

August 17, 2015  
Project No. 1998

Ms. Sarah Porter, Agent  
City of New Bedford Conservation Commission  
New Bedford City Hall  
133 William Street  
New Bedford, MA 02744

The Crocker Building  
Four Court Street, Suite 104  
Taunton, Massachusetts 02780  
Telephone: (508) 824-9279  
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**RE: NEW BEDFORD-LOGAL LLC**  
DEP File No. SE 049-0702 - Response to Amended Order of Conditions (OOC) and Construction  
Review Comments-100 Duchaine Boulevard

Dear Ms. Porter:

Field Engineering Co., Inc. has revised the memorandum on the Amended Order of Conditions submittal and Site Observations dated July 16, 2015 prepared by Nitsch Engineering and has prepared the following response narrative and supporting documentation for consideration by the Commission.

Numbering below corresponds to the numbering in Nitsch's memorandum.

1. The parking area that was designed to sheet flow to the sediment forebay that is part of Wet Basin 1 was not graded properly. Instead of the parking area flowing directly to the sediment forebay, portions of the parking area flow towards a low point near the storage portion of the basin. During heavy storms, water collects in the low spot and then overtops the Cape Cod berm that was installed along the parking area before flowing directly into the storage area of the wet basin. The side slopes in this area of the wet basin have eroded. In some areas, this erosion is significant and has left deep channels in the side of the wet basin. The basin is not graded consistent with the approved plans. The plans show the side slopes to the basin be graded to the edge of the parking lot. However, there is a six to eight-foot flat area between the top of the side slopes to the basin and the edge of the parking lot.

**Response: We acknowledge the conditions described in Comment 1 above. One of the purposes for the Request for Amended Order of Conditions was to address this condition and this is further described in the comments below.**

2. Rich Riccio had submitted a plan depicting the extension of a rip-rap apron to collect stormwater that is overtopping the Cape Cod berm. During the site visit, additional options were discussed. It is important that stormwater that is generated by the parking lot be routed through the sediment forebay to insure that it receives adequate treatment in accordance with the Stormwater Management Guidelines. Therefore, if the parking lot is not regraded, a piped solution will be necessary to route this water to the forebay. Given the fact that there is some space between the edge of the parking lot and the top of the wet basin, there is an opportunity to create a depression or series of depressions that could collect the stormwater and route it directly to the sediment forebay. We discussed developing a plan that shows depressions along this flat area with field drains. The rim of the field drains should be set at an elevation that is higher than the bottom of the depressions but lower than the berm at the top of the storage portion of the wet basin. I recommended that as-built information be collected to perform this design. This design should be submitted to the Conservation Commission as part of the request for an Amended Order of Conditions.



**Response: We have collected as-built information related to the area described above and have developed a revised design plan showing a series of two field drains set in a shallow depression within the flat area. These field drains will discharge via a perforated HDPE Pipe set in a stone trench to the existing sediment forebay.**

3. The owner was not enthusiastic about regrading the parking area consistent with the approved plans. Due to the amount of disturbance this would require, it would significantly impact their business. The facility is currently operating and the area required to regrade the parking lot would prevent access to many of their loading areas.

**Response: No response necessary. We feel that the solution discussed above is an adequate alternative to regrading the entire parking area that drains to this basin and will meet the intent of the design related to pre-treatment and attenuation of the runoff generated from this portion of the site.**

4. The rip rap pad that is located upstream of the sediment forebay is not working properly. The stone is too small and the pad has accumulated a significant amount of sediment. Stormwater simply runs over the top of the pad. Erosion of the side slopes has also begun. The design of the rip-rap pad needs to be re-evaluated and installed with stone that meets the specifications of the approved plans.

**Response: The owner has already replaced the "riprap" pad located upstream of the sediment forebay with new riprap placed over a layer of filter fabric. Pictures of this work have been submitted to the Commission.**

5. The edge of the bituminous parking area near the sediment forebay has eroded. This could be due to water running off the edge of the parking area or vehicles backing into this area and rolling off the edge of the bituminous. I recommended that a curb be installed flush with the pavement in this area to prevent the bituminous from eroding further. The owner agreed to do this along with the other improvements in this area.

**Response: In repairing the "riprap" pad referenced above, the owner has brought in larger stone and has "buted" the stone right up to the existing edge of pavement. We feel that with the larger stone right up against the edge of pavement, backing of trucks over the edge of the pavement will be minimized. Upon further review of this area during the installation of the new riprap, we do not feel installing the flush concrete curb is necessary at this time, but will continue to monitor this area for any future erosion. Please see attached pictures showing the installation of the riprap in this location.**

6. The stone between the sediment forebay and the storage area of the basin also appears to be too small.

**Response: The owner is in the process of repairing/replacing the stone in these locations and this work will be completed prior to submitting a Request for Certificate of Compliance.**

7. The side slopes of the wet basin appear to be too steep. The owners' representative indicated that they do not mow them because they are too steep. The side slopes should be checked to see if they are at the proper slope. Any areas of the side slopes that have experienced significant erosion need to be repaired.

**Response: We have collected as-built data for wet basin 1 and this information is depicted on the attached updated Exhibit Plan to accompany the Request for Amended Order of Conditions. The owner has been repairing the side slopes as necessary and we will continue to monitor their**



condition and recommend additional solutions should erosion continue. The as-built data shows that wet basin 1 was constructed with steeper side slopes than recommended and less storage volume than originally proposed. We have reviewed the as-built hydrologic calculations of the basin with a slightly revised plate configuration on the outlet control structure and the wet basin will still function in accordance with the design plans (following installation of the steel plate) in meeting or reducing the rates of runoff to the subject Analysis Point. A revised comparison of the pre-development versus post development hydrologic calculations has been provided as an attachment to this response letter. The installation of the steel plate will occur prior to the submittal of a Request for Certificate of Compliance.

8. We recommend that an as-built of all of the stormwater features be performed sooner rather than later given the fact that portions of the site have not been built correctly. We are concerned that the wet and dry basins have not been constructed big enough to retain the proper volumes required in the approved calculations. Since there will be some work required, it would best to know if the basins need to be enlarged prior to this work beginning.

**Response: As-built information has been obtained for all of the stormwater features as recommended by Nitsch. This office is in the process of reviewing this information and any additional corrective measures to the remaining stormwater features will be completed prior to the submittal of a Request for Certificate of Compliance.**

9. The wetlands vegetation in wet basin 1 appears to have taken extremely well.

**Response: No further comment. We agree that the wetland vegetation in wet basin 1 has taken extremely well and would like minimize any further disturbance in this area.**

10. The steel plate on the outlet control structure from wet basin 1 needs to be installed.

**Response: We are in agreement. We have provided the owner with updated specifications to the steel plate based on existing conditions within the basin and the plate will be installed prior to the submittal of a Request for Certificate of Compliance.**

11. Additional rip-rap needs to be replaced at the discharge points into the sediment forebay at wet basin 2.

**Response: The owner is in the process of installing/replacing the riprap at all discharge points related to the stormwater management system.**

12. Similar to wet basin 1, it appears the side slopes around wet basin 2 may be too steep. We recommend an as-built be performed to insure that the proper volume is achieved in wet basin 2.

**Response: We have collected as-built information related to the construction of wet basin 2. Similar to wet basin 1, it appears that the slopes are steeper than specified and the basin is smaller than designed. In addition, the outlet culvert specified on the drawings has not been installed. Based on a review of the as-built hydrologic calculations, we would like to propose the installation of a larger outlet than previously proposed in order to maintain the wet basin in its current configuration and minimize the amount of additional disturbance in this area in close proximity to the wetlands. As the attached hydrologic calculations summaries show, by installing a larger outlet culvert we can still meet or reduce the peak rates of runoff to the subject Analysis Point.**



13. The wetlands vegetation in wet basin 2 has taken extremely well.

**Response: No further comment. We agree that the wetland vegetation in wet basin 2 has taken extremely well and would like to minimize and further disturbance in this area.**

14. There are other issues with the grading in the parking lot. The area draining to the Stormceptor unit with a double grate has not been uniformly graded and there is significant puddling in the parking area. It is unclear whether the grate has been set too high or the parking area around the grate has either settled or is too low. This could become an issue in the winter.

**Response: The applicant is aware of this condition and is currently working with the paving contractor to come up with a solution. Some ponding does occur on the pavement but the water from this drainage area does eventually get into the Stormceptor and flow through the drainage system. Any modifications required to this area beyond what is shown on the current plans will be reviewed with the Conservation Commission as necessary and will be performed prior to the submittal of a Request for Certificate of Compliance.**

15. The rip-rap at the discharge point to the swale located across the access drive south of the parking area needs to be re-installed with additional rip rap that meets the specifications shown on the plans.

**Response: The owner is in the process of installing/replacing the riprap at all discharge points related to the stormwater management system.**

16. The site plans imply that a uniform gravel driveway will be constructed along the western side of the building. The plans show an 18' wide gravel drive with loam and seed on both sides of the gravel driveway. This area has not been loam and seeded. This was discussed with the owner who agreed to formalize the access drive and install the loam and seed.

**Response: Loam and seed has been placed in this area adjacent to the building to better define the 18' wide gravel driveway in this location. Pictures of this work are included as an attachment to this response letter.**

17. There is evidence of frequent ponding on the west side of the gravel parking area that directs stormwater to the detention basin 1. It appears that the rim of the Stormceptor may be set too high or perhaps the grading of the gravel parking area is inconsistent with the plans. The owner was going to look into this and modify as needed.

**Response: The parking area in question does drain to the west side of the lot towards detention basin 1. The owner is aware of the ponding issues within the gravel parking area and has created a berm at the edge of the parking area to insure that all of the runoff does get to the Stormceptor prior to discharge to the basin. We will continue to monitor this condition and make any modifications as necessary to maintain proper drainage flows in this area.**

18. Rip-rap needs to be installed at the discharge pipes into detention basin 1. Rip-rap also needs to be placed at the overflow from detention basin 1.

**Response: The owner is in the process of installing/replacing the riprap at all discharge points related to the stormwater management system.**

19. Some of the side slopes along detention basin 1 have also eroded. These areas need to be repaired. We recommend performing an as-built survey of detention basin 1

**Response: The owner has repaired the side slopes along detention basin 1. In addition, we have collected as-built information for the construction of detention basin 1 but have not had a chance to review this information prior to completion of this letter. The basin appears to be functioning properly with minimal water discharging to the wetlands. We are in the process of reviewing the as-built information collected for this basin for compliance with the design plans. Any modifications required to this area beyond what is shown on the current plans will be reviewed with the Conservation Commission as necessary.**

20. We walked the erosion and sedimentation control line surrounding the stock piles as described in the Request for an Amended Order of Conditions. In general, the erosion and sedimentation control appeared to be in good condition.

**Response: As you are aware, we have further reviewed the erosion and sedimentation controls in the field with yourself and the Chairman of the Commission. The applicant has placed hay bales across the paved access drives to the stock pile area to minimize the potential for runoff to run down these drives towards the resource areas. No further comment is required at this time.**

We feel that we have adequately addressed the Consultant's comments related to the Amended Order of Conditions request with this letter and the attached plans and documentation and look forward to discussing this information with the Commission at the next available meeting. We understand there are a number of outstanding issues related to the overall stormwater management system that the owner is still working through as described above. These issues will be resolved prior to a Request for Certificate of Compliance being submitted. Please do not hesitate to contact me should you have any questions or require additional information.

Sincerely,

**Field Engineering Co., Inc.**



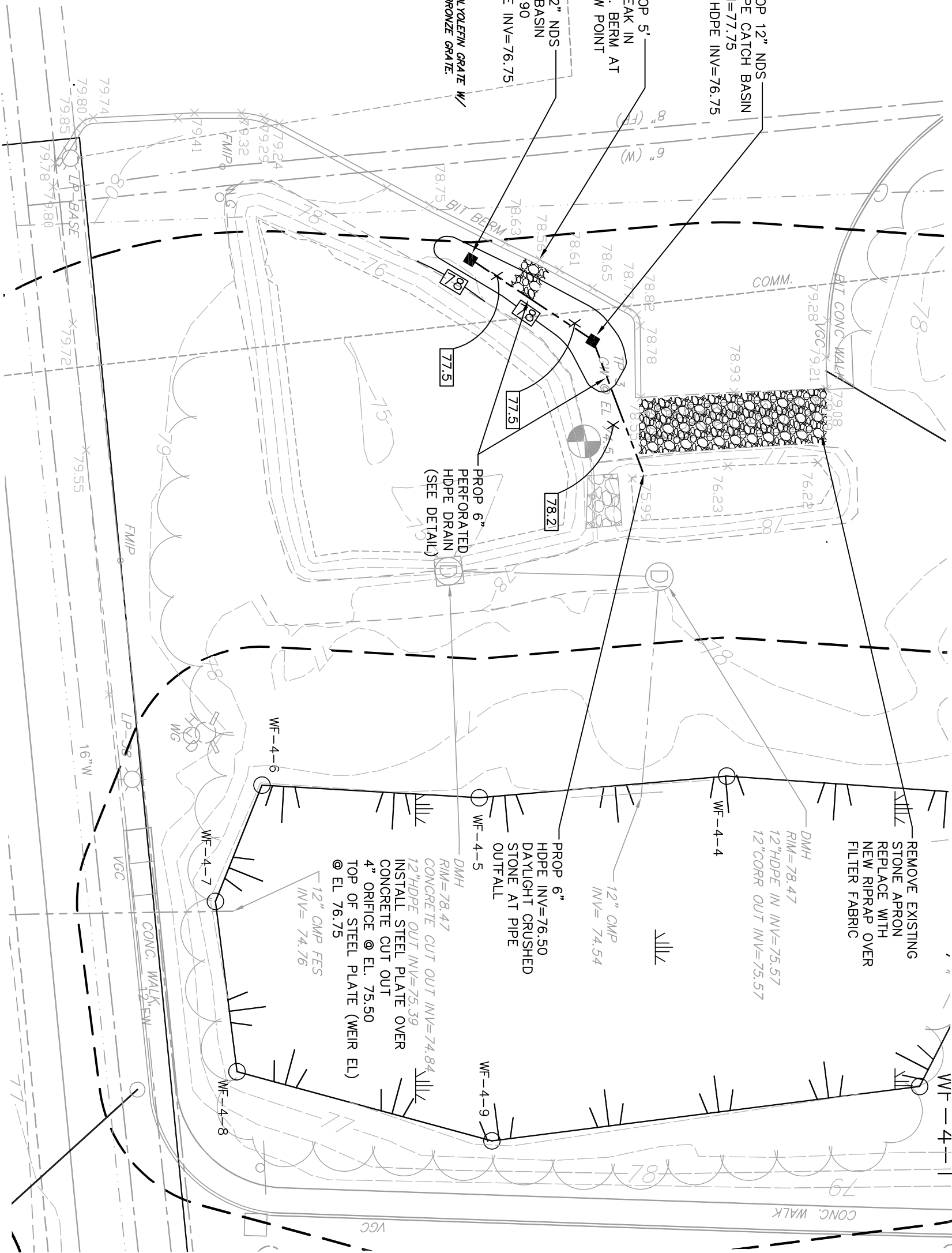
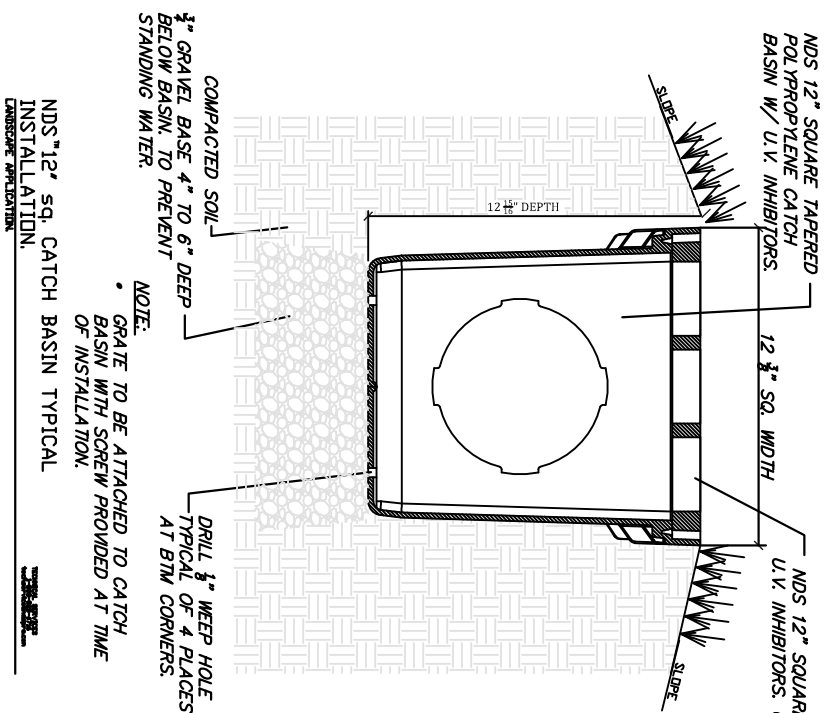
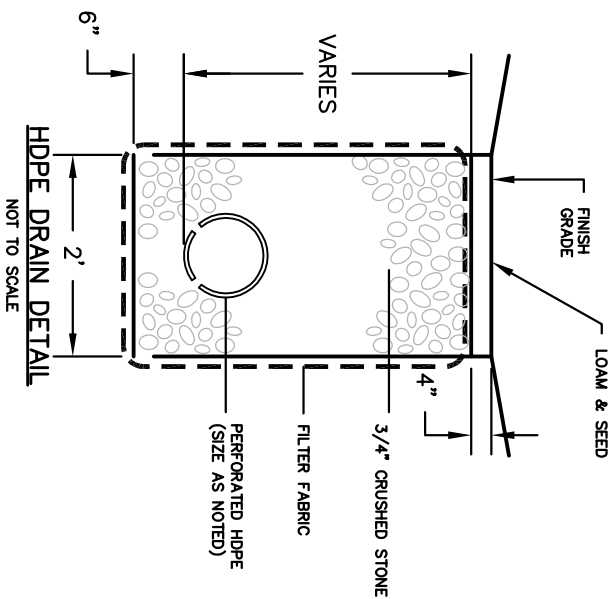
Richard R. Ruccio III, P.E.  
Project Manager

cc: Judith Nitsch Engineering (Scott Turner)  
Eric DeCosta, NWD, Inc.

Attachments

1. Wet Basin 1 Remediation Exhibit Plan
2. Updated Hydrologic Calculation Summary Sheets
3. Photographs





**FIELD**  
**ENGINEERING**  
**CO., INC.**  
CONSULTING ENGINEERS

11D INDUSTRIAL DRIVE  
P.O. BOX 1178  
MATTAPAN, MA 02739  
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FAX: (508) 758-2849

THE CROCKER BUILDING  
4 COURT STREET SUITE 104  
TAUNTON, MA 02780  
TEL: (508) 824-9279  
FAX: (508) 824-9276

**WET BASIN 1 REMEDIATION EXHIBIT PLAN**  
**LOGAL, LLC**  
100 DUCHAINE BOULEVARD  
NEW BEDFORD, MASSACHUSETTS

Project No.	1998	Date	8/14/15
Scale	1"=20'	Revised	
Issued For	PERMITTING	Sheet	1 OF 1

Table 1.3 – Approved Pre Development Hydrologic Summary

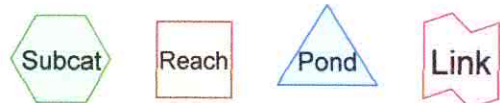
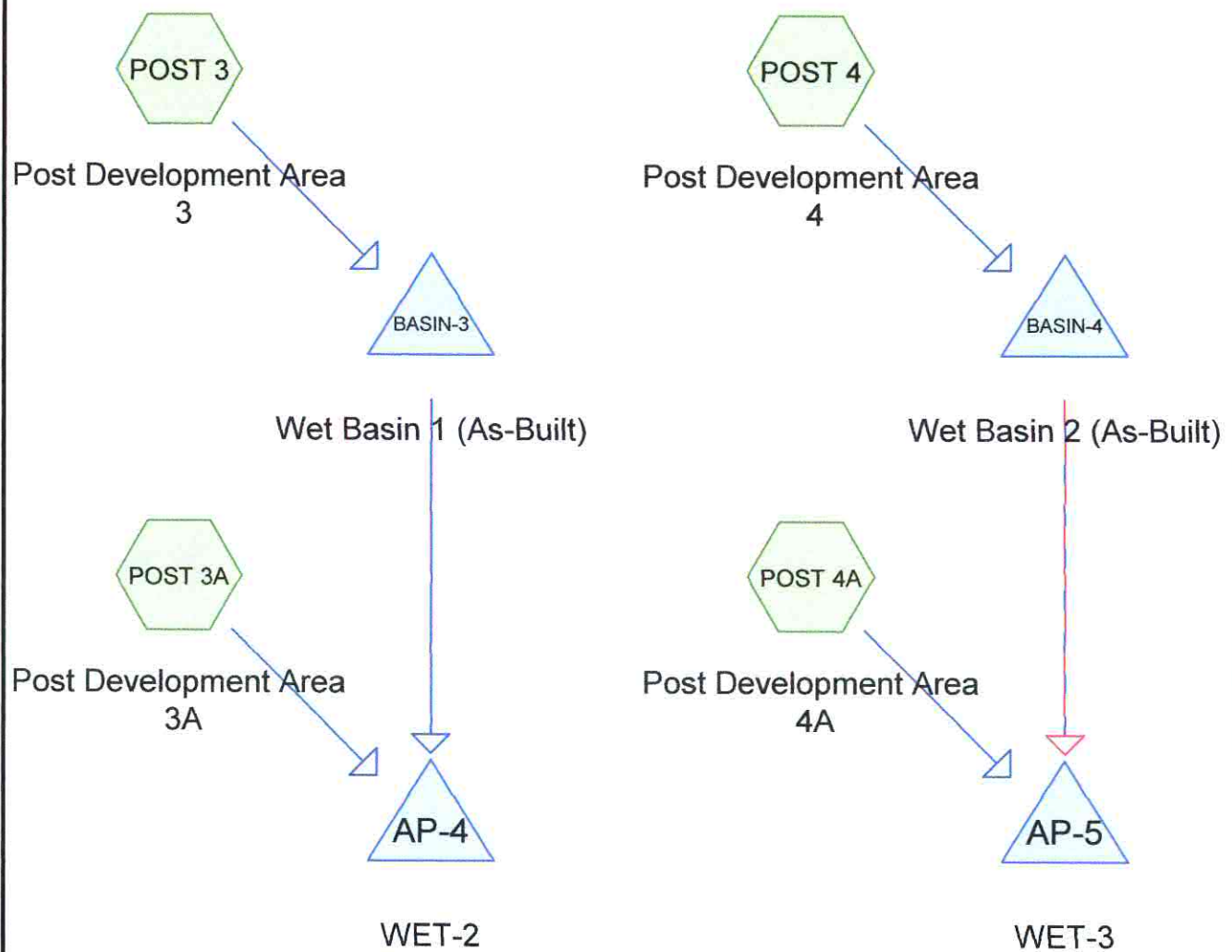
Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)	Analysis Point AP-2 Rate of Flow (c.f.s.)	Analysis Point AP-3 Rate of Flow (c.f.s.)	Analysis Point AP-4 Rate of Flow (c.f.s.)	Analysis Point AP-5 Rate of Flow (c.f.s.)
2-year storm	2.51	2.47	11.76	3.22	7.43
10-year storm	3.56	4.38	17.57	5.17	11.11
25-year storm	4.20	5.64	21.13	6.39	13.36
100-year storm	5.31	7.88	27.33	8.55	17.28

Table 1.4 – Updated Post Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)	Analysis Point AP-2 Rate of Flow (c.f.s.) As-Built (Design)	Analysis Point AP-3 Rate of Flow (c.f.s.) As-Built (Design)	Analysis Point AP-4 Rate of Flow (c.f.s.) As-Built (Design)	Analysis Point AP-5 Rate of Flow (c.f.s.) As-Built (Design)
2-year storm	N/A	TBD (1.55)	TBD (9.70)	2.57 (2.49)	4.23 (5.92)
10-year storm	N/A	TBD (2.82)	TBD (14.10)	4.07 (3.99)	8.13 (9.42)
25-year storm	N/A	TBD (3.55)	TBD (16.70)	4.89 (4.96)	10.40 (11.25)
100-year storm	N/A	TBD (7.67)	TBD (21.75)	7.73 (8.05)	15.02 (15.17)

This office is still reviewing the results of the as-built survey on Detention Basin 1 which is discharging to Analysis Point 2. This information will be further updated with the Request for Certificate of Compliance.

The As-Built Rates of Flow to AP-4 and AP-5 are based on anticipated modifications to the outlets of these basins as discussed in the Letter Report-Response to Comments prepared by Field Engineering dated 8/17/15.





**1998-As-Built**

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Type III 24-hr 100 YR Rainfall=7.00"

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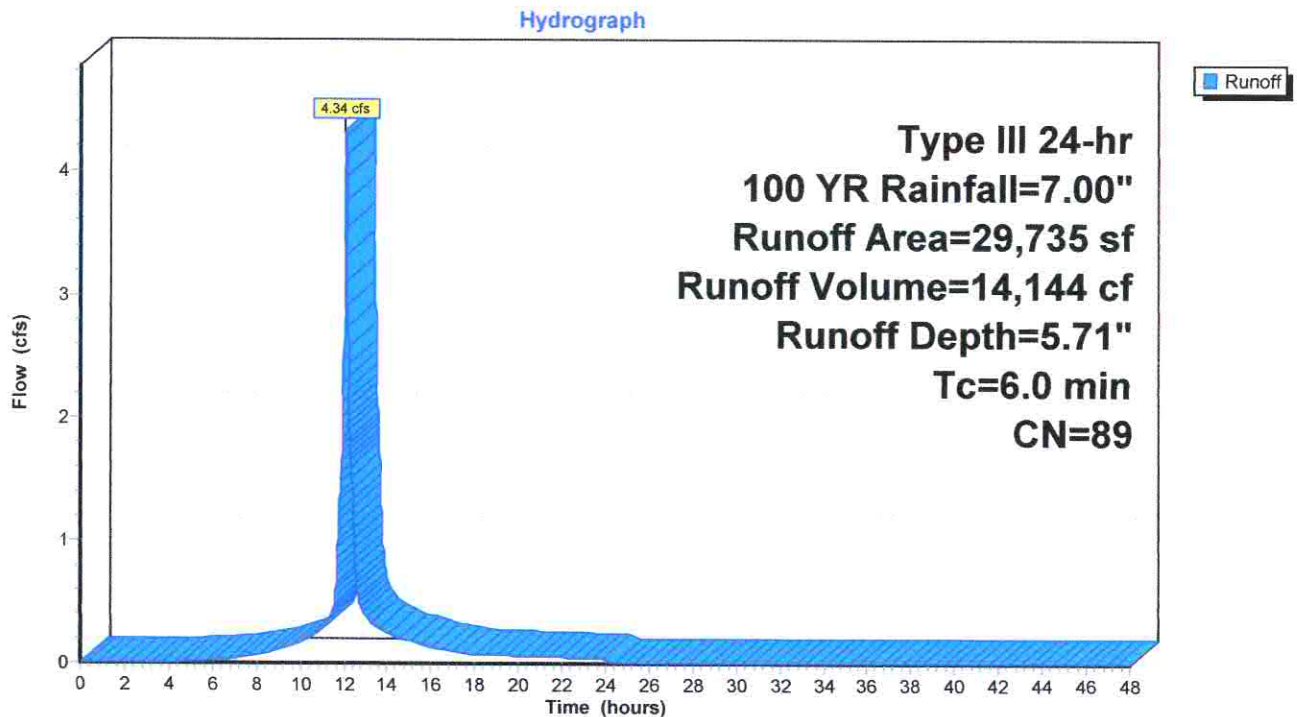
**Summary for Subcatchment POST 3: Post Development Area 3**

Runoff = 4.34 cfs @ 12.08 hrs, Volume= 14,144 cf, Depth= 5.71"

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 100 YR Rainfall=7.00"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

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

**Subcatchment POST 3: Post Development Area 3**

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Type III 24-hr 100 YR Rainfall=7.00"

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**Summary for Subcatchment POST 3A: Post Development Area 3A**

Runoff = 6.18 cfs @ 12.09 hrs, Volume= 19,450 cf, Depth= 4.92"

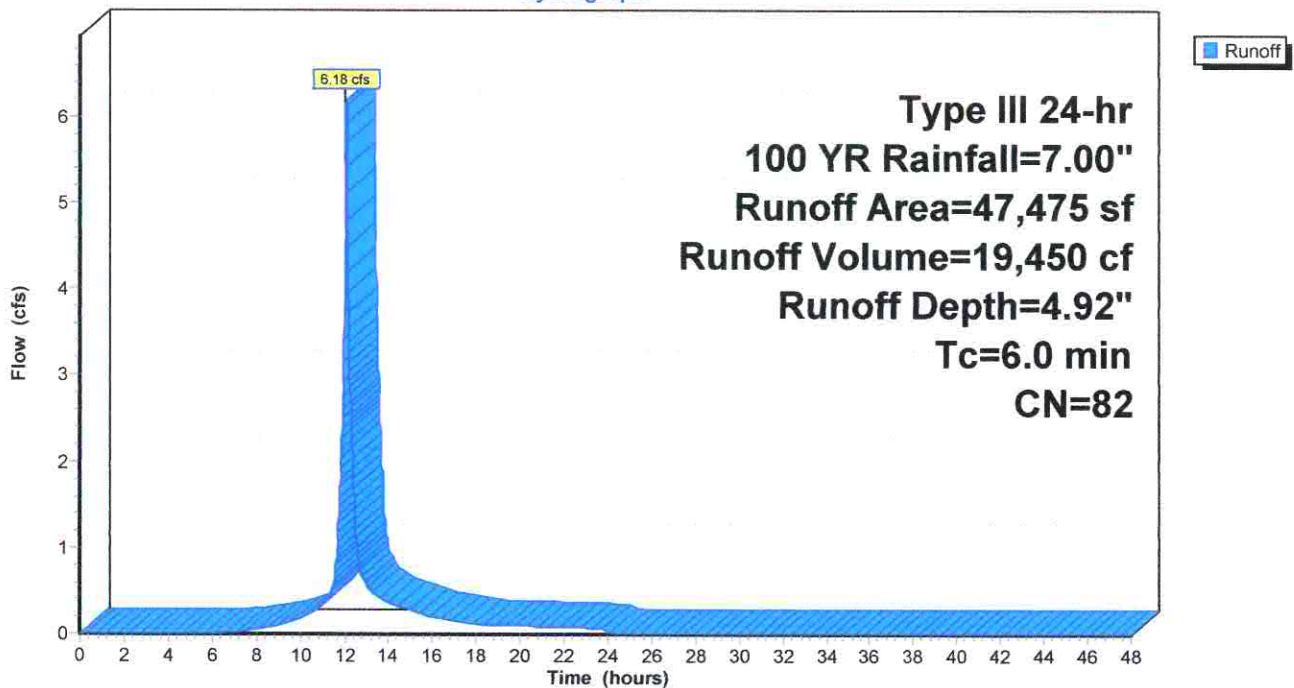
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	74	>75% Grass cover, Good, HSG C
47,475	82	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

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

**Subcatchment POST 3A: Post Development Area 3A**

Hydrograph





**1998-As-Built**

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Type III 24-hr 100 YR Rainfall=7.00"

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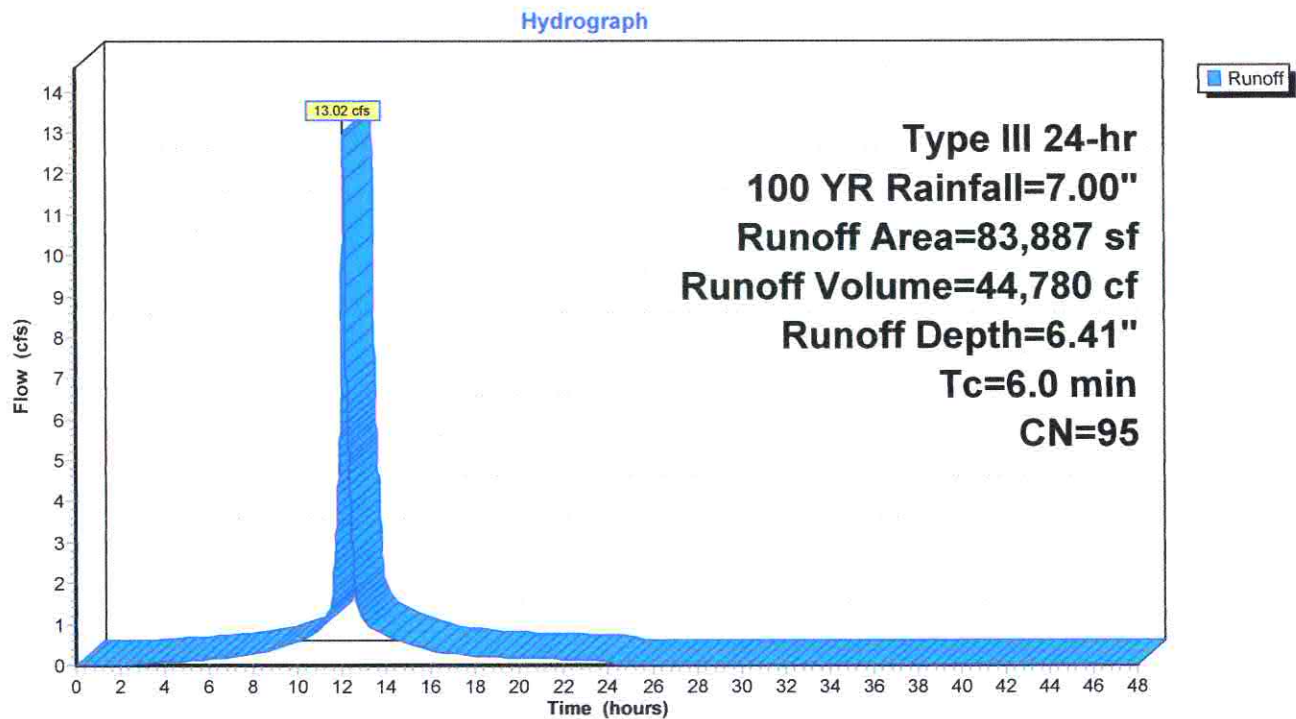
**Summary for Subcatchment POST 4: Post Development Area 4**

Runoff = 13.02 cfs @ 12.08 hrs, Volume= 44,780 cf, Depth= 6.41"

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 100 YR Rainfall=7.00"

Area (sf)	CN	Description
71,885	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
83,887	95	Weighted Average
12,002		14.31% Pervious Area
71,885		85.69% Impervious Area

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

**Subcatchment POST 4: Post Development Area 4**

**1998-As-Built**

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Type III 24-hr 100 YR Rainfall=7.00"

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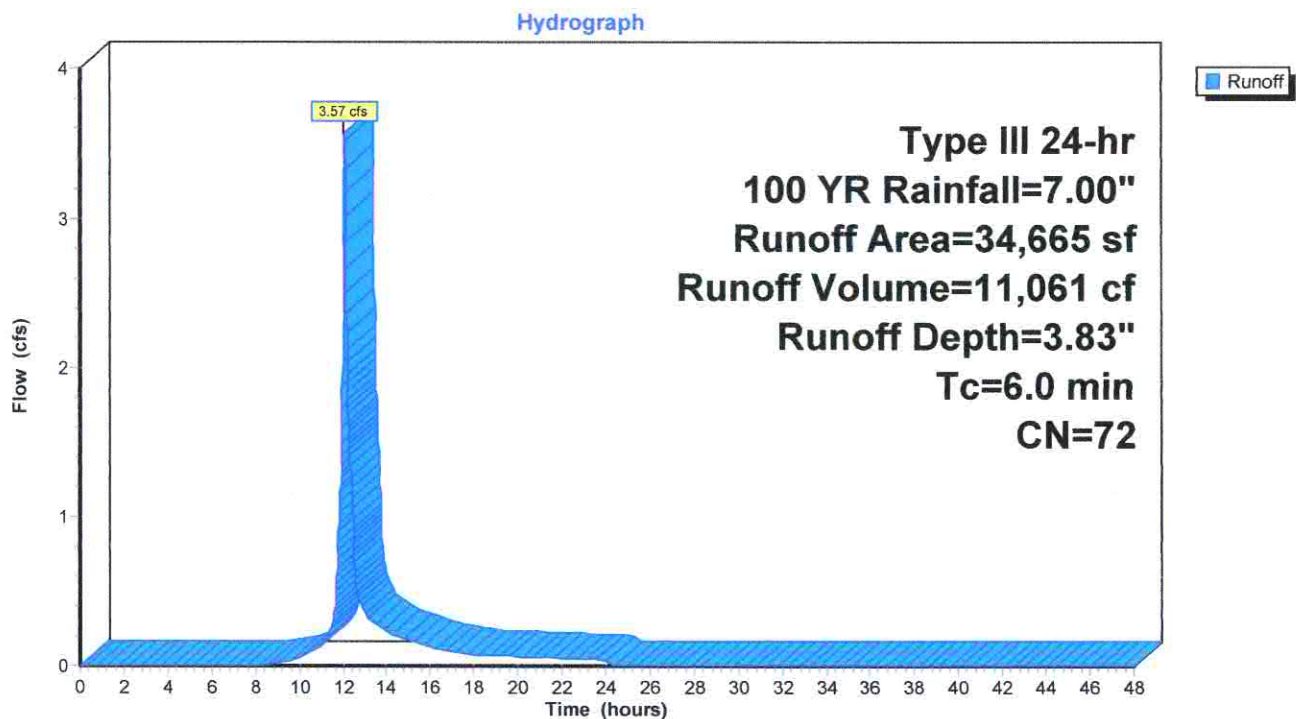
**Summary for Subcatchment POST 4A: Post Development Area 4A**

Runoff = 3.57 cfs @ 12.09 hrs, Volume= 11,061 cf, Depth= 3.83"

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 100 YR Rainfall=7.00"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
2,549	98	Paved parking, HSG C
34,665	72	Weighted Average
32,116		92.65% Pervious Area
2,549		7.35% Impervious Area

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

**Subcatchment POST 4A: Post Development Area 4A**



**Summary for Pond AP-4: WET-2**

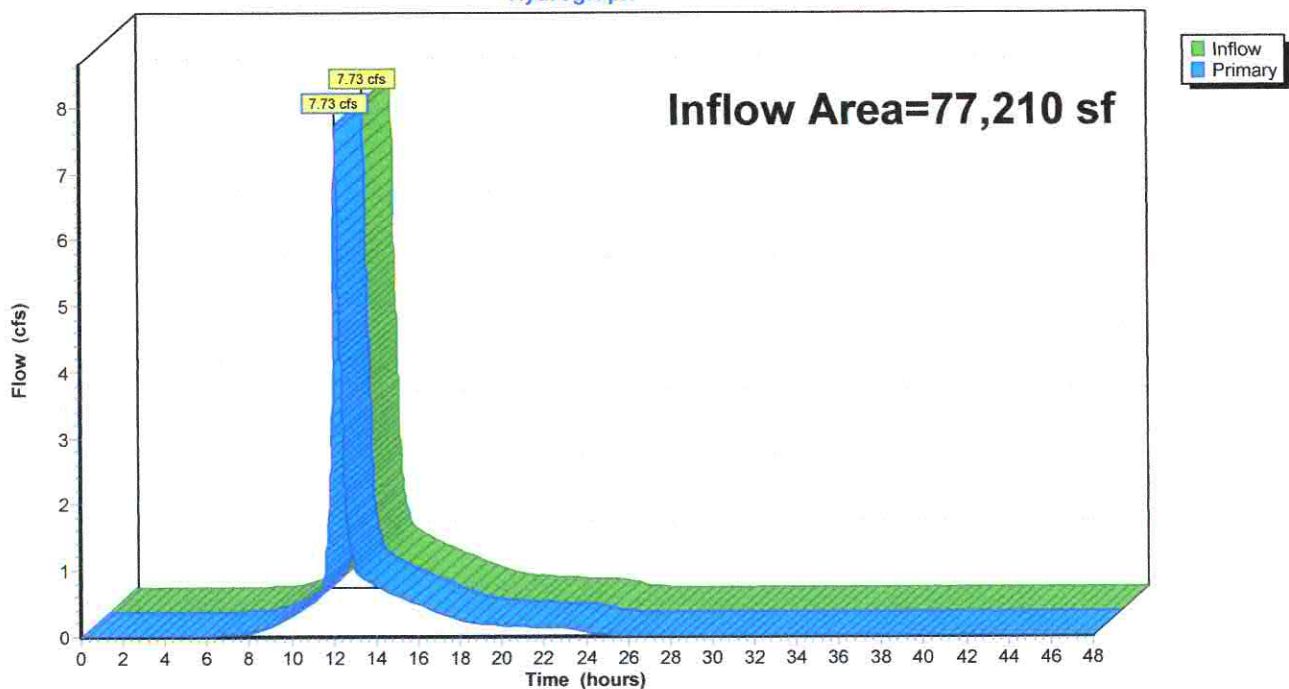
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth = 5.16" for 100 YR event  
Inflow = 7.73 cfs @ 12.12 hrs, Volume= 33,200 cf  
Primary = 7.73 cfs @ 12.12 hrs, Volume= 33,200 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

**Pond AP-4: WET-2**

Hydrograph



## 1998-As-Built

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Type III 24-hr 100 YR Rainfall=7.00"

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### Summary for Pond AP-5: WET-3

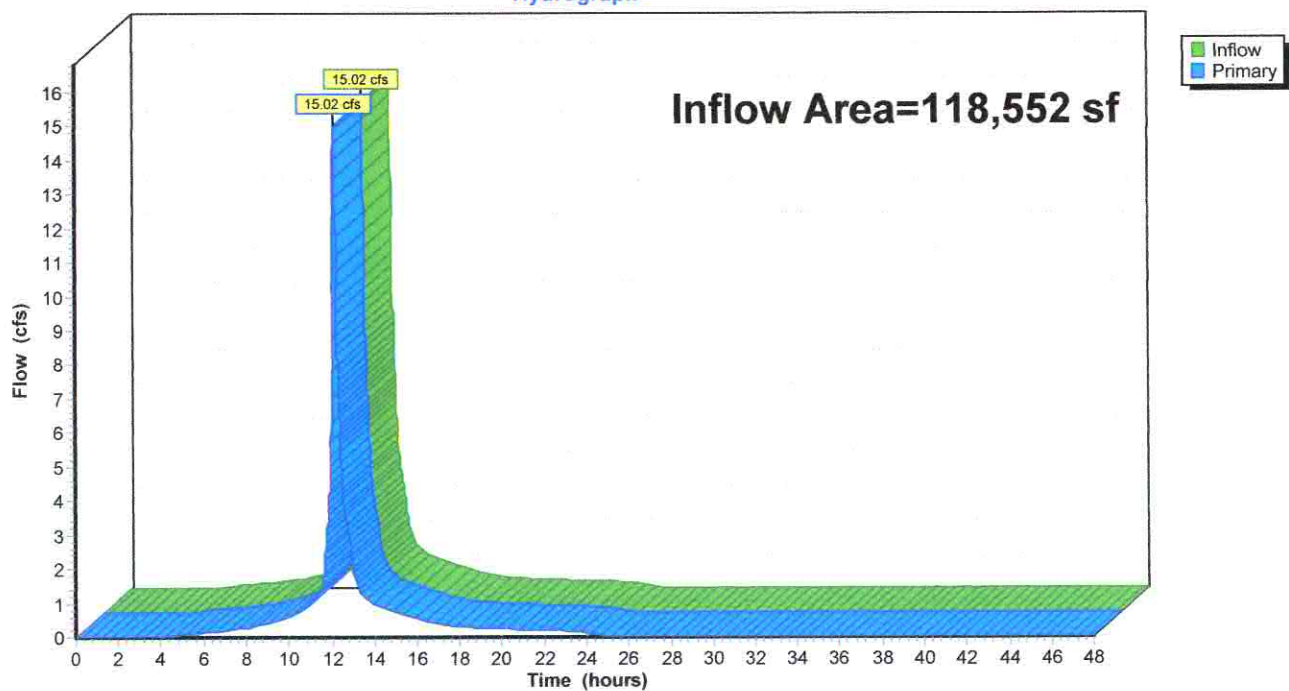
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 5.62" for 100 YR event  
Inflow = 15.02 cfs @ 12.12 hrs, Volume= 55,531 cf  
Primary = 15.02 cfs @ 12.12 hrs, Volume= 55,531 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

### Pond AP-5: WET-3

Hydrograph





**1998-As-Built**

Type III 24-hr 100 YR Rainfall=7.00"

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**Summary for Pond BASIN-3: Wet Basin 1 (As-Built)**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 5.71" for 100 YR event  
 Inflow = 4.34 cfs @ 12.08 hrs, Volume= 14,144 cf  
 Outflow = 2.65 cfs @ 12.19 hrs, Volume= 13,750 cf, Atten= 39%, Lag= 6.0 min  
 Primary = 2.65 cfs @ 12.19 hrs, Volume= 13,750 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4  
 Peak Elev= 77.05' @ 12.19 hrs Surf.Area= 3,238 sf Storage= 4,261 cf  
 Flood Elev= 78.00' Surf.Area= 3,838 sf Storage= 7,622 cf

Plug-Flow detention time= 95.1 min calculated for 13,747 cf (97% of inflow)  
 Center-of-Mass det. time= 78.5 min ( 861.7 - 783.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	7,622 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	238	0	0
76.00	2,378	1,308	1,308
77.00	3,206	2,792	4,100
78.00	3,838	3,522	7,622

Device	Routing	Invert	Outlet Devices
#1	Primary	75.39'	<b>12.0" Round 12" HDPE</b> L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.39' / 74.54' S= 0.0121 ' /' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	75.50'	<b>4.0" Vert. 4" Orifice</b> C= 0.600
#3	Device 1	76.75'	<b>4.0' long x 1.25' rise Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) 1.8' Crest Height

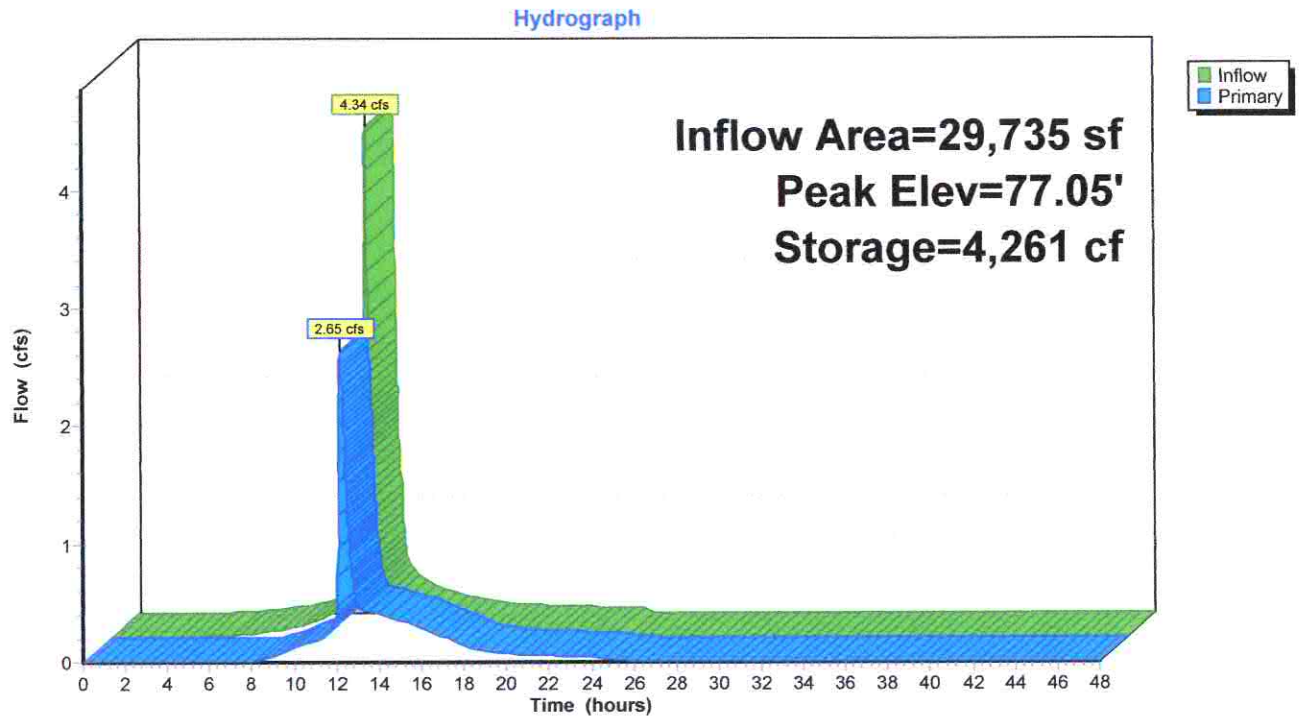
**Primary OutFlow** Max=2.65 cfs @ 12.19 hrs HW=77.05' TW=0.00' (Dynamic Tailwater)

1=12" HDPE (Passes 2.65 cfs of 4.07 cfs potential flow)

2=4" Orifice (Orifice Controls 0.49 cfs @ 5.66 fps)

3=Sharp-Crested Rectangular Weir (Weir Controls 2.16 cfs @ 1.83 fps)

**Pond BASIN-3: Wet Basin 1 (As-Built)**



**1998-As-Built**

Type III 24-hr 100 YR Rainfall=7.00"

Prepared by Field Engineering Co. Inc.

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**Summary for Pond BASIN-4: Wet Basin 2 (As-Built)**

Inflow Area = 83,887 sf, 85.69% Impervious, Inflow Depth = 6.41" for 100 YR event  
 Inflow = 13.02 cfs @ 12.08 hrs, Volume= 44,780 cf  
 Outflow = 11.67 cfs @ 12.12 hrs, Volume= 44,470 cf, Atten= 10%, Lag= 2.4 min  
 Primary = 4.39 cfs @ 12.12 hrs, Volume= 38,778 cf  
 Secondary = 7.29 cfs @ 12.12 hrs, Volume= 5,692 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4  
 Peak Elev= 78.24' @ 12.12 hrs Surf.Area= 3,556 sf Storage= 5,186 cf  
 Flood Elev= 79.00' Surf.Area= 3,774 sf Storage= 7,954 cf

Plug-Flow detention time= 24.5 min calculated for 44,470 cf (99% of inflow)  
 Center-of-Mass det. time= 19.8 min ( 779.8 - 760.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	7,954 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	355	0	0
77.00	2,404	1,380	1,380
78.00	3,485	2,945	4,324
79.00	3,774	3,630	7,954

Device	Routing	Invert	Outlet Devices
#1	Primary	76.40'	<b>12.0" Round Culvert</b> L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 76.40' / 76.10' S= 0.0150 ' / ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Secondary	77.75'	<b>8.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

**Primary OutFlow** Max=4.38 cfs @ 12.12 hrs HW=78.24' TW=0.00' (Dynamic Tailwater)  
 ↑1=Culvert (Inlet Controls 4.38 cfs @ 5.58 fps)

**Secondary OutFlow** Max=7.27 cfs @ 12.12 hrs HW=78.24' TW=0.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 7.27 cfs @ 1.84 fps)



# 1998-As-Built

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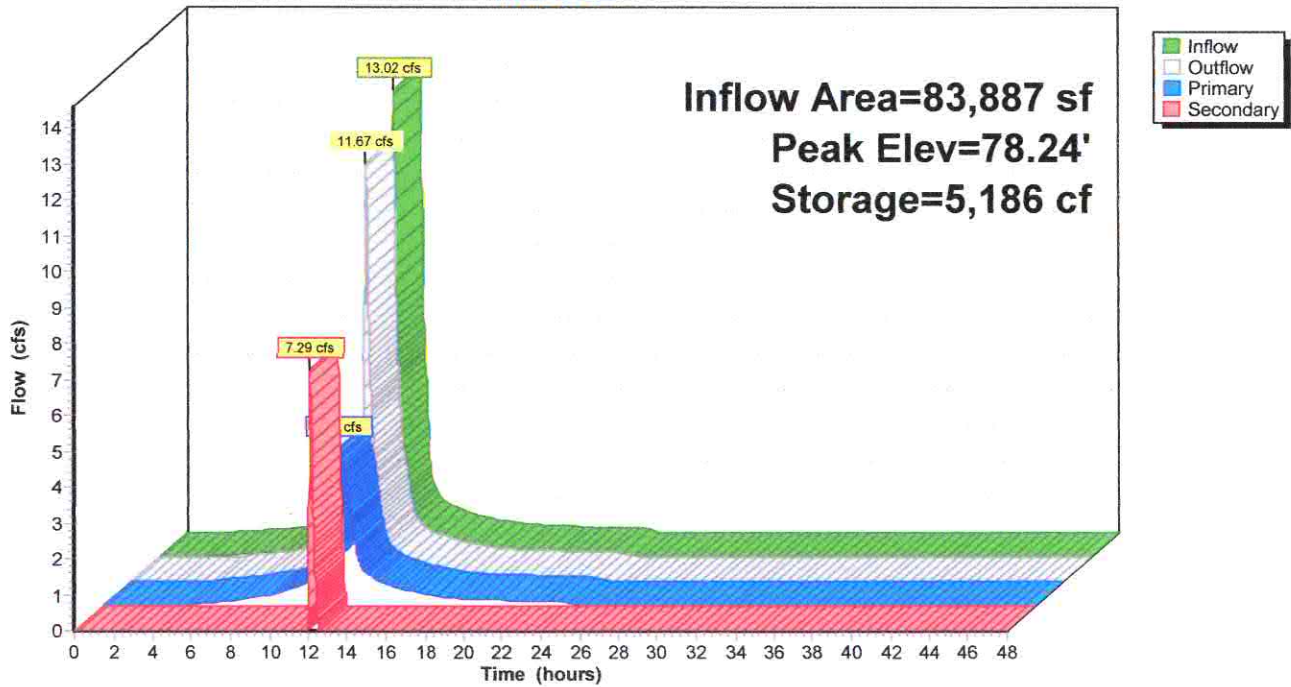
Type III 24-hr 100 YR Rainfall=7.00"

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## Pond BASIN-4: Wet Basin 2 (As-Built)

Hydrograph



**1998-As-Built**

Type III 24-hr 2 YR Rainfall=3.50"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4

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 POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=2.36"  
Tc=6.0 min CN=89 Runoff=1.87 cfs 5,841 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=1.78"  
Tc=6.0 min CN=82 Runoff=2.28 cfs 7,052 cf

**Subcatchment POST 4: Post Development** Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=2.94"  
Tc=6.0 min CN=95 Runoff=6.24 cfs 20,546 cf

**Subcatchment POST 4A: Post Development** Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=1.12"  
Tc=6.0 min CN=72 Runoff=0.99 cfs 3,238 cf

**Pond AP-4: WET-2** Inflow=2.57 cfs 12,499 cf  
Primary=2.57 cfs 12,499 cf

**Pond AP-5: WET-3** Inflow=4.23 cfs 23,474 cf  
Primary=4.23 cfs 23,474 cf

**Pond BASIN-3: Wet Basin 1 (As-Built)** Peak Elev=76.46' Storage=2,486 cf Inflow=1.87 cfs 5,841 cf  
Outflow=0.37 cfs 5,447 cf

**Pond BASIN-4: Wet Basin 2 (As-Built)** Peak Elev=77.74' Storage=3,465 cf Inflow=6.24 cfs 20,546 cf  
Primary=3.47 cfs 20,236 cf Secondary=0.00 cfs 0 cf Outflow=3.47 cfs 20,236 cf

**Total Runoff Area = 195,762 sf Runoff Volume = 36,677 cf Average Runoff Depth = 2.25"**  
**43.89% Pervious = 85,916 sf 56.11% Impervious = 109,846 sf**

**1998-As-Built**

Type III 24-hr 10 YR Rainfall=4.80"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4

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 POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=3.58"  
Tc=6.0 min CN=89 Runoff=2.79 cfs 8,873 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=2.90"  
Tc=6.0 min CN=82 Runoff=3.70 cfs 11,476 cf

**Subcatchment POST 4: Post Development** Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=4.22"  
Tc=6.0 min CN=95 Runoff=8.77 cfs 29,511 cf

**Subcatchment POST 4A: Post Development** Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=2.05"  
Tc=6.0 min CN=72 Runoff=1.88 cfs 5,908 cf

**Pond AP-4: WET-2** Inflow=4.07 cfs 19,955 cf  
Primary=4.07 cfs 19,955 cf

**Pond AP-5: WET-3** Inflow=8.13 cfs 35,108 cf  
Primary=8.13 cfs 35,108 cf

**Pond BASIN-3: Wet Basin 1 (As-Built)** Peak Elev=76.83' Storage=3,582 cf Inflow=2.79 cfs 8,873 cf  
Outflow=0.78 cfs 8,479 cf

**Pond BASIN-4: Wet Basin 2 (As-Built)** Peak Elev=78.01' Storage=4,355 cf Inflow=8.77 cfs 29,511 cf  
Primary=3.98 cfs 27,696 cf Secondary=2.60 cfs 1,505 cf Outflow=6.58 cfs 29,201 cf

**Total Runoff Area = 195,762 sf Runoff Volume = 55,767 cf Average Runoff Depth = 3.42"**  
**43.89% Pervious = 85,916 sf 56.11% Impervious = 109,846 sf**



**1998-As-Built**

Type III 24-hr 25 YR Rainfall=5.50"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4

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 POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=4.25"  
Tc=6.0 min CN=89 Runoff=3.29 cfs 10,537 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=3.53"  
Tc=6.0 min CN=82 Runoff=4.49 cfs 13,965 cf

**Subcatchment POST 4: Post Development** Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=4.92"  
Tc=6.0 min CN=95 Runoff=10.13 cfs 34,360 cf

**Subcatchment POST 4A: Post Development** Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=2.59"  
Tc=6.0 min CN=72 Runoff=2.41 cfs 7,481 cf

**Pond AP-4: WET-2** Inflow=4.89 cfs 24,108 cf  
Primary=4.89 cfs 24,108 cf

**Pond AP-5: WET-3** Inflow=10.40 cfs 41,531 cf  
Primary=10.40 cfs 41,531 cf

**Pond BASIN-3: Wet Basin 1 (As-Built)** Peak Elev=76.91' Storage=3,808 cf Inflow=3.29 cfs 10,537 cf  
Outflow=1.29 cfs 10,143 cf

**Pond BASIN-4: Wet Basin 2 (As-Built)** Peak Elev=78.10' Storage=4,671 cf Inflow=10.13 cfs 34,360 cf  
Primary=4.14 cfs 31,338 cf Secondary=4.14 cfs 2,713 cf Outflow=8.29 cfs 34,050 cf

**Total Runoff Area = 195,762 sf Runoff Volume = 66,343 cf Average Runoff Depth = 4.07"**  
**43.89% Pervious = 85,916 sf 56.11% Impervious = 109,846 sf**

**1998-As-Built**

Type III 24-hr 100 YR Rainfall=7.00"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4

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 POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=5.71"  
Tc=6.0 min CN=89 Runoff=4.34 cfs 14,144 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=4.92"  
Tc=6.0 min CN=82 Runoff=6.18 cfs 19,450 cf

**Subcatchment POST 4: Post Development** Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=6.41"  
Tc=6.0 min CN=95 Runoff=13.02 cfs 44,780 cf

**Subcatchment POST 4A: Post Development** Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=3.83"  
Tc=6.0 min CN=72 Runoff=3.57 cfs 11,061 cf

**Pond AP-4: WET-2** Inflow=7.73 cfs 33,200 cf  
Primary=7.73 cfs 33,200 cf

**Pond AP-5: WET-3** Inflow=15.02 cfs 55,531 cf  
Primary=15.02 cfs 55,531 cf

**Pond BASIN-3: Wet Basin 1 (As-Built)** Peak Elev=77.05' Storage=4,261 cf Inflow=4.34 cfs 14,144 cf  
Outflow=2.65 cfs 13,750 cf

**Pond BASIN-4: Wet Basin 2 (As-Built)** Peak Elev=78.24' Storage=5,186 cf Inflow=13.02 cfs 44,780 cf  
Primary=4.39 cfs 38,778 cf Secondary=7.29 cfs 5,692 cf Outflow=11.67 cfs 44,470 cf

**Total Runoff Area = 195,762 sf Runoff Volume = 89,435 cf Average Runoff Depth = 5.48"**  
**43.89% Pervious = 85,916 sf 56.11% Impervious = 109,846 sf**





New RipRap Pad  
Wet Basin 1





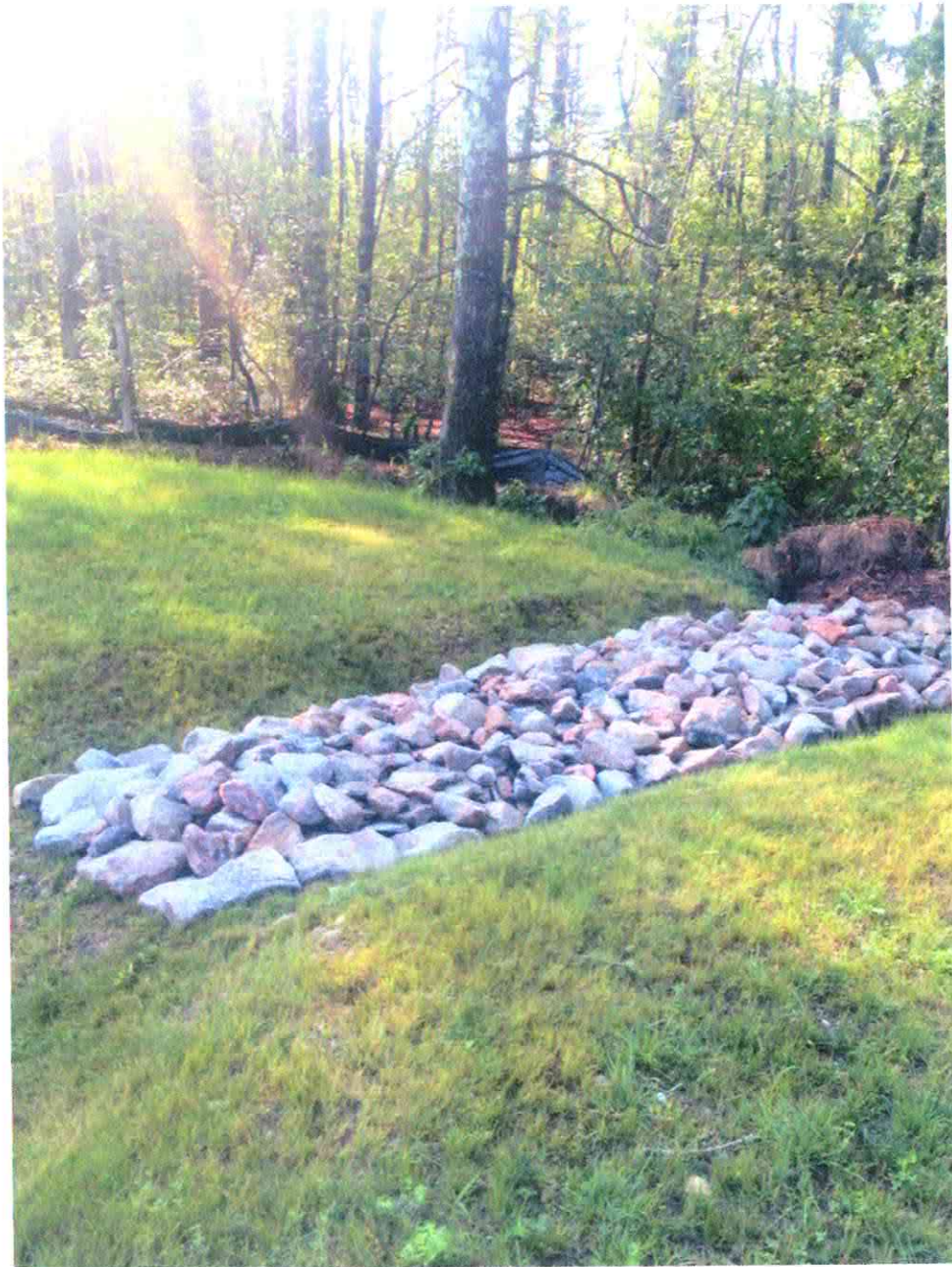
New RipRap Pad  
Wet Basin 1





New Rip Rap Pad  
Wet Basin 1





Rip Rap Spillway  
Detention Basin /





Loam + Seed West Side  
of Building