
To:	City of Spokane Planning Department	From:	Zak Sargent, PE Spokane, WA
Reference:	Deep Pine Overlook - PUD Concept Sewer and Water	Date:	July 13, 2017

This memorandum summarizes the concept layout for the water and sewer utilities to serve the proposed 94-lot development. Both sewer and water will be placed within the proposed streets per City of Spokane Standard Drawing W-113. The proposed lines for each utility will connect to existing City main line located along US-195.

Concept Sewer

Conforming to City of Spokane standards, sewer lines will be a minimum of 10 feet in depth and located along roadway centerlines. During final design, grades and sizes of pipes will be determined and confirmed. As shown in the attached concept utility plan, following is a summary of the anticipated gravity collection system:

- Starting at the north end of the development, Lots 89-94 will be collected by an 8-inch line running southeast along Fritz Lane. Lots 72-88 and 36-46 will be collected by an 8-inch line running north along Fritz Lane.
- Lots 13-16 will be collected in an 8-inch line running southwest along Kampa Lane to the lift station. This line will also collect the lines located within Fritz Lane from above.
- Lots 64-71 and 31-35 will be collected in an 8-inch line running southeast along Fritz Lane. Lots 56-63 and 53-55 will be collected in an 8-inch line running northwest in Fritz Lane. These lines will connect to a manhole at the south intersection of Kampa Lane and Fritz Lane, which will outlet to the southwest along Kampa Lane.
- The 8-inch line from the intersection of Kampa Lane and Fritz Lane will continue to the west then north along Kampa Lane picking up Lots 47-52, 1-12, and 17-30, cumulating at the lift station.

Individual residences will have gravity sewer connections and feed to the gravity-based collection system. The collected flow will be brought to a lift station located across from Lot 13 on the west side of Kampa Lane. This lift station will then pump and discharge to the location where the previous City manhole was located, approximately 90 feet south of the project entrance north of US-195 onramp. This manhole will be re-established and connected by an 8-inch line across US-195 to a 27-inch sewer main. Discharging to this manhole will require a bridge crossing; therefore, structural analysis of the bridge will be performed and the bridge will be reinforced as needed to accommodate the additional load of the 8-inch main. Additional freeze protection will be added per recommended guidelines and City requirements.

Based on current layouts and projections, the lift station was conceptually sized using DOE "Orange Book" and City of Spokane Design Standards, 2007. The following is a summary of these calculations:

Reference: Deep Pine Overlook - PUD

- Estimated 32,900 gpd average flow based on 350 gal/day/lot.
- A peaking factor of 4 was used to determine the peak flow of 131,600 gpd.
- Approximate maximum pumping capacity 120 gpm at 46 feet of total dynamic head.
- Approximately 1,370 gallons of reserve volume storage will be required to provide 1 hour along with a portable generator for backup power.

During final design, we will work with the City to adjust pumping rates and storage volumes to ensure that the proposed improvement fits within existing capacity limits.

Concept Water

Conforming to City of Spokane standards, water lines will be buried a minimum of 5.5 feet in depth and located a minimum of 9.5 feet from roadway centerlines to the north or east. Water will be fed to the system via a connection to an existing City 24-inch water main located approximately 280 feet north of the project entrance.

Conceptually, it is anticipated that the development water supply will be through 8-inch lines feeding the residences and hydrants. An 8-inch carrier pipe will cross Latah Creek along or under the existing bridge. As in the case of the sewer line, structural analysis of the bridge will be performed and reinforcement will be added as needed to accommodate the additional load of the 8-inch main. Additional freeze protection will be added as needed per recommended guidelines and City requirements.

Hydrant spacing will be within 250 feet of all properties, conforming to fire department requirements. Additionally, all hydrants must be capable of providing 1,000 gpm and all residential units must have individual sprinkler systems.

A preliminary hydraulic analysis was performed for the proposed water system and is summarized in the attached Hydraulic Analysis Memo. As supported by the calculations, the system has more than adequate pressure and flow capacity. The water system will require a pressure reducing valve at the connection point to the 24-inch main.

As designs are still conceptual, the following will be completed during the final design stage:

- Stantec will work the City to finalizing the hydraulic study to verify that adequate water service will be provided for both domestic and fire flow per City standards.
- Plan and profile construction plans conforming to City of Spokane Department of Engineering Services standards will be created and submitted to the City for review prior to construction.



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City of Spokane
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Reference: Deep Pine Overlook - PUD

- Roadways will be designed to comply with fire access requirements as outlined in the Pre-Development Conference notes and the 2009 IFC with State and Local Amendments.

Additionally, any and all easement legal descriptions for the required sewer and water installations will be provided at the time of final design.

STANTEC CONSULTING SERVICES INC.

A handwritten signature in blue ink that reads "Zak Sargent".

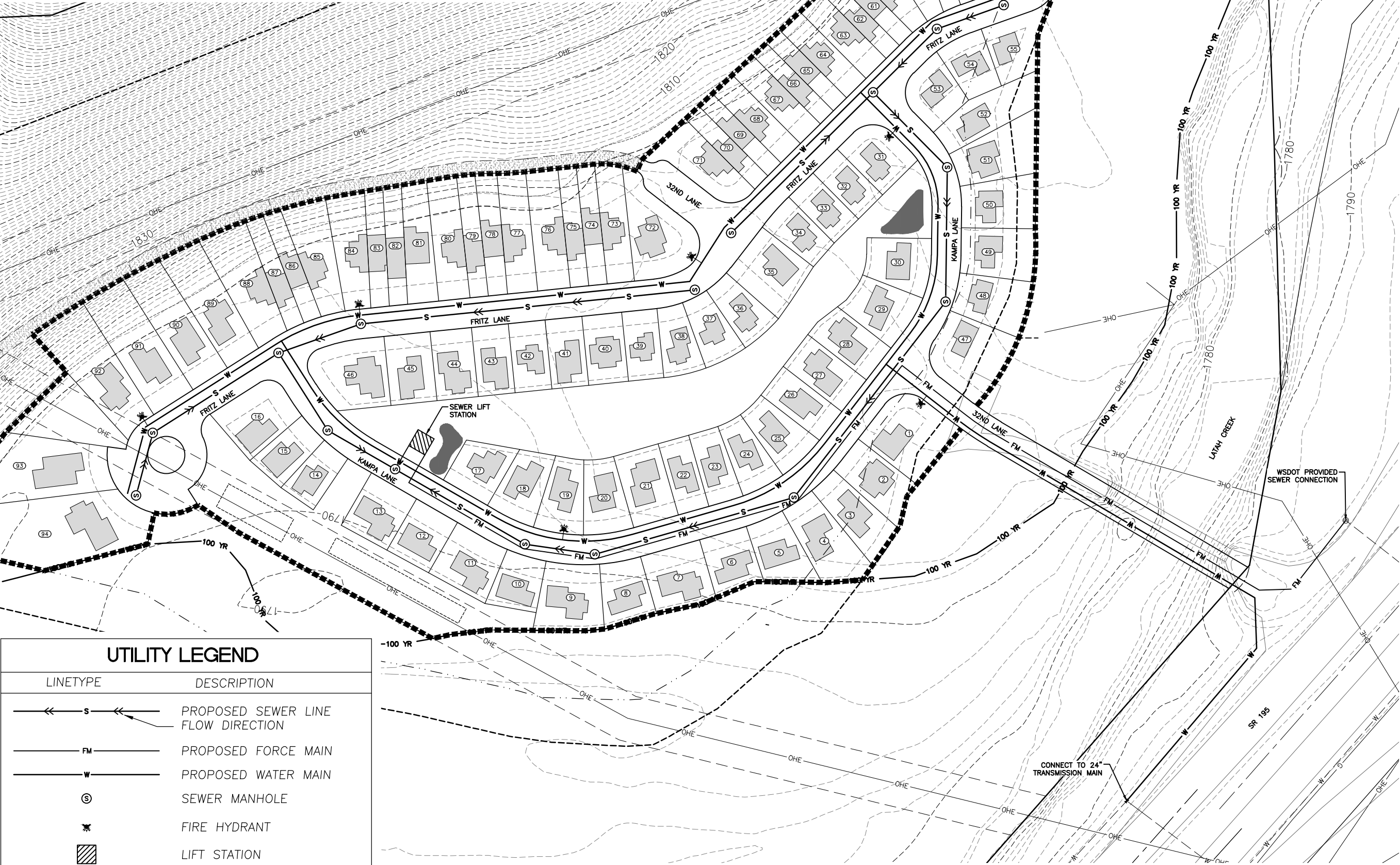
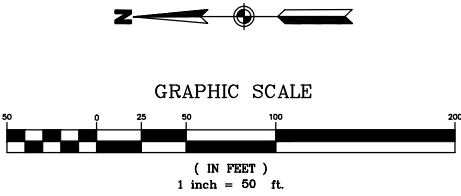
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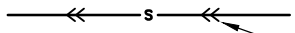

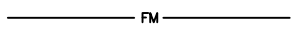
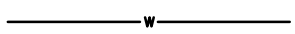



Design with community in mind

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CONCEPT SEWER AND WATER PLAN
DEEP PINE OVERLOOK



UTILITY LEGEND

LINETYPE	DESCRIPTION
	PROPOSED SEWER LINE
	FLOW DIRECTION
	PROPOSED FORCE MAIN
	PROPOSED WATER MAIN
	SEWER MANHOLE
	FIRE HYDRANT
	LIFT STATION



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PROJECT:
**DEEP PINE
OVERLOOK**
**PLANNED UNIT
DEVELOPMENT**

City of Spokane, WA

SECTION INDEX

SEC. 36, T. 25 N. R. 42 E.W.M.

SECTION INDEX

SEC. 31, T. 25 N. R. 43 E.W.M.

Project Mgr.	AEG
Drawn	ZCS
Drawn	
Checked	AEG
Date	07/13/2017

CAD File: CONCEPT-UTILITY.dwg

Sheet Contents: CONCEPT UTILITY

Sheet No.: 1 OF 1

STANTEC W.O. 2047053900

To:	Deep Pine Overlook Water Supply Hydraulic Analysis Planning Development	By:	Elisheva Walters Spokane, WA
Reference:	Deep Pine Overlook- PUD Water Supply Hydraulic Analysis 2047053900	Date:	July 12, 2017

This memo explains the methods for and results of a hydraulic model performed on the proposed water system layout for the Deep Pine Overlook development. Stantec used Bentley WaterCAD v8i to model existing and proposed conditions to estimate the availability of water for domestic and fire use.

The City of Spokane GIS utility database was used to construct a model of the existing water main from Spokane's reservoir on 1202 W Eagle Ridge Blvd to Stantec's proposed connection point northwest of S Inland Empire Way. The existing water line is illustrated on Figure 1 as a red line. Per the City of Spokane's Design Standards, 8-inch DI pipe was used to add the proposed development water layout to the model.

Six separate scenarios were constructed in WaterCAD to model flow to the six proposed hydrants. Each scenario modeled 32 gallons per minute maximum daily demand as a baseline for domestic flow, added to 1,000 gallons per minute for one hydrant (flow to only one hydrant per scenario).

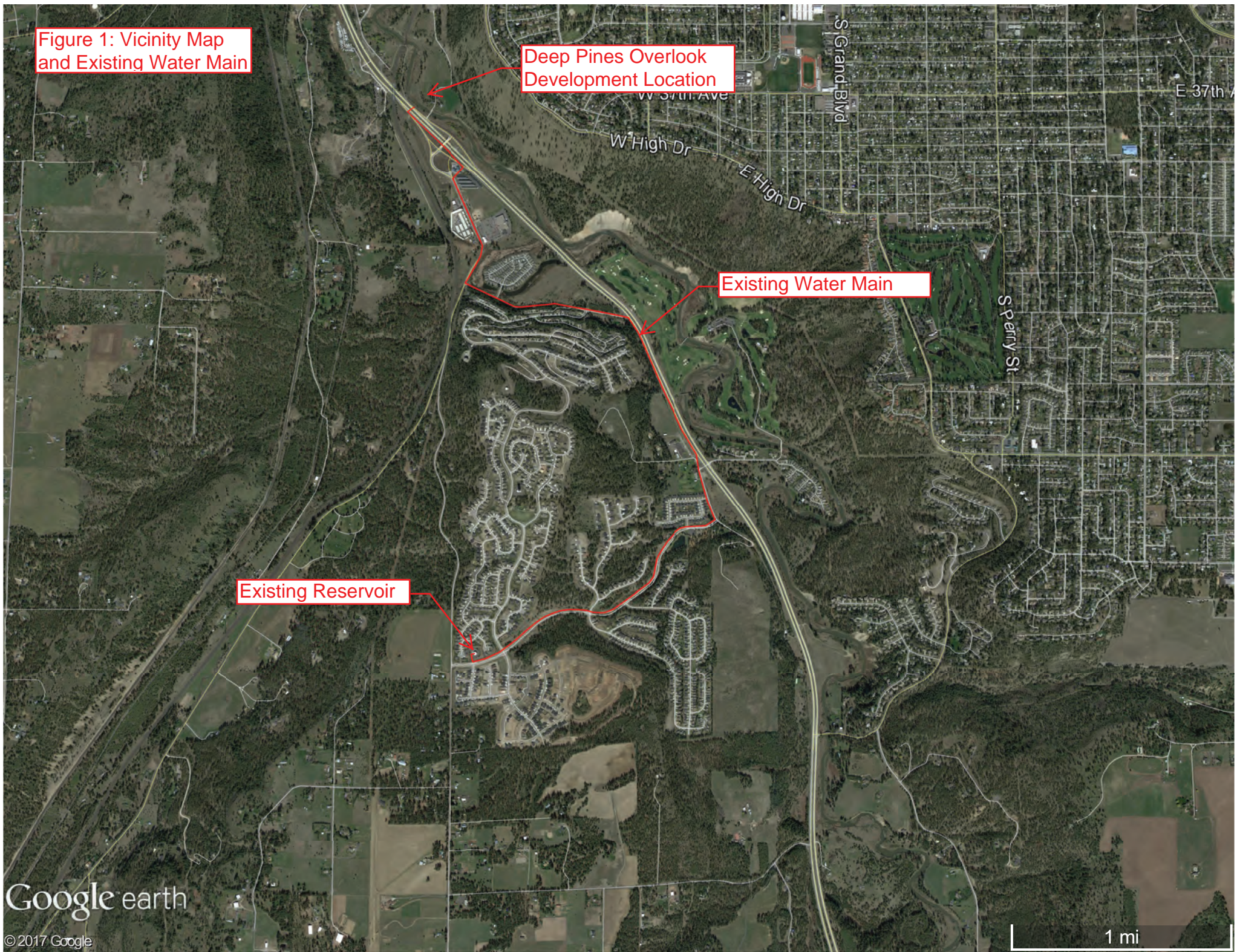
To limit excessive pressures in the system, a pressure reducing valve (PRV) will be required at the connection point to the existing main. The PRV in the model was set to limit pressure at its outlet to 81 pounds per square inch (psi). Tables 1-6 show the hydraulic model results for the system. The Tables show that proposed hydrants and "junctions" (sample connection points to homes), which are all downstream of the PRV, will see pressures of more than 45 psi and less than the 80 psi, constraints defined by the 2015 City of Spokane Water System Plan. The minimum modeled fire flow scenario pressures do not drop below 71 psi. Figure 2 illustrates the proposed water layout and shows the labeling corresponding to the Tables.

Figure 1: Vicinity Map
and Existing Water Main

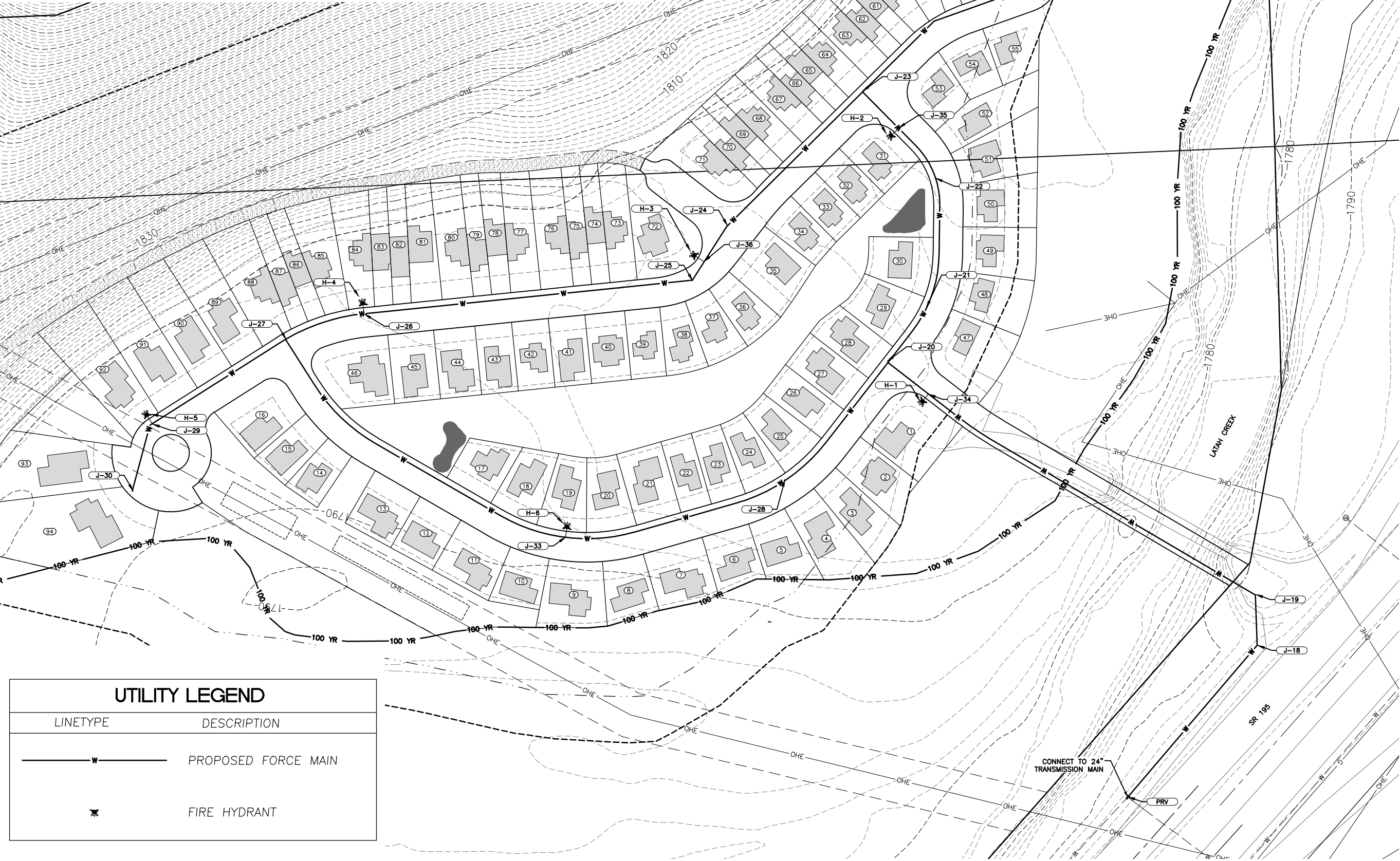
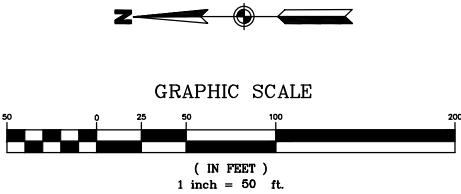
Deep Pines Overlook
Development Location

Existing Water Main

Existing Reservoir



CONCEPT WATER MODEL SCHEMATIC
DEEP PINE OVERLOOK



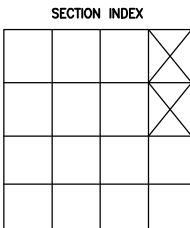
UTILITY LEGEND	
LINETYPE	DESCRIPTION
	PROPOSED FORCE MAIN
	FIRE HYDRANT



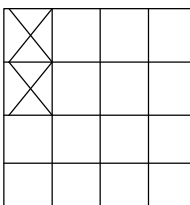
621 West Mallon Avenue, Suite 309
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PROJECT:
**DEEP PINE
OVERLOOK**
**PLANNED UNIT
DEVELOPMENT**

City of Spokane, WA



SEC. 36, T. 25 N. R. 42 E.W.M.



SEC. 31, T. 25 N. R. 43 E.W.M.

Project Mgr.	AEG
Drawn	EKW
Drawn	
Checked	
Date	7/12/2017

CAD File: 1226800-MODEL-SCHEMATIC.dwg

Sheet Contents: WATER MODEL SCHEMATIC

Sheet No.: FIGURE 2

STANTEC W.O. 2047053900

Table 1: Hydrant 1 Scenario

ID	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-18	1,793.00	0	1,976.10	79
J-19	1,793.00	0	1,975.04	79
J-20	1,793.00	2	1,966.99	75
J-21	1,793.00	2	1,966.99	75
J-22	1,793.00	2	1,966.99	75
J-23	1,793.00	2	1,966.99	75
J-24	1,793.00	2	1,966.99	75
J-25	1,793.00	2	1,966.99	75
J-26	1,793.00	2	1,966.99	75
J-27	1,793.00	2	1,966.99	75
J-28	1,793.00	2	1,966.99	75
J-29	1,793.00	2	1,966.99	75
J-30	1,793.00	2	1,966.99	75
J-33	1,793.00	2	1,966.99	75
J-34	1,793.00	2	1,966.99	75
J-35	1,793.00	2	1,966.99	75
J-36	1,793.00	2	1,966.99	75
H-1	1,793.00	1,000	1,966.88	75
H-2	1,793.00	0	1,966.99	75
H-3	1,793.00	0	1,966.99	75
H-4	1,793.00	0	1,966.99	75
H-5	1,793.00	0	1,966.99	75
H-6	1,793.00	0	1,966.99	75

Table 2: Hydrant 2 Scenario

ID	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-18	1,793.00	0	1,976.10	79
J-19	1,793.00	0	1,975.04	79
J-20	1,793.00	2	1,965.92	75
J-21	1,793.00	2	1,965.47	75
J-22	1,793.00	2	1,963.19	74
J-23	1,793.00	2	1,963.00	74
J-24	1,793.00	2	1,963.32	74
J-25	1,793.00	2	1,963.50	74
J-26	1,793.00	2	1,964.08	74
J-27	1,793.00	2	1,964.55	74
J-28	1,793.00	2	1,965.33	75
J-29	1,793.00	2	1,964.55	74
J-30	1,793.00	2	1,964.55	74
J-33	1,793.00	2	1,965.19	75
J-34	1,793.00	2	1,966.99	75
J-35	1,793.00	2	1,962.92	74
J-36	1,793.00	2	1,963.39	74
H-1	1,793.00	0	1,966.99	75
H-2	1,793.00	1,000	1,962.81	73
H-3	1,793.00	0	1,963.39	74
H-4	1,793.00	0	1,964.08	74
H-5	1,793.00	0	1,964.55	74
H-6	1,793.00	0	1,965.19	75

Table 3: Hydrant 3 Scenario

ID	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-18	1,793.00	0	1,976.10	79
J-19	1,793.00	0	1,975.04	79
J-20	1,793.00	2	1,965.92	75
J-21	1,793.00	2	1,965.58	75
J-22	1,793.00	2	1,963.88	74
J-23	1,793.00	2	1,963.24	74
J-24	1,793.00	2	1,961.62	73
J-25	1,793.00	2	1,961.48	73
J-26	1,793.00	2	1,962.54	73
J-27	1,793.00	2	1,963.41	74
J-28	1,793.00	2	1,964.84	74
J-29	1,793.00	2	1,963.41	74
J-30	1,793.00	2	1,963.41	74
J-33	1,793.00	2	1,964.60	74
J-34	1,793.00	2	1,966.99	75
J-35	1,793.00	2	1,963.67	74
J-36	1,793.00	2	1,961.27	73
H-1	1,793.00	0	1,966.99	75
H-2	1,793.00	0	1,963.67	74
H-3	1,793.00	1,000	1,961.16	73
H-4	1,793.00	0	1,962.54	73
H-5	1,793.00	0	1,963.41	74
H-6	1,793.00	0	1,964.60	74

Table 4: Hydrant 4 Scenario

ID	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-18	1,793.00	0	1,976.10	79
J-19	1,793.00	0	1,975.04	79
J-20	1,793.00	2	1,965.92	75
J-21	1,793.00	2	1,965.69	75
J-22	1,793.00	2	1,964.50	74
J-23	1,793.00	2	1,964.06	74
J-24	1,793.00	2	1,962.94	74
J-25	1,793.00	2	1,962.33	73
J-26	1,793.00	2	1,960.45	72
J-27	1,793.00	2	1,961.87	73
J-28	1,793.00	2	1,964.17	74
J-29	1,793.00	2	1,961.87	73
J-30	1,793.00	2	1,961.87	73
J-33	1,793.00	2	1,963.79	74
J-34	1,793.00	2	1,966.99	75
J-35	1,793.00	2	1,964.36	74
J-36	1,793.00	2	1,962.70	73
H-1	1,793.00	0	1,966.99	75
H-2	1,793.00	0	1,964.36	74
H-3	1,793.00	0	1,962.70	73
H-4	1,793.00	1,000	1,960.34	72
H-5	1,793.00	0	1,961.87	73
H-6	1,793.00	0	1,963.79	74

Table 5: Hydrant 5 Scenario

ID	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-18	1,793.00	0	1,976.10	79
J-19	1,793.00	0	1,975.04	79
J-20	1,793.00	2	1,965.92	75
J-21	1,793.00	2	1,965.74	75
J-22	1,793.00	2	1,964.85	74
J-23	1,793.00	2	1,964.52	74
J-24	1,793.00	2	1,963.68	74
J-25	1,793.00	2	1,963.22	74
J-26	1,793.00	2	1,961.81	73
J-27	1,793.00	2	1,960.69	73
J-28	1,793.00	2	1,963.67	74
J-29	1,793.00	2	1,957.61	71
J-30	1,793.00	2	1,957.61	71
J-33	1,793.00	2	1,963.17	74
J-34	1,793.00	2	1,966.99	75
J-35	1,793.00	2	1,964.74	74
J-36	1,793.00	2	1,963.50	74
H-1	1,793.00	0	1,966.99	75
H-2	1,793.00	0	1,964.74	74
H-3	1,793.00	0	1,963.50	74
H-4	1,793.00	0	1,961.81	73
H-5	1,793.00	1,000	1,957.50	71
H-6	1,793.00	0	1,963.17	74

Table 6: Hydrant 6 Scenario

ID	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-18	1,793.00	0	1,976.10	79
J-19	1,793.00	0	1,975.04	79
J-20	1,793.00	2	1,965.92	75
J-21	1,793.00	2	1,965.82	75
J-22	1,793.00	2	1,965.30	75
J-23	1,793.00	2	1,965.10	74
J-24	1,793.00	2	1,964.62	74
J-25	1,793.00	2	1,964.36	74
J-26	1,793.00	2	1,963.55	74
J-27	1,793.00	2	1,962.91	74
J-28	1,793.00	2	1,962.78	73
J-29	1,793.00	2	1,962.91	74
J-30	1,793.00	2	1,962.91	74
J-33	1,793.00	2	1,962.08	73
J-34	1,793.00	2	1,966.99	75
J-35	1,793.00	2	1,965.23	75
J-36	1,793.00	2	1,964.51	74
H-1	1,793.00	0	1,966.99	75
H-2	1,793.00	0	1,965.23	75
H-3	1,793.00	0	1,964.51	74
H-4	1,793.00	0	1,963.55	74
H-5	1,793.00	0	1,962.91	74
H-6	1,793.00	1,000	1,961.97	73