CROCKETT
ENGINEERING CONSULTANTS

STORM WATER NARRATIVE

FOR

The Village at Discovery
Lot 13

PROJECT NO.
230286

November 22, 2024

1000 W. Nifong Blvd. Building 1 • Columbia, MO 65203
Phone: 573-447-0292
www.crockettengineering.com

ENGINEERING CONSULTANTS
1000 W. Nifong Blvd., Bldg. 1
Columbia, Missouri 65203
(573) 447-0292

TABLE OF CONTENTS

APPENDICES

1. General Information

The site is located at 250 NE Alura Way in Lee´s Summit, Missouri. The proposed development will be a clubhouse for an apartment complex to the north of this lot. The proposed development will be constructed on Lot 13 of The Village at Discovery Park Plat recorded as Instrument Number 2023E0089550. Lot 13 of said Plat contains 1.14 acres. The proposed use will be a 2-story clubhouse building consisting of approximately 21,162 square feet.

The site is currently open grass area. The stormwater currently sheet flows to the southwest where it is collected by multiple curb opening inlets. These curb opening inlets connect to an existing 7´ x 13´ reinforced concrete box storm sewer outlet that conveys water 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 the existing reinforced concrete box and then will be conveyed to the regional detention facility. The water is then 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. 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	1.14	100	5% to 9%	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 the southwest into multiple curb opening inlets. An existing 7′ x 13′ RCB conveys the water from the side opening inlet to an existing regional detention facility. The existing detention facility is designed to have capacity for this whole 1.14-acre site. This site is encompassed by drainage area ″D1″ 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	Tc (minutes)	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	100-year Peak Flow (cfs)
V1	1.20	0.3	5	1.95	2.65	4.64

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 an existing RCB and then conveyed to a detention facility. Any runoff that is not collected by the on-site sewer system will be collected by gutter inlets placed along the private street (Alura Way) and conveyed to the same regional detention facility.

The calculations prepared by Olsson used a post-development runoff coefficient of 0.83; the storm sewer that this development ties into is designed for this capacity. After final design of this site the calculated actual runoff coefficient is 0.71, 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 0.71.

The table below summarizes the proposed conditions analysis:

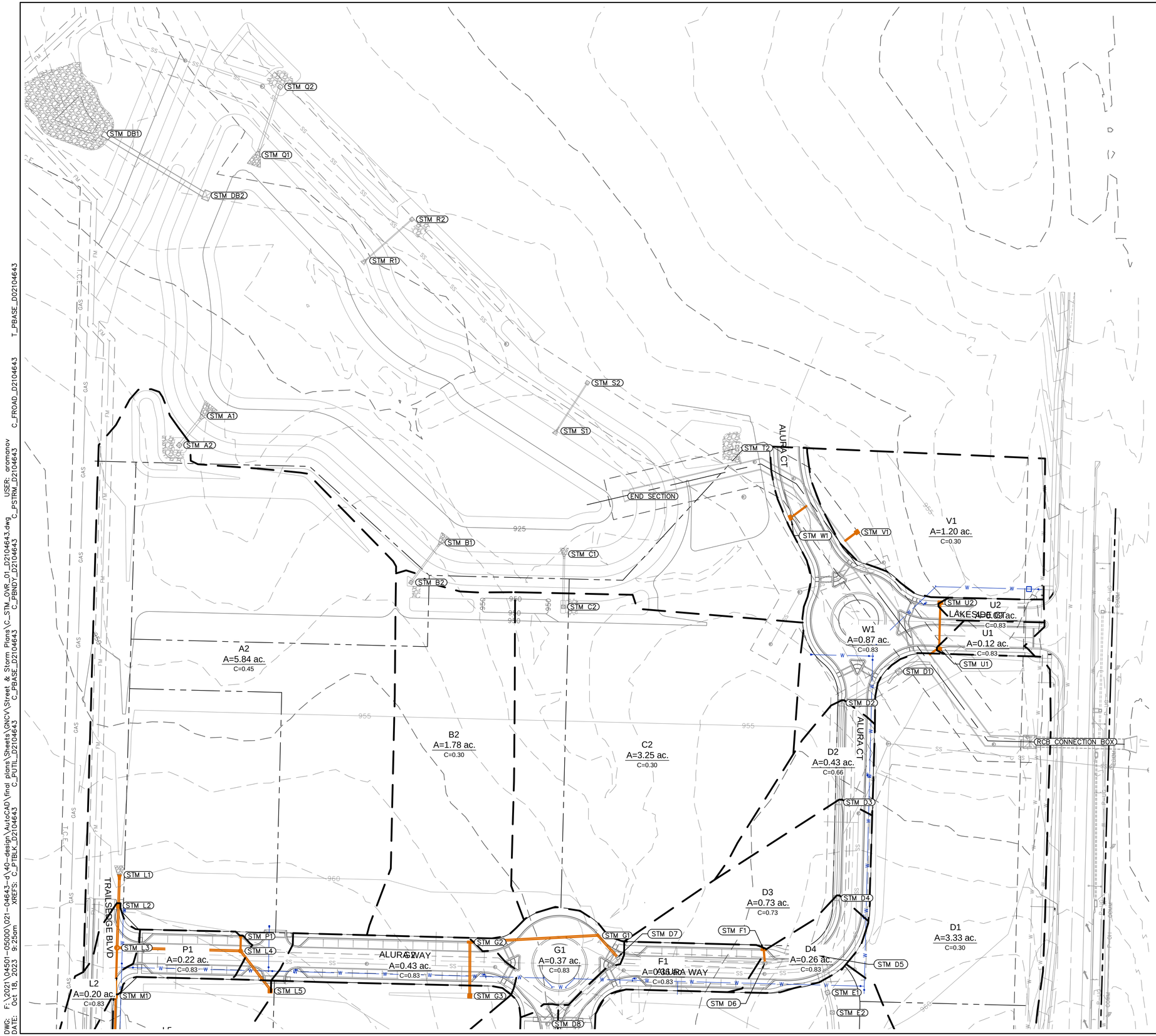
Subarea	Drainage Area (Acres)	Runoff Coefficient	Tc (Minutes)	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	100-year Peak Flow (cfs)
DA 1	0.22	0.81	5	0.96	1.31	2.25
DA 2	0.23	0.81	5	1.01	1.37	2.35
DA 3	0.37	0.81	5	1.62	2.20	3.78
DA 4	0.13	0.81	5	0.57	0.77	1.33
DA 5	0.24	0.99	5	1.29	1.75	2.45
TOTAL	1.19	-	5	5.45	7.40	12.16

5. Conclusions and Recommendations

The proposed Lot 13 facility 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
A3 Proposed Final Drainage Area Map



LEGEND

- PROPERTY BOUNDARIES
- LOT LINE
- EASEMENT LINE
- EXISTING WATER MAIN
- PROPOSED PRIVATE STORM SEWER
- PROPOSED PRIVATE SANITARY SEWER
- PROPOSED PRIVATE WATER MAIN
- 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.

RELEASED FOR CONSTRUCTION
As Noted on Plan Review

Development Services Department
Lee's Summit, Missouri

11/01/2023

olsson
Olsson - Civil Engineering
Missouri Certificate of Authority #001592
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177
www.olsson.com

STATE OF MISSOURI
DAVID L. EICKMAN
NUMBER PE-2009015436
10/24/23
PROFESSIONAL ENGINEER

DAVID EICKMAN, P.E.
MO# 2009015436

REV. NO.	DATE	REVISIONS DESCRIPTION	BY

REVISIONS

STORMWATER MANAGEMENT PLAN - PROPOSED CONDITIONS
PRIVATE SITE DEVELOPMENT PLANS

THE VILLAGE AT DISCOVERY PARK ZONE 1
NW COLBERN RD & NE DOUGLAS ST

LEE'S SUMMIT, MISSOURI

2023

drawn by:	BM/GS/OS/TW
checked by:	AR/JN
approved by:	DE
QA/QC by:	JS/NH
project no.:	D21-04643
drawing no.:	STM_OVR_01_D2104643
date:	10.18.2023

SHEET
C401

DWG: F:\2021\04501-05000\021-04643-d\40-design\AutoCAD\final plans\Sheets\GNCV\Street & Storm Plans\C_STM_OVR_01_D2104643.dwg USER: aromanov
DATE: Oct 18, 2023 9:25am XREFS: C_PTBLK_D2104643 C_PSTRM_D2104643
C_PUTIL_D2104643 C_PBASE_D2104643
C_FROAD_D2104643 C_PBNDY_D2104643
T_PBASE_D2104643

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 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

olsson
Olsson - Civil Engineering
Missouri Certificate of Authority #001592
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177
www.olsson.com

STATE OF MISSOURI
DAVID L. EICKMAN
NUMBER PE-2009015436
10/24/23
PROFESSIONAL ENGINEER

DAVID EICKMAN, P.E.
MO# 2009015436

REV. NO.	DATE	REVISIONS DESCRIPTION	BY

REVISIONS

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

2023

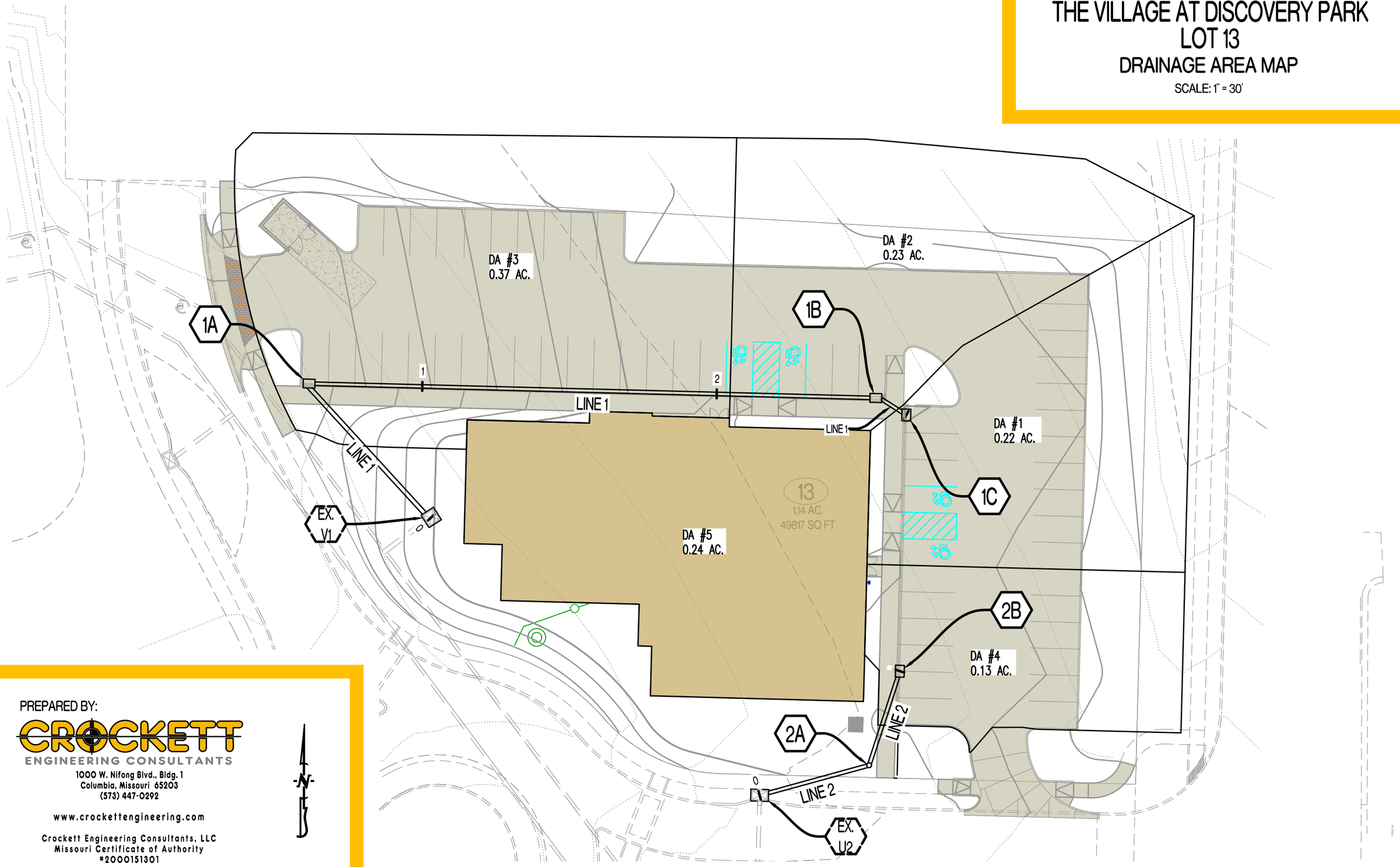
drawn by:	BM/GS/OS/TW
checked by:	AR/JN
approved by:	DE
QA/QC by:	JS/NH
project no.:	D21-04643
drawing no.:	STM_OVR_02_D2104643
date:	10.18.2023

SHEET
C403

DWG: F:\2021\04501-05000\021-04643-d\40-design\AutoCAD\final plans\Sheets\GNCV\Street & Storm Plans\C_STM_OVR_02_D2104643.dwg USER: oromanov
DATE: Oct 18, 2023 9:26am XREFS: C_PTBLK_D2104643 C_PUTIL_D2104643 C_PBASE_D2104643 C_PBNDY_D2104643 C_PSTRM_D2104643
C_FROAD_D2104643 C_PSTRM_FUTURE_D2104643 C_FBASE_D2104643 T_PBASE_D2104643

THE VILLAGE AT DISCOVERY PARK
LOT 13
DRAINAGE AREA MAP

SCALE: 1" = 30'



PREPARED BY:

CROCKETT
ENGINEERING CONSULTANTS

1000 W. Nifong Blvd., Bldg. 1
Columbia, Missouri 65203
(573) 447-0292

www.crockettengineering.com

Crockett Engineering Consultants, LLC
Missouri Certificate of Authority
#2000151301

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

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

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	973.16
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	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
RCB 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						
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						
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													
100 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	49.51	11.98	112.54	2.29	933.72	939.00
STM B2	STM B1	66.27	932.65	930.00	4.00	24	0.013	6.89	7.57	45.23	0.93	933.58	946.00
STM C2	STM C1	70.49	932.82	930.00	4.00	24	0.013	12.58	9.14	45.24	1.27	934.09	946.00
STM D1	PUBL RCB	33.40	936.80	936.25	1.65	60	0.013	140.80	13.10	334.26	3.40	940.20	950.67
STM D2	STM D1	87.42	938.61	937.30	1.50	60	0.013	130.24	10.32	318.85	3.26	941.87	953.83
STM D3	STM D2	133.06	941.17	939.11	1.55	60	0.013	125.97	10.39	324.09	3.21	944.38	955.16
STM D4	STM D3	128.22	943.89	941.27	2.04	60	0.013	120.64	9.36	372.32	3.14	947.03	956.44
STM D5	STM D4	80.81	946.53	944.89	2.03	48	0.013	118.07	13.80	204.84	3.27	949.81	956.95
STM D6	STM D5	72.98	947.83	947.03	1.10	42	0.013	63.38	8.19	105.33	2.49	950.32	957.70
STM D7	STM D6	197.01	950.20	948.03	1.10	42	0.013	59.66	8.68	105.52	2.42	952.62	959.70
STM D8	STM D7	129.31	952.12	950.70	1.10	36	0.013	43.62	8.60	69.95	2.15	954.27	962.59
STM D9	STM D8	15.22	952.89	952.62	1.75	36	0.013	43.62	9.49	88.22	2.15	955.04	962.46
STM D10	STM D9	96.59	954.78	953.09	1.75	36	0.013	40.83	8.11	88.23	2.08	956.86	964.22
STM D11	STM D10	50.57	956.17	955.28	1.75	30	0.013	32.30	8.91	54.25	1.93	958.10	965.22
STM D12	STM D11	155.87	959.10	956.37	1.75	30	0.013	28.30	7.62	54.25	1.81	960.91	968.36
STM D13	STM D12	81.40	961.84	959.60	2.75	30	0.013	28.30	9.15	68.01	1.81	963.65	968.75
EX STM D-A	STM D13	38.59	963.91	962.34	4.07	30	0.013	28.30	9.14	82.72	1.81	965.72	971.55
STM E1	STM D5	50.53	949.05	947.53	3.01	36	0.013	54.69	9.27	115.67	2.40	951.45	956.17
STM E2	STM E1	27.73	950.08	949.25	2.99	36	0.013	54.69	9.44	115.39	2.40	952.48	959.31
STM E3	STM E2	59.68	951.47	950.28	1.99	36	0.013	54.69	9.44	94.17	2.40	953.87	960.41
STM E4	STM E3	128.00	954.23	951.67	2.00	36	0.013	54.69	9.44	94.32	2.40	956.63	962.96
STM E5	STM E4	79.72	956.02	954.43	1.99	36	0.013	54.69	9.44	94.19	2.40	958.42	964.55
EX STM E-A	STM E5	143.57	960.13	956.22	2.72	36	0.013	54.69	9.44	110.06	2.40	962.53	972.11
STM F1	STM D6	18.00	951.28	950.92	2.00	15	0.013	3.72	5.84	9.13	0.78	952.06	957.60
STM G1	STM D7	39.56	952.29	951.70	1.49	24	0.013	16.04	7.86	27.62	1.44	953.73	959.71
STM G2	STM G1	171.49	955.36	952.79	1.50	24	0.013	12.22	7.14	27.69	1.26	956.62	961.53
STM G3	STM G2	72.05	956.71	955.86	1.18	24	0.013	7.78	5.97	24.57	0.99	957.70	959.92
STM H1	STM D9	20.35	956.86	956.45	2.01	15	0.013	1.65	3.51	9.17	0.51	957.37	962.22
STM I1	STM D9	53.15	956.76	955.70	1.99	15	0.013	1.14	4.11	9.12	0.42	957.18	962.11
STM J1	STM D11	22.74	958.18	957.73	1.98	15	0.013	2.79	4.16	9.08	0.67	958.85	965.14
STM K1	STM D11	34.16	958.10	957.42	1.99	15	0.013	1.21	2.49	9.11	0.43	958.53	965.27
STM L2	STM L1	41.03	956.12	955.71	1.00	24	0.013	15.60	7.14	22.61	1.42	957.54	964.76
STM L3	STM L2	56.59	956.90	956.33	1.00	24	0.013	13.22	6.37	22.62	1.31	958.21	966.39
STM L4	STM L3	165.14	959.05	957.40	1.00	24	0.013	5.21	4.39	22.62	0.80	959.85	964.75
STM L5	STM L4	66.64	959.92	959.25	1.01	24	0.013	2.94	3.70	22.68	0.60	960.52	962.59
STM M1	STM L3	64.41	964.57	961.83	4.25	15	0.013	8.01	9.14	13.32	1.11	965.68	969.35
STM M2	STM M1	90.14	968.39	964.77	4.02	15	0.013	5.15	5.34	12.94	0.92	969.31	973.16
STM M3	STM M2	90.49	972.29	968.60	4.08	15	0.013	2.62	3.86	13.04	0.65	972.94	976.84
STM N1	STM D10	51.657	956.87	956.28	1.14	24	0.013	8.52	6.09	24.17	1.04	957.91	961.12
STM O1	STM D10	73.489	957.75	956.28	2	18	0.013	0.01	0.45	14.85	0.04	957.79	963.92
STM P1	STM L4	19.51	960.09	959.8	1.49	15	0.013	2.27	4.72	7.87	0.6	960.69	964.6
STM U1	PUBL RCB	14.935	939.49	938	9.98	15	0.013	2.15	7.3	20.4	0.58	940.07	954.22
STM U2	STM U1	62	949.36	948.12	2	15	0.013	0.93	3.87	9.13	0.38	949.74	954.67
STM V1	PUBL RCB	20	938	936	10	18	0.013	4.65	8.93	33.21	0.83	938.83	953.21
STM W1	PUBL RCB	23.713	938.85	936	12.02	15	0.013	9.39	12.66	22.39	1.17	940.02	951.03
PUBL RCB BEND 1	Outfall	188.958	931	928.4	1.38	84 x 156	0.013	760.31	16.63	2111.18	4.73	935.73	939.87
PUBL RCB BEND 2	PUBL RCB BEND 1	54.413	931.75	931	1.38	84 x 156	0.013	760.31	12.36	2113.02	4.73	936.48	940.25
PUBL RCB BEND 3	PUBL RCB BEND 2	423.772	937.58	931.75	1.38	84 x 156	0.013	760.31	12.36	2111.61	4.73	942.31	946.71
RCB CONNECTION	PUBL RCB BEND 3	60.78	938.42	937.58	1.38	84 x 156	0.013	760.31	12.36	2115.82	4.73	943.15	946.84

olsson
Olsson - Civil Engineering
Water - Community - Authority #001592
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177
www.olsson.com

STATE OF MISSOURI
DAVID L. EICKMAN
NUMBER PE-2009015436
10/24/23
PROFESSIONAL ENGINEER

DAVID EICKMAN, P.E.
MO# 2009015436

REVISIONS			
REV. NO.	DATE	REVISIONS DESCRIPTION	BY

STORMWATER CALCULATIONS - PROPOSED CONDITIONS
PRIVATE SITE DEVELOPMENT PLANS

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

2023

drawn by:	BM/GS/OS/TW
checked by:	AR/JN
approved by:	DE
QA/QC by:	JS/NH
project no.:	D21-04643
drawing no.:	C_STM05_D2104643
date:	10.18.2023

SHEET
C411

DWG: F:\2021\04501-05000\021-04643-d\40-design\AutoCAD\final plans\Sheets\GNCV\Street & Storm Plans\C_STM05_D2104643.dwg USER: aromanov
DATE: Oct 18, 2023 9:30am XREFS: C_PTBLK_D2104643

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

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 L2	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

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													
100 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	68.10	13.52	112.54	2.63	934.06	939.00
STM B2	STM B1	66.27	932.65	930.00	4.00	24	0.013	39.12	12.50	45.23	1.95	934.60	946.00
STM C2	STM C1	70.49	932.82	930.00	4.00	24	0.013	21.47	10.96	45.24	1.66	934.48	946.00
STM D1	PUBL RCB	33.40	936.80	936.25	1.65	60	0.013	268.37	16.64	334.26	4.53	941.33	950.67
STM D2	STM D1	87.42	938.61	937.30	1.50	60	0.013	240.21	13.70	318.85	4.36	942.97	953.83
STM D3	STM D2	133.06	941.17	939.11	1.55	60	0.013	219.15	12.97	324.09	4.20	945.37	955.16
STM D4	STM D3	128.22	943.89	941.27	2.04	60	0.013	215.14	12.40	372.32	4.17	948.06	956.44
STM D5	STM D4	80.81	946.53	944.89	2.03	48	0.013	212.57	17.79	204.84	3.88	950.41	956.95
STM D6	STM D5	72.98	947.83	947.03	1.10	42	0.013	108.46	11.64	105.33	3.15	950.98	957.70
STM D7	STM D6	197.01	950.20	948.03	1.10	42	0.013	104.74	11.83	105.52	3.12	953.32	959.70
STM D8	STM D7	129.31	952.12	950.70	1.10	36	0.013	88.70	12.55	69.95	3.00	955.99	962.59
STM D9	STM D8	15.22	952.89	952.62	1.75	36	0.013	88.70	12.55	88.22	3.00	957.24	962.46
STM D10	STM D9	96.59	954.78	953.09	1.75	36	0.013	85.91	12.15	88.23	3.00	959.82	964.22
STM D11	STM D10	50.57	956.17	955.28	1.75	30	0.013	54.32	11.07	54.25	2.50	961.63	965.22
STM D12	STM D11	155.87	959.10	956.37	1.75	30	0.013	50.32	10.25	54.25	2.50	964.74	968.36
STM D13	STM D12	81.40	961.84	959.60	2.75	30	0.013	50.32	10.25	68.01	2.50	966.62	968.75
EX STM D-A	STM D13	38.59	963.91	962.34	4.07	30	0.013	50.32	10.25	82.72	2.50	967.85	971.55
STM E1	STM D5	50.53	949.05	947.53	3.01	36	0.013	104.11	14.89	115.67	2.91	951.96	956.17
STM E2	STM E1	27.73	950.08	949.25	2.99	36	0.013	104.11	15.18	115.39	2.91	952.99	959.31
STM E3	STM E2	59.68	951.47	950.28	1.99	36	0.013	104.11	14.73	94.17	3.00	954.74	960.41
STM E4	STM E3	128.00	954.23	951.67	2.00	36	0.013	104.11	14.73	94.32	3.00	958.87	962.96
STM E5	STM E4	79.72	956.02	954.43	1.99	36	0.013	104.11	14.73	94.19	3.00	961.83	964.55
EX STM E-A	STM E5	143.57	960.13	956.22	2.72	36	0.013	104.11	14.73	110.06	3.00	966.34	972.11
STM F1	STM D6	18.00	951.28	950.92	2.00	15	0.013	3.72	5.84	9.13	0.78	952.06	957.60
STM G1	STM D7	39.56	952.29	951.70	1.49	24	0.013	16.04	6.25	27.62	1.44	953.73	959.71
STM G2	STM G1	171.49	955.36	952.79	1.50	24	0.013	12.22	7.14	27.69	1.26	956.62	961.53
STM G3	STM G2	72.05	956.71	955.86	1.18	24	0.013	7.78	5.97	24.57	0.99	957.70	959.92
STM H1	STM D9	20.35	956.86	956.45	2.01	15	0.013	1.65	1.34	9.17	1.25	958.25	962.22
STM I1	STM D9	53.15	956.76	955.70	1.99	15	0.013	1.14	0.93	9.12	1.25	958.23	962.11
STM J1	STM D11	22.74	958.18	957.73	1.98	15	0.013	2.79	2.27	9.08	1.25	962.49	965.14
STM K1	STM D11	34.16	958.10	957.42	1.99	15	0.013	1.21	0.99	9.11	1.25	962.40	965.27
STM L2	STM L1	41.03	956.12	955.71	1.00	24	0.013	33.31	10.70	22.61	2.00	958.51	964.76
STM L3	STM L2	56.59	956.90	956.33	1.00	24	0.013	30.93	9.85	22.62	2.00	960.09	966.39
STM L4	STM L3	165.14	959.05	957.40	1.00	24	0.013	22.92	7.30	22.62	2.00	962.39	964.75
STM L5	STM L4	66.64	959.92	959.25	1.01	24	0.013	20.65	6.57	22.68	2.00	963.28	962.59
STM M1	STM L3	64.41	964.57	961.83	4.25	15	0.013	8.01	9.14	13.32	1.11	965.68	969.35
STM M2	STM M1	90.14	968.39	964.77	4.02	15	0.013	5.15	5.34	12.94	0.92	969.31	973.16
STM M3	STM M2	90.49	972.29	968.60	4.08	15	0.013	2.62	3.86	13.04	0.65	972.94	976.84
STM N1	STM D10	51.657	956.87	956.28	1.14	24	0.013	23.02	7.33	24.17	2.00	961.28	961.12
STM O1	STM D10	73.489	957.75	956.28	2	18	0.013	8.57	4.85	14.85	1.50	961.23	963.92
STM P1	STM L4	19.51	960.09	959.8	1.49	15	0.013	2.27	1.85	7.87	1.25	962.75	964.60
STM U1	PUBL RCB	14.935	939.49	938	9.98	15	0.013	2.15	7.30	20.40	0.58	940.07	954.22
STM U2	STM U1	62	949.36	948.12	2	15	0.013	0.93	3.87	9.13	0.38	949.74	954.67
STM V1	PUBL RCB	20	938	936	10	18	0.013	12.39	12.45	33.21	1.33	939.33	953.21
STM W1	PUBL RCB	23.713	938.85	936	12.02	15	0.013	9.39	12.66	22.39	1.17	940.02	951.03
PUBL RCB BEND 1	Outfall	188.958	931	928.4	1.38	84 x 156	0.013	895.62	17.5	2111.18	5.28	936.28	939.87
PUBL RCB BEND 2	PUBL RCB BEND 1	54.413	931.75	931	1.38	84 x 156	0.013	895.62	13.06	2113.02	5.28	937.03	940.25
PUBL RCB BEND 3	PUBL RCB BEND 2	423.772	937.58	931.75	1.38	84 x 156	0.013	895.62	13.05	2111.61	5.28	942.86	946.71
RCB CONNECTION	PUBL RCB BEND 3	60.78	938.42	937.58	1.38	84 x 156	0.013	895.62	13.06	2115.82	5.28	943.70	946.84

olsson
Olsson - Civil Engineering
Missouri Certificate of Authority #001592
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177
www.olsson.com

STATE OF MISSOURI
DAVID L. EICKMAN
NUMBER PE-2009015436
10/24/23
PROFESSIONAL ENGINEER
DAVID EICKMAN, P.E.
MO# 2009015436

REVISIONS

REV. NO.	DATE	REVISIONS DESCRIPTION	BY

STORMWATER CALCULATIONS - FUTURE CONDITIONS
PRIVATE SITE DEVELOPMENT PLANS

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

2023

drawn by:	BM/GS/OS/TW
checked by:	AR/JN
approved by:	DE
QA/QC by:	JS/NH
project no.:	D21-04643
drawing no.:	C_STM05_D2104643
date:	10.18.2023

SHEET
C412

DWG: F:\2021\04501-05000\021-04643-d\40-design\AutoCAD\final plans\Sheets\GNCV\Street & Storm Plans\C_STM05_D2104643.dwg
DATE: Oct 18, 2023 9:30am
USER: aromanov
XREFS: C_PTBLK_D2104643

Appendix C

C1 NRCS Soils Report

Soil Map—Jackson County, Missouri
(Lot 13 - Soil Map)

Map Scale: 1:381 if printed on B landscape (17" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 15 30 60 90

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 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
10117	Sampsel silty clay loam, 5 to 9 percent slopes	0.0	0.1%
30080	Greenton silty clay loam, 5 to 9 percent slopes	1.1	99.9%
Totals for Area of Interest		**1.1**	**100.0%**