

MACRO STORM WATER DRAINAGE STUDY

Winterset Cedar Creek

SITE ACREAGE: 3.69 ACRES

Lee's Summit, MO

PREPARED BY:



Revision

Date	Comment	By
9-8-20	Revised per City Comments Dated September 8, 2020	AEP
9-22-20	Revised per City Comments Dated September 15, 2020	AEP

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3.0 General Information

The proposed Winterset Cedar Creek single-family residential subdivision is to be located in the southwest quarter of the southwest quarter of Section 2, Township 47 North, Range 32 West, Lee's Summit, Jackson County, Missouri. The proposed development would be adjacent to Winterset Park and consist of an extension of SW Winter Road. The proposed development area is 3.69 acres. The proposed improvements would consist of five lots, a road extension with terminating cul-de-sac in addition to associated utility infrastructure. The property is currently wooded and does not contain any onsite detention systems, BMPs nor water bodies. Runoff from the north side of the property is tributary to Cedar Creek and runoff from the south side of the property is tributary to an unnamed branch of Cedar Creek. The confluence of Cedar Creek and Tributary C1 to Cedar Creek constitutes the Point of Interest (POI) for the subject project. The POI is adjacent to the property and represents the place where all contributing runoff from the project may be accounted. The POI is also the point at which the project sub-basins may be compared to the rest of the Cedar Creek Watershed. Exhibit A at the end of the report contains an aerial view of the existing project site. The proposed Site Plan may be found in Exhibit B. The overall Watershed Map for the proposed project may be found in Exhibit C.

3.1 Purpose

The purpose of the memorandum is to determine if any negative impacts due to storm water runoff from the proposed improvements are anticipated downstream due to the 2, 10, 100 and 1.37" water quality storm.

3.2 Scope

Determine Proximity of Property to Cedar Creek.

Determine Location of Property within the Overall Cedar Creek Watershed.

Determine the Pre versus Post Development Peak Flows for the 2, 10, 100 and Water Quality Storms at the POI.

4.0 Methodology

The memorandum conforms to KC Metro Area APWA Section 5600 requirements in addition to all other applicable codes and requirements of the City of Lee's Summit, Missouri.

5.0 FEMA Floodplain Determination

The property is located in an Area of Minimal Flood Hazard, Zone X, according to FEMA Firm Map Number 29095C0416G, effective January 20, 2017.

See Exhibit D for a FIRMette which includes the proposed project site. Note the large regulatory floodplain and floodway present on both Cedar Creek and Tributary C1 to Cedar Creek adjacent to the proposed project site.

6.0 NRCS Soil Classification

Soil classifications are published by the United States Department of Agriculture/National Resources Conservation Service (USDA/NRCS) and made available via their website. Data was taken from the web soil survey for Jackson County, Missouri, Version 22, May 29, 2020. The existing site contains one major soil type:

10082 Snead-Rock Outcrop Complex, 14 to 30 percent slopes
Hydrologic Soils Group (HSG): Type D

See Exhibit E for a detailed soils report of the proposed project site.

7.0 Sub-basin/Watershed Analysis

The overall watershed map for the project was developed to determine both the proximity of the project to the receiving stream and the location of the project in the overall watershed. See Exhibit C for a depiction of the Overall Watershed Map for the project. The overall watershed is approximately 6,290 +/- acres with the majority of the watershed being developed. The subject property encompasses 3.69 acres and accounts for approximately 0.06% of the overall watershed. The terrain consists of a Snead-Rock outcrop complex with steep slopes and high runoff rates per the NRCS soils report.

The proposed development is located adjacent to Cedar Creek on the north and an unnamed branch tributary to Tributary C1 to Cedar Creek on the south. The proposed development is located approximately 430' south of Cedar Creek. The south sub-basin of the project extends 6,000+ feet south from Cedar Creek and includes all lands contributing runoff to Tributary C1 to Cedar Creek. The development is located in the lower 1/10th of the sub-basin and is located adjacent to

Cedar Creek. The following table summarizes the results of the Existing Conditions Analysis for the proposed project sub-basin. The hydrologic data used in this analysis is in line with the FEMA Flood Insurance Study for the watershed, see Exhibit G for FIS reference data. The highlighted FIS data is approximately at the POI.

Table 1 - Existing Conditions Sub-basin & Hydrologic Data at the POI

Sub-basin	POI	Area (ac.)	CN	Tc (min.)	Q(1.37") (cfs)	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
Existing	Confluence	5042	85	242.0	319.42	1999.69	3560.08	5916.63

The following table summarizes the results of the Proposed Conditions Analysis. A complete Hydraflow Report may be found in Exhibit F which contains both Existing and Proposed Hydrologic Data.

Table 2 - Proposed Conditions Sub-basin & Hydrologic Data at the POI

Sub-basin	POI	Area (ac.)	CN	Tc (min.)	Q(1.37") (cfs)	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
Prop. Project	Confluence	3.69	82	16.94	1.031	7.97	14.50	24.35
Prop. Remainder	Confluence	5038.31	85	242.0	319.19	1998.23	3557.48	5912.31
Prop. Combined	Confluence	5042			319.27	1998.59	3558.09	5913.27

As discussed, the data shown in the above tables confirms that the development of the subject project due to its location in the watershed will reduce the overall peak flow rates at the POI for all regulatory storm events including the 1.37" water quality storm. The reduction in peak flow may be attributed to the time variance of contributing areas within the watershed.

Table 3 below provides a comparison of runoff data between Proposed and Existing Conditions for the Proposed Development.

Table 3 - Point of Interest Discharge Comparison

	Condition	Q1.37" (cfs)	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
POI Confluence	Proposed	319.27	1998.59	3558.09	5913.27
	Existing	319.42	1999.69	3560.08	5916.63
	Difference	-0.15	-1.10	-1.99	-3.36

As shown in the Table above all proposed peak flows will be attenuated below existing peak flows for all regulatory design storm events. Therefore the development and free release of runoff from this property will not create any negative downstream hydraulic impacts but will reduce the required carrying capacity of downstream elements providing increased freeboard. Due to the large size of the sub-basin and the minimal size of the proposed development the proposed peak flow generated during the water quality storm will not create deleterious conditions to downstream conveyance elements.

8.0 Conclusion

No further developments will be directly downstream and adjacent to Winterset Cedar Creek. Based on the size, geometry, soil characteristics and downstream position of the property in its sub-basin the free release of proposed peak flows will provide attenuation below existing conditions for all regulatory design storms including the 1.37" water quality storm. We recommend the free release of runoff from all storm water events. The study is in conformance with all applicable City of Lee's Summit standards and criteria.

Waiver Requests:

- 1) KCAPWA Section 5608 Stormwater Detention and Retention, 5608.4 Performance Criteria, C. Release Rates, 1. Comprehensive Control, a. Post-Development Peak Discharge Rates for the 50%, 10% and 1% Storms. We request this criterion be waived based on the peak discharge reduction outlined in the report.
- 2) KCAPWA Section 5608 Stormwater Detention and Retention, 5608.4 Performance Criteria, C. Release Rates, 1. Comprehensive Control, b. 40-hour Extended Detention. We request this criterion be waived based on the peak discharge reduction in addition to the minimal volume attributed from the subject property compared to the overall watershed.

Exhibit A
Project Aerial View



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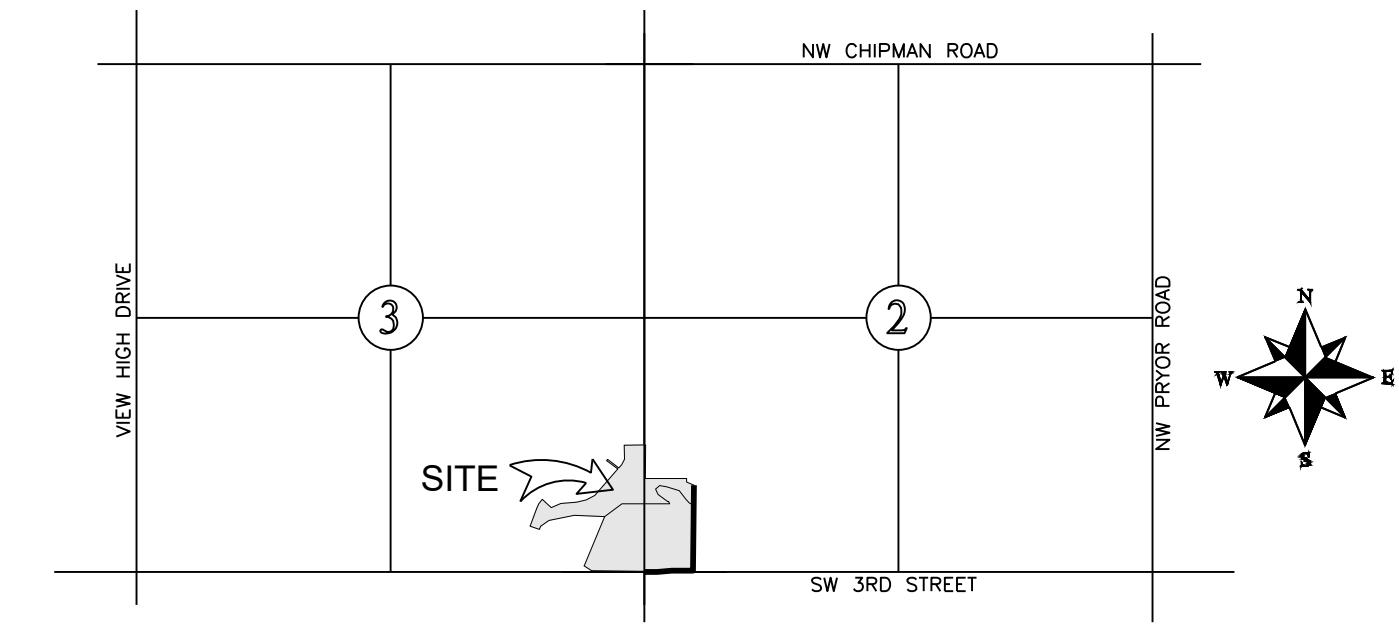
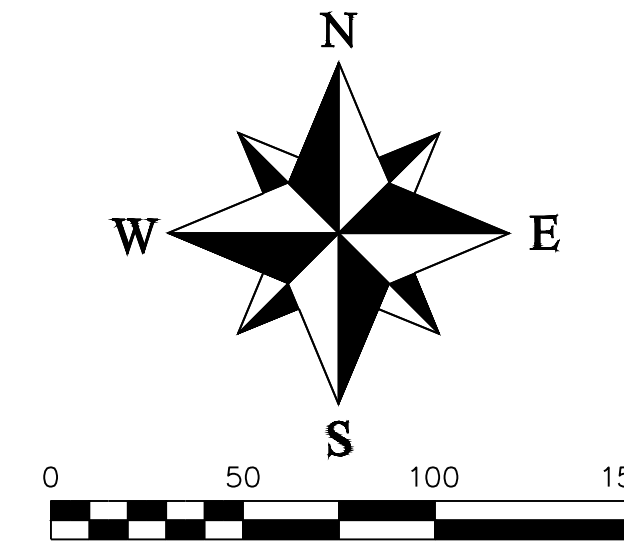
Google Earth

Exhibit B
Proposed Site Plan

Preliminary Development Plan

THE RIDGE AT WINTERSET SUMMIT

A Replat of Tract B2, Winterset Valley - 2nd Plat
and Lot 1-A, Lee's Summit West Elementary
Part of Section 2 & 3, Township 47 North, Range 32 West
Lee's Summit, Jackson County, Missouri



LOCATION MAP
SECTION 2 & 3 -T47N-R32W
Not to Scale

BOUNDARY DESCRIPTION

A tract of land being located in Section 2 and Section 3, Township 47 North, Range 32 West, in Jackson County, Missouri being more particularly described as follows

Tract B2, WINTERSET VALLEY 2ND PLAT, a subdivision as recorded in the Office of the Recorder, Jackson County, Missouri,
EXCEPT

A tract of land being part of Tract B2, WINTERSET VALLEY -2ND PLAT, a subdivision in Lee's Summit, Jackson County, Missouri, described as follows: Beginning at the Northeast corner of said Tract B2, said corner also being the Northwest corner of WINTERSET PARK, a subdivision in Lee's Summit, Jackson County, Missouri; thence South 02 degrees 51 minutes 13 seconds West along the West line of said subdivision 89.23 feet to the Northwest corner of Lot 16 of said WINTERSET PARK; thence North 64 degrees 28 minutes 06 seconds West 108.37 feet; thence North 02 degrees 51 minutes 13 seconds East 46.37 feet to a point on the North line of said Tract B2; thence South 87 degrees 46 minutes 53 seconds East along said North line 100.01 feet to the point of beginning.

and

Lot 1-A, Lee's Summit West Elementary, a subdivision as recorded in the Office of the Recorder, Jackson County, Missouri

LEGEND

These standard symbols will be found in the drawing.

- Set 1/2" Rebar & Cap
- ⊙ Found Survey Monument (As Noted)
- Ⓜ Exception Document Location
- x-x-x-x-x- Existing Fence Line - Chain Link
- x-W/M-----x-W/M----- Existing Water Line
- x-SAN-----x-SAN----- Existing Sanitary Sewer Main
- x-STM-----x-STM----- Existing Storm Sewer
- GAS--- Existing Gas Line
- UT--- Existing Underground Telephone
- E--- Existing Underground Electric
- ST---ST---ST--- Proposed Storm Sewer
- SS--- Proposed Sanitary Sewer
- W---W---W--- Proposed 8" D.I.P. Water

Current Zoning: R-1, Single Family Residential / AG, Agricultural

SURVEY AND PLAT NOTES:

THE SUBJECT PROPERTY SURVEYED LIES WITHIN A FLOOD ZONE DESIGNATED ZONE (X). AREAS LOCATED OUTSIDE THE 100 YEAR FLOOD PLAIN, PER F.E.M.A. MAP, COMMUNITY PANEL NO. 29095C0416G EFFECTIVE DATE: JANUARY 20, 2017.

SURVEYOR'S GENERAL NOTES:

- 1) This survey is based upon the following information provided by the client or researched by this surveyor.
 - (A) Final Plat of CEDAR CREEK ELEMENTARY SCHOOL
 - (B) Final Plat of LEE'S SUMMIT WEST ELEMENTARY SCHOOL
 - (C) Final Plat of WINTERSET VALLEY - 2ND PLAT
- 2) This survey meets or exceeds the accuracy standards of a (SUBURBAN) Property Boundary Survey as defined by the Missouri Standards for Property Boundary Surveys.
- 3) No Title report was furnished
- 4) Bearings shown hereon are based upon bearings described in the legal description
- 5) This company assumes no responsibility in the location of existing utilities within the subject premises. This is an above-ground survey. The underground utilities, if shown, are based on information provided by the various utility companies and these locations should be considered approximate. There may be additional underground utilities not shown on this drawing. Dig Rite Ticket #150071203, 150071179, 150071171
- 7) Subsurface and environmental conditions were not surveyed or considered as a part of this survey. No evidence or statement is made concerning the existence of underground or overhead conditions, containers or facilities that may affect the use or development of this property. No attempt has been made to obtain or show data concerning existence, size, depth, conditions, capacity or location of any utility existing on the site, whether private, municipal or public owned.

Proposed Preliminary Plat

The Ridge at Winterset Summit Development Area

Proposed Total Plat Area	2,028,856.87 sf (46.58 Acres)
Residential Site Area	154,804.45 sf (3.55 Acres)
School Site Area	1,116,264.84 sf (25.63 Acres)
Common Site Area	757,787.58 sf (17.40 Acres)
Residential Lots	5
Density	1.45 lots per acre

Proposed Usage

Lots 1601 - 1605 Single Family Residential

Setbacks	Front Yard	Varies By Lot
		20 Feet Minimum
		(See Plat Drawing)
	Rear Yard	30 Feet
	Side Yard	7.5 Feet

Lot 1606

Setbacks	Front Yard	40 Feet
	Rear Yard	30 Feet
	Side Yard	7.5 Feet

Tract A

Both ownership and maintenance of the Common Area tract is dedicated to The Ridge at Winterset Summit Home Owner's Association

Lots 1601 - 1605 will be part of the The Ridge at Winterset Summit Home Owner's Association.

Lot 1606 will be owned and maintained by the Lee's Summit R-7 School District

UTILITIES:
THE INFORMATION CONCERNING THE EXISTENCE, LOCATION, SIZE OR TYPE OF MATERIALS OF UNDERGROUND UTILITIES SHOWN HEREON, WHICH ARE NOT VISIBLE FROM THE SURFACE, HAS BEEN COMPILED FROM THE RECORDS OF THE VARIOUS UTILITY COMPANIES OR OTHER SOURCES OF INFORMATION AND HAS NOT BEEN VERIFIED IN THE FIELD BY THIS COMPANY. WHERE RECORD MEASUREMENTS WERE NOT AVAILABLE, THE LOCATION OF THESE UNDERGROUND LINES WAS SCALED FROM THE COMPANY'S RECORDS. THIS INFORMATION IS NOT TO BE CONSTRUED AS ACCURATE, COMPLETE NOR EXACT. ANY INFORMATION CONCERNING UNDERGROUND UTILITIES SHOWN HEREON MUST BE CONFIRMED BY THE DESIGN PROFESSIONAL PRIOR TO DESIGNING ANY IMPROVEMENTS WHICH MAY BE AFFECTED BY THIS INFORMATION OR BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION ACTIVITY.

OIL - GAS WELLS
ACCORDING TO EDWARD ALTON MAY JR'S ENVIRONMENTAL IMPACT STUDY OF ABANDONED OIL AND GAS WELLS IN LEE'S SUMMIT, MISSOURI IN 1995, THERE ARE NOT OIL AND GAS WELLS WITHIN 185 FEET OF THE PROPERTY AS SURVEYED HEREON.

REVISIONS	
DATE	

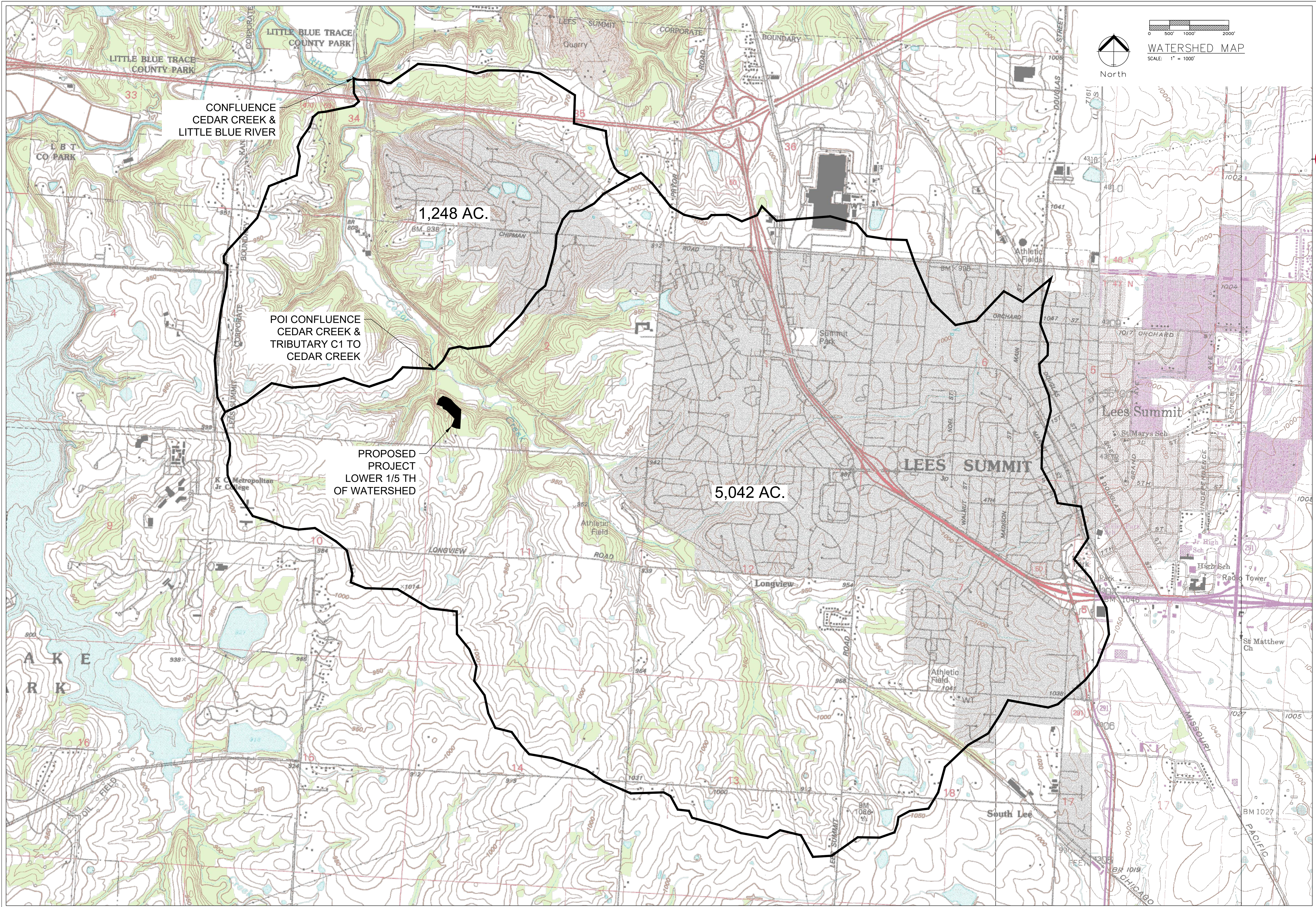
Part of Section 2 & 3
Township 47 North, Range 32 West
Lee's Summit, Jackson County, Missouri

Preliminary Development Plan

PROFESSIONAL SEAL

ENGINEERING & SURVEYING SOLUTIONS
50 SE 30TH STREET
LEE'S SUMMIT, MO 64082
P: (816) 623-9888 F: (816) 623-9849

Exhibit C
Overall Watershed Map



WATERSHED MAP
SCALE: 1" = 1000'



CONFLUENCE
CEDAR CREEK &
LITTLE BLUE RIVER

1,248 AC.

POI CONFLUENCE
CEDAR CREEK &
TRIBUTARY C1 TO
CEDAR CREEK

PROPOSED
PROJECT
LOWER 1/5 TH
OF WATERSHED

5,042 AC.



Professional Registration
Missouri
Engineering 200602188-D
Surveying 200603189-D
Kansas
Engineering E-1895
Surveying LS-218
Oklahoma
Engineering 6254
Nebraska
Engineering CA2821

Project Center
Creek
Issue Date
January 16, 2020
Watershed Map
Construction Plans for:
Winterset Cedar Creek
Lees Summit, Jackson County, Missouri

Matthew J. Schlicht
MO PE 2006019708
KS PE 19071
OK PE 25226
REVISIONS
EXHIBIT