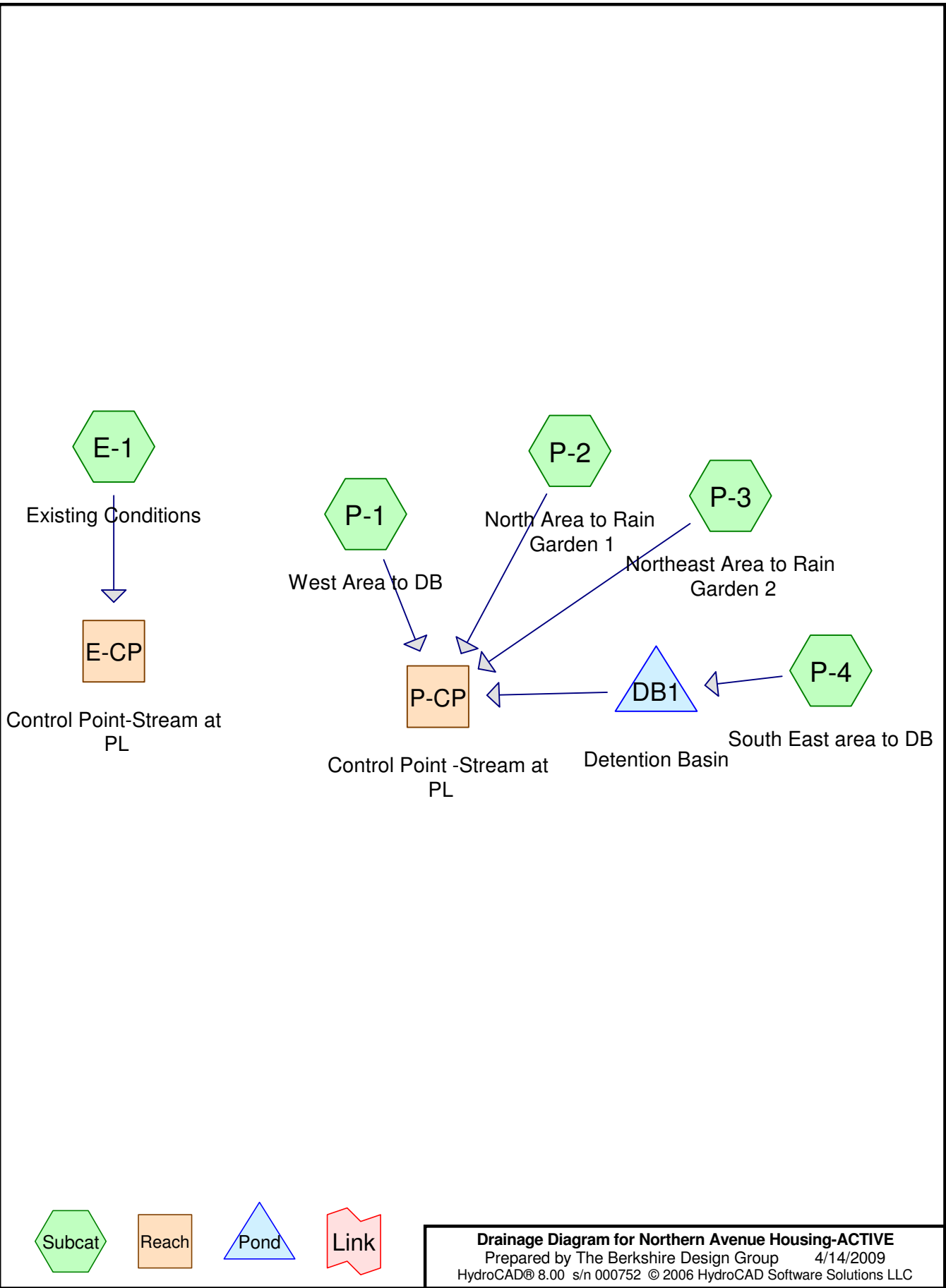


Appendix A – Pre- and Post Development Hydrologic Calculations



Northern Avenue Housing-ACTIVE

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Area Listing (selected nodes)

<u>Area (acres)</u>	<u>CN</u>	<u>Description (subcats)</u>
5.920	70	Woods, Good, HSG C (E-1,P-1,P-3,P-4)
3.824	74	>75% Grass cover, Good, HSG C (E-1,P-1,P-2,P-3,P-4)
4.416	78	Wetlands (E-1,P-1)
0.058	90	Patio (P-1,P-3,P-4)
0.092	98	Detention Basin (P-4)
1.332	98	Paved parking & roofs (E-1,P-1,P-2,P-3,P-4)
0.028	98	Rain Garden (P-2,P-3)
<hr/>		
15.671		

Northern Avenue Housing-ACTIVE

Type III 24-hr 2-Year Rainfall=2.95"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment E-1: Existing Conditions

Runoff Area=341,304 sf Runoff Depth>0.87"
Flow Length=570' Tc=23.1 min CN=74 Runoff=4.71 cfs 0.569 af

Subcatchment P-1: West Area to DB

Runoff Area=247,451 sf Runoff Depth>0.98"
Flow Length=575' Tc=23.6 min CN=76 Runoff=3.88 cfs 0.462 af

Subcatchment P-2: North Area to Rain Garden 1

Runoff Area=21,034 sf Runoff Depth>1.77"
Tc=5.0 min CN=88 Runoff=1.00 cfs 0.071 af

Subcatchment P-3: Northeast Area to Rain Garden 2

Runoff Area=24,881 sf Runoff Depth>1.21"
Tc=5.0 min CN=80 Runoff=0.80 cfs 0.058 af

Subcatchment P-4: South East area to DB

Runoff Area=47,938 sf Runoff Depth>1.47"
Tc=5.0 min CN=84 Runoff=1.90 cfs 0.135 af

Reach E-CP: Control Point-Stream at PL

Inflow=4.71 cfs 0.569 af
Outflow=4.71 cfs 0.569 af

Reach P-CP: Control Point -Stream at PL

Inflow=4.71 cfs 0.705 af
Outflow=4.71 cfs 0.705 af

Pond DB1: Detention Basin

Peak Elev=90.87' Storage=3,056 cf Inflow=1.90 cfs 0.135 af
Outflow=0.14 cfs 0.114 af

Total Runoff Area = 15.671 ac Runoff Volume = 1.295 af Average Runoff Depth = 0.99"
90.73% Pervious Area = 14.218 ac 9.27% Impervious Area = 1.452 ac

Northern Avenue Housing-ACTIVE

Type III 24-hr 2-Year Rainfall=2.95"

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Subcatchment E-1: Existing Conditions

Runoff = 4.71 cfs @ 12.36 hrs, Volume= 0.569 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.95"

Area (sf)	CN	Description
96,180	78	Wetlands
93,521	74	>75% Grass cover, Good, HSG C
6,300	98	Paved parking & roofs
145,303	70	Woods, Good, HSG C
341,304	74	Weighted Average
335,004		Pervious Area
6,300		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	60	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
4.8	280	0.0375	0.97		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	230	0.0174	0.33		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
23.1	570	Total			

Subcatchment P-1: West Area to DB

Runoff = 3.88 cfs @ 12.36 hrs, Volume= 0.462 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.95"

Area (sf)	CN	Description
96,180	78	Wetlands
41,250	74	>75% Grass cover, Good, HSG C
15,704	98	Paved parking & roofs
92,697	70	Woods, Good, HSG C
1,620	90	Patio
247,451	76	Weighted Average
231,747		Pervious Area
15,704		Impervious Area

Northern Avenue Housing-ACTIVE

Type III 24-hr 2-Year Rainfall=2.95"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	65	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
4.8	280	0.0375	0.97		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	230	0.0174	0.33		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
23.6	575	Total			

Subcatchment P-2: North Area to Rain Garden 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.00 cfs @ 12.08 hrs, Volume= 0.071 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.95"

Area (sf)	CN	Description
9,195	74	>75% Grass cover, Good, HSG C
11,109	98	Paved parking & roofs
730	98	Rain Garden
21,034	88	Weighted Average
9,195		Pervious Area
11,839		Impervious Area

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

Subcatchment P-3: Northeast Area to Rain Garden 2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.80 cfs @ 12.08 hrs, Volume= 0.058 af, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.95"

Area (sf)	CN	Description
8,504	74	>75% Grass cover, Good, HSG C
6,722	98	Paved parking & roofs
8,555	70	Woods, Good, HSG C
600	90	Patio
500	98	Rain Garden
24,881	80	Weighted Average
17,659		Pervious Area
7,222		Impervious Area

Northern Avenue Housing-ACTIVE

Type III 24-hr 2-Year Rainfall=2.95"

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

Subcatchment P-4: South East area to DB

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.90 cfs @ 12.08 hrs, Volume= 0.135 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.95"

Area (sf)	CN	Description
14,111	74	>75% Grass cover, Good, HSG C
18,205	98	Paved parking & roofs
11,322	70	Woods, Good, HSG C
4,000	98	Detention Basin
300	90	Patio
47,938	84	Weighted Average
25,733		Pervious Area
22,205		Impervious Area

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

Reach E-CP: Control Point-Stream at PL

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

Inflow Area = 7.835 ac, Inflow Depth > 0.87" for 2-Year event
Inflow = 4.71 cfs @ 12.36 hrs, Volume= 0.569 af
Outflow = 4.71 cfs @ 12.36 hrs, Volume= 0.569 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach P-CP: Control Point -Stream at PL

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

Inflow Area = 7.835 ac, Inflow Depth > 1.08" for 2-Year event
Inflow = 4.71 cfs @ 12.33 hrs, Volume= 0.705 af
Outflow = 4.71 cfs @ 12.33 hrs, Volume= 0.705 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr 2-Year Rainfall=2.95"

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Pond DB1: Detention Basin

Inflow Area = 1.101 ac, Inflow Depth > 1.47" for 2-Year event
 Inflow = 1.90 cfs @ 12.08 hrs, Volume= 0.135 af
 Outflow = 0.14 cfs @ 13.71 hrs, Volume= 0.114 af, Atten= 92%, Lag= 97.8 min
 Primary = 0.14 cfs @ 13.71 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 90.87' @ 13.71 hrs Surf.Area= 3,656 sf Storage= 3,056 cf

Plug-Flow detention time= 268.3 min calculated for 0.114 af (84% of inflow)
 Center-of-Mass det. time= 201.3 min (1,033.3 - 832.0)

Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	8,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	89.00'	126 cf	24.0"D x 40.00'L 24" Inlet Pipe (from DMH to Basin) S= 0.0040 '/'
#3	89.20'	352 cf	24.0"D x 112.00'L 24" Pipe (from SWTC to DMH) S= 0.0050 '/'
		9,028 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
90.00	2,789	0	0
91.00	3,500	3,145	3,145
92.00	4,269	3,885	7,029
92.33	4,953	1,522	8,551

Device	Routing	Invert	Outlet Devices
#1	Primary	89.90'	12.0" x 18.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 89.80' S= 0.0056 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#2	Device 1	90.00'	2.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	90.88'	1.20' W x 0.50' H Vert. Orifice/Grate C= 0.600
#4	Device 1	91.20'	3.0" Vert. Orifice/Grate X 3.00 C= 0.600

Primary OutFlow Max=0.14 cfs @ 13.71 hrs HW=90.87' (Free Discharge)

- ↑ 1=Culvert (Passes 0.14 cfs of 2.15 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.14 cfs @ 4.20 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)
- ↑ 4=Orifice/Grate (Controls 0.00 cfs)

Northern Avenue Housing-ACTIVE

Type III 24-hr 10-Year Rainfall=4.45"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment E-1: Existing Conditions

Runoff Area=341,304 sf Runoff Depth>1.92"

Flow Length=570' Tc=23.1 min CN=74 Runoff=11.07 cfs 1.256 af

Subcatchment P-1: West Area to DB

Runoff Area=247,451 sf Runoff Depth>2.08"

Flow Length=575' Tc=23.6 min CN=76 Runoff=8.66 cfs 0.984 af

Subcatchment P-2: North Area to Rain Garden 1

Runoff Area=21,034 sf Runoff Depth>3.15"

Tc=5.0 min CN=88 Runoff=1.76 cfs 0.127 af

Subcatchment P-3: Northeast Area to Rain Garden 2

Runoff Area=24,881 sf Runoff Depth>2.42"

Tc=5.0 min CN=80 Runoff=1.62 cfs 0.115 af

Subcatchment P-4: South East area to DB

Runoff Area=47,938 sf Runoff Depth>2.77"

Tc=5.0 min CN=84 Runoff=3.56 cfs 0.254 af

Reach E-CP: Control Point-Stream at PL

Inflow=11.07 cfs 1.256 af

Outflow=11.07 cfs 1.256 af

Reach P-CP: Control Point -Stream at PL

Inflow=11.06 cfs 1.446 af

Outflow=11.06 cfs 1.446 af

Pond DB1: Detention Basin

Peak Elev=91.27' Storage=4,569 cf Inflow=3.56 cfs 0.254 af

Outflow=1.14 cfs 0.220 af

Total Runoff Area = 15.671 ac Runoff Volume = 2.736 af Average Runoff Depth = 2.10"**90.73% Pervious Area = 14.218 ac 9.27% Impervious Area = 1.452 ac**

Northern Avenue Housing-ACTIVE

Type III 24-hr 10-Year Rainfall=4.45"

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Subcatchment E-1: Existing Conditions

Runoff = 11.07 cfs @ 12.33 hrs, Volume= 1.256 af, Depth> 1.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.45"

Area (sf)	CN	Description
96,180	78	Wetlands
93,521	74	>75% Grass cover, Good, HSG C
6,300	98	Paved parking & roofs
145,303	70	Woods, Good, HSG C
341,304	74	Weighted Average
335,004		Pervious Area
6,300		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	60	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
4.8	280	0.0375	0.97		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	230	0.0174	0.33		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
23.1	570	Total			

Subcatchment P-1: West Area to DB

Runoff = 8.66 cfs @ 12.34 hrs, Volume= 0.984 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.45"

Area (sf)	CN	Description
96,180	78	Wetlands
41,250	74	>75% Grass cover, Good, HSG C
15,704	98	Paved parking & roofs
92,697	70	Woods, Good, HSG C
1,620	90	Patio
247,451	76	Weighted Average
231,747		Pervious Area
15,704		Impervious Area

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Type III 24-hr 10-Year Rainfall=4.45"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	65	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
4.8	280	0.0375	0.97		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	230	0.0174	0.33		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
23.6	575	Total			

Subcatchment P-2: North Area to Rain Garden 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.76 cfs @ 12.07 hrs, Volume= 0.127 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.45"

Area (sf)	CN	Description
9,195	74	>75% Grass cover, Good, HSG C
11,109	98	Paved parking & roofs
730	98	Rain Garden
21,034	88	Weighted Average
9,195		Pervious Area
11,839		Impervious Area

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

Subcatchment P-3: Northeast Area to Rain Garden 2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.62 cfs @ 12.08 hrs, Volume= 0.115 af, Depth> 2.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.45"

Area (sf)	CN	Description
8,504	74	>75% Grass cover, Good, HSG C
6,722	98	Paved parking & roofs
8,555	70	Woods, Good, HSG C
600	90	Patio
500	98	Rain Garden
24,881	80	Weighted Average
17,659		Pervious Area
7,222		Impervious Area

Northern Avenue Housing-ACTIVE

Type III 24-hr 10-Year Rainfall=4.45"

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

Subcatchment P-4: South East area to DB

[49] Hint: Tc<2dt may require smaller dt

Runoff = 3.56 cfs @ 12.08 hrs, Volume= 0.254 af, Depth> 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.45"

Area (sf)	CN	Description
14,111	74	>75% Grass cover, Good, HSG C
18,205	98	Paved parking & roofs
11,322	70	Woods, Good, HSG C
4,000	98	Detention Basin
300	90	Patio
47,938	84	Weighted Average
25,733		Pervious Area
22,205		Impervious Area

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

Reach E-CP: Control Point-Stream at PL

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

Inflow Area = 7.835 ac, Inflow Depth > 1.92" for 10-Year event

Inflow = 11.07 cfs @ 12.33 hrs, Volume= 1.256 af

Outflow = 11.07 cfs @ 12.33 hrs, Volume= 1.256 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach P-CP: Control Point -Stream at PL

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

Inflow Area = 7.835 ac, Inflow Depth > 2.22" for 10-Year event

Inflow = 11.06 cfs @ 12.32 hrs, Volume= 1.446 af

Outflow = 11.06 cfs @ 12.32 hrs, Volume= 1.446 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Northern Avenue Housing-ACTIVE

Type III 24-hr 10-Year Rainfall=4.45"

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Pond DB1: Detention Basin

Inflow Area = 1.101 ac, Inflow Depth > 2.77" for 10-Year event
 Inflow = 3.56 cfs @ 12.08 hrs, Volume= 0.254 af
 Outflow = 1.14 cfs @ 12.39 hrs, Volume= 0.220 af, Atten= 68%, Lag= 19.1 min
 Primary = 1.14 cfs @ 12.39 hrs, Volume= 0.220 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 91.27' @ 12.39 hrs Surf.Area= 3,827 sf Storage= 4,569 cf

Plug-Flow detention time= 182.9 min calculated for 0.220 af (87% of inflow)
 Center-of-Mass det. time= 123.6 min (937.5 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	8,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	89.00'	126 cf	24.0"D x 40.00'L 24" Inlet Pipe (from DMH to Basin) S= 0.0040 '/'
#3	89.20'	352 cf	24.0"D x 112.00'L 24" Pipe (from SWTC to DMH) S= 0.0050 '/'
		9,028 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
90.00	2,789	0	0
91.00	3,500	3,145	3,145
92.00	4,269	3,885	7,029
92.33	4,953	1,522	8,551

Device	Routing	Invert	Outlet Devices
#1	Primary	89.90'	12.0" x 18.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 89.80' S= 0.0056 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#2	Device 1	90.00'	2.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	90.88'	1.20' W x 0.50' H Vert. Orifice/Grate C= 0.600
#4	Device 1	91.20'	3.0" Vert. Orifice/Grate X 3.00 C= 0.600

Primary OutFlow Max=1.14 cfs @ 12.39 hrs HW=91.27' (Free Discharge)

- ↑ 1=Culvert (Passes 1.14 cfs of 3.19 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.18 cfs @ 5.20 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 0.93 cfs @ 2.00 fps)
- ↑ 4=Orifice/Grate (Orifice Controls 0.03 cfs @ 0.89 fps)

Northern Avenue Housing-ACTIVE

Type III 24-hr 100-Year Rainfall=6.50"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment E-1: Existing Conditions

Runoff Area=341,304 sf Runoff Depth>3.59"

Flow Length=570' Tc=23.1 min CN=74 Runoff=21.00 cfs 2.346 af

Subcatchment P-1: West Area to DB

Runoff Area=247,451 sf Runoff Depth>3.80"

Flow Length=575' Tc=23.6 min CN=76 Runoff=15.93 cfs 1.798 af

Subcatchment P-2: North Area to Rain Garden 1

Runoff Area=21,034 sf Runoff Depth>5.11"

Tc=5.0 min CN=88 Runoff=2.80 cfs 0.205 af

Subcatchment P-3: Northeast Area to Rain Garden 2

Runoff Area=24,881 sf Runoff Depth>4.23"

Tc=5.0 min CN=80 Runoff=2.83 cfs 0.201 af

Subcatchment P-4: South East area to DB

Runoff Area=47,938 sf Runoff Depth>4.66"

Tc=5.0 min CN=84 Runoff=5.94 cfs 0.428 af

Reach E-CP: Control Point-Stream at PL

Inflow=21.00 cfs 2.346 af

Outflow=21.00 cfs 2.346 af

Reach P-CP: Control Point -Stream at PL

Inflow=20.85 cfs 2.586 af

Outflow=20.85 cfs 2.586 af

Pond DB1: Detention Basin

Peak Elev=91.71' Storage=6,310 cf Inflow=5.94 cfs 0.428 af

Outflow=2.84 cfs 0.380 af

Total Runoff Area = 15.671 ac Runoff Volume = 4.979 af Average Runoff Depth = 3.81"
90.73% Pervious Area = 14.218 ac 9.27% Impervious Area = 1.452 ac

Northern Avenue Housing-ACTIVE

Type III 24-hr 100-Year Rainfall=6.50"

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Subcatchment E-1: Existing Conditions

Runoff = 21.00 cfs @ 12.32 hrs, Volume= 2.346 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
96,180	78	Wetlands
93,521	74	>75% Grass cover, Good, HSG C
6,300	98	Paved parking & roofs
145,303	70	Woods, Good, HSG C
341,304	74	Weighted Average
335,004		Pervious Area
6,300		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	60	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
4.8	280	0.0375	0.97		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	230	0.0174	0.33		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
23.1	570	Total			

Subcatchment P-1: West Area to DB

Runoff = 15.93 cfs @ 12.33 hrs, Volume= 1.798 af, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
96,180	78	Wetlands
41,250	74	>75% Grass cover, Good, HSG C
15,704	98	Paved parking & roofs
92,697	70	Woods, Good, HSG C
1,620	90	Patio
247,451	76	Weighted Average
231,747		Pervious Area
15,704		Impervious Area

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Type III 24-hr 100-Year Rainfall=6.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	65	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
4.8	280	0.0375	0.97		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	230	0.0174	0.33		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
23.6	575	Total			

Subcatchment P-2: North Area to Rain Garden 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 2.80 cfs @ 12.07 hrs, Volume= 0.205 af, Depth> 5.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
9,195	74	>75% Grass cover, Good, HSG C
11,109	98	Paved parking & roofs
730	98	Rain Garden
21,034	88	Weighted Average
9,195		Pervious Area
11,839		Impervious Area

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

Subcatchment P-3: Northeast Area to Rain Garden 2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 2.83 cfs @ 12.07 hrs, Volume= 0.201 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
8,504	74	>75% Grass cover, Good, HSG C
6,722	98	Paved parking & roofs
8,555	70	Woods, Good, HSG C
600	90	Patio
500	98	Rain Garden
24,881	80	Weighted Average
17,659		Pervious Area
7,222		Impervious Area

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

Subcatchment P-4: South East area to DB

[49] Hint: Tc<2dt may require smaller dt

Runoff = 5.94 cfs @ 12.07 hrs, Volume= 0.428 af, Depth> 4.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
14,111	74	>75% Grass cover, Good, HSG C
18,205	98	Paved parking & roofs
11,322	70	Woods, Good, HSG C
4,000	98	Detention Basin
300	90	Patio
47,938	84	Weighted Average
25,733		Pervious Area
22,205		Impervious Area

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

Reach E-CP: Control Point-Stream at PL

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

Inflow Area = 7.835 ac, Inflow Depth > 3.59" for 100-Year event

Inflow = 21.00 cfs @ 12.32 hrs, Volume= 2.346 af

Outflow = 21.00 cfs @ 12.32 hrs, Volume= 2.346 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach P-CP: Control Point -Stream at PL

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

Inflow Area = 7.835 ac, Inflow Depth > 3.96" for 100-Year event

Inflow = 20.85 cfs @ 12.31 hrs, Volume= 2.586 af

Outflow = 20.85 cfs @ 12.31 hrs, Volume= 2.586 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr 100-Year Rainfall=6.50"

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Pond DB1: Detention Basin

Inflow Area = 1.101 ac, Inflow Depth > 4.66" for 100-Year event
 Inflow = 5.94 cfs @ 12.07 hrs, Volume= 0.428 af
 Outflow = 2.84 cfs @ 12.23 hrs, Volume= 0.380 af, Atten= 52%, Lag= 9.5 min
 Primary = 2.84 cfs @ 12.23 hrs, Volume= 0.380 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 91.71' @ 12.23 hrs Surf.Area= 4,052 sf Storage= 6,310 cf

Plug-Flow detention time= 128.4 min calculated for 0.380 af (89% of inflow)
 Center-of-Mass det. time= 76.6 min (875.8 - 799.2)

Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	8,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	89.00'	126 cf	24.0"D x 40.00'L 24" Inlet Pipe (from DMH to Basin) S= 0.0040 '/'
#3	89.20'	352 cf	24.0"D x 112.00'L 24" Pipe (from SWTC to DMH) S= 0.0050 '/'
		9,028 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
90.00	2,789	0	0
91.00	3,500	3,145	3,145
92.00	4,269	3,885	7,029
92.33	4,953	1,522	8,551

Device	Routing	Invert	Outlet Devices
#1	Primary	89.90'	12.0" x 18.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 89.80' S= 0.0056 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#2	Device 1	90.00'	2.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	90.88'	1.20' W x 0.50' H Vert. Orifice/Grate C= 0.600
#4	Device 1	91.20'	3.0" Vert. Orifice/Grate X 3.00 C= 0.600

Primary OutFlow Max=2.83 cfs @ 12.23 hrs HW=91.71' (Free Discharge)

- ↑ 1=Culvert (Passes 2.83 cfs of 4.33 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.21 cfs @ 6.10 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 2.18 cfs @ 3.64 fps)
- ↑ 4=Orifice/Grate (Orifice Controls 0.44 cfs @ 2.99 fps)