storage in the retention basin.

3. Adequately upsize and reconfigure the existing SB-1 ditch to address the increase in runoff associated with the addition of aggregate and asphalt around the admin building and the loss of storage in the main retention basin.

2.0 REFERENCES

*SEE ORIGINAL STORMWATER CALCULATIONS (**20015690-CA-CW-001**) FOR REFERENCES*

SEMINOLE GENERATING STATION (PA78-10) AMENDMENT REQUEST (AM20-236)

3.0 DESIGN BASIS

*SEE ORIGINAL STORMWATER CALCULATIONS (**20015690-CA-CW-001**) FOR DESIGN BASIS*

4.0 ANALYSIS

The following data will be used as the basis for the stormwater design on this project:

Storm Distribution: SCS Type II, 24-hour
Rainfall Depths: D_{25} = 7.68", D_{100} = 10.30"
Hydrologic Soil Group "A"
CN = 39 (>75% Grass Cover, Good)
CN = 76 (Gravel Surfacing)
CN = 89 (Limerock Base)
CN = 98 (Asphalt Paved Surface)
CN = 98 (Concrete Surfacing)
CN = 98 (Water Surface)

Runoff and peak discharges will be determined utilizing the hydrologic methodology outlined in Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds".

Autodesk Storm and Sanitary Analysis (SSA) was used as the modeling software for determining stormwater runoff volume, peak runoff rate and water surface elevations.

4.1 DRAINAGE AREA SB-5

SB-5 is a 12.57-acre drainage area located at the south side of the Seminole Combined-Cycle Facility (seen on pg. 39 of ***20015690-CA-CW-001***). The SB-5 drainage area consists of the 4-acre retention pond, cooling tower, and the admin building along with its' associated parking. While a majority of the runoff generated in this subbasin sheet flows directly into the retention pond, four grate inlets have been installed to capture runoff on the east and west side of the cooling tower. After the original calculation was issued, an area of 0.58-acres surrounding the admin building that was originally shown as grass will now be gravel surfaced. A 0.09-acre asphalt walkway connecting the admin/warehouse building to the gate near the southwest corner of the cooling tower has also been added since the original calculation. Tables 1 & 2 below provide a summary of the curve number for SB-5 from the original calculation along with a revised curve number reflecting the addition of the 0.58-acre gravel area and 0.1-acre asphalt walkway. Peak flow rates for both the 25 & 100-year storms have also been provided below.

Table 1: SB-5 Drainage Area Curve Number Calculation (pg. 42 of 20015690-CA-CW-001)

SB-5 Curve Number - Operational Phase							
Building Area (sf)	79,783.15		*Building Area (ac)*	1.83		*Buildings Curve Number*	98
Road Area (sf)	44,973.91		*Road Area (ac)*	1.03		*Road Curve Number*	98
Grass Area (sf)	269,157.88		*Grass Area (ac)*	6.18		*Grass Curve Number*	39
Gravel Area (sf)	20,753.40		*Gravel Area (ac)*	0.48		*Gravel Curve Number*	76
Water Surface Area (sf)	178,596.00		*Water Surface Area (ac)*	4.10		*Water Surface Curve Number*	98
Sidewalk Area (sf)	3,072.07		*Sidewalk Area (ac)*	0.07		*Sidewalk Curve Number*	98
Total Area (sf)	596,336.40		***Total Area (ac)***	13.69		***Composite Curve Number***	70.60

SB-5 Curve Number for the Original Calculation: 70.60
SB-5 Time of Concentration from Original Calculation: 6 minutes

SB-5 25-year Peak Runoff from Original Calculation: 85.35 cfs
SB-5 100-year Peak Runoff from Original Calculation: 130.93 cfs

Table 2: SB-5 Drainage Area Curve Number Calculation
(Addition of Rock & Walkway around Admin Building)

SB-5 Curve Number - Operational Phase							
Building Area (sf)	30,927.60		*Building Area (ac)*	0.71		*Buildings Curve Number*	98
Road Area (sf)	44,973.91		*Road Area (ac)*	1.03		*Road Curve Number*	98
Grass Area (sf)	240,451.20		*Grass Area (ac)*	5.52		*Grass Curve Number*	39
Gravel Area (sf)	46,173.60		*Gravel Area (ac)*	1.06		*Gravel Curve Number*	76
Water Surface Area (sf)	178,596.00		*Water Surface Area (ac)*	4.10		*Water Surface Curve Number*	98
Sidewalk Area (sf)	6,556.87		*Sidewalk Area (ac)*	0.15		*Sidewalk Curve Number*	98
Total Area (sf)	547,549.20		***Total Area (ac)***	12.57		***Composite Curve Number***	70.24

SB-5 Curve Number for the Updated Calculation: 70.24
SB-5 Time of Concentration from Updated Calculation: 6 minutes

SB-5 25-year Peak Runoff from Updated Calculation: 84.52 cfs
SB-5 100-year Peak Runoff from Updated Calculation: 130.09 cfs

5.0 EXISTING DESIGN MODIFICATIONS

The addition of aggregate & asphalt surfacing to SB-5 along with utility conflicts in and around the retention pond will require minor adjustments to proposed stormwater control features included in the original report. These modifications are highlighted and described in detail below.

5.1 RETENTION POND STORAGE MODIFICATION

The main stormwater management feature for the Seminole Combined-Cycle Facility is the 4-acre retention pond located at the south end of the site, which acts as the outfall for the entire 51-acre drainage area. In the northwest corner of the basin, several utilities run in and around the footprint of the pond. One, an alternate power feed to the Medium Voltage enclosure, rises in grade where the construction trailers are currently located. To avoid this utility, the northern edge of the pond will be shifted 15’ south as shown in Figure 1. This results in a loss of storage in the pond below the spillway of 24,599 cubic feet. Stage-storage information for the retention pond as previously permitted along with the retention pond as proposed can be found below in Tables 3 & 4.

Table 3: Retention Pond Stage Storage Table (Original Calculation)

	RETENTION POND (P-1) STAGE - STORAGE DATA						
	ELEV. RANGE		CONTOUR AREA	INCREMENT		TOTAL	
			AC	CF	AC-FT	CF	AC-FT
	65.00		2.20				
		66.00	2.63	105,134	2.41	105,134	2.41
	66.00						
		67.00	3.10	125,488	2.88	230,622	5.29
	67.00						
		68.00	3.48	140,135	3.22	370,757	8.51
	68.00						
		69.00	3.81	152,028	3.49	522,785	12.00
	69.00						
		70.00	4.09	161,660	3.71	684,445	15.71
WEIR EL	70.00						
TOP OF BANK		71.00	4.33	168,646	3.87	853,091	19.58

Table 4: Retention Pond Stage Storage Table (Modified Footprint)

	RETENTION POND (P-1) STAGE - STORAGE DATA						
	ELEV. RANGE		CONTOUR AREA	INCREMENT		TOTAL	
			AC	CF	AC-FT	CF	AC-FT
	65.00		2.20				
		66.00	2.51	102,518	2.35	102,518	2.35
	66.00						
		67.00	2.86	116,853	2.68	219,371	5.04
	67.00						
		68.00	3.20	131,866	3.03	351,237	8.06
	68.00						
		69.00	3.56	147,177	3.38	498,414	11.44
	69.00						
		70.00	3.85	161,432	3.71	659,846	15.15
WEIR EL	70.00						
TOP OF BANK		71.00	4.07	172,510	3.96	832,356	19.11

5.2 SB-1 DITCH MODIFICATIONS

To account for the increase in runoff and loss of storage outlined in Sections 4.1 & 5.1 above, several modifications to the SB-1 Ditch will be required. The first modification consists of expanding the footprint of the SB-1 Ditch to replace the storage lost in the retention basin, which can be seen in Figure 2. Tables 5 & 6 below provide stage-storage information for the SB-1 Ditch in its current orientation (AM20-236) as well as with the proposed footprint expansion.

Table 5: SB-1 Ditch Stage Storage Information (AM20-236)

SB-1 Ditch Stage Storage (AM20-236)		
Elevation	*Contour Area (sq. ft)*	*Cumulative Volume (cu. ft)*
73	14,950	0
74	27,991	21,471
75	32,680	51,806
76	37,446	86,869
77	42,243	126,714
77.5	44,682	148,445

SB-1 Ditch 25-year Max Water Surface Elevation (AM20-236): 75.13
SB-1 Ditch 100-year Max Water Surface Elevation (AM20-236): 77.44

Table 6: SB-1 Ditch Stage Storage Information (Footprint Increase)

SB-1 Ditch Stage Storage (After Footprint Modification)		
Elevation	*Contour Area (sq. ft)*	*Cumulative Volume (cu. ft)*
73	60,282	0
74	64,928	62,605
75	69,630	129,884
76	74,389	201,893
77	79,205	278,690
77.5	81,634	318,900

SB-1 Ditch 25-year Max Water Surface Elevation (Expanded Footprint): 75.28
SB-1 Ditch 100-year Max Water Surface Elevation (Expanded Footprint): 76.36

In the original calculation, the (3) 24” RCP culverts that serve as the outfall for the SB-1 Ditch were set with an invert elevation 6 inches above the bottom of the ditch at EL 73.50’. The SB-1 Ditch was originally designed to act as an infiltration area where extended detention of runoff was not required. With the additional runoff generated by SB-5 and the loss of storage in the main basin, this is no longer the case. Now the basin must detain runoff for a longer period before sending it downstream. To fulfill this need, a 3’ tall concrete weir wall will be installed around the upstream end of the (3) 24” culverts to allow the basin to fill up to EL 76’ before runoff flows over the weir, into the culverts, and out of the SB-1 Ditch. Please refer to the P0015690-CM-001 for details on the weir wall.

Top of Weir Wall EL: 76.00

6.0 CONCLUSIONS

The results of this analysis confirm that the addition of aggregate & asphalt surfacing around the admin building and the loss of storage in the retention basin can be managed successfully by making a few modifications to the SB-1 Ditch. Both the SB-1 Ditch & the retention pond are adequately designed to the standards of the St. Johns River Water Management District (SJRWMD) and can pass the design storms while discharging below permitted limits.

Retention Basin Bottom EL w/ 6" Sediment Build-up (AM20-236): 67.50

25-year Retention Pond Water Surface Elevation (AM20-236): 69.47
25-year Retention Pond Peak Discharge (AM20-236): 0.00 cfs

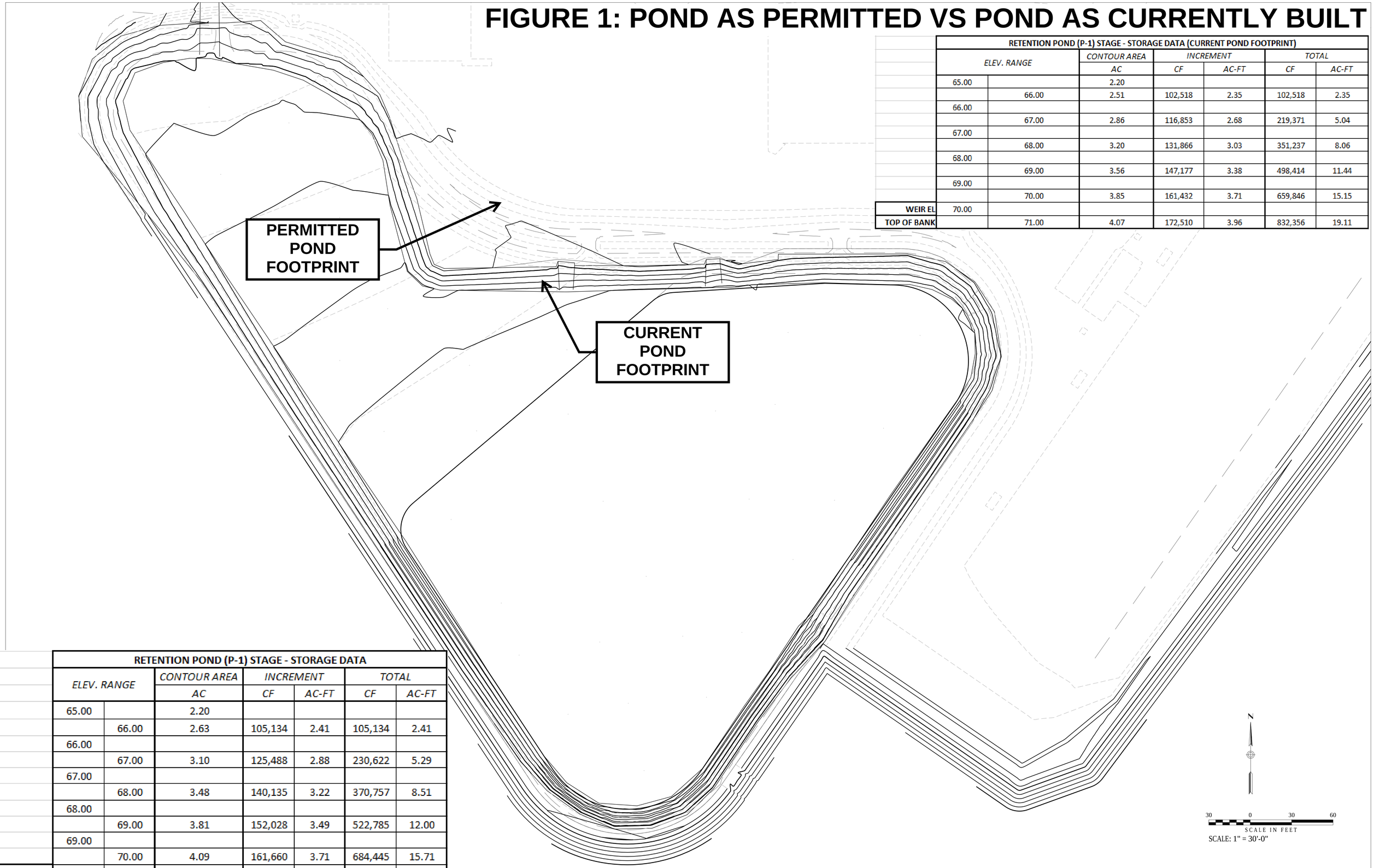
Retention Basin Final Design Bottom EL: 67.00

25-year Retention Pond Water Surface Elevation (with Modification): 68.97
25-year Retention Pond Peak Discharge (with Modification): 0.00 cfs
100-year Retention Pond Water Surface Elevation (with Modification): 70.10
100-year Retention Pond Peak Discharge (with Modification): 1.03 cfs

100-year Retention Pond Max Allowable Discharge: 2.20 cfs

Required Water Treatment Volume (See Attached Calculation): 4.42 ac-ft
Provided Water Treatment Volume (See Attached Calculation): 4.90 ac-ft

FIGURE 1: POND AS PERMITTED VS POND AS CURRENTLY BUILT



	RETENTION POND (P-1) STAGE - STORAGE DATA (CURRENT POND FOOTPRINT)						
	ELEV. RANGE		CONTOUR AREA	INCREMENT		TOTAL	
			AC	CF	AC-FT	CF	AC-FT
	65.00		2.20				
		66.00	2.51	102,518	2.35	102,518	2.35
	66.00						
		67.00	2.86	116,853	2.68	219,371	5.04
	67.00						
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	68.00						
		69.00	3.56	147,177	3.38	498,414	11.44
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		70.00	3.85	161,432	3.71	659,846	15.15
WEIR EL	70.00						
TOP OF BANK		71.00	4.07	172,510	3.96	832,356	19.11

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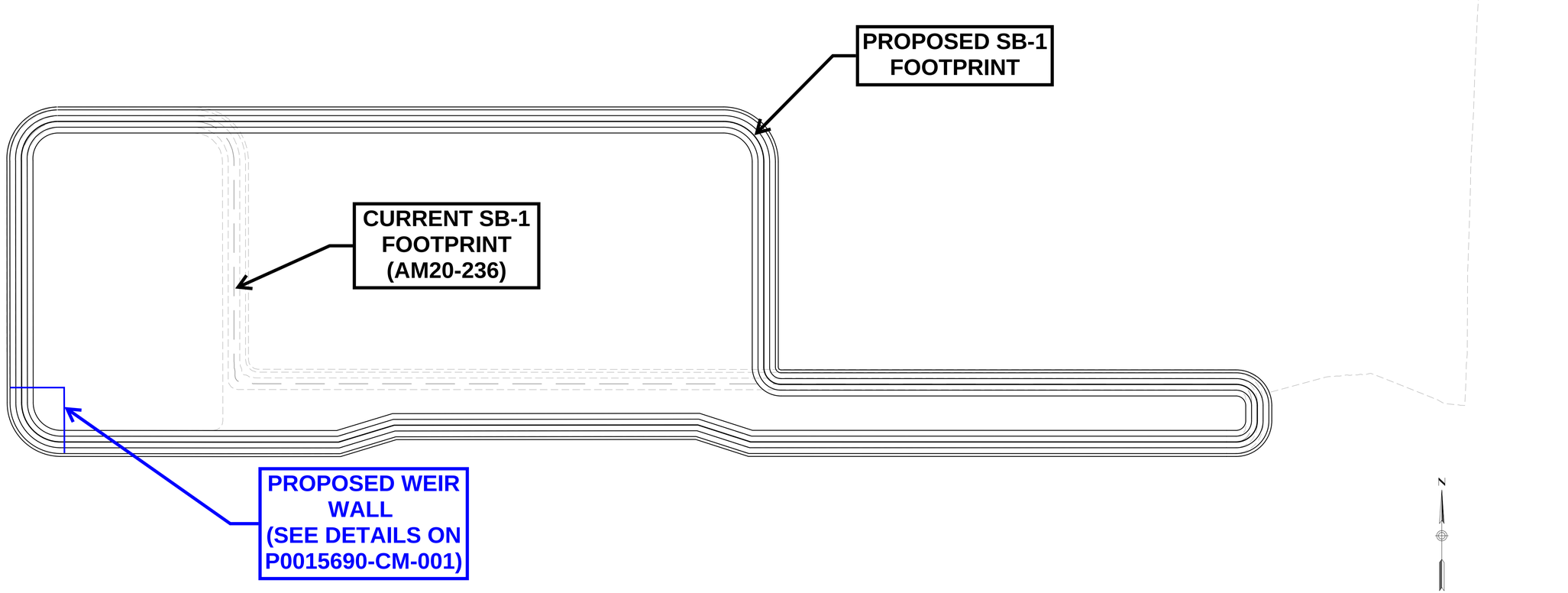
			AC	CF	AC-FT	CF	AC-FT
	65.00		2.20				
		66.00	2.63	105,134	2.41	105,134	2.41
	66.00						
		67.00	3.10	125,488	2.88	230,622	5.29
	67.00						
		68.00	3.48	140,135	3.22	370,757	8.51
	68.00						
		69.00	3.81	152,028	3.49	522,785	12.00
	69.00						
		70.00	4.09	161,660	3.71	684,445	15.71
WEIR EL	70.00						
TOP OF BANK		71.00	4.33	168,646	3.87	853,091	19.58

FIGURE 2: SB-1 DITCH (AM20-236 VS PROPOSED EXPANDED FOOTPRINT)

SB-1 Ditch Stage Storage (Current Footprint)		
Elevation	*Contour Area (sq. ft)*	*Cumulative Volume (cu. ft)*
73	14,950	0
74	27,991	21,471
75	32,680	51,806
76	37,446	86,869
77	42,243	126,714
77.5	44,682	148,445

SB-1 Ditch Stage Storage (Proposed Footprint)		
Elevation	*Contour Area (sq. ft)*	*Cumulative Volume (cu. ft)*
73	60,282	0
74	64,928	62,605
75	69,630	129,884
76	74,389	201,893
77	79,205	278,690
77.5	81,634	318,900



TREATMENT VOLUME CALCULATION

For discharges to Class III receiving water bodies, the retention system shall provide on-line retention of the first 0.5 inch of runoff over the entire site or 1.25 inches of runoff from the impervious area, whichever is greater plus an additional 0.5 inches of rainfall over the entire drainage area. [Ref. 7]

Treatment Volume Option A - 0.5 inch over the entire drainage area (excluding the pond)

TV = one inch of runoff over drainage area

DA = Drainage Area excluding the pond

CF = Conversion Factor

RO = Runoff

$$WaterSurfaceArea := 6.11acre$$

$$DA := 50.55acre - WaterSurfaceArea$$

DA = 50.55 ac - 6.11 ac

$$DA = 44.44 \cdot acre$$

$$CF := 12\frac{in}{ft}$$

$$RO := 0.5in$$

$$TVa := \left(RO \cdot \frac{DA}{CF}\right)$$

TV = (0.5 in * (44.44 ac/12 in/ft))

$$TVa = 1.85 \cdot ft \cdot acre$$

Treatment Volume Option B - 1.25 inch over the impervious area (excluding the pond)

TV = 1.25 in * IA

IA = Impervious Area

RO1 = Runoff Depth over Impervious Area

$$ImperviousRoadandSidewalk := 22.77acre$$

$$ImperviousBuilding := 0.10acre$$

$$IA\_ConstructionPhase := ImperviousRoadandSidewalk + ImperviousBuilding$$

$$IA\_ConstructionPhase = 22.87 \cdot acre$$

$$ImperviousRoadandSidewalk := 21.36acre$$

$$ImperviousBuilding := 3.33acre$$

$$IA\_OperationalPhase := ImperviousRoadandSidewalk + ImperviousBuilding$$

IA_OperationalPhase = 21.36 acres + 3.33 acres

$$IA\_OperationalPhase = 24.69 \cdot acre$$

For the purpose of this calculation, the Semi-Impervious gravel area that is included in the Operational Phase Site Acreage & Surfacing Table on CS-001 was considered impervious for water quality treatment volume requirements.

To provide the most conservative value of water treatment volume required, the greater impervious area found above will be used which occurs during the construction phase of the project.

IA_OperationalPhase (24.69 acres) > IA_ConstructionPhase (22.87 acres)

$IA\_Controlling := IA\_OperationalPhase$

$IA\_Controlling = 24.69 \cdot acre$

$RO1 := 1.25in$

$TVb := RO1 \cdot \frac{IA\_Controlling}{CF}$ TVb = 1.25 in * (24.69 acre/12 in/ft)

$TVb = 2.57 \cdot ft \cdot acre$

The largest volume from Option A & Option B was used as the required treatment volume in the retention pond.

Treatment Volume Required - Option B (2.57 acre-ft) > Treatment Volume Required - Option A (1.85 acre-ft)

$TV\_Required := TVb = 2.57 \cdot acre \cdot ft$

To find the total treatment volume required, we also need to add an additional half inch of runoff from the entire drainage area.

$TV\_TotalVolumeRequired := TVb + TVa$

$TV\_TotalVolumeRequired = 4.42 \cdot acre \cdot ft$

$TreatmentVolumeBetweenEL67and68 := 3.03acre \cdot ft$

TreatmentVolumeBetweenEL67.5and68 = 1.52 acre-ft

$TreatmentVolumeBetweenEL68and69 := 3.38acre \cdot ft$

At elevation 69 the retention pond provides a treatment volume of 4.90 acre-ft (1.52 acre-ft + 3.38 acre-ft), which is where we will set our water quality elevation (See Stage-Storage Table on CS-001 for source of treatment volume values).

$WaterQualityElevation := 69$

$TreatmentVolumeProvidedAtEL\_69 := 4.90acre \cdot ft$ 4.90 acre-ft > 4.42 acre-ft

At elevation 69, which is the invert elevation of the riser structure, the pond provides 4.90 acre-ft of treatment volume, which is greater than the required 4.42 ac-ft.