

April 13, 2018

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

Re: **18-0129 Northpoint Summit Square II Apartments Water Demand Statement**

Mr. Weisenborn:

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

### **PROJECT DESCRIPTION**

An approximately 12.8-acre multi-family complex is currently being proposed at the southeast corner of NW Ward Road and NE Tudor Road in Lee's Summit, MO. A site location map has been provided as Exhibit A. The complex generally consists of five primary 4/5-story buildings, a courtyard, and associated parking facilities. The proposed complex will consist of 35 studios, 165 1-bedroom units, and 123 2-bedroom units, for a total unit count of 323. 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 in the currently adopted IFC for residential buildings greater than 3600 square feet.

### **DETERMINATION OF PEAK HOUR DEMAND**

The peak hour demand has been estimated using the criteria outlined in 6901.C of the LS DCM. Given the proposed unit count of 323, the maximum daily water demand (M) for the proposed use is 224,485 gpd, yielding a peak hour demand (P) of 448,970 gpd (or 311.78 gpm). The calculations for the determination of peak hour demand have been provided as Exhibit C.

### **DETERMINATION OF FIRE FLOW REQUIREMENTS**

From Exhibit B of the IFC, fire flow requirements for residential buildings greater than 3600 square feet are based on building types outlined in the International Building Code. The proposed buildings will be sprinklered and have been designated as Type V-A buildings. The total floor area considered in the estimation of fire flow requirements is 395,000 square feet. Based on table B105.1 in the IFC, the required fire flow in gallons per minute for 395,000 square feet of fire flow area is 8,000 gpm. According to the IFC, a reduction of 50% is allowed for approved buildings equipped with automatic sprinkler systems. Therefore, the required fire flow for the development has been estimated at 50% of 8,000 gpm or 4,000 gpm.

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## 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 4311.78 gpm.

Three fire hydrants immediately surrounding the development have recently been tested. A map of the fire hydrants giving their numeric designations has been provided by the City of Lee's Summit and is enclosed in this report as part of Exhibit D. The fire hydrants tested were 023-141 located South of NE Tudor Road, and 023-141 and 023-145 located north of Donovan Road. Based on the results from the fire flow tests, the hydrant located on NE Tudor Road (hydrant 023-141) is projected to have an available hydrant flow of 8967 gpm. The hydrants located on Donovan Road are projected to have an available hydrant flow of 5614 gpm each. The total projected available fire flow provided by the existing hydrants surrounding the site has been taken as the sum of the projected available fire flow provided by each hydrant for a total of approximately 20,195 gpm. Please refer to Exhibit D for details regarding the information obtained during the fire hydrant flow tests and the expected performance of these fire hydrants based on the test results.

## SUMMARY

Due to the results from the fire hydrant flow tests and the proximity of the City's water tanks and pumping facility, 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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Kelsey L. Fitzpatrick, E.I.  
[kfitzpatrick@ric-consult.com](mailto:kfitzpatrick@ric-consult.com)

**RENAISSANCE INFRASTRUCTURE CONSULTING**

# **Exhibit A**

## **Site Location Map**



# **Exhibit B**

## **Proposed General Layout**

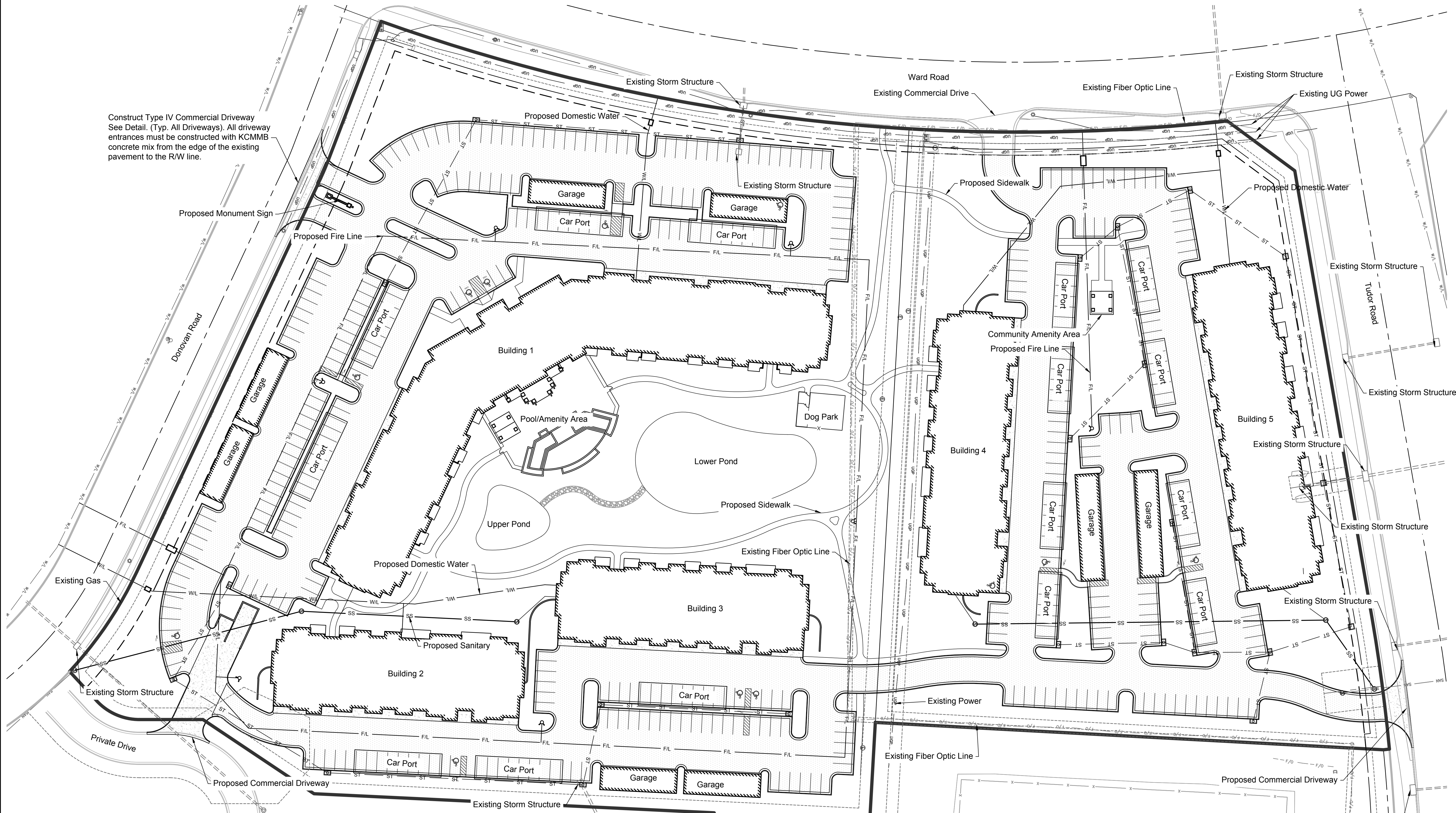
| NO. | BY       | DATE     | REVISION           |
|-----|----------|----------|--------------------|
| 1   | APT. MES | 04/13/18 | ORIGINAL SUBMITTAL |

**Renaissance Infrastructure Consulting**

132 ABBIE AVENUE  
KANSAS CITY, KANSAS 66103

913.317.9500  
WWW.RIC-CONSULT.COM

MISSOURI CERTIFICATE OF AUTHORITY NO. 200035630



Construct Type IV Commercial Driveway See Detail. (Typ. All Driveways). All driveway entrances must be constructed with KCMMB concrete mix from the edge of the existing pavement to the R/W line.

FOR NON-PUBLIC WORK

- Screened items indicate a pre-construction topographic survey
- Contraction joints shall conform to APWA Section 2200.
- All concrete to be 4000 psi with 5% (+/- 1%) air entrainment. Cement mixtures with water/cement ratios at 0.5 or below are recommended
- Construction of reinforced concrete pavements shall be in accordance with ACI 330 standard specifications.
- Curing compound to be applied to all concrete surfaces immediately after broom finish.
- Contractor shall reject concrete if it cannot be placed within 90 minutes of batch time expiration time shall be reduced to 60 minutes on high summer temperatures.

PAVEMENT MARKING AND SIGNAGE NOTES

- Parking stall marking stripes shall be four inch (4") wide white stripes. Handicap stall marking shall be furnished at locations shown on plans.
- Traffic control devices and pavement markings shall conform to the requirements of the "Manual of Uniform Traffic Control Devices." and to the City of Lee's Summit.
- Traffic control and pavement markings shall be painted with a white Sherwin Williams S-W traffic marking series b-29/2 or approved equal. The pavement marking shall be applied in accordance with manufacturers recommendations. Apply on a clean, dry surface and at a surface temperature of not less than 70°F and the ambient air temperature shall not be less than 60°F and rising. Two coats shall be applied.
- All pavement markings for handicap stalls and aisles shall be blue.

LAYOUT & PAVING NOTES

- All construction shall conform to the City of Lee's Summit's minimum design standards.
- The contractor shall check existing grades, dimensions, and inverts in the field and report any discrepancies to the architect/engineer prior to beginning work.
- The contractor shall verify the exact location of all existing utilities, take care to protect utilities that are to remain, and repair contractor caused damage according to current local standards and at the contractor's expense. coordinate all construction with the appropriate utility company.
- The contractor shall comply with all local codes, obtain all permits, and pay all fees prior to beginning work.
- Prior to installing, constructing, or performing any work in the public right of way or on the public storm sewer line (including concrete pavement or connecting private drainage systems to the storm sewer), contact City of Lee's Summit public works at 816.969.1800 for inspection of the work. Contact must be made at least 24 hours prior to start of the work.
- Provide a smooth transition between existing pavement and new pavement. Field adjustment of final grades may be necessary. Adjust all utilities prior to installation of pavement.
- The contractor shall protect all trees to remain, in accordance with the specifications. Do not operate or store heavy equipment, nor handle, nor store materials within the driplines of trees or outside the limit of grading.
- Concrete walks and pads shall have a broom finish. All concrete shall be 4,000 p.s.i. unless otherwise noted. Curb ramps, sidewalk slopes, and driveway ramps shall be constructed in accordance with all current local requirements. If applicable, the contractor shall request inspection of sidewalk and ramp forms prior to placement of concrete.
- All damage to existing asphalt pavement to remain which results from new construction shall be replaced with like materials at contractor's expense.
- Dimensions are to the back of curb, or edge of concrete, unless otherwise noted.
- Excess material shall be disposed of by the contractor off the owner's property at no additional cost in a legal manner.
- Maintain one set of as-built drawings on the job site for distribution to the engineer upon completion.
- Concrete curb at all concrete paving and both side of drive-in ramps shall be integral.
- Contractor shall be responsible for mud and debris on public ROW which shall be removed in a timely manner daily.

SITE DATA TABLE

PROPERTY INFO:  
Existing Zoning:  
Total Land Area:  
Proposed Street Right-of-Way:  
Net Land Area:  
Proposed Use:

PMIX  
12.779 Acres, 556,641 sqft  
0.00 Acres  
12.779 Acres, 556,641 sqft  
Multifamily Residential

BUILDING INFO:  
Building 1:  
Buildings 2 & 3:  
Building 4:  
Building 5:

Type A - N (4/4 - 104 Units)  
Type D (4/5 - (2) 51 Units)  
Type C (4/5 - 59 Units)  
Type B (4/5 - 58 Units)

PARKING INFO:

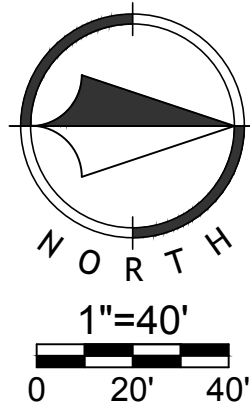
Studio Apartment = 35 Units  
1 Bedroom Apartment = 198 Units  
2 Bedroom Apartment = 123 Units  
Total 1-2 Bedroom Apartments = 356 Units  
1.5 Stalls / 1-2 BR Unit = 418 Spaces  
0.5 Stalls / Unit (Visitor) = 178 Spaces  
Total Parking Required = 596 Spaces  
Surface Stalls Provided = 317 Spaces  
Carport Stalls Provided = 95 Spaces  
Detached Garage Stalls Provided = 52 Spaces  
Attached Garage Stalls Provided = 93 Spaces

Total Parking Provided = 557 Spaces  
ADA Parking Required = 11 Spaces  
ADA Parking Provided = 11 Spaces

See NSPJ Letter dated 04/13/18 to Mike Weisenborn.

Total Floor Area = 1,816 SF  
Total Impervious Area = 3.142 Acres

Floor Area Ratio (FAR) = 0.142  
Dwellings (Units) Per Acre = 27.86



# **Exhibit C**

## **Estimated Water Demand Calculations**

$$N \text{ (Residential Population)} = \text{Number of Dwelling Units} * 2.78^{\text{people}} / \text{dwelling unit}$$
$$N = 323 * 2.78 = 897.94 \text{ people}$$

$$R \text{ (Avg. Daily Water Demand of Residential Population)} = N * 125 \text{ gallons/person}$$
$$R = 897.94 * 125 = 112,242.50 \text{ gpd}$$

$$A \text{ (Average Daily Water Demand)} = R + C + S$$
$$A = 112,242.50 + 0 + 0 = 112,242.50 \text{ gpd}$$

$$M \text{ (Maximum Daily Water Demand)} = A * Y \text{ (Maximum Day to Average Day Ratio)}$$
$$M = 112,242.50 * 2.1 = 224,485 \text{ gpd}$$

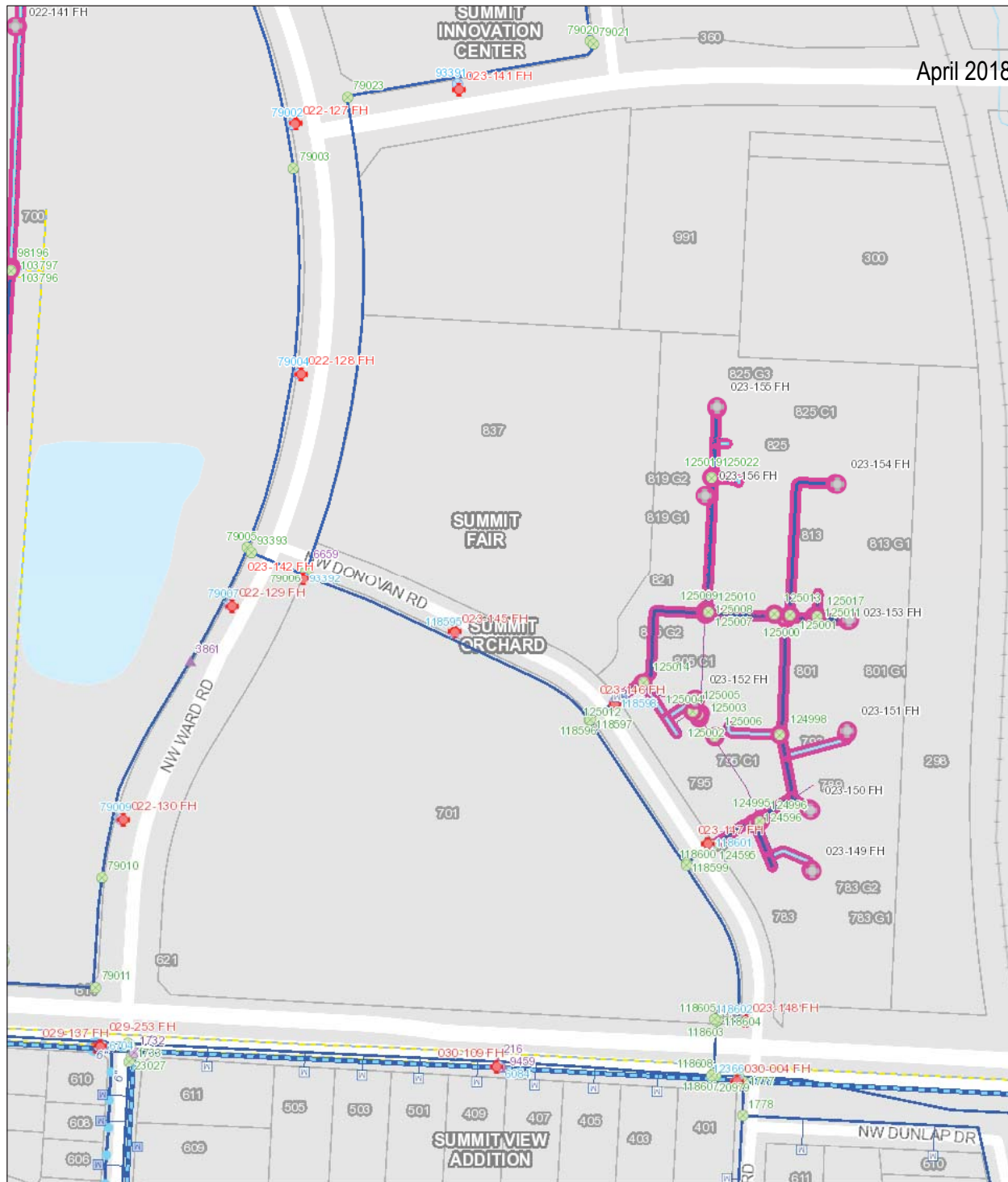
$$P \text{ (Peak Hour Demand)} = 2 * M$$
$$P = 2 * 224,485 = 448,970 \text{ gpd}$$
$$P \text{ (gpm)} = \frac{448970}{1440} = 311.78 \text{ gpm}$$

## **Exhibit D**

# **Existing Fire Hydrant Flow Test**

# Infrastructure Map

April 2018



4/11/2018 8:39:44 AM

Pump Stations Active LS  
 Enclosed Storage Facility Active LS

## Meters Active LS

CORRECTED  
 ESTIMATED  
 GEOCODED

Fire Hydrants Active LS

## Valves Buried or Can Not Locate Active LS

Buried  
 Cannot Locate

## Isolation Valves Active LS

Isolation Valve

## Facility Valves Active LS

Facility Valve

## Valves Active LS

Flush Box Hydrant  
 Inline Valve

## Blow Off Valves Active LS

Blow Off Valve

## Valves Buried or CNL Active LS

Buried  
 Cannot Locate

## Air Reliefs Active LS

Active  
 Buried  
 Can Not Locate

## Service Lines Active LS

## Water Mains Active LS

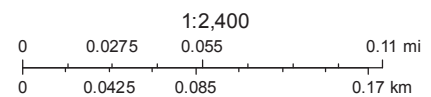
Transmission Main  
 Major Distribution Main  
 Minor Distribution Main  
 Fire Line  
 Pump Stations Active Other  
 Enclosed Storage Facility Active Other

## Fire Hydrants Active Other

Blow Off Valve  
 Facility Valve  
 Flush Box Hydrant  
 Inline Valve  
 Isolation Valve  
 Air Reliefs Active Other  
 Service Lines Active Other

## Water Mains Active Other

Transmission Main  
 Major Distribution Main  
 Minor Distribution Main  
 Fire Line  
 Water Mains Abandoned/Removed



**EXISTING FIRE HYDRANT FLOW TEST RESULTS:**

**Fire Hydrant 023-141**

|                                |      |
|--------------------------------|------|
| <b>Pressure Static (PSI)</b>   | 82   |
| <b>Pressure Residual (PSI)</b> | 80   |
| <b>Pressure Pitot (PSI)</b>    | 70   |
| <b>Coefficient</b>             | 0.9  |
| <b>GPM</b>                     | 1404 |
| <b>Test Time (min.)</b>        | 5    |
| <b>Nozzle Size</b>             | 2.5  |

**Fire Hydrants 023-142 & 023-145**

|                                |      |
|--------------------------------|------|
| <b>Pressure Static (PSI)</b>   | 82   |
| <b>Pressure Residual (PSI)</b> | 78   |
| <b>Pressure Pitot (PSI)</b>    | 58   |
| <b>Coefficient</b>             | 0.9  |
| <b>GPM</b>                     | 1278 |
| <b>Test Time (min.)</b>        | 5    |
| <b>Nozzle Size</b>             | 2.5  |

Fire Hydrant Flow Calculator - Hydrant 023-141

Static: 82 psi before flowing  
Residual: 80 psi while flowing  
Pitot: 70 pitot gage reading  
Diameter: 2.5 size of opening tested  
This hydrant is flowing: 1404 GPM from the test outlet  
Projected available hydrant flow: 8967 GPM <sup>Note 1</sup>  
2nd Static: 0 secondary psi before flowing  
2nd Residual: 0 secondary psi while flowing  
The main can be expected to flow about: NaN 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.
3. Fire flows have been calculated using FireHydrant.org flow calculator.

Fire Hydrant Flow Calculator - Hydrants 023-142 and 023-145

Static: 82 psi before flowing  
Residual: 78 psi while flowing  
Pitot: 58 pitot gage reading  
Diameter: 2.5 size of opening tested  
This hydrant is flowing: 1278 GPM from the test outlet  
Projected available hydrant flow: 5614 GPM <sup>Note 1</sup>  
2nd Static: 0 secondary psi before flowing  
2nd Residual: 0 secondary psi while flowing  
The main can be expected to flow about: NaN 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.
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