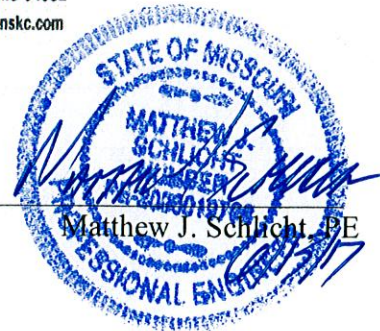# SANITARY STUDY

<u>View High Sewer</u>
PART OF THE SE ¼ SEC. 33 – T.48 N – R. 31 W

DRAINAGE AREA ACREAGE: 172 Acres

LEE'S SUMMIT,
JACKSON COUNTY,
MISSOURI

PREPARED BY:

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GENERAL INFORMATION

- The study is to evaluate the development of the 172 acres at the Northeast Corner of View High Drive and 3rd Street drain into Cedar Creek
- The site is 172 acres
- 100 acres of offsite are combined to the system at manhole A-5
- Currently planned to develop the 72 acres +/- located at the upstream end of the sanitary main extension with a mixed use development
    - i. 312 Unit Apartment
    - ii. 215,000 sq. ft. office/retail/restaurant
    - iii. 150 Unit Senior Facility
- The site is currently undeveloped land
- The existing sanitary facilities are located on Chipman Road.

LIST OF ABBREVIATIONS

Gallons per Day (gpd)
Cubic Feet per Second (cfs)
Acre (ac)
Inch per hour (iph)
Time of Concentrations, T_c (min)

4. METHODOLOGY

The sanitary flows for the proposed developed were determined utilizing Section 6500 of the City of Lee's Summit Design and Construction Manual Revised September 15, 2005.

The sanitary flows for the existing site were determined utilizing Section 5500 of American Public Works Association, Standard Specifications and Design Criteria.

Peak Wastewater Flows (PWF)
Reference: Section 6501.C.1

$$PWF = PBF + PIG + PIF \text{ (see below for definition of PBF, PIG, \& PIF)}$$

Peak Base Flows (PBF)
Reference: Section 6501.C.1.a.i
- 1,500 gpd/ac

Onsite
PBF = 1,500 gpd/ac*3.0 (EDU) * 72 ac = 324,000 gpd

Offsite
PBF = 1,500 gpd/ac*100 ac * 3.0 (EDU) = 450,000 gpd

Peak Infiltration (PIG)
Reference: Section 6501.C.1.b.i

Peak infiltration to be used for residential land in Lee's Summit is 250 gpd / ac

Onsite
PIG = 250 gpd/ac * 72 ac = 18,000 gpd
Offsite
PIG = 250 gpd/ac * 100 ac = 25,000 gpd

Peak Inflow (PIF)
Reference: Section 6501.C.1.c
Design for the 50-year storm event

$Q = Kia$ Where:

Q = peak inflow, cfs
K = inflow factor, unitless ($K = 0.006$ as per Design and Construction Manual)
i = rainfall intensity that corresponds to a tributary area's time of concentration, iph
A = tributary area, ac

Rainfall intensity is interpolated by Section 6501.d a figure relating Time of Concentration and Frequency are shown.
Time of Concentration, T_c calculated by:

Onsite
T_c (min) = 18.56 * (Area, ac)$^{0.2524}$
$Tc(min) = 18.56 * (72)^{0.2524}$
$Tc(min) = 55$ min
$Q = 0.003*3.55*72$
$Q = 0.77$ cfs = 0.50 MGD

Offsite
T_c (min) = 18.56 * (Area, ac)$^{0.2524}$
$Tc(min) = 18.56 * (100)^{0.2524}$
$Tc(min) = 60$ min
$Q = 0.003*3.26*100$
$Q = 0.98$ cfs = 0.63 MGD

Total Flow

Onsite	842,000 GPD (1.30 c.f.s.)
Offsite	1,105,000 GPD (1.71 c.f.s.)
Total	=1,947,000 GPD (3.01 c.f.s.)

The HGL Calculated for the sewer main extension is shown in HGL Calculations

HGL Flow Calculations

City of Lee's Summit Criteria with all land developed (Offsite)

Line Segment	Gravity Flow Capacity CFS	Segment Flow CFS	Excess Capacity CFS	DownStream HGL	Upstre HGL
A-1	3.27	3.01	0.26	800.94	801.1
A-2	3.17	3.01	0.16	801.38	802.1
A-3	10.67	3.01	7.66	802.13	809.
A-4	14.39	3.01	11.38	809.1	821.6
A-5	11.31	3.01	8.3	821.61	826.0
A-6	9.84	3.01	6.83	826.05	830.9
A-7	5	3.01	1.99	832.37	834.4
A-8	13.28	3.01	10.27	834.45	851
A-9	14.25	3.01	11.24	851	858.7
A-10	3.19	3.01	0.18	859.17	859.5
A-11	3.16	3.01	0.15	859.73	859.9
A-12	10.68	3.01	7.67	859.93	864.7
A-13	3.24	3.01	0.23	865.15	865.2
A-14	17.63	3.01	14.62	865.24	876.9
A-15	9.32	3.01	6.31	876.99	883.4
ONSITE	7.76	1.3	6.46	883.49	902.48

Drainage Area Map and Sanitary Layout

DRAINAGE MAP
SCALE: N/A

North