Final Stormwater Management Plan

Downtown Lee's Summit Apartments

115 S.E. Main Street
Section: SE ¼ Sec. 6-47-31
Lee's Summit, Missouri

Prepared by:

PLANNING
ENGINEERING
IMPLEMENTATION

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Indianapolis, Indiana 46240

PEI #171125
January 27, 2020

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- Proposed Drainage Map A2
- Proposed HydroCAD Model Results
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B. Details & Calculations

- Detention Design Details

1. INTRODUCTION

This report is a final stormwater management plan for the proposed Downtown Lee's Summit Apartment development prepared by Phelps Engineering, Inc. (PEI) on behalf of the developer – Cityscape Residential, LLC.

The proposed site is bounded by SE Main Street (public) to the west, SE 1st Street to the north (public), SE Douglas Street (public) to the east, and SE 2nd Street (public) to the south. The proposed development is approximately 3.73 acres and consists of multi-family apartment units, a parking garage, and an existing church which will be re-purposed as a leasing office.

The property lies within Zone X, defined as areas determined to be outside the 0.2% annual chance floodplain, as shown on the flood insurance rate map prepared by the Federal Emergency Management Agency for the City of Lee's Summit, Community No. 290174, Jackson County, Missouri, Map No. 29095C0417G, and dated January 20, 2017.

See the Vicinity Map below.

Figure 1 - Vicinity Map

2. STORMWATER REQUIREMENTS

Stormwater design criteria are in accordance with City of Lee's Summit Technical Specifications and Design Criteria and APWA 5600.

Onsite detention shall be provided, for the increase in impervious area, for the 2-year, 10-yr, and 100-year rainfall events that meet the APWA Comprehensive Control discharge rates. The detention system shall be designed to drawdown over a minimum of 40-hours during the 90% mean annual event.

All storm sewers shall be sized to convey the 25-year design storm.

3. EXISTING SITE CONDITIONS

The existing site is developed and consists of urban land, upland soils. No NRCS Hydrologic Soil Group (HSG) is provided for this soil type. Therefore, a HSG of D has been assumed for conservative purposes. See Appendix A of this report for the NRCS Web Soil Survey for the site.

The existing site consists of open space in good condition and paved areas (parking, sidewalks, and buildings), corresponding to CN values of 80 and 98 for Type D soils. The existing site surface drains southeasterly where it is captured by existing curb inlets along SE 2nd Street. The existing site consists of 114,837 S.F. of impervious area. See Appendix A of this report for Existing Drainage A1.

4. PROPOSED SITE CONDITIONS

The proposed site consists of a combination of open space in good condition and paved areas (parking, sidewalks, and buildings) corresponding to CN values of 80 and 98, respectively, for Type D soils. The proposed site will maintain the existing drainage pattern. Stormwater will be conveyed from the proposed site via an enclosed underground private stormwater system and connect to the existing public stormwater system along SE 2nd Street. The proposed site consists of 127,515 S.F. of impervious area. This represents an increase in impervious area of 12,678 S.F. from the existing conditions. See Appendix A of this report for Proposed Drainage Map A2.

5. STORMWATER DETENTION

Detention shall be provided for the increase in impervious area, 12,678 S.F (0.29 acres). A portion of the apartment roof drain gutter/downspout system and courtyard area for the proposed apartment buildings, equaling the runoff volume generated by the 12,678 S.F. increase in impervious area, will be routed to an underground detention system located in the courtyard of the apartment complex. The underground detention system consists of 22 MC-4500 Stormtech Chambers and 4 end caps. The bottom of stone elevation in the underground detention system will be set at an elevation of 1031.00. An outlet control structure with flow control orifices will be located directly downstream of the detention system. The detention system and outlet control system is sized to control the discharge for the 2-year, 10-year, and 100-year storm events to the APWA allowable discharge rates per City of Lee's Summit requirements. The low flow opening, a 1/2" orifice set at an elevation of 1030.75, is designed to drawdown the detention system during the 90% mean annual event over a minimum of 40-hours. The outlet control structure will also contain a 4.25" orifice set at an elevation of 1033.60, which will control the 2, 10 and 100 year peak discharge rates from the detention system.

Table 1 – APWA Allowable Discharge

Storm Event	Allowable Discharge (cfs)		
	Site Area (acres)	Discharge Rate (cfs)	Discharge (cfs)
2-Year	0.30	0.5	0.15
10-Year	0.30	2.0	0.60
100-Year	0.30	3.0	0.90

Table 2 – Proposed Runoff Conditions

Drainage Sub-Basin	Open Space (ft^2)	Impervious (ft^2)	Total (ft^2)	Total (acres)	Composite CN	Time of Conc. (min)
Detention	2,022	11,027	13,049	0.30	95	5

Using HydroCAD, the 2-year, 10-year, and 100-year peak discharges from the proposed detention basin were determined and are shown in Table 3 below. The proposed 2-year, 10-year, and 100-year detention basin results are shown in Table 4 below. See Appendix A of this report for proposed PondPack calculations.

Table 3 – Proposed Runoff Results

Storm Event	APWA[1] Allowable Discharge (cfs)	Peak Overall (cfs)	Peak Discharge Rate (cfs/acre)
2-Year	0.15	0.14	0.47
10-Year	0.60	0.54	1.80
100-Year	0.90	0.88	2.93

[1] – See Table 1 for allowable discharge calculations.

Table 4 – Proposed Detention Basin Results

Basin	Storm Event	Detention Inflow (cfs)	Detention Outflow (cfs)	Maximum WSEL (ft.)	Maximum Storage (cf)
Detention	2-Year	1.47	0.14	1033.71	1,875
	10-Year	2.28	0.54	1034.87	2,725
	100-Year	3.36	0.88	1037.05	3,915

The proposed detention basin results in proposed flows less than the APWA allowable release rates for the 2-year, 10-year, and 100-year events meeting the City of Lee's Summit detention requirements. See Appendix "B" for the Detention Design Details.

6. CONCLUSION

This report and attached appendices complete Phelps Engineering Inc.'s submittal of the Final Stormwater Management Plan for the Downtown Lee's Summit Apartments. Please feel free to contact PEI at (913) 393-1155 if you require additional information.

Sincerely,

PHELPS ENGINEERING, INC.

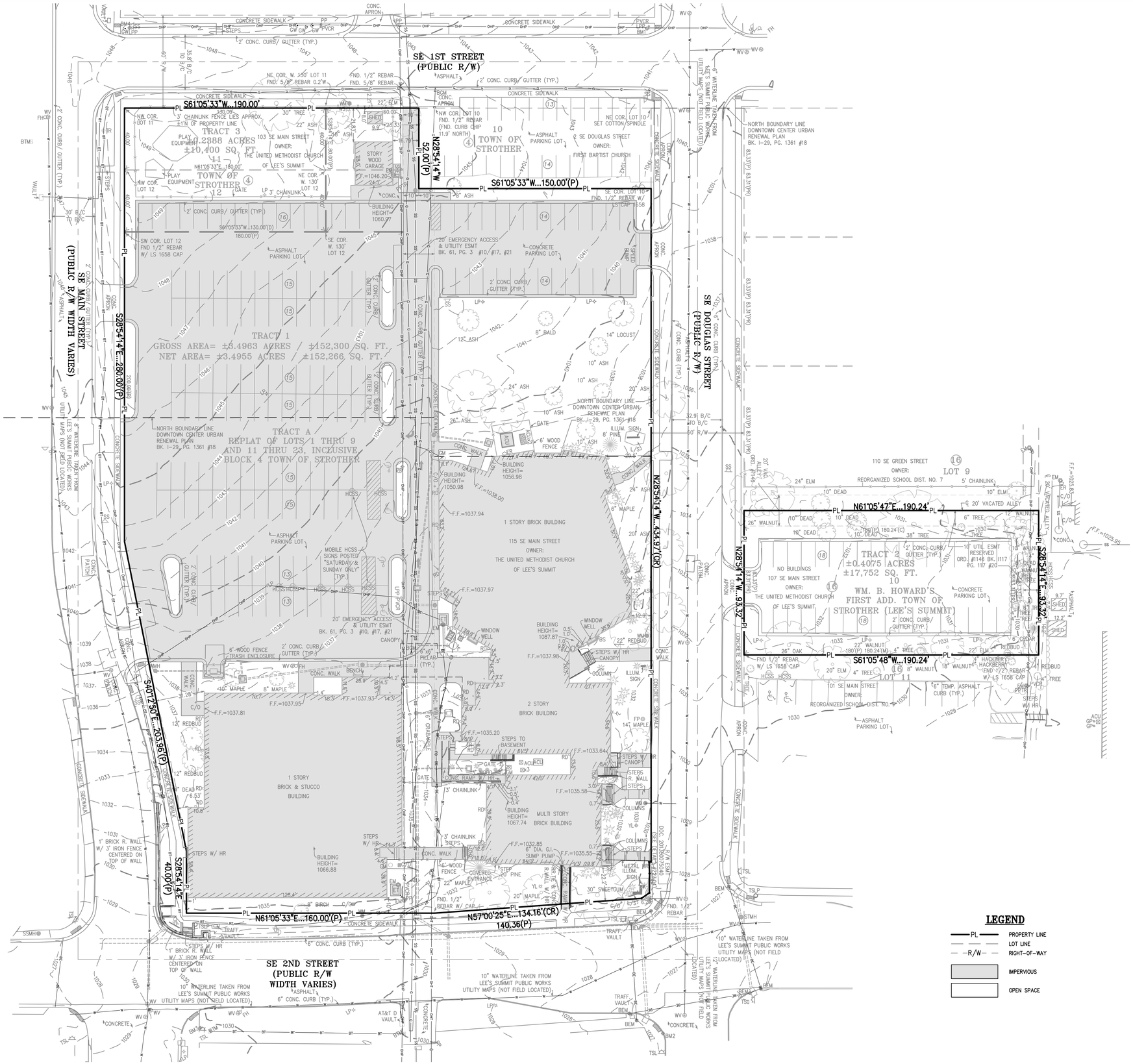
Doug Ubben, Jr., P.E.

Enclosures

APPENDIX A

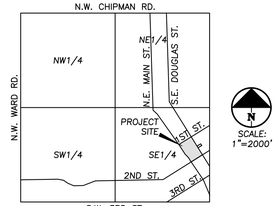
Treatment & Detention

- Existing Drainage Map A1
- Proposed Drainage Map A2
- Proposed HydroCAD Model
- NRCS Web Soil Survey



UTILITY NOTES:
VISUAL INDICATIONS OF UTILITIES ARE AS SHOWN. UNDERGROUND LOCATIONS SHOWN, AS FURNISHED BY THEIR LESSORS, ARE APPROXIMATE AND SHOULD BE VERIFIED IN THE FIELD AT THE TIME OF CONSTRUCTION. FOR ACTUAL FIELD LOCATIONS OF UNDERGROUND UTILITIES CALL 811.

EXISTING IMPERVIOUS AREA = 114,837 S.F.



VICINITY MAP
SEC. 6–T47N–R31W

LEGEND

PL	PROPERTY LINE
	LOT LINE
R/W	RIGHT-OF-WAY
	IMPERVIOUS
	OPEN SPACE

TOTAL LOTS (3) = 180,452 S.F. (4.1426 ACRES)

IMPERVIOUS = 125,691 S.F. (2.8855 ACRES)

OPEN SPACE = 54,761 S.F. (1.2571 ACRES)

SCALE: 1"=30'
0' 30' 60'

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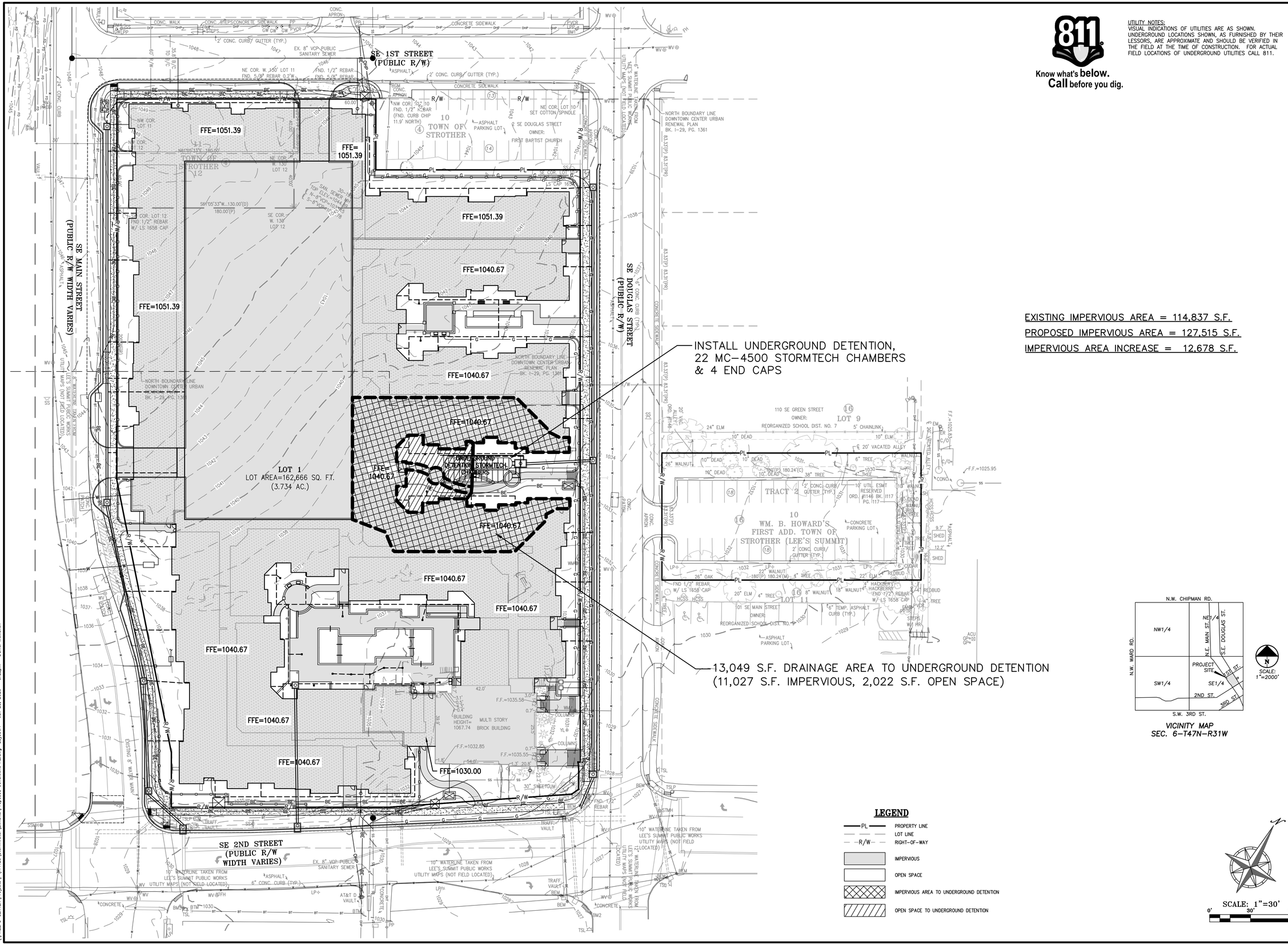
EXISTING CONDITIONS MAP
LEE'S SUMMIT APARTMENTS
115 S.E. MAIN STREET
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

No.	Date	Revisions:	By	App.

PROJECT NO. 171125
DATE: 12-17-18 DRAWN: SNH
CHECKED: DAF APPROVED: DJC
CERTIFICATE OF AUTHORIZATION KANSAS ENGINEERING - LS-82
ENGINEERING - E-301
CERTIFICATE OF AUTHORIZATION MISSOURI SURVEYING - 2007001128
ENGINEERING - 2007002508

SHEET
A1



811 Know what's below. Call before you dig.

UTILITY NOTES:
VISUAL INDICATIONS OF UTILITIES ARE AS SHOWN. UNDERGROUND LOCATIONS SHOWN, AS FURNISHED BY THEIR LESSORS, ARE APPROXIMATE AND SHOULD BE VERIFIED IN THE FIELD AT THE TIME OF CONSTRUCTION. FOR ACTUAL FIELD LOCATIONS OF UNDERGROUND UTILITIES CALL 811.

EXISTING IMPERVIOUS AREA = 114,837 S.F.
PROPOSED IMPERVIOUS AREA = 127,515 S.F.
IMPERVIOUS AREA INCREASE = 12,678 S.F.

LEGEND

- PL — PROPERTY LINE
- LOT LINE
- R/W — RIGHT-OF-WAY
- IMPERVIOUS
- OPEN SPACE
- IMPERVIOUS AREA TO UNDERGROUND DETENTION
- OPEN SPACE TO UNDERGROUND DETENTION

VICINITY MAP
SEC. 6-T47N-R31W

SCALE: 1"=30'
0' 30' 60'

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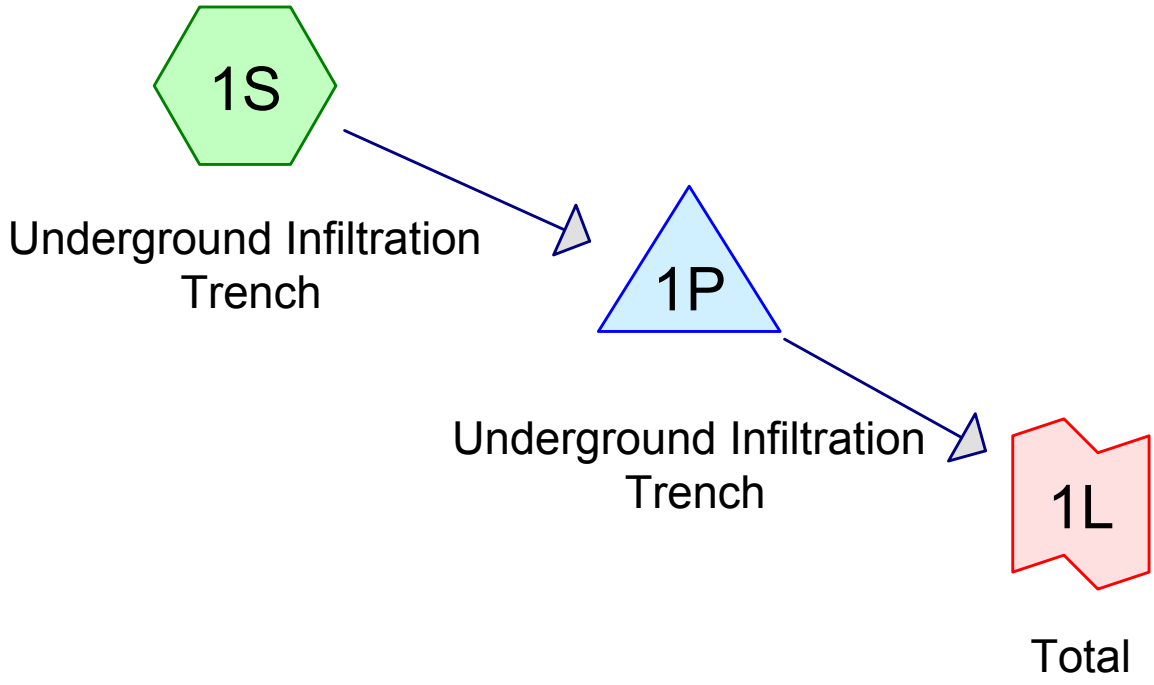
PROPOSED CONDITIONS MAP

LEE'S SUMMIT APARTMENTS
115 S.E. MAIN STREET
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

No.	Revisions:	Date	By	App.

PROJECT NO. 171125
DATE: 12-17-19 | DRAWN: SNH
CHECKED: DAF | APPROVED: JDC
CERTIFICATE OF AUTHORIZATION
KANSAS ENGINEERING – LS-92
MISSOURI ENGINEERING – E-291
CERTIFICATE OF AUTHORIZATION
LAND SURVEYING-2007001128
ENGINEERING-2007003239

SHEET
A2



Subcat Reach Pond Link

Routing Diagram for Proposed-Final
Prepared by Microsoft, Printed 11/14/2019

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.046	80	>75% Grass cover, Good, HSG D (1S)
0.253	98	Paved parking, HSG D (1S)
0.300	**95**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.300	HSG D	1S
0.000	Other	
0.300		**TOTAL AREA**

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	0.000	0.046	0.000	0.046	>75% Grass cover, Good	1S
0.000	0.000	0.000	0.253	0.000	0.253	Paved parking	1S
0.000	**0.000**	**0.000**	**0.300**	**0.000**	**0.300**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Underground Runoff Area=13,049 sf 84.50% Impervious Runoff Depth=2.94"
Tc=5.0 min CN=95 Runoff=1.47 cfs 0.073 af

Pond 1P: Underground Infiltration Trench Peak Elev=1,033.71' Storage=1,875 cf Inflow=1.47 cfs 0.073 af
Outflow=0.14 cfs 0.052 af

Link 1L: Total Inflow=0.14 cfs 0.052 af
Primary=0.14 cfs 0.052 af

Total Runoff Area = 0.300 ac Runoff Volume = 0.073 af Average Runoff Depth = 2.94"
15.50% Pervious = 0.046 ac 84.50% Impervious = 0.253 ac

Summary for Subcatchment 1S: Underground Infiltration Trench

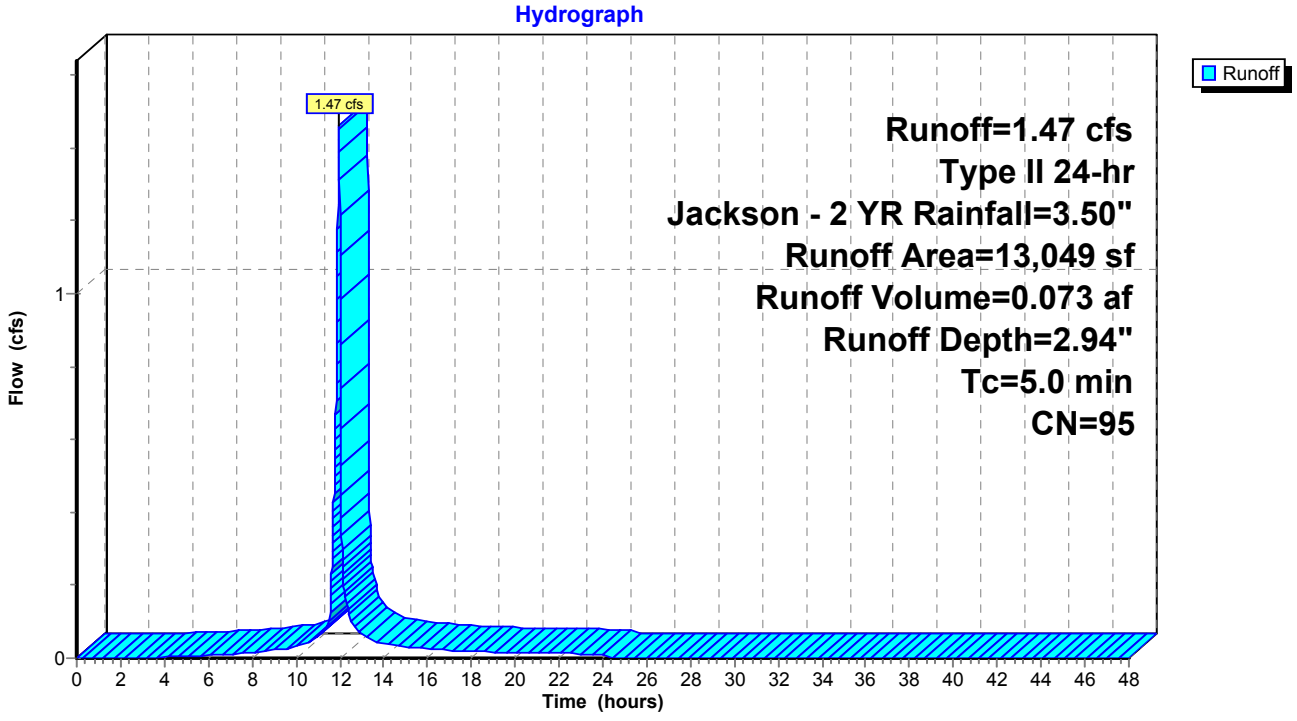
Runoff = 1.47 cfs @ 11.96 hrs, Volume= 0.073 af, Depth= 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr Jackson - 2 YR Rainfall=3.50"

Area (sf)	CN	Description
11,027	98	Paved parking, HSG D
2,022	80	>75% Grass cover, Good, HSG D
13,049	95	Weighted Average
2,022		15.50% Pervious Area
11,027		84.50% Impervious Area

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

Subcatchment 1S: Underground Infiltration Trench



Summary for Pond 1P: Underground Infiltration Trench

Inflow Area = 0.300 ac, 84.50% Impervious, Inflow Depth = 2.94" for Jackson - 2 YR event
Inflow = 1.47 cfs @ 11.96 hrs, Volume= 0.073 af
Outflow = 0.14 cfs @ 12.34 hrs, Volume= 0.052 af, Atten= 90%, Lag= 22.8 min
Primary = 0.14 cfs @ 12.34 hrs, Volume= 0.052 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 1,033.71' @ 12.34 hrs Surf.Area= 1,014 sf Storage= 1,875 cf

Plug-Flow detention time= 686.8 min calculated for 0.052 af (71% of inflow)
Center-of-Mass det. time= 592.4 min (1,366.3 - 773.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,030.50'	8 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2A	1,031.00'	1,700 cf	**19.42'W x 51.39'L x 6.75'H Field A** 6,736 cf Overall - 2,486 cf Embedded = 4,250 cf x 40.0% Voids
#3A	1,031.75'	2,486 cf	**ADS_StormTech MC-4500 +Cap** x 22 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 22 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
#4	1,037.75'	20 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		4,214 cf	Total Available Storage

Storage Group A created with Chamber Wizard

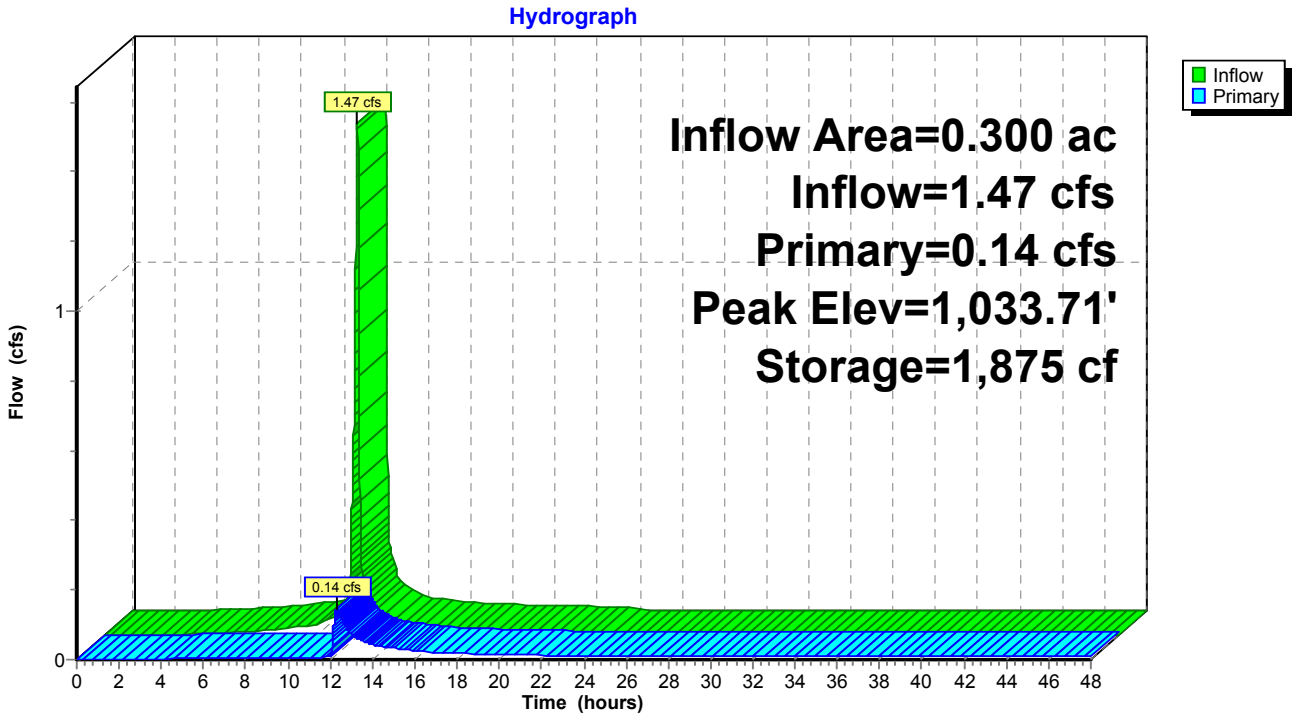
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,030.50	16	0	0
1,031.00	16	8	8

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,037.75	16	0	0
1,039.00	16	20	20

Device	Routing	Invert	Outlet Devices
#1	Primary	1,030.50'	**15.0" Round 15" Outlet Pipe** L= 48.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 1,030.50' / 1,030.00' S= 0.0102 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	1,037.05'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	1,030.75'	**0.5" Vert. 0.5" WQ Orifice** C= 0.600
#4	Device 1	1,033.60'	**4.2" Horiz. 4.25" Low Flow Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.14 cfs @ 12.34 hrs HW=1,033.71' (Free Discharge)
└─**1=15" Outlet Pipe** (Passes 0.14 cfs of 9.50 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=0.5" WQ Orifice** (Orifice Controls 0.01 cfs @ 8.25 fps)
  └─**4=4.25" Low Flow Orifice** (Weir Controls 0.13 cfs @ 1.08 fps)

Pond 1P: Underground Infiltration Trench



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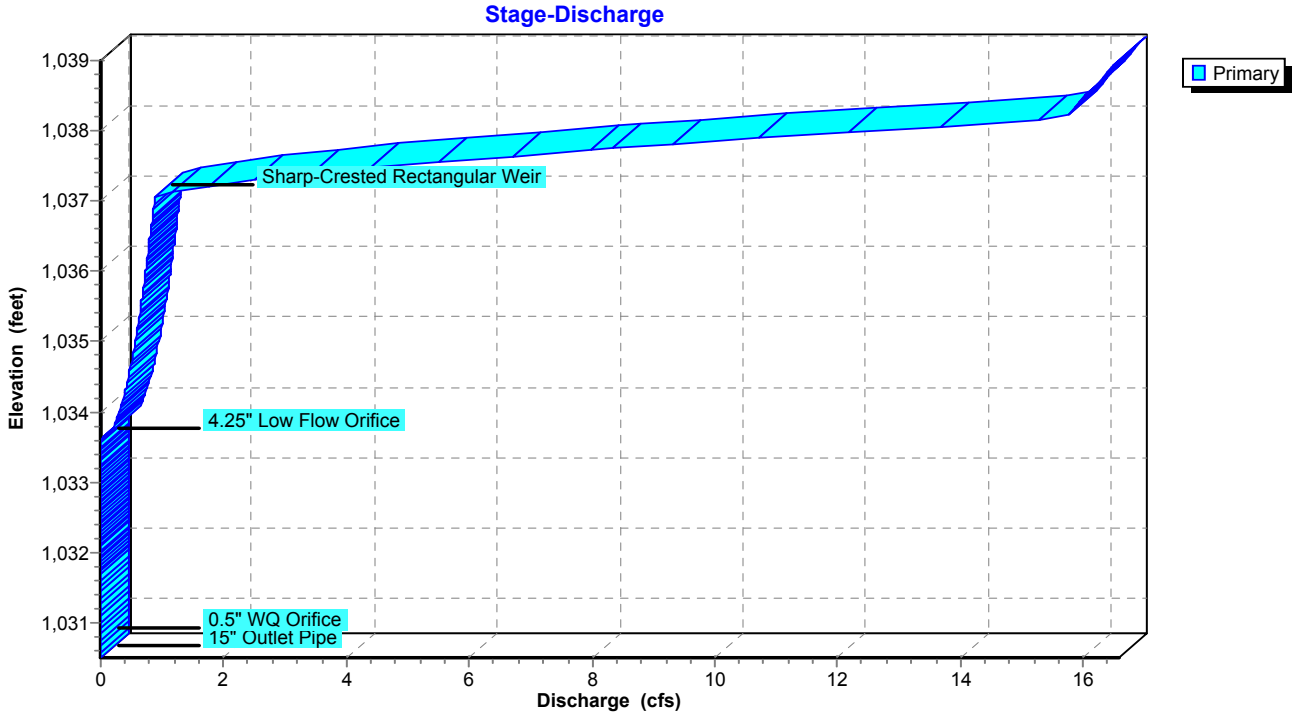

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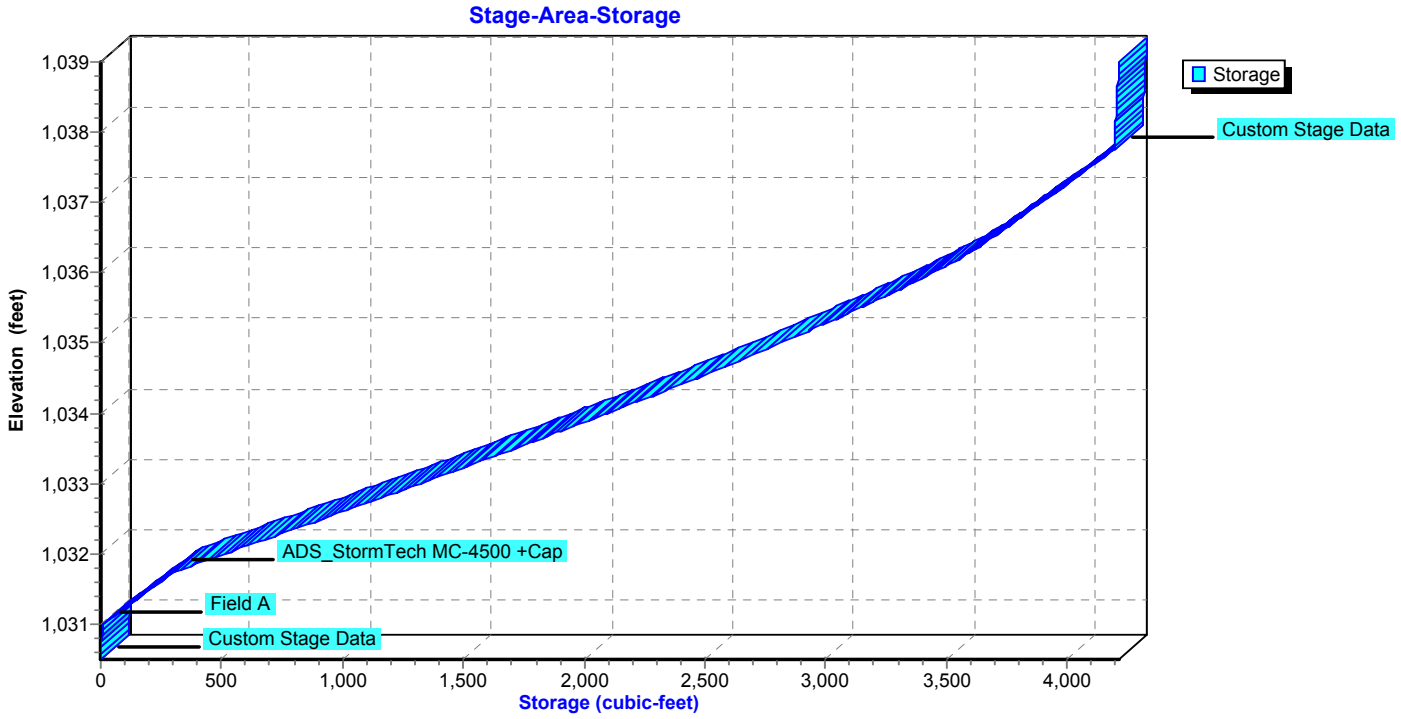
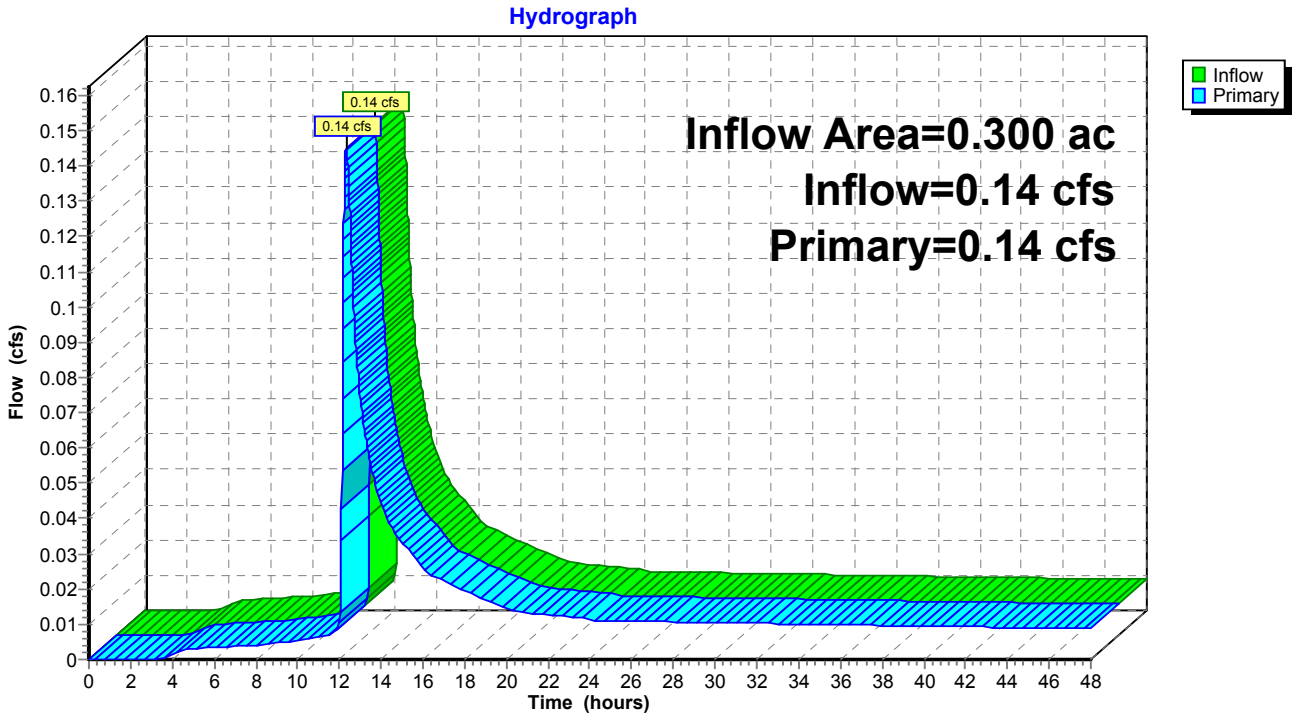


Summary for Link 1L: Total

Inflow Area = 0.300 ac, 84.50% Impervious, Inflow Depth > 2.07" for Jackson - 2 YR event
Inflow = 0.14 cfs @ 12.34 hrs, Volume= 0.052 af
Primary = 0.14 cfs @ 12.34 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Total



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Underground Runoff Area=13,049 sf 84.50% Impervious Runoff Depth=4.72"
Tc=5.0 min CN=95 Runoff=2.28 cfs 0.118 af

Pond 1P: Underground Infiltration Trench Peak Elev=1,034.87' Storage=2,725 cf Inflow=2.28 cfs 0.118 af
Outflow=0.54 cfs 0.096 af

Link 1L: Total Inflow=0.54 cfs 0.096 af
Primary=0.54 cfs 0.096 af

Total Runoff Area = 0.300 ac Runoff Volume = 0.118 af Average Runoff Depth = 4.72"
15.50% Pervious = 0.046 ac 84.50% Impervious = 0.253 ac

Summary for Subcatchment 1S: Underground Infiltration Trench

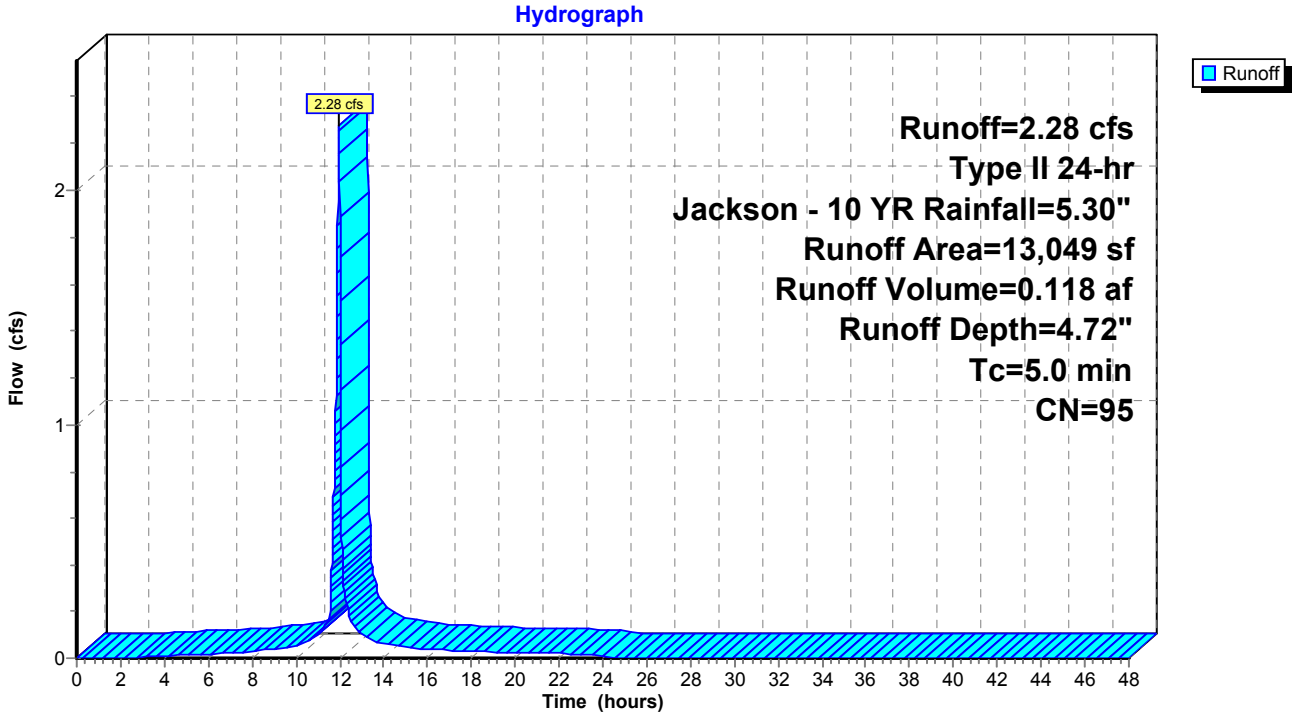
Runoff = 2.28 cfs @ 11.96 hrs, Volume= 0.118 af, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr Jackson - 10 YR Rainfall=5.30"

Area (sf)	CN	Description
11,027	98	Paved parking, HSG D
2,022	80	>75% Grass cover, Good, HSG D
13,049	95	Weighted Average
2,022		15.50% Pervious Area
11,027		84.50% Impervious Area

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

Subcatchment 1S: Underground Infiltration Trench



Summary for Pond 1P: Underground Infiltration Trench

Inflow Area = 0.300 ac, 84.50% Impervious, Inflow Depth = 4.72" for Jackson - 10 YR event
Inflow = 2.28 cfs @ 11.96 hrs, Volume= 0.118 af
Outflow = 0.54 cfs @ 12.09 hrs, Volume= 0.096 af, Atten= 77%, Lag= 7.9 min
Primary = 0.54 cfs @ 12.09 hrs, Volume= 0.096 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 1,034.87' @ 12.09 hrs Surf.Area= 1,014 sf Storage= 2,725 cf

Plug-Flow detention time= 423.0 min calculated for 0.096 af (82% of inflow)
Center-of-Mass det. time= 346.3 min (1,108.4 - 762.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,030.50'	8 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2A	1,031.00'	1,700 cf	**19.42'W x 51.39'L x 6.75'H Field A** 6,736 cf Overall - 2,486 cf Embedded = 4,250 cf x 40.0% Voids
#3A	1,031.75'	2,486 cf	**ADS_StormTech MC-4500 +Cap** x 22 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 22 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
#4	1,037.75'	20 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		4,214 cf	Total Available Storage

Storage Group A created with Chamber Wizard

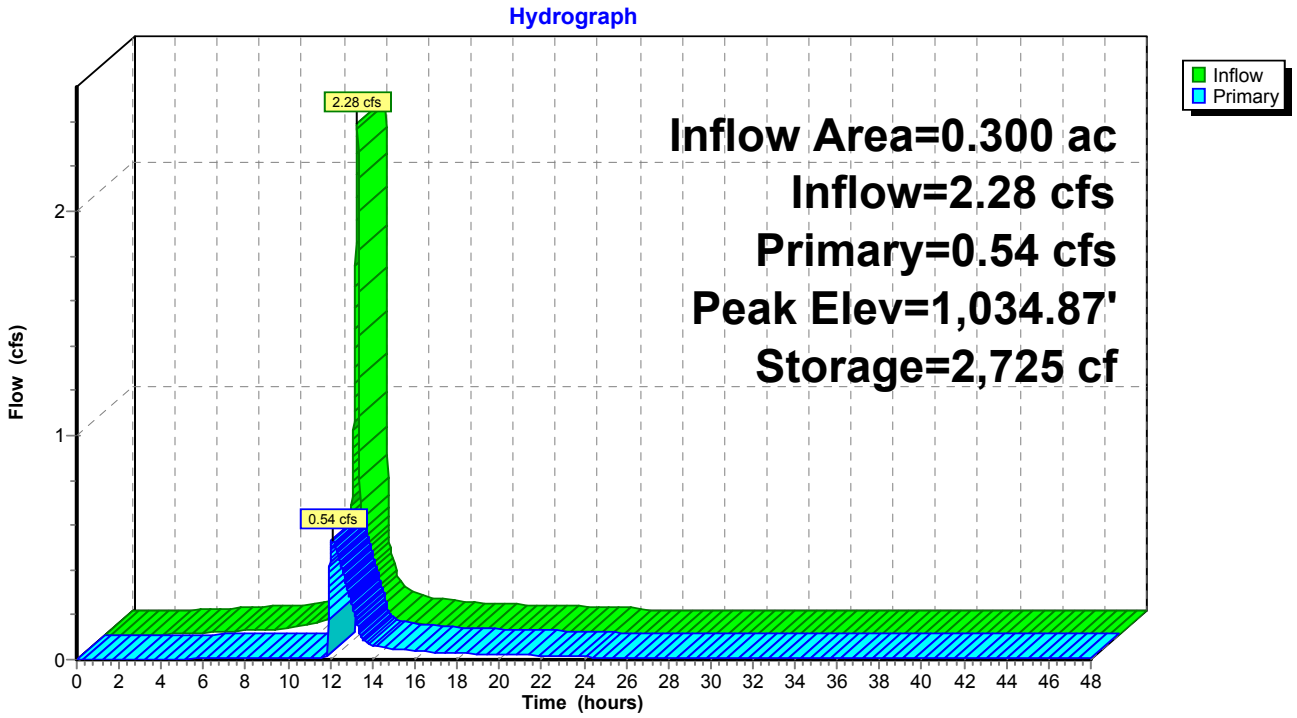
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,030.50	16	0	0
1,031.00	16	8	8

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,037.75	16	0	0
1,039.00	16	20	20

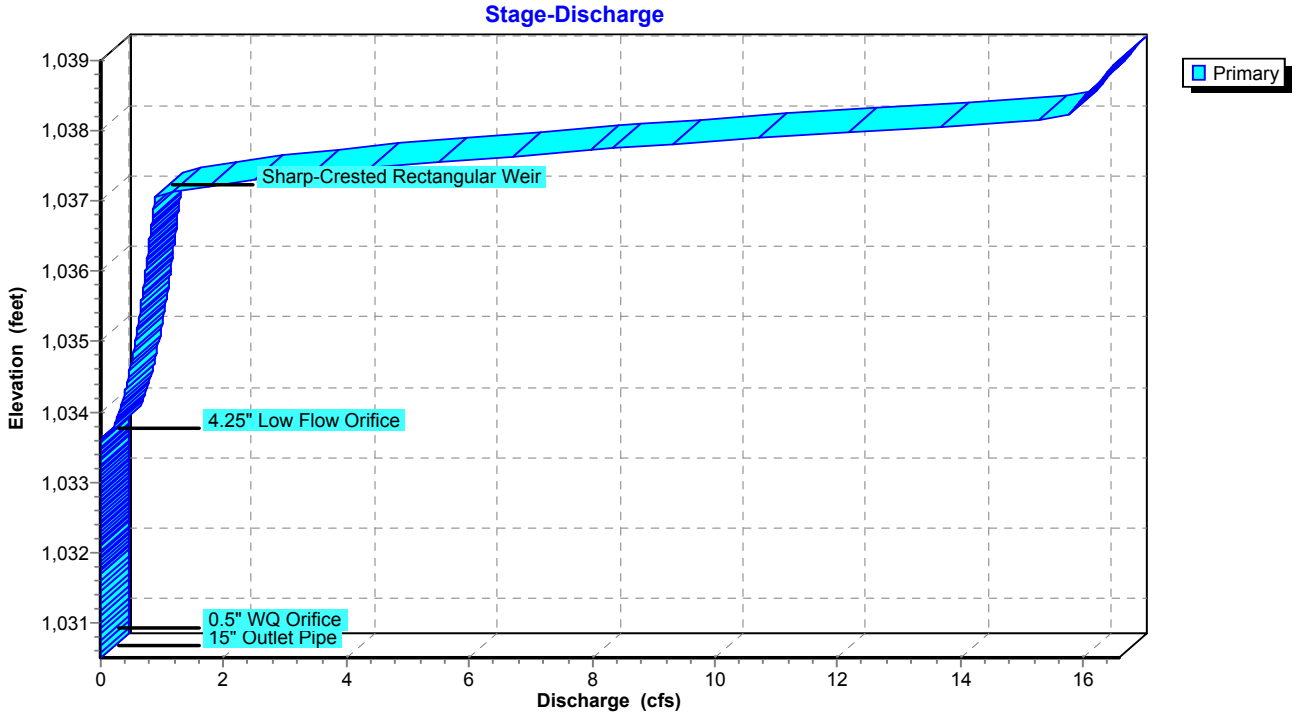
Device	Routing	Invert	Outlet Devices
#1	Primary	1,030.50'	**15.0" Round 15" Outlet Pipe** L= 48.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 1,030.50' / 1,030.00' S= 0.0102 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	1,037.05'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	1,030.75'	**0.5" Vert. 0.5" WQ Orifice** C= 0.600
#4	Device 1	1,033.60'	**4.2" Horiz. 4.25" Low Flow Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.54 cfs @ 12.09 hrs HW=1,034.87' (Free Discharge)
└─**1=15" Outlet Pipe** (Passes 0.54 cfs of 11.43 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=0.5" WQ Orifice** (Orifice Controls 0.01 cfs @ 9.75 fps)
  └─**4=4.25" Low Flow Orifice** (Orifice Controls 0.52 cfs @ 5.42 fps)

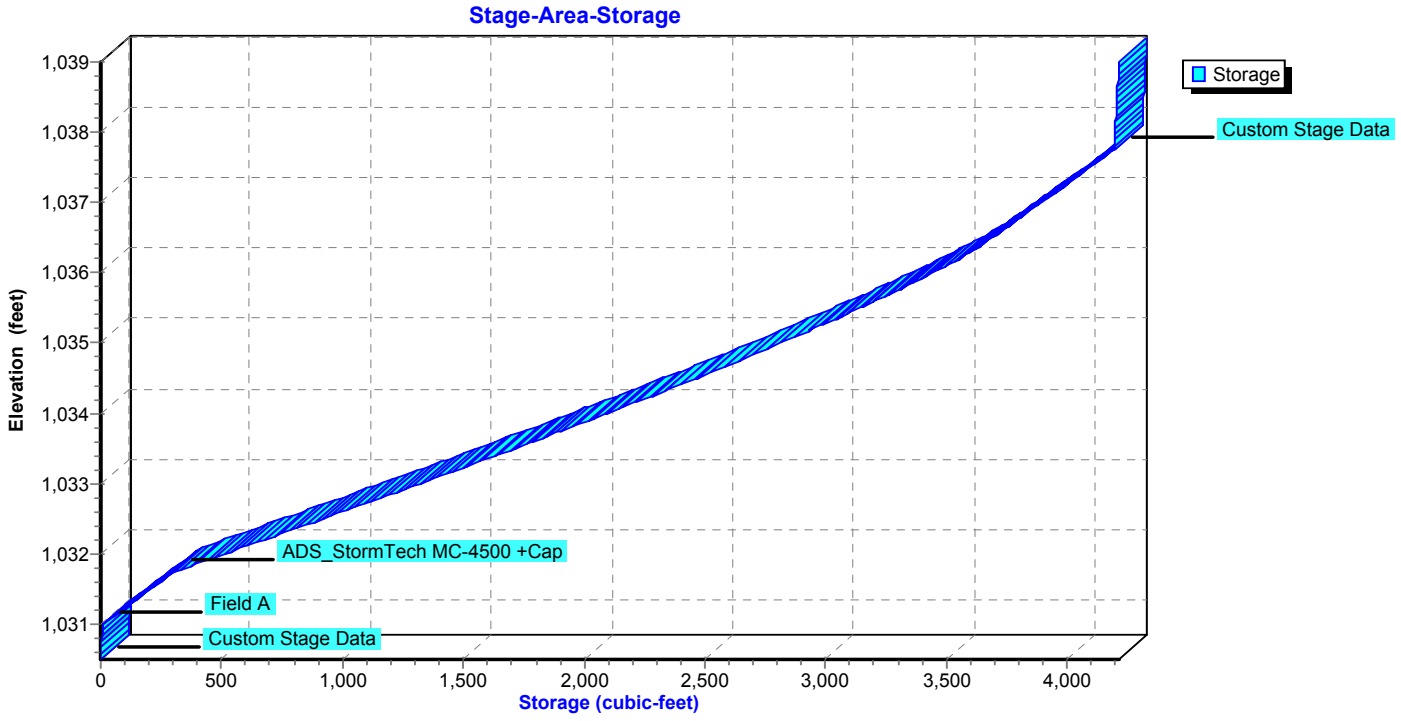
Pond 1P: Underground Infiltration Trench



Pond 1P: Underground Infiltration Trench



Pond 1P: Underground Infiltration Trench

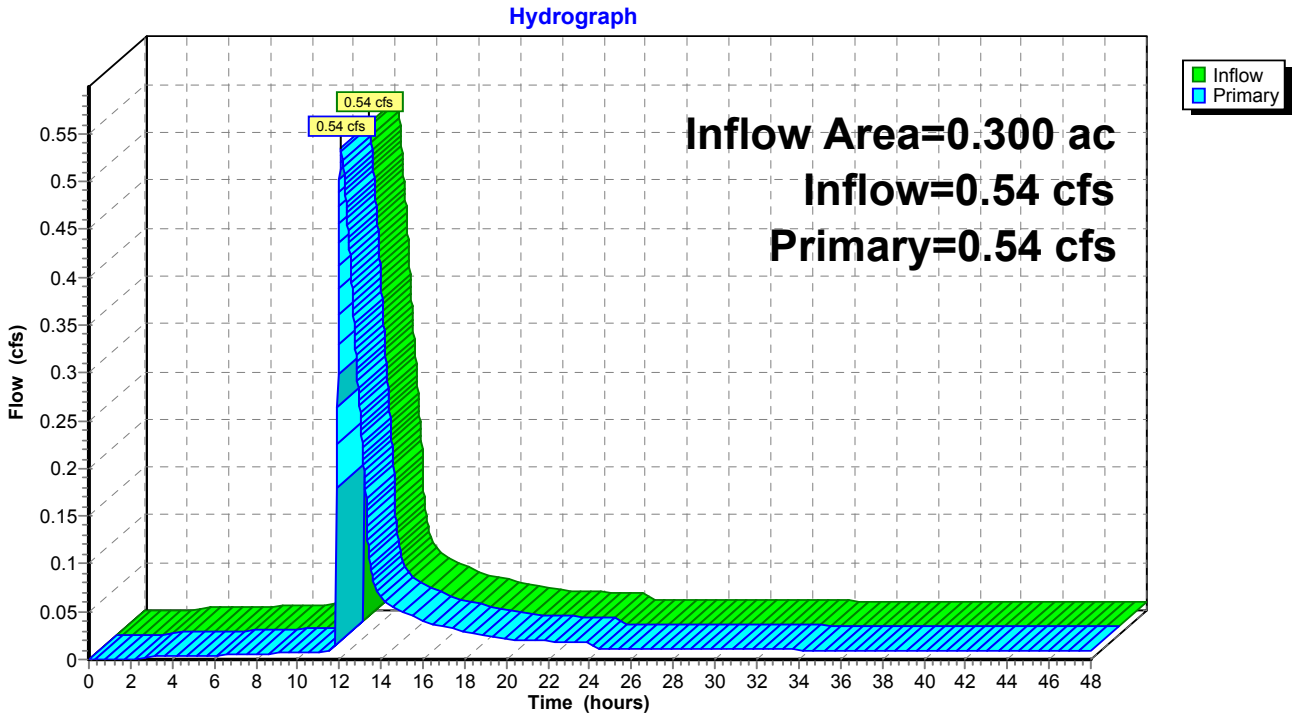


Summary for Link 1L: Total

Inflow Area = 0.300 ac, 84.50% Impervious, Inflow Depth > 3.85" for Jackson - 10 YR event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.096 af
Primary = 0.54 cfs @ 12.09 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Total



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Underground Runoff Area=13,049 sf 84.50% Impervious Runoff Depth=7.10"
Tc=5.0 min CN=95 Runoff=3.36 cfs 0.177 af

Pond 1P: Underground Infiltration Trench Peak Elev=1,037.05' Storage=3,915 cf Inflow=3.36 cfs 0.177 af
Outflow=0.88 cfs 0.156 af

Link 1L: Total Inflow=0.88 cfs 0.156 af
Primary=0.88 cfs 0.156 af

Total Runoff Area = 0.300 ac Runoff Volume = 0.177 af Average Runoff Depth = 7.10"
15.50% Pervious = 0.046 ac 84.50% Impervious = 0.253 ac

Summary for Subcatchment 1S: Underground Infiltration Trench

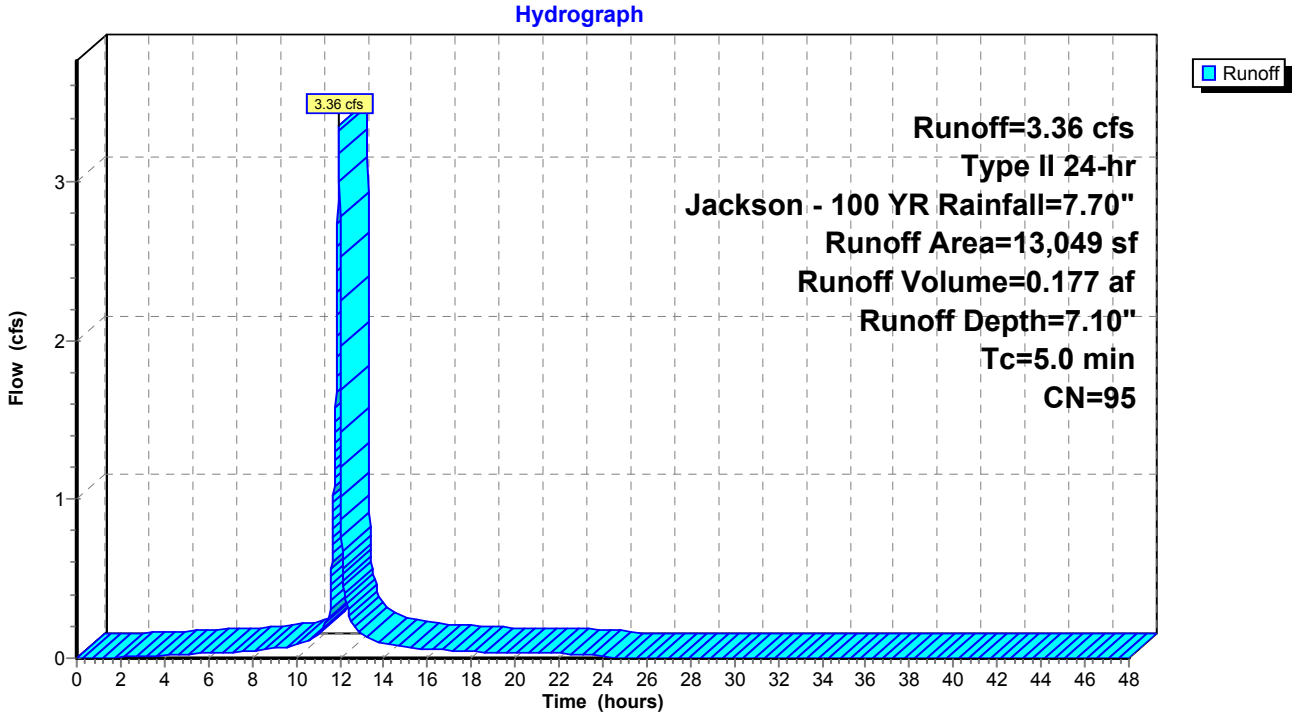
Runoff = 3.36 cfs @ 11.96 hrs, Volume= 0.177 af, Depth= 7.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr Jackson - 100 YR Rainfall=7.70"

Area (sf)	CN	Description
11,027	98	Paved parking, HSG D
2,022	80	>75% Grass cover, Good, HSG D
13,049	95	Weighted Average
2,022		15.50% Pervious Area
11,027		84.50% Impervious Area

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

Subcatchment 1S: Underground Infiltration Trench



Summary for Pond 1P: Underground Infiltration Trench

Inflow Area = 0.300 ac, 84.50% Impervious, Inflow Depth = 7.10" for Jackson - 100 YR event
Inflow = 3.36 cfs @ 11.96 hrs, Volume= 0.177 af
Outflow = 0.88 cfs @ 12.08 hrs, Volume= 0.156 af, Atten= 74%, Lag= 7.4 min
Primary = 0.88 cfs @ 12.08 hrs, Volume= 0.156 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 1,037.05' @ 12.08 hrs Surf.Area= 1,014 sf Storage= 3,915 cf

Plug-Flow detention time= 303.8 min calculated for 0.156 af (88% of inflow)
Center-of-Mass det. time= 243.6 min (996.6 - 753.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,030.50'	8 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2A	1,031.00'	1,700 cf	**19.42'W x 51.39'L x 6.75'H Field A** 6,736 cf Overall - 2,486 cf Embedded = 4,250 cf x 40.0% Voids
#3A	1,031.75'	2,486 cf	**ADS_StormTech MC-4500 +Cap** x 22 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 22 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
#4	1,037.75'	20 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		4,214 cf	Total Available Storage

Storage Group A created with Chamber Wizard

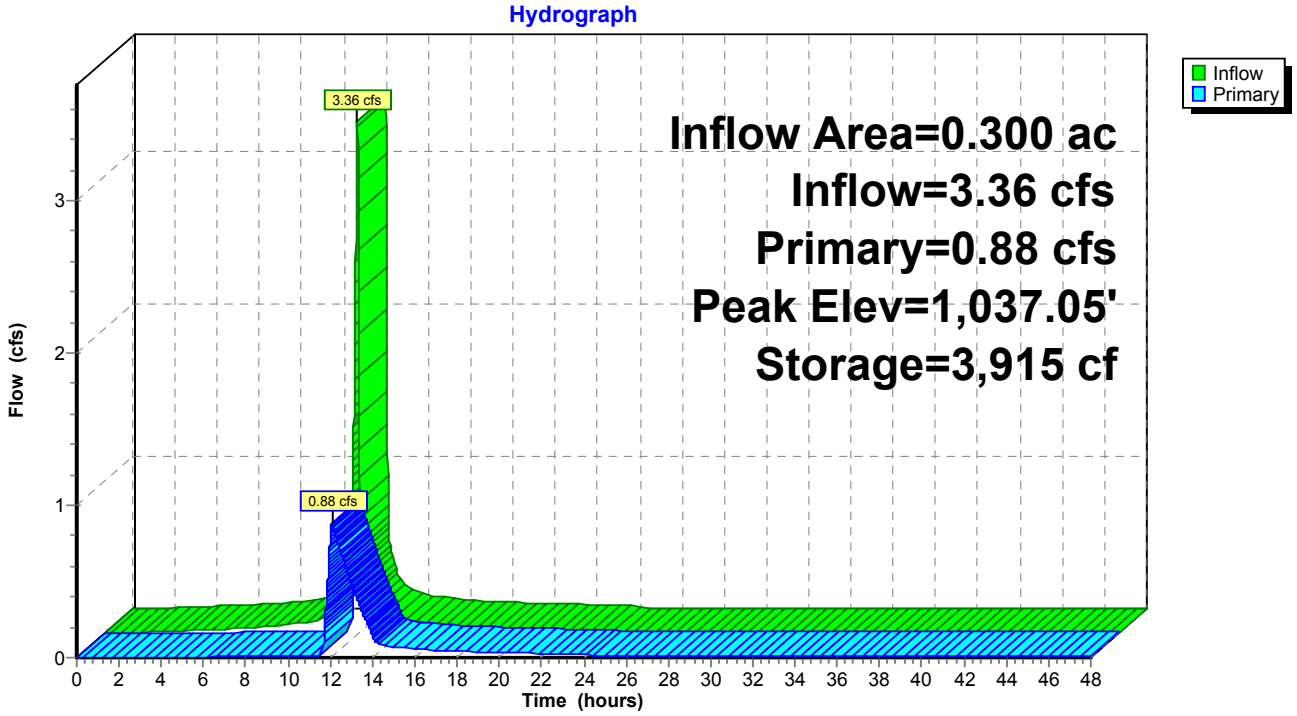
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,030.50	16	0	0
1,031.00	16	8	8

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,037.75	16	0	0
1,039.00	16	20	20

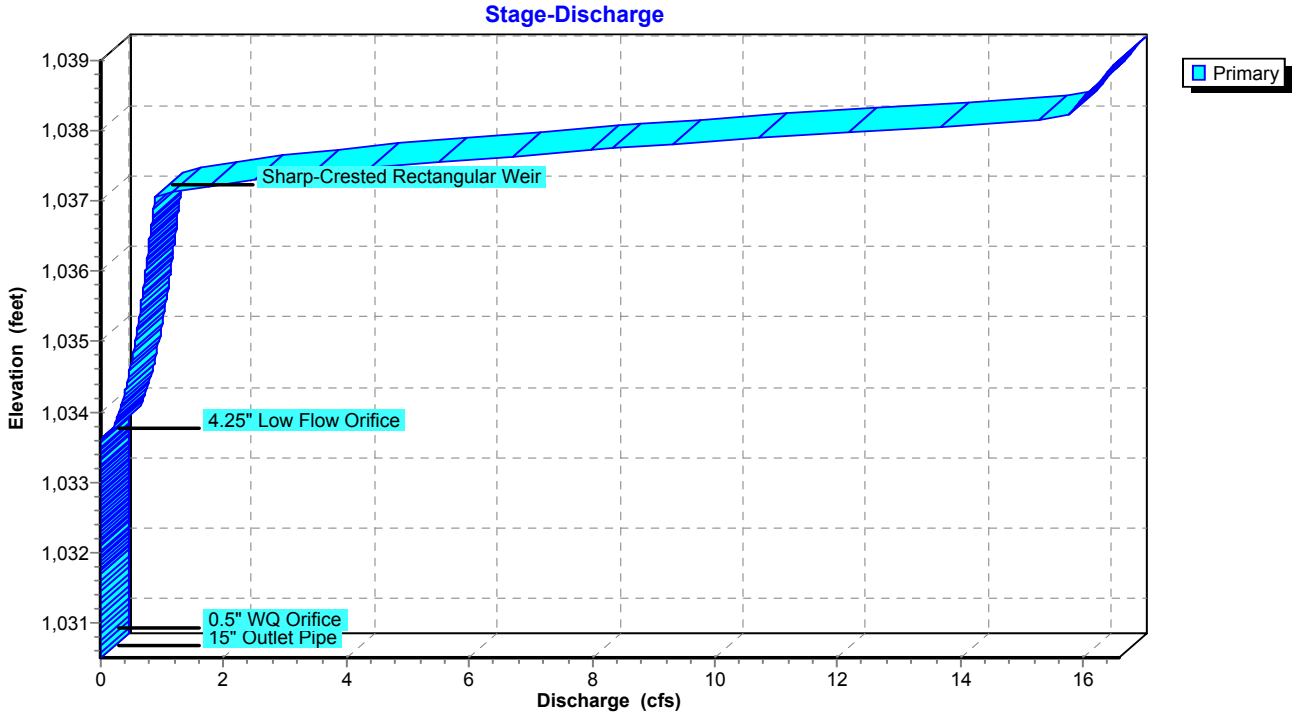
Device	Routing	Invert	Outlet Devices
#1	Primary	1,030.50'	**15.0" Round 15" Outlet Pipe** L= 48.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 1,030.50' / 1,030.00' S= 0.0102 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	1,037.05'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	1,030.75'	**0.5" Vert. 0.5" WQ Orifice** C= 0.600
#4	Device 1	1,033.60'	**4.2" Horiz. 4.25" Low Flow Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.88 cfs @ 12.08 hrs HW=1,037.05' (Free Discharge)
└─**1=15" Outlet Pipe** (Passes 0.88 cfs of 14.38 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.13 fps)
  ├─**3=0.5" WQ Orifice** (Orifice Controls 0.02 cfs @ 12.07 fps)
  └─**4=4.25" Low Flow Orifice** (Orifice Controls 0.86 cfs @ 8.95 fps)

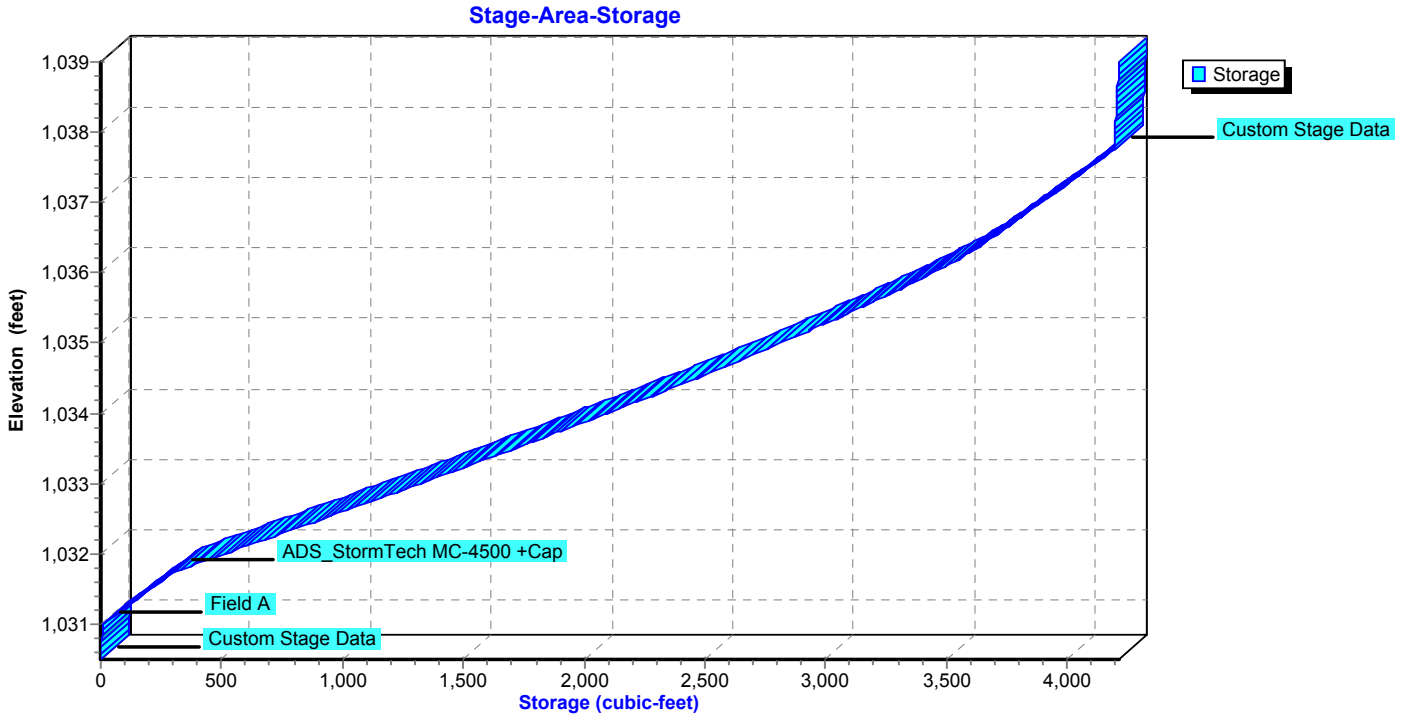
Pond 1P: Underground Infiltration Trench



Pond 1P: Underground Infiltration Trench



Pond 1P: Underground Infiltration Trench

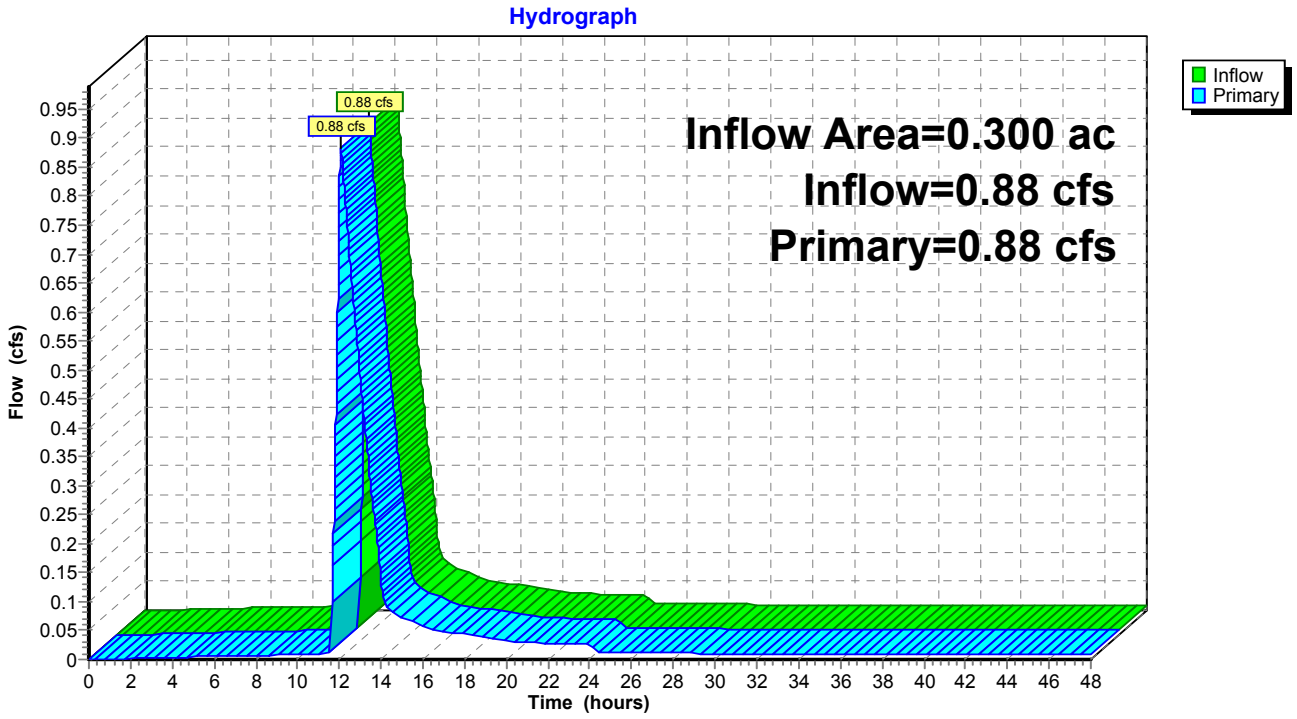


Summary for Link 1L: Total

Inflow Area = 0.300 ac, 84.50% Impervious, Inflow Depth > 6.23" for Jackson - 100 YR event
Inflow = 0.88 cfs @ 12.08 hrs, Volume= 0.156 af
Primary = 0.88 cfs @ 12.08 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Total



United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jackson County, Missouri

Downtown Lee's Summit Apartments

December 20, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

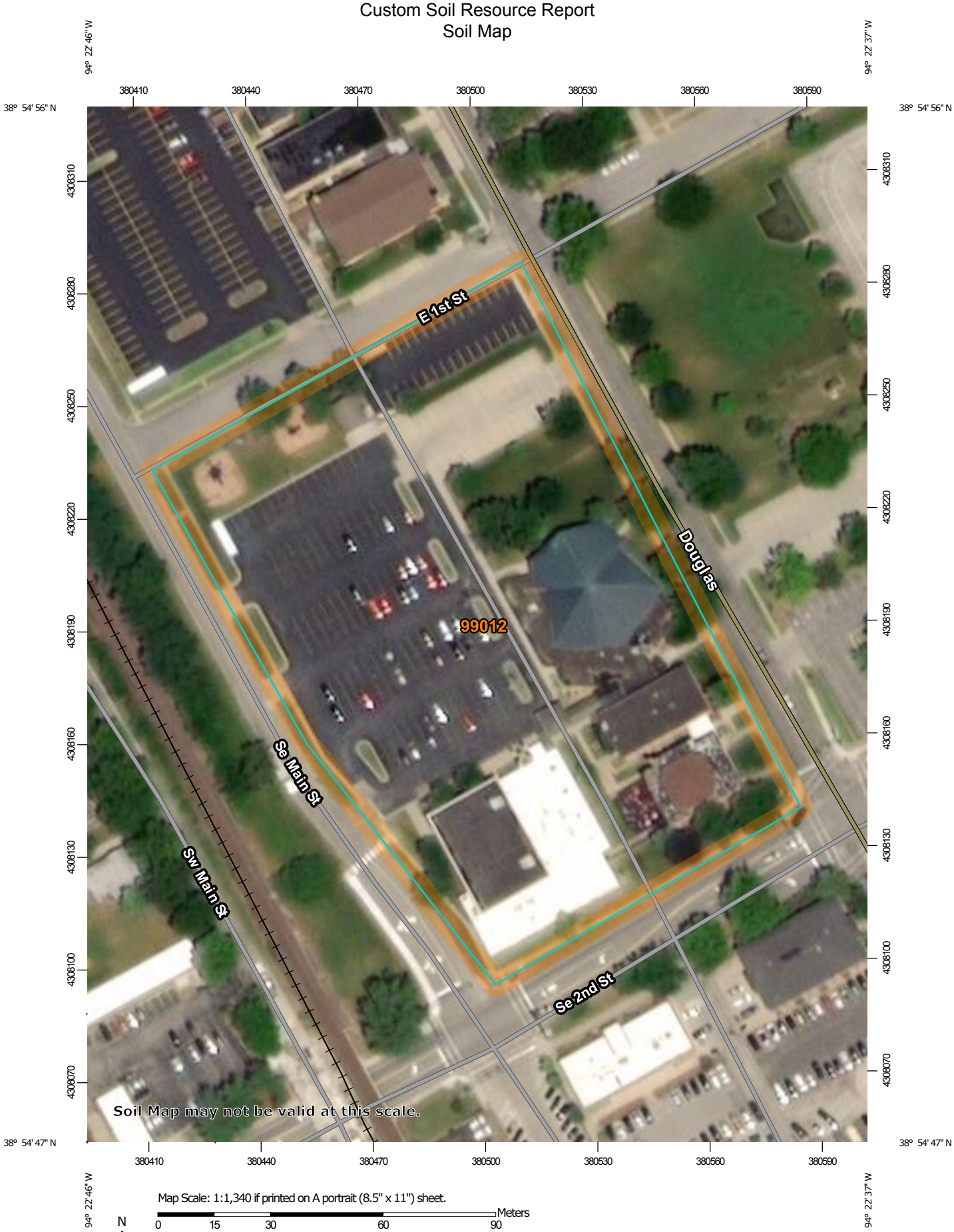
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,340 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 19, Sep 13, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2017—Sep 22, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
99012	Urban land, upland, 5 to 9 percent slopes	4.3	100.0%
Totals for Area of Interest		**4.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jackson County, Missouri

99012—Urban land, upland, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2q0qh
Mean annual precipitation: 36 to 43 inches
Frost-free period: 170 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 5 percent
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: Deep Loess Upland Prairie (R107BY002MO)
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: No

Harvester

Percent of map unit: 5 percent
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

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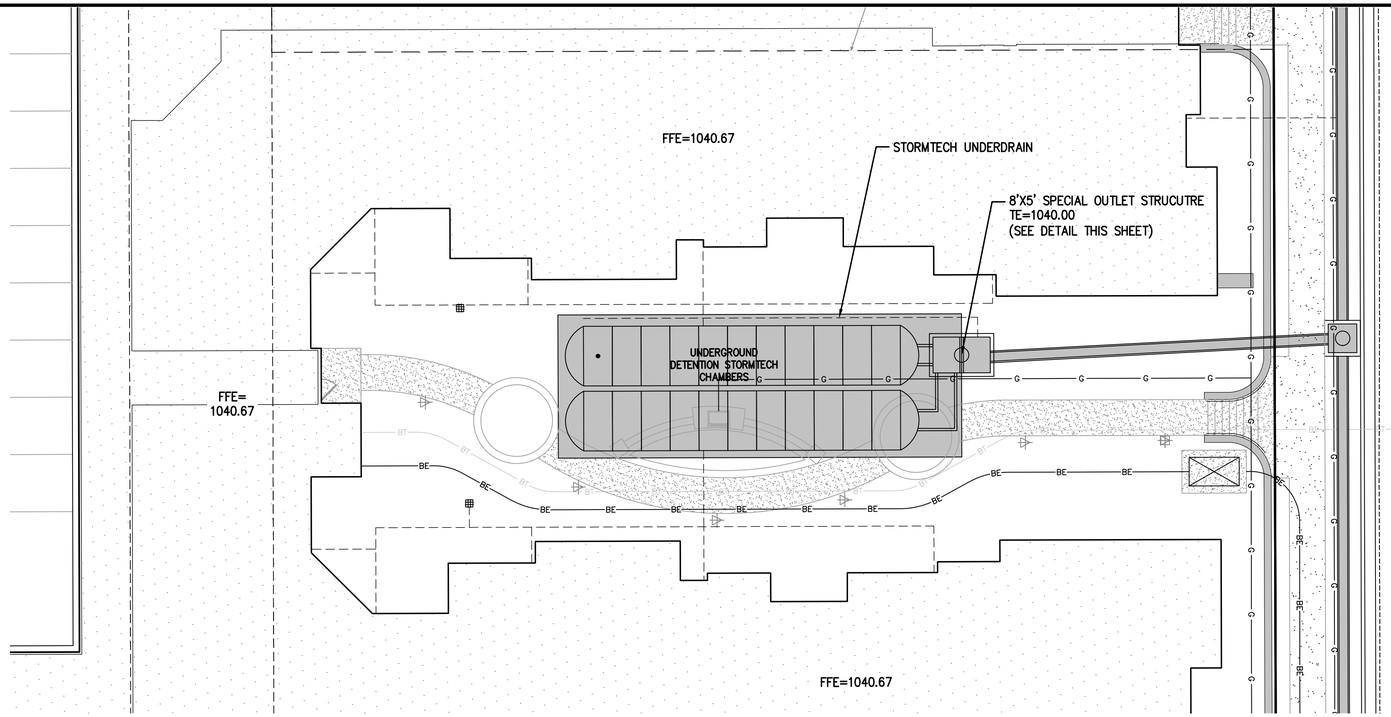
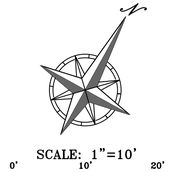
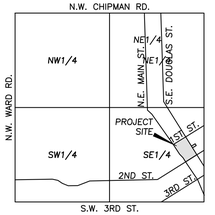
APPENDIX B

Details & Calculations

- Detention Design Details



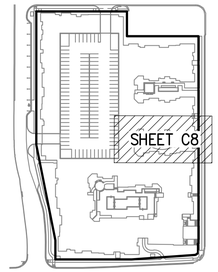


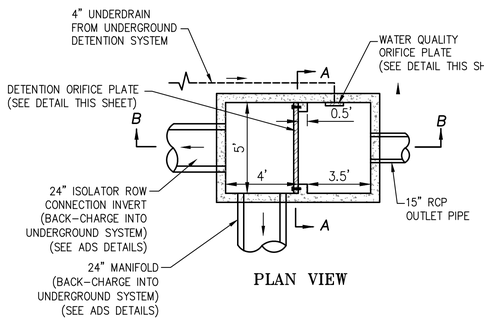


VICINITY MAP
SEC. 6–T47N–R31W

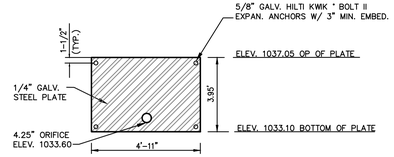
N
SCALE: 1"=2000'

KEY PLAN

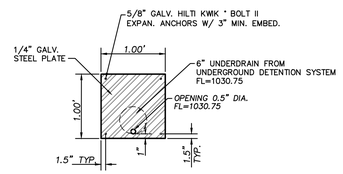




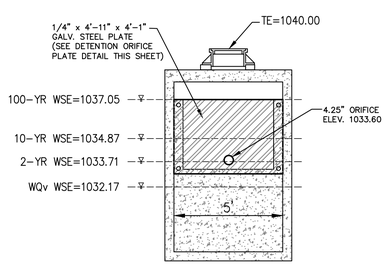
PLAN VIEW



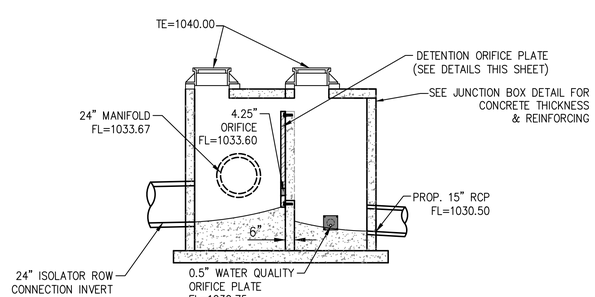
DETENTION ORIFICE PLATE
(Not to Scale)



WATER QUALITY (WQ) ORIFICE PLATE
(Not to Scale)



SECTION A–A



SECTION B–B

8'X5' SPECIAL OUTLET STRUCTURE DETAILS

(NOT TO SCALE)

FLOOD NOTE:

THE SUBJECT PROPERTY LIES WITHIN ZONE X, DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON THE FLOOD INSURANCE RATE MAP PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY FOR THE CITY OF LEE'S SUMMIT, COMMUNITY NO. 290174, JACKSON COUNTY, MISSOURI, MAP NO. 29095C0417G, AND DATED JANUARY 20, 2017.

811 Know what's **below.** **Call** before you dig.

UTILITY NOTES:
VISUAL INDICATIONS OF UTILITIES ARE AS SHOWN. UNDERGROUND LOCATIONS SHOWN, AS FURNISHED BY THEIR LESSORS, ARE APPROXIMATE AND SHOULD BE VERIFIED IN THE FIELD AT THE TIME OF CONSTRUCTION. FOR ACTUAL FIELD LOCATIONS OF UNDERGROUND UTILITIES CALL 811.

STATE OF MISSOURI
DOUGLAS EUGENE UBBEN, JR.
NUMBER PE-2011010998
PROFESSIONAL ENGINEER

PHELPS ENGINEERING, INC.
1270 N. Winchester
Olathe, Kansas 66061
(913) 393-1155
Fax (913) 393-1066
www.phelpsengineering.com

PLANNING
ENGINEERING
IMPLEMENTATION

STORMWATER DETENTION PLAN

DOWNTOWN LEE'S SUMMIT APARTMENTS
114 S.E. DOUGLAS STREET
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

No.	Date	Revisions:	By	App.

PROJECT NO.: 171125
DATE: 01-28-20 DRAWN: SNH
CHECKED: DAF APPROVED: DEU
CERTIFICATE OF AUTHORIZATION
KANSAS SURVEYING – LS-82
ENGINEERING – E-391
CERTIFICATE OF AUTHORIZATION
MISSOURI
LAND SURVEYING–2007001128
ENGINEERING–2007002938

SHEET
C8

WORKSHEET: Water Quality Volume - Underground Infiltration Trench

Project: Downtown Lee's Summit Apartments **By:** DLM **Date:** 1/27/2020
Location: Lee's Summit, MO **Check:** DEU **Date:** 1/27/2020

Basin ID#	WQ_v Calculations					
	A_T (ac)	I (%)	R_v	WQ_v (in)	WQ_v (ac-ft)	WQ_v (cf)
IT #1	0.30	85	0.82	1.12	0.03	1,216

Orifice Calculation	D (in)	Z_{gravel} (in)	D_{perf} (in)	S_{perf} (in)	n_{perf}	Su (ft)	G_{pipe} (%)	D_f (ft)	H_{max} (ft)	H_o (ft)	WQv (cf)	Q_{avg} (cfs)	Max Orifice A (in^2)	Max Orifice D (in)	Check Q w/ Design Diameter (cfs)
IT #1	4	8	0.375	6	4	20	0.5	0	6.75	3.375	1,216	0.01	0.14	0.418	0.01

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	DIRK HUDSON 816-602-4201 DIRK.HUDSON@ADS-PIPE.COM
ADS SALES REP:	JOHN WHITWOOD 816-805-5570 JOHN.WHITWOOD@ADS-PIPE.COM
PROJECT NO:	S149291

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST™ by StormTech

FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

DOWNTOWN LEE'S SUMMIT APARTMENTS

LEE'S SUMMIT, MO

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

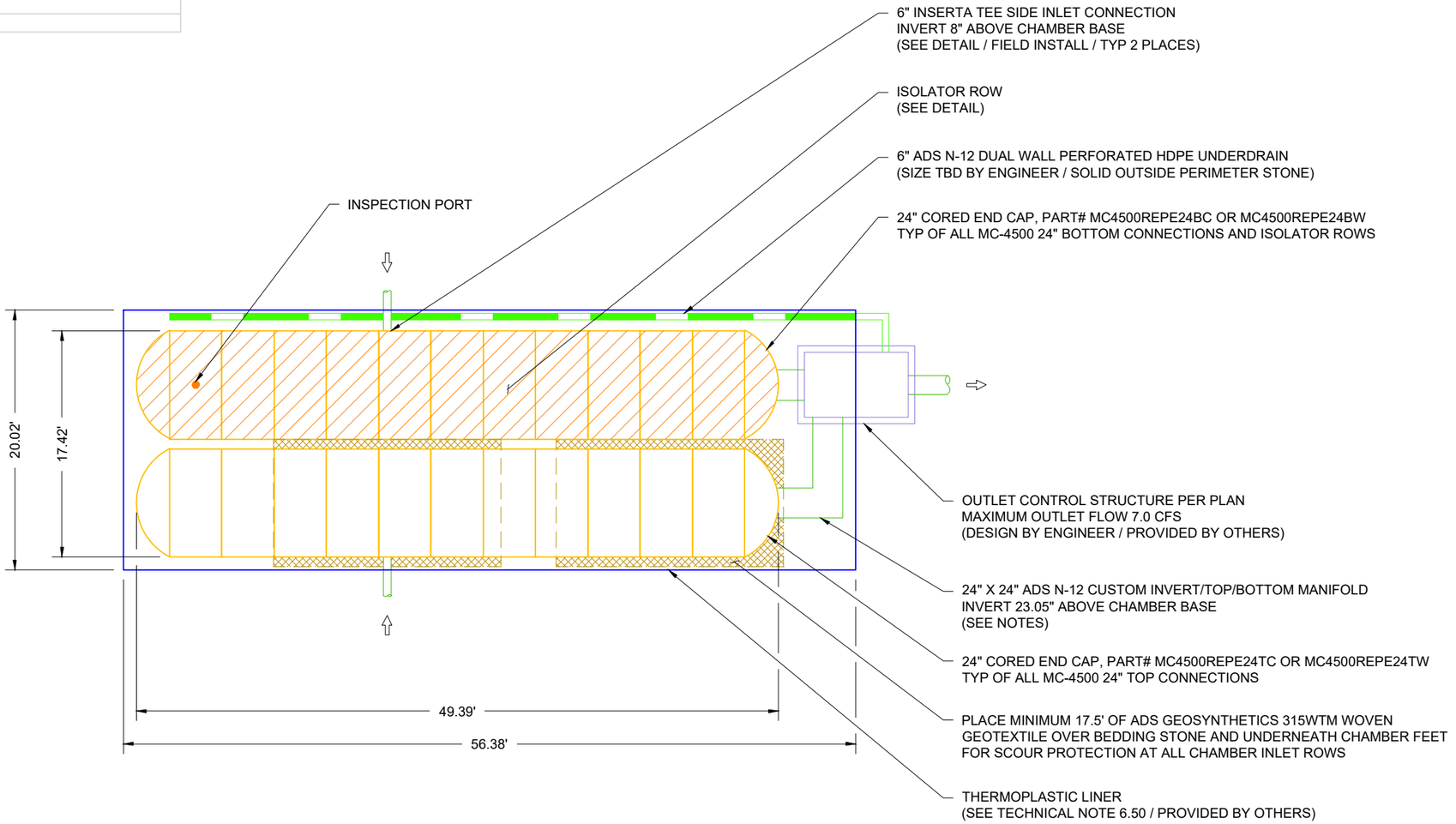
22	STORMTECH MC-4500 CHAMBERS
4	STORMTECH MC-4500 END CAPS
12	STONE ABOVE (in)
9	STONE BELOW (in)
40	% STONE VOID
4537	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
1128	SYSTEM AREA (ft²)
153	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS

1043.75	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
1039.25	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
1038.75	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
1038.75	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
1038.75	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
1037.75	TOP OF STONE
1036.75	TOP OF MC-4500 CHAMBER
1033.67	24" TOP MANIFOLD INVERT
1032.42	INSERTA TEE SIDE INLET CONNECTION INVERT
1031.94	24" ISOLATOR ROW CONNECTION INVERT
1031.75	BOTTOM OF MC-4500 CHAMBER
1031.00	UNDERDRAIN INVERT
1031.00	BOTTOM OF STONE

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- THE SITE DESIGN ENGINEER MUST REVIEW THE PROXIMITY OF THE CHAMBERS TO THE BUILDING/STRUCTURE. NO FOUNDATION LOADS SHALL BE TRANSMITTED TO THE CHAMBERS. THE SITE DESIGN ENGINEER MUST CONSIDER EFFECTS OF POSSIBLE SATURATED SOILS ON BEARING CAPACITY OF SOILS AND SEEPAGE INTO BASEMENTS.
- ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.



DOWNTOWN LEE'S SUMMIT APARTMENTS
LEE'S SUMMIT, MO
DATE: 11/13/19 DRAWN: AGC
PROJECT #: S149291 CHECKED: XXX

DATE	DRWN	CHKD	DESCRIPTION
11/14/19	AGC		REV. ELEVATIONS & ADDED LINER

StormTech
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860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

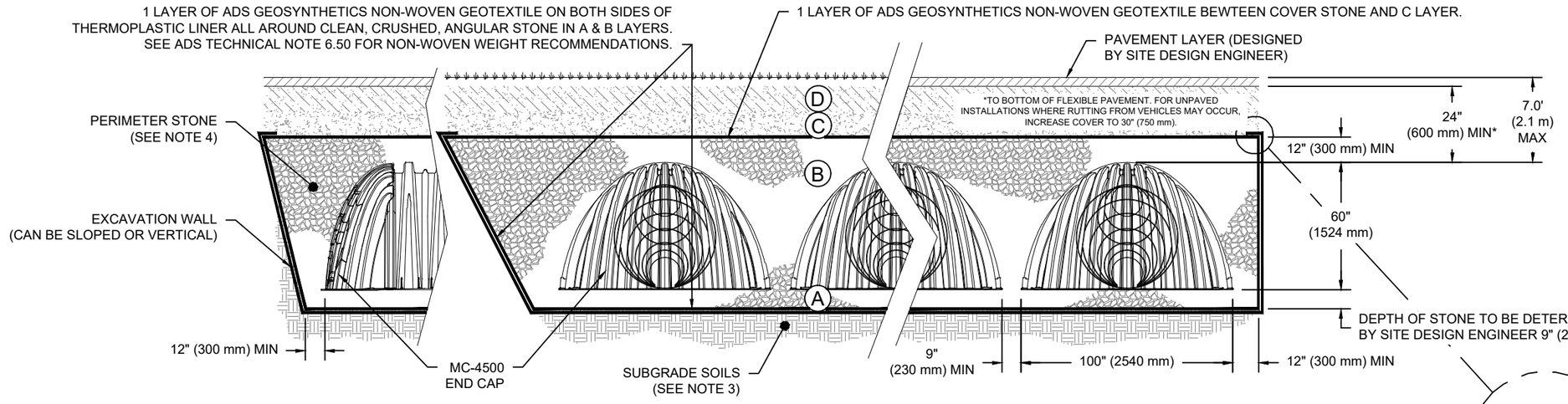
ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

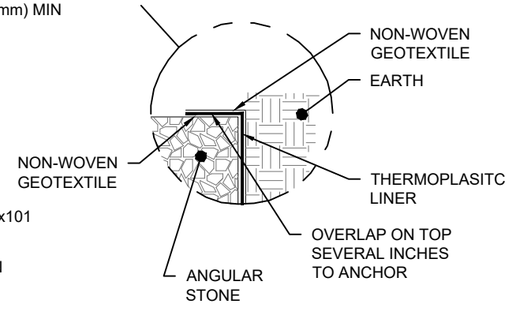
0 10' 20'

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.





THERMOPLASTIC LINER DETAIL

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

DOWNTOWN LEE'S SUMMIT APARTMENTS
LEE'S SUMMIT, MO
DATE: 11/13/19 | DRAWN: AGC | PROJECT #: S149291 | CHECKED: XXX

DATE	DRWN	CHKD	DESCRIPTION
11/14/19	AGC		REV. ELEVATIONS & ADDED LINER

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

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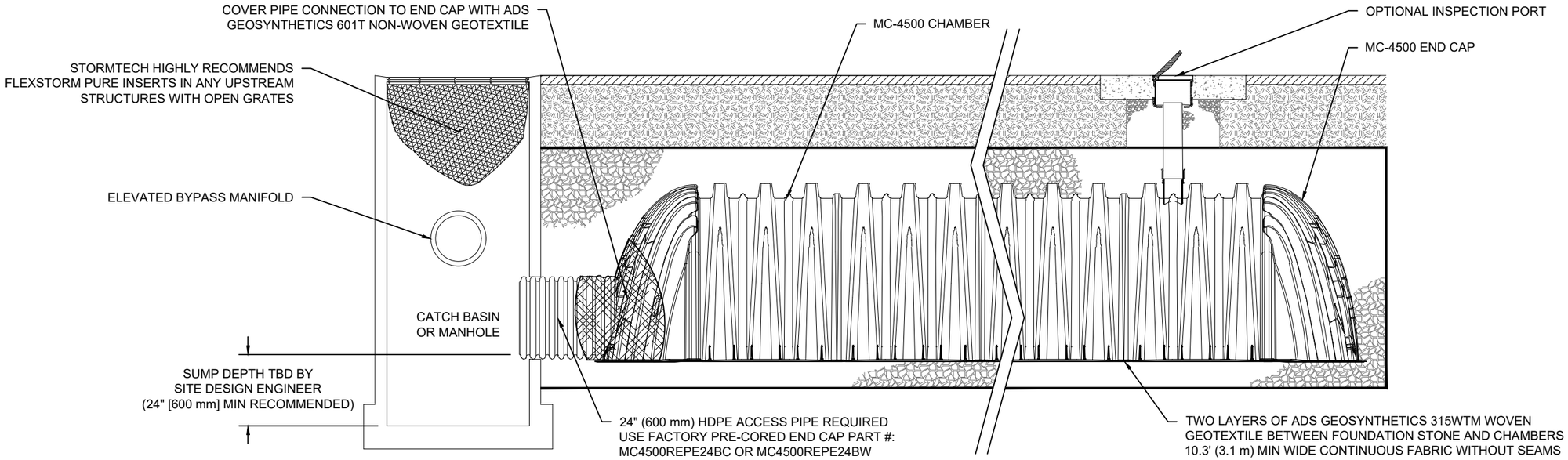
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026



MC-4500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

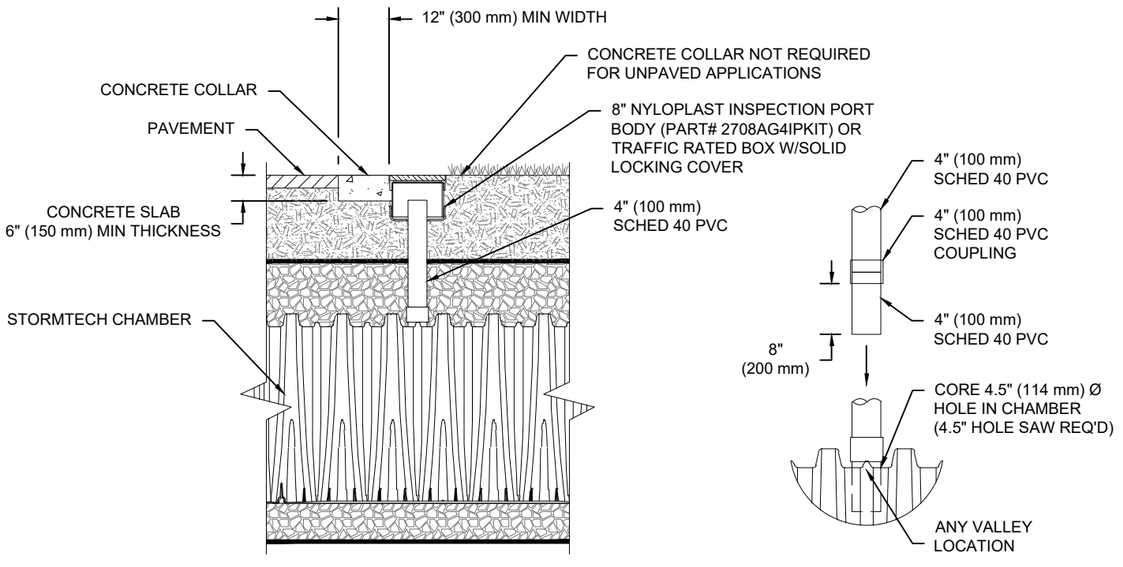
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED (4" PVC NOT PROVIDED BY ADS).

4" PVC INSPECTION PORT DETAIL
NTS

CONNECTION DETAIL
NTS

DOWNTOWN LEE'S SUMMIT APARTMENTS
LEE'S SUMMIT, MO
DATE: 11/13/19 | DRAWN: AGC | PROJECT #: S149291 | CHECKED: XXX

DATE	DRWN	CHKD	DESCRIPTION
11/14/19	AGC		REV. ELEVATIONS & ADDED LINER

StormTech
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70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

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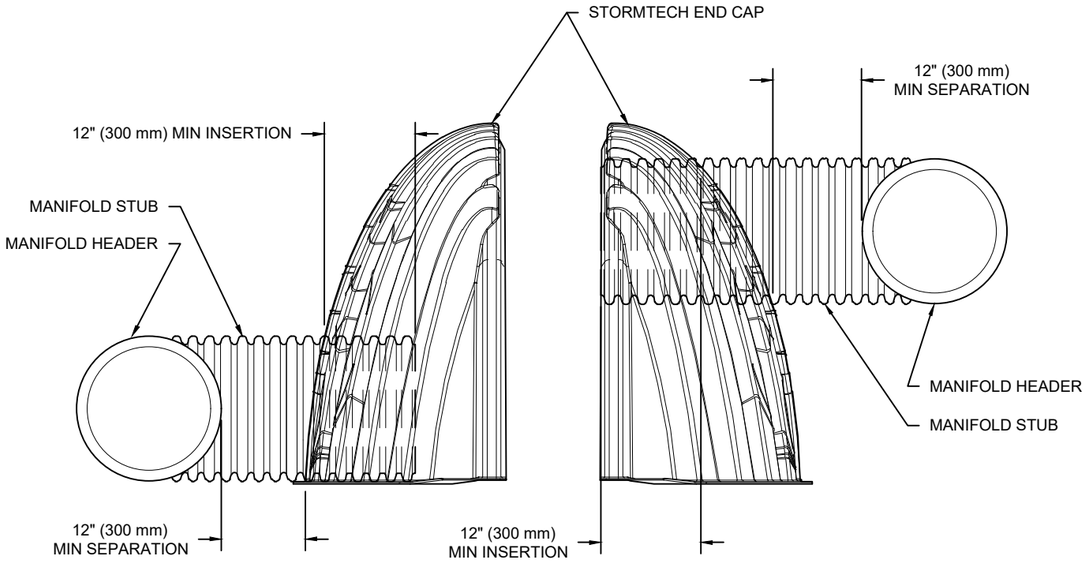
4640 TRUEMAN BLVD
HILLIARD, OH 43026

MC-SERIES END CAP INSERTION DETAIL

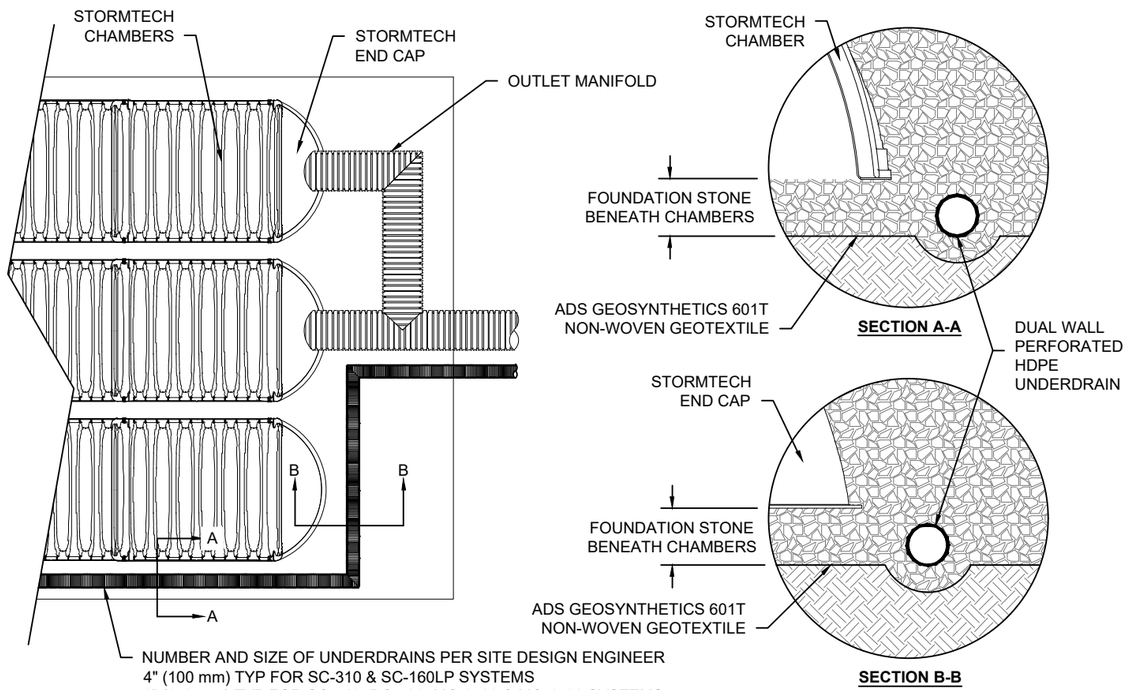
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

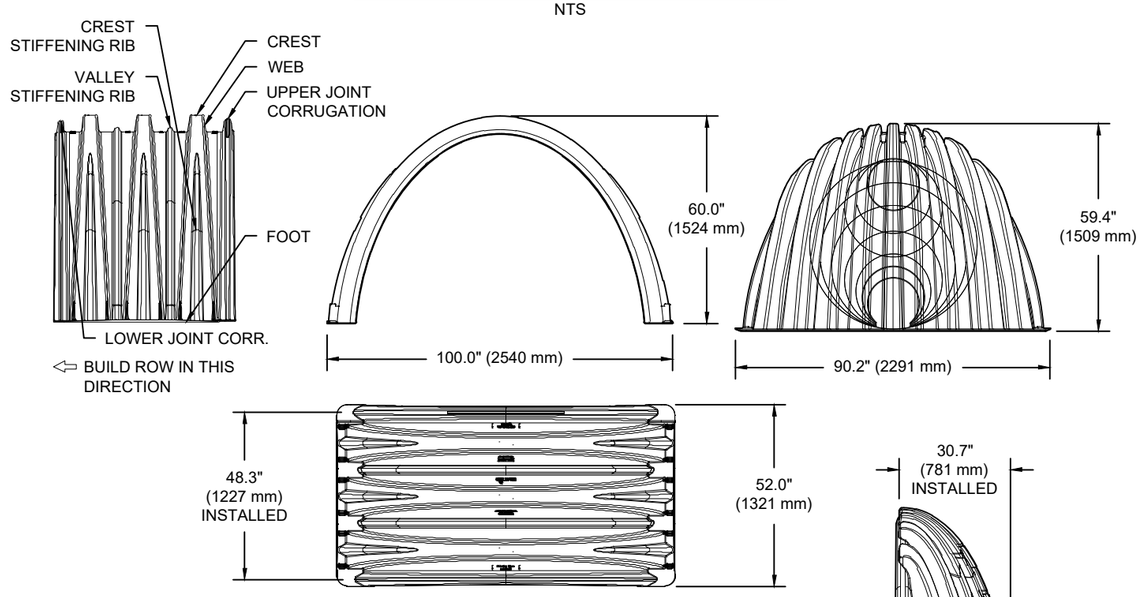
UNDERDRAIN DETAIL

NTS



MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT	130.0 lbs.	(59.0 kg)

NOMINAL END CAP SPECIFICATIONS

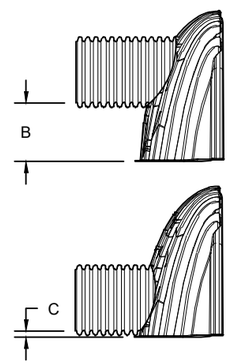
SIZE (W X H X INSTALLED LENGTH)	90.2" X 59.4" X 30.7"	(2291 mm X 1509 mm X 781 mm)
END CAP STORAGE	35.7 CUBIC FEET	(1.01 m³)
MINIMUM INSTALLED STORAGE*	108.7 CUBIC FEET	(3.08 m³)
WEIGHT	135.0 lbs.	(61.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500REPE06T	6" (150 mm)	42.54" (1.081 m)	---
MC4500REPE06B		---	0.86" (22 mm)
MC4500REPE08T	8" (200 mm)	40.50" (1.029 m)	---
MC4500REPE08B		---	1.01" (26 mm)
MC4500REPE10T	10" (250 mm)	38.37" (975 mm)	---
MC4500REPE10B		---	1.33" (34 mm)
MC4500REPE12T	12" (300 mm)	35.69" (907 mm)	---
MC4500REPE12B		---	1.55" (39 mm)
MC4500REPE15T	15" (375 mm)	32.72" (831 mm)	---
MC4500REPE15B		---	1.70" (43 mm)
MC4500REPE18TC	18" (450 mm)	29.36" (746 mm)	---
MC4500REPE18TW			
MC4500REPE18BC		---	1.97" (50 mm)
MC4500REPE18BW			
MC4500REPE24TC	24" (600 mm)	23.05" (585 mm)	---
MC4500REPE24TW			
MC4500REPE24BC		---	2.26" (57 mm)
MC4500REPE24BW			
MC4500REPE30BC	30" (750 mm)	---	2.95" (75 mm)
MC4500REPE36BC	36" (900 mm)	---	3.25" (83 mm)
MC4500REPE42BC	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

DOWNTOWN LEE'S SUMMIT APARTMENTS
LEE'S SUMMIT, MO
DATE: 11/13/19 | DRAWN: AGC | CHECKED: XXX
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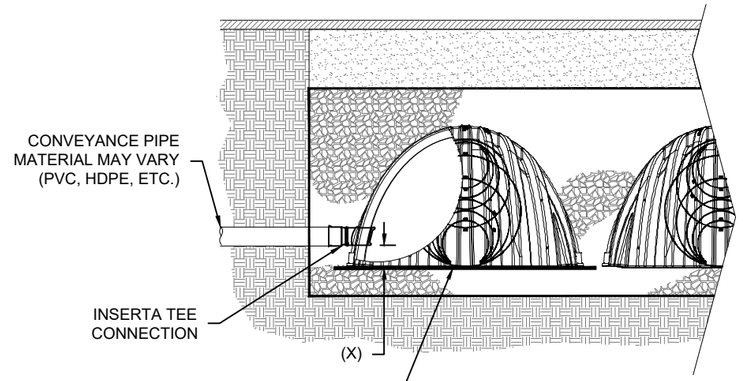
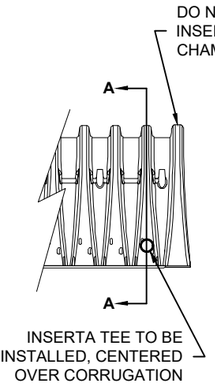
INSERTA TEE DETAIL

NTS



SECTION A-A



SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

DOWNTOWN LEE'S SUMMIT APARTMENTS
LEE'S SUMMIT, MO

DATE: 11/13/19 | DRAWN: AGC | CHECKED: XXX | PROJECT #: S149291

DATE	DRWN	CHKD	DESCRIPTION
11/14/19	AGC		REV. ELEVATIONS & ADDED LINER

ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

INSERTA TEE
INSERTA TEE | PO BOX 714
CORNELIUS, OR 97116
PH:(503) 357-2110 FAX:(503) 359-5417
SALES@INSERTATEE.COM

PARKING GARAGE
(457 SPACES)

LOT 1
LOT AREA=162,666 SQ. FT.
(3.734 AC.)

D1

D2

D3

NORTH BOUNDARY LINE
DOWNTOWN CENTER URBAN
RENEWAL PLAN
BK. I-29, PG. 1361

FFE=1040.67

RELOCATE EXISTING GAS
AROUND DEVELOPMENT

FFE=1040.67

FFE=
1040.67

BT

T1

E1

E2

E3

FFE=1040.67

PROPOSED
4-STORY BUILDING
329,535 S.F.

20' EMERGENCY ACCESS
& UTILITY ESMT
BK. 61, PG. 3
(TO BE VACATED)

ABANDON/REMOVE EXISTING
8" VCP PUBLIC SANITARY

FFE=1040.67

FFE=1040.67

R/W

OHP

SS

WV

W

BE

CONC. PATCH

CONC. APRON

CONCRETE SIDEWALK

ET

ALK