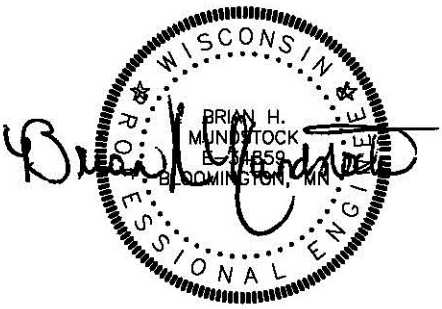
Kwik Trip #968
Waukesha, WI

Stormwater Management Calculations

~~1/4/18~~
03/12/2018



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Narrative

Kwik Trip is proposing to reconstruct the existing paved parking lot at the existing gas station and convenience store located at the southeast corner of Abbott Drive and Parklawn Drive in Waukesha, WI. The parking lot reconstruction will include the installation of a new sumped storm sewer catchbasin, oil-debris skimming device, and storm sewer piping. The existing storm sewer catchbasin located at the existing driveway entrance off of Abbott Drive will remain . This existing catchbasin will be re-routed with new storm piping to the new catchbasin. All stormwater runoff that comes into contact with the fueling islands drains to the new sumped catchbasin and oil-debris skimming device.

The site's hydrology was modeled using HydroCAD software, which utilizes the TR-55 methodology.

Proposed Conditions

Area	Total (sf)	Impervious (sf)	Pervious (sf)
1S	7,280	7,280	0
2S	6,906	6,906	0
3S	3,034	3,034	0
Total	17,220	17,220	0

*See attached Proposed Conditions drainage area map

HydroCAD Results

24-HR Storm Event	Peak Discharge Rate to Ex. Catchbasin (cfs)	Peak Discharge Rate from new CB #1 to City (cfs)
1-YR	0.51	1.28
2-YR	0.58	1.45
5-YR	0.71	1.77
10-YR	0.83	2.08
100-YR	1.36	3.38

*See attached HydroCAD report for more details

Pipe Analysis

Pipe Sizing Calculations

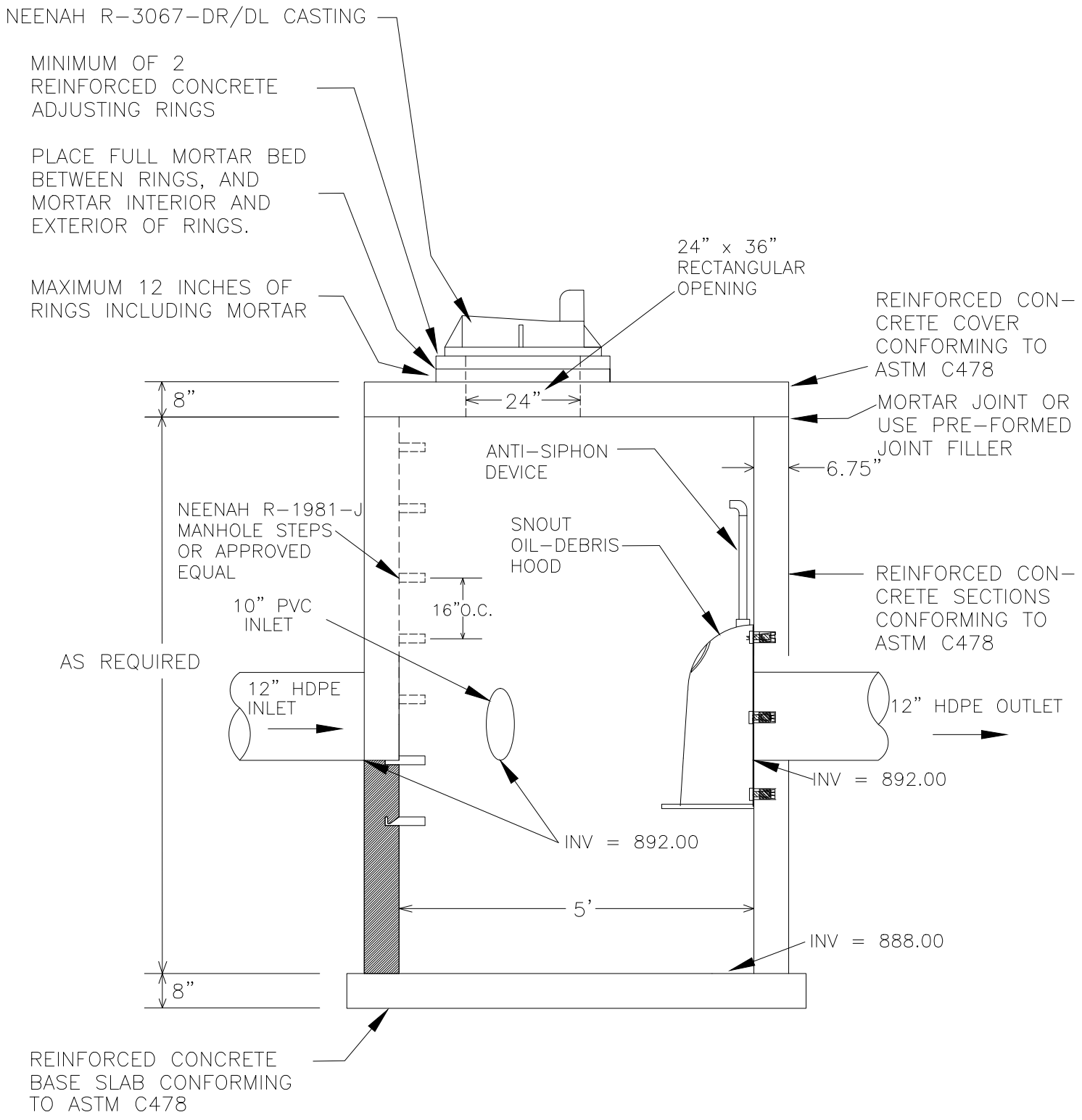
From
Ex. CB to CB#1 0.83 cfs @ 1.15% → 12" HDPE (Capacity = 4.14 cfs)
CB#1 to City CB 2.08 cfs @ 0.40% → 12" HDPE (Capacity = 2.44 cfs)

Pipe are sized for a 10-YR Storm Event. Capacity is calculated using Mannings Equation with n= 0.012.

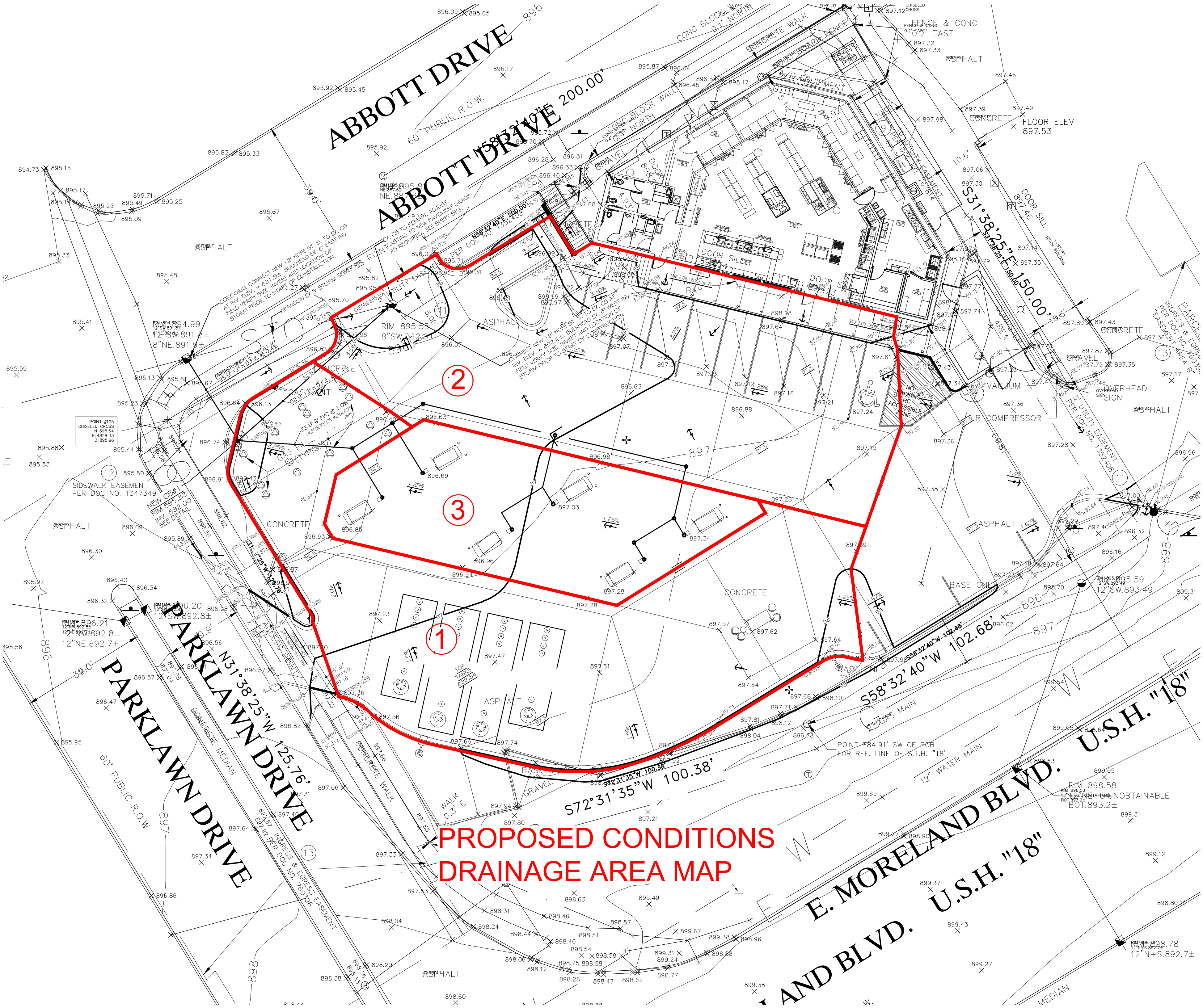
*See attached HydroCAD report for more details on runoff and pipe sizing.

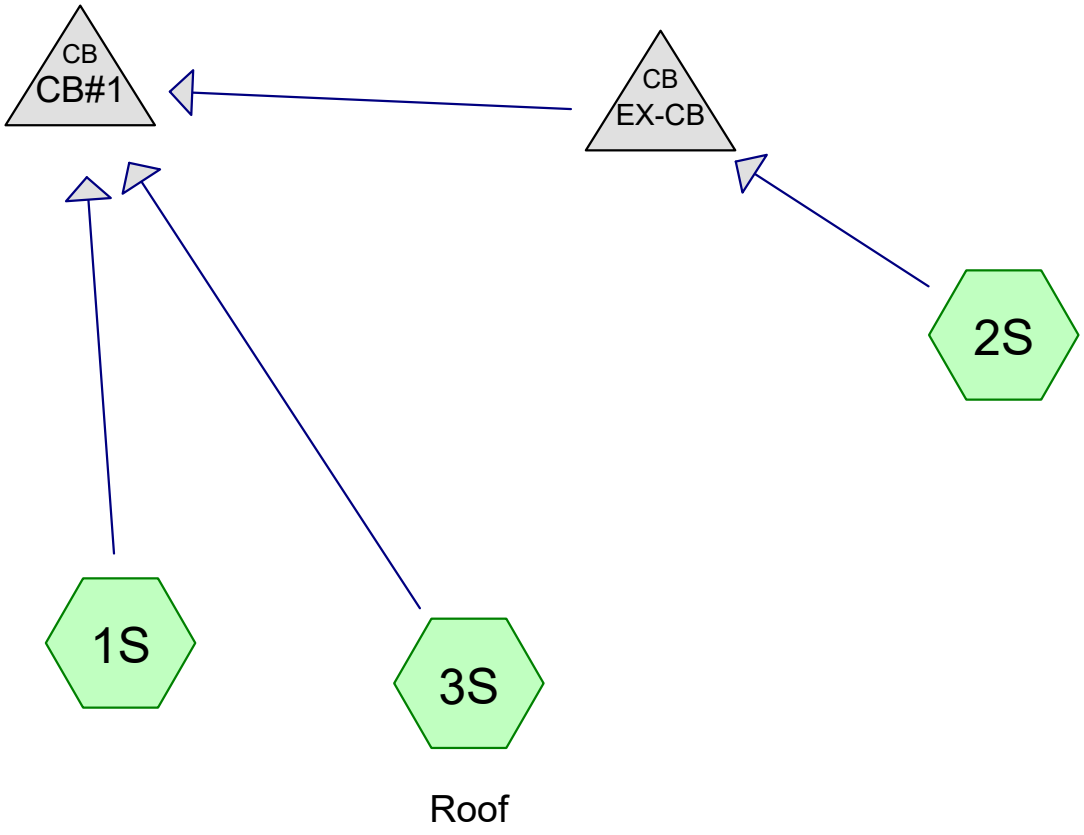
Inlet Capacity Calculations

Inlet Structure	Casting Type	Open Area (sf)	Top of Casting Elev.	Overflow Elev.	Inlet Capacity (cfs)	10-YR Flow to Inlet (cfs)
Ex. CB	Neenah R-1733	1.5	895.55	895.74	3.4	0.83
CB #1	Neenah R-3067 DR/DL	1.9	895.83	896.38	7.01	0.88



OIL SKIMMER CB #1


ABBOTT DRIVE
60' PUBLIC R.O.W.
N58°32'40"E 200.00'
PARKLAWN DRIVE
60' PUBLIC R.O.W.
N31°38'25"W 125.76'
S31°38'25"E 150.00'
S58°32'40"W 102.68'
S72°31'35"W 100.38'
E. MORELAND BLVD. U.S.H. "18"
ASPHALT
CONCRETE
GRAVEL
FLOOR ELEV 897.53
DOOR SILL
AIR COMPRESSOR
VACUUM
OVERHEAD SIGN
SIDEWALK EASEMENT PER DOC NO. 1347349
INGRESS & EGRESS EASEMENT PER DOC NO. 760396
12" WATER MAIN
GAS MAIN
1
2
3
PROPOSED CONDITIONS
DRAINAGE AREA MAP



Subcat Reach Pond Link

Routing Diagram for KT Waukesha 968
Prepared by Sunde Engineering, PLLC, Printed 3/12/2018

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1S: Runoff Area=7,280 sf 100.00% Impervious Runoff Depth=2.15"
Tc=6.0 min CN=98 Runoff=0.54 cfs 1,305 cf

Subcatchment 2S: Runoff Area=6,906 sf 100.00% Impervious Runoff Depth=2.15"
Tc=6.0 min CN=98 Runoff=0.51 cfs 1,238 cf

Subcatchment 3S: Roof Runoff Area=3,034 sf 100.00% Impervious Runoff Depth=2.15"
Tc=6.0 min CN=98 Runoff=0.23 cfs 544 cf

Pond CB#1: Peak Elev=892.74' Inflow=1.28 cfs 3,087 cf
12.0" Round Culvert n=0.013 L=25.0' S=0.0040 '/' Outflow=1.28 cfs 3,087 cf

Pond EX-CB: Peak Elev=892.96' Inflow=0.51 cfs 1,238 cf
12.0" Round Culvert n=0.013 L=52.0' S=0.0115 '/' Outflow=0.51 cfs 1,238 cf

Summary for Subcatchment 1S:

Runoff = 0.54 cfs @ 11.96 hrs, Volume= 1,305 cf, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.38"

	Area (sf)	CN	Description
*	7,280	98	Paved parking
	7,280		100.00% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 0.51 cfs @ 11.96 hrs, Volume= 1,238 cf, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.38"

	Area (sf)	CN	Description
*	6,906	98	Paved parking
	6,906		100.00% Impervious Area

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

Summary for Subcatchment 3S: Roof

Runoff = 0.23 cfs @ 11.96 hrs, Volume= 544 cf, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.38"

	Area (sf)	CN	Description
*	3,034	98	Roofs
	3,034		100.00% Impervious Area

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

Summary for Pond CB#1:

Inflow Area = 17,220 sf,100.00% Impervious, Inflow Depth = 2.15" for 1-yr event
Inflow = 1.28 cfs @ 11.96 hrs, Volume= 3,087 cf
Outflow = 1.28 cfs @ 11.96 hrs, Volume= 3,087 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.28 cfs @ 11.96 hrs, Volume= 3,087 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 892.74' @ 11.96 hrs
Flood Elev= 896.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 892.00' / 891.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.25 cfs @ 11.96 hrs HW=892.73' (Free Discharge)
1=Culvert (Barrel Controls 1.25 cfs @ 2.85 fps)

Summary for Pond EX-CB:

Inflow Area = 6,906 sf,100.00% Impervious, Inflow Depth = 2.15" for 1-yr event
Inflow = 0.51 cfs @ 11.96 hrs, Volume= 1,238 cf
Outflow = 0.51 cfs @ 11.96 hrs, Volume= 1,238 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 11.96 hrs, Volume= 1,238 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 892.96' @ 11.96 hrs
Flood Elev= 895.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.60'	**12.0" Round Culvert** L= 52.0' Ke= 0.500 Inlet / Outlet Invert= 892.60' / 892.00' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 11.96 hrs HW=892.95' (Free Discharge)
1=Culvert (Inlet Controls 0.50 cfs @ 2.02 fps)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1S: Runoff Area=7,280 sf 100.00% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=98 Runoff=0.62 cfs 1,492 cf

Subcatchment 2S: Runoff Area=6,906 sf 100.00% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=98 Runoff=0.58 cfs 1,416 cf

Subcatchment 3S: Roof Runoff Area=3,034 sf 100.00% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=98 Runoff=0.26 cfs 622 cf

Pond CB#1: Peak Elev=892.80' Inflow=1.45 cfs 3,530 cf
12.0" Round Culvert n=0.013 L=25.0' S=0.0040 '/' Outflow=1.45 cfs 3,530 cf

Pond EX-CB: Peak Elev=892.98' Inflow=0.58 cfs 1,416 cf
12.0" Round Culvert n=0.013 L=52.0' S=0.0115 '/' Outflow=0.58 cfs 1,416 cf

Summary for Subcatchment 1S:

Runoff = 0.62 cfs @ 11.96 hrs, Volume= 1,492 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.69"

	Area (sf)	CN	Description
*	7,280	98	Paved parking
	7,280		100.00% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 0.58 cfs @ 11.96 hrs, Volume= 1,416 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.69"

	Area (sf)	CN	Description
*	6,906	98	Paved parking
	6,906		100.00% Impervious Area

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

Summary for Subcatchment 3S: Roof

Runoff = 0.26 cfs @ 11.96 hrs, Volume= 622 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.69"

	Area (sf)	CN	Description
*	3,034	98	Roofs
	3,034		100.00% Impervious Area

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

Summary for Pond CB#1:

Inflow Area = 17,220 sf,100.00% Impervious, Inflow Depth = 2.46" for 2-yr event
Inflow = 1.45 cfs @ 11.96 hrs, Volume= 3,530 cf
Outflow = 1.45 cfs @ 11.96 hrs, Volume= 3,530 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 11.96 hrs, Volume= 3,530 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 892.80' @ 11.96 hrs
Flood Elev= 896.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 892.00' / 891.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.42 cfs @ 11.96 hrs HW=892.79' (Free Discharge)
1=Culvert (Barrel Controls 1.42 cfs @ 2.95 fps)

Summary for Pond EX-CB:

Inflow Area = 6,906 sf,100.00% Impervious, Inflow Depth = 2.46" for 2-yr event
Inflow = 0.58 cfs @ 11.96 hrs, Volume= 1,416 cf
Outflow = 0.58 cfs @ 11.96 hrs, Volume= 1,416 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.58 cfs @ 11.96 hrs, Volume= 1,416 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 892.98' @ 11.96 hrs
Flood Elev= 895.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.60'	**12.0" Round Culvert** L= 52.0' Ke= 0.500 Inlet / Outlet Invert= 892.60' / 892.00' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.57 cfs @ 11.96 hrs HW=892.98' (Free Discharge)
1=Culvert (Inlet Controls 0.57 cfs @ 2.09 fps)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1S: Runoff Area=7,280 sf 100.00% Impervious Runoff Depth=3.03"
Tc=6.0 min CN=98 Runoff=0.75 cfs 1,837 cf

Subcatchment 2S: Runoff Area=6,906 sf 100.00% Impervious Runoff Depth=3.03"
Tc=6.0 min CN=98 Runoff=0.71 cfs 1,742 cf

Subcatchment 3S: Roof Runoff Area=3,034 sf 100.00% Impervious Runoff Depth=3.03"
Tc=6.0 min CN=98 Runoff=0.31 cfs 765 cf

Pond CB#1: Peak Elev=892.90' Inflow=1.77 cfs 4,344 cf
12.0" Round Culvert n=0.013 L=25.0' S=0.0040 '/' Outflow=1.77 cfs 4,344 cf

Pond EX-CB: Peak Elev=893.03' Inflow=0.71 cfs 1,742 cf
12.0" Round Culvert n=0.013 L=52.0' S=0.0115 '/' Outflow=0.71 cfs 1,742 cf

Summary for Subcatchment 1S:

Runoff = 0.75 cfs @ 11.96 hrs, Volume= 1,837 cf, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=3.26"

	Area (sf)	CN	Description
*	7,280	98	Paved parking
	7,280		100.00% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 0.71 cfs @ 11.96 hrs, Volume= 1,742 cf, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=3.26"

	Area (sf)	CN	Description
*	6,906	98	Paved parking
	6,906		100.00% Impervious Area

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

Summary for Subcatchment 3S: Roof

Runoff = 0.31 cfs @ 11.96 hrs, Volume= 765 cf, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=3.26"

	Area (sf)	CN	Description
*	3,034	98	Roofs
	3,034		100.00% Impervious Area

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

Summary for Pond CB#1:

Inflow Area = 17,220 sf,100.00% Impervious, Inflow Depth = 3.03" for 5-yr event
Inflow = 1.77 cfs @ 11.96 hrs, Volume= 4,344 cf
Outflow = 1.77 cfs @ 11.96 hrs, Volume= 4,344 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.77 cfs @ 11.96 hrs, Volume= 4,344 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 892.90' @ 11.96 hrs
Flood Elev= 896.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 892.00' / 891.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.73 cfs @ 11.96 hrs HW=892.89' (Free Discharge)
1=Culvert (Barrel Controls 1.73 cfs @ 3.11 fps)

Summary for Pond EX-CB:

Inflow Area = 6,906 sf,100.00% Impervious, Inflow Depth = 3.03" for 5-yr event
Inflow = 0.71 cfs @ 11.96 hrs, Volume= 1,742 cf
Outflow = 0.71 cfs @ 11.96 hrs, Volume= 1,742 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.71 cfs @ 11.96 hrs, Volume= 1,742 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 893.03' @ 11.96 hrs
Flood Elev= 895.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.60'	**12.0" Round Culvert** L= 52.0' Ke= 0.500 Inlet / Outlet Invert= 892.60' / 892.00' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.69 cfs @ 11.96 hrs HW=893.02' (Free Discharge)
1=Culvert (Inlet Controls 0.69 cfs @ 2.21 fps)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1S: Runoff Area=7,280 sf 100.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=98 Runoff=0.88 cfs 2,169 cf

Subcatchment 2S: Runoff Area=6,906 sf 100.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=98 Runoff=0.83 cfs 2,058 cf

Subcatchment 3S: Roof Runoff Area=3,034 sf 100.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=98 Runoff=0.37 cfs 904 cf

Pond CB#1: Peak Elev=893.00' Inflow=2.08 cfs 5,131 cf
12.0" Round Culvert n=0.013 L=25.0' S=0.0040 '/' Outflow=2.08 cfs 5,131 cf

Pond EX-CB: Peak Elev=893.07' Inflow=0.83 cfs 2,058 cf
12.0" Round Culvert n=0.013 L=52.0' S=0.0115 '/' Outflow=0.83 cfs 2,058 cf

Summary for Subcatchment 1S:

Runoff = 0.88 cfs @ 11.96 hrs, Volume= 2,169 cf, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	7,280	98	Paved parking
	7,280		100.00% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 0.83 cfs @ 11.96 hrs, Volume= 2,058 cf, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	6,906	98	Paved parking
	6,906		100.00% Impervious Area

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

Summary for Subcatchment 3S: Roof

Runoff = 0.37 cfs @ 11.96 hrs, Volume= 904 cf, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.81"

	Area (sf)	CN	Description
*	3,034	98	Roofs
	3,034		100.00% Impervious Area

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

Summary for Pond CB#1:

Inflow Area = 17,220 sf,100.00% Impervious, Inflow Depth = 3.58" for 10-yr event
Inflow = 2.08 cfs @ 11.96 hrs, Volume= 5,131 cf
Outflow = 2.08 cfs @ 11.96 hrs, Volume= 5,131 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.08 cfs @ 11.96 hrs, Volume= 5,131 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 893.00' @ 11.96 hrs
Flood Elev= 896.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 892.00' / 891.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.03 cfs @ 11.96 hrs HW=892.99' (Free Discharge)
1=Culvert (Barrel Controls 2.03 cfs @ 3.25 fps)

Summary for Pond EX-CB:

Inflow Area = 6,906 sf,100.00% Impervious, Inflow Depth = 3.58" for 10-yr event
Inflow = 0.83 cfs @ 11.96 hrs, Volume= 2,058 cf
Outflow = 0.83 cfs @ 11.96 hrs, Volume= 2,058 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 11.96 hrs, Volume= 2,058 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 893.07' @ 11.96 hrs
Flood Elev= 895.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.60'	**12.0" Round Culvert** L= 52.0' Ke= 0.500 Inlet / Outlet Invert= 892.60' / 892.00' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 11.96 hrs HW=893.06' (Free Discharge)
1=Culvert (Inlet Controls 0.81 cfs @ 2.31 fps)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1S: Runoff Area=7,280 sf 100.00% Impervious Runoff Depth=5.93"
Tc=6.0 min CN=98 Runoff=1.43 cfs 3,599 cf

Subcatchment 2S: Runoff Area=6,906 sf 100.00% Impervious Runoff Depth=5.93"
Tc=6.0 min CN=98 Runoff=1.36 cfs 3,414 cf

Subcatchment 3S: Roof Runoff Area=3,034 sf 100.00% Impervious Runoff Depth=5.93"
Tc=6.0 min CN=98 Runoff=0.60 cfs 1,500 cf

Pond CB#1: Peak Elev=893.56' Inflow=3.38 cfs 8,512 cf
12.0" Round Culvert n=0.013 L=25.0' S=0.0040 '/' Outflow=3.38 cfs 8,512 cf

Pond EX-CB: Peak Elev=893.22' Inflow=1.36 cfs 3,414 cf
12.0" Round Culvert n=0.013 L=52.0' S=0.0115 '/' Outflow=1.36 cfs 3,414 cf

Summary for Subcatchment 1S:

Runoff = 1.43 cfs @ 11.96 hrs, Volume= 3,599 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.17"

	Area (sf)	CN	Description
*	7,280	98	Paved parking
	7,280		100.00% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 1.36 cfs @ 11.96 hrs, Volume= 3,414 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.17"

	Area (sf)	CN	Description
*	6,906	98	Paved parking
	6,906		100.00% Impervious Area

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

Summary for Subcatchment 3S: Roof

Runoff = 0.60 cfs @ 11.96 hrs, Volume= 1,500 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.17"

	Area (sf)	CN	Description
*	3,034	98	Roofs
	3,034		100.00% Impervious Area

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

Summary for Pond CB#1:

Inflow Area = 17,220 sf,100.00% Impervious, Inflow Depth = 5.93" for 100-yr event
Inflow = 3.38 cfs @ 11.96 hrs, Volume= 8,512 cf
Outflow = 3.38 cfs @ 11.96 hrs, Volume= 8,512 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.38 cfs @ 11.96 hrs, Volume= 8,512 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 893.56' @ 11.96 hrs
Flood Elev= 896.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.00'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 892.00' / 891.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.31 cfs @ 11.96 hrs HW=893.53' (Free Discharge)
1=Culvert (Barrel Controls 3.31 cfs @ 4.21 fps)

Summary for Pond EX-CB:

Inflow Area = 6,906 sf,100.00% Impervious, Inflow Depth = 5.93" for 100-yr event
Inflow = 1.36 cfs @ 11.96 hrs, Volume= 3,414 cf
Outflow = 1.36 cfs @ 11.96 hrs, Volume= 3,414 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.36 cfs @ 11.96 hrs, Volume= 3,414 cf

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 893.22' @ 11.96 hrs
Flood Elev= 895.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	892.60'	**12.0" Round Culvert** L= 52.0' Ke= 0.500 Inlet / Outlet Invert= 892.60' / 892.00' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.32 cfs @ 11.96 hrs HW=893.21' (Free Discharge)
1=Culvert (Inlet Controls 1.32 cfs @ 2.65 fps)