

**To:** Scott House, Director of Public Works, City of East Lansing  
Bob Scheuerman, Engineering Administrator, City of East Lansing

**From:** Brandon Elegert, Kimley-Horn  
Justin M. Muller, P.E., Kimley-Horn

**Date:** February 13, 2017

**Subj:** Downtown Lifestyle District  
Stormwater Management Memorandum

The proposed Downtown Lifestyle District is located along East Grand River Avenue between Abbot Road and M.A.C. Avenue in East Lansing, MI. The redevelopment consists of construction of an approximate 22,300 square foot anchor retailer, 21,000 square feet of specialty retail, 271 units of market rate apartments, 93 units of 55 and older apartments, and a 715 stall parking garage. The development will be constructed in the current location of a public surface parking lot (Lot 1) and existing 1- and 2-story buildings located at 125, 135, and 201 East Grand River Avenue.

The purpose of this Memorandum is to summarize the existing and proposed stormwater discharges from the Site. The drainage was analyzed utilizing HydroCAD version 10.0.

**Existing Conditions**

As mentioned, the proposed redevelopment will replace Lot 1 and the existing buildings along Grand River Avenue. The existing buildings that will be demolished consists of retail, apartments, and restaurants. Lot 1 is a paved surface parking lot consisting of approximately **5,400 square feet of landscaped areas.**

The Site is serviced by an existing combined sewer system within a public alley. The existing system ranges from an 18” pipe to a 21” pipe which flows from west to east. Downstream of the alley the pipe is upsized to 24” as noted in City provided utility maps and a topographic survey.

The combined sewer receives sanitary discharge from the buildings along Grand River and stormwater discharge from Lot 1. HydroCAD version 10.0 was utilized to evaluate the runoff generated by the project area. Per the City Stormwater Design Manual the Site is reduce the volume and pre-development rate of a 2-year, 24 hour storm. Based on conversations with City Staff, the Site is exempt from the “water quality treatment performance standard” since the Site discharges to a combined sewer system. Below is a summary of the runoff and volume from a 2-year, 24-hour storm.

Table 1: Existing Storm Rates

<b>Existing Drainage Area</b>	<b>Q(cfs)</b>	<b>Volume (ac*ft)</b>
V-DA-1	<b>11.91</b>	<b>0.617</b>

An existing drainage area map and the HydroCAD model is included within the appendix.

**Proposed Conditions**

In the proposed conditions, the anchor retailer and the market rate apartments will discharge to the combined sewer within the alley. As discussed with the City of East Lansing, the proposed development on the existing Lot 1 parcel (specialty retail, 55 and older apartments and parking structure) will discharge to a recently constructed 36” combined sewer within Albert Avenue. The proposed development will include streetscape with proposed landscaping as well as amenity

decks for the proposed market rate apartments as well as the 55 and older apartments. Below is a summary of the proposed landscaped areas on the project.

Table 2: Proposed Landscaped Area

Site Area	Landscaped Area (SF)
Albert Avenue	2,278
Grand River Avenue	500
Market Rate Apartment Amenity Deck	1,987
55 and Older Amenity Deck	1,789
<b>Total</b>	<b>6,554</b>

A 2-year, 24-hour rain event was determined using runoff rates as established by the City of East Lansing's Post Construction Stormwater Management Guidance Manual. The table below provides a summary of the runoff rate due to a 2-year, 24-hour event.

Table 3: Proposed Storm Rates

Existing Drainage Area	Q(cfs)	Volume (ac*ft)	Notes
C-DA-1	6.98	0.361	Discharges to Alley
C-DA-2	4.93	0.255	Discharges to Albert
<b>Total</b>	<b>11.91</b>	<b>0.616</b>	

The proposed development maintains the existing runoff rates and volumes per the City's Stormwater Management Guidelines and increases the amount of pervious area in comparison with the existing conditions.

Please contact me at (651) 643-0488 if you have any questions.

Sincerely,

**KIMLEY-HORN OF MICHIGAN**

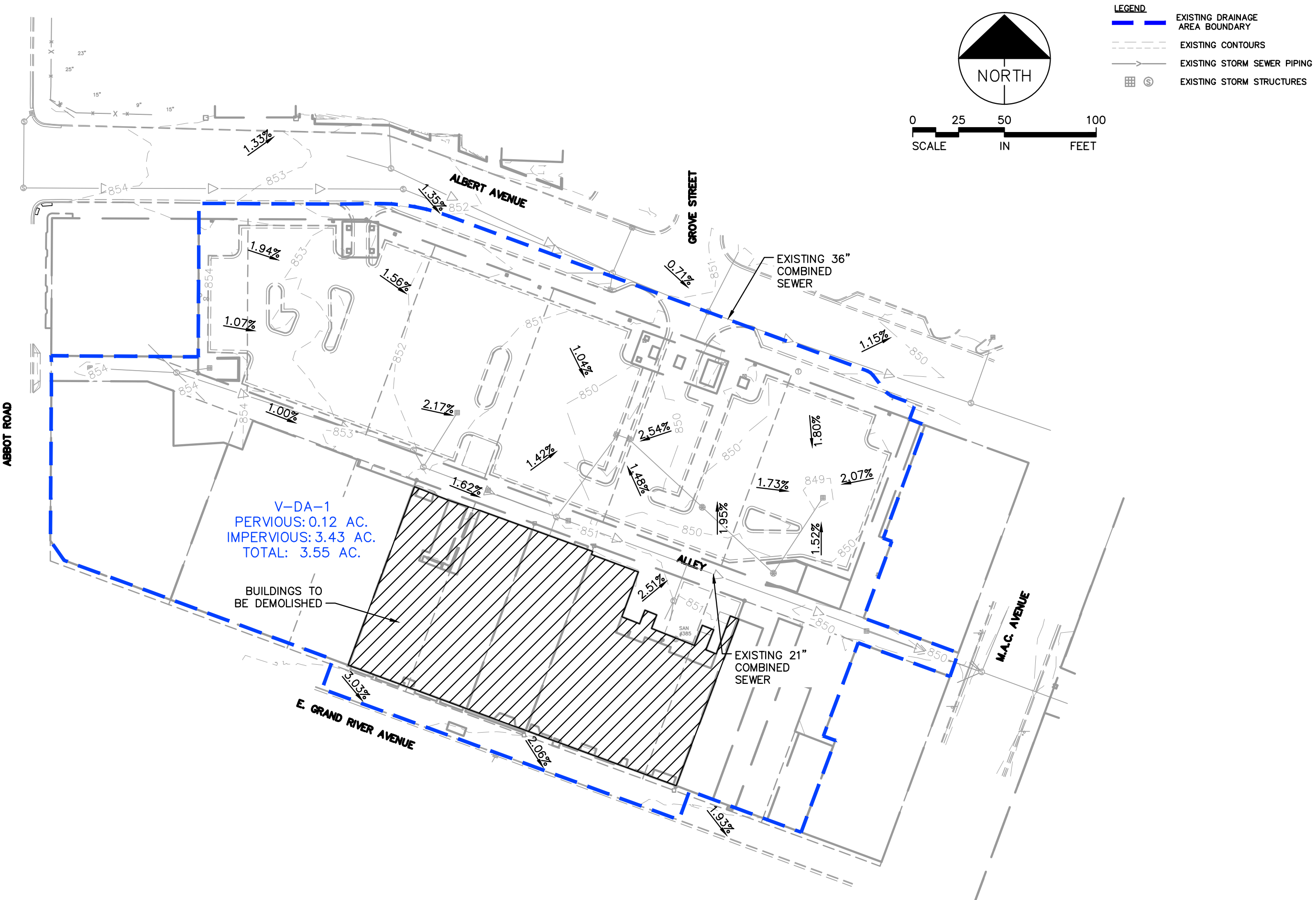


Brandon R. Elegert  
Project Manager

Appendices:

- Appendix 1: Pre-Development Drainage Area Exhibit
- Appendix 2: Post-Development Drainage Area Exhibit
- Appendix 3: Pre-Development HydroCAD Model
- Appendix 4: Post-Development HydroCAD Model

**APPENDIX 1: PRE-DEVELOPMENT DRAINAGE AREA EXHIBIT**



SHEET NO.  
**D-1**

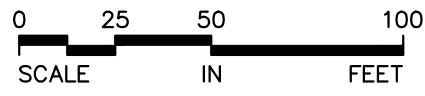
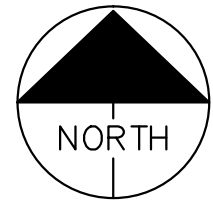
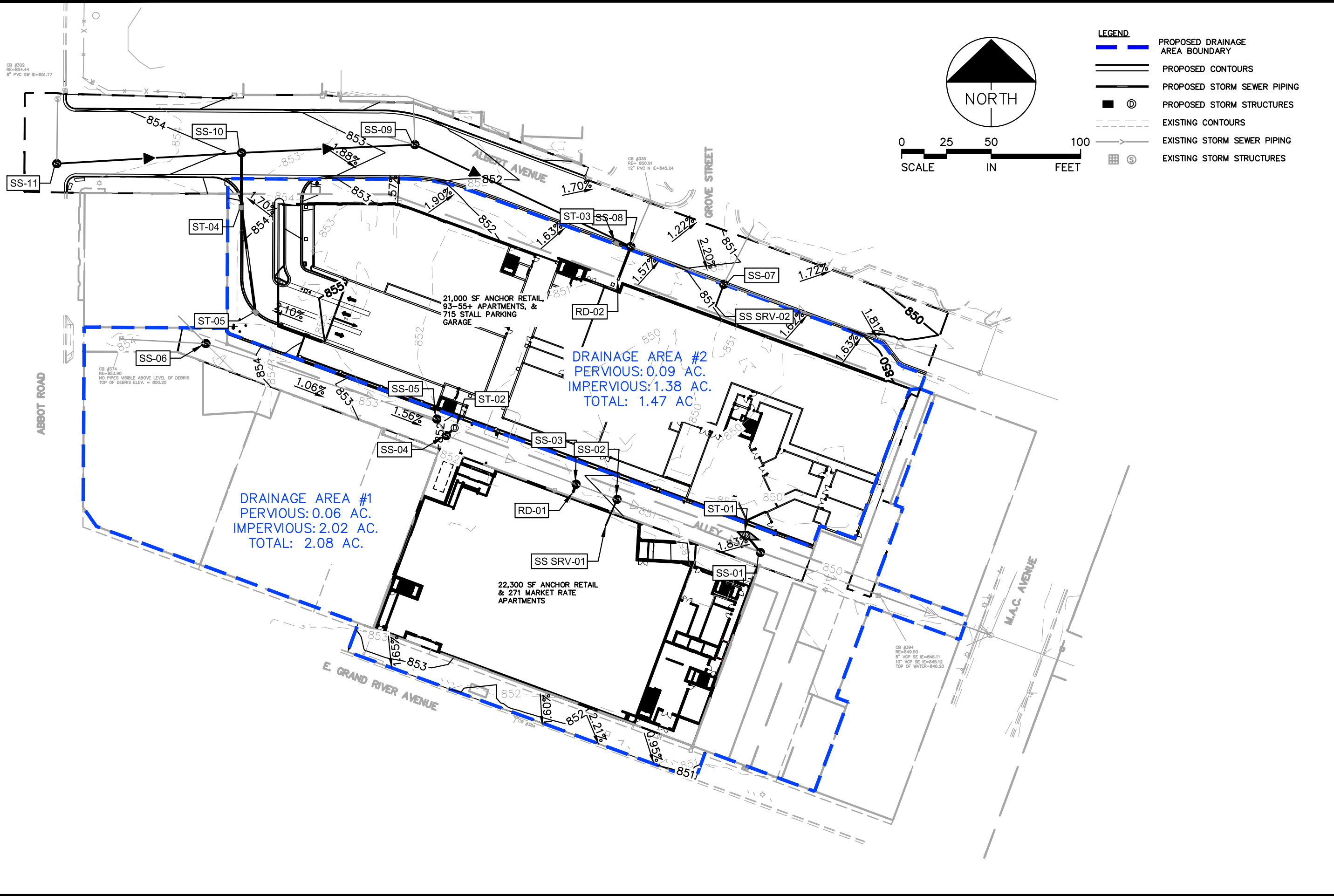
DRAWN BY: APD  
DATE: 02/13/17

PRE-DEVELOPMENT  
DRAINAGE EXHIBIT

DOWNTOWN LIFESTYLE  
DISTRICT

**Kimley»Horn**  
2080 UNIVERSITY AVENUE WEST, SUITE 2000, ST. PAUL, MN 55114  
PHONE: 651-948-4107  
WWW.KIMLEY-HORN.COM

**APPENDIX 2: POST-DEVELOPMENT DRAINAGE AREA EXHIBIT**



- LEGEND**
- PROPOSED DRAINAGE AREA BOUNDARY
  - PROPOSED CONTOURS
  - PROPOSED STORM SEWER PIPING
  - ⊙ PROPOSED STORM STRUCTURES
  - EXISTING CONTOURS
  - EXISTING STORM SEWER PIPING
  - ⊙ EXISTING STORM STRUCTURES

SHEET NO.  
**D-2**

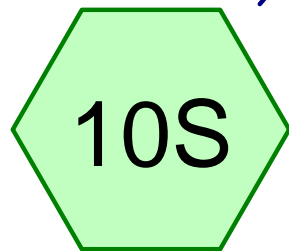
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POST-DEVELOPMENT  
 DRAINAGE EXHIBIT

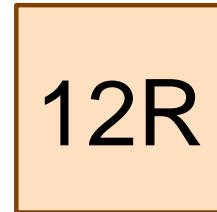
DOWNTOWN LIFESTYLE  
 DISTRICT

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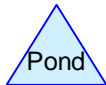
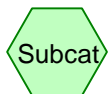
**APPENDIX 3: PRE-DEVELOPMENT HYDROCAD MODEL**



V-DA-1



V-Runoff



Routing Diagram for Downtown Lifestyle District - Pre-Development Drainage

Prepared by Kimley-Horn and Associates, Printed 2/10/2017

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# Downtown Lifestyle District - Pre-Development Drainage

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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.120	74	>75% Grass cover, Good, HSG C (10S)
3.430	98	Paved parking, HSG B (10S)
<b>3.550</b>	<b>97</b>	<b>TOTAL AREA</b>

# Downtown Lifestyle District - Pre-Development Drainage

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.430	HSG B	10S
0.120	HSG C	10S
0.000	HSG D	
0.000	Other	
<b>3.550</b>		<b>TOTAL AREA</b>

## Downtown Lifestyle District - Pre-Development Drainage

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.120	0.000	0.000	0.120	>75% Grass cover, Good	10S
0.000	3.430	0.000	0.000	0.000	3.430	Paved parking	10S
<b>0.000</b>	<b>3.430</b>	<b>0.120</b>	<b>0.000</b>	<b>0.000</b>	<b>3.550</b>	<b>TOTAL AREA</b>	

**Downtown Lifestyle District - Pre-Development Drainage** *Type II 24-hr 2-year Rainfall=2.42"*

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Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 10S: V-DA-1**

Runoff Area=3.550 ac 96.62% Impervious Runoff Depth=2.08"  
Tc=5.0 min CN=97 Runoff=11.91 cfs 0.617 af

**Reach 12R: V-Runoff**

Inflow=11.91 cfs 0.617 af  
Outflow=11.91 cfs 0.617 af

**Total Runoff Area = 3.550 ac Runoff Volume = 0.617 af Average Runoff Depth = 2.08"**  
**3.38% Pervious = 0.120 ac 96.62% Impervious = 3.430 ac**

**Summary for Subcatchment 10S: V-DA-1**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 11.91 cfs @ 11.95 hrs, Volume= 0.617 af, Depth= 2.08"

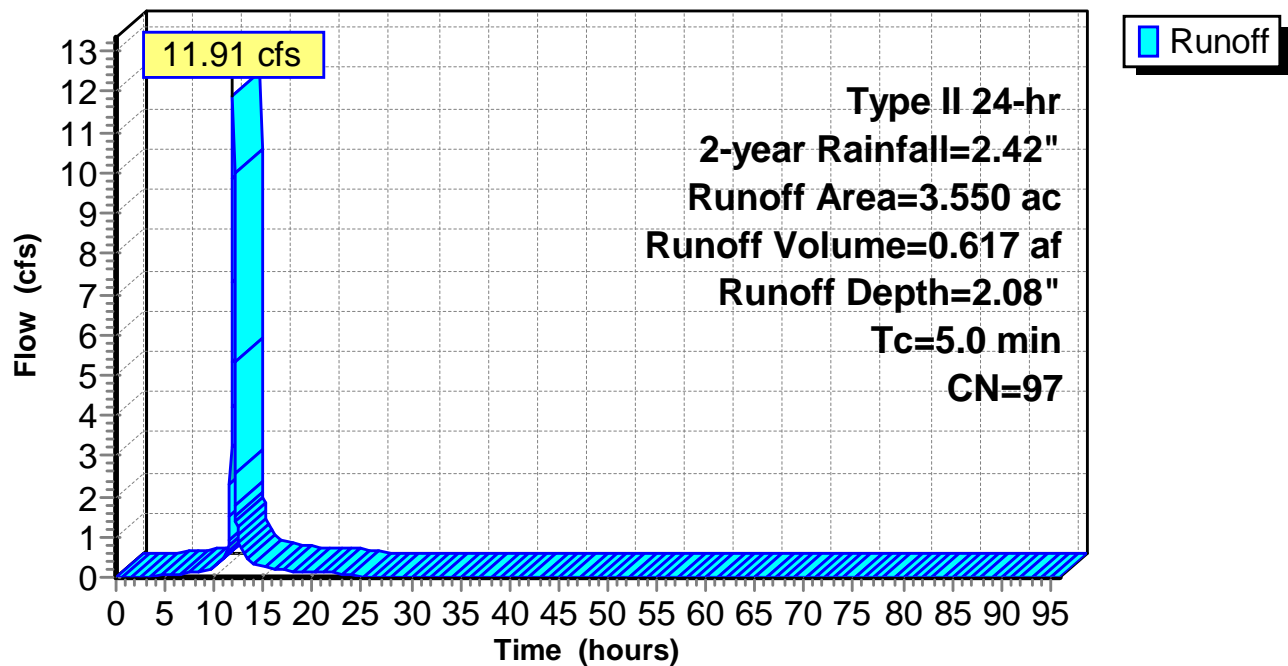
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-year Rainfall=2.42"

Area (ac)	CN	Description
3.430	98	Paved parking, HSG B
0.120	74	>75% Grass cover, Good, HSG C
3.550	97	Weighted Average
0.120		3.38% Pervious Area
3.430		96.62% Impervious Area

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

**Subcatchment 10S: V-DA-1**

**Hydrograph**



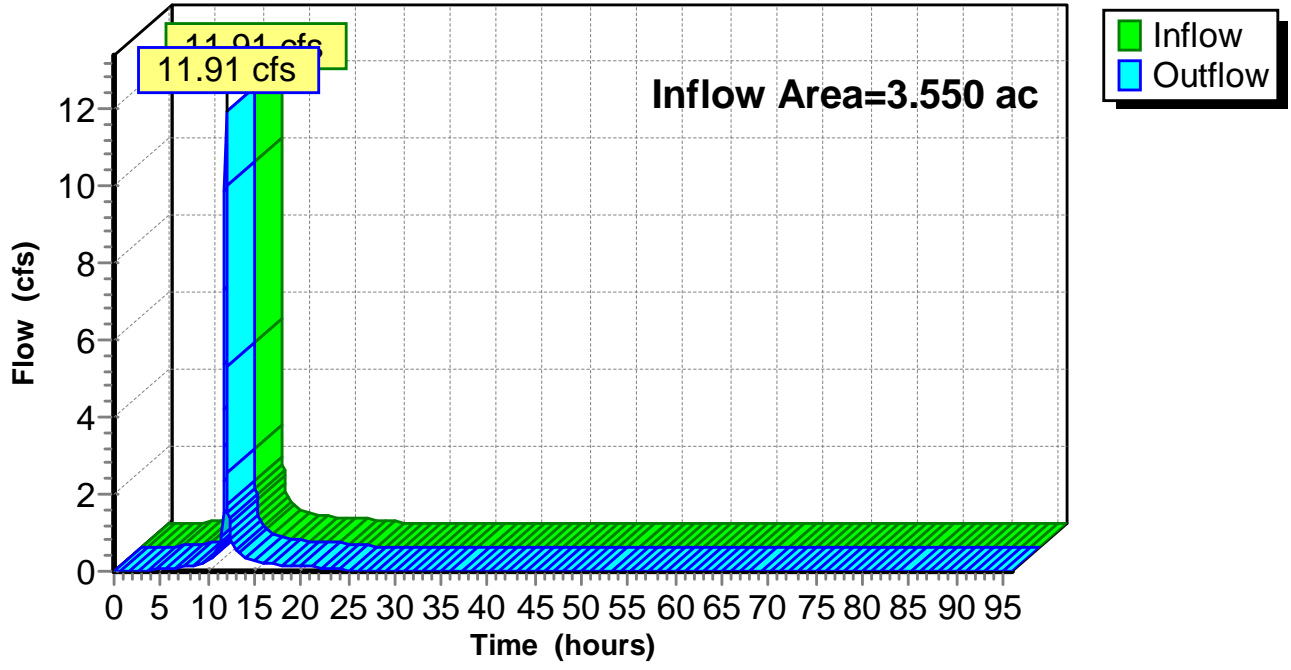
### Summary for Reach 12R: V-Runoff

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

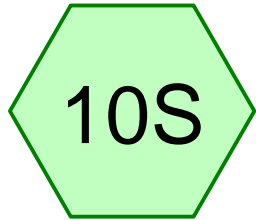
Inflow Area = 3.550 ac, 96.62% Impervious, Inflow Depth = 2.08" for 2-year event  
Inflow = 11.91 cfs @ 11.95 hrs, Volume= 0.617 af  
Outflow = 11.91 cfs @ 11.95 hrs, Volume= 0.617 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

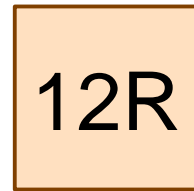
#### Reach 12R: V-Runoff Hydrograph



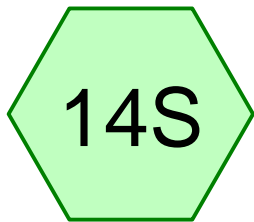
**APPENDIX 4: POST-DEVELOPMENT HYDROCAD MODEL**



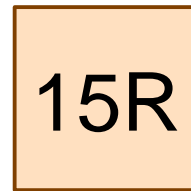
C-DA-1



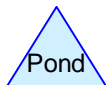
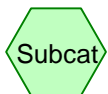
Alley



C-DA-2



Albert Avenue



Routing Diagram for Downtown Lifestyle District - Post-Development Drainage

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## Downtown Lifestyle District - Post-Development Drainage

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### Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	74	<50% Grass cover, Poor, HSG C (10S, 14S)
3.400	98	Paved parking, HSG B (10S, 14S)
<b>3.550</b>	<b>97</b>	<b>TOTAL AREA</b>

# Downtown Lifestyle District - Post-Development Drainage

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.400	HSG B	10S, 14S
0.150	HSG C	10S, 14S
0.000	HSG D	
0.000	Other	
<b>3.550</b>		<b>TOTAL AREA</b>

## Downtown Lifestyle District - Post-Development Drainage

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.150	0.000	0.000	0.150	<50% Grass cover, Poor	10S, 14S
0.000	3.400	0.000	0.000	0.000	3.400	Paved parking	10S, 14S
<b>0.000</b>	<b>3.400</b>	<b>0.150</b>	<b>0.000</b>	<b>0.000</b>	<b>3.550</b>	<b>TOTAL AREA</b>	

**Downtown Lifestyle District - Post-Development Drainage** Type II 24-hr 2-year Rainfall=2.42"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 10S: C-DA-1** Runoff Area=2.080 ac 97.12% Impervious Runoff Depth=2.08"  
Tc=5.0 min CN=97 Runoff=6.98 cfs 0.361 af

**Subcatchment 14S: C-DA-2** Runoff Area=1.470 ac 93.88% Impervious Runoff Depth=2.08"  
Tc=5.0 min CN=97 Runoff=4.93 cfs 0.255 af

**Reach 12R: Alley** Inflow=6.98 cfs 0.361 af  
Outflow=6.98 cfs 0.361 af

**Reach 15R: Albert Avenue** Inflow=4.93 cfs 0.255 af  
Outflow=4.93 cfs 0.255 af

**Total Runoff Area = 3.550 ac Runoff Volume = 0.617 af Average Runoff Depth = 2.08"**  
**4.23% Pervious = 0.150 ac 95.77% Impervious = 3.400 ac**

**Summary for Subcatchment 10S: C-DA-1**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 6.98 cfs @ 11.95 hrs, Volume= 0.361 af, Depth= 2.08"

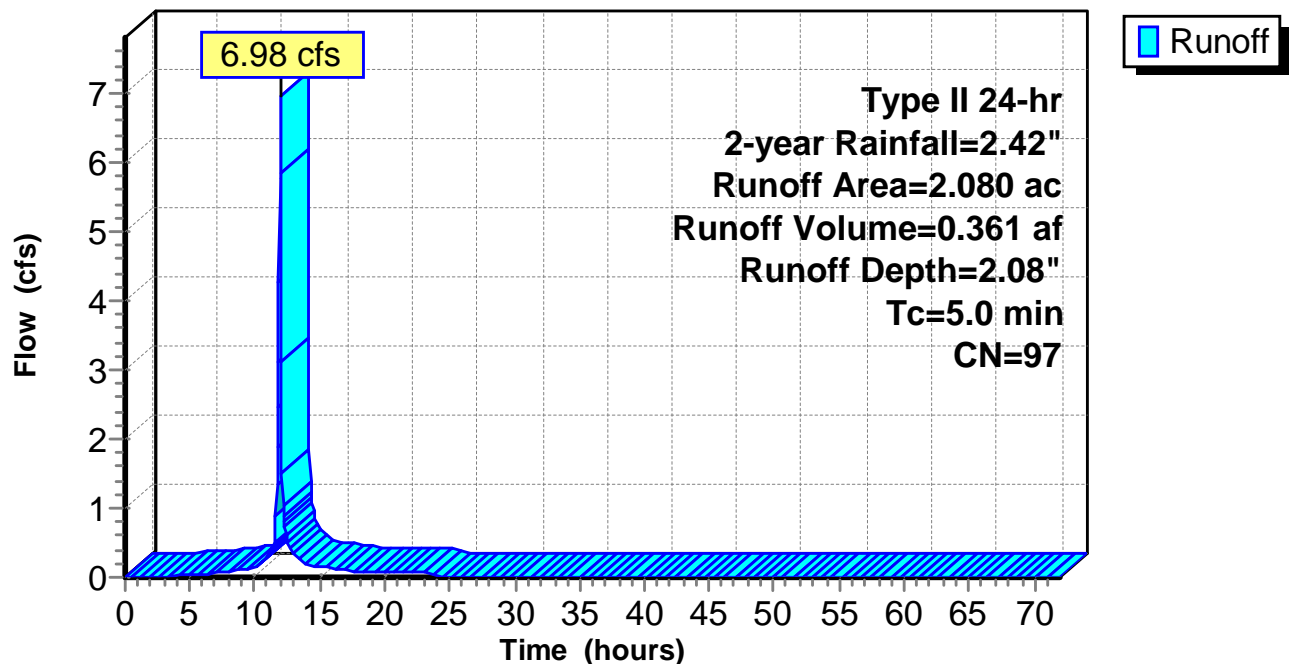
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-year Rainfall=2.42"

Area (ac)	CN	Description
2.020	98	Paved parking, HSG B
* 0.060	74	<50% Grass cover, Poor, HSG C
2.080	97	Weighted Average
0.060		2.88% Pervious Area
2.020		97.12% Impervious Area

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

**Subcatchment 10S: C-DA-1**

**Hydrograph**



**Summary for Subcatchment 14S: C-DA-2**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 4.93 cfs @ 11.95 hrs, Volume= 0.255 af, Depth= 2.08"

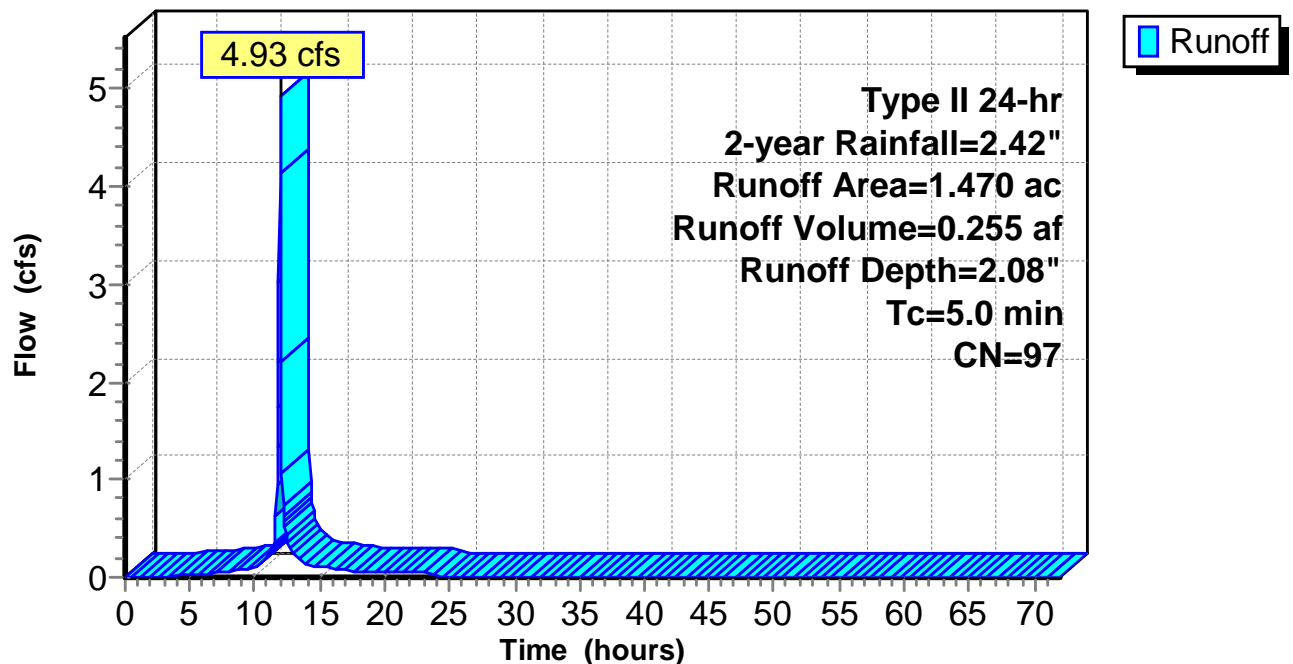
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-year Rainfall=2.42"

Area (ac)	CN	Description
1.380	98	Paved parking, HSG B
* 0.090	74	<50% Grass cover, Poor, HSG C
1.470	97	Weighted Average
0.090		6.12% Pervious Area
1.380		93.88% Impervious Area

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

**Subcatchment 14S: C-DA-2**

**Hydrograph**



### Summary for Reach 12R: Alley

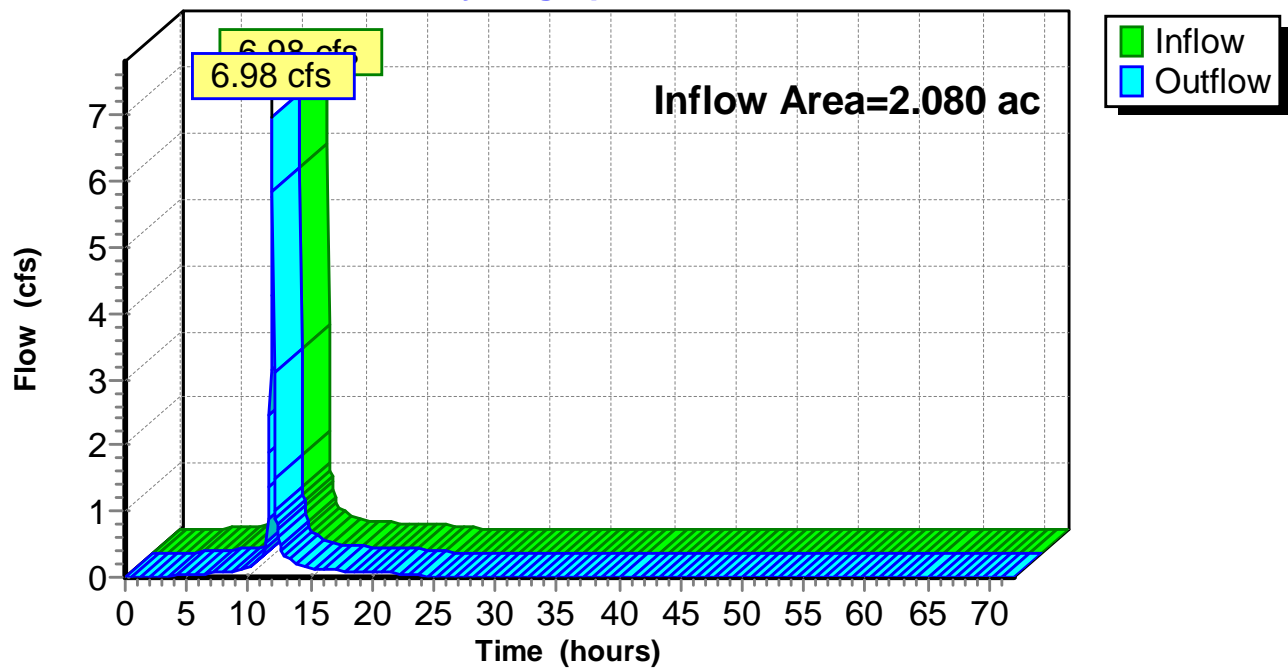
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.080 ac, 97.12% Impervious, Inflow Depth = 2.08" for 2-year event  
Inflow = 6.98 cfs @ 11.95 hrs, Volume= 0.361 af  
Outflow = 6.98 cfs @ 11.95 hrs, Volume= 0.361 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach 12R: Alley

#### Hydrograph



### Summary for Reach 15R: Albert Avenue

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

Inflow Area = 1.470 ac, 93.88% Impervious, Inflow Depth = 2.08" for 2-year event  
Inflow = 4.93 cfs @ 11.95 hrs, Volume= 0.255 af  
Outflow = 4.93 cfs @ 11.95 hrs, Volume= 0.255 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach 15R: Albert Avenue

#### Hydrograph

