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Project Memo

Date: November 17, 2016

Job No. 1948F

To: New Bedford Conservation Commission

Cc:

From: Richard Riccio III, P.E.

Re: DEP SE-49-0693-200 Theodore Rice Boulevard



Please find attached selected HydroCAD sheets detailing the as-built hydrologic calculations for the stormwater management system servicing the existing development at 200 Theodore Rice Boulevard. We re-HydroCAD model taking into account the as-built volumes and flow control structure information of the two detention basins located along the easterly side of the developed site.

Based on the conditions in the field and this analysis, we find that the detention basins have been constructed in substantial compliance with the approved plans. The attached calculations show an overall reduction in the run-off rates in all storm events at the subject Analysis Points being the Easterly Wetland system and overall city drainage system to which this site contributes run-off. The following tables summarize the estimated rates of run-off in the Pre and Post Developed in the approved design and as-built conditions for both the easterly wetland (Analysis Point 1) and the overall city drainage system (Analysis Point 2)

Storm Event	Approved Pre-Development Runoff Rate to Analysis Point 1 (Easterly Wetland) (c.f.s.)	Approved Design Post-Development Runoff Rate to Analysis Point 1 DEP SE-49-0693 (c.f.s.)	As-Built Post-Development Runoff Rate to Analysis Point 1 (c.f.s.)
2-year storm	11.89	4.30	3.06
10-year storm	20.82	13.71	11.82
25-year storm	26.61	17.43	18.03
100-year storm	37.01	23.06	24.24

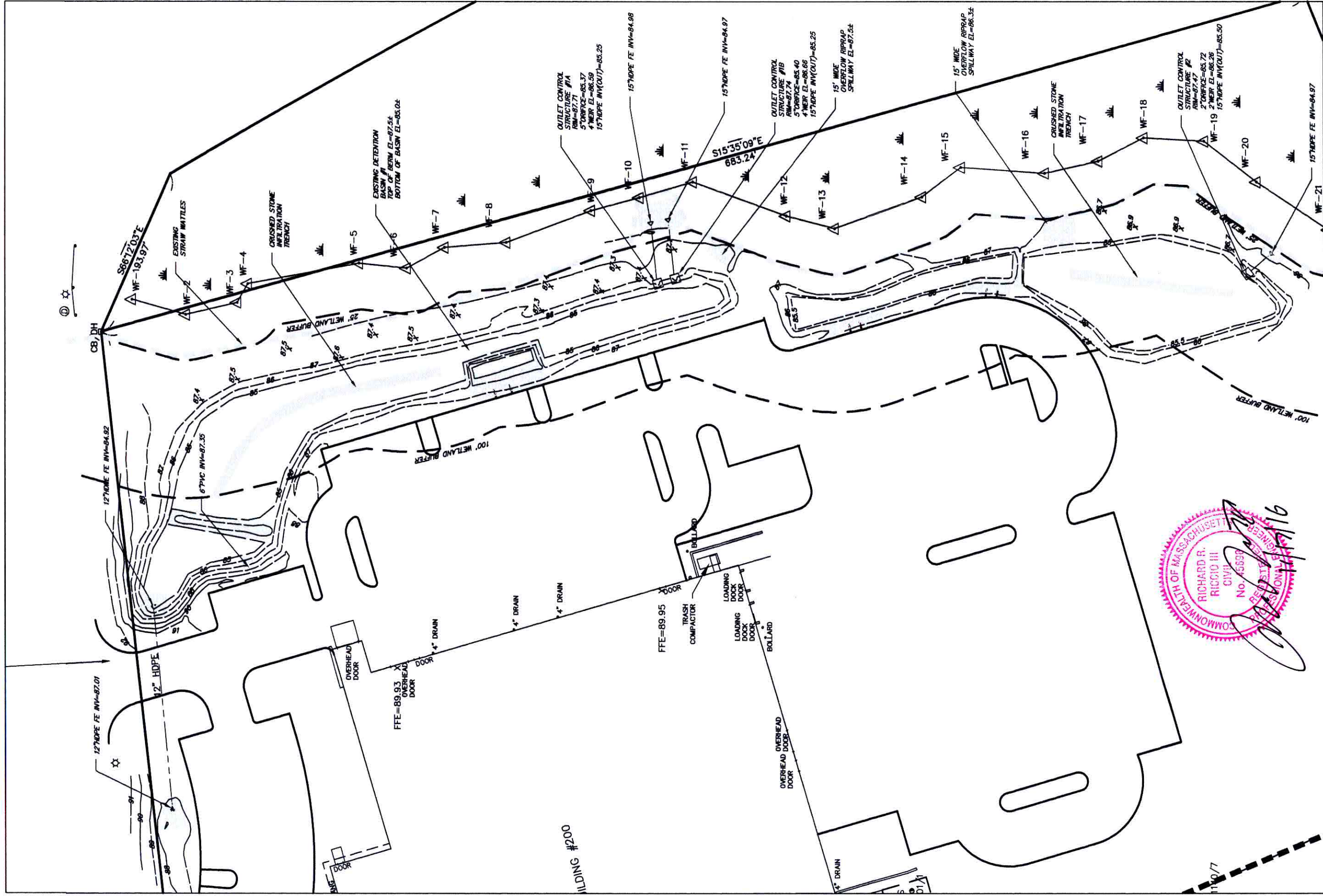
Storm Event	Approved Pre-Development Runoff Rate to Analysis Point 2 (City Drainage) (c.f.s.)	Approved Design Post-Development Runoff Rate to Analysis Point 2 DEP SE-49-0693 (c.f.s.)	As-Built Post-Development Runoff Rate to Analysis Point 2 (c.f.s.)
2-year storm	15.35	11.05	10.99
10-year storm	27.81	26.86	24.40
25-year storm	36.12	35.26	35.19
100-year storm	51.15	48.13	49.45

As the above tables show, there is a slight increase in the as-built run-off rate for the 100-year storm event from the approved post development run-off rate to the subject analysis points; however, it is still much less than the approved pre-development run-off rate. Therefore, we feel the system is substantially compliant with the approved the design. This slight increase in the as-built run-off rates from the approved post development calculations could be attributable to slight variations in the as-constructed volumes and flow control structure configurations of the installed detention basins from the approved design.

We trust that this information shall satisfy the requirements of the Commission in confirming the adequacy of the as-built stormwater management system. If the Commission requires any additional information or has any questions, feel free to contact me at the above number.

Attachments (2)

- Detention Basin As-Built Plan
- Select Sheets-As-Built Hydrologic Calculations



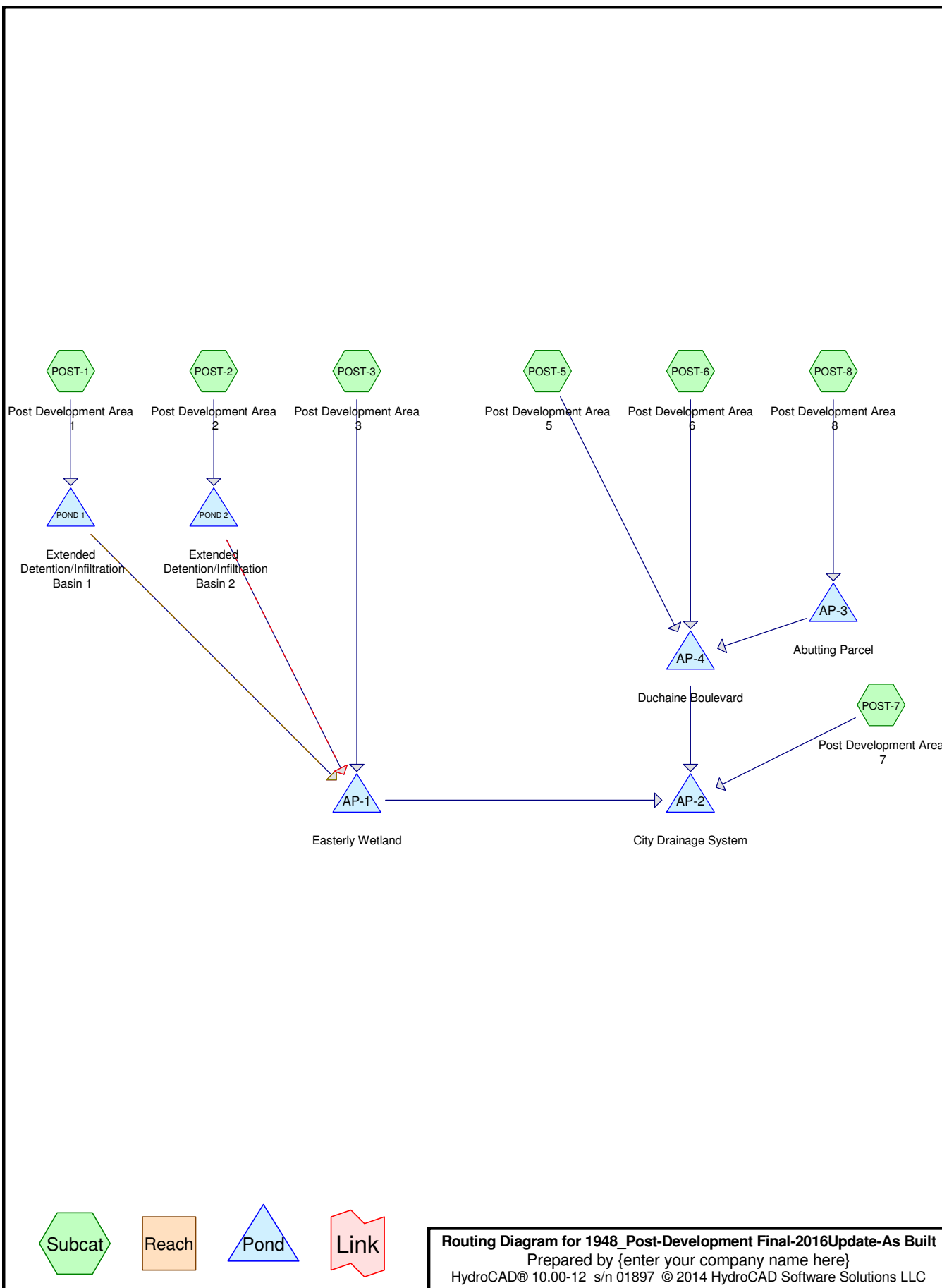
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**FIRST HIGHLAND DEVELOPMENT
DETENTION BASIN AS-BUILT PLAN
200 THEODORE RICE BOULEVARD
NEW BEDFORD, MASSACHUSETTS**

Project No.	1948F	Date	11/16/16
Scale	1"=40'	Sheet	1 OF 1





1948_Post-Development Final-2016Update-As Built*Type III 24-hr 2-Year Rainfall=3.50"*

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST-1: Post

Runoff Area=210,010 sf 81.60% Impervious Runoff Depth=2.54"

Tc=6.0 min CN=91 Runoff=13.98 cfs 1.021 af

Subcatchment POST-2: Post Development

Runoff Area=29,717 sf 51.34% Impervious Runoff Depth=1.78"

Tc=6.0 min CN=82 Runoff=1.42 cfs 0.101 af

Subcatchment POST-3: Post Development

Runoff Area=150,851 sf 2.08% Impervious Runoff Depth=0.71"

Flow Length=390' Slope=0.0100 '/' Tc=13.8 min CN=64 Runoff=1.78 cfs 0.203 af

Subcatchment POST-5: Post Development

Runoff Area=66,789 sf 54.70% Impervious Runoff Depth=1.71"

Flow Length=300' Slope=0.0100 '/' Tc=9.9 min CN=81 Runoff=2.67 cfs 0.218 af

Subcatchment POST-6: Post Development

Runoff Area=43,316 sf 78.89% Impervious Runoff Depth=2.45"

Tc=6.0 min CN=90 Runoff=2.80 cfs 0.203 af

Subcatchment POST-7: Post

Runoff Area=109,739 sf 43.74% Impervious Runoff Depth=1.37"

Flow Length=487' Tc=13.6 min CN=76 Runoff=3.07 cfs 0.287 af

Subcatchment POST-8: Post Development

Runoff Area=80,316 sf 0.00% Impervious Runoff Depth=0.49"

Tc=6.0 min CN=59 Runoff=0.67 cfs 0.076 af

Pond AP-1: Easterly Wetland

Inflow=3.06 cfs 0.780 af

Primary=3.06 cfs 0.780 af

Pond AP-2: City Drainage System

Inflow=10.99 cfs 1.563 af

Primary=10.99 cfs 1.563 af

Pond AP-3: Abutting Parcel

Inflow=0.67 cfs 0.076 af

Primary=0.67 cfs 0.076 af

Pond AP-4: Duchaine Boulevard

Inflow=5.89 cfs 0.497 af

Primary=5.89 cfs 0.497 af

Pond POND 1: Extended

Peak Elev=86.70' Storage=20,055 cf Inflow=13.98 cfs 1.021 af

s 0.444 af Primary=1.17 cfs 0.305 af Secondary=0.79 cfs 0.271 af Tertiary=0.00 cfs 0.000 af Outflow=2.30 cfs 1.021 af

Pond POND 2: Extended Detention/Infiltration

Peak Elev=85.74' Storage=1,590 cf Inflow=1.42 cfs 0.101 af

Discarded=0.17 cfs 0.101 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.101 af

Total Runoff Area = 15.857 ac Runoff Volume = 2.109 af Average Runoff Depth = 1.60"**55.34% Pervious = 8.776 ac 44.66% Impervious = 7.081 ac**

1948_Post-Development Final-2016Update-As Built *Type III 24-hr 10-Year Rainfall=4.80"*

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST-1: Post Runoff Area=210,010 sf 81.60% Impervious Runoff Depth=3.79"
Tc=6.0 min CN=91 Runoff=20.44 cfs 1.522 af

Subcatchment POST-2: Post Development Runoff Area=29,717 sf 51.34% Impervious Runoff Depth=2.90"
Tc=6.0 min CN=82 Runoff=2.30 cfs 0.165 af

Subcatchment POST-3: Post Development Runoff Area=150,851 sf 2.08% Impervious Runoff Depth=1.45"
Flow Length=390' Slope=0.0100 '/' Tc=13.8 min CN=64 Runoff=4.25 cfs 0.419 af

Subcatchment POST-5: Post Development Runoff Area=66,789 sf 54.70% Impervious Runoff Depth=2.81"
Flow Length=300' Slope=0.0100 '/' Tc=9.9 min CN=81 Runoff=4.40 cfs 0.359 af

Subcatchment POST-6: Post Development Runoff Area=43,316 sf 78.89% Impervious Runoff Depth=3.68"
Tc=6.0 min CN=90 Runoff=4.13 cfs 0.305 af

Subcatchment POST-7: Post Runoff Area=109,739 sf 43.74% Impervious Runoff Depth=2.37"
Flow Length=487' Tc=13.6 min CN=76 Runoff=5.47 cfs 0.498 af

Subcatchment POST-8: Post Development Runoff Area=80,316 sf 0.00% Impervious Runoff Depth=1.12"
Tc=6.0 min CN=59 Runoff=2.09 cfs 0.172 af

Pond AP-1: Easterly Wetland Inflow=11.82 cfs 1.450 af
Primary=11.82 cfs 1.450 af

Pond AP-2: City Drainage System Inflow=24.40 cfs 2.785 af
Primary=24.40 cfs 2.785 af

Pond AP-3: Abutting Parcel Inflow=2.09 cfs 0.172 af
Primary=2.09 cfs 0.172 af

Pond AP-4: Duchaine Boulevard Inflow=10.26 cfs 0.837 af
Primary=10.26 cfs 0.837 af

Pond POND 1: Extended Peak Elev=87.02' Storage=24,873 cf Inflow=20.44 cfs 1.522 af
s 0.500 af Primary=4.39 cfs 0.555 af Secondary=3.54 cfs 0.467 af Tertiary=0.00 cfs 0.000 af Outflow=8.30 cfs 1.522 af

Pond POND 2: Extended Detention/Infiltration Peak Elev=85.92' Storage=2,934 cf Inflow=2.30 cfs 0.165 af
Discarded=0.18 cfs 0.156 af Primary=0.04 cfs 0.009 af Secondary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.165 af

Total Runoff Area = 15.857 ac Runoff Volume = 3.441 af Average Runoff Depth = 2.60"
55.34% Pervious = 8.776 ac 44.66% Impervious = 7.081 ac

1948_Post-Development Final-2016Update-As Built *Type III 24-hr 25-Year Rainfall=5.60"*

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST-1: Post Runoff Area=210,010 sf 81.60% Impervious Runoff Depth=4.57"
Tc=6.0 min CN=91 Runoff=24.38 cfs 1.835 af

Subcatchment POST-2: Post Development Runoff Area=29,717 sf 51.34% Impervious Runoff Depth=3.62"
Tc=6.0 min CN=82 Runoff=2.86 cfs 0.206 af

Subcatchment POST-3: Post Development Runoff Area=150,851 sf 2.08% Impervious Runoff Depth=1.98"
Flow Length=390' Slope=0.0100 '/' Tc=13.8 min CN=64 Runoff=6.00 cfs 0.572 af

Subcatchment POST-5: Post Development Runoff Area=66,789 sf 54.70% Impervious Runoff Depth=3.52"
Flow Length=300' Slope=0.0100 '/' Tc=9.9 min CN=81 Runoff=5.51 cfs 0.450 af

Subcatchment POST-6: Post Development Runoff Area=43,316 sf 78.89% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=90 Runoff=4.95 cfs 0.369 af

Subcatchment POST-7: Post Runoff Area=109,739 sf 43.74% Impervious Runoff Depth=3.04"
Flow Length=487' Tc=13.6 min CN=76 Runoff=7.03 cfs 0.638 af

Subcatchment POST-8: Post Development Runoff Area=80,316 sf 0.00% Impervious Runoff Depth=1.59"
Tc=6.0 min CN=59 Runoff=3.14 cfs 0.244 af

Pond AP-1: Easterly Wetland Inflow=18.03 cfs 1.899 af
Primary=18.03 cfs 1.899 af

Pond AP-2: City Drainage System Inflow=35.19 cfs 3.600 af
Primary=35.19 cfs 3.600 af

Pond AP-3: Abutting Parcel Inflow=3.14 cfs 0.244 af
Primary=3.14 cfs 0.244 af

Pond AP-4: Duchaine Boulevard Inflow=13.14 cfs 1.063 af
Primary=13.14 cfs 1.063 af

Pond POND 1: Extended Peak Elev=87.17' Storage=27,432 cf Inflow=24.38 cfs 1.835 af
0.526 af Primary=6.50 cfs 0.708 af Secondary=5.53 cfs 0.599 af Tertiary=0.00 cfs 0.000 af Outflow=12.44 cfs 1.834 af

Pond POND 2: Extended Detention/Infiltration Peak Elev=86.03' Storage=3,846 cf Inflow=2.86 cfs 0.206 af
Discarded=0.19 cfs 0.187 af Primary=0.05 cfs 0.019 af Secondary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.206 af

Total Runoff Area = 15.857 ac Runoff Volume = 4.314 af Average Runoff Depth = 3.26"
55.34% Pervious = 8.776 ac 44.66% Impervious = 7.081 ac

Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment POST-1: Post Runoff Area=210,010 sf 81.60% Impervious Runoff Depth=5.94"
Tc=6.0 min CN=91 Runoff=31.23 cfs 2.386 af

Subcatchment POST-2: Post Development Runoff Area=29,717 sf 51.34% Impervious Runoff Depth=4.92"
Tc=6.0 min CN=82 Runoff=3.85 cfs 0.279 af

Subcatchment POST-3: Post Development Runoff Area=150,851 sf 2.08% Impervious Runoff Depth=3.00"
Flow Length=390' Slope=0.0100 '/' Tc=13.8 min CN=64 Runoff=9.33 cfs 0.866 af

Subcatchment POST-5: Post Development Runoff Area=66,789 sf 54.70% Impervious Runoff Depth=4.81"
Flow Length=300' Slope=0.0100 1/' Tc=9.9 min CN=81 Runoff=7.45 cfs 0.614 af

Subcatchment POST-6: Post Development Runoff Area=43,316 sf 78.89% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=90 Runoff=6.37 cfs 0.483 af

Subcatchment POST-7: Post Runoff Area=109,739 sf 43.74% Impervious Runoff Depth=4.26"
Flow Length=487' Tc=13.6 min CN=76 Runoff=9.85 cfs 0.894 af

Subcatchment POST-8: Post Development Runoff Area=80,316 sf 0.00% Impervious Runoff Depth=2.51"
Tc=6.0 min CN=59 Runoff=5.20 cfs 0.385 af

Pond AP-1: Easterly Wetland Inflow=24.24 cfs 2.723 af
Primary=24.24 cfs 2.723 af

Pond AP-2: City Drainage System Inflow=49.45 cfs 5.098 af
Primary=49.45 cfs 5.098 af

Pond AP-3: Abutting Parcel Inflow=5.20 cfs 0.385 af
Primary=5.20 cfs 0.385 af

Pond AP-4: Duchaine Boulevard Inflow=18.47 cfs 1.482 af
Primary=18.47 cfs 1.482 af

Pond POND 1: Extended				Peak Elev=87.47' Storage=32,936 cf Inflow=31.23 cfs 2.386 af			
0.565 af	Primary=7.46 cfs	0.964 af	Secondary=7.44 cfs	0.854 af	Tertiary=0.00 cfs	0.000 af	Outflow=15.37 cfs 2.383 af

Pond POND 2: Extended Detention/Infiltration Peak Elev=86.24' Storage=5,633 cf Inflow=3.85 cfs 0.279 af
Discarded=0.20 cfs 0.240 af Primary=0.07 cfs 0.039 af Secondary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.279 af

Total Runoff Area = 15.857 ac Runoff Volume = 5.907 af Average Runoff Depth = 4.47"
55.34% Pervious = 8.776 ac 44.66% Impervious = 7.081 ac

Summary for Subcatchment POST-1: Post Development Area 1

Runoff = 31.23 cfs @ 12.09 hrs, Volume= 2.386 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
117,140	98	Roofs, HSG B
54,222	98	Paved parking, HSG B
38,648	61	>75% Grass cover, Good, HSG B
210,010	91	Weighted Average
38,648		18.40% Pervious Area
171,362		81.60% Impervious Area

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

Summary for Subcatchment POST-2: Post Development Area 2

Runoff = 3.85 cfs @ 12.09 hrs, Volume= 0.279 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
15,256	98	Paved parking, HSG B
10,651	61	>75% Grass cover, Good, HSG B
3,810	80	>75% Grass cover, Good, HSG D
29,717	82	Weighted Average
14,461		48.66% Pervious Area
15,256		51.34% Impervious Area

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

Summary for Subcatchment POST-3: Post Development Area 3

Runoff = 9.33 cfs @ 12.20 hrs, Volume= 0.866 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

1948_Post-Development Final-2016Update-As Built Type III 24-hr 100-Year Rainfall=7.00"

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Area (sf)	CN	Description
3,139	98	Paved parking, HSG B
15,504	61	>75% Grass cover, Good, HSG B
11,430	80	>75% Grass cover, Good, HSG D
81,786	55	Woods, Good, HSG B
38,992	77	Woods, Good, HSG D
150,851	64	Weighted Average
147,712		97.92% Pervious Area
3,139		2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0100	0.08		Sheet Flow, A-B Grass: Dense n= 0.240 P2= 3.50"
3.5	340	0.0100	1.61		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
13.8	390	Total			

Summary for Subcatchment POST-5: Post Development Area 5

Runoff = 7.45 cfs @ 12.14 hrs, Volume= 0.614 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
36,536	98	Paved parking, HSG B
30,253	61	>75% Grass cover, Good, HSG B
66,789	81	Weighted Average
30,253		45.30% Pervious Area
36,536		54.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0100	0.12		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.50"
2.8	250	0.0100	1.50		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
9.9	300	Total			

Summary for Subcatchment POST-6: Post Development Area 6

Runoff = 6.37 cfs @ 12.09 hrs, Volume= 0.483 af, Depth= 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
34,171	98	Paved parking, HSG B
9,145	61	>75% Grass cover, Good, HSG B
43,316	90	Weighted Average
9,145		21.11% Pervious Area
34,171		78.89% Impervious Area

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

Summary for Subcatchment POST-7: Post Development Area 7

Runoff = 9.85 cfs @ 12.19 hrs, Volume= 0.894 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
47,999	98	Paved parking, HSG B
7,096	39	>75% Grass cover, Good, HSG A
54,644	61	>75% Grass cover, Good, HSG B
109,739	76	Weighted Average
61,740		56.26% Pervious Area
47,999		43.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0100	0.12		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.50"
0.2	37	0.0300	2.79		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
6.3	400	0.0050	1.06		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
13.6	487	Total			

Summary for Subcatchment POST-8: Post Development Area 8

Runoff = 5.20 cfs @ 12.10 hrs, Volume= 0.385 af, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
43,702	55	Woods, Good, HSG B
28,772	61	>75% Grass cover, Good, HSG B
1,347	80	>75% Grass cover, Good, HSG D
6,495	77	Woods, Good, HSG D
80,316	59	Weighted Average
80,316		100.00% Pervious Area

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

Summary for Pond AP-1: Easterly Wetland

Analysis Point 1 is taken at the Boundary of the Easterly Wetland System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8.966 ac, 48.58% Impervious, Inflow Depth = 3.64" for 100-Year event
 Inflow = 24.24 cfs @ 12.20 hrs, Volume= 2.723 af
 Primary = 24.24 cfs @ 12.20 hrs, Volume= 2.723 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Summary for Pond AP-2: City Drainage System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 15.857 ac, 44.66% Impervious, Inflow Depth = 3.86" for 100-Year event
 Inflow = 49.45 cfs @ 12.15 hrs, Volume= 5.098 af
 Primary = 49.45 cfs @ 12.15 hrs, Volume= 5.098 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Summary for Pond AP-3: Abutting Parcel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.844 ac, 0.00% Impervious, Inflow Depth = 2.51" for 100-Year event
 Inflow = 5.20 cfs @ 12.10 hrs, Volume= 0.385 af
 Primary = 5.20 cfs @ 12.10 hrs, Volume= 0.385 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Summary for Pond AP-4: Duchaine Boulevard

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.371 ac, 37.13% Impervious, Inflow Depth = 4.07" for 100-Year event
 Inflow = 18.47 cfs @ 12.10 hrs, Volume= 1.482 af
 Primary = 18.47 cfs @ 12.10 hrs, Volume= 1.482 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Summary for Pond POND 1: Extended Detention/Infiltration Basin 1

Inflow Area = 4.821 ac, 81.60% Impervious, Inflow Depth = 5.94" for 100-Year event
 Inflow = 31.23 cfs @ 12.09 hrs, Volume= 2.386 af
 Outflow = 15.37 cfs @ 12.24 hrs, Volume= 2.383 af, Atten= 51%, Lag= 9.0 min
 Discarded = 0.47 cfs @ 12.24 hrs, Volume= 0.565 af
 Primary = 7.46 cfs @ 12.24 hrs, Volume= 0.964 af
 Secondary = 7.44 cfs @ 12.24 hrs, Volume= 0.854 af
 Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Peak Elev= 87.47' @ 12.24 hrs Surf.Area= 19,959 sf Storage= 32,936 cf

Plug-Flow detention time= 116.2 min calculated for 2.383 af (100% of inflow)

Center-of-Mass det. time= 115.3 min (891.7 - 776.4)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	33,521 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
85.00	9,291	0	0
86.00	12,152	10,722	10,722
87.00	15,554	13,853	24,575
87.50	20,231	8,946	33,521

Device	Routing	Invert	Outlet Devices
#1	Primary	85.25'	15.0" Round Culvert L= 29.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 85.25' / 84.97' S= 0.0097 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	85.25'	15.0" Round Culvert L= 29.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 85.25' / 84.98' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 1	85.37'	5.0" Vert. Orifice/Grate C= 0.600
#4	Device 2	85.40'	5.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	86.59'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#6	Device 2	86.66'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#7	Tertiary	87.50'	15.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

#8 Discarded 85.00' Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.47 cfs @ 12.24 hrs HW=87.47' (Free Discharge)

↑ **8=Exfiltration** (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=7.46 cfs @ 12.24 hrs HW=87.47' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 7.46 cfs @ 6.08 fps)

↑ **3=Orifice/Grate** (Passes < 0.90 cfs potential flow)

↑ **5=Sharp-Crested Rectangular Weir** (Passes < 10.33 cfs potential flow)

Secondary OutFlow Max=7.43 cfs @ 12.24 hrs HW=87.47' (Free Discharge)

↑ **2=Culvert** (Barrel Controls 7.43 cfs @ 6.06 fps)

↑ **4=Orifice/Grate** (Passes < 0.90 cfs potential flow)

↑ **6=Sharp-Crested Rectangular Weir** (Passes < 9.16 cfs potential flow)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.00' (Free Discharge)

↑ **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond POND 2: Extended Detention/Infiltration Basin 2

Inflow Area = 0.682 ac, 51.34% Impervious, Inflow Depth = 4.92" for 100-Year event
 Inflow = 3.85 cfs @ 12.09 hrs, Volume= 0.279 af
 Outflow = 0.27 cfs @ 13.52 hrs, Volume= 0.279 af, Atten= 93%, Lag= 86.0 min
 Discarded = 0.20 cfs @ 13.52 hrs, Volume= 0.240 af
 Primary = 0.07 cfs @ 13.52 hrs, Volume= 0.039 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 4

Peak Elev= 86.24' @ 13.52 hrs Surf.Area= 8,663 sf Storage= 5,633 cf

Plug-Flow detention time= 215.7 min calculated for 0.279 af (100% of inflow)

Center-of-Mass det. time= 215.6 min (1,018.6 - 803.0)

Volume	Invert	Avail.Storage	Storage Description
#1	85.50'	11,803 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
85.50	6,257	0	0
86.00	8,134	3,598	3,598
86.90	10,100	8,205	11,803
Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	15.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 85.50' / 84.97' S= 0.0408 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	85.72'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	86.26'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Secondary	86.30'	15.0' long x 10.0' breadth Broad-Crested Rectangular Weir

1948_Post-Development Final-2016Update-As Built *Type III 24-hr 100-Year Rainfall=7.00"*

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			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60
			Coef. (English)	2.49	2.56	2.70	2.69	2.68	2.69	2.67	2.64
#5	Discarded	85.50'	1.020 in/hr Exfiltration over Surface area								

Discarded OutFlow Max=0.20 cfs @ 13.52 hrs HW=86.24' (Free Discharge)
↑ **5=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.07 cfs @ 13.52 hrs HW=86.24' (Free Discharge)
↑ **1=Culvert** (Passes 0.07 cfs of 2.23 cfs potential flow)
 ↑ **2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.19 fps)
 ↑ **3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)