

SUMMIT ORCHARDS WEST

LEE'S SUMMIT, MO

Stormwater Analysis Report

Prepared For:



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Kansas City, MO 64116

Prepared By:



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August 2022



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Attachments

Exhibit 1: PDP Site Plan

Exhibit 2: PDP Storm Sewer General Layout

Appendix A: THH Inc. Stormwater Drainage Report for Ward Road- Summit Technology Campus (Sep 2006)

Appendix B:

- Red Development Lee's Summit Fair Stormwater Drainage Study (Olsson Associates, Dec 2006)
- Regional Detention Basin Stormwater Flows Analysis (THH, Inc., July 2009)
- Detention Basin Contributing Areas Exhibit (THH, Inc., Sep 2009)
- Summit Innovation Center Stormwater Drainage Report (THH Inc., March 2015)
- Summit Orchard Lot 7A Stormwater Report (April 2016)

1 Site Description

Summit Orchards West is a proposed 24.70-acre mixed-use development consisting of three (3) individual parcels located southeast of the interchange of Interstate-470 and US Highway 50. The project is bounded on the north and east by Ward Road, on the south by NW Chipman Rd, and on the west by Outerview Road. The proposed development is directly east of the existing Summit Technology Campus. This study will focus on the entire development, which will contain a proposed 2.79-acre commercial lot, an 11.83-acre multifamily residential lot, and a 10.08-acre industrial lot. The Preliminary Development Plan (PDP) Site Plan is attached as Exhibit 1. The entirety of the proposed development is within the drainage area for a regional detention basin that was previously completed and approved for the Summit Technology Campus and surrounding area.

Floodplain Summary

FEMA Flood Boundary Map 29095C0417G does not designate any floodplain on the property. The entire property is unshaded Zone X.

Soil Conditions

Soil data was obtained from the NRCS Web Soil Survey. Soils within the watershed are a mixture of Hydrologic Soil Groups C and D. For this study, all Curve Numbers are based on HSG D for proposed conditions. The soils found in the watershed are summarized in the table below.

Table 1 Soil Data

Name	Slopes	HSG
Arisburg-Urban land complex	1-5%	C
Snead-Rock outcrop complex	5-14%	D
Udarents-Urban land-Sampsel complex	5-9%,	C
Urban land, upland	5-9%	C/D

2 Methodology

Analysis of the proposed Summit Orchards West improvements will be compared the findings found in the “Stormwater Drainage Report for Ward Road- Summit Technology Campus (September 2006)” created by THH Inc. This report serves as the Stormwater Master Plan for the area that was approved by the City of Lee’s Summit in 2007, and is attached as Appendix A. The objective of this report is to demonstrate compliance with the anticipated site conditions shown in the approved master plan, ensuring that the downstream regional detention basin will have the necessary capacity to continue functioning as it was originally designed. Since the proposed development is a small portion of the total drainage area contributing to the regional detention basin, the proposed Curve Number (CN) of the development will be compared to the designed CN for the project parcel in the THH Inc. report.

Additionally, the Summit Orchards West property and watershed have been included as a part of numerous stormwater studies created for the Summit Technology Campus and surrounding area. The following studies were provided to Sitepoint at the time of design, and are included in this report for reference in Appendix B:

- Red Development Lee's Summit Fair Stormwater Drainage Study (Olsson Associates, Dec 2006)
- Regional Detention Basin Stormwater Flows Analysis (THH, Inc., July 2009)
- Detention Basin Contributing Areas Exhibit (THH, Inc., Sep 2009)
- Summit Innovation Center Stormwater Drainage Report (THH Inc., March 2015)
- Summit Orchard Lot 7A Stormwater Report (April 2016)

3 Existing Conditions

The Summit Orchards West project property is currently an undeveloped portion of a large mixed-use development, which features a regional detention facility to control stormwater runoff flow rates to downstream systems. The study for this basin was submitted and approved in 2007 (Appendix A). In this study, the basin's entire drainage area is divided into sub-basins. The Summit Orchards West development is in sub-basin 1, 3 and 4, as shown in Exhibit 1 of the attached report. Included in the study are the existing, proposed, and future conditions for the sub-basins. The existing conditions for these sub-basins are as follows:

Existing Conditions (Per THH Inc. Report)				
Sub-Basin	Area (sq. miles)	Area (acres)	CN	Lag Time (hr.)
1	0.0844	54	76	0.65
3	0.0938	60	78	0.80
4	0.0938	60	81	0.62

The "Proposed Conditions" section of the study does not show any changes to the sub-basins, as there were no improvements in the immediate future planned in these areas at the time. These conditions will be considered the existing site conditions in this report.

4 Proposed Conditions

The THH Inc. report lists the "Future Conditions" of Sub-Basins 1, 3, and 4 as follows:

Future Conditions (Per THH Inc. Report)				
Sub-Basin	Area (sq. miles)	Area (acres)	CN	Lag Time (hr.)
1	0.0844	54	92	0.49
3	0.0938	60	94	0.60
4	0.0938	60	94	0.47

These conditions show a change in CN from 76 to 92 for sub-basin 1, 78 to 94 for sub-basin 3, and a change from 81 to 94 for Sub Basin 4. The 1% design storm event was analyzed under these conditions to ensure proper function of the basin. Per the PDP, the proposed conditions of the Summit Orchards West development shall be as follows:

Proposed Conditions (Per PDP)		
Surface	Area (acres)	CN
Pervious	8.02	80
Impervious	16.68	98

Composite CN	92
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The proposed CN for the development is at or below the planned CN for sub-basins 1, 3, and 4. All runoff from the site will drain to the regional detention basin, which has been modeled to accommodate such an increase in runoff.

To match the existing drainage patterns, all runoff from the proposed development, along with all upstream runoff coming on site, will be routed north towards the existing 5'x5' RCB culvert on the northern end of the project property. Existing and proposed stormwater conveyance systems will be utilized on site to properly drain runoff to the 5'x5' RCB culvert. The preliminary drainage design is attached as Exhibit 2.

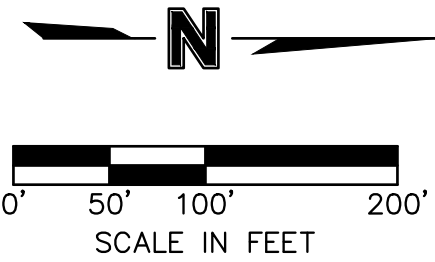
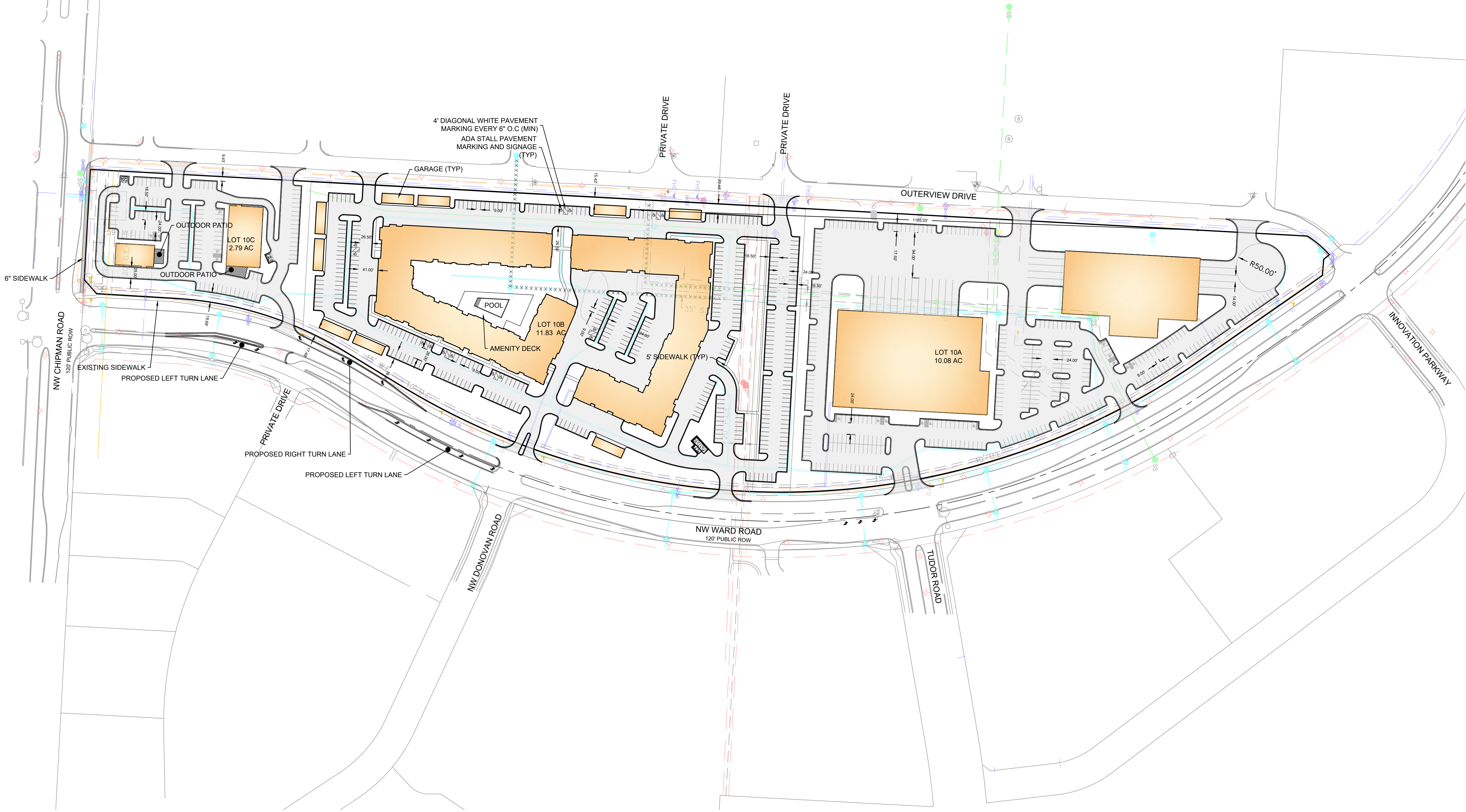
5 Summary

The proposed Summit Orchards West commercial, industrial, and multi-family residential development has been designed to match future condition assumption of the area, as specified in the approved basin design and master plan for the Summit Technology Campus by THH, Inc. All stormwater runoff on site will be conveyed to the existing 5'x5' culvert on the northern end of the lot. As seen in the comparison of existing and proposed curve numbers, the proposed improvements are within the design assumptions made in the THH Inc. stormwater master plan, and will not adversely affect the downstream regional detention basin's performance.

Exhibit 1

S:\01 PROJECTS\MULTI-FAMILY\424 SUMMIT SQUARE 3\UTILITIES\PLANS\PRELIMINARY DEVELOPMENT PLAN\C-0200 SITE PLANNING

SITE DATA									
Lot No.	Total Area	Impervious Coverage	Maximum Building Height	Building Area (All stories)	Floor Area Ratio (FAR)	Proposed Building Use	Parking		
							Requirement		Proposed
10A	10.08 AC. (439,085 S.F.)	309,264 S.F. (70%)	60', 2 stories	123,000 S.F. (Building 1, 51,000 S.F. Building 2, 72,000 S.F.)	0.28	Office/Warehouse	4 per 1,000 S.F. of Office plus 1 per 1,000 S.F. of warehouse	243	326
10B	11.83 AC. (515,315 S.F.)	330,466 S.F. (64%)	60', 4 stories	470,000 S.F. (Building 1, 215,000 S.F. Building 2, 255,000 S.F.)	0.91	Multifamily Residential	1.7 per DU	549	562
10C	2.79 AC. (121,532 S.F.)	70,773 S.F. (58%)	45'	12,300 S.F. (Building 1, 8,800 S.F. Building 2, 3,500 S.F.)	0.10	Retail/ Drive-Through Restaurant	5 per 1,000 S.F. of Retail and 14 per 1,000 S.F. of Restaurant	93	114



LEGEND	
	STANDARD DUTY ASPHALT PAVEMENT
	CG-1 CURB & GUTTER
	STANDARD DUTY CONCRETE PAVEMENT

SITE PLAN

SUMMIT ORCHARDS WEST
PRELIMINARY DEVELOPMENT PLAN
LEE'S SUMMIT, JACKSON COUNTY, MO

REVIEWED BY:	DATE:	NO.:	REVISIONS/APPROVALS:
M.C.D.	2022.08.26		INITIAL CITY SUBMITAL
DESIGNED BY:			
DRAFTED BY:			
SP PROJECT #:			
MELISSA G. DEGENIA, P.E.			
2011000992			

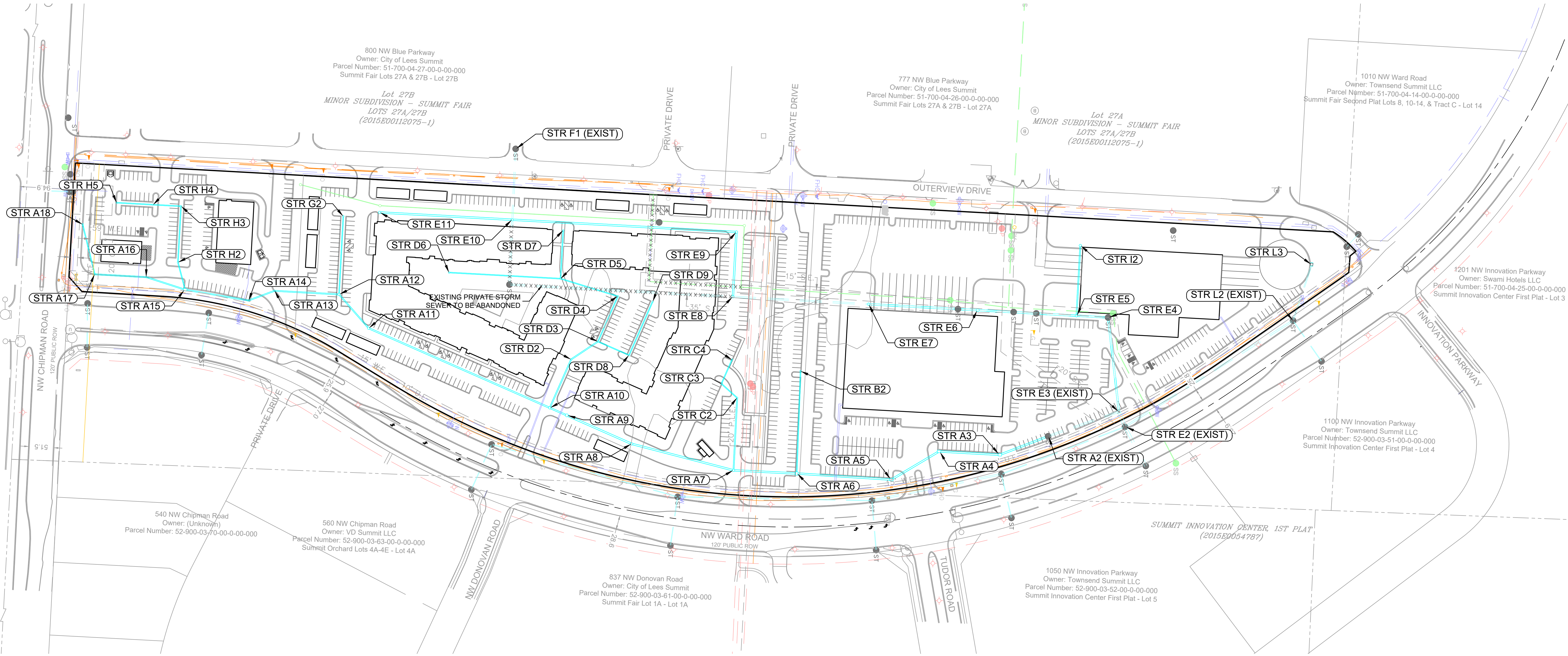
Certificate of Authority #MO 2020018354

SHEET #:

C-0200

Exhibit 2

S:\01 PROJECTS\MULTI-FAMILY\424 SUMMIT SQUARE\3\UTILITIES\PLANS\PRELIMINARY DEVELOPMENT PLAN-C-0500 DRAINAGE PLANNING



Structure Table		Structure Table	
Structure Name	Structure Details	Structure Name	Structure Details
STR A2 (EXIST)	Inlet (5'x5' Inside) RIM = 978.649 PIPE A2 INV IN = 964.480 PIPE A1 (EXIST) INV OUT = 964.480	STR A12	Storm Manhole (4' dia. Inside) RIM = 1000.747 PIPE G1 INV IN = 991.460 PIPE A12 INV IN = 990.960 PIPE A11 INV OUT = 990.960
STR A3	Inlet (6'x4' Inside) RIM = 980.297 PIPE A3 INV IN = 965.500 PIPE A2 INV OUT = 965.515	STR A13	Nyloplast C.I. (30"-3'x2') RIM = 998.270 PIPE A13 INV IN = 992.245 PIPE A12 INV OUT = 992.245
STR A4	Inlet (6'x4' Inside) RIM = 980.750 PIPE A4 INV IN = 966.760 PIPE A3 INV OUT = 966.720	STR A14	Nyloplast C.I. (30"-3'x2') RIM = 998.832 PIPE A14 INV IN = 992.790 PIPE A13 INV OUT = 992.790
STR A5	Inlet (6'x4' Inside) RIM = 978.368 PIPE A5 INV IN = 967.867 PIPE A4 INV OUT = 967.867	STR A15	Inlet (6'x4' Inside) RIM = 998.801 PIPE A15 INV IN = 994.145 PIPE A14 INV OUT = 994.650 PIPE A14 INV OUT = 994.145
STR A6	Inlet (6'x4' Inside) RIM = 984.000 PIPE A6 INV IN = 969.768 PIPE B1 INV IN = 969.760 PIPE A5 INV OUT = 969.768	STR A16	Nyloplast C.I. (30"-3'x2') RIM = 1000.937 PIPE A16 INV IN = 994.916 PIPE A15 INV OUT = 994.920
STR A7	Storm Manhole (4' dia. Inside) RIM = 990.628 PIPE A7 INV IN = 982.090 PIPE C1 INV IN = 983.090 PIPE A6 INV OUT = 971.035	STR A17	Nyloplast C.I. (30"-3'x2') RIM = 1000.616 PIPE A17 INV IN = 996.500 PIPE A16 INV OUT = 995.952
STR A8	Storm Manhole (4' dia. Inside) RIM = 1000.298 PIPE A8 INV IN = 984.350 PIPE A7 INV OUT = 984.350	STR A18	Nyloplast C.I. (30"-3'x2') RIM = 1000.652 PIPE A17 INV OUT = 997.500
STR A9	Storm Manhole (5' dia. Inside) RIM = 1000.280 PIPE A9 INV IN = 986.330 PIPE A8 INV OUT = 985.764	STR B2	Nyloplast C.I. (30"-3'x2') RIM = 989.952 PIPE B1 INV IN = 985.000
STR A10	Storm Manhole (4' dia. Inside) RIM = 1000.253 PIPE A10 INV IN = 986.710 PIPE D1 INV IN = 987.210 PIPE A9 INV OUT = 986.710	STR C2	Nyloplast Drain Basin (30") RIM = 990.105 PIPE C2 INV IN = 985.082 PIPE C1 INV OUT = 984.542
STR A11	Storm Manhole (4' dia. Inside) RIM = 1000.680 PIPE A11 INV IN = 990.576 PIPE A10 INV OUT = 990.100	STR C3	Nyloplast C.I. (30"-3'x2') RIM = 990.410 PIPE C3 INV IN = 985.500 PIPE C2 INV OUT = 985.505

Structure Table	
Structure Name	Structure Details
STR C4	Nyloplast C.I. (30"-3'x2') RIM = 990.405 PIPE C3 INV OUT = 986.000
STR D2	Nyloplast Drain Basin (30") RIM = 1000.723 PIPE D2 INV IN = 989.350 PIPE D1 INV OUT = 989.050
STR D3	Nyloplast Drain Basin (30") RIM = 1000.000 PIPE D3 INV IN = 990.500 PIPE D7 INV IN = 990.500 PIPE D2 INV OUT = 990.000
STR D4	Nyloplast Drain Basin (30") RIM = 999.832 PIPE D4 INV IN = 992.254 PIPE D3 INV OUT = 992.000
STR D5	Nyloplast Drain Basin (30") RIM = 1000.500 PIPE D5 INV IN = 994.000 PIPE D6 INV IN = 994.000 PIPE D4 INV OUT = 993.750
STR D6	Nyloplast Drain Basin (30") RIM = 1001.000 PIPE D5 INV OUT = 997.500
STR D7	Nyloplast Drain Basin (30") RIM = 1000.501 PIPE D6 INV OUT = 996.549
STR D8	Nyloplast Drain Basin (30") RIM = 1000.000 PIPE D8 INV IN = 993.000 PIPE D7 INV OUT = 992.750
STR D9	Nyloplast Drain Basin (30") RIM = 1000.000 PIPE D8 INV OUT = 997.000
STR E2 (EXIST)	Inlet (7'x5' Inside) RIM = 966.450 PIPE E2 (EXIST) INV IN = 958.950 PIPE L1 (EXIST) INV IN = 958.920 PIPE E1 (EXIST) INV OUT = 958.750

Structure Table	
Structure Name	Structure Details
STR E3 (EXIST)	Inlet (7'x5' Inside) RIM = 967.825 PIPE E3 INV IN = 962.440 PIPE A1 (EXIST) INV IN = 960.050 PIPE E2 (EXIST) INV OUT = 960.050
STR E4	Storm Manhole (5' dia. Inside) RIM = 982.616 PIPE E4 INV IN = 966.500 PIPE E3 INV OUT = 966.500
STR E5	Storm Manhole (4' dia. Inside) RIM = 982.000 PIPE E5 INV IN = 967.500 PIPE I1 INV IN = 973.000 PIPE E4 INV OUT = 967.500
STR E6	Storm Manhole (5' dia. Inside) RIM = 980.422 PIPE E6 INV IN = 970.500 PIPE E5 INV OUT = 970.500
STR E7	Storm Manhole (4' dia. Inside) RIM = 983.077 PIPE E7 (EXIST) INV IN = 974.707 PIPE E6 INV OUT = 974.000
STR E8	Storm Manhole (4' dia. Inside) RIM = 993.247 PIPE E8 INV IN = 977.590 PIPE E7 (EXIST) INV OUT = 977.590
STR E9	Storm Manhole (4' dia. Inside) RIM = 998.800 PIPE E9 INV IN = 978.522 PIPE E8 INV OUT = 978.520
STR E10	Storm Manhole (4' dia. Inside) RIM = 1001.674 PIPE E10 INV IN = 982.250 PIPE F1 (EXIST) INV IN = 982.120 PIPE E9 INV OUT = 982.120
STR E11	Storm Manhole (4' dia. Inside) RIM = 1001.873 PIPE E10 INV OUT = 990.000
STR F1 (EXIST)	Storm Manhole (5' dia. Inside) RIM = 1004.106 PIPE F1 (EXIST) INV OUT = 987.040

Structure Table	
Structure Name	Structure Details
STR G2	Nyloplast Drain Basin (30") RIM = 1000.746 PIPE G1 INV OUT = 997.500
STR H2	Nyloplast Drain Basin (30") RIM = 999.016 PIPE H2 INV IN = 995.000 PIPE H1 INV OUT = 995.000
STR H3	Nyloplast Drain Basin (30") RIM = 999.010 PIPE H3 INV IN = 995.750 PIPE H2 INV OUT = 995.750
STR H4	Nyloplast Drain Basin (30") RIM = 1000.000 PIPE H4 INV IN = 996.250 PIPE H3 INV OUT = 996.250
STR H5	Nyloplast Drain Basin (30") RIM = 1000.152 PIPE H4 INV OUT = 997.000
STR I2	Storm Manhole (4' dia. Inside) RIM = 982.923 PIPE I1 INV OUT = 975.000
STR L2 (EXIST)	Inlet (4'x4' Inside) RIM = 976.239 PIPE L2 (EXIST) INV IN = 961.880 PIPE L1 (EXIST) INV OUT = 961.880
STR L3	Inlet (6'x4' Inside) RIM = 975.757 PIPE L2 (EXIST) INV OUT = 962.340

Pipe Table		
Pipe Name	Size	Length
PIPE A1 (EXIST)	36.00"	150.158
PIPE A2	36.00"	103.473
PIPE A3	36.00"	122.000
PIPE A4	36.00"	110.720
PIPE A5	36.00"	190.126
PIPE A6	36.00"	126.660
PIPE A7	36.00"	210.826
PIPE A8	36.00"	141.788
PIPE A9	30.00"	37.280
PIPE A10	30.00"	396.387

Pipe Table		
Pipe Name	Size	Length
PIPE E2 (EXIST)	???"	32.484
PIPE E3	36.00"	189.874
PIPE E4	36.00"	63.403
PIPE E5	36.00"	198.068
PIPE E6	36.00"	219.001
PIPE E7 (EXIST)	33.00"	272.020
PIPE E8	36.00"	129.818
PIPE E9	36.00"	449.780
PIPE E10	36.00"	265.887
PIPE F1 (EXIST)	33.00"	141.992

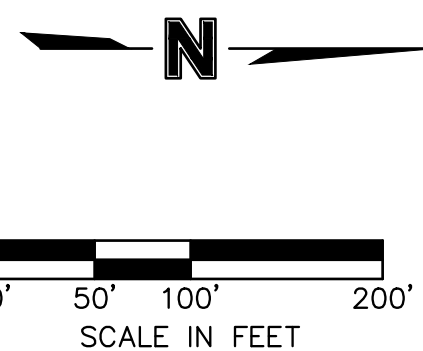
Pipe Table		
Pipe Name	Size	Length
PIPE A11	24.00"	89.844
PIPE A12	24.00"	129.465
PIPE A13	24.00"	55.567
PIPE A14	24.00"	128.684
PIPE A15	24.00"	81.598
PIPE A16	24.00"	103.529
PIPE A17	18.00"	102.934
PIPE B1	18.00"	205.030
PIPE C1	24.00"	145.196
PIPE C2	18.00"	42.323

Pipe Table		
Pipe Name	Size	Length
PIPE E1	18.00"	156.668
PIPE H1	18.00"	56.689
PIPE H2	18.00"	112.358
PIPE H3	18.00"	56.179
PIPE H4	18.00"	72.753
PIPE I1	24.00"	140.701
PIPE L1 (EXIST)	36.00"	398.198
PIPE L2 (EXIST)	24.00"	118.369

Pipe Table		
Pipe Name	Size	Length
PIPE C3	18.00"	52.573
PIPE D1	24.00"	106.000
PIPE D2	24.00"	64.551
PIPE D3	18.00"	99.000
PIPE D4	18.00"	120.112
PIPE D5	18.00"	223.527
PIPE D6	18.00"	96.632
PIPE D7	18.00"	68.000
PIPE D8	18.00"	117.256
PIPE E1 (EXIST)	???"	127.961

Pipe Table		
Pipe Name	Size	Length
PIPE E2 (EXIST)	???"	32.484
PIPE E3	36.00"	189.874
PIPE E4	36.00"	63.403
PIPE E5	36.00"	198.068
PIPE E6	36.00"	219.001
PIPE E7 (EXIST)	33.00"	272.020
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PIPE F1 (EXIST)	33.00"	141.992

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PIPE G1	18.00"	156.668
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PIPE H3	18.00"	56.179
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PIPE I1	24.00"	140.701
PIPE L1 (EXIST)	36.00"	398.198
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SITEPOINT

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REVISIONS/APPROVALS:

NO. DATE

INITIAL CITY SUBMITTAL

2022.08.26

REVIEWED BY:

M.G.D.

DESIGNED BY:

R.E.B.

DRAFTED BY:

D.A.H.

SP PROJECT #:

MELISSA GREGG

201100092

STORM SEWER GENERAL LAYOUT PLAN

SUMMIT ORCHARDS WEST

ENTITLEMENT

PRELIMINARY DEVELOPMENT PLAN

LEE'S SUMMIT, JACKSON COUNTY, MO

Certificate of Authority #MO 2020018354

SHEET #:

C-0500