



STORM WATER NARRATIVE
FOR
The Village at Discovery
Lot 1

PROJECT NO.
230286



October 18, 2024



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1. General Information

The site is located at 221 NE Alura Way in Lee's Summit, Missouri. This project consists of developing one lot as part of The Village at Discovery Park development. The proposed development will include one structure with a use of commercial and restaurant with adjacent parking. The proposed development will be constructed on Lot 1 of The Village at Discovery Park Plat recorded as Instrument Number 2023E0089550. Lot 1 of said Plat contains 2.05 acres. The proposed structures will have a total footprint of 14,112 sq. ft. and the total impervious area will be ±65,220 sq. ft. (1.50 ac.). The calculated runoff coefficient is determined by $0.3 + 0.6 * (\% \text{ impervious})$, this lot has an overall runoff coefficient of 0.74.

The site is currently open grass area. The stormwater currently sheet flows north. There are multiple curb opening inlets from previous lot development to the north and west. These inlets all flow into a private storm line where it is then conveyed to a regional detention facility. This regional detention facility is part of the "MASS GRADING & EROSION AND SEDIMENT CONTROL PLANS" prepared by Olsson, approved and issued for construction on 10/25/2023.

The stormwater from the proposed development will be collected and conveyed with the use of on-site storm sewer. The on-site storm sewer will discharge into existing junction boxes/inlets and will then be conveyed to the regional detention facility. The water is treated and discharged through a 5' x 6' RCB to a tributary of Little Cedar Creek. This tributary is not regulated by USACE per the USGS National Water Information System Map.

Per the FEMA Flood Map Service Center no portion of the site is located in the 100 year flood plain per FIRM Map 29095C0409G, effective date of January 20, 2017. No floodplain permits are required.

The soil classifications per the USDA Nation Resources Conservation Service (NRCS) Web Soil Survey shows this site to consist of Greenton silty clay loam and Sharpsburg-Urban land complex. See table below:

Soils Classifications Chart:

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	Slopes	Hydrologic Soil Group
30080	Greenton silty clay loam	1.40	69.1	5% to 9%	C/D
10128	Sharpsburg-Urban land complex	0.60	30.9	2% to 5%	C/D

*Refer to Exhibit C1

2. Methodology

The parameters for determining the runoff calculations for this site are equal to the parameters in the stormwater calculations prepared by Olsson for the plans named "Private Site Development Plans for the Village at Discovery Park Zone 1". These calculations and associated storm sewer plans have been approved by Development Services Department of Lee's Summit, Missouri. This report only includes a summary of the approved calculations.

Rational Method:

- Return Frequencies: 2, 10, & 100 year
- Intensity-Duration-Frequency Curves for Kansas City, Missouri
- Rational method runoff coefficients
- Rational method for Time of Concentration
- Rainfall data is taken from the APWA 5600 "Storm Drainage Systems & Facilities", dated February 16, 2011.

- Rainfall intensity is calculated from Table 5602-5, taking the time of concentration to be 5 minutes.
 - 2 year – 5.41 inches
 - 10 year – 7.35 inches
 - 100 year – 10.32 inches

3. Existing Conditions Analysis

Existing conditions were modeled using the open space area as pasture in good condition. The stormwater currently sheet flows to multiple inlets positioned along the northern and western line. An existing storm pipe network conveys the water from the structures to an existing regional detention facility. The existing detention facility is designed to have capacity for this whole 2.05-acre site. This site has two existing drainage areas. Area E1 captures 4.95 acres, this includes Lot 3, Lot 4, and approximately two-thirds of Lot 1. Area D1 captures 3.33 acres, this includes the remaining one-third of Lot 1, and Lot 2. Please see sheet C402 for drainage areas on “PRIVATE SITE DEVELOPMENT PLANS” prepared by Olsson and approved for construction on 11/03/2023. See Section B of the Appendix for Olsson plans and calculations.

The table below summarizes the existing conditions analysis:

Subarea	Drainage Area (acres)	Runoff Coefficient	T _c (minutes)	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	100-year Peak Flow (cfs)
E1	4.95	0.3	5	8.03	10.91	19.16
D1	3.33	0.3	5	5.40	7.34	12.89

4. Proposed Conditions Analysis

The stormwater from the proposed development will be collected and conveyed with the use of onsite storm sewer. The storm sewer will be routed to the existing storm network and then conveyed to a detention facility. Any runoff that is not collected by the on-site sewer system will be collected by curb inlets placed along Alura Way and Discovery Ave. and conveyed to the same regional detention facility.

The calculations prepared by Olsson used a post-development runoff coefficient of 0.82. The storm sewer that this development ties into is designed for this capacity. After final design of this site the calculated runoff coefficient is 0.74, meaning that less runoff will be generated and there will be ample capacity in both the existing storm

sewer and detention facility. The design factor of 0.81 comes from APWA 5600 – Table 5602-3: Runoff Parameters, neighborhood areas of business. This is used for design because it is more conservative than using the actual coefficient of 0.74.

The table below summarizes the proposed conditions analysis:

Subarea	Drainage Area (Acres)	Runoff Coefficient	Tc (Minutes)	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	100-year Peak Flow (cfs)
DA 1	0.20	0.81	5	0.88	1.19	2.04
DA 2	0.01	0.30	5	0.02	0.02	0.04
DA 3	0.01	0.30	5	0.02	0.02	0.04
DA 4	0.19	0.81	5	0.83	1.13	1.94
DA 5	0.04	0.81	5	0.17	0.24	0.41
DA 6	0.01	0.30	5	0.02	0.02	0.04
DA 7	0.18	0.81	5	0.79	1.07	1.84
DA 8	0.12	0.81	5	0.53	0.71	1.23
DA 9	0.01	0.30	5	0.02	0.02	0.04
DA 10	0.22	0.81	5	0.96	1.31	2.25
DA 11	0.42	0.81	5	1.84	2.50	4.29
DA 12	0.20	0.81	5	0.88	1.19	2.04
DA 13	0.28	0.81	5	1.23	1.67	2.86
DA 14	0.15	0.99	5	0.80	1.09	1.53
DA 15	0.17	0.99	5	0.91	1.24	1.74
TOTAL	2.21	-	-	9.90	13.42	22.33

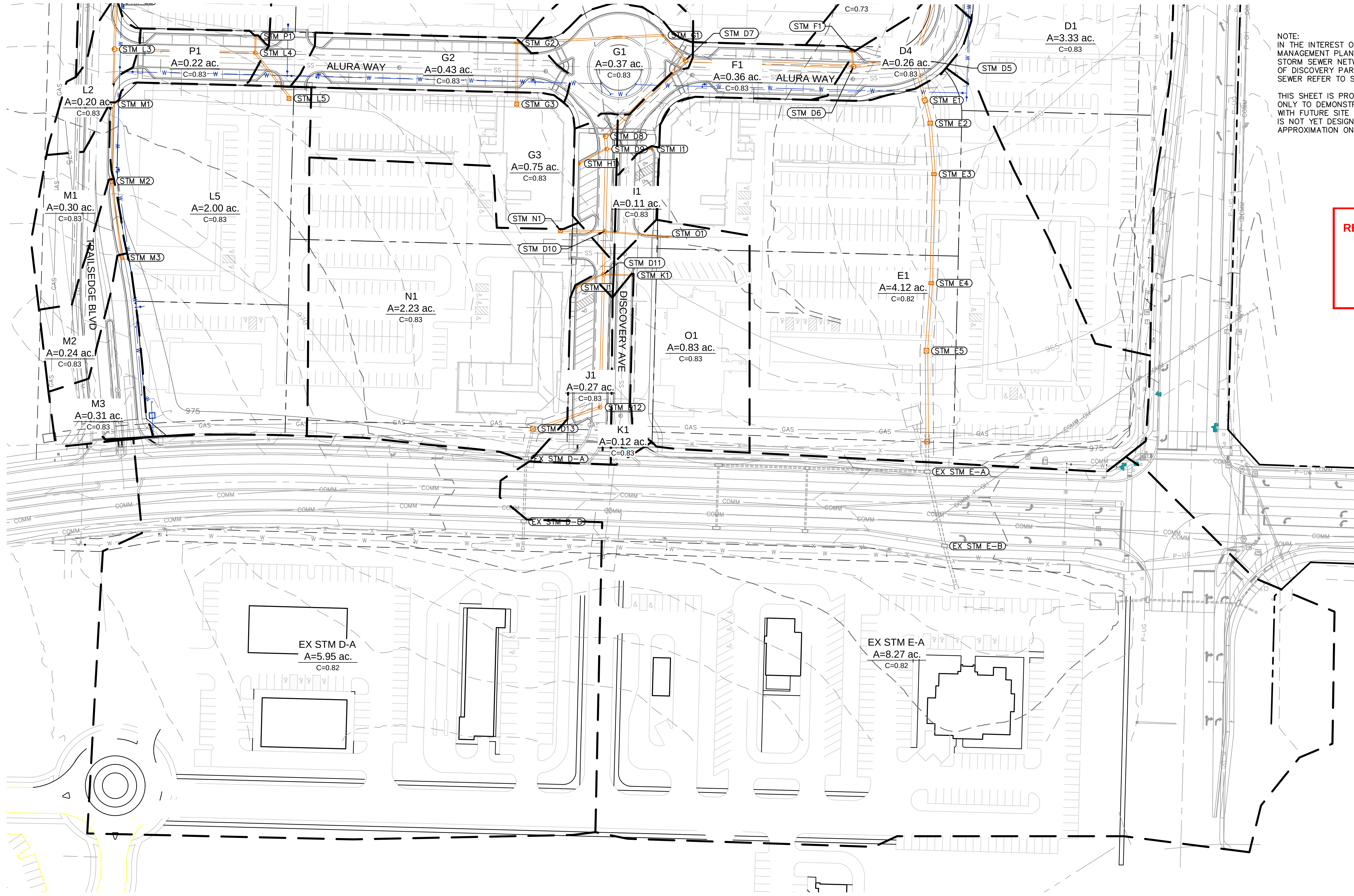
5. Conclusions and Recommendations

The proposed development has been evaluated and this report shows that the post development stormwater runoff able to be handled by the existing storm network and regional detention facility.

Appendix A

- A1 Existing Condition Drainage Area Map
- A2 Proposed Condition Drainage Area Map

DWG: F:\2021\04501-05000\021-04643-1\40-design\SiteCAD\final\plans\Sheets\GNCA\Street & Storm Plans\C_STM_OVR_02_D2104643.dwg
DATE: Oct 18, 2023 9:26am
XREFS: C_PBASE_D2104643 C_PUTIL_D2104643 C_PFBASE_D2104643 C_PBNBY_D2104643 C_PSTRM_D2104643 C_PSTRM_FUTURE_D2104643 C_FROAD_D2104643 C_FBASE_D2104643 T_PBASE_D2104643
USER: arcmaney



- LEGEND**
- PROPERTY BOUNDARIES
 - LOT LINE
 - EASEMENT LINE
 - EXISTING WATER MAIN
 - PROPOSED PRIVATE STORM SEWER
 - PROPOSED PRIVATE SANITARY SEWER
 - PROPOSED PRIVATE WATER MAIN
 - PROPOSED PUBLIC WATER MAIN (PER SEPARATE PLAN SET)
 - PROPOSED WATER MAIN (PER NW COLBERN RD PLANS)
 - FINISHED MAJOR CONTOUR (10' INTERVAL)
 - FINISHED MINOR CONTOUR (2' INTERVAL)

NOTE:
IN THE INTEREST OF BETTER CLARITY, THIS STORMWATER MANAGEMENT PLAN COVERS BOTH PRIVATE AND PUBLIC STORM SEWER NETWORKS PROPOSED WITH THE DEVELOPMENT OF DISCOVERY PARK ZONE 1. FOR DETAILS ON PUBLIC STORM SEWER REFER TO SEPARATE PUBLIC STORM SEWER PLANS.

THIS SHEET IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY TO DEMONSTRATE HOW THE STORM SYSTEM INTERACTS WITH FUTURE SITE DEVELOPMENT. SAID FUTURE DEVELOPMENT IS NOT YET DESIGN OR PERMITTED, SO THE VALUES ARE AN APPROXIMATION ONLY.

RELEASED FOR CONSTRUCTION
As Noted on Plan Review

Development Services Department
Lee's Summit, Missouri
11/01/2023

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DATE
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REVISIONS
2023

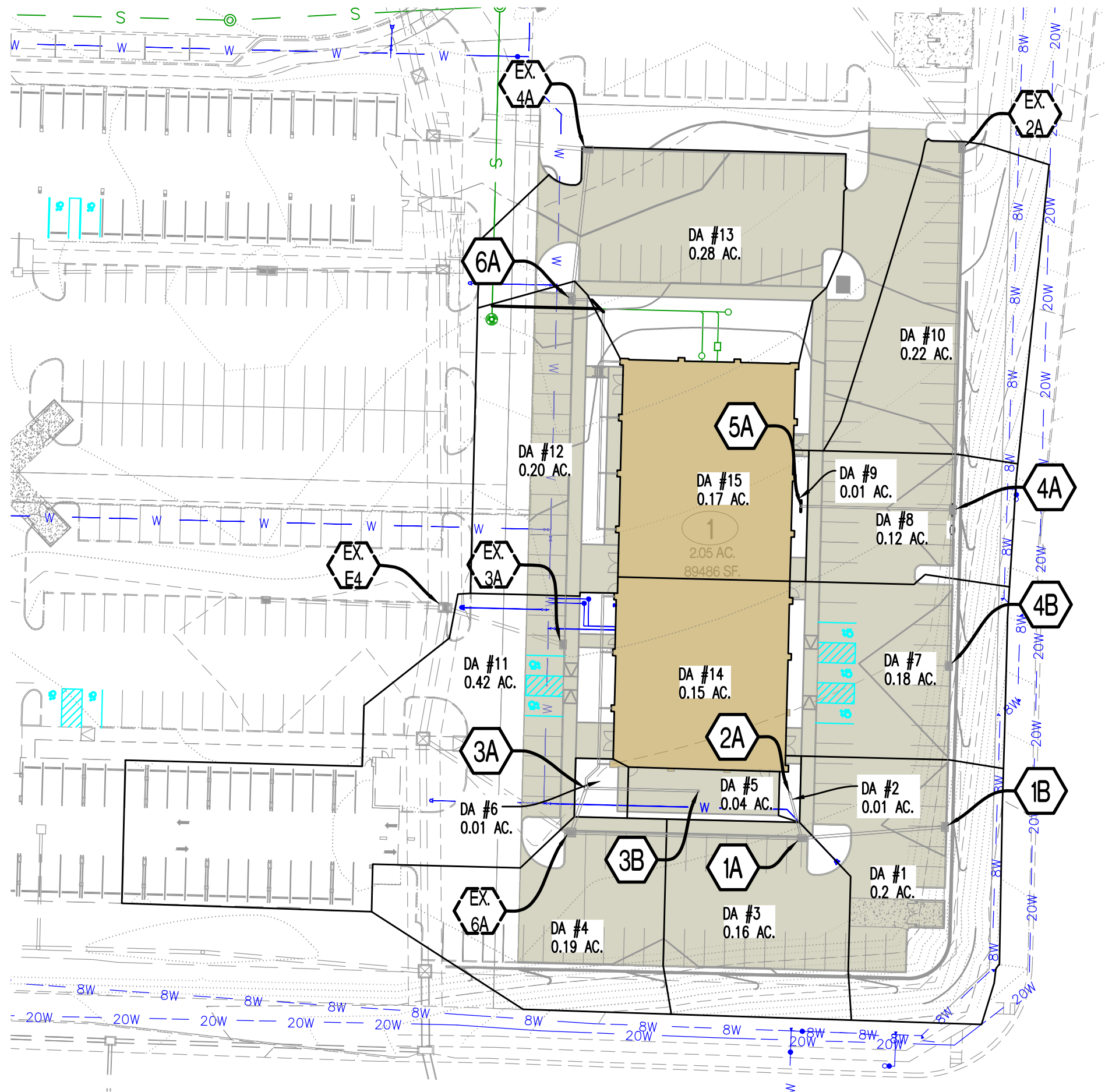
STORMWATER MANAGEMENT PLAN - FUTURE CONDITIONS
PRIVATE SITE DEVELOPMENT PLANS

THE VILLAGE AT DISCOVERY PARK ZONE 1
NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MISSOURI

drawn by: BM/GS/STW
checked by: AR/JN
approved by: DE
QA/QC by: JS/NH
project no.: D21-04643
drawing no.: STM_OVR_02_D2104643
date: 10.18.2023

SHEET
C404

THE VILLAGE AT DISCOVERY PARK
LOT 1 DRAINAGE AREA MAP
SCALE: 1" = 50'



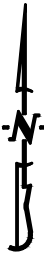
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Appendix B

Supporting Calculations from Olsson

Drainage Area Design Table						
10 Year Return Frequency						
Inlet ID	Drainage Area	C	Tc	i	K	Peak Flow
	(ac)		(min)	(in/hr)		(cfs)
A2	5.84	0.45	5.00	7.35	1.00	19.32
B2	1.78	0.30	5.00	7.35	1.00	3.93
C2	3.25	0.30	5.00	7.35	1.00	7.17
D1	3.33	0.30	10.47	5.98	1.00	5.97
D2	0.43	0.66	5.00	7.35	1.00	2.09
D3	0.73	0.66	5.00	7.35	1.00	3.54
D4	0.26	0.83	5.00	7.35	1.00	1.59
E1	4.95	0.30	10.67	5.94	1.00	8.82
F1	0.36	0.83	5.00	7.35	1.00	2.20
G1	0.37	0.83	5.00	7.35	1.00	2.26
G2	0.43	0.83	5.00	7.35	1.00	2.62
G3	2.01	0.30	5.00	7.35	1.00	4.43
H1	0.16	0.83	5.00	7.35	1.00	0.98
I1	0.11	0.83	5.00	7.35	1.00	0.67
J1	0.27	0.83	5.00	7.35	1.00	1.65
K1	0.12	0.83	5.00	7.35	1.00	0.73
L2	0.20	0.83	5.00	7.35	1.00	1.22
L5	0.76	0.30	5.00	7.35	1.00	1.68
M1	0.30	0.83	5.00	7.35	1.00	1.83
M2	0.24	0.83	5.00	7.35	1.00	1.46
M3	0.31	0.83	5.00	7.35	1.00	1.89
N1	2.20	0.30	5.00	7.35	1.00	4.85
P1	0.22	0.83	5.00	7.35	1.00	1.34
U1	0.12	0.83	5.00	7.35	1.00	0.73
U2	0.09	0.83	5.00	7.35	1.00	0.55
V1	1.20	0.30	5.00	7.35	1.00	2.65
W1	0.87	0.83	5.00	7.35	1.00	5.31

Drainage Area Design Table						
100 Year Return Frequency						
Inlet ID	Drainage Area	C	Tc	i	K	Peak Flow
	(ac)		(min)	(in/hr)		(cfs)
A2	5.84	0.45	5.00	10.32	1.25	33.91
B2	1.78	0.30	5.00	10.32	1.25	6.89
C2	3.25	0.30	5.00	10.32	1.25	12.58
D1	3.33	0.30	10.47	8.46	1.25	10.56
D2	0.43	0.66	5.00	10.32	1.25	3.66
D3	0.73	0.66	5.00	10.32	1.25	6.22
D4	0.26	0.83	5.00	10.32	1.25	2.68
E1	4.95	0.30	10.67	8.40	1.25	15.60
F1	0.36	0.83	5.00	10.32	1.25	3.72
G1	0.37	0.83	5.00	10.32	1.25	3.82
G2	0.43	0.83	5.00	10.32	1.25	4.44
G3	2.01	0.30	5.00	10.32	1.25	7.78
H1	0.16	0.83	5.00	10.32	1.25	1.65
I1	0.11	0.83	5.00	10.32	1.25	1.14
J1	0.27	0.83	5.00	10.32	1.25	2.79
K1	0.12	0.83	5.00	10.32	1.25	1.24
L2	0.20	0.83	5.00	10.32	1.25	2.06
L5	0.76	0.30	5.00	10.32	1.25	2.94
M1	0.30	0.83	5.00	10.32	1.25	3.10
M2	0.24	0.83	5.00	10.32	1.25	2.48
M3	0.31	0.83	5.00	10.32	1.25	3.20
N1	2.20	0.30	5.00	10.32	1.25	8.52
P1	0.22	0.83	5.00	10.32	1.25	2.27
U1	0.12	0.83	5.00	10.32	1.25	1.24
U2	0.09	0.83	5.00	10.32	1.25	0.93
V1	1.20	0.30	5.00	10.32	1.25	4.65
W1	0.87	0.83	5.00	10.32	1.25	8.98

Inlet Design Table						
10 Year Return Frequency						
Inlet ID	Captured Flow	Bypass Flow	Inlet Efficiency (Note 2)	Gutter Depth	Gutter Spread	Ponding Depth
	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
A2	19.54	0.00	100.00%	...	...	0.44
B2	3.93	0.00	100.00%	...	...	0.18
C2	7.17	0.00	100.00%	...	...	0.26
D1	5.97	0.00	100.00%	...	...	0.26
D2	2.28	0.05	97.66%	0.19	8.71	...
D3	3.31	0.25	93.07%	0.22	10.21	...
D4	1.57	0.01	99.14%	0.16	7.54	...
E1	8.82	0.00	100.00%	...	...	0.41
F1	2.20	0.00	100.00%	...	...	...
G1	2.26	0.00	100.00%	...	...	...
G2	2.62	0.00	100.00%	...	...	...
G3	4.43	0.00	100.00%	...	...	0.30
H1	0.98	0.00	100.00%	...	...	...
I1	0.67	0.00	100.00%	...	...	...
J1	1.65	0.00	100.00%	...	...	...
K1	0.73	0.00	99.99%	0.11	4.96	...
L2	1.33	0.07	94.89%	0.12	5.55	...
L5	1.68	0.00	100.00%	...	...	0.16
M1	1.76	0.18	90.83%	0.14	6.27	...
M2	1.52	0.11	93.16%	0.13	5.88	...
M3	1.73	0.17	91.21%	0.13	6.21	...
N1	0.00	0.00	0.00%	...	...	0.32
P1	1.34	0.00	100.00%	...	...	...
U1	0.73	0.00	99.99%	0.11	4.96	...
U2	0.55	0.00	99.70%	0.10	4.45	...
V1	2.65	0.00	100.00%	...	...	0.22
W1(L)	...	...	...	0.25	11.38	...
W1(R)	...	...	...	0.11	5.27	...
W1	5.37	0.00	100.00%	...	...	...
Notes:						
1. Inlet capacity at sag location has been reduced by a clogging factor of 0.80, reducing theoretical Both theoretical capacity and reduced capacity are shown.						
2. Inlet efficiency shown in the tables is Captured Flow/Total Flow, denoting the actual percentage						

RELEASED FOR CONSTRUCTION
As Noted on Plan Review

Development Services Department
Lee's Summit, Missouri

11/01/2023

Inlet Design Table						
100 Year Return Frequency						
Inlet ID	Captured Flow	Bypass Flow	Inlet Efficiency (Note 2)	Gutter Depth	Gutter Spread	Ponding Depth
	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
A2	35.22	0.00	100.00%	...	...	0.53
B2	6.89	0.00	100.00%	...	...	0.26
C2	12.58	0.00	100.00%	...	...	0.38
D1	10.56	0.00	100.00%	...	...	0.37
D2	4.27	0.39	91.57%	0.24	11.29	...
D3	5.33	1.00	84.25%	0.27	12.67	...
D4	2.57	0.11	95.93%	0.20	9.18	...
E1	15.68	0.00	100.00%	...	...	0.42
F1	3.72	0.00	100.00%	...	...	...
G1	3.82	0.00	100.00%	...	...	...
G2	4.44	0.00	100.00%	...	...	...
G3	7.78	0.00	100.00%	...	...	0.44
H1	1.65	0.00	100.00%	...	...	...
I1	1.14	0.00	100.00%	...	...	...
J1	2.79	0.00	100.00%	...	...	...
K1	1.21	0.03	97.86%	0.13	6.03	...
L2	2.38	0.44	84.48%	0.16	7.22	...
L5	2.94	0.00	100.00%	...	...	0.23
M1	2.86	0.76	79.11%	0.17	7.92	...
M2	2.53	0.52	82.85%	0.16	7.44	...
M3	2.62	0.58	81.88%	0.16	7.56	...
N1	0.00	0.00	0.00%	...	...	0.47
P1	2.27	0.00	100.00%	...	...	...
U1	1.22	0.02	98.53%	0.13	6.03	...
U2	0.93	0.00	99.65%	0.12	5.42	...
V1	4.65	0.00	100.00%	...	...	0.31
W1(L)	...	...	...	0.30	14.06	...
W1(R)	...	...	...	0.14	6.42	...
W1	9.39	0.00	100.00%	...	...	...
Notes:						
1. Inlet capacity at sag location has been reduced by a clogging factor of 0.80, reducing theoretical Both theoretical capacity and reduced capacity are shown.						
2. Inlet efficiency shown in the tables is Captured Flow/Total Flow, denoting the actual percentage						

Storm Sewer Design Calculation Table													
10 Year Return Frequency													
Upstream Structure	Downstream Structure	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Slope (%)	Diameter (in)	Manning's n	Total Flow (cfs)	Velocity (ft/s)	Capacity (cfs)	Flow Depth (ft)	Upstream Struct. HGL (ft)	Upstream Top Elev. (ft)
STM A2	STM A1	50.22	931.43	930.00	2.85	36	0.013	28.68	10.04	112.54	1.73	933.16	939.00
STM B2	STM B1	66.27	932.65	930.00	4.00	24	0.013	3.93	6.42	45.23	0.69	933.34	946.00
STM C2	STM C1	70.49	932.82	930.00	4.00	24	0.013	7.17	7.68	45.24	0.95	933.77	946.00
STM D1	PUBL RCB	33.40	936.80	936.25	1.65	60	0.013	80.46	11.01	334.26	2.54	939.34	950.67
STM D2	STM D1	87.42	938.61	937.30	1.50	60	0.013	74.49	8.87	318.85	2.44	941.05	953.83
STM D3	STM D2	133.06	941.17	939.11	1.55	60	0.013	72.21	9.01	324.09	2.40*	943.57	955.16
STM D4	STM D3	128.22	943.89	941.27	2.04	60	0.013	68.90	7.73	372.32	2.34	946.23	956.44
STM D5	STM D4	80.81	946.53	944.89	2.03	48	0.013	67.33	11.42	204.84	2.48	949.01	956.95
STM D6	STM D5	72.98	947.83	947.03	1.10	42	0.013	36.41	6.72	105.33	1.87	949.70 j	957.70
STM D7	STM D6	197.01	950.20	948.03	1.10	42	0.013	34.21	7.18	105.52	1.81	952.01	959.70
STM D8	STM D7	129.31	952.12	950.70	1.10	36	0.013	24.90	7.43	69.95	1.61	953.73	962.59
STM D9	STM D8	15.22	952.89	952.62	1.75	36	0.013	24.90	8.46	88.22	1.61	954.49	962.46
STM D10	STM D9	96.59	954.78	953.09	1.75	36	0.013	23.25	6.73	88.23	1.55	956.33	964.22
STM D11	STM D10	50.57	956.17	955.28	1.75	30	0.013	18.39	7.80	54.25	1.45	957.62	965.22
STM D12	STM D11	155.87	959.10	956.37	1.75	30	0.013	16.01	6.23	54.25	1.35	960.45	968.36
STM D13	STM D12	81.40	961.84	959.60	2.75	30	0.013	16.01	8.42	68.01	1.35	963.19	968.75
EX STM D-A	STM D13	38.59	963.91	962.34	4.07	30	0.013	16.01	8.41	82.72	1.35	965.26	971.55
STM E1	STM D5	50.53	949.05	947.53	3.01	36	0.013	30.92	7.93	115.67	1.80	950.85	956.17
STM E2	STM E1	27.73	950.08	949.25	2.99	36	0.013	30.92	7.52	115.39	1.80	951.88	959.31
STM E3	STM E2	59.68	951.47	950.28	1.99	36	0.013	30.92	7.52	94.17	1.80	953.27	960.41
STM E4	STM E3	128.00	954.23	951.67	2.00	36	0.013	30.92	7.52	94.32	1.80	956.03	962.96
STM E5	STM E4	79.72	956.02	954.43	1.99	36	0.013	30.92	7.52	94.19	1.80	957.82	964.55
EX STM E-A	STM E5	143.57	960.13	956.22	2.72	36	0.013	30.92	7.52	110.06	1.80	961.93	972.11
STM F1	STM D6	18.00	951.28	950.92	2.00	15	0.013	2.20	4.98	9.13	0.59	951.87	957.60
STM G1	STM D7	39.56	952.29	951.70	1.49	24	0.013	9.31	6.63	27.62	1.09	953.38	959.71
STM G2	STM G1	171.49	955.36	952.79	1.50	24	0.013	7.05	6.10	27.69	0.94	956.30	961.53
STM G3	STM G2	72.05	956.71	955.86	1.18	24	0.013	4.43	5.06	24.57	0.74	957.45	959.92
STM H1	STM D9	20.35	956.86	956.45	2.01	15	0.013	0.98	3.01	9.17	0.39	957.25	962.22
STM I1	STM D9	53.15	956.76	955.70	1.99	15	0.013	0.67	3.52	9.12	0.32	957.08	962.11
STM J1	STM D11	22.74	958.18	957.73	1.98	15	0.013	1.65	3.50	9.08	0.51	958.69	965.14
STM K1	STM D11	34.16	958.10	957.42	1.99	15	0.013	0.73	3.61	9.11	0.33	958.43	965.27
STM L2	STM L1	41.03	956.12	955.71	1.00	24	0.013	9.36	6.08	22.61	1.09	957.21	964.76
STM L3	STM L2	56.59	956.90	956.33	1.00	24	0.013	8.03	5.56	22.62	1.01	957.91	966.39
STM L4	STM L3	165.14	959.05	957.40	1.00	24	0.013	3.02	4.27	22.62	0.61	959.66	964.75
STM L5	STM L4	66.64	959.92	959.25	1.01	24	0.013	1.68	3.43	22.68	0.45	960.37	962.59
STM M1	STM L3	64.41	964.57	961.83	4.25	15	0.013	5.01	7.67	13.32	0.91	965.48	969.35
STM M2	STM M1	90.14	968.39	964.77	4.02	15	0.013	3.25	4.47	12.94	0.73	969.12	973.84
STM M3	STM M2	90.49	972.29	968.60	4.08	15	0.013	1.73	3.59	13.04	0.52	972.81	976.84
STM N1	STM D10	51.657	956.87	956.28	1.14	24	0.013	4.85	5.16	24.17	0.77	957.64	961.12
STM O1	STM D10	73.489	957.75	956.28	2	18	0.013	0.01	0.71	14.85	0.04	957.79	963.92
STM P1	STM L4	19.51	960.09	959.8	1.49	15	0.013	1.34	4.04	7.87	0.46	960.55	964.6
STM U1	PUBL RCB	14.935	939.49	938	9.98	15	0.013	1.28	6.25	20.4	0.45	939.94	954.22
STM U2	STM U1	62	949.36	948.12	2	15	0.013	0.55	3.33	9.13	0.29	949.65	954.67
STM V1	PUBL RCB	20	938	936	10	18	0.013	2.65	7.46	33.21	0.62	938.62	953.21
STM W1	PUBL RCB	23.713	938.85	936	12.02	15	0.013	5.37	10.13	22.39	0.94	939.79	951.03
PUBL RCB BEND 1	Outfall	188.958	931	928.4	1.38	84 x 156	0.013	486.99	14.33	2111.18	3.52	934.52	939.87
PUBL RCB BEND 2	PUBL RCB BEND 1	54.413	931.75	931	1.38	84 x 156	0.013	486.99	10.65	2113.02	3.52	935.27	940.25
PUBL RCB BEND 3	PUBL RCB BEND 2	423.772	937.58	931.75	1.38	84 x 156	0.013	486.99	10.65	2111.61	3.52	941.1	946.71
PUBL CONNECTION	PUBL RCB BEND 3	60.78	938.42	937.58	1.38	84 x 156	0.013	486.99	10.65	2115.82	3.52	941.94	946.84

Drainage Area Design Table						
10 Year Return Frequency						
Inlet ID	Drainage Area	C	Tc	i	K	Peak Flow
	(ac)		(min)	(in/hr)		(cfs)
A2	3.37	0.83	5.00	7.35	1.00	20.57
B2	3.79	0.83	5.00	7.35	1.00	23.13
C2	2.08	0.83	5.00	7.35	1.00	12.69
D2	2.04	0.83	5.00	7.35	1.00	12.45
D3	0.42	0.83	5.00	7.35	1.00	2.56
D4	0.26	0.83	5.00	7.35	1.00	1.59
F1	0.36	0.83	5.00	7.35	1.00	2.20
G1	0.37	0.83	5.00	7.35	1.00	2.26
G2	0.43	0.83	5.00	7.35	1.00	2.62
H1	0.16	0.83	5.00	7.35	1.00	0.98
I1	0.11	0.83	5.00	7.35	1.00	0.67
J1	0.27	0.83	5.00	7.35	1.00	1.65
K1	0.12	0.83	5.00	7.35	1.00	0.73
L2	0.20	0.83	5.00	7.35	1.00	1.22
M1	0.30	0.83	5.00	7.35	1.00	1.83
M2	0.24	0.83	5.00	7.35	1.00	1.46
M3	0.31	0.83	5.00	7.35	1.00	1.89
N1	2.23	0.83	5.00	7.35	1.00	13.61
O1	0.83	0.83	5.00	7.35	1.00	5.07
P1	0.22	0.83	5.00	7.35	1.00	1.34
U1	0.12	0.83	5.00	7.35	1.00	0.73
U2	0.09	0.83	5.00	7.35	1.00	0.55
V1	1.20	0.83	5.00	7.35	1.00	7.32
W1	0.87	0.83	5.00	7.35	1.00	5.31

Inlet Design Table						
10 Year Return Frequency						
Inlet ID	Captured Flow	Bypass Flow	Inlet Efficiency (Note 2)	Gutter Depth	Gutter Spread	Ponding Depth
	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
A2	18.67	2.11	89.83%	...	...	0.46
B2	14.93	8.20	64.57%	...	...	0.36
C2	12.69	0.00	100.00%	...	...	0.39
D2	9.19	3.35	73.26%	0.35	16.37	...
D3	2.48	0.10	96.27%	0.20	9.04	...
D4	1.57	0.01	99.14%	0.16	7.54	...
F1	2.20	0.00	100.00%	...	...	...
G1	2.26	0.00	100.00%	...	...	...
G2	2.62	0.00	100.00%	...	...	...
H1	0.98	0.00	100.00%	...	...	...
I1	0.67	0.00	100.00%	...	...	...
J1	1.65	0.00	100.00%	...	...	...
K1	0.73	0.00	99.99%	0.11	4.96	...
L2	1.33	0.07	94.89%	0.12	5.55	...
M1	1.76	0.18	90.83%	0.14	6.27	...
M2	1.52	0.11	93.16%	0.13	5.88	...
M3	1.73	0.17	91.21%	0.13	6.21	...
N1	13.61	0.00	100.00%	...	...	...
O1	5.07	0.00	100.00%	...	...	...
P1	1.34	0.00	100.00%	...	...	...
U1	0.73	0.00	99.99%	0.11	4.96	...
U2	0.55	0.00	99.70%	0.10	4.45	...
V1	7.32	0.00	100.00%	...	...	0.43
W1(L)	...	...	...	0.30	13.87	...
W1(R)	...	...	...	0.11	5.27	...
W1	8.67	0.00	100.00%	...	...	...
Notes:						
1. Inlet capacity at sag location has been reduced by a clogging factor of 0.80, reducing theoretical Both theoretical capacity and reduced capacity are shown.						
2. Inlet efficiency shown in the tables is Captured Flow/Total Flow, denoting the actual percentage						

RELEASED FOR CONSTRUCTION
As Noted on Plan Review

Development Services Department
Lee's Summit, Missouri

11/01/2023

Drainage Area Design Table						
100 Year Return Frequency						
Inlet ID	Drainage Area	C	Tc	i	K	Peak Flow
	(ac)		(min)	(in/hr)		(cfs)
A2	3.37	0.83	5.00	10.32	1.25	34.79
B2	3.79	0.83	5.00	10.32	1.25	39.12
C2	2.08	0.83	5.00	10.32	1.25	21.47
D2	2.04	0.83	5.00	10.32	1.25	21.06
D3	0.42	0.83	5.00	10.32	1.25	4.34
D4	0.26	0.83	5.00	10.32	1.25	2.68
F1	0.36	0.83	5.00	10.32	1.25	3.72
G1	0.37	0.83	5.00	10.32	1.25	3.82
G2	0.43	0.83	5.00	10.32	1.25	4.44
H1	0.16	0.83	5.00	10.32	1.25	1.65
I1	0.11	0.83	5.00	10.32	1.25	1.14
J1	0.27	0.83	5.00	10.32	1.25	2.79
K1	0.12	0.83	5.00	10.32	1.25	1.24
L2	0.20	0.83	5.00	10.32	1.25	2.06
M1	0.30	0.83	5.00	10.32	1.25	3.10
M2	0.24	0.83	5.00	10.32	1.25	2.48
M3	0.31	0.83	5.00	10.32	1.25	3.20
N1	2.23	0.83	5.00	10.32	1.25	23.02
O1	0.83	0.83	5.00	10.32	1.25	8.57
P1	0.22	0.83	5.00	10.32	1.25	2.27
U1	0.12	0.83	5.00	10.32	1.25	1.24
U2	0.09	0.83	5.00	10.32	1.25	0.93
V1	1.20	0.83	5.00	10.32	1.25	12.39
W1	0.87	0.83	5.00	10.32	1.25	8.98

Inlet Design Table						
100 Year Return Frequency						
Inlet ID	Captured Flow	Bypass Flow	Inlet Efficiency (Note 2)	Gutter Depth	Gutter Spread	Ponding Depth
	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
A2	18.67	17.43	51.71%	...	...	0.50
B2	14.93	24.19	38.17%	...	...	0.50
C2	14.93	6.54	69.55%	...	...	0.31
D2	12.48	9.01	58.07%	0.43	20.04	...
D3	4.01	0.44	90.17%	0.24	11.10	...
D4	2.57	0.11	95.93%	0.20	9.18	...
F1	3.72	0.00	100.00%	...	...	...
G1	3.82	0.00	100.00%	...	...	...
G2	4.44	0.00	100.00%	...	...	...
H1	1.65	0.00	100.00%	...	...	...
I1	1.14	0.00	100.00%	...	...	...
J1	2.79	0.00	100.00%	...	...	...
K1	1.21	0.03	97.86%	0.13	6.03	...
L2	2.38	0.44	84.48%	0.16	7.22	...
M1	2.86	0.76	79.11%	0.17	7.92	...
M2	2.53	0.52	82.85%	0.16	7.44	...
M3	2.62	0.58	81.88%	0.16	7.56	...
N1	15.52	7.50	67.43%	...	...	...
O1	8.57	0.00	100.00%	...	...	...
P1	2.27	0.00	100.00%	...	...	...
U1	1.22	0.02	98.53%	0.13	6.03	...
U2	0.93	0.00	99.65%	0.12	5.42	...
V1	12.39	0.00	100.00%	...	...	0.41
W1(L)	...	...	...	0.40	18.34	...
W1(R)	...	...	...	0.14	6.42	...
W1	15.52	2.49	86.15%	...	...	...
Notes:						
1. Inlet capacity at sag location has been reduced by a clogging factor of 0.80, reducing theoretical Both theoretical capacity and reduced capacity are shown.						
2. Inlet efficiency shown in the tables is Captured Flow/Total Flow, denoting the actual percentage						

Storm Sewer Design Calculation Table													
10 Year Return Frequency													
Upstream Structure	Downstream Structure	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Slope (%)	Diameter (in)	Manning's n	Total Flow (cfs)	Velocity (ft/s)	Capacity (cfs)	Flow Depth (ft)	Upstream Struct. HGL (ft)	Upstream Top Elev. (ft)
STM A2	STM A1	50.22	931.43	930.00	2.85	36	0.013	40.46	11.20	112.54	2.07	933.50	939.00
STM B2	STM B1	66.27	932.65	930.00	4.00	24	0.013	23.13	11.28	45.23	1.71	934.36	946.00
STM C2	STM C1	70.49	932.82	930.00	4.00	24	0.013	12.69	9.16	45.24	1.28	934.10	946.00
STM D1	PUBL RCB	33.40	936.80	936.25	1.65	60	0.013	156.75	13.57	334.26	3.59	940.39	950.67
STM D2	STM D1	87.42	938.61	937.30	1.50	60	0.013	140.23	10.46	318.85	3.39	942.00	953.83
STM D3	STM D2	133.06	941.17	939.11	1.55	60	0.013	127.78	10.20	324.09	3.23	944.40	955.16
STM D4	STM D3	128.22	943.89	941.27	2.04	60	0.013	125.30	9.57	372.32	3.20	947.09	956.44
STM D5	STM D4	80.81	946.53	944.89	2.03	48	0.013	123.73	14.05	204.83	3.34	949.87	956.95
STM D6	STM D5	72.98	947.83	947.03	1.10	42	0.013	63.39	8.11	105.33	2.49	950.32	957.70
STM D7	STM D6	197.01	950.20	948.03	1.10	42	0.013	61.19	8.84	105.52	2.45	952.65	959.70
STM D8	STM D7	129.31	952.12	950.70	1.10	36	0.013	51.88	9.72	69.95	2.34	954.46	962.59
STM D9	STM D8	15.22	952.89	952.62	1.75	36	0.013	51.88	10.08	88.22	2.34	955.23	962.46
STM D10	STM D9	96.59	954.78	953.09	1.75	36	0.013	50.23	8.97	88.23	2.30	957.08	964.22
STM D11	STM D10	50.57	956.17	955.28	1.75	30	0.013	31.55	8.07	54.25	1.91	958.08	965.22
STM D12	STM D11	155.87	959.10	956.37	1.75	30	0.013	29.17	7.85	54.25	1.84	960.94	968.36
STM D13	STM D12	81.40	961.84	959.60	2.75	30	0.013	29.17	9.22	68.01	1.84	963.68	968.75
EX STM D-A	STM D13	38.59	963.91	962.34	4.07	30	0.013	29.17	9.22	82.72	1.84	965.75	971.55
STM E1	STM D5	50.53	949.05	947.53	3.01	36	0.013	60.34	9.88	115.67	2.51	951.56	956.17
STM E2	STM E1	27.73	950.08	949.25	2.99	36	0.013	60.34	9.96	115.39	2.51	952.59	959.31
STM E3	STM E2	59.68	951.47	950.28	1.99	36	0.013	60.34	9.96	94.17	2.51	953.98	960.41
STM E4	STM E3	128.00	954.23	951.67	2.00	36	0.013	60.34	9.96	94.32	2.51	956.74	962.96
STM E5	STM E4	79.72	956.02	954.43	1.99	36	0.013	60.34	9.96	94.19	2.51	958.53	964.55
EX STM E-A	STM E5	143.57	960.13	956.22	2.72	36	0.013	60.34	9.96	110.06	2.51	962.64	972.11
STM F1	STM D6	18.00	951.28	950.92	2.00	15	0.013	2.20	4.98	9.13	0.59	951.87	957.60
STM G1	STM D7	39.56	952.29	951.70	1.49	24	0.013	9.31	5.83	27.62	1.09	953.38	959.71
STM G2	STM G1	171.49	955.36	952.79	1.50	24	0.013	7.05	6.10	27.69	0.94	956.30	961.53
STM G3	STM G2	72.05	956.71	955.86	1.18	24	0.013	4.43	5.06	24.57	0.74	957.45	959.92
STM H1	STM D9	20.35	956.86	956.45	2.01	15	0.013	0.98	3.01	9.17	0.39	957.25	962.22
STM I1	STM D9	53.15	956.76	955.70	1.99	15	0.013	0.67	3.52	9.12	0.32	957.08	962.11
STM J1	STM D11	22.74	958.18	957.73	1.98	15	0.013	1.65	3.50	9.08	0.51	958.69	965.14
STM K1	STM D11	34.16	958.10	957.42	1.99	15	0.013	0.73	1.94	9.11	0.33	958.43	965.27
STM L1	STM L1	41.03	956.12	955.71	1.00	24	0.013	19.89	7.74	22.61	1.60	957.72	964.76
STM L3	STM L2	56.59	956.90	956.33	1.00	24	0.013	18.56	7.55	22.62	1.55	958.45	966.39
STM L4	STM L3	165.14	959.05	957.40	1.00	24	0.013	13.55	6.83	22.62	1.32	960.37	964.75
STM L5	STM L4	66.64	959.92	959.25	1.01	24	0.013	12.21	6.30	22.68	1.25	961.17	962.59
STM M1	STM L3	64.41	964.57	961.83	4.25	15	0.013	5.01	7.67	13.32	0.91	965.48	969.35
STM M2	STM M1	90.14	968.39	964.77	4.02	15	0.013	3.25	4.47	12.94	0.73	969.12	973.16
STM M3	STM M2	90.49	972.29	968.60	4.08	15	0.013	1.73	3.59	13.04	0.52	972.81	976.84
STM N1	STM D10	51.657	956.87	956.28	1.14	24	0.013	13.61	7.03	24.17	1.33	958.2	961.12
STM O1	STM D10	73.489	957.75	956.28	2	18	0.013	5.07	5.02	14.85	0.87	958.62	963.92
STM P1	STM L4	19.51	960.09	959.8	1.49	15	0.013	1.34	2.87	7.87	0.46	960.55	964.6
STM U1	PUBL RCB	14.935	939.49	938	9.98	15	0.013	1.28	6.25	20.4	0.45	939.94	954.22
STM U2	STM U1	62	949.36	948.12	2	15	0.013	0.55	3.33	9.13	0.29	949.65	954.67
STM V1	PUBL RCB	20	938	936	10	18	0.013	7.32	10.29	33.21	1.05	939.05	953.21
STM W1	PUBL RCB	23.713	938.85	936	12.02	15	0.013	5.37	10.13	22.39	0.94	939.79	951.03
PUBL RCB BEND 1	Outfall	188.958	931	928.4	1.38	84 x 156	0.013	567.95	15.11	2111.18	3.9	934.9	939.87
PUBL RCB BEND 2	PUBL RCB BEND 1	54.413	931.75	931	1.38	84 x 156	0.013	567.95	11.22	2113.02	3.9	935.65	940.25
PUBL RCB BEND 3	PUBL RCB BEND 2	423.772	937.58	931.75	1.38	84 x 156	0.013	567.95	11.21	2111.6	3.9	941.48	946.71
RCB CONNECTION	PUBL RCB BEND 3	60.78	938.42	937.58	1.38	84 x 156	0.013	567.95	11.22	2115.82	3.90	942.32	946.84

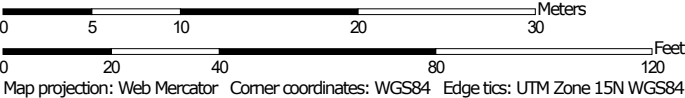
Appendix C

C1 NRCS Soils Report

Soil Map—Jackson County, Missouri
(Village at Discovery Park - Lot 1)



Map Scale: 1:426 if printed on B portrait (11" x 17") sheet.



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

Soil Map—Jackson County, Missouri
(Village at Discovery Park - Lot 1)

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 25, Aug 22, 2023

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

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

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
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	0.6	30.9%
30080	Greenton silty clay loam, 5 to 9 percent slopes	1.4	69.1%
Totals for Area of Interest		2.1	100.0%