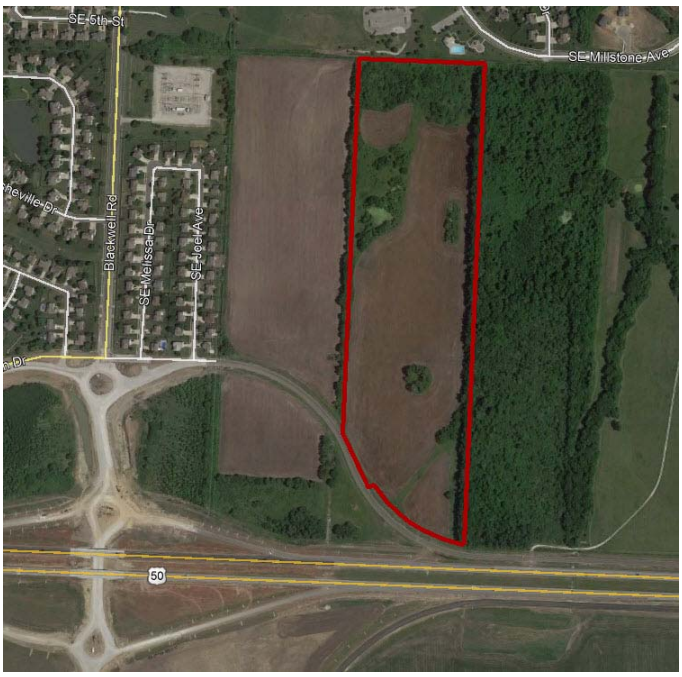
Tanner Consulting LLC
LAND PLANNING | LAND SURVEYING | CIVIL ENGINEERING
5323 SOUTH LEWIS AVENUE, TULSA OKLAHOMA 74105-6539

5/3/2018

City of Lee's Summit
Development Services
220 SE Green
Lee's Summit, MO 64063
816-980-1200

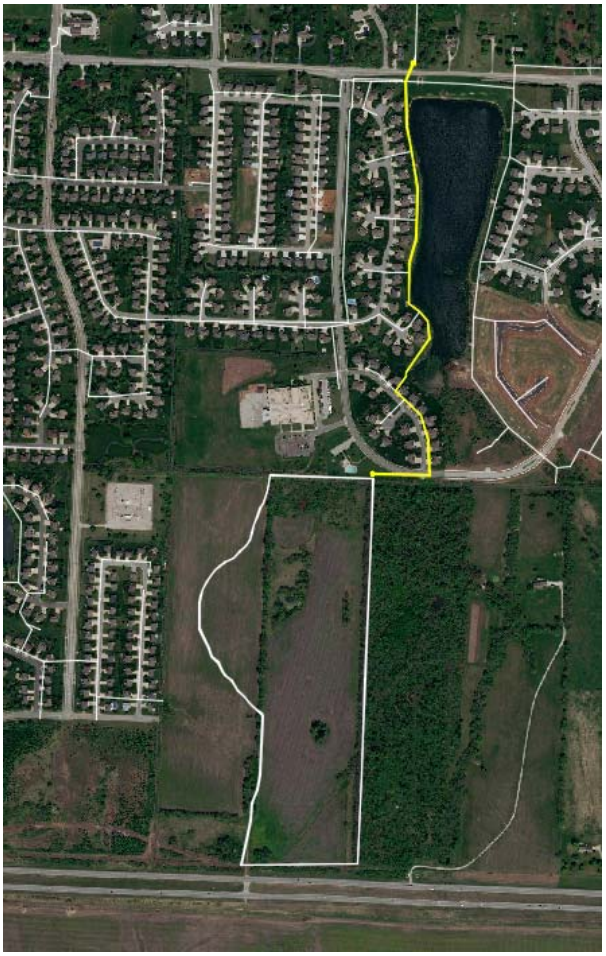
Re: Sanitary Sewer Impact
Case Properties
Artisan Point (Robbins Site)

The purpose of this study is to evaluate the potential impact of the multi-family housing development proposed for a 35.36 Acre site located in the NW/4 of Section 11, T-47-N, R-31-W, within the jurisdiction of the City of Lee's Summit. The property is lies north of Shenandoah Drive approximately 1,600 feet east of Blackwell, within the upper reaches of the South Prairie Lee Watershed.

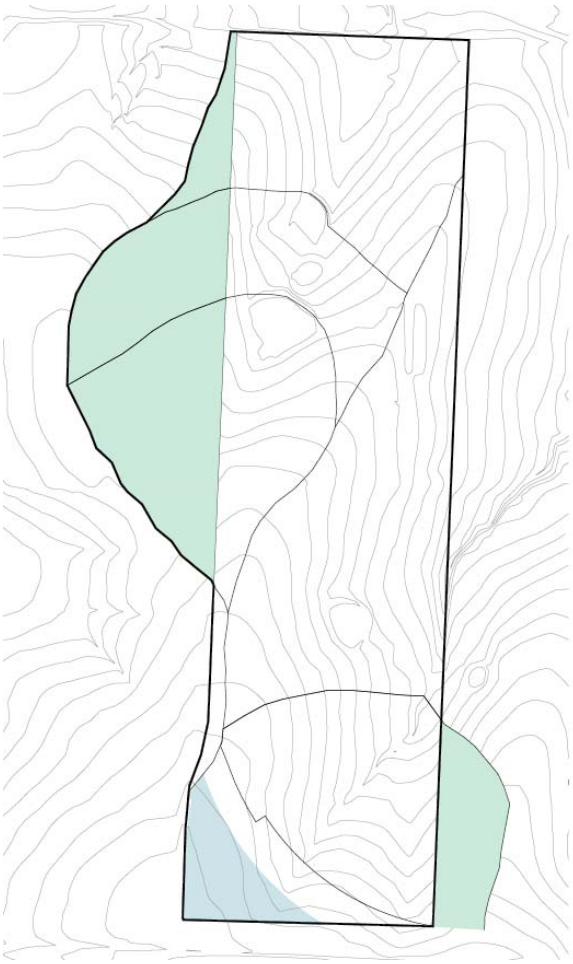


Subject Property

The subject property, together with additional offsite areas, currently drains to the north east corner of the site. The downstream receiving sanitary sewer will be an 8-inch main located within the Summit Mill Addition. The system then flows 3,200 feet north through single-family developments to a pump station located on the north side of East Langford Road.



Downstream Analysis



Contributing Area

Sanitary sewer loads contributing to the Langford Road pump station may be broken down into:

- 83 Existing Homes in the Summit Mill Subdivision(s)
- Existing Highland Park Elementary School (500 Enrollment)
- Proposed 600 apartment units connecting at Summit Mill
- Probable Commercial development south of Shenandoah (600 seats, restaurant).
- 40 Probable single-family homes adjacent to the subject property.

The proposed multi-family development will consist of 600 dwelling units constructed in two phases. Each phase will have approximately equal numbers of one bedroom and two-bedroom units.

Case Properties owns and operates 44 apartment complexes over a 5-state region. Recent analysis of water usage in comparable projects identifies an average of 2,500 gallons per month per unit. 300 units generate a water demand of approximately 750,000 gallons per month.

A small area of commercial property may be served by sanitary sewer main extensions to the south side of Shenandoah. The largest load for the small triangular area would be due to restaurant development. We estimate that two 300-seat restaurants could be constructed on the east side of the ridge.

Approximately 11 acres west and southeast of the site may be served by sanitary sewer extensions connecting to the main lines constructed by the apartment development. Given a density of 3.7 du/acre, approximately 40 residential lots could contribute load to the existing system.

The following table itemizes the assumptions of future loads:

Area Label	Description			DU	Persons per DU	Population	Average Total GPD	Average Daily Total (GPD)	Peaking Factor	Peak Flow (GPD)	Peak Flow (GPM)	Peak Flow (CFS)
	Single Family Downstream			83	3.7	299.7	100	29,970	4	119,880	83	0.185
	Elmentary School					500	14	7,000	4	28,000	19	0.043

Area Label	Description	Acres	DU/Ac	DU	Persons per DU	Population	Average Total GPD	Average Daily Total (GPD)	Peaking Factor	Peak Flow (GPD)	Peak Flow (GPM)	Peak Flow (CFS)
	1 Bedroom	30.00	10	300	2	600	100	60,000	4	240,000	167	0.370
	2 Bedroom	30.00	10	300	3	900	100	90,000	4	360,000	250	0.556

Area Label	Description	Acres		Seats	GPD per Patron	Seatings/Day	Average Total GPD	Average Daily Total (GPD)	Peaking Factor	Peak Flow (GPD)	Peak Flow (GPM)	Peak Flow (CFS)
	Commercial Lot	1.66										
	300 Seat Restaurant			300	6	8		14,400	4	57,600	40	0.089
	300 Seat Restaurant			300	6	8		14,400	4	57,600	40	0.089

Area Label	Description	Acres	DU/Ac	DU	Persons per DU	Population	Average Total GPD	Average Daily Total (GPD)	Peaking Factor	Peak Flow (GPD)	Peak Flow (GPM)	Peak Flow (CFS)
DA 7	North West Area	0.87	4	3.5	3.7	12.9	100	1,288	4	5,150	4	0.008
DA 5	West Central Area	3.19	4	12.8	3.7	47.2	100	4,721	4	18,885	13	0.029
DA 3	South West Area	4.60	4	18.4	3.7	68.1	100	6,808	4	27,232	19	0.042

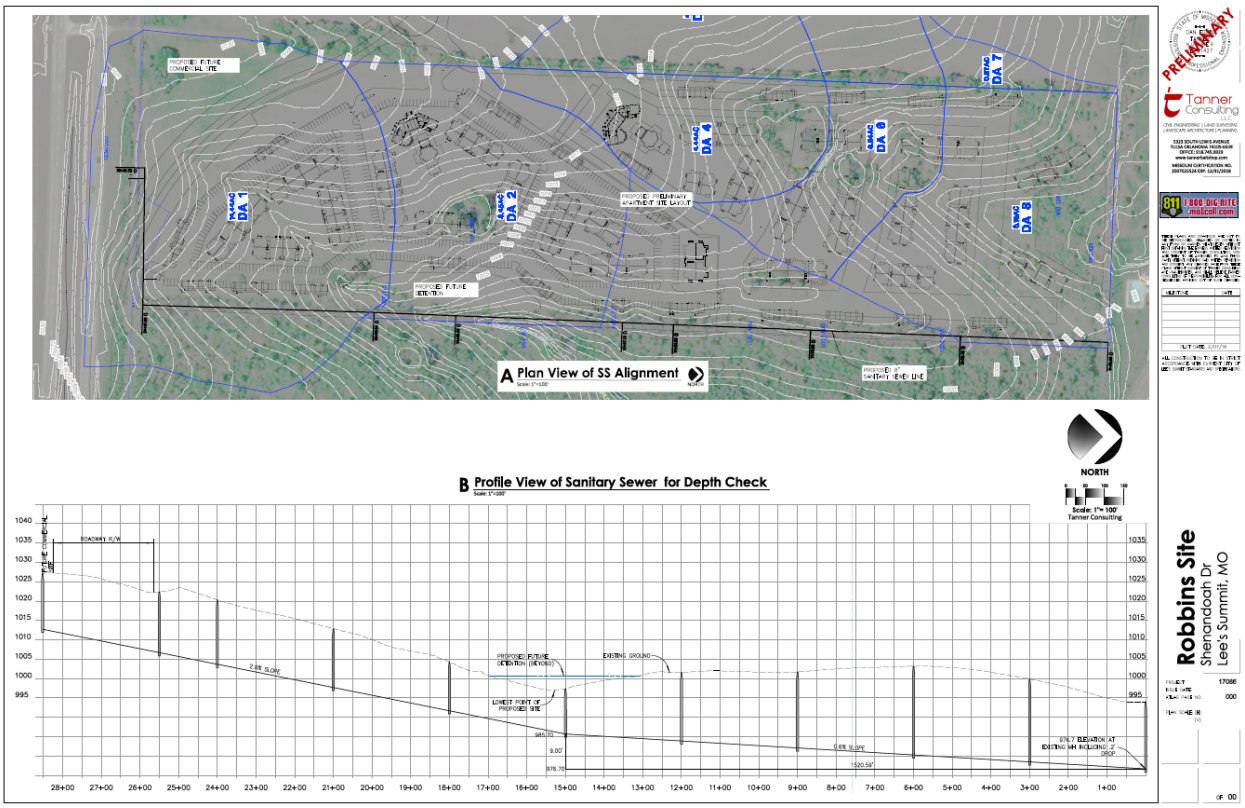
Peak Totals	41,617		914,347	635	1.411
Branch Load to Pump Station			Non Peak CFS		0.353

Analysis

The capacity of the existing sanitary sewer gravity mains affected by the proposed apartment project have been analyzed by developing a hydraulic profile extending from the Langford Road Pump Station for 5200 feet upstream to the uppermost commercial development area.

Exhibit 1 is the profile of the existing system:

Exhibit 2 is the profile of the proposed system.



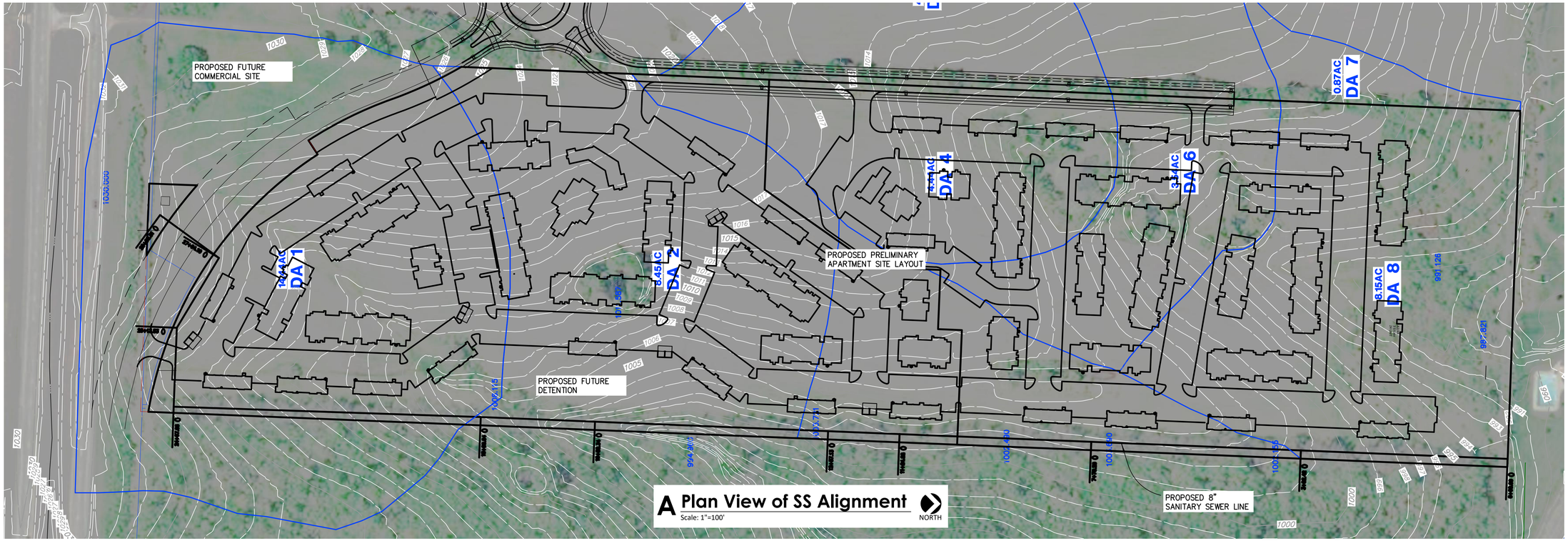
Summary of Findings

The hydraulic capacity of an 8-inch PVC pipe laid on the minimum slope of 0.004 will convey the peak load of .353 CFS at half full. Applying a peaking factor of 4, an 8-inch pipe on minimum grade may surcharge up to 2.94 feet.

Submitted for approval,

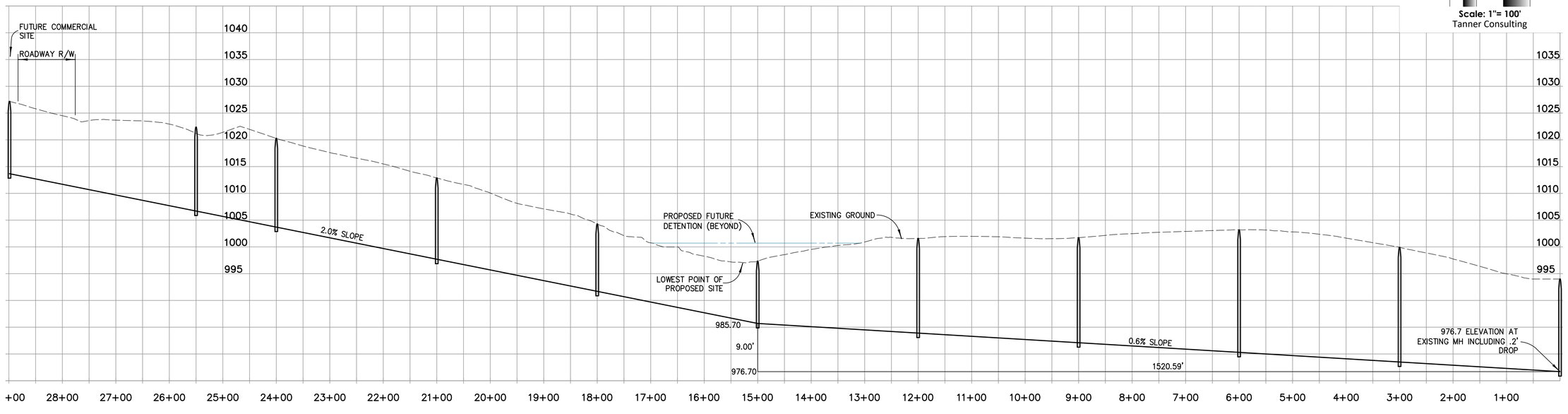
STATE OF MISSOURI
DAN EDWIN
TANNER
NUMBER
E-21427
REGISTERED PROFESSIONAL ENGINEER
5.3.2018

Dan E. Tanner, PE
Tanner Consulting, LLC
Missouri Certificate of Authorization 2007025524
Expires 12/31/2018



A Plan View of SS Alignment
Scale: 1"=100'

NORTH



NORTH

0 50 100 150

Scale: 1"= 100'
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PRELIMINARY

STATE OF MISSOURI
DAN EDWIN TANNER
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REGISTERED PROFESSIONAL ENGINEER

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LANDSCAPE ARCHITECTURE | PLANNING

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MISSOURI CERTIFICATION NO.
2007025524 EXP. 12/31/2018

811 1-800-DIG-RITE
molocall.com

MILESTONE	DATE
PLOT DATE: 5/03/18	

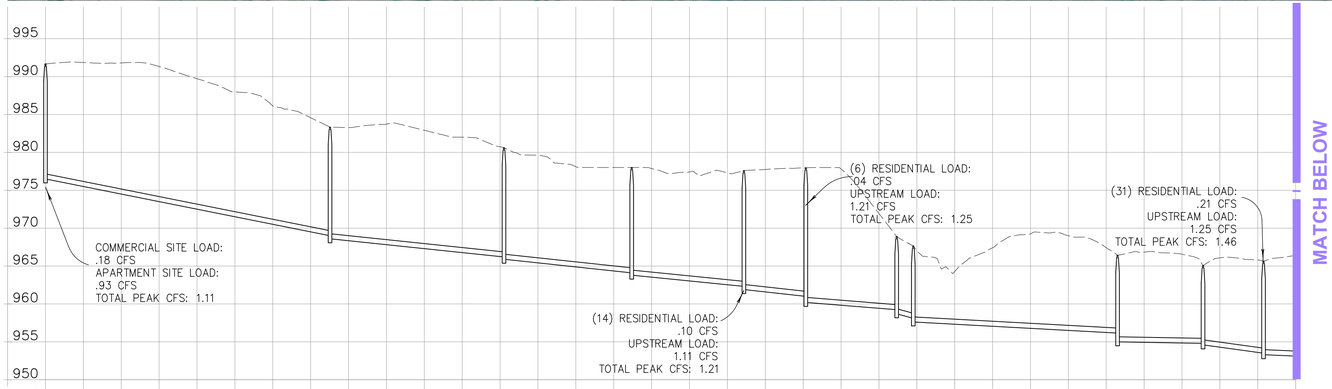
ALL CONSTRUCTION TO BE IN STRICT ACCORDANCE WITH CURRENT CITY OF LEE'S SUMMIT STANDARDS AND SPECIFICATIONS

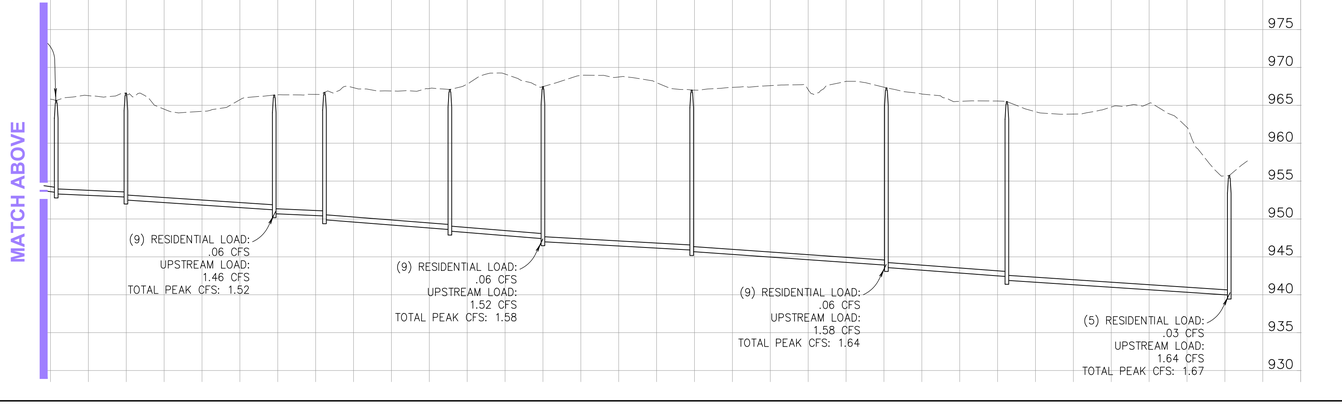
Artisan Point
Shenandoah Dr
Lee's Summit, MO

PROJECT: 17086
ISSUE DATE:
ATLAS PAGE NO: 000

PLAN SCALE: (H)
(V)

OF 00





CSR 10 CSR 20-8—DEPARTMENT OF NATURAL RESOURCES

Generally means eight (8)-hour shift employees at institutions, commercial establishments, factories and similar establishments. Total employee waste figure, if applicable, must be added to the appropriate patron or residential total from the following table:

Residential		
Single family dwellings	.17	75–100
Apartments or condominiums	.17	60–100
Rooming houses	.15	45
Boarding houses	.17	75
Mobile homes	.17	75–100

Food or Drink Establishments (wastes per patron)		
Hotels	.15	50
Motels (without restaurants)	.10	40
Luxury resorts	.17	75
Camper trailers	.08	30
Work or construction camps	.15	60
Churches (per seat)	.01	5
Stores, malls or shopping centers (per one thousand (1000) square feet of floor area)	.34	200
Stadiums, auditoriums, theaters or drive-in (per seat)	.01	5

*Note: Gallons per person per day includes normal infiltration for residential systems.

NORTH

0 50 100 150

Scale: 1"= 100'
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