



MEMORANDUM

TO: BRIAN JOHNSON, WATER SYSTEM
SPECIALIST
FROM: KERRI SIDEBOTTOM, P.E.
DATE: FEBRUARY 14, 2024
SUBJECT: EAST TOWN CROSSING FIRE FLOW
AVAILABILITY
CITY OF PUYALLUP, PIERCE COUNTY,
WASHINGTON
G&O #21415.18

Per your request, I have analyzed the available fire flow at the proposed East Town Crossing development, in the central part of the City's water service area. The setup of the hydraulic model and the assumptions used to determine the static pressure and available fire flow are noted as follows.

- The available fire flows and pressures are measured at 14 nodes, corresponding to the proposed hydrants within the development, as shown in the attached figure.
- Water system demands are based on projected 2038 demands and reservoirs are depleted of fire suppression and equalizing storage, as established in the *2019 Water System Plan (WSP)*, approved by the Department of Health (DOH). The City's water model was updated in 2021 to reflect additional system improvements since the WSP was developed.
- All pump stations are idle, and the Salmon Springs source is operating at 1,100 gallons per minute (gpm).

The development is located in Zone 1, which is supplied by Maplewood Springs and the 15th Avenue SE Reservoirs. The system was modeled as-is, with the proposed piping indicated on the attached figure. The model was run for two different scenarios, both of which include new 8-inch piping. The new piping for Scenario 1 includes the Phase 1 piping as shown on the attached figure in pink. Scenario 2 includes additional piping for Phase 2 of the development and an 8-inch loop on the west side of the site, which is shown in orange on the attached figure.



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The available pressure under 2038 peak hour demands at the hydrants is included in Table 1.

TABLE 1
Peak Hour Pressure

Node	Hydrant	Elevation, feet	Peak Hour Pressure, psi
J2238	J	71	42
J2240	L	72	42
J2242	M	72	42
J2244	N	76	40
J2246	H	76	40
J2248	I	76	40
J2250	F	73	42
J2252	D	69	43
J2254	C	67	44
J2256	B	66	45
J2258	A	66	45
J2260	E	72	42
J2274	G	75	41
J2276	K	71	42

The peak hour pressures within the development are essentially the same under either of the proposed scenarios, and the looping does not appreciably impact the pressures.

SCENARIO 1

Scenario 1 includes the piping planned for Phase 1, as shown in pink on the attached figure. The piping includes 8-inch mains, mostly dead-ends, extending from the existing 8-inch main running from north to south through the site. Part of the existing 8-inch main will be replaced during construction of the development.

Available fire flow was modeled at 12 of the proposed hydrants in the development, Hydrants A through L. The hydrants are located on 8-inch pipes throughout the development, many of which are dead-ends. The fire flow is modeled on the main line, and hydrant laterals are not explicitly included in the modeling. The results of this modeling are included in Table 2. The modeled fire flow is available at any hydrant individually, but not simultaneously.



TABLE 2
Modeled Fire Flow Availability, Scenario 1

Node	Hydrant	Available Fire Flow, gpm	Residual Pressure at Available Fire Flow, psi	Minimum System Pressure at Available Fire Flow, psi
J2238	J	2,510 ⁽¹⁾	23	23
J2240	L	1,560 ⁽¹⁾	24	24
J2246	H	1,560 ⁽¹⁾	21	21
J2248	I	2,850 ⁽¹⁾	20	20
J2250	F	1,560 ⁽¹⁾	25	25
J2252	D	1,540 ⁽¹⁾	25	25
J2254	C	1,540 ⁽¹⁾	26	26
J2256	B	1,540 ⁽¹⁾	22	22
J2258	A	1,540 ⁽¹⁾	20	20
J2260	E	1,560 ⁽¹⁾	22	22
J2274	G	1,560 ⁽¹⁾	25	25
J2276	K	1,560 ⁽¹⁾	28	28

(1) Limited by maximum system-wide velocity of 10 feet per second.

Fire flow to all of the hydrants is limited by the 10-foot per second maximum velocity through the existing and proposed 8-inch pipes in this scenario.

SCENARIO 2

Scenario 2 includes the piping indicated for Phases 1 and 2, as shown in pink and orange on the attached figure, as well as an additional loop shown in orange in the west of the site. The piping includes 8-inch pipes extending from the existing 8-inch main running from north to south through the site and including improved looping, as compared with Scenario 1.

Available fire flow was measured at the 14 proposed hydrants in the development, Hydrants A through N. The hydrants are located on 8-inch pipes throughout the development. The fire flow is modeled on the main line, and hydrant laterals are not explicitly included in the modeling. The results of this modeling are included in Table 3. The modeled fire flow is available at any hydrant individually, but not simultaneously.



TABLE 3
Modeled Fire Flow Availability, Scenario 2

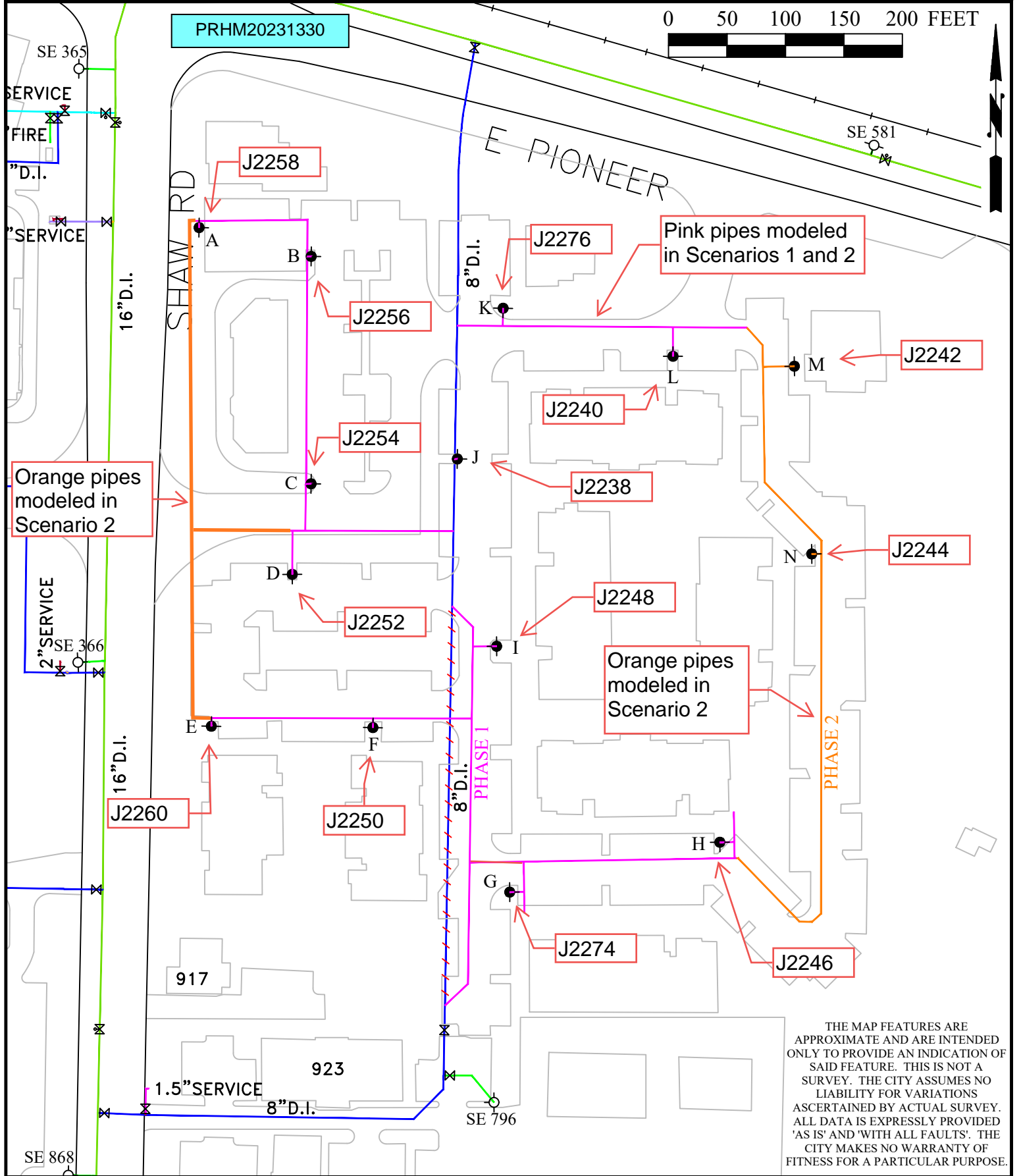
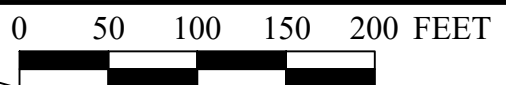
Node	Hydrant	Available Fire Flow, gpm	Residual Pressure at Available Fire Flow, psi	Minimum System Pressure at Available Fire Flow, psi
J2238	J	2,540 ⁽¹⁾	23	23
J2240	L	2,240 ⁽¹⁾	23	23
J2242	M	2,380 ⁽²⁾	20	20
J2244	N	2,150 ⁽²⁾	20	20
J2246	H	2,350 ⁽²⁾	20	20
J2248	I	2,650 ⁽¹⁾	21	21
J2250	F	2,220 ⁽¹⁾	22	22
J2252	D	2,230 ⁽¹⁾	23	23
J2254	C	1,950 ⁽¹⁾	26	26
J2256	B	2,420 ⁽¹⁾	20	20
J2258	A	2,430 ⁽²⁾	20	20
J2260	E	2,490 ⁽²⁾	20	20
J2274	G	2,020 ⁽¹⁾	24	24
J2276	K	1,910 ⁽¹⁾	27	27

- (1) Limited by maximum system-wide velocity of 10 feet per second.
- (2) Limited by minimum system-wide pressure of 20 psi at all service locations.

Fire flow to most of the hydrants is limited by the 10-foot per second maximum velocity through the existing and proposed 8-inch pipes, though flow to several of the hydrants located on looped pipes is limited by the 20 psi-minimum, system-wide pressure at all service locations.

The Department of Health and City Standards for water distribution systems are to meet the peak hourly demand of the system while providing a minimum pressure of 30 psi, system-wide. Under peak daily demand with a fire flow, the system is designed to maintain a minimum pressure of 20 psi, system-wide. Although the peak hourly demand pressure may currently be higher than these standards, the Developer must recognize that the City may not provide pressure higher than 30 psi in the future. The flows and pressures determined in this memo are based on the approximate hydrant elevation at ground level. The Developer may design their sprinkler system for whatever pressure they wish, however they must recognize and be responsible for conditions when the pressure may be less than currently exists.

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CITY OF PUYALLUP
PUBLIC WORKS
WATER DIVISION

HYDRAULIC MODEL FOR EAST TOWN CROSSING (FIGURE 1)

SCALE AS SHOWN

02/02/2024

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PG104/MODEL_EAST_TOWN_CROSSING