

December 11, 2019

Mike Weisenborn  
Project Manager, Development Center  
City of Lee's Summit  
220 SE Green Street  
Lee's Summit, MO 64063

Re: **18-0251 Sequoia Water Demand Statement**

Mr. Weisenborn:

Per the requirements provided by the City of Lee's Summit's planning code regarding the preliminary development plan submittal for the proposed Burton Townhomes, a water use demand analysis has been conducted. The following is a report of the analysis.

### PROJECT DESCRIPTION

The proposed Burton Townhomes development is in the City of Lee's Summit, Jackson County, MO. The project is located on the southwest corner of NW Olive St and NW Orchard Dr and is 3.78 acres in size. A site location map has been provided as Exhibit A. The complex generally consists of fourteen duplex units and associated infrastructure. The entire site is located within the Cedar Creek Watershed. Refer to Exhibit B for a layout of the proposed complex.

### METHODOLOGY

Based on the provisions outlined in the Lee's Summit Design and Construction Manual (LS DCM) 6900 for Water Mains, the water demand has been estimated. Required fire flow capacity has been determined using the provisions outlined in the LS DCM 6900, the American Water Works Association (AWWA), and the International Fire Code (IFC) published in 2012.

According to the LS DCM, the water distribution system shall adequately supply "the peak hour demand and maximum day demand (estimated at 0.67 gpm/customer) ... while maintaining a pressure of not less than 40 psi at all points of delivery". In addition, the system must meet the fire flow requirements set forth by LS DCM 6901.C.2.a.

### DETERMINATION OF PEAK HOUR DEMAND

The peak hour demand has been estimated using the criteria outlined in LS DCM 6901.C. Table 1 shows values for the proposed water used demand. The calculations were completed assuming a fully developed 36-unit residential area. Calculations for the determination of peak hour demand have been provided as Exhibit C.

**Table 1: Estimated Water Use Demand Calculations**

Residential Population, N	72.28 People
Ave. Daily Water Demand of Residential Population, R	9,035 gallons/person
Average Daily Water Demand, A	9,035 gallons/day
Max. Daily Water Demand, M	18,973.5 gallons/day
Peak Hour Demand, P	26.35 gallons/min

### DETERMINATION OF FIRE FLOW REQUIREMENTS

Lee's Summit Design and Construction Manual (LS DCM) Section 6900 – WATER MAINS was used to determine fire flow requirements for the proposed site. A fire flow requirement of 1,000 gpm was assumed using LS DCM 6901.C.3.a.i for residential structures up to 3,600 ft<sup>2</sup>. Fire hydrant flow testing was completed for existing FH-30-089. A projected average hydrant flow of 1,554 gpm was calculated based on the fire flow test. Calculations for the determination of demand of average fire hydrant flows have been provided as Exhibit D.

### WATER DEMAND ANALYSIS

The water demand for the proposed development is the sum of the peak hour demand and the minimum fire flow requirement determined in the previous sections for a total flow requirement of 1,026.35 gpm.

One existing fire hydrant on the west side of NW Olive St at the intersection of NW Orchard St was tested for the expected fire flow rate. The fire hydrant has been designated FH-30-089 by the City of Lee's Summit, MO and is expected to provide an average flowrate of 1554 gpm. The average hydrant flowrate was found to exceed the total flow requirement for the proposed site.

### SUMMARY

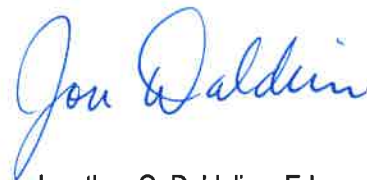
Due to the results from the fire hydrant flow tests it is our opinion that the existing water mains will provide adequate capacity for the proposed use.

If you have any questions or need additional clarification, please do not hesitate to contact us.

Sincerely,



Mick E. Slutter, P.E.  
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Jonathan G. Daldalian, E.I.  
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**RENAISSANCE INFRASTRUCTURE CONSULTING**

# **Exhibit A**

## **Project Location Map**

# Exhibit A: Burton Townhomes Project Location Map



Oct 24, 2019 11:20am  
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Exhibit A  
18-0251  
Prepared: 12/11/19



**Renaissance  
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# **Exhibit B**

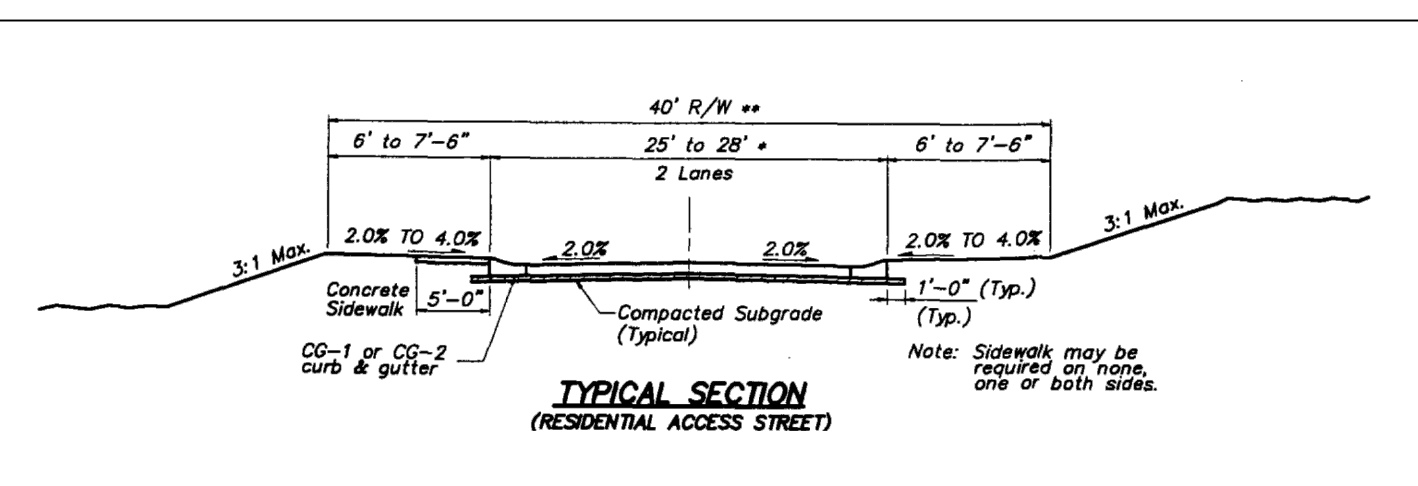
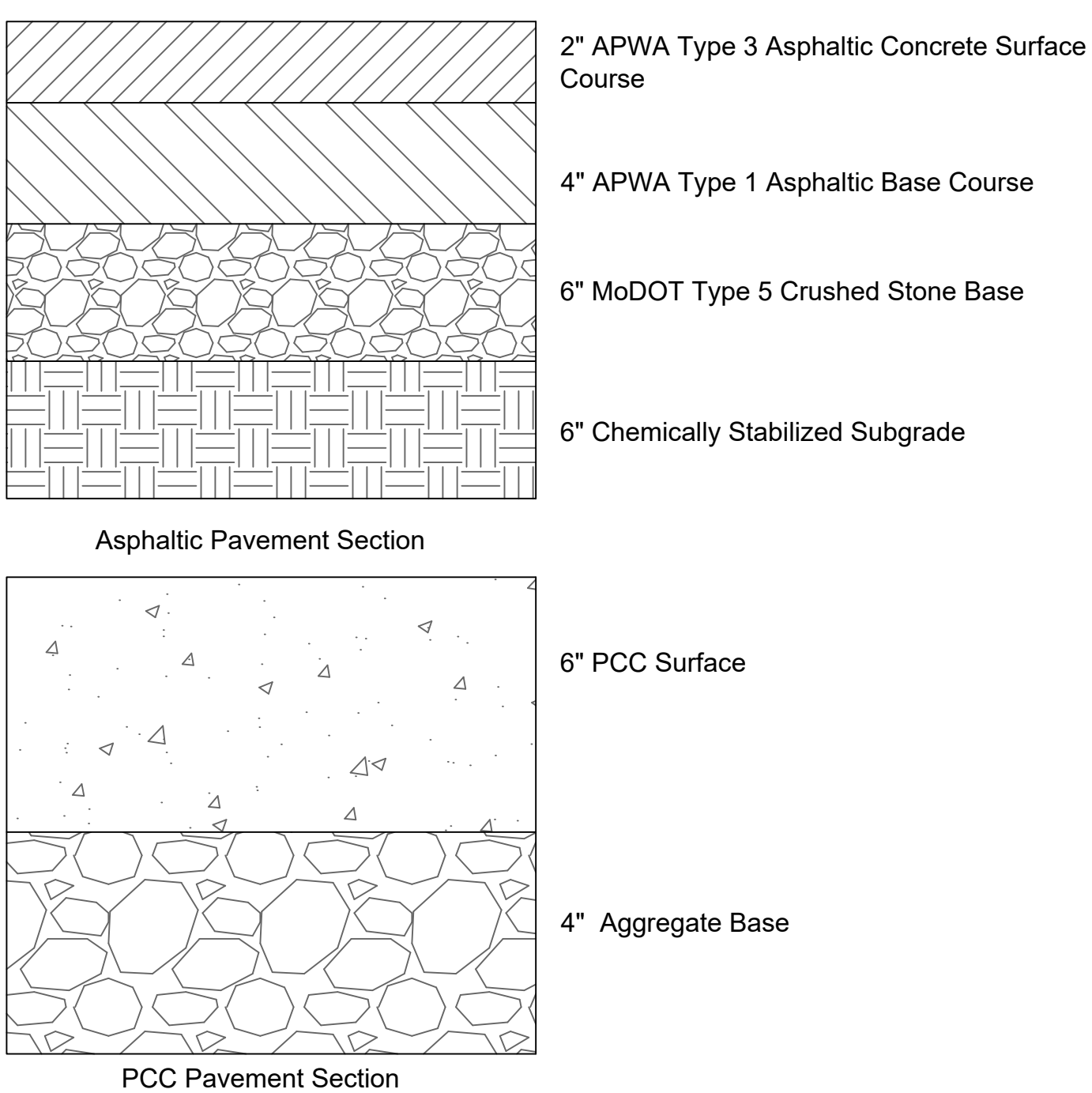
## **Project General Layout**

**Land Use Schedule**  
Total Floor Area = 23,007 SF  
Dwelling Units/AC (MAX 7.5/AC) = 7.0  
Land Area = 3.76 AC  
Parking Required: 26 (2/Unit)  
Parking Provided: 26  
Impervious Coverage = 2.43 AC  
Floor Area Ratio (FAR) = 0.14

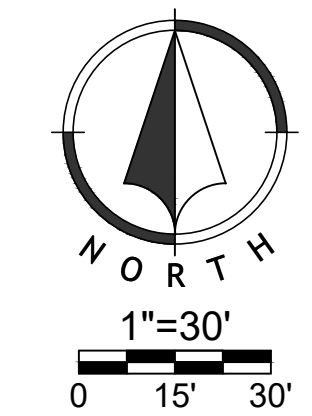
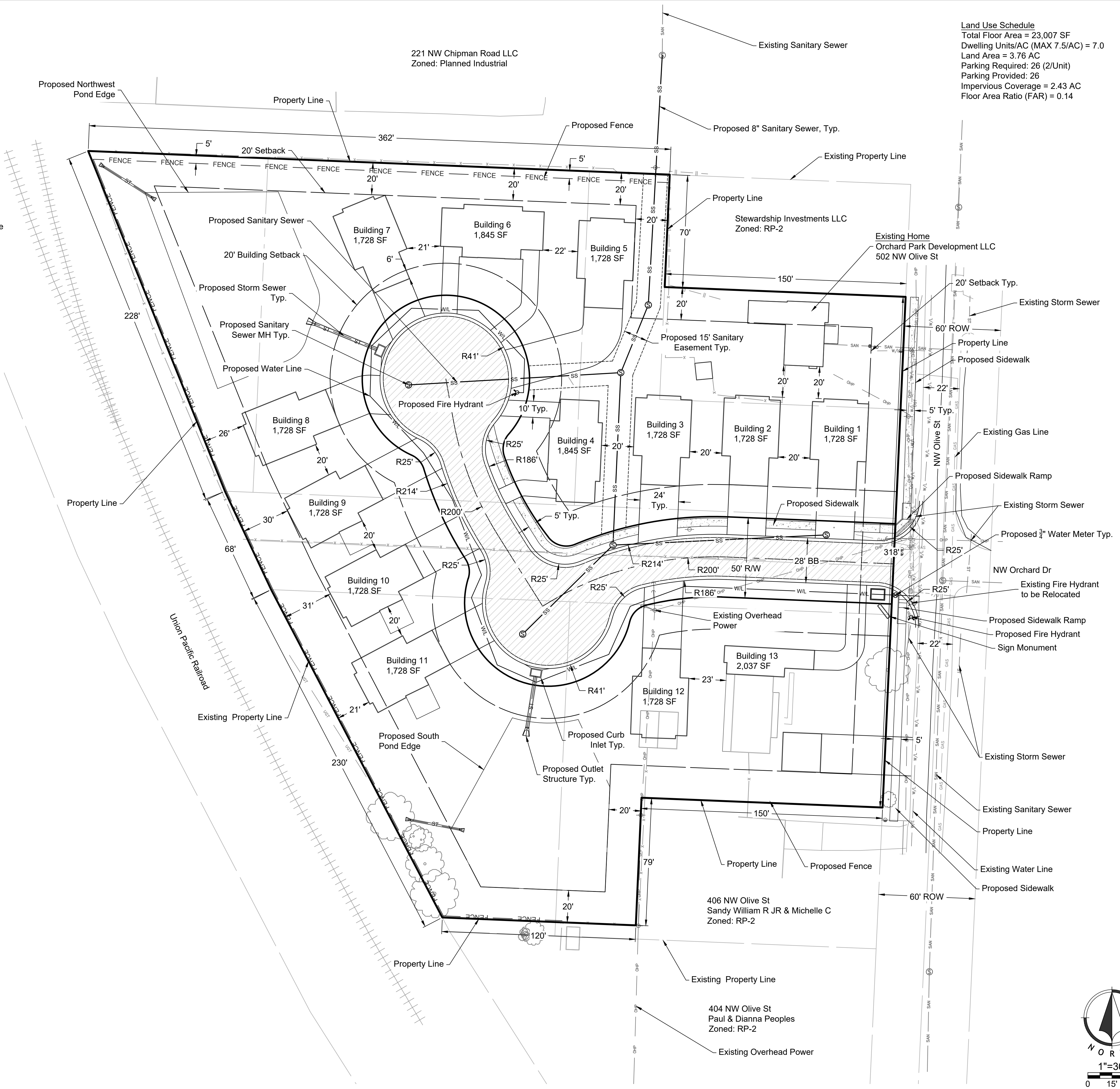
**LEGEND**

--- Existing Section Line	--- R/W --- Proposed Right-of-Way
--- Existing Right-of-Way Line	--- P/L --- Proposed Property Line
--- Existing Lot Line	--- L/L --- Proposed Lot Line
--- Existing Easement Line	--- U/E --- Proposed Easement
--- Existing Curb & Gutter	--- Proposed Curb & Gutter
--- Existing Sidewalk	--- Proposed Sidewalk
--- Existing Storm Sewer	--- Proposed Storm Sewer
□ Existing Storm Structure	□ Proposed Storm Structure
--- W/L --- Existing Waterline	--- WATER --- Proposed Waterline
--- GAS --- Existing Gas Main	--- SS --- Proposed Sanitary Sewer
--- SAN --- Existing Sanitary Sewer	○ Proposed Sanitary Manhole
⊙ Existing Sanitary Manhole	--- Proposed Contour Major
--- Existing Contour Major	--- Proposed Contour Minor
--- Existing Contour Minor	--- Future Curb & Gutter
--- Proposed Asphaltic Pavement	

**Note:**  
1) All fencing constructed adjacent to PI zoning districts shall conform to City of Lee's Summit UDO Section 8.890 minimum buffer screen requirements.



\*This width may be used only in planned development where a minimum of 4 off street parking spaces are provided for each dwelling unit.  
\*\*Must be approved by the local authority during the preliminary planned development stage under special conditions such as extremely hilly topography, preserving existing trees or other site conditions.



# **Exhibit C**

## **Water Use Demand Calculations**

Water use demand calculations were completed using the Lee's Summit Design & Construction Manual (LS DCM) 6900 – Water Mains.

From 6901.C.a

$$N (\text{Residential Population}) = \text{Number of Dwelling Units} * 2.78 \text{ people/dwelling}$$

$$N = 26 * 2.78 = 72.28$$

From 6901.C.b

$$R (\text{Ave. Daily Water Demand of Residential Population}) = N * 125 \text{ gallons/person}$$

$$R = 72.28 * 125 = 9,035 \text{ gallons/person}$$

From 6901.C.e

$$A (\text{Average Daily Water Demand, gpd}) = R + C + S$$

$$A = 9,035 + 0 + 0 = 9,035 \text{ gpd}$$

From 6901.C.f

$$M (\text{Max. Daily Water Demand, gpd}) = A * Y (Y = 2.1)$$

$$M = 9,035 * 2.1 = 18,973.5 \text{ gpd}$$

From 6901.C.g

$$P (\text{Peak Hour Demand, gpd}) = 2 * M$$

$$P = 2 * 18,973.5 = 37,947.5 \text{ gpd}$$

$$P = \frac{37,947.5 \text{ gpd}}{1440} = 26.35 \text{ gpm}$$



# **Exhibit D**

## **Existing Hydrant Flows**

**Fire Hydrant Flow Calculator – Hydrant FH 030-089**

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Static:  psi before flowing  
Residual:  psi while flowing  
Pitot:  pitot gage reading  
Diameter:  size of opening tested  
This hydrant is flowing:  GPM from the test outlet  
Projected available hydrant flow:  GPM **Note 1**  
2nd Static:  secondary psi before flowing  
2nd Residual:  secondary psi while flowing  
The main can be expected to flow about:  GPM

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**Notes:**

1. Projected available flows calculated at 20 psi residual, or ½ the static pressure for low pressure hydrants having static pressures of less than 40 psi.
2. This calculator is based on established Hazen-Williams formulas and is provided for convenience and estimation purposes only. The author and FireHydrant.org express no warranty for its suitability for any particular purpose.