APPENDIX J

Water Study

SUD-B Northeast Quadrant Specific Plan Potable Water Distribution Modeling Report

DRAFT REPORT

December 5, 2016

FRAYJI DESIGN GROUP

SUD-B Northeast Quadrant Specific Plan Potable Water Distribution Modeling Report

DRAFT REPORT

for

Peery-Arrillaga and Chris Property Development

Prepared by

Frayji Design Group, Inc.

December 5, 2016

City of Lincoln, California

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1. Introduction

This report represents model results for the treated water pipe distribution system in the Special Use District B Northeastern Quadrant (SUD-B NEQ) Specific Plan Area located west of the present City of Lincoln. SUD-B is planned within the 2008 adopted City of Lincoln General Plan. According to the Water System Constraints Analysis, March 2006 report prepared by Frank Bradham for the City of Lincoln's General Plan Update, the entire SUD-B area was assigned an annual water demand of 1,707 acre-feet per year, which is an average daily demand of 1.5 million gallons per day (mgd), and a maximum day demand of 3.8 mgd. SUD-B consists of 1620 acres, of which the NEQ is approximately 186 acres excluding existing frontage roads right-of-way that will be annexed as part of the SUD-B NEQ Specific Plan.

The SUD-B NEQ Specific Plan is within the City of Lincoln's General Plan boundary with the exception of a one acre parcel, Assessor's Parcel Number: 009-031-028, which is within the city limits. As shown on Exhibit 1, this Specific Plan boundary contains four parcels consisting of two property owners. Also, City of Lincoln right-of-way exists within this Specific Plan boundary which fronts the site on Nelson Lane and Nicolaus Road.

The 2050 General Plan is designed to respond to the anticipated demand for housing and services within the City of Lincoln's Sphere of Influence over the next 40 years. This Specific Plan ensures that adequate backbone infrastructure, public facilities and essential services needed to support the proposed development will be available and in place to serve project residents.

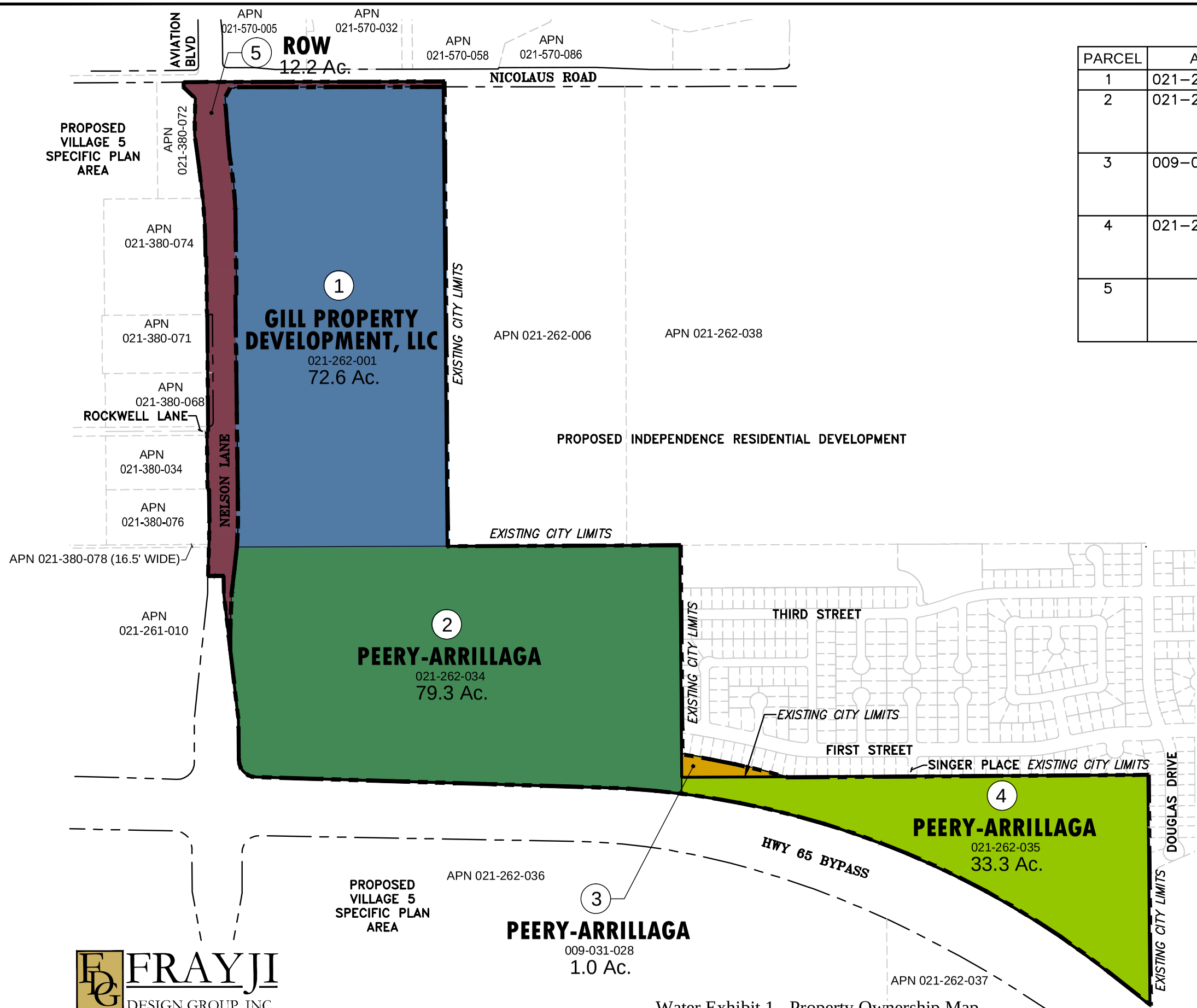
SUD-B NEQ Specific Plan will allow for commercial and residential neighborhoods that are anticipated to be single family homes and will include parks, open space and public streets. Residential densities will be compliant with airport compatibility zones of the Placer County Airport Land Use Compatibility Plan. The project will be oriented around the Markham Ravine open space preserve, a major amenity that traverses the site from east to west. The land uses and street system shown in the proposed Land Use and Circulation plan are similar to the City of Lincoln's General Plan. The Specific Plan Land Use Plan is provided as Exhibit 2 and summarized in Table 1.

While it is possible that SUD-B NEQ will be constructed in several phases, this report analyses the water system for the entire SUD-B NEQ project as a full build-out.

TABLE 1- SUD-B NEQ SPECIFIC PLAN - PROPOSED LAND USE

Land Use Designation	Allowed Density	Estimated Dwelling Units (du)	Acres
Residential			
Low Density Residential (LDR)	3-5.9 DU /acre	430	84.8
Residential Subtotal		**430**	**84.8**
Commercial			
Commercial (C)			69.7
Commercial Subtotal			**69.7**
Parks / Open Space			
Park (P)			4.0
Open Space/Corridors (OS)			22.6
Parks /Open Space/Landscape Subtotal			**26.6**
Major Roadways			
Proposed Right-of-Way			5.0
Existing Right-of-Way			12.3
Right-of-Way Subtotal			**17.3**
	Total	**430**	**198.4**

Individual land use acres do not add up to Total Acreage due to rounding.
All acreages shown are approximate and subject to change.
Water Supply Assessment report by others.



PARCEL	APN	OWNER	ACRES
1	021–262–001	Gill Property Development, LLC	72.6
2	021–262–034	John Arrillaga Survivor's Trust & Richard T. Peery Separate Property Trust (Peery–Arrillaga)	79.3
3	009–031–028	John Arrillaga Survivor's Trust & Richard T. Peery Separate Property Trust (Peery–Arrillaga)	1.0
4	021–262–035	John Arrillaga Survivor's Trust & Richard T. Peery Separate Property Trust (Peery–Arrillaga)	33.3
5		Existing Placer County Right of Way & City of Lincoln Right of Way	12.2
		TOTAL:	198.4

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Water Exhibit 1 - Property Ownership Map

SUD-B Northeast Quandrant Specific Plan

City of Lincoln, California December 5, 2016

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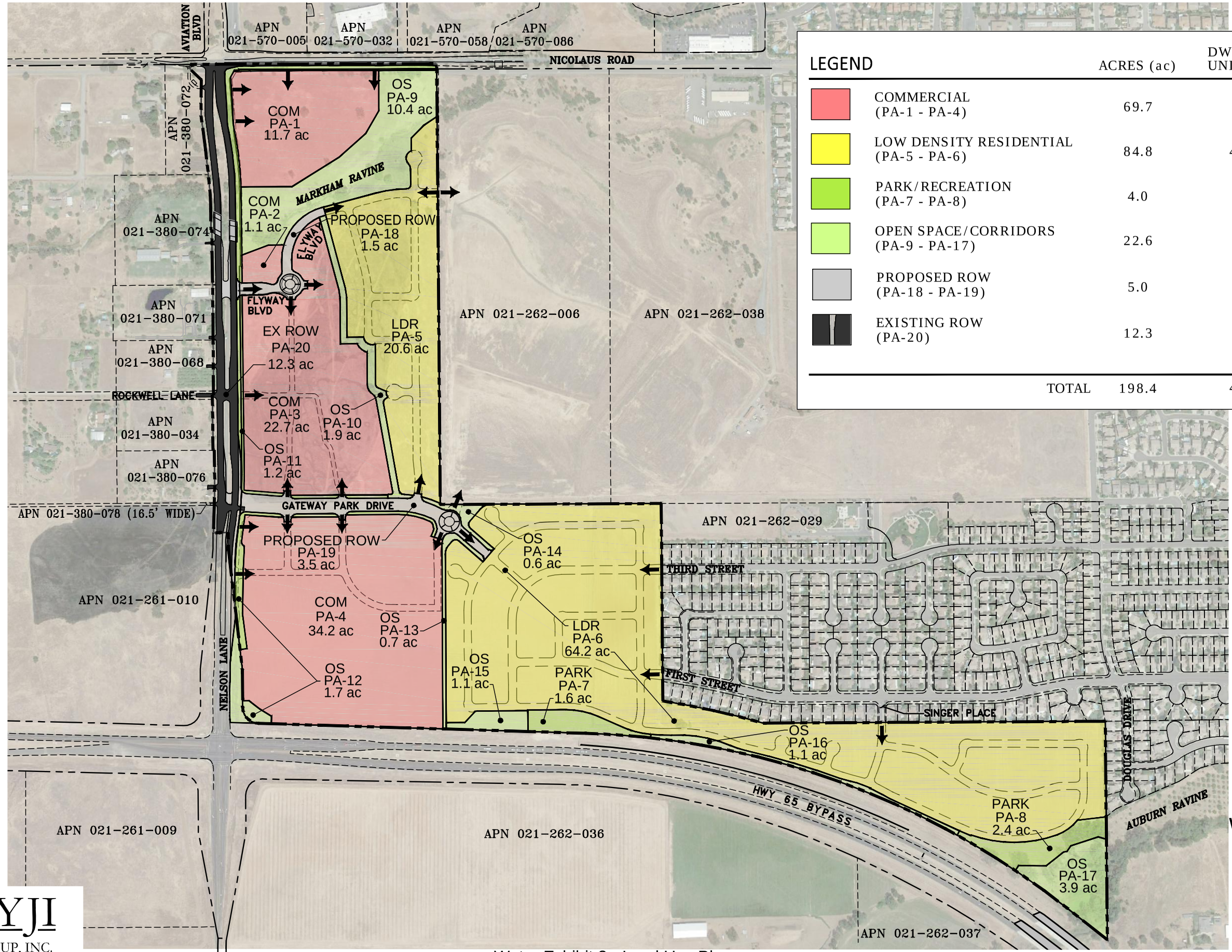

LEGEND	ACRES (ac)	DWELLING UNITS
COMMERCIAL (PA-1 - PA-4)	69.7	-
LOW DENSITY RESIDENTIAL (PA-5 - PA-6)	84.8	430
PARK/RECREATION (PA-7 - PA-8)	4.0	-
OPEN SPACE/CORRIDORS (PA-9 - PA-17)	22.6	-
PROPOSED ROW (PA-18 - PA-19)	5.0	-
EXISTING ROW (PA-20)	12.3	-
TOTAL	198.4	430

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Water Exhibit 2 - Land Use Plan

SUD-B Northeast Quandrant Specific Plan

City of Lincoln, California December 5, 2016

2. Model Assumptions and Design Constraints

The distribution system in this report was modeled using Bentley Water-CAD V8 XM Edition, a Haestad Methods Solution Center software. The model was based on the complete buildout of the SUD-B NEQ Specific Plan Land Uses.

This model was prepared for the purpose of sizing pipes within the Specific Plan Area and establishing the required zone to meet water supply criteria set by the City of Lincoln. The model was run under steady-state condition.

Due to a limited availability of information regarding water deliveries in the area, fire flow tests were used to establish available flows and pressures. Fire flow tests were conducted by the City of Lincoln Department of Public Services in December 2014 at hydrants located at First Street and Jansen Court, the west end of Third Street, and at Nicolaus Road and Aviation Blvd, the results of the hydrant tests are included in the appendices. Connections to all three hydrants were added to this model with the provided hydrant flow test results converted to pump sources at the hydrant locations. Due to redundancy with the proximity of the First and Third Street hydrants, the Third Street hydrant was omitted as a pump source with this model.

Using the results of these fire flow tests, a pump curve was developed for each location in order to represent the flows and pressures at those locations, using the procedures described in *Advanced Water Distribution Modeling and Management*, Section 5. The 3-point pump curve was created as follows for the two pump locations used:

1. The Shutoff point was set to be the Static Pressure and zero flow. The Static Pressure is multiplied by 2.31 psi/ft to convert it from psi to feet.
2. The Maximum Operating point is set to be the Residual Pressure/flow in the hydrant. The Residual pressure is also converted to feet.
3. The middle ordinate of the curve, the Design Point, is calculated using the following equation:

$$Q_0 = Q_t \left(\frac{(P_s - P_0)}{(P_s - P_t)}\right)^{0.54}$$

Q_0 = Flow available at the chosen pressure (gpm)
Q_t = Residual flow during hydrant test (gpm)
P_s = Static pressure during hydrant test (psi)
P_0 = Chosen pressure, at which Q_0 is to be calculated (psi)
P_t = Residual pressure during hydrant test (psi)

TABLE 2 - THREE POINT PUMP CURVES

Fire Hydrant		Flow (gpm)	Head (ft)
Nicolaus and Aviation			
	Shutoff	0	265.7
	Design	920	259.9
	Max Operating	1338	254.1
West End of Third Street			
	Shutoff	0	258.7
	Design	908	250.6
	Max Operating	1320	242.6

A pump connected to an unlimited reservoir was used to represent the actual Lincoln water system. Pipes connecting the pump and reservoir were sized and assigned a low roughness coefficient so as to minimize head loss. Exhibit 3 shows the locations of the fire hydrants.

3. Pipe Sizing Criteria

The water distribution model was ran to confirm pipe sizing for the SUD-B NEQ Specific Plan Area. The model is based on the treated water pipe distribution layout prepared by Frayji Design Group, Inc. Node elevations are based on projected grades to aid in preparation of the report. Hazen-Williams roughness values were based on the City of Lincoln's Design Criteria and Procedures Manual, Section 8, Domestic Water Supply System. A roughness coefficient of 130 was used for this model and pipe node elevations are assumed at approximately 3 feet deep

Based on the Water-CAD model results, pipe sizes and network layout meets the minimum system design criteria as presented in the “allowable pressure” and “velocity” section set by the City of Lincoln and shown in Table 5, Section 7.

4. Water System Distribution Improvements

The SUD-B NEQ water distribution system will be constructed in phases to accommodate water demand for the area as it builds out. The existing water system connects to downtown Lincoln to east of the Plan Area, eventually connecting to the City's Reservoir 1, Refinery Point storage tank. The tank max HGL is 396 feet, according to the Water System Constraints Analysis, March 2006 report prepared by Frank Bradham for the City of Lincoln's General Plan Update.

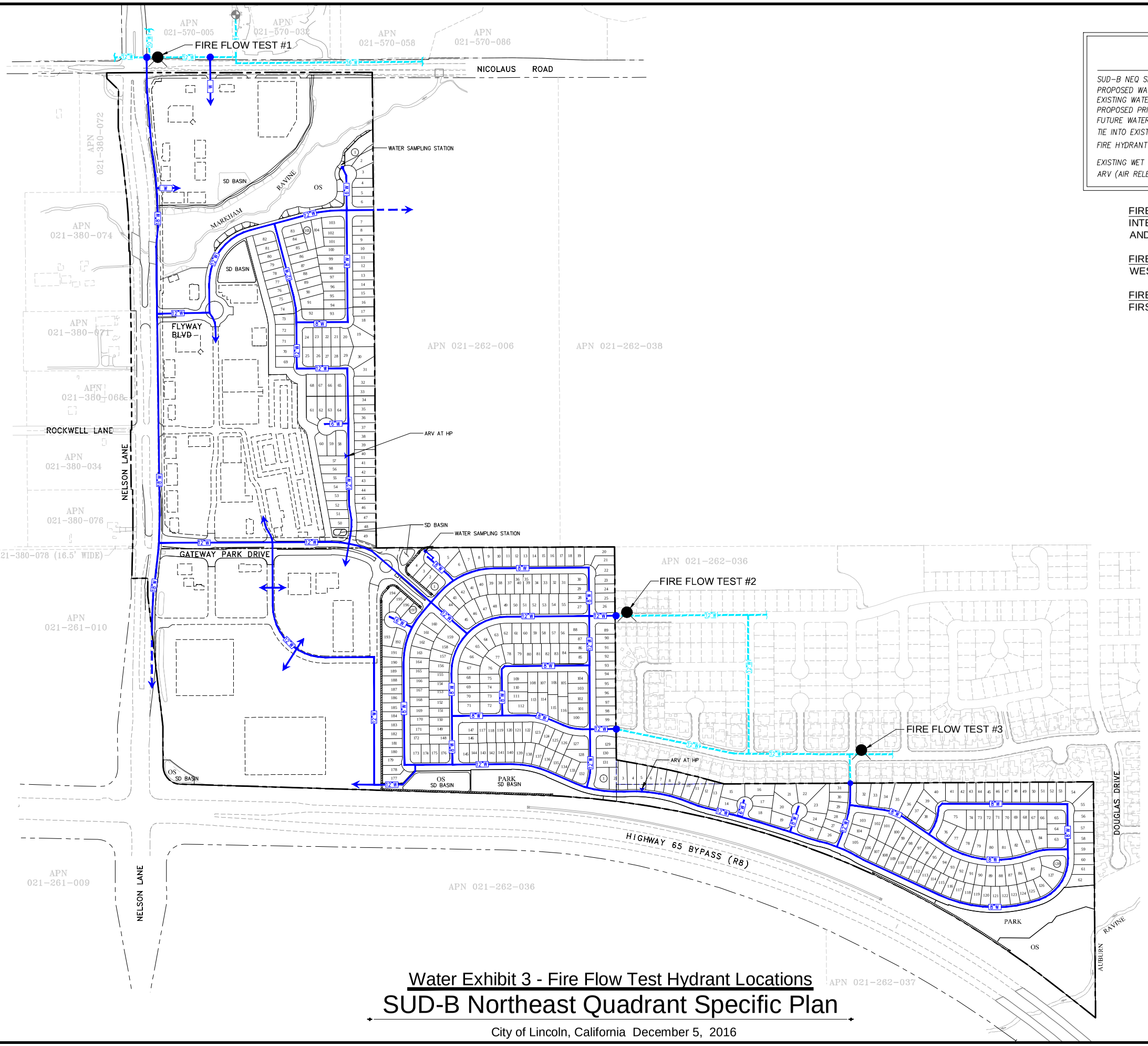
The project's water system will tie into existing waterlines in five locations as shown on Exhibit 4 and as listed at the end of this section. There will be three connections into 12" waterlines in the residential neighborhood at the ends of First Street, Third Street and Singer Place with 12" waterlines serving the eastern portion of this Specific Plan area. At the northern end of this Specific Plan area, there will be two connections into the existing 12" waterline in Nicolaus Road. One connection will be a waterline that will serve the planned commercial area in the north area of the Specific Plan. Just east of the commercial connection point, the existing 12" waterline connects to a 16" trunk line heading east in Nicolaus Road. The other connection is at the Nicolaus Road / Nelson Lane intersection with an 18" trunk line which extends south along Nelson Lane to this Specific Plan area's southern boundary conterminous with the State Highway 65 Bypass boundary.

The 18" trunk line in Nelson Lane is a portion of the Preliminary Master Water Plan of the City General Plan and this line south of this Specific Plan area is planned be constructed in the future by others. Additionally, reclaimed water is expected to be available within this Specific Plan area with this line to be constructed by others at a future date. At that time, the water supply for the irrigation within this Specific Plan area could be changed from the potable water supply (utilized at time of installation) to a reclaimed water system when available, if desired, by the commercial development owners. At the time of initial irrigation installation, the systems could be designed in compliance with the City's reclaimed water standards to allow a simple transition if the water source for the irrigation is desired to be changed from potable to reclaimed in the future.

As the Specific Plan area develops, domestic water distribution lines will be constructed to serve commercial and residential areas internally with pipe sizes ranging from 6" to 12".

The list below itemizes this Specific Plan's water system distribution improvements.

- Connect to existing 12" water main on Nicolaus Road.
- Construct 18" water main on Nelson Lane from the Nicolaus Road / Nelson Lane intersection to approximately 600 feet south of the southerly road.
- Connect to existing 12" water main at the Nicolaus Road / Nelson Lane intersection.
- Connect to existing 12" water main on Third Street.
- Connect to existing 12" water main on First Street.
- Connect to existing 12" water main on Singer Place.
- Construct 6", 8" and 12" water main as necessary to meet anticipated water demand.
- Construct landscape irrigation compatible with the option to convert from the potable water supply to the reclaimed water system after the reclaimed waterline is constructed and available.



LEGEND

- SUD-B NEQ SPECIFIC PLAN BOUNDARY
- PROPOSED WATER PIPE
- EXISTING WATER PIPE
- PROPOSED PRIVATE WATER STUB
- FUTURE WATER PIPE BY OTHERS
- TIE INTO EXISTING WATER PIPE
- FIRE HYDRANT FLOW TEST LOCATION
- EXISTING WET WELL SITE
- ARV (AIR RELEASE VALVE)

FIRE FLOW TEST #1:
INTERSECTION OF NICOLAUS ROAD
AND AVIATION BLVD.

FIRE FLOW TEST #2:
WEST END OF 3RD STREET.

FIRE FLOW TEST #3:
FIRST STREET EAST OF SINGER PLACE.

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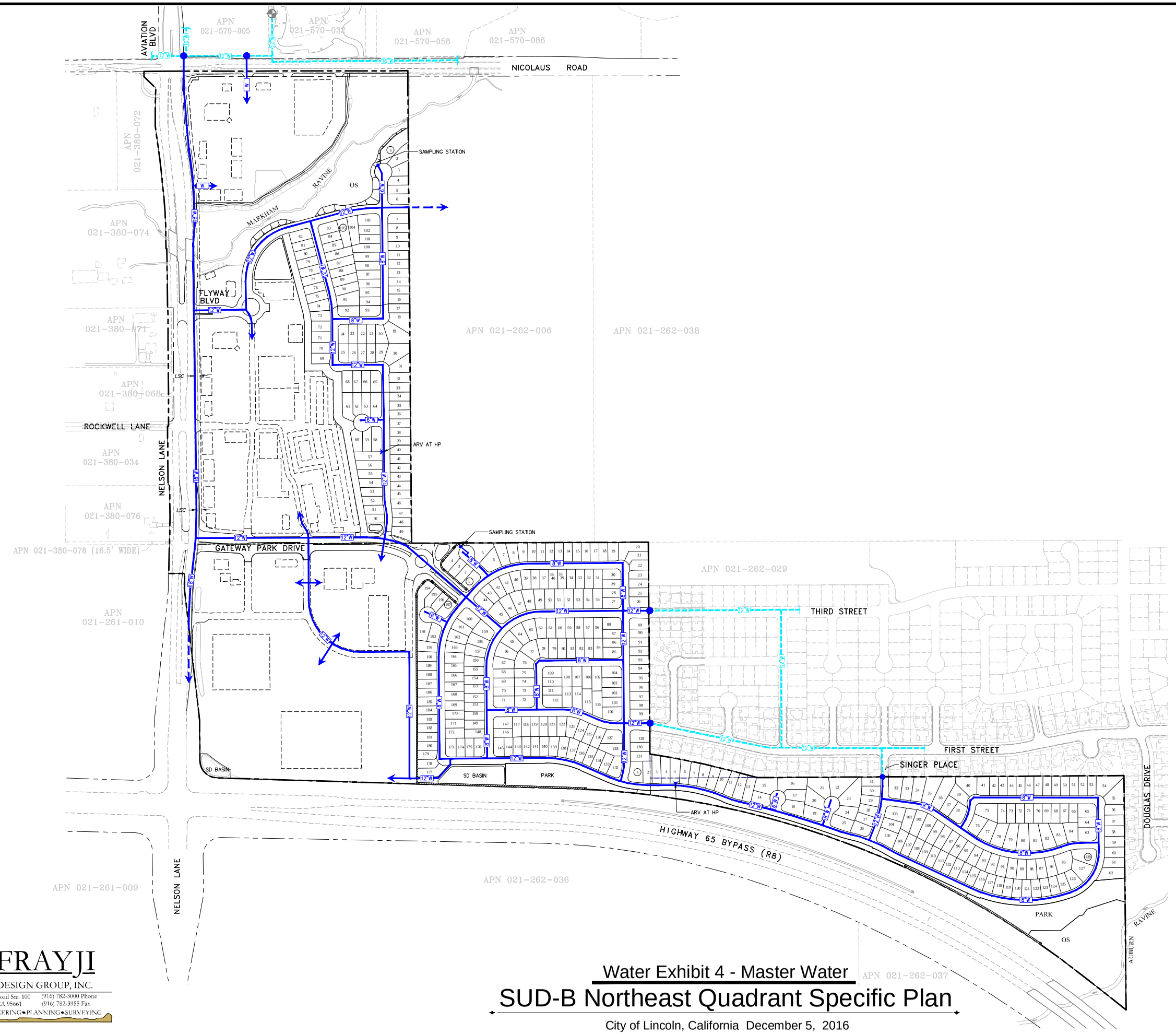
Water Exhibit 3 - Fire Flow Test Hydrant Locations

SUD-B Northeast Quadrant Specific Plan

City of Lincoln, California December 5, 2016



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Water Exhibit 4 - Master Water

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5. Demands

The water distribution model was used to evaluate Average Daily Demand, Maximum Day Demand, Peak Hourly Demand, and Maximum Day Demand with Fire Flow. Demands were assigned to individual areas in SUD-B NEQ based on proposed land uses and layout. Several water studies completed in the City of Lincoln were compared and the peaking factors used in those studies were also used in these calculations. The demand rates for each land use category are summarized in Table 3 and were used to calculate the demand at each node.

TABLE 3 - DEMAND RATES

Land Use Category	Average Day Demand	Max. Day Demand Peaking Factor * (2.5)	Peak Hourly Demand Factor ** (1.6)
VLDR	460 gpd/unit	1,150 gpd/unit	1,840 gpd/unit
VLDR	0.32 gpm/unit	0.80 gpm/unit	1.28 gpm/unit
Commercial	2,500 gpd/acre	6,250 gpd/acre	10,000 gpd/acre
Commercial	1.74 gpm/acre	4.34 gpm/acre	6.94 gpm/acre
Park	5,200 gpd/acre	13,000 gpd/acre	20,800 gpd/acre
Park	3.61 gpm/acre	9.03 gpm/acre	14.44 gpm/acre

Water calculations are performed using gpm.
**Max. Day Demand = Average Day Demand × Max. Day Demand Peaking Factor*
***Peak Hourly Demand = Max. Day Demand × Peak Hourly Demand Peaking Factor*

Based on the distributed demands, demand nodes were established to represent the combined land use areas, and are shown in Table 4 and illustrated in Exhibit 5.

TABLE 4 - DEMAND NODES

Average Daily Demand

	LDR AC	LDR units	LDR gpm	COMM AC	COMM gpm	Park AC	Park gpm	Total gpm
Com-NorthA				6.0	10.4			10.4
Com-NorthB				6.0	10.4			10.4
Res-North	20.6	105	33.5					33.5
Com-MidA				11.8	21.7			21.7
Com-MidB				11.7	21.5			21.5
Com-South				34.2	61.8			61.8
Res-Mid	40.6	197	62.9			0.8	2.9	65.8
Res-South	23.6	128	39.3			1.8	6.5	45.8
Total	84.8	430	135.7	69.7	125.8	2.6	9.4	270.9

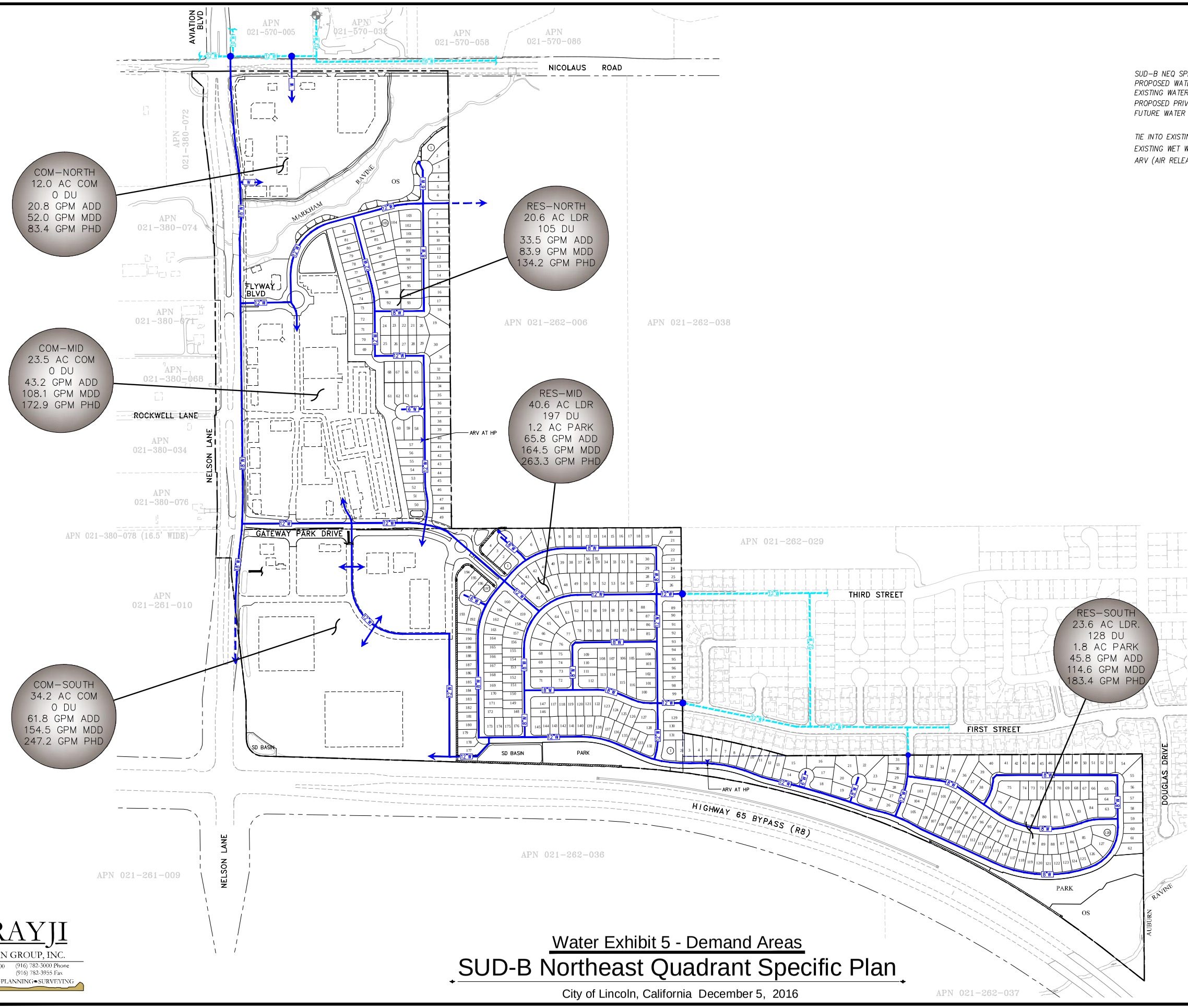
Max Day Demand

	LDR AC	LDR units	LDR gpm	COMM AC	COMM gpm	Park AC	Park gpm	Total gpm
Com-NorthA				6.0	26.0			26.0
Com-NorthB				6.0	26.0			26.0
Res-North	20.6	105	83.8					83.8
Com-MidA				11.8	54.3			54.3
Com-MidB				11.7	53.8			53.8
Com-South				34.2	154.5			154.5
Res-Mid	40.6	197	157.3			0.8	7.3	164.6
Res-South	23.6	128	98.3			1.8	16.3	114.6
Total	84.8	430	339.4	69.7	314.6	2.6	23.6	677.6

Peak Hour Demand

	LDR AC	LDR units	LDR gpm	COMM AC	COMM gpm	Park AC	Park gpm	Total gpm
Com-NorthA				6.0	41.6			41.6
Com-NorthB				6.0	41.6			41.6
Res-North	20.6	105	134.1					134.1
Com-MidA				11.8	86.8			86.8
Com-MidB				11.7	86.1			86.1
Com-South				34.2	247.2			247.2
Res-Mid	40.6	197	251.7			0.8	11.7	263.4
Res-South	23.6	128	157.3			1.8	26.1	183.4
Total	84.8	430	543.1	69.7	503.3	2.6	37.8	1084.2

Maximum Day Demand Peaking Factor and Peak Hourly Demand Factor were applied to the total demand at each node to define the demands for average daily and peak hour scenarios.



LEGEND

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Water Exhibit 5 - Demand Areas

SUD-B Northeast Quadrant Specific Plan

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6. Average Day, Maximum Day and Peak Hourly Demand Model Runs

The model was run for three static conditions: Average Day Demand, Maximum Day Demand and Peak Hour Demand. The scope of this model is limited to distribution within SUD-B NEQ Specific Plan area. The purpose of this model is to verify pipe sizes and establish pressure zones. Refer to Exhibit 6 for the distribution modeling plan which provide the models node and pipe numbers and the Appendices for model run scenarios and disk containing the Water-CAD model outputs.

Fire Flow

A rate of 3,000 gpm for flow was added to Maximum Day Demand at the worst case scenario. The Maximum Day Demand model was run with the additional fire flow. As the maximum fire flow occurs in the Commercial area of development, the fire flow was added at junction J-14 south of the Com-Mid node. Each pipe was tested to verify the ability of the system to deliver the required fire flow. For single story units (VLDR), the fire flow demand is 1,500 gpm.

7. Allowable Pressure and Velocity

The criteria shown in Table 5 indicates the design criteria used to determine whether the proposed system is acceptable and modifications were made, as necessary, to meet these criteria.

TABLE 5 - DESIGN CRITERIA

Average Day Demand:	
Maximum Pressure	120 psi
Maximum Day Demand:	
Maximum Velocity	7 fps
Minimum Pressure	50 psi
Maximum Pressure	150 psi
Peak Hour Demand:	
Maximum Velocity	10 fps
Minimum Pressure	50 psi
Maximum Pressure	120 psi
Max. Day Demand plus one FireFlow-3,000 gpm:	
Maximum Velocity	10 fps
Minimum Pressure	20 psi
Maximum Pressure	120 psi

8. Source and Pressure Zones

The five water sources are listed in Section 4 and are repeated below.

- Connect to existing 12" water main on Nicolaus Road.
- Construct 18" water main on Nelson Lane from the Nicolaus Road / Nelson Lane intersection to approximately 600 feet south of the southerly road.
- Connect to existing 12" water main at the Nicolaus Road / Nelson Lane intersection.
- Connect to existing 12" water main on Third Street.
- Connect to existing 12" water main on First Street.
- Connect to existing 12" water main on Singer Place.

The Specific Plan area is relatively flat, with little change in elevation resulting in no anticipated major changes in pressure zones.

An existing well is located north of the plan area on Nicolaus Road at Aviation Boulevard, as shown on Exhibits 2-6. The main source of water for this Specific Plan area will be the City Reservoir 1 storage tank, which supplies water to downtown Lincoln and west along Third Street and Nicolaus Lane to the SUD-B NEQ area. The City of Lincoln purchases treated water from the Nevada Irrigation District (NID), and additional water supplies from the Placer County Water Agency (PCWA).

9. Results

There are no static pressure concerns found within the project area. Table 6 below has a list of minimum and maximum pressures within the Plan Area. Throughout the SUD-B NEQ area, the node pressure remained within the acceptable pressure range meeting the City of Lincoln standards for all scenarios including fire-flow, maximum day, peak hour, and average demand conditions. The pressure is mainly determined by the assumed tank elevation for the modeled pump-hydrant system. The minimum pressure in the street near any service is maintained at a minimum 98.7 psi, thus the entire system meets the City's requirement of 50 psi at service connections.

TABLE 6 - SUD-B NEQ WATER MODEL PRESSURE & VELOCITY RESULTS (BUILD OUT)

Scenario	Pressure Range (psi)	Max. Velocity (fps)	Total Flow (MGD)
Average Daily Demand	112.4-118.9	0.58	0.39
Maximum Day Demand	111.2-117.5	1.26	0.98
Peak Hourly Demand	110.7-117.1	1.45	1.56
Maximum Day Demand + Fire Flow*	98.7-107.5	3.76	1.70

*Fire Flow is based on 3,000 GPM for 4 hours.

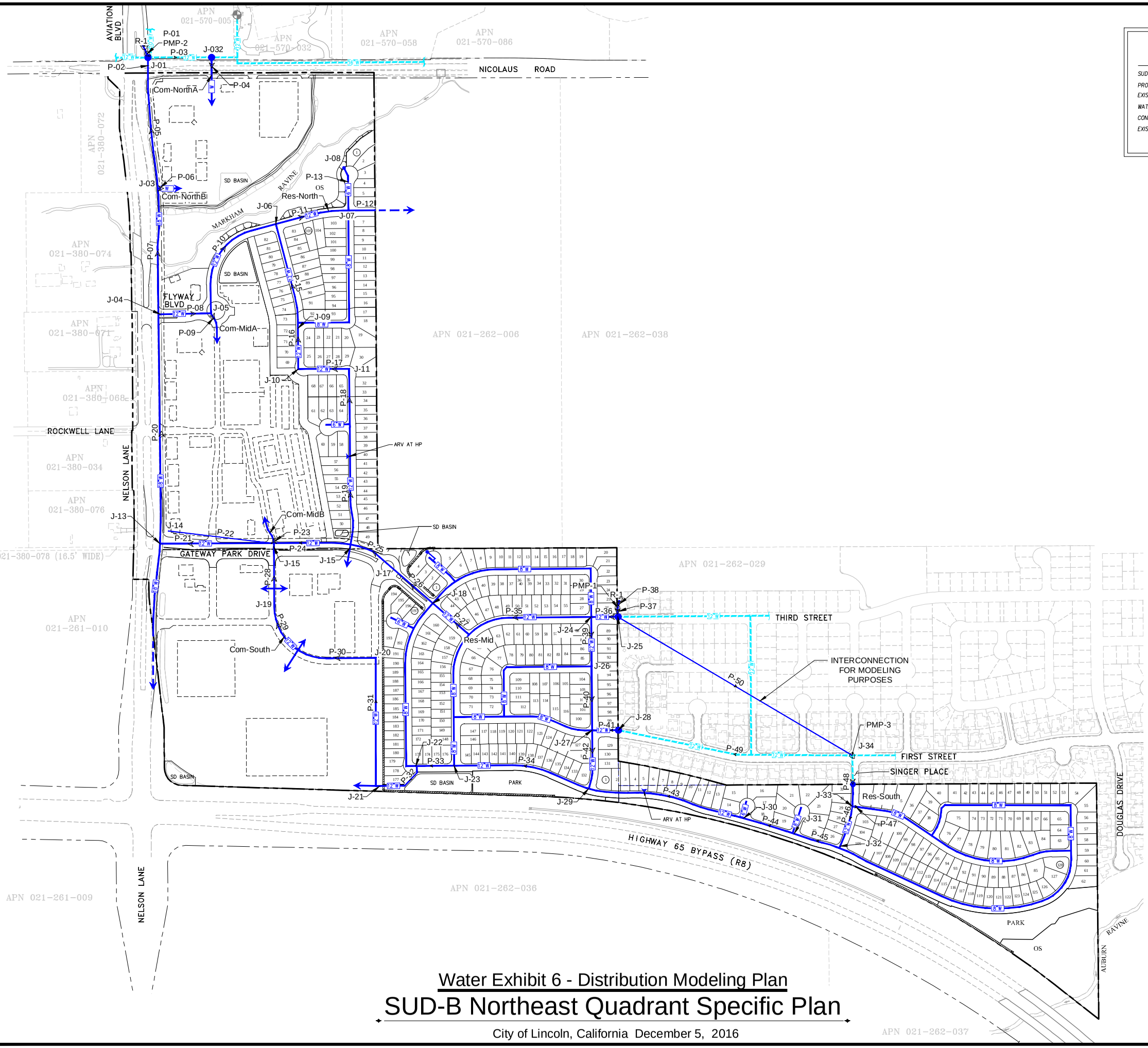
Maximum and minimum pressures generally follow the same pattern for all scenarios and alternatives. Maximum pressures and velocities occur near the pump-hydrant system. Both maximum and minimum pressures are within the acceptable range.

Model results show that the entire project area could be served with the shown piping layout and connection assumptions. Appendix B contains the Water-CAD output generated for the entire project from the model runs, including nodal pressures and pipe velocities and a large scale version of the system map.

Additionally, the southern portion of this SUD-B Specific Plan Area (SPA), the Peery-Arrillaga Property, has been modeled independent of the northern portion of the SPA, Gill Property, as an interim condition. This independent modeling excludes the connection to the existing 10" water line in Nicolaus Road and the proposed 18" water line down Nelson Lane. This interim scenario has three 12" water line connections into the existing City of Lincoln water system at First Street, Third Street and Singer Place. This modeled result, as shown in Appendix C, successfully demonstrates that the Peery-Arrillaga Property can be served, as in interim condition, without connecting to the existing 10" water line in Nicolaus Road.

10. Conclusion

This model was used to design and verify the water distribution system for SUD-B NEQ Specific Plan Area. Model results show that the proposed system will meet fire flow demands within the development area under Maximum Day Demands as well as meeting pipe velocity and node pressure requirements for Peak Hour and Average Day Demands.



LEGEND

SUD-B NEQ SPECIFIC PLAN BOUNDARY	
PROPOSED WATER PIPE	P-10
EXISTING WATER PIPE	
WATER NODE	J-55
CONNECTION TO EXISTING WATER SYSTEM	
EXISTING WET WELL SITE	

Label	Diameter (in)	Label	Diameter (in)
P-01	48	P-26	12
P-02	48	P-27	12
P-03	18	P-28	12
P-04	8	P-29	12
P-05	18	P-30	12
P-06	8	P-31	12
P-07	18	P-32	12
P-08	12	P-33	12
P-09	8	P-34	12
P-10	12	P-35	12
P-11	12	P-36	12
P-12	12	P-37	48
P-13	6	P-38	48
P-14	12	P-39	12
P-15	12	P-40	12
P-16	12	P-41	12
P-17	12	P-42	12
P-18	12	P-43	12
P-19	12	P-44	12
P-20	18	P-45	12
P-21	12	P-46	12
P-22	12	P-47	12
P-23	8	P-48	12
P-24	12	P-49	12
P-25	12	P-50	12

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Water Exhibit 6 - Distribution Modeling Plan

SUD-B Northeast Quadrant Specific Plan

City of Lincoln, California December 5, 2016

Appendix A

Fire Flow Tests and Pump Curves

FIRE FLOW TEST

City of Lincoln
Department of Public Services
600 Sixth Street
Lincoln, California 95648
(916) 434-2450
Fax (916) 543-8516

PROJECT: SUD-B NORTHEAST QUADRANT **DATE OF THIS REPORT: 1/7/15**

1)Location: Corner of Nicolaus and Aviation

2)Date of Test: _12/23/14_____ T**ime: 9:15am**

3)Test Made By: **J. Miller** **Representative of:** City of Lincoln
4)

FLOW HYDRANT	Hydrant at Nicolaus and Aviation
SIZE NOZZLE	2 ½"
PITOT READING	82
GPM*	1,338

5a) Static : 115 PSI; **Residual** 110 PSI;

Location: Next Hydrant North of Flow Hydrant

6)PROJECTED RESULTS FROM FIELD TEST: @20 psi _greater than 1,500 GPM

NOTE: The field results reflect system conditions at the date of the test. System conditions can vary and are subject to change, are dependent on future development, storage levels, pressure settings, well operations within the storage/transmission system hydraulically up-gradient of this location.

Pump Definition Detailed Report: Nicolaus

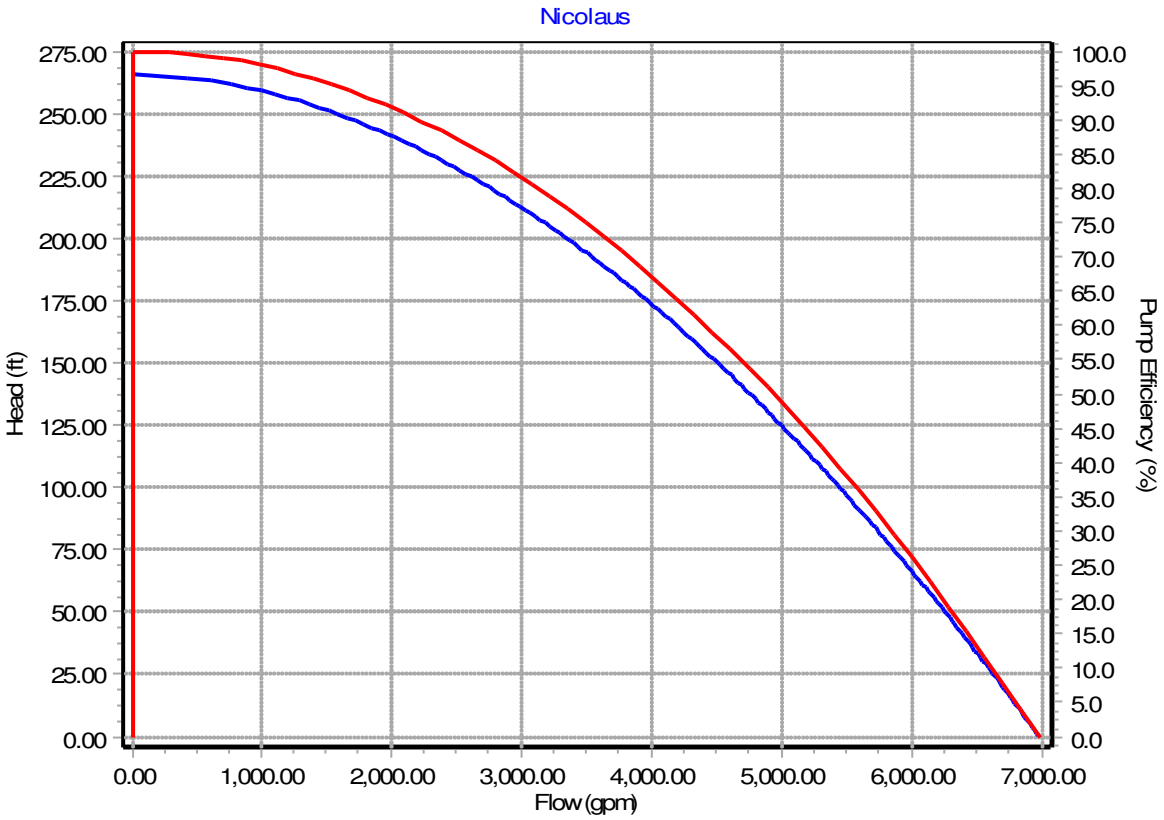
Element Details			
ID	34	Notes	Pump Curve based on fire hydrant test "Corner of Nicolaus and Aviation"
Label	Nicolaus		

Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	260.00 ft
Shutoff Flow	0.00 gpm	Maximum Operating Flow	1,338.00 gpm
Shutoff Head	265.70 ft	Maximum Operating Head	254.10 ft
Design Flow	920.00 gpm		

Pump Efficiency			
Pump Efficiency	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0.00 gpm		

Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

Pump Definition Detailed Report: Nicolaus



Coefficients: a = 265.70 ft; b = 1.360e-005 ft/(gpm)^c; c = 1.897

FIRE FLOW TEST

City of Lincoln
Department of Public Services
600 Sixth Street
Lincoln, California 95648
(916) 434-2450
Fax (916) 543-8516

PROJECT: SUD-B NORTHEAST QUADRANT **DATE OF THIS REPORT: 1/7/15**

1)Location: West End of Third Street

2)Date of Test: _12/23/14_____ T**ime: 10:15**

3)Test Made By: J. Miller **Representative of:** City of Lincoln

4)

FLOW HYDRANT	Hydrant at the West end of First Street (dead end)
SIZE NOZZLE	2 ½"
PITOT READING	80
GPM*	1,320

5a) Static : _112____PSI; **Residual** __105_PSI;

Location: Next Hydrant East of Flow Hydrant_____

6)PROJECTED RESULTS FROM FIELD TEST: @20 psi _greater than 1,500 GPM

NOTE: The field results reflect system conditions at the date of the test. System conditions can vary and are subject to change, are dependent on future development, storage levels, pressure settings, well operations within the storage/transmission system hydraulically up-gradient of this location.

Pump Definition Detailed Report: Third Street

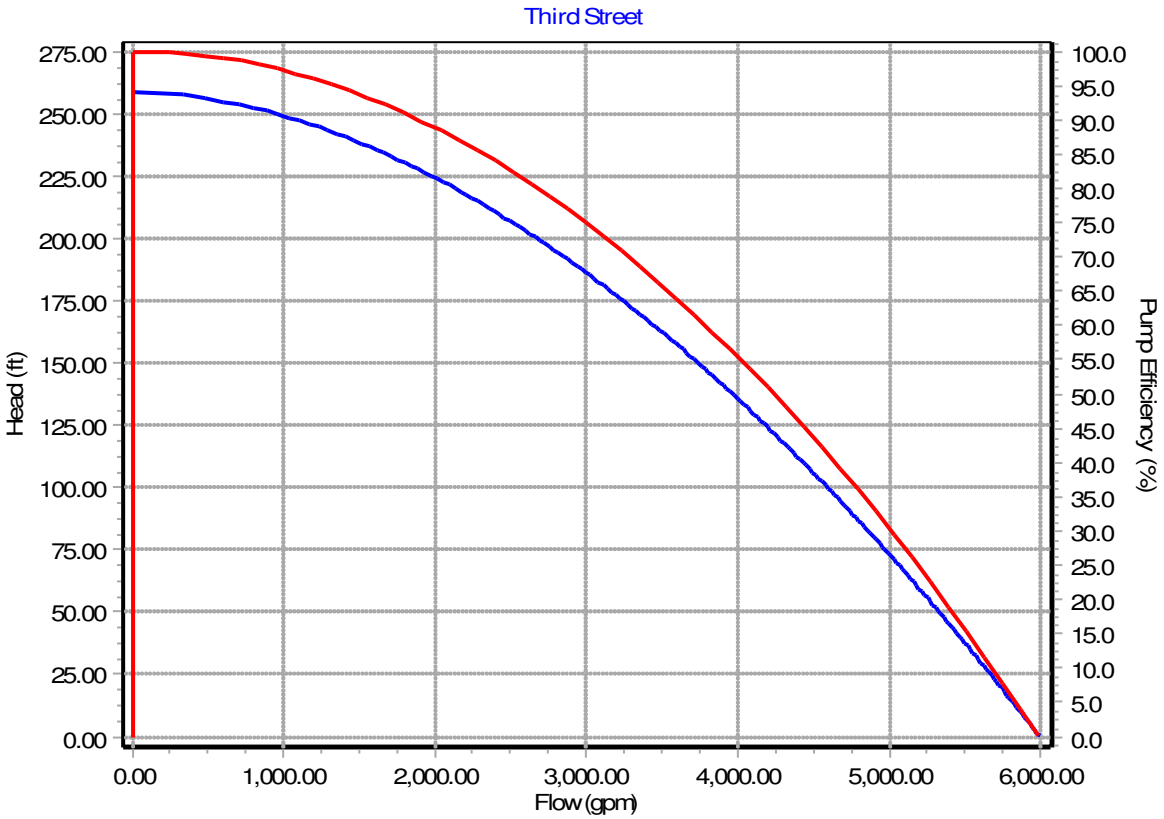
Element Details			
ID	32	Notes	pump curve based on fire hydrant test "West End of Third Street"
Label	Third Street		

Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	250.60 ft
Shutoff Flow	0.00 gpm	Maximum Operating Flow	1,320.00 gpm
Shutoff Head	258.70 ft	Maximum Operating Head	242.60 ft
Design Flow	908.00 gpm		

Pump Efficiency			
Pump Efficiency	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0.00 gpm		

Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

Pump Definition Detailed Report: Third Street



Coefficients: a = 258.70 ft; b = 3.001e-005 ft/(gpm)^c; c = 1.836

FIRE FLOW TEST

City of Lincoln
Department of Public Services
600 Sixth Street
Lincoln, California 95648
(916) 434-2450
Fax (916) 543-8516

PROJECT: SUD-B NORTHEAST QUADRANT **DATE OF THIS REPORT: 1/7/2015**

1)Location: First Street and Jansen Court

2)Date of Test: _12/23/14_____ T**ime: 10:45am**

3)Test Made By: J. Miller **Representative of:** City of Lincoln

4)

FLOW HYDRANT	Intersection of First Street and Jansen Court
SIZE NOZZLE	2 ½"
PITOT READING	85
GPM*	1,362

5a) Static : 110 PSI; **Residual** 105 PSI;

Location: Next Hydrant East on First Street

6)PROJECTED RESULTS FROM FIELD TEST: @20 psi _greater than 1,500 GPM

NOTE: The field results reflect system conditions at the date of the test. System conditions can vary and are subject to change, are dependant on storage levels, pressure settings, well operations within the storage/transmission system hydraulically up-gradient of this location.

Pump Definition Detailed Report: First Street

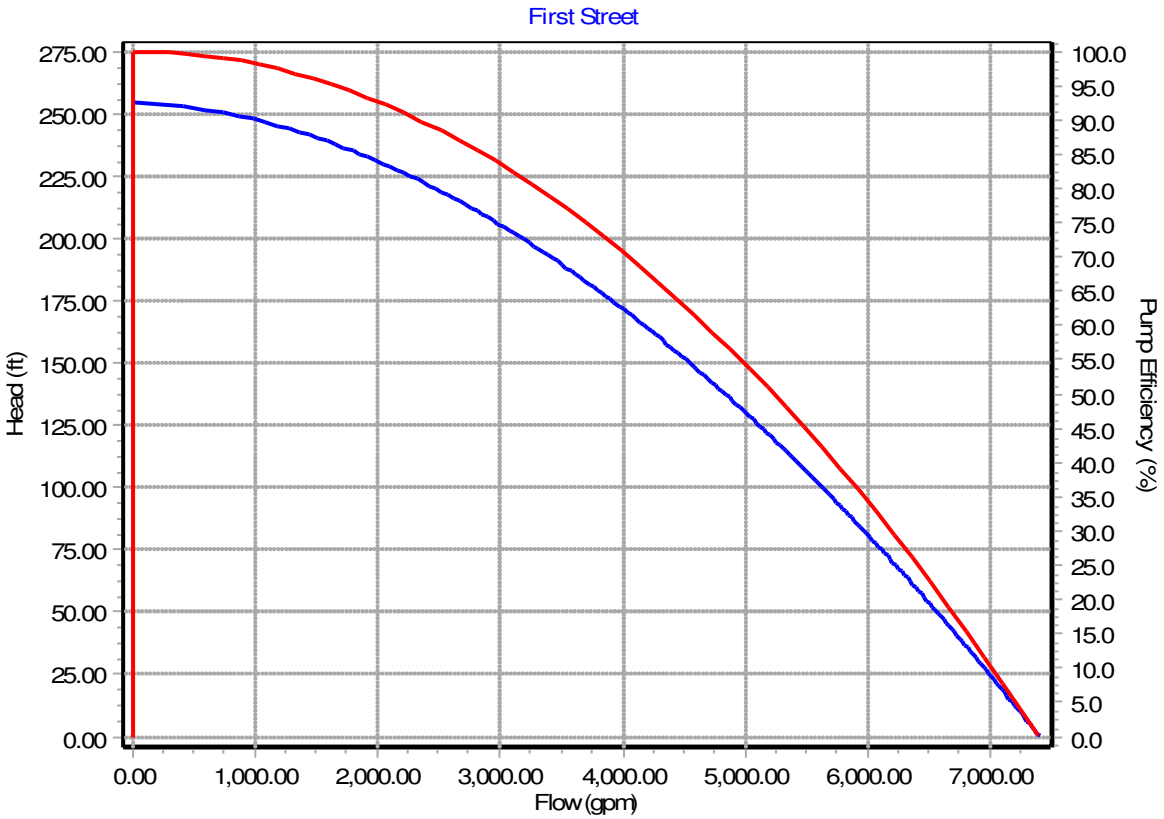
Element Details			
ID	33	Notes	Pump curve based on Fire Hydrant Test "First Street and Jansen Court"
Label	First Street		

Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	248.30 ft
Shutoff Flow	0.00 gpm	Maximum Operating Flow	1,362.00 gpm
Shutoff Head	254.10 ft	Maximum Operating Head	242.60 ft
Design Flow	937.00 gpm		

Pump Efficiency			
Pump Efficiency	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0.00 gpm		

Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

Pump Definition Detailed Report: First Street



Coefficients: a = 254.10 ft; b = 2.113e-005 ft/(gpm)^c; c = 1.830

Appendix B

Model Results – Entire Specific Plan Area:

Appendix B1: Average Daily Demand Results

Appendix B2: Maximum Daily Demand Results

Appendix B3: Peak Hour Demand Results

Appendix B4: Maximum Daily Demand + Fire Flow Results

Appendix B1: Average Daily Demand Results

Average Daily Demand Model Results: Pipe Attributes							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-01	R-2	PMP-2	48	130	1	0	0
P-02	PMP-2	J-01	48	130	1	0	0
P-03	J-01	J-02	18	130	409.63	10.4	0.01
P-04	J-02	Com-NorthA	8	130	36.23	10.4	0.07
P-05	J-01	J-03	18	130	653.64	-10.4	0.01
P-06	J-03	Com-NorthB	8	130	53.79	10.4	0.07
P-07	J-04	J-03	18	130	713.05	20.8	0.03
P-08	J-04	J-05	12	130	337.27	21.33	0.06
P-09	J-05	Com-MidA	8	130	51.92	21.7	0.14
P-10	J-05	J-06	12	130	718.39	-0.37	0
P-11	J-06	Res-North	12	130	291.17	33.5	0.1
P-12	Res-North	J-07	12	130	118.08	0	0
P-13	J-07	J-08	6	130	274.43	0	0
P-14	J-07	Con East	12	130	141.19	(N/A)	(N/A)
P-15	J-06	J-09	12	130	565.81	-33.87	0.1
P-16	J-10	J-09	12	130	259.23	33.87	0.1
P-17	J-11	J-10	12	130	284.54	33.87	0.1
P-18	J-12	J-11	12	130	314.36	33.87	0.1
P-19	J-16	J-12	12	130	691.72	33.87	0.1
P-20	J-04	J-13	18	130	1295.99	-42.14	0.05
P-21	J-13	J-15	12	130	627.97	-42.14	0.12
P-22	J-14	J-15	12	130	593.42	0	0
P-23	Com-MidB	J-15	8	130	66.15	-21.5	0.14
P-24	J-15	J-16	12	130	441.56	-45.46	0.13
P-25	J-17	J-16	12	130	222.29	79.33	0.23
P-26	J-18	J-17	12	130	332.92	79.33	0.23
P-27	J-18	Res-Mid	12	130	262.03	-79.33	0.23
P-28	J-15	J-19	12	130	317.86	-18.17	0.05
P-29	J-19	Com-South	12	130	213.92	-18.17	0.05
P-30	Com-South	J-20	12	130	527.51	-79.97	0.23
P-31	J-21	J-20	12	130	749.92	79.97	0.23
P-32	J-22	J-21	12	130	259.98	79.97	0.23
P-33	J-23	J-22	12	130	220.23	79.97	0.23
P-34	J-23	J-29	12	130	771.13	-79.97	0.23
P-35	Res-Mid	J-24	12	130	723.93	-145.13	0.41
P-36	J-24	J-25	12	130	137.5	-203.51	0.58
P-37	PMP-1	J-25	48	130	1	270.9	0.05
P-38	R-1	PMP-1	48	130	1	270.9	0.05
P-39	J-24	J-26	12	130	276.5	58.38	0.17
P-40	J-26	J-27	12	130	355.78	58.38	0.17
P-41	J-28	J-27	12	130	135.23	6.84	0.02
P-42	J-27	J-29	12	130	331.37	65.22	0.19
P-43	J-29	J-30	12	130	874.81	-14.75	0.04
P-44	J-30	J-31	12	130	291.52	-14.75	0.04
P-45	J-31	J-32	12	130	277.14	-14.75	0.04
P-46	J-33	J-32	12	130	231.97	14.75	0.04
P-47	J-33	Res-South	12	130	46.12	45.8	0.13
P-48	J-33	J-34	12	130	283.51	-60.55	0.17
P-49	J-28	J-34	12	130	1326.94	-6.84	0.02
P-50	J-25	J-34	12	130	1528.58	67.39	0.19

Average Daily Demand Model Results: Node Attributes			
Label	Demand (gpm)	Elevation (ft)	Pressure (psi)
Com-MidA	21.7	117	118
Com-MidB	21.5	118	117.6
Com-NorthA	10.4	115	118.9
Com-NorthB	10.4	117	118
Com-South	61.8	120	116.7
Con East	(N/A)	117	(N/A)
J-01	0	119	117.1
J-02	0	115	118.9
J-03	0	117	118
J-04	0	118	117.6
J-05	0	117	118
J-06	0	116	118.4
J-07	0	116	118.4
J-08	0	117	118
J-09	0	119	117.1
J-10	0	120	116.7
J-11	0	123	115.4
J-12	0	124	115
J-13	0	120	116.7
J-14	0	119	117.1
J-15	0	120	116.7
J-16	0	121	116.3
J-17	0	121	116.3
J-18	0	122	115.8
J-19	0	120	116.7
J-20	0	122	115.8
J-21	0	122	115.8
J-22	0	124	115
J-23	0	125	114.6
J-24	0	125	114.6
J-25	0	130	112.4
J-26	0	129	112.8
J-27	0	128	113.3
J-28	0	128.5	113
J-29	0	127.5	113.5
J-30	0	128	113.3
J-31	0	127.5	113.5
J-32	0	127	113.7
J-33	0	127.5	113.5
J-34	0	129.6	112.6
Res-Mid	65.8	123.5	115.2
Res-North	33.5	117	118
Res-South	45.8	127	113.7

Appendix B2: Maximum Daily Demand

Maximum Daily Demand Model Results: Pipe Attributes							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-01	R-2	PMP-2	48	130	1	85.42	0.02
P-02	PMP-2	J-01	48	130	1	85.42	0.02
P-03	J-01	J-02	18	130	409.63	26	0.03
P-04	J-02	Com-NorthA	8	130	36.23	26	0.17
P-05	J-01	J-03	18	130	653.64	59.42	0.07
P-06	J-03	Com-NorthB	8	130	53.79	26	0.17
P-07	J-04	J-03	18	130	713.05	-33.42	0.04
P-08	J-04	J-05	12	130	337.27	78.67	0.22
P-09	J-05	Com-MidA	8	130	51.92	54.3	0.35
P-10	J-05	J-06	12	130	718.39	24.37	0.07
P-11	J-06	Res-North	12	130	291.17	83.9	0.24
P-12	Res-North	J-07	12	130	118.08	0	0
P-13	J-07	J-08	6	130	274.43	0	0
P-14	J-07	Con East	12	130	141.19	(N/A)	(N/A)
P-15	J-06	J-09	12	130	565.81	-59.53	0.17
P-16	J-10	J-09	12	130	259.23	59.53	0.17
P-17	J-11	J-10	12	130	284.54	59.53	0.17
P-18	J-12	J-11	12	130	314.36	59.53	0.17
P-19	J-16	J-12	12	130	691.72	59.53	0.17
P-20	J-04	J-13	18	130	1295.99	-45.25	0.06
P-21	J-13	J-15	12	130	627.97	-45.25	0.13
P-22	J-14	J-15	12	130	593.42	0	0
P-23	Com-MidB	J-15	8	130	66.15	-53.8	0.34
P-24	J-15	J-16	12	130	441.56	-88.84	0.25
P-25	J-17	J-16	12	130	222.29	148.37	0.42
P-26	J-18	J-17	12	130	332.92	148.37	0.42
P-27	J-18	Res-Mid	12	130	262.03	-148.37	0.42
P-28	J-15	J-19	12	130	317.86	-10.21	0.03
P-29	J-19	Com-South	12	130	213.92	-10.21	0.03
P-30	Com-South	J-20	12	130	527.51	-164.71	0.47
P-31	J-21	J-20	12	130	749.92	164.71	0.47
P-32	J-22	J-21	12	130	259.98	164.71	0.47
P-33	J-23	J-22	12	130	220.23	164.71	0.47
P-34	J-23	J-29	12	130	771.13	-164.71	0.47
P-35	Res-Mid	J-24	12	130	723.93	-312.87	0.89
P-36	J-24	J-25	12	130	137.5	-443.43	1.26
P-37	PMP-1	J-25	48	130	1	592.08	0.1
P-38	R-1	PMP-1	48	130	1	592.08	0.1
P-39	J-24	J-26	12	130	276.5	130.56	0.37
P-40	J-26	J-27	12	130	355.78	130.56	0.37
P-41	J-28	J-27	12	130	135.23	9.88	0.03
P-42	J-27	J-29	12	130	331.37	140.45	0.4
P-43	J-29	J-30	12	130	874.81	-24.26	0.07
P-44	J-30	J-31	12	130	291.52	-24.26	0.07
P-45	J-31	J-32	12	130	277.14	-24.26	0.07
P-46	J-33	J-32	12	130	231.97	24.26	0.07
P-47	J-33	Res-South	12	130	46.12	114.5	0.32
P-48	J-33	J-34	12	130	283.51	-138.76	0.39
P-49	J-28	J-34	12	130	1326.94	-9.88	0.03
P-50	J-25	J-34	12	130	1528.58	148.64	0.42

Maximum Daily Demand Model Results: Node Attributes			
Label	***Demand (gpm)***	***Elevation (ft)***	***Pressure (psi)***
Com-MidA	54.3	117	116.7
Com-MidB	53.8	118	116.2
Com-NorthA	26	115	117.5
Com-NorthB	26	117	116.7
Com-South	154.5	120	115.4
Con East	(N/A)	117	(N/A)
J-01	0	119	115.8
J-02	0	115	117.5
J-03	0	117	116.7
J-04	0	118	116.2
J-05	0	117	116.7
J-06	0	116	117.1
J-07	0	116	117.1
J-08	0	117	116.7
J-09	0	119	115.8
J-10	0	120	115.4
J-11	0	123	114.1
J-12	0	124	113.6
J-13	0	120	115.4
J-14	0	119	115.8
J-15	0	120	115.4
J-16	0	121	114.9
J-17	0	121	114.9
J-18	0	122	114.5
J-19	0	120	115.4
J-20	0	122	114.5
J-21	0	122	114.5
J-22	0	124	113.7
J-23	0	125	113.3
J-24	0	125	113.3
J-25	0	130	111.2
J-26	0	129	111.6
J-27	0	128	112
J-28	0	128.5	111.8
J-29	0	127.5	112.2
J-30	0	128	112
J-31	0	127.5	112.2
J-32	0	127	112.4
J-33	0	127.5	112.2
J-34	0	129.6	111.3
Res-Mid	164.5	123.5	113.9
Res-North	83.9	117	116.7
Res-South	114.5	127	112.4

Appendix B3: Peak Hour Demand Results

Peak Hourly Demand Model Results: Pipe Attributes							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-01	R-2	PMP-2	48	130	1	395.48	0.07
P-02	PMP-2	J-01	48	130	1	395.48	0.07
P-03	J-01	J-02	18	130	409.63	41.7	0.05
P-04	J-02	Com-NorthA	8	130	36.23	41.7	0.27
P-05	J-01	J-03	18	130	653.64	353.78	0.45
P-06	J-03	Com-NorthB	8	130	53.79	41.7	0.27
P-07	J-04	J-03	18	130	713.05	-312.08	0.39
P-08	J-04	J-05	12	130	337.27	180.54	0.51
P-09	J-05	Com-MidA	8	130	51.92	86.8	0.55
P-10	J-05	J-06	12	130	718.39	93.74	0.27
P-11	J-06	Res-North	12	130	291.17	134.2	0.38
P-12	Res-North	J-07	12	130	118.08	0	0
P-13	J-07	J-08	6	130	274.43	0	0
P-14	J-07	Con East	12	130	141.19	(N/A)	(N/A)
P-15	J-06	J-09	12	130	565.81	-40.46	0.11
P-16	J-10	J-09	12	130	259.23	40.46	0.11
P-17	J-11	J-10	12	130	284.54	40.46	0.11
P-18	J-12	J-11	12	130	314.36	40.46	0.11
P-19	J-16	J-12	12	130	691.72	40.46	0.11
P-20	J-04	J-13	18	130	1295.99	131.53	0.17
P-21	J-13	J-15	12	130	627.97	131.53	0.37
P-22	J-14	J-15	12	130	593.42	0	0
P-23	Com-MidB	J-15	8	130	66.15	-86.1	0.55
P-24	J-15	J-16	12	130	441.56	-43.17	0.12
P-25	J-17	J-16	12	130	222.29	83.63	0.24
P-26	J-18	J-17	12	130	332.92	83.63	0.24
P-27	J-18	Res-Mid	12	130	262.03	-83.63	0.24
P-28	J-15	J-19	12	130	317.86	88.6	0.25
P-29	J-19	Com-South	12	130	213.92	88.6	0.25
P-30	Com-South	J-20	12	130	527.51	-158.6	0.45
P-31	J-21	J-20	12	130	749.92	158.6	0.45
P-32	J-22	J-21	12	130	259.98	158.6	0.45
P-33	J-23	J-22	12	130	220.23	158.6	0.45
P-34	J-23	J-29	12	130	771.13	-158.6	0.45
P-35	Res-Mid	J-24	12	130	723.93	-346.93	0.98
P-36	J-24	J-25	12	130	137.5	-511.43	1.45
P-37	PMP-1	J-25	48	130	1	688.72	0.12
P-38	R-1	PMP-1	48	130	1	688.72	0.12
P-39	J-24	J-26	12	130	276.5	164.5	0.47
P-40	J-26	J-27	12	130	355.78	164.5	0.47
P-41	J-28	J-27	12	130	135.23	-1.11	0
P-42	J-27	J-29	12	130	331.37	163.39	0.46
P-43	J-29	J-30	12	130	874.81	4.79	0.01
P-44	J-30	J-31	12	130	291.52	4.79	0.01
P-45	J-31	J-32	12	130	277.14	4.79	0.01
P-46	J-33	J-32	12	130	231.97	-4.79	0.01
P-47	J-33	Res-South	12	130	46.12	183.2	0.52
P-48	J-33	J-34	12	130	283.51	-178.41	0.51
P-49	J-28	J-34	12	130	1326.94	1.11	0
P-50	J-25	J-34	12	130	1528.58	177.3	0.5

Peak Hourly Demand Model Results: Node Attributes			
Label	***Demand (gpm)***	***Elevation (ft)***	***Pressure (psi)***
Com-MidA	86.8	117	116.1
Com-MidB	86.1	118	115.7
Com-NorthA	41.7	115	117.1
Com-NorthB	41.7	117	116.2
Com-South	247.2	120	114.8
Con East	(N/A)	117	(N/A)
J-01	0	119	115.3
J-02	0	115	117.1
J-03	0	117	116.2
J-04	0	118	115.7
J-05	0	117	116.1
J-06	0	116	116.6
J-07	0	116	116.6
J-08	0	117	116.1
J-09	0	119	115.3
J-10	0	120	114.8
J-11	0	123	113.5
J-12	0	124	113.1
J-13	0	120	114.9
J-14	0	119	115.3
J-15	0	120	114.8
J-16	0	121	114.4
J-17	0	121	114.4
J-18	0	122	114
J-19	0	120	114.8
J-20	0	122	114
J-21	0	122	114
J-22	0	124	113.2
J-23	0	125	112.7
J-24	0	125	112.8
J-25	0	130	110.7
J-26	0	129	111.1
J-27	0	128	111.5
J-28	0	128.5	111.3
J-29	0	127.5	111.7
J-30	0	128	111.5
J-31	0	127.5	111.7
J-32	0	127	111.9
J-33	0	127.5	111.7
J-34	0	129.6	110.8
Res-Mid	263.3	123.5	113.3
Res-North	134.2	117	116.1
Res-South	183.2	127	111.9

Appendix B4: Maximum Daily Demand + Fire Flow Results

Maximum Daily Demand + Fire Flow Model Results: Pipe Attributes							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-01	R-2	PMP-2	48	130	1	1924.55	0.34
P-02	PMP-2	J-01	48	130	1	1924.55	0.34
P-03	J-01	J-02	18	130	409.63	26	0.03
P-04	J-02	Com-NorthA	8	130	36.23	26	0.17
P-05	J-01	J-03	18	130	653.64	1898.55	2.39
P-06	J-03	Com-NorthB	8	130	53.79	26	0.17
P-07	J-04	J-03	18	130	713.05	-1872.55	2.36
P-08	J-04	J-05	12	130	337.27	557.51	1.58
P-09	J-05	Com-MidA	8	130	51.92	54.3	0.35
P-10	J-05	J-06	12	130	718.39	503.21	1.43
P-11	J-06	Res-North	12	130	291.17	83.9	0.24
P-12	Res-North	J-07	12	130	118.08	0	0
P-13	J-07	J-08	6	130	274.43	0	0
P-14	J-07	Con East	12	130	141.19	(N/A)	(N/A)
P-15	J-06	J-09	12	130	565.81	419.31	1.19
P-16	J-10	J-09	12	130	259.23	-419.31	1.19
P-17	J-11	J-10	12	130	284.54	-419.31	1.19
P-18	J-12	J-11	12	130	314.36	-419.31	1.19
P-19	J-16	J-12	12	130	691.72	-419.31	1.19
P-20	J-04	J-13	18	130	1295.99	1315.04	1.66
P-21	J-13	J-15	12	130	627.97	1315.04	3.73
P-22	J-14	J-15	12	130	593.42	-3000	8.51
P-23	Com-MidB	J-15	8	130	66.15	-53.8	0.34
P-24	J-15	J-16	12	130	441.56	-1182.98	3.36
P-25	J-17	J-16	12	130	222.29	763.67	2.17
P-26	J-18	J-17	12	130	332.92	763.67	2.17
P-27	J-18	Res-Mid	12	130	262.03	-763.67	2.17
P-28	J-15	J-19	12	130	317.86	-555.78	1.58
P-29	J-19	Com-South	12	130	213.92	-555.78	1.58
P-30	Com-South	J-20	12	130	527.51	-710.28	2.01
P-31	J-21	J-20	12	130	749.92	710.28	2.01
P-32	J-22	J-21	12	130	259.98	710.28	2.01
P-33	J-23	J-22	12	130	220.23	710.28	2.01
P-34	J-23	J-29	12	130	771.13	-710.28	2.01
P-35	Res-Mid	J-24	12	130	723.93	-928.17	2.63
P-36	J-24	J-25	12	130	137.5	-1323.81	3.76
P-37	PMP-1	J-25	48	130	1	1752.95	0.31
P-38	R-1	PMP-1	48	130	1	1752.95	0.31
P-39	J-24	J-26	12	130	276.5	395.64	1.12
P-40	J-26	J-27	12	130	355.78	395.64	1.12
P-41	J-28	J-27	12	130	135.23	112.66	0.32
P-42	J-27	J-29	12	130	331.37	508.3	1.44
P-43	J-29	J-30	12	130	874.81	-201.98	0.57
P-44	J-30	J-31	12	130	291.52	-201.98	0.57
P-45	J-31	J-32	12	130	277.14	-201.98	0.57
P-46	J-33	J-32	12	130	231.97	201.98	0.57
P-47	J-33	Res-South	12	130	46.12	114.5	0.32
P-48	J-33	J-34	12	130	283.51	-316.48	0.9
P-49	J-28	J-34	12	130	1326.94	-112.66	0.32
P-50	J-25	J-34	12	130	1528.58	429.15	1.22

Maximum Daily Demand + Fire Flow Model Results: Node Attributes			
Label	***Demand (gpm)***	***Elevation (ft)***	***Pressure (psi)***
Com-MidA	54.3	117	105.9
Com-MidB	53.8	118	104.1
Com-NorthA	26	115	107.5
Com-NorthB	26	117	106.4
Com-South	154.5	120	103.4
Con East	(N/A)	117	(N/A)
J-01	0	119	105.8
J-02	0	115	107.5
J-03	0	117	106.4
J-04	0	118	105.6
J-05	0	117	105.9
J-06	0	116	106.1
J-07	0	116	106.1
J-08	0	117	105.7
J-09	0	119	104.7
J-10	0	120	104.2
J-11	0	123	102.8
J-12	0	124	102.3
J-13	0	120	104.4
J-14	3000	119	98.7
J-15	0	120	103.2
J-16	0	121	103.5
J-17	0	121	103.6
J-18	0	122	103.4
J-19	0	120	103.4
J-20	0	122	102.9
J-21	0	122	103.3
J-22	0	124	102.6
J-23	0	125	102.3
J-24	0	125	103
J-25	0	130	101.1
J-26	0	129	101.2
J-27	0	128	101.6
J-28	0	128.5	101.3
J-29	0	127.5	101.7
J-30	0	128	101.5
J-31	0	127.5	101.7
J-32	0	127	102
J-33	0	127.5	101.8
J-34	0	129.6	100.9
Res-Mid	164.5	123.5	102.9
Res-North	83.9	117	105.7
Res-South	114.5	127	102

Appendix C

Model Results – Peery-Arrillaga Property Only:

Appendix C1: Average Daily Demand Results

Appendix C2: Maximum Daily Demand Results

Appendix C3: Peak Hour Demand Results

Appendix C4: Maximum Daily Demand + Fire Flow Results

Appendix C1: Average Daily Demand Results

Average Daily Demand Model Results: Pipe Attributes (Peery Only)							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-21	J-13	J-15	12	130	627.97	0	0
P-22	J-14	J-15	12	130	593.42	0	0
P-24	J-15	J-16	12	130	441.56	-21.31	0.06
P-25	J-17	J-16	12	130	222.29	21.31	0.06
P-26	J-18	J-17	12	130	332.92	21.31	0.06
P-27	J-18	Res-Mid	12	130	262.03	-21.31	0.06
P-28	J-15	J-19	12	130	317.86	21.31	0.06
P-29	J-19	Com-South	12	130	213.92	21.31	0.06
P-30	Com-South	J-20	12	130	527.51	-40.49	0.11
P-31	J-21	J-20	12	130	749.92	40.49	0.11
P-32	J-22	J-21	12	130	259.98	40.49	0.11
P-33	J-23	J-22	12	130	220.23	40.49	0.11
P-34	J-23	J-29	12	130	771.13	-40.49	0.11
P-35	Res-Mid	J-24	12	130	723.93	-87.11	0.25
P-36	J-24	J-25	12	130	137.5	-128.71	0.37
P-37	PMP-1	J-25	48	130	1	173.4	0.03
P-38	R-1	PMP-1	48	130	1	173.4	0.03
P-39	J-24	J-26	12	130	276.5	41.59	0.12
P-40	J-26	J-27	12	130	355.78	41.59	0.12
P-41	J-28	J-27	12	130	135.23	-0.3	0
P-42	J-27	J-29	12	130	331.37	41.29	0.12
P-43	J-29	J-30	12	130	874.81	0.81	0
P-44	J-30	J-31	12	130	291.52	0.81	0
P-45	J-31	J-32	12	130	277.14	0.81	0
P-46	J-33	J-32	12	130	231.97	-0.81	0
P-47	J-33	Res-South	12	130	46.12	45.8	0.13
P-48	J-33	J-34	12	130	283.51	-44.99	0.13
P-49	J-28	J-34	12	130	1326.94	0.3	0
P-50	J-25	J-34	12	130	1528.58	44.7	0.13

Average Daily Demand Model Results: Node Attributes (Peery Only)			
Label	Demand (gpm)	Elevation (ft)	Pressure (psi)
Com-South	61.8	120	116.9
J-13	0	120	116.9
J-14	0	119	117.4
J-15	0	120	116.9
J-16	0	121	116.5
J-17	0	121	116.5
J-18	0	122	116.1
J-19	0	120	116.9
J-20	0	122	116.1
J-21	0	122	116.1
J-22	0	124	115.2
J-23	0	125	114.8
J-24	0	125	114.8
J-25	0	130	112.6
J-26	0	129	113.1
J-27	0	128	113.5
J-28	0	128.5	113.3
J-29	0	127.5	113.7
J-30	0	128	113.5
J-31	0	127.5	113.7
J-32	0	127	113.9
J-33	0	127.5	113.7
J-34	0	129.6	112.8
Res-Mid	65.8	123.5	115.4
Res-South	45.8	127	113.9

Appendix C2: Maximum Daily Demand

Maximum Daily Demand Model Results: Pipe Attributes (Peery Only)							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-21	J-13	J-15	12	130	627.97	0	0
P-22	J-14	J-15	12	130	593.42	0	0
P-24	J-15	J-16	12	130	441.56	-53.26	0.15
P-25	J-17	J-16	12	130	222.29	53.26	0.15
P-26	J-18	J-17	12	130	332.92	53.26	0.15
P-27	J-18	Res-Mid	12	130	262.03	-53.26	0.15
P-28	J-15	J-19	12	130	317.86	53.26	0.15
P-29	J-19	Com-South	12	130	213.92	53.26	0.15
P-30	Com-South	J-20	12	130	527.51	-101.24	0.29
P-31	J-21	J-20	12	130	749.92	101.24	0.29
P-32	J-22	J-21	12	130	259.98	101.24	0.29
P-33	J-23	J-22	12	130	220.23	101.24	0.29
P-34	J-23	J-29	12	130	771.13	-101.24	0.29
P-35	Res-Mid	J-24	12	130	723.93	-217.86	0.62
P-36	J-24	J-25	12	130	137.5	-321.91	0.91
P-37	PMP-1	J-25	48	130	1	433.7	0.08
P-38	R-1	PMP-1	48	130	1	433.7	0.08
P-39	J-24	J-26	12	130	276.5	104.05	0.3
P-40	J-26	J-27	12	130	355.78	104.05	0.3
P-41	J-28	J-27	12	130	135.23	-0.76	0
P-42	J-27	J-29	12	130	331.37	103.29	0.29
P-43	J-29	J-30	12	130	874.81	2.05	0.01
P-44	J-30	J-31	12	130	291.52	2.05	0.01
P-45	J-31	J-32	12	130	277.14	2.05	0.01
P-46	J-33	J-32	12	130	231.97	-2.05	0.01
P-47	J-33	Res-South	12	130	46.12	114.6	0.33
P-48	J-33	J-34	12	130	283.51	-112.55	0.32
P-49	J-28	J-34	12	130	1326.94	0.76	0
P-50	J-25	J-34	12	130	1528.58	111.79	0.32

Maximum Daily Demand Model Results: Node Attributes (Peery Only)			
Label	***Demand (gpm)***	***Elevation (ft)***	***Pressure (psi)***
Com-South	154.5	120	116.1
J-13	0	120	116.1
J-14	0	119	116.6
J-15	0	120	116.1
J-16	0	121	115.7
J-17	0	121	115.7
J-18	0	122	115.3
J-19	0	120	116.1
J-20	0	122	115.3
J-21	0	122	115.3
J-22	0	124	114.4
J-23	0	125	114
J-24	0	125	114
J-25	0	130	111.9
J-26	0	129	112.3
J-27	0	128	112.7
J-28	0	128.5	112.5
J-29	0	127.5	112.9
J-30	0	128	112.7
J-31	0	127.5	112.9
J-32	0	127	113.2
J-33	0	127.5	112.9
J-34	0	129.6	112
Res-Mid	164.6	123.5	114.6
Res-South	114.6	127	113.2

Appendix C3: Peak Hour Demand Results

Peak Hourly Demand Model Results: Pipe Attributes (Peery Only)							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-21	J-13	J-15	12	130	627.97	0	0
P-22	J-14	J-15	12	130	593.42	0	0
P-24	J-15	J-16	12	130	441.56	-85.22	0.24
P-25	J-17	J-16	12	130	222.29	85.22	0.24
P-26	J-18	J-17	12	130	332.92	85.22	0.24
P-27	J-18	Res-Mid	12	130	262.03	-85.22	0.24
P-28	J-15	J-19	12	130	317.86	85.22	0.24
P-29	J-19	Com-South	12	130	213.92	85.22	0.24
P-30	Com-South	J-20	12	130	527.51	-161.98	0.46
P-31	J-21	J-20	12	130	749.92	161.98	0.46
P-32	J-22	J-21	12	130	259.98	161.98	0.46
P-33	J-23	J-22	12	130	220.23	161.98	0.46
P-34	J-23	J-29	12	130	771.13	-161.98	0.46
P-35	Res-Mid	J-24	12	130	723.93	-348.52	0.99
P-36	J-24	J-25	12	130	137.5	-514.9	1.46
P-37	PMP-1	J-25	48	130	1	693.7	0.12
P-38	R-1	PMP-1	48	130	1	693.7	0.12
P-39	J-24	J-26	12	130	276.5	166.38	0.47
P-40	J-26	J-27	12	130	355.78	166.38	0.47
P-41	J-28	J-27	12	130	135.23	-1.19	0
P-42	J-27	J-29	12	130	331.37	165.19	0.47
P-43	J-29	J-30	12	130	874.81	3.21	0.01
P-44	J-30	J-31	12	130	291.52	3.21	0.01
P-45	J-31	J-32	12	130	277.14	3.21	0.01
P-46	J-33	J-32	12	130	231.97	-3.21	0.01
P-47	J-33	Res-South	12	130	46.12	183.2	0.52
P-48	J-33	J-34	12	130	283.51	-179.99	0.51
P-49	J-28	J-34	12	130	1326.94	1.19	0
P-50	J-25	J-34	12	130	1528.58	178.8	0.51

Peak Hourly Demand Model Results: Node Attributes (Peery Only)			
Label	***Demand (gpm)***	***Elevation (ft)***	***Pressure (psi)***
Com-South	247.2	120	114.8
J-13	0	120	114.8
J-14	0	119	115.2
J-15	0	120	114.8
J-16	0	121	114.4
J-17	0	121	114.4
J-18	0	122	114
J-19	0	120	114.8
J-20	0	122	114
J-21	0	122	114
J-22	0	124	113.1
J-23	0	125	112.7
J-24	0	125	112.8
J-25	0	130	110.7
J-26	0	129	111
J-27	0	128	111.5
J-28	0	128.5	111.2
J-29	0	127.5	111.7
J-30	0	128	111.4
J-31	0	127.5	111.7
J-32	0	127	111.9
J-33	0	127.5	111.7
J-34	0	129.6	110.8
Res-Mid	263.3	123.5	113.3
Res-South	183.2	127	111.9

Appendix C4: Maximum Daily Demand + Fire Flow Results

Maximum Daily Demand + Fire Flow Model Results: Pipe Attributes (Peery Only)							
Label	Start Junction	Stop Junction	Diameter (in)	Hazen-Williams C	Length (ft)	Flow (gpm)	Velocity (ft/s)
P-21	J-13	J-15	12	130	627.97	0	0
P-22	J-14	J-15	12	130	593.42	-3000	8.51
P-24	J-15	J-16	12	130	441.56	-1766.43	5.01
P-25	J-17	J-16	12	130	222.29	1766.43	5.01
P-26	J-18	J-17	12	130	332.92	1766.43	5.01
P-27	J-18	Res-Mid	12	130	262.03	-1766.43	5.01
P-28	J-15	J-19	12	130	317.86	-1233.57	3.5
P-29	J-19	Com-South	12	130	213.92	-1233.57	3.5
P-30	Com-South	J-20	12	130	527.51	-1388.07	3.94
P-31	J-21	J-20	12	130	749.92	1388.07	3.94
P-32	J-22	J-21	12	130	259.98	1388.07	3.94
P-33	J-23	J-22	12	130	220.23	1388.07	3.94
P-34	J-23	J-29	12	130	771.13	-1388.07	3.94
P-35	Res-Mid	J-24	12	130	723.93	-1931.03	5.48
P-36	J-24	J-25	12	130	137.5	-2628.69	7.46
P-37	PMP-1	J-25	48	130	1	3433.7	0.61
P-38	R-1	PMP-1	48	130	1	3433.7	0.61
P-39	J-24	J-26	12	130	276.5	697.67	1.98
P-40	J-26	J-27	12	130	355.78	697.67	1.98
P-41	J-28	J-27	12	130	135.23	265.26	0.75
P-42	J-27	J-29	12	130	331.37	962.93	2.73
P-43	J-29	J-30	12	130	874.81	-425.15	1.21
P-44	J-30	J-31	12	130	291.52	-425.15	1.21
P-45	J-31	J-32	12	130	277.14	-425.15	1.21
P-46	J-33	J-32	12	130	231.97	425.15	1.21
P-47	J-33	Res-South	12	130	46.12	114.6	0.33
P-48	J-33	J-34	12	130	283.51	-539.75	1.53
P-49	J-28	J-34	12	130	1326.94	-265.26	0.75
P-50	J-25	J-34	12	130	1528.58	805.01	2.28

Maximum Daily Demand + Fire Flow Model Results: Node Attributes (Peery Only)			
Label	***Demand (gpm)***	***Elevation (ft)***	***Pressure (psi)***
Com-South	154.5	120	70.1
J-13	0	120	69.3
J-14	3000	119	64.7
J-15	0	120	69.3
J-16	0	121	70.2
J-17	0	121	70.9
J-18	0	122	71.5
J-19	0	120	69.8
J-20	0	122	70.3
J-21	0	122	71.8
J-22	0	124	71.5
J-23	0	125	71.5
J-24	0	125	73.8
J-25	0	130	72.5
J-26	0	129	71.9
J-27	0	128	72.1
J-28	0	128.5	71.9
J-29	0	127.5	72
J-30	0	128	72
J-31	0	127.5	72.2
J-32	0	127	72.5
J-33	0	127.5	72.4
J-34	0	129.6	71.5
Res-Mid	164.6	123.5	71.7
Res-South	114.6	127	72.6

Appendix D

Large Scale Exhibit:

Appendix D1: Exhibit 4 – Master Water Plan

Appendix D2: Exhibit 6 - Distribution Modeling Plan

Appendix E

Disk containing Water-CAD model outputs