SEBAGO TECHNICS, INC.
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JOB	17200		
SHEET NO.	1	OF	1
CALCULATED BY	CAB	DATE	9/7/2017
CHECKED BY			
FILE NAME	17200 WQV CALCS	PRINT DATE	9/7/2017

Note: The wet pond is sized in general conformance with Chapter 4 of the Maine Department of Environmental Protection BMPs Technical Design Manual, latest revision.

Treatment Calculations for Proposed Wet Pond:										
(CPV = Channel Protection Volume)										
(PPV = Permanent Pool Volume)										
Tributary Areas										
Impervious Area =			174,894	sf						
Landscaped Area =			44,942	sf						
Permanent Pool Volume Calculation (Between Elevations 33.0 and 41.0)										
PPV = 2.0" x Impervious + 0.8"x Landscaped =					32,145	cf				
Provided PPV =					32,986	cf				
Channel Protection Volume Calculation (Between Elevations 41.0 and 42.3)								* see calculations below		
CPV = 1" x Impervious + 0.4"x Landscaped =					16,073	cf				
Provided CPV =					16,827	cf				
Mean Depth										
12" below permanent pool elevation=										
surface area @ 40=		7,454	sf							
volume below 40=		24,276	cf							
volume/surface=		3.26								
Gravel Trench										
Provided CPV =	16,827	cf								
Trench sizing =	3 feet/1000 cf of CPV									
Trench length req. =	50	ft								
Trench length provided	60	ft								
Emergency Spillway & Berm Design Calculations										
Top of Berm Elevation					44.40	ft				
Emergency Spillway Width					20.00	ft				
Emergency Spillway Elevation					42.80	ft				
25-Year Peak Elevation					43.32	ft				
(assume outlet control structure plugged)										
25-Year Freeboard					1.08	ft				
100-Year Peak Elevation					43.38	ft				
100-Year Free Board					1.02	ft				
Pre-treatment Sediment Forebay Volume Calculation										
Sand Application Rate=			50.0	cf/acre/year						
Total Impervious Area			174,894	sf						
Tributary to Wet Pond #1										
Required Pre-treatment Volume=			200.8	cf						
Provided Pre-treatment Volume=			247.0	cf						

Calculations supporting 25-year peak elevation with plugged outlet condition

Summary for Pond 10.3P: Proposed Pond CPV

Inflow Area = 5.294 ac, 66.26% Impervious, Inflow Depth = 4.53" for 25-YR event
Inflow = 27.06 cfs @ 12.08 hrs, Volume= 1.998 af
Outflow = 19.98 cfs @ 12.16 hrs, Volume= 1.437 af, Atten= 26%, Lag= 4.3 min
Secondary = 19.98 cfs @ 12.16 hrs, Volume= 1.437 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 43.32' @ 12.16 hrs Surf.Area= 17,017 sf Storage= 32,996 cf
Flood Elev= 44.00' Surf.Area= 18,967 sf Storage= 45,146 cf

Plug-Flow detention time= 163.7 min calculated for 1.436 af (72% of inflow)
Center-of-Mass det. time= 74.4 min (864.1 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	45,146 cf	**CPV (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.00	10,772	0	0
41.40	12,678	4,690	4,690
42.00	13,591	7,881	12,571
42.30	14,783	4,256	16,827
42.50	15,141	2,992	19,819
42.80	15,700	4,626	24,445
43.00	16,079	3,178	27,623
44.00	18,967	17,523	45,146

Device	Routing	Invert	Outlet Devices
#1	Secondary	42.80'	**20.0' long x 6.0' breadth Emergency Overflow Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Secondary OutFlow Max=19.96 cfs @ 12.16 hrs HW=43.32' TW=0.00' (Dynamic Tailwater)
└**1=Emergency Overflow Spillway** (Weir Controls 19.96 cfs @ 1.90 fps)

Calculations supporting 100-year peak elevation

Summary for Pond 10P: Proposed Pond CPV

Inflow Area = 5.294 ac, 66.26% Impervious, Inflow Depth = 6.77" for 100-YR event
Inflow = 39.57 cfs @ 12.08 hrs, Volume= 2.987 af
Outflow = 29.62 cfs @ 12.15 hrs, Volume= 2.987 af, Atten= 25%, Lag= 4.2 min
Primary = 6.05 cfs @ 12.15 hrs, Volume= 2.326 af
Secondary = 23.58 cfs @ 12.15 hrs, Volume= 0.662 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 43.38' @ 12.15 hrs Surf.Area= 17,172 sf Storage= 33,915 cf
Flood Elev= 44.00' Surf.Area= 18,967 sf Storage= 45,146 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 91.9 min (870.9 - 779.0)

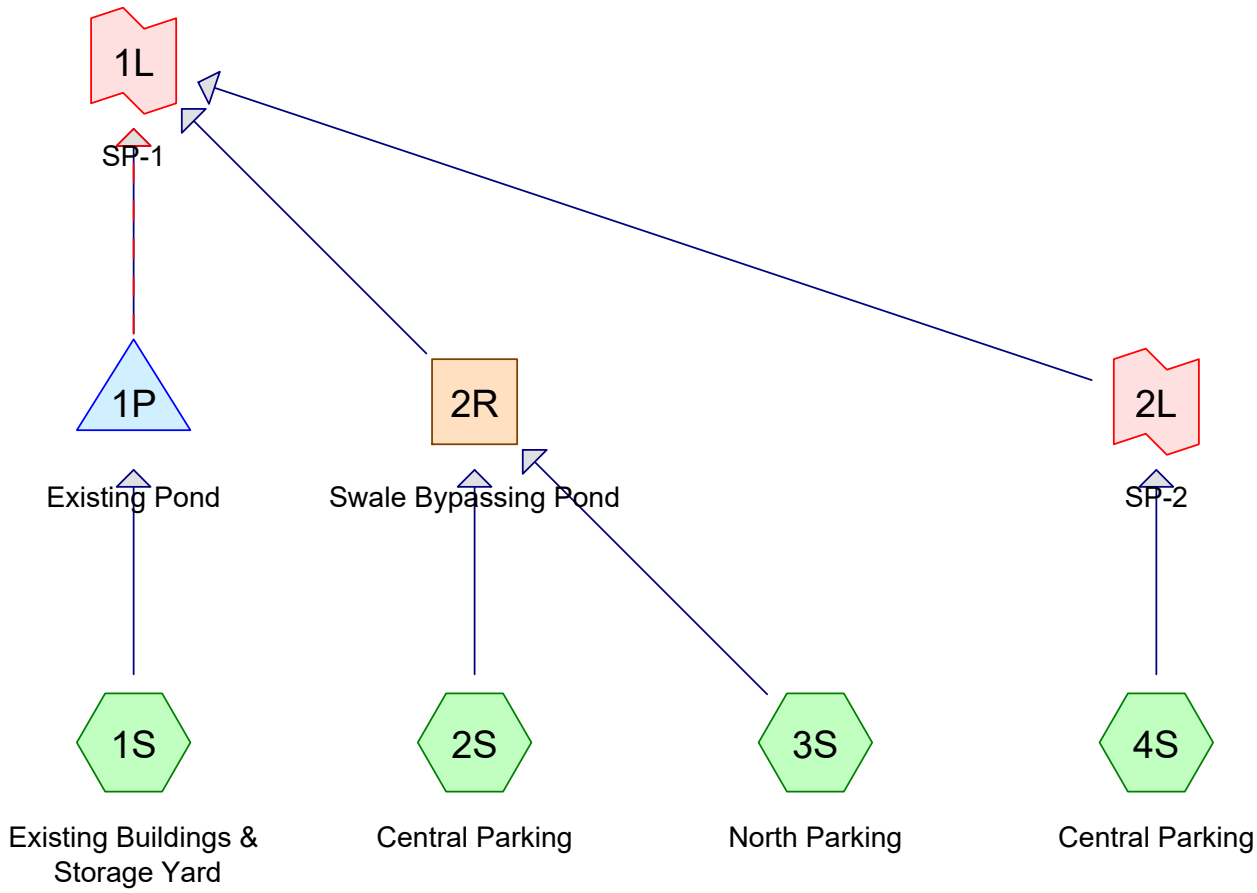
Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	45,146 cf	**CPV (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.00	10,772	0	0
41.40	12,678	4,690	4,690
42.00	13,591	7,881	12,571
42.30	14,783	4,256	16,827
42.50	15,141	2,992	19,819
42.80	15,700	4,626	24,445
43.00	16,079	3,178	27,623
44.00	18,967	17,523	45,146

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	**15.0" Round Stormdrain** L= 188.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 38.30' / 37.35' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	38.50'	**6.0" Round Underdrain** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 38.50' / 38.30' S= 0.0033 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 1	42.30'	**2.0" W x 2.0" H Vert. Grate X 36.00** C= 0.600
#4	Secondary	42.80'	**20.0' long x 6.0' breadth Emergency Overflow Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=6.05 cfs @ 12.15 hrs HW=43.38' TW=39.23' (Dynamic Tailwater)
└─**1=Stormdrain** (Passes 6.05 cfs of 8.27 cfs potential flow)
  ├─**2=Underdrain** (Outlet Controls 1.25 cfs @ 6.34 fps)
  └─**3=Grate** (Orifice Controls 4.80 cfs @ 4.80 fps)

Secondary OutFlow Max=23.54 cfs @ 12.15 hrs HW=43.38' TW=0.00' (Dynamic Tailwater)
└─**4=Emergency Overflow Spillway** (Weir Controls 23.54 cfs @ 2.04 fps)



Subcat Reach Pond Link

Routing Diagram for 17200 PRE
Prepared by {enter your company name here}, Printed 9/7/2017
HydroCAD® 10.00-18 s/n 01856 © 2016 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.490	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S, 4S)
0.621	48	Brush, Good, HSG B (1S, 2S)
0.840	96	Gravel surface, HSG B (1S, 3S)
3.177	98	Paved parking, HSG B (1S, 2S, 4S)
0.329	98	Roofs, HSG B (1S, 2S)
0.111	98	Water Surface, HSG B (1S)
5.567	**89**	**TOTAL AREA**

Summary for Subcatchment 1S: Existing Buildings & Storage Yard

Runoff = 24.26 cfs @ 12.08 hrs, Volume= 1.792 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
118,019	98	Paved parking, HSG B
32,847	96	Gravel surface, HSG B
13,283	98	Roofs, HSG B
25,775	48	Brush, Good, HSG B
11,548	61	>75% Grass cover, Good, HSG B
4,820	98	Water Surface, HSG B
206,292	89	Weighted Average
70,170		34.01% Pervious Area
136,122		65.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Central Parking

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.121 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
9,694	98	Paved parking, HSG B
1,051	98	Roofs, HSG B
2,590	61	>75% Grass cover, Good, HSG B
1,278	48	Brush, Good, HSG B
14,613	87	Weighted Average
3,868		26.47% Pervious Area
10,745		73.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: North Parking

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
3,734	96	Gravel surface, HSG B
1,395	61	>75% Grass cover, Good, HSG B
5,129	86	Weighted Average
5,129		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Central Parking

Runoff = 1.79 cfs @ 12.09 hrs, Volume= 0.130 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
5,814	61	>75% Grass cover, Good, HSG B
10,672	98	Paved parking, HSG B
16,486	85	Weighted Average
5,814		35.27% Pervious Area
10,672		64.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 2R: Swale Bypassing Pond

Inflow Area = 0.453 ac, 54.43% Impervious, Inflow Depth = 4.30" for 25-YR event
Inflow = 2.23 cfs @ 12.09 hrs, Volume= 0.162 af
Outflow = 2.23 cfs @ 12.09 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Existing Pond

Inflow Area = 4.736 ac, 65.99% Impervious, Inflow Depth = 4.54" for 25-YR event
Inflow = 24.26 cfs @ 12.08 hrs, Volume= 1.792 af
Outflow = 14.76 cfs @ 12.19 hrs, Volume= 1.793 af, Atten= 39%, Lag= 6.1 min
Primary = 14.76 cfs @ 12.19 hrs, Volume= 1.793 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 41.89' @ 12.19 hrs Surf.Area= 8,290 sf Storage= 13,569 cf
Flood Elev= 43.50' Surf.Area= 10,197 sf Storage= 28,477 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 10.9 min (800.2 - 789.3)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	33,708 cf	**Existing CPV (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.00	6,075	0	0
41.00	7,222	6,649	6,649
42.00	8,419	7,821	14,469
43.00	9,665	9,042	23,511
44.00	10,729	10,197	33,708

Device	Routing	Invert	Outlet Devices
#1	Primary	38.87'	**24.0" x 24.0" Horiz. Energy Dissipation Structure** C= 0.600 Limited to weir flow at low heads
#2	Device 1	35.00'	**24.0" Round Stormdrain** L= 82.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 35.00' / 35.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	39.20'	**12.0" Vert. Orifice** C= 0.600
#4	Device 2	41.20'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Secondary	43.00'	**30.0' long x 6.0' breadth Emergency Overflow Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=14.75 cfs @ 12.19 hrs HW=41.89' TW=0.00' (Dynamic Tailwater)
- **1=Energy Dissipation Structure** (Passes 14.75 cfs of 33.48 cfs potential flow)
  - **2=Stormdrain** (Passes 14.75 cfs of 26.30 cfs potential flow)
    - **3=Orifice** (Orifice Controls 5.60 cfs @ 7.13 fps)
    - **4=Sharp-Crested Rectangular Weir** (Weir Controls 9.15 cfs @ 2.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.00' TW=0.00' (Dynamic Tailwater)
- **5=Emergency Overflow Spillway** (Controls 0.00 cfs)

Summary for Link 1L: SP-1

Inflow Area = 5.567 ac, 64.96% Impervious, Inflow Depth = 4.49" for 25-YR event
Inflow = 17.37 cfs @ 12.17 hrs, Volume= 2.085 af
Primary = 17.37 cfs @ 12.17 hrs, Volume= 2.085 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link 2L: SP-2

Inflow Area = 0.378 ac, 64.73% Impervious, Inflow Depth = 4.11" for 25-YR event
Inflow = 1.79 cfs @ 12.09 hrs, Volume= 0.130 af
Primary = 1.79 cfs @ 12.09 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Existing Buildings & Runoff Area=206,292 sf 65.99% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=10.99 cfs 0.786 af

Subcatchment 2S: Central Parking Runoff Area=14,613 sf 73.53% Impervious Runoff Depth=1.83"
Tc=6.0 min CN=87 Runoff=0.72 cfs 0.051 af

Subcatchment 3S: North Parking Runoff Area=5,129 sf 0.00% Impervious Runoff Depth=1.75"
Tc=6.0 min CN=86 Runoff=0.24 cfs 0.017 af

Subcatchment 4S: Central Parking Runoff Area=16,486 sf 64.73% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=85 Runoff=0.74 cfs 0.053 af

Reach 2R: Swale Bypassing Pond Inflow=0.96 cfs 0.068 af
Outflow=0.96 cfs 0.068 af

Pond 1P: Existing Pond Peak Elev=40.89' Storage=5,872 cf Inflow=10.99 cfs 0.786 af
Primary=4.13 cfs 0.786 af Secondary=0.00 cfs 0.000 af Outflow=4.13 cfs 0.786 af

Link 1L: SP-1 Inflow=5.25 cfs 0.907 af
Primary=5.25 cfs 0.907 af

Link 2L: SP-2 Inflow=0.74 cfs 0.053 af
Primary=0.74 cfs 0.053 af

Total Runoff Area = 5.567 ac Runoff Volume = 0.907 af Average Runoff Depth = 1.95"
35.04% Pervious = 1.951 ac 64.96% Impervious = 3.617 ac

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Existing Buildings & Runoff Area=206,292 sf 65.99% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=89 Runoff=18.37 cfs 1.338 af

Subcatchment 2S: Central Parking Runoff Area=14,613 sf 73.53% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=87 Runoff=1.24 cfs 0.089 af

Subcatchment 3S: North Parking Runoff Area=5,129 sf 0.00% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=86 Runoff=0.42 cfs 0.030 af

Subcatchment 4S: Central Parking Runoff Area=16,486 sf 64.73% Impervious Runoff Depth=3.00"
Tc=6.0 min CN=85 Runoff=1.32 cfs 0.095 af

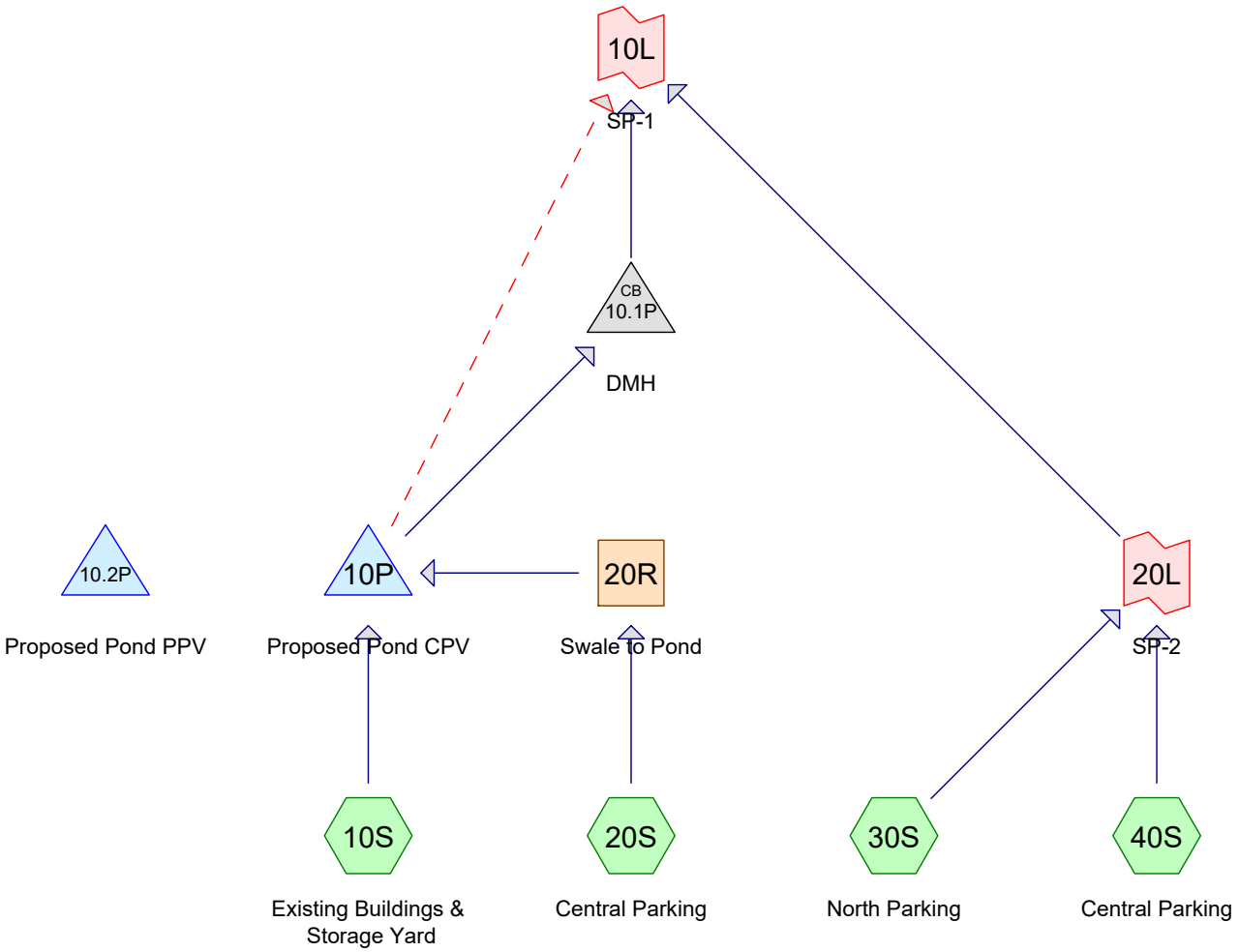
Reach 2R: Swale Bypassing Pond Inflow=1.66 cfs 0.120 af
Outflow=1.66 cfs 0.120 af

Pond 1P: Existing Pond Peak Elev=41.57' Storage=10,947 cf Inflow=18.37 cfs 1.338 af
Primary=8.77 cfs 1.338 af Secondary=0.00 cfs 0.000 af Outflow=8.77 cfs 1.338 af

Link 1L: SP-1 Inflow=10.28 cfs 1.552 af
Primary=10.28 cfs 1.552 af

Link 2L: SP-2 Inflow=1.32 cfs 0.095 af
Primary=1.32 cfs 0.095 af

Total Runoff Area = 5.567 ac Runoff Volume = 1.552 af Average Runoff Depth = 3.35"
35.04% Pervious = 1.951 ac 64.96% Impervious = 3.617 ac



Subcat Reach Pond Link

Routing Diagram for 17200 POST

Prepared by {enter your company name here}, Printed 9/7/2017

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.577	61	>75% Grass cover, Good, HSG B (10S, 20S, 30S, 40S)
0.621	48	Brush, Good, HSG B (10S, 20S)
0.840	96	Gravel surface, HSG B (10S, 30S)
3.177	98	Paved parking, HSG B (10S, 20S, 40S)
0.329	98	Roofs, HSG B (10S, 20S)
0.247	98	Water Surface, HSG B (10S)
5.791	**89**	**TOTAL AREA**

Area evaluated is slightly larger than existing model because pond was expanded.

Summary for Subcatchment 10S: Existing Buildings & Storage Yard

Runoff = 25.40 cfs @ 12.08 hrs, Volume= 1.877 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
118,019	98	Paved parking, HSG B
32,847	96	Gravel surface, HSG B
13,283	98	Roofs, HSG B
25,775	48	Brush, Good, HSG B
15,319	61	>75% Grass cover, Good, HSG B
10,772	98	Water Surface, HSG B
216,015	89	Weighted Average
73,941		34.23% Pervious Area
142,074		65.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 20S: Central Parking

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.121 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
9,694	98	Paved parking, HSG B
1,051	98	Roofs, HSG B
2,590	61	>75% Grass cover, Good, HSG B
1,278	48	Brush, Good, HSG B
14,613	87	Weighted Average
3,868		26.47% Pervious Area
10,745		73.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 30S: North Parking

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
3,734	96	Gravel surface, HSG B
1,395	61	>75% Grass cover, Good, HSG B
5,129	86	Weighted Average
5,129		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 40S: Central Parking

Runoff = 1.79 cfs @ 12.09 hrs, Volume= 0.130 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
5,814	61	>75% Grass cover, Good, HSG B
10,672	98	Paved parking, HSG B
16,486	85	Weighted Average
5,814		35.27% Pervious Area
10,672		64.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 20R: Swale to Pond

Inflow Area = 0.335 ac, 73.53% Impervious, Inflow Depth = 4.33" for 25-YR event
Inflow = 1.66 cfs @ 12.09 hrs, Volume= 0.121 af
Outflow = 1.66 cfs @ 12.09 hrs, Volume= 0.121 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond 10.1P: DMH

Inflow Area = 5.294 ac, 66.26% Impervious, Inflow Depth = 4.16" for 25-YR event
Inflow = 5.14 cfs @ 12.31 hrs, Volume= 1.834 af
Outflow = 5.14 cfs @ 12.31 hrs, Volume= 1.834 af, Atten= 0%, Lag= 0.0 min
Primary = 5.14 cfs @ 12.31 hrs, Volume= 1.834 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 38.96' @ 12.31 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	37.25'	**15.0" Round Stormdrain** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 37.25' / 37.00' S= 0.0053 '/' Cc= 0.900

n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=5.14 cfs @ 12.31 hrs HW=38.96' TW=0.00' (Dynamic Tailwater)
↑—**1=Stormdrain** (Barrel Controls 5.14 cfs @ 4.19 fps)

Summary for Pond 10.2P: Proposed Pond PPV

Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	32,986 cf	**CPV (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
33.00	345	0	0	
34.00	882	614	614	
35.00	1,673	1,278	1,891	
36.00	2,713	2,193	4,084	
37.00	3,827	3,270	7,354	
40.00	7,454	16,922	24,276	
40.40	7,976	3,086	27,361	
41.00	10,772	5,624	32,986	← PPV Volume

Summary for Pond 10P: Proposed Pond CPV

Inflow Area = 5.294 ac, 66.26% Impervious, Inflow Depth = 4.53" for 25-YR event
Inflow = 27.06 cfs @ 12.08 hrs, Volume= 1.998 af
Outflow = 10.81 cfs @ 12.31 hrs, Volume= 1.998 af, Atten= 60%, Lag= 13.3 min
Primary = 5.14 cfs @ 12.31 hrs, Volume= 1.834 af
Secondary = 5.68 cfs @ 12.31 hrs, Volume= 0.164 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 43.04' @ 12.31 hrs Surf.Area= 16,197 sf Storage= 28,285 cf
Flood Elev= 44.00' Surf.Area= 18,967 sf Storage= 45,146 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 106.3 min (896.0 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	45,146 cf	**CPV (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
41.00	10,772	0	0	
41.40	12,678	4,690	4,690	
42.00	13,591	7,881	12,571	
42.30	14,783	4,256	16,827	← CPV Volume
42.50	15,141	2,992	19,819	
42.80	15,700	4,626	24,445	
43.00	16,079	3,178	27,623	
44.00	18,967	17,523	45,146	

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	**15.0" Round Stormdrain** L= 188.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 38.30' / 37.35' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	38.50'	**6.0" Round Underdrain** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 38.50' / 38.30' S= 0.0033 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 1	42.30'	**2.0" W x 2.0" H Vert. Grate X 36.00** C= 0.600
#4	Secondary	42.80'	**20.0' long x 6.0' breadth Emergency Overflow Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=5.14 cfs @ 12.31 hrs HW=43.04' TW=38.96' (Dynamic Tailwater)
└─**1=Stormdrain** (Passes 5.14 cfs of 8.21 cfs potential flow)
  ├─**2=Underdrain** (Outlet Controls 1.24 cfs @ 6.29 fps)
  └─**3=Grate** (Orifice Controls 3.90 cfs @ 3.90 fps)

Secondary OutFlow Max=5.67 cfs @ 12.31 hrs HW=43.04' TW=0.00' (Dynamic Tailwater)
└─**4=Emergency Overflow Spillway** (Weir Controls 5.67 cfs @ 1.18 fps)

Summary for Link 10L: SP-1

Inflow Area = 5.791 ac, 64.81% Impervious, Inflow Depth = 4.50" for 25-YR event
Inflow = 11.79 cfs @ 12.30 hrs, Volume= 2.169 af
Primary = 11.79 cfs @ 12.30 hrs, Volume= 2.169 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link 20L: SP-2

Inflow Area = 0.496 ac, 49.37% Impervious, Inflow Depth = 4.14" for 25-YR event
Inflow = 2.36 cfs @ 12.09 hrs, Volume= 0.171 af
Primary = 2.36 cfs @ 12.09 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Existing Buildings & Runoff Area=216,015 sf 65.77% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=11.51 cfs 0.823 af

Subcatchment 20S: Central Parking Runoff Area=14,613 sf 73.53% Impervious Runoff Depth=1.83"
Tc=6.0 min CN=87 Runoff=0.72 cfs 0.051 af

Subcatchment 30S: North Parking Runoff Area=5,129 sf 0.00% Impervious Runoff Depth=1.75"
Tc=6.0 min CN=86 Runoff=0.24 cfs 0.017 af

Subcatchment 40S: Central Parking Runoff Area=16,486 sf 64.73% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=85 Runoff=0.74 cfs 0.053 af

Reach 20R: Swale to Pond Inflow=0.72 cfs 0.051 af
Outflow=0.72 cfs 0.051 af

Pond 10.1P: DMH Peak Elev=37.84' Inflow=1.12 cfs 0.874 af
15.0" Round Culvert n=0.013 L=47.0' S=0.0053 '/' Outflow=1.12 cfs 0.874 af

Pond 10.2P: Proposed Pond PPV Peak Elev=0.00' Storage=0 cf

Pond 10P: Proposed Pond CPV Peak Elev=42.16' Storage=14,767 cf Inflow=12.23 cfs 0.874 af
Primary=1.12 cfs 0.874 af Secondary=0.00 cfs 0.000 af Outflow=1.12 cfs 0.874 af

Link 10L: SP-1 Inflow=2.00 cfs 0.944 af
Primary=2.00 cfs 0.944 af

Link 20L: SP-2 Inflow=0.98 cfs 0.070 af
Primary=0.98 cfs 0.070 af

Total Runoff Area = 5.791 ac Runoff Volume = 0.944 af Average Runoff Depth = 1.96"
35.19% Pervious = 2.037 ac 64.81% Impervious = 3.753 ac

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Existing Buildings & Runoff Area=216,015 sf 65.77% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=89 Runoff=19.24 cfs 1.401 af

Subcatchment 20S: Central Parking Runoff Area=14,613 sf 73.53% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=87 Runoff=1.24 cfs 0.089 af

Subcatchment 30S: North Parking Runoff Area=5,129 sf 0.00% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=86 Runoff=0.42 cfs 0.030 af

Subcatchment 40S: Central Parking Runoff Area=16,486 sf 64.73% Impervious Runoff Depth=3.00"
Tc=6.0 min CN=85 Runoff=1.32 cfs 0.095 af

Reach 20R: Swale to Pond Inflow=1.24 cfs 0.089 af
Outflow=1.24 cfs 0.089 af

Pond 10.1P: DMH Peak Elev=38.58' Inflow=4.19 cfs 1.490 af
15.0" Round Culvert n=0.013 L=47.0' S=0.0053 '/' Outflow=4.19 cfs 1.490 af

Pond 10.2P: Proposed Pond PPV Peak Elev=0.00' Storage=0 cf

Pond 10P: Proposed Pond CPV Peak Elev=42.77' Storage=23,899 cf Inflow=20.48 cfs 1.490 af
Primary=4.19 cfs 1.490 af Secondary=0.00 cfs 0.000 af Outflow=4.19 cfs 1.490 af

Link 10L: SP-1 Inflow=4.63 cfs 1.615 af
Primary=4.63 cfs 1.615 af

Link 20L: SP-2 Inflow=1.75 cfs 0.125 af
Primary=1.75 cfs 0.125 af

Total Runoff Area = 5.791 ac Runoff Volume = 1.615 af Average Runoff Depth = 3.35"
35.19% Pervious = 2.037 ac 64.81% Impervious = 3.753 ac