

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: East Lansing Downtown Lifestyle District
Combines Sewer Capacity Analysis

The proposed Downtown Lifestyle District project 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 provide anticipated combined sanitary sewer flows to evaluate the downstream capacity of the existing infrastructure.

Project Assumptions

To determine the existing and proposed sanitary and storm sewer flows there have been several assumptions made based on the City of East Lansing's "Albert Street Sewer Study" prepared by Hubbel, Roth, & Clark, Inc. dated February 11, 2011.

The following assumptions have been made to determine flow from the existing and proposed uses;

- Flow discharge is quantified by a "Residential Equivalency Unit" (REU)
- 1 REU = 315 gallons/day
- Peaking Factor = 4.0
- REU's for existing and proposed uses are as followed:
 - Retail: 0.14 REU/1,000 SF
 - Office: 0.40 REU/1,000 SF
 - Restaurant: 1.5 REU/1,000 SF
 - Residential: 1 REU = # Occupants/3.5 people
- Storm runoff rates modeled with a 10-year, 24-hour storm (3.43 in/hr) as described in the City of East Lansing's Post Construction Stormwater Management Guidance Manual

Existing Conditions

The proposed redevelopment will replace Lot 1 and the existing buildings along Grand River Avenue. Lot 1 is an existing paved parking lot with minimal landscaped area. The existing buildings that will be demolished consists of retail, apartments, and restaurants. Currently the Site is serviced by an existing combined sewer system within a public alley, as shown in the attached exhibit. The combined system conveys sanitary sewage and stormwater flow from the existing buildings and stormwater from Lot 1 and the 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.

Existing Sanitary Flow

To determine the existing flow generated by the project area, the sanitary sewer flow and stormwater discharge was evaluated. The sanitary sewer flow was determined by reviewing the

assumed uses of the existing buildings and a topographic survey of the properties along Grand River Avenue. A peaking factor of 4.0 was applied based on guidance from the City. A table is provided within the appendix which summarizes the existing flow from the project area.

The total peak daily sanitary flow is 100,062 gallons per day or **0.15 cfs**.

Existing Stormwater Flow

The combined sewer also receives discharge from stormwater runoff from Lot 1 and the adjacent building rooftops. HydroCAD version 10.0 was utilized to evaluate the runoff generated by the project area. A 10-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 10-year, 24-hour event.

Table 2: Existing Storm Rates

Existing Drainage Area	Area (ac)	Weighted CN	Time of Concentration (min)	Q(cfs)
V-DA-1	3.55	97	5	17.21

Existing Sewer Capacity

The total existing flow entering into the combined sewer is **17.36 cfs**. Based on the calculations provided above the project area contributes approximately 110% of the available capacity of a 21” pipe based on the existing pipe slope of 0.84%.

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.

Proposed Sanitary Flow – Alley Combined Sewer

The proposed sanitary flow was determined by utilizing the method above. A peaking factor of 4.0 was applied as previously discussed. A table is provided within the appendix which summarizes the proposed flow from the project area.

The proposed peak daily sanitary flow to the alley combined sewer is 255,508 gallons per day or **0.35 cfs**.

Proposed Stormwater Flow – Alley Combined Sewer

The alley combined sewer also receives discharge from stormwater runoff from the existing and proposed rooftops and the alley. The stormwater flow from the buildings proposed on Lot 1 will be discharged to Albert Avenue. A 10-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 10-year, 24-hour event.

Table 4: Proposed Storm Rates

Existing Drainage Area	Area (ac)	Weighted CN	Time of Concentration (min)	Q(cfs)
C-DA-1	2.08	97	5	10.09

Proposed Sewer Rates - Alley

The total proposed flow entering into the combined sewer is **10.44 cfs**. Based on the calculations provided above the project area contributes approximately 66% of the available capacity of the

Technical Memorandum

pipe. Based on the reduction of stormwater discharge to the existing combined sewer main, upgrades to the existing combined sewer will not be required.

Proposed Sanitary Flow – Albert Avenue Combined Sewer

The proposed sanitary flow was determined by utilizing the proposed water meter sizes. A peaking factor of 4.0 was applied. As previously mentioned, the City has recently upgraded the combined sewer within Albert Avenue to be 36" in anticipation of a redevelopment of Lot 1. A table is provided within the appendix which summarizes the proposed flow from the project area.

The proposed peak daily sanitary flow to the Albert Avenue combined sewer is 52,664 gallons per day or **0.08 cfs**.

Proposed Stormwater Flow – Albert Avenue Combined Sewer

The combined sewer also receives discharge from stormwater runoff from the existing and proposed buildings. A 10-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 10-year, 24-hour event.

Table 6: Proposed Storm Rates

Existing Drainage Area	Area (ac)	Weighted CN	Time of Concentration (min)	Q(cfs)
C-DA-2	1.47	97	5	7.13

Proposed Sewer Rates – Albert Avenue

The total proposed flow entering into the combined sewer is **7.21 cfs**. Based on the "Albert Street Sewer Study" as provided by the City, the Albert Avenue combined sewer was estimated to receive approximately 8.1 cfs due to the redevelopment of Lot 1. Based on the calculations above, it is determined that the 36" combined sewer within Albert Avenue has adequate capacity for the redevelopment of Lot 1.

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: Existing Sanitary Sewer Flows From Project Area
- Appendix 2: Existing Project Area Exhibit
- Appendix 3: Proposed Sanitary Sewer Flows From Project Area
- Appendix 4: Proposed Project Area Exhibit
- Appendix 5: Pre-Development HydroCAD Model
- Appendix 6: Post-Development HydroCAD Model

References:

- Albert Street Sewer Study
- Lot 1 Redevelopment Stormwater Management Memorandum

APPENDIX 1: EXISTING SANITARY SEWER FLOWS FROM PROJECT AREA

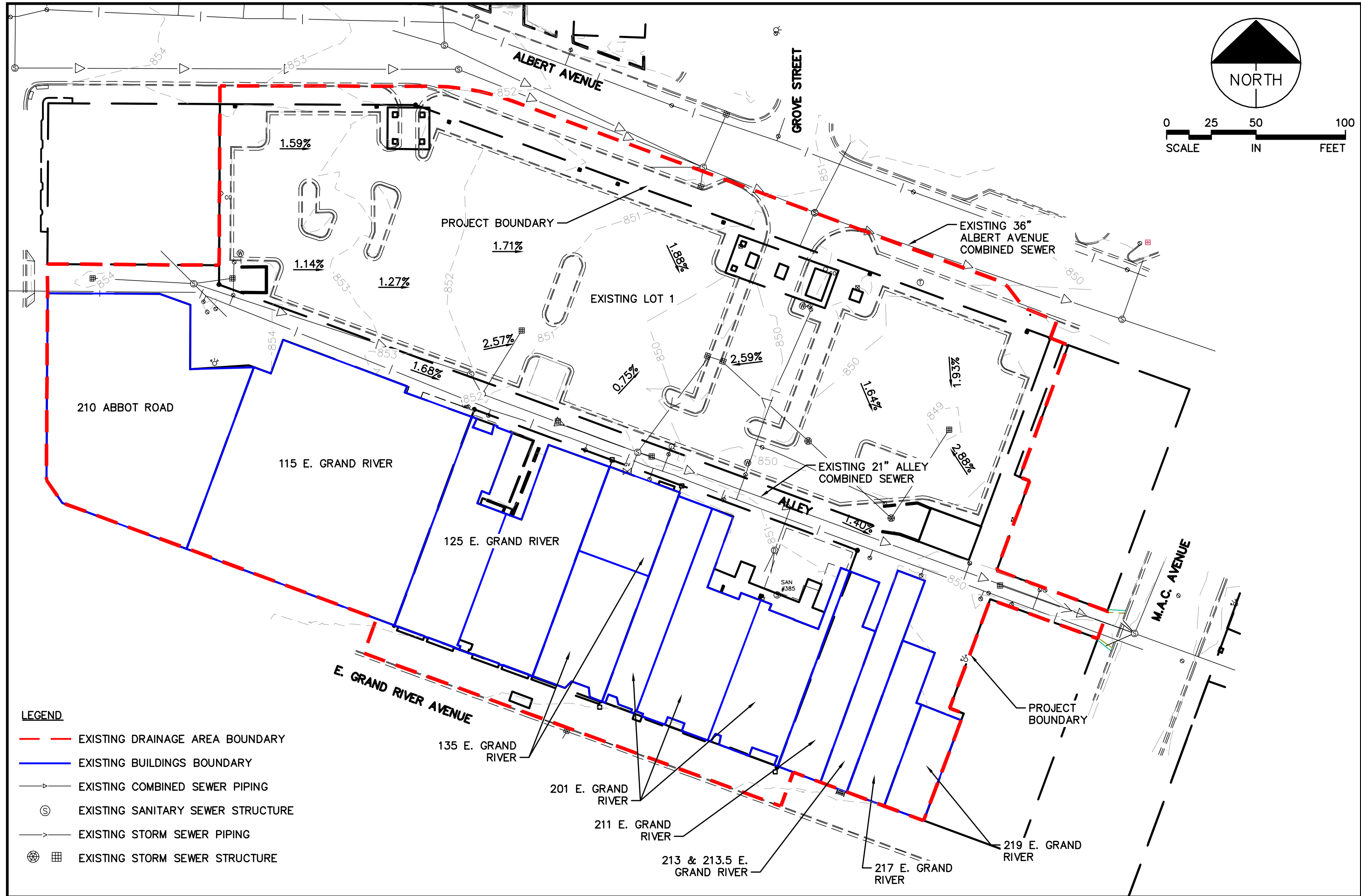
Appendix 1: Existing Sanitary Sewer Flows From Project Area

Address	Use	Area (SF)/Beds	REU	Average Daily Flow (gpd)	Peak Daily Flow (gpd)	Notes
210 Abbot Road	Restaurant	11,900	18	5,623	22,491	Existing Landshark Bar and Restaurant
	Restaurant	11,900	18	5,623	22,491	Existing Conrads Resturant and Post Bar
	Office	11,900	5	1,499	5,998	Existing 2nd Story Office
<i>Subtotal</i>		<i>35,700</i>	<i>40</i>	<i>12,745</i>	<i>50,980</i>	
115 E. Grand River	Retail	15,550	2	686	2,743	Existing Retail
	Apartments	14	4	1,260	5,040	Assumed 7, 2-bedroom apartments
<i>Subtotal</i>		<i>15,564</i>	<i>6</i>	<i>1,946</i>	<i>7,783</i>	
125 E. Grand River	Restaurant	3,930	6	1,857	7,428	Vacant Pancheros and Charlie Kang's
	Retail	5,240	1	231	924	Existing Retail
	Apartments	16	5	1,440	5,760	Assumed 8, 2-bedroom apartments
<i>Subtotal</i>		<i>9,186</i>	<i>11</i>	<i>3,528</i>	<i>14,112</i>	
135 E. Grand River	Retail	5,130	1	226	905	Existing Retail
	Apartments	4	1	360	1,440	Assumed 2, 2-bedroom apartments
<i>Subtotal</i>		<i>5,130</i>	<i>2</i>	<i>586</i>	<i>2,345</i>	
201 E. Grand River	Retail	2,400	0	106	423	Existing Sundance
	Restaurant	4,000	6	1,890	7,560	Existing Noodles and Company
	Retail	3,500	0	154	617	Existing Verizon and Clever Clover
	Office	9,900	4	1,247	4,990	Existing 2nd Story Office
<i>Subtotal</i>		<i>30,064</i>	<i>11</i>	<i>3,398</i>	<i>13,590</i>	
211 E. Grand River	Restaurant	2,800	4	1,323	5,292	Existing Lou and Harry's
	Office	2,800	1	353	1,411	Existing 2nd Story Office
<i>Subtotal</i>		<i>5,600</i>	<i>5</i>	<i>1,676</i>	<i>6,703</i>	
213 E. Grand River	Retail	2,000	0	88	353	Existing Pitaya
213.5 E. Grand River	Office	2,000	1	252	1,008	Existing Office
217 E. Grand River	Retail	2,000	0	88	353	Existing GNC
219 E. Grand River	Restaurant	1,500	2	709	2,835	Existing GNC
Total		108,744	79	25,015	100,062	
	Flow Rate (Gal/day)	Flow Rate (MGal/day)	Flow Rate (cfs)			
Existing Sewer Flow Rate	100,062	0.1001	0.1548			

Max Sewer Capacity	
R	0.875 ft
A	2.405281875 ft^2
Kn	1.486
n	0.012
P	5.497787144 ft
R (Hydraulic Radius)	0.4375
S	0.0084
Q	15.73240882 cfs

APPENDIX 2: EXISTING PROJECT AREA EXHIBIT

K:\TWC_DEV\HARBOR BAY REAL ESTATE ADVISORS\EAST_LANSING\3 Design\CAD\Exhibits\Ex-1 - Sanitary Sewer Areas.dwg February 10, 2017 - 1:01pm



- LEGEND**
- EXISTING DRAINAGE AREA BOUNDARY
 - EXISTING BUILDINGS BOUNDARY
 - EXISTING COMBINED SEWER PIPING
 - ⊙ EXISTING SANITARY SEWER STRUCTURE
 - EXISTING STORM SEWER PIPING
 - ⊕ EXISTING STORM SEWER STRUCTURE

Kimley»Horn	2080 UNIVERSITY AVENUE WEST, SUITE 2200, ST. PAUL, MN 55114 PHONE: 612-442-4187 WWW.KIMLEY-HORN.COM	DOWNTOWN LIFESTYLE DISTRICT EXISTING PROJECT AREA EXHIBIT
DRAWN BY: APD		SHEET NO. S-1
		DATE: 02/13/17

APPENDIX 3: PROPOSED SANITARY SEWER FLOWS FROM PROJECT AREA

Appendix 3: Proposed Sanitary Sewer Flows From Project Area

Existing Properties to Remain

Address	Use	Area (SF)/Beds	REU	Average Daily Flow (gpd)	Peak Daily Flow (gpd)	Notes
210 Abbot Road	Restaurant	11,900	18	5,623	22,491	Existing Landshark Bar and Restaurant
	Restaurant	11,900	18	5,623	22,491	Existing Conrads Resturant and Post Bar
	Retail	11,900	5	1,499	5,998	Existing 2nd Story Office
Subtotal		35,700	40	12,745	50,980	
115 E. Grand River	Retail	15,550	2	686	2,743	Existing Retail
	Apartments	14	4	1,260	5,040	Assumed 7, 2-bedroom apartments
Subtotal		15,564	6	1,946	7,783	
211 E. Grand River	Restaurant	2,800	4	1,323	5,292	Existing Lou and Harry's
	Office	2,800	1	353	1,411	Existing 2nd Story Office
Subtotal		5,600	5	1,676	6,703	
213 E. Grand River	Retail	2,000	0	88	353	Existing Pitaya
213.5 E. Grand River	Office	2,000	1	252	1,008	Existing Office
217 E. Grand River	Retail	2,000	0	88	353	Existing GNC
219 E. Grand River	Restaurant	1,500	2	709	2,835	Existing GNC
Total		64,364	56	17,504	70,014	

Proposed Development

Alley

Address	Area (SF)/Beds	REU	Average Daily Flow (gpd)	Peak Daily Flow (gpd)
Anchor Retailer	22,300	3	983	3,934
Market Rate Apartments	421	120	37,890	151,560
Total		123	38,873	155,494

Albert Avenue

Address	Area (SF)/Beds	REU	Average Daily Flow (gpd)	Peak Daily Flow (gpd)
Specialty Retail	21,000	3	926	3,704
55 and Older Apartments	136	39	12,240	48,960
Parking Structure	NA	0	0	0
Total		42	13,166	52,664

	Flow Rate (Gal/day)	Flow Rate (MGal/day)	Flow Rate (cfs)
Proposed Alley Sewer Flow Rate	225,508	0.2255	0.3489
Proposed Albert Sewer Flow Rate	52,664	0.0527	0.0815

Max Sewer Capacity

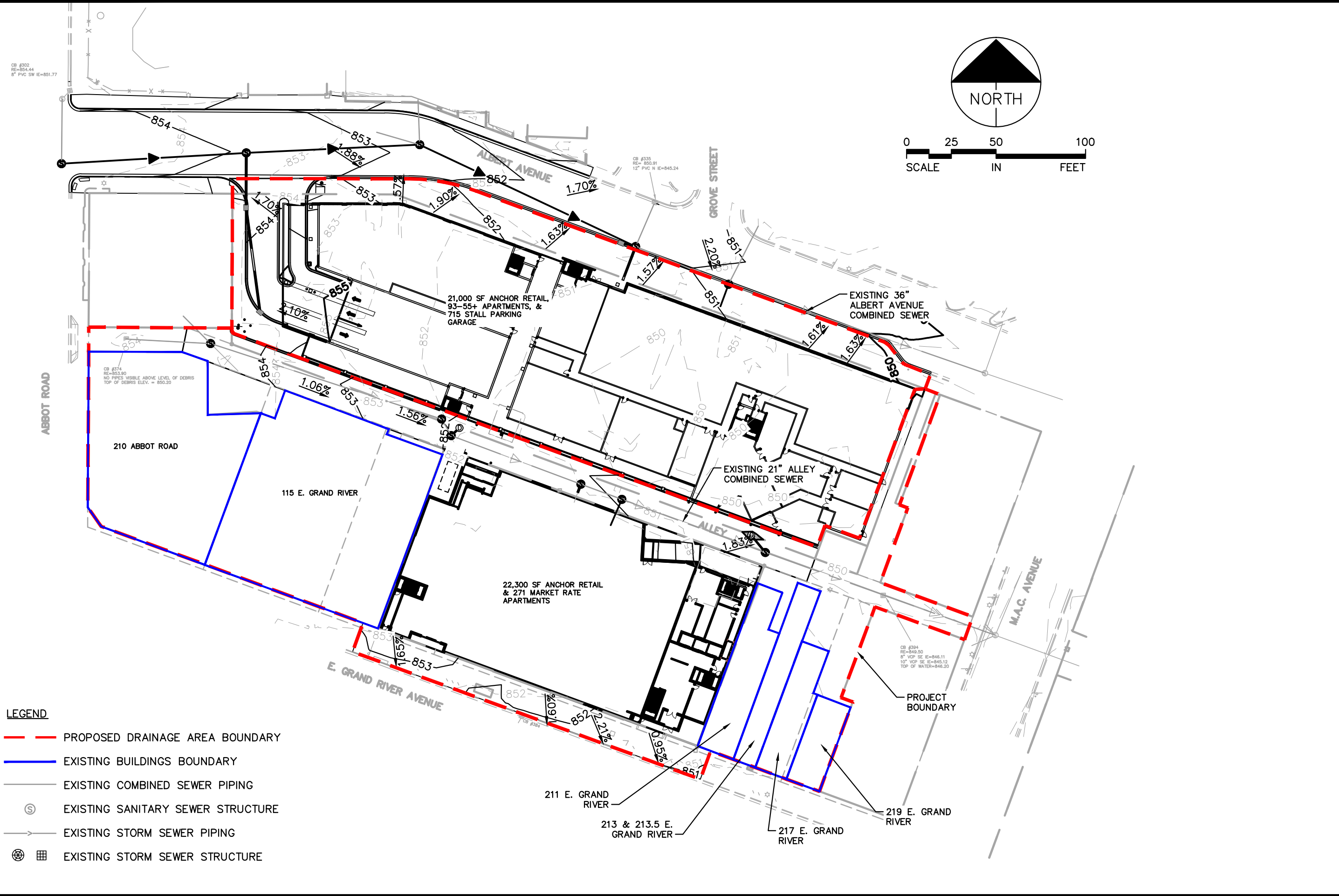
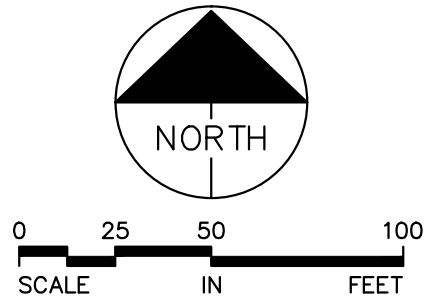
R	0.875	ft
A	2.405281875	ft ²
Kn	1.486	
n	0.012	
P	5.497787144	ft
R (Hydraulic Radius)	0.4375	
S	0.0084	
Q	15.73240882	cfs

APPENDIX 4: PROPOSED PROJECT AREA EXHIBIT

CB #302
RE=854.44
8" PVC SW IE=851.77

CB #335
RE=850.91
12" PVC N IE=845.24

CB #374
RE=853.90
NO PIPES VISIBLE ABOVE LEVEL OF DEBRIS
TOP OF DEBRIS ELEV. = 850.20



- LEGEND**
- PROPOSED DRAINAGE AREA BOUNDARY
 - EXISTING BUILDINGS BOUNDARY
 - EXISTING COMBINED SEWER PIPING
 - ⊙ EXISTING SANITARY SEWER STRUCTURE
 - EXISTING STORM SEWER PIPING
 - ⊕ EXISTING STORM SEWER STRUCTURE

SHEET NO.
S-2

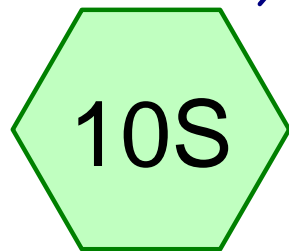
DRAWN BY: APD
DATE: 02/13/17

PROPOSED PROJECT
AREA EXHIBIT

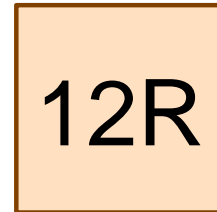
DOWNTOWN LIFESTYLE
DISTRICT

Kimley»Horn
2080 UNIVERSITY AVENUE WEST, SUITE 2000, ST. PAUL, MN 55114
PHONE: 651-545-4107
WWW.KIMLEY-HORN.COM

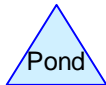
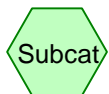
APPENDIX 5: PRE-DEVELOPMENT HYDROCAD MODEL



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

Prepared by Kimley-Horn and Associates

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Page 2

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)
3.550	97	TOTAL AREA

Downtown Lifestyle District - Pre-Development Drainage

Prepared by Kimley-Horn and Associates

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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	
3.550		TOTAL AREA

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
0.000	3.430	0.120	0.000	0.000	3.550	TOTAL AREA	

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=3.08"
Tc=5.0 min CN=97 Runoff=17.21 cfs 0.913 af

Reach 12R: V-Runoff

Inflow=17.21 cfs 0.913 af
Outflow=17.21 cfs 0.913 af

Total Runoff Area = 3.550 ac Runoff Volume = 0.913 af Average Runoff Depth = 3.08"
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 = 17.21 cfs @ 11.95 hrs, Volume= 0.913 af, Depth= 3.08"

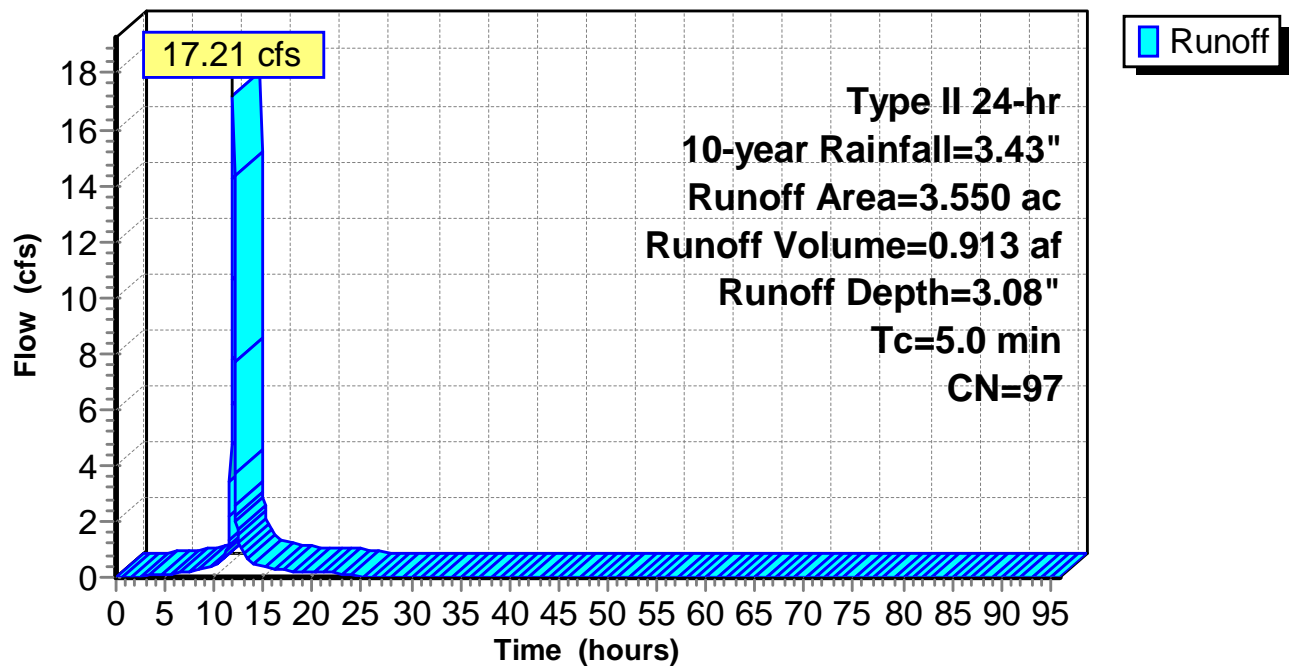
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, $dt= 0.05$ hrs
 Type II 24-hr 10-year Rainfall=3.43"

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



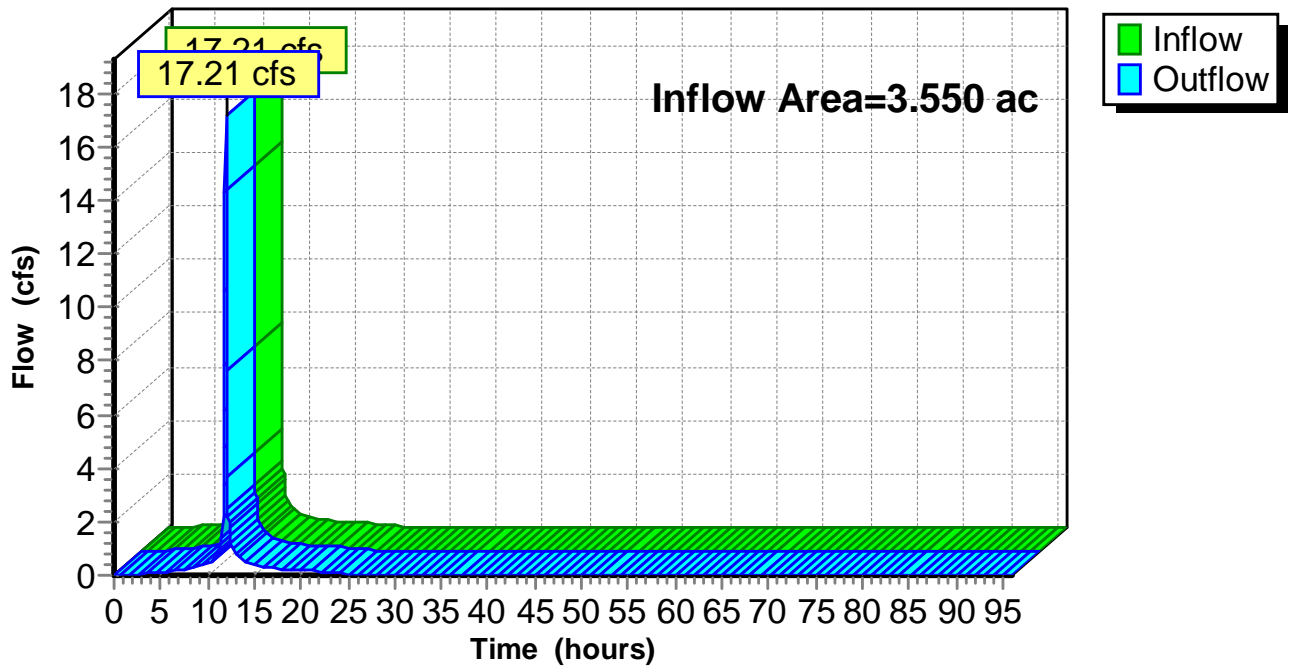
Summary for Reach 12R: V-Runoff

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

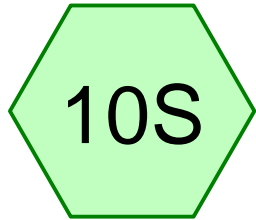
Inflow Area = 3.550 ac, 96.62% Impervious, Inflow Depth = 3.08" for 10-year event
Inflow = 17.21 cfs @ 11.95 hrs, Volume= 0.913 af
Outflow = 17.21 cfs @ 11.95 hrs, Volume= 0.913 af, Atten= 0%, Lag= 0.0 min

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

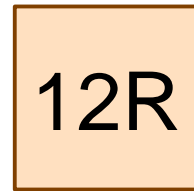
Reach 12R: V-Runoff Hydrograph



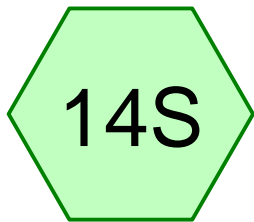
APPENDIX 6: POST-DEVELOPMENT HYDROCAD MODEL



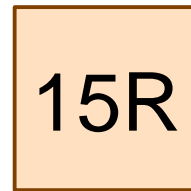
C-DA-1



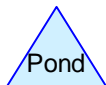
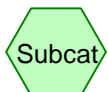
Alley



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)
3.550	97	TOTAL AREA

Downtown Lifestyle District - Post-Development Drainage

Prepared by Kimley-Horn and Associates

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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	
3.550		TOTAL AREA

Downtown Lifestyle District - Post-Development Drainage

Prepared by Kimley-Horn and Associates

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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
0.000	3.400	0.150	0.000	0.000	3.550	TOTAL AREA	

Downtown Lifestyle District - Post-Development Drainag *Type II 24-hr 10-year Rainfall=3.43"*

Prepared by Kimley-Horn and Associates

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Page 5

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=3.08"
Tc=5.0 min CN=97 Runoff=10.09 cfs 0.535 af

Subcatchment 14S: C-DA-2 Runoff Area=1.470 ac 93.88% Impervious Runoff Depth=3.08"
Tc=5.0 min CN=97 Runoff=7.13 cfs 0.378 af

Reach 12R: Alley Inflow=10.09 cfs 0.535 af
Outflow=10.09 cfs 0.535 af

Reach 15R: Albert Avenue Inflow=7.13 cfs 0.378 af
Outflow=7.13 cfs 0.378 af

Total Runoff Area = 3.550 ac Runoff Volume = 0.913 af Average Runoff Depth = 3.08"
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 = 10.09 cfs @ 11.95 hrs, Volume= 0.535 af, Depth= 3.08"

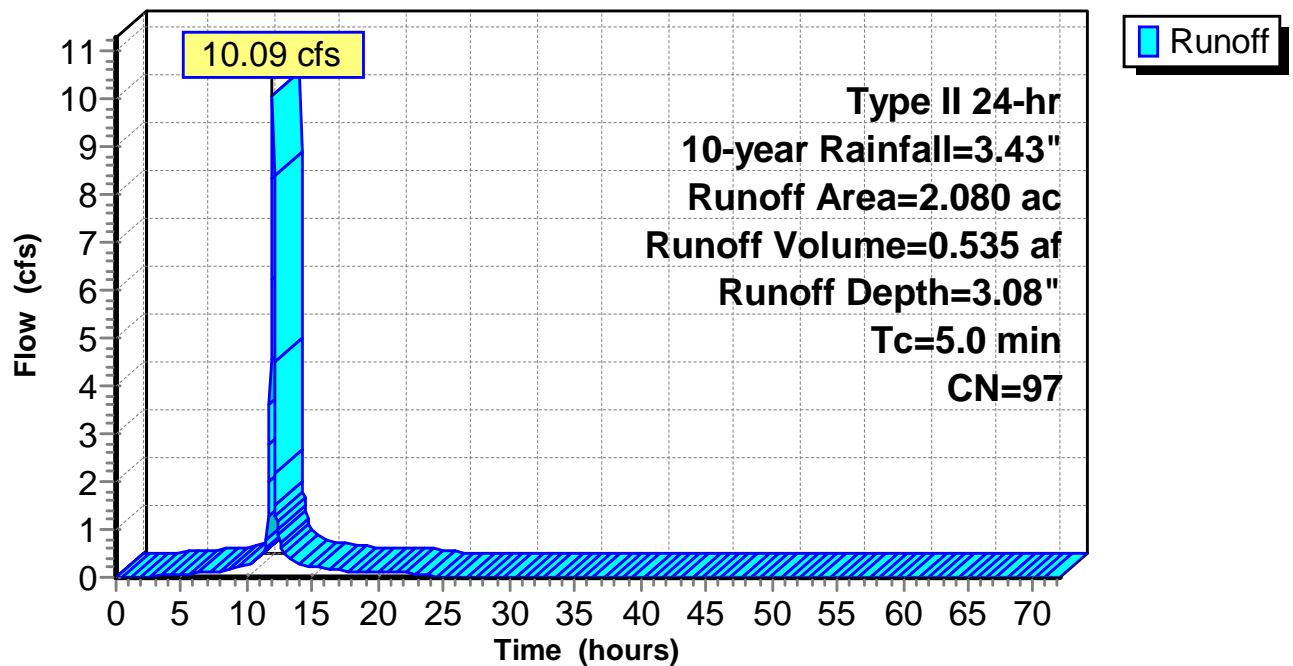
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-year Rainfall=3.43"

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 = 7.13 cfs @ 11.95 hrs, Volume= 0.378 af, Depth= 3.08"

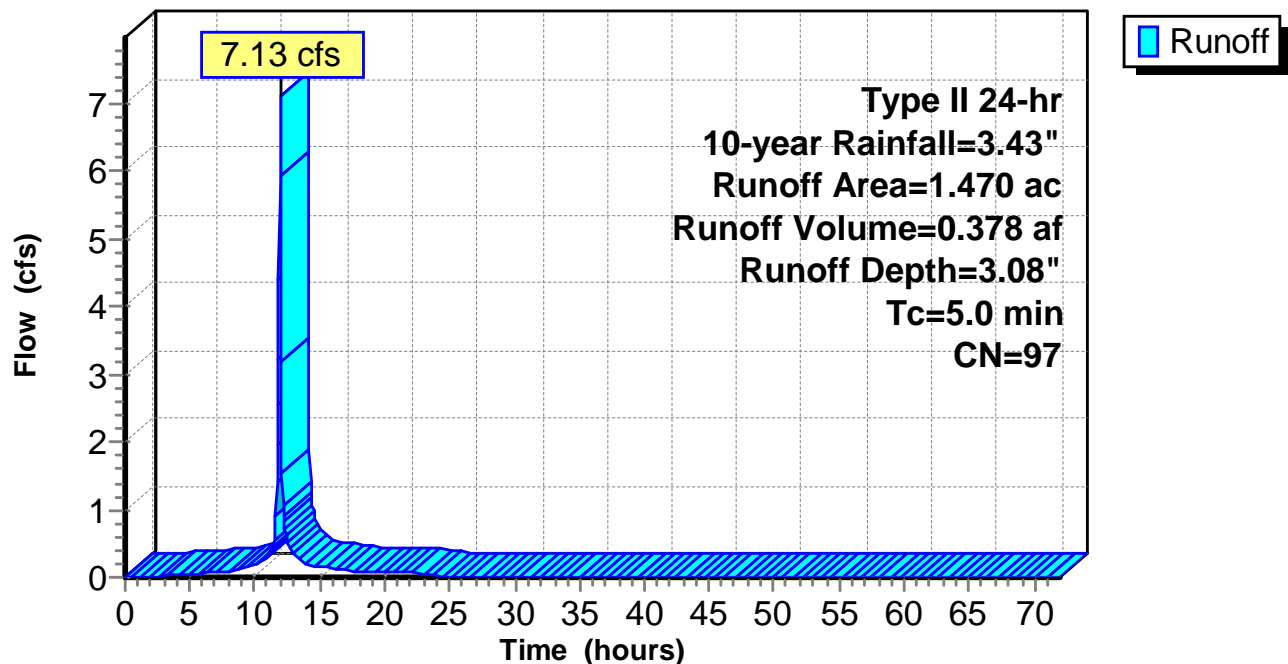
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-year Rainfall=3.43"

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

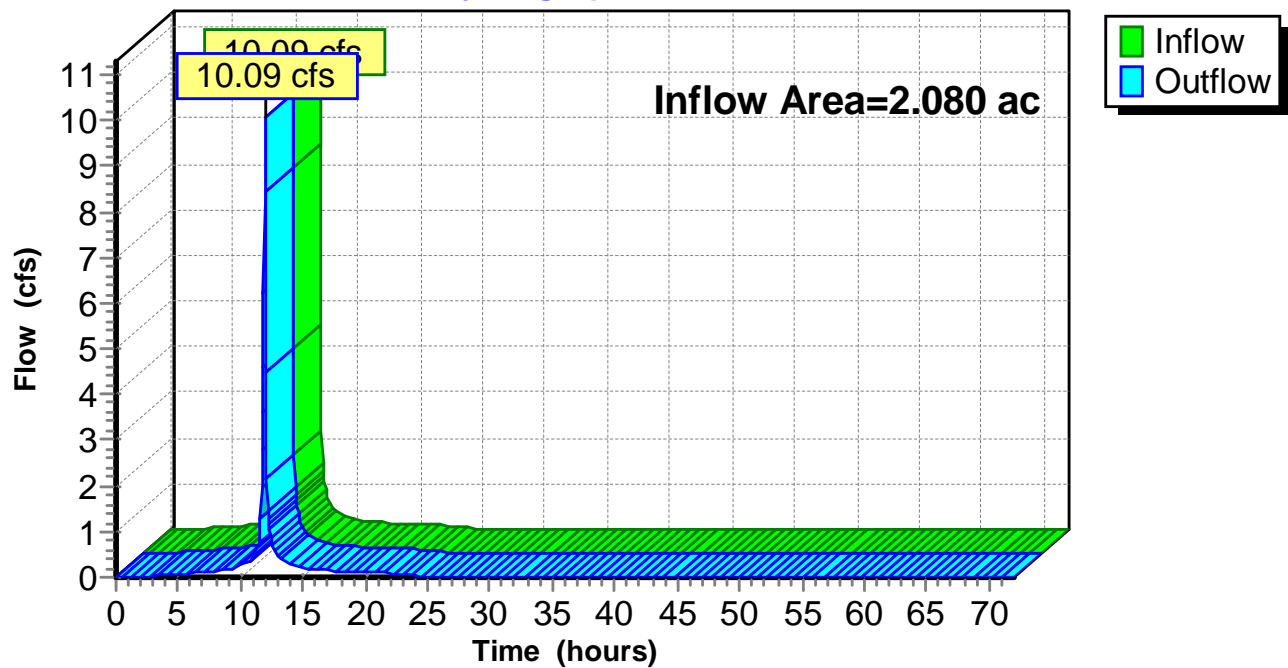
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.080 ac, 97.12% Impervious, Inflow Depth = 3.08" for 10-year event
Inflow = 10.09 cfs @ 11.95 hrs, Volume= 0.535 af
Outflow = 10.09 cfs @ 11.95 hrs, Volume= 0.535 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 = 3.08" for 10-year event
Inflow = 7.13 cfs @ 11.95 hrs, Volume= 0.378 af
Outflow = 7.13 cfs @ 11.95 hrs, Volume= 0.378 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

