

PRELIMINARY UTILITY REPORT

FOR

**COSTCO WHOLESALE DEVELOPMENT
TOWN OF CASTLE ROCK, COLORADO
SDP25-0021**

Prepared for:

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October 24, 2025

UTILITY REPORT APPROVAL BLOCKS

Engineer's Statement:

The enclosed utility report, and exhibits, were prepared by me or under my direct supervision and is correct to the best of my knowledge and belief. Said utility report has been prepared in accordance with applicable Town of Castle Rock criteria and is in conformance with the master utility plans for the affected area. I accept responsibility for any liability caused by negligent acts, errors, or omissions on my part in preparing this report.

Signature: _____
Registered Professional Engineer
State Of Colorado No. _____
(Affix Seal)

Owner/Developer's Statement:

As Owner/Developer of Land identified within this report; I agree to proceed, implement and comply with all recommendations and requirements outlined herein.

Name of Developer

Authorized Signature

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1. PROJECT LOCATION AND DESCRIPTION

A. General

The purpose of this Preliminary Utility Report is to present the design of the water and wastewater distribution systems for the Costco Wholesale development. This Preliminary Utility Report analyzes the proposed infrastructure associated with the development of Costco Wholesale, hereon referred to as the "Site".

B. Site Location

The legal description of the site is Dawson Filing No. 1, Lot 1, pending recording of the plat. The Site is approximately centered within Section 22, Township 8 South, Range 67 West of the Sixth Principal Meridian. The Site is bounded by Ike Street to the east, Dawson Trails Boulevard the west, and Crystal Valley Parkway and Gambel Ridge Tributary on south, and Tracts N, P, Q, R and S of Dawson Filing No. 1 to the north. A vicinity map for the site can be found in Appendix A.

C. Project Description

The proposed development includes a 162,050 square-foot retail warehouse, a 12-pump fueling facility, a 186 square-foot fueling station enclosure and associated parking and circulation within a 19.65-acre lot. The single-family-equivalent (SFE) of the proposed development is 80.5 SFE, at a rate of 0.0005 SFE per square-foot of retail, per Section 4.4.1 of the Town's water design criteria.

The proposed Costco Wholesale warehouse is within the Dawson Trails planned development. At present, the site is vacant land and is not accessible by public roads. It is 0.05 miles west of the BSNF railroad and 0.10 miles north of Territorial Road. The development parcel lies within Planning Area F-2, which permits residential and nonresidential as allowable uses. Early phases of infrastructure around the site will construct the following improvements:

- An interchange on Interstate 25 with Crystal Valley Parkway south of the site
- Dawson Trails Boulevard along the west edge of the site
- Ike Street along the east edge of the site
- Stabilization of Gambel Ridge Tributary along the south edge of the site
- Regional detention facility C1 on the south side of Crystal Valley Parkway
- Regional detention facility B1 in the upper Gambel Ridge watershed
- Potable water and sanitary sewer improvements to support development of Dawson Trails
- Overlot grading of Dawson Trails Filing No. 1, including the Costco parcel.
- Blue Zone to Red Zone booster pump located at the northeast intersection of Ike St and Costco Lane
- Red Zone water tanks located within Dawson Trails Filing No. 2

The above improvements will be constructed prior to or concurrent with the Costco project, and all intended to be complete by the conclusion of construction on the Costco site.

This report proposes locations and sizes for the water and wastewater systems and analyzes the proposed networks using criteria from the Town of Castle Rock Water System Design 2018 Criteria Manual and Wastewater Collection Design 2018 Criteria Manual. The project contains approximately 160981-sf of commercial space split between the warehouse and a small fuel station facility along with 3.1-acres of landscaped area, which are equivalent to 80 and 29 SFE per the Water Criteria Manual. The 109 combined SFE equates to an average daily demand of

30-gpm, a peak hour demand of 131-gpm and a maximum daily demand of 64-gpm as calculated from Section 4.4 of the Water Criteria Manual.

This report analyzes the proposed water and sanitary sewer systems which will be constructed as part of the development, as well as the connections to the surrounding existing infrastructure. The utility design will conform to the current Town of Castle Rock standards. Easements will be provided for utilities that fall out of the public right-of-way. These will be dedicated on the final plat or at the time of final design/construction documents. The proposed water line will be accessible within the site, predominantly within the proposed roadways.

2. WATER SYSTEM

A. General

The water system will be served by a network of Red Zone water distribution lines operated by Castle Rock Water, located within the surrounding public roadway and internal to the site within utility easements. A Water System Map has been included in Appendix E.

A variance request is submitted with this report to permit static pressures to exceed 125 psi within the proposed on-site water system (Section 4.4.3 of the Town's water criteria). The development is located near the boundary between the Red and Blue Pressure Zones, and a connection to the blue zone does not provide sufficient pressure to meet the operational requirements of the site's user. Connection to the Red Zone meets the user requirements and adheres to the Town's minimum pressure limits under all modeled scenarios. However, the maximum static pressure of 132 psi exceeds the Town's 125 psi by 7psi when the Red Zone tank is at maximum HGL. Pressure reducing valves will be utilized within the building mechanical system to reduce pressure for the end user.

B. Master Plan: Water Distribution System

The layout and design of the major water distribution system proposed in this report generally conforms with the Town of Castle Rock 2017 Water Master Plan. The Site is serviced by the Red Pressure Zone. Some surrounding roads contain Blue Zone infrastructure, but there are no Blue Zone connections to the Costco site. The water distribution system bringing potable water to the Site is shown on the Overall Water Map in Appendix E and will consist of the following:

Included with Dawson Trails Filing 1 Infrastructure

- Blue Zone loop installed with Dawson Trails Filing 1 Infrastructure, necessary to feed the Red Zone
- Water Booster Pump from the Blue Zone to Red Zone

Included with Dawson Trails Filing 2 Infrastructure

- Tank 19 (Red Zone)
- A 24"/20" Transmission main connection between the Blue Zone/Red Zone pump station and the Red Zone Tank

High water and low water levels for Red Zone Tank 19 are obtained from design documents currently in development. See Appendix E for an Overall Water Plan Map.

C. Regional Offsite Improvements

The Costco Wholesale development will require four (4) significant offsite improvements located within the vicinity of the development. The first is Tank 19, which will be a supply for the Red Zone. Tank 19 consists of two tanks that are located approximately on the location of the previously abandoned water tanks within Dawson Trails Filing 2. The second offsite improvement is a connection to the existing 12" Blue Zone water main at Crystal Valley Parkway, just west of Plum Creek Blvd, on the east side of Interstate I-25. This will be a 24-inch connection and would require a directional bore below two (2) existing railroad tracks, Interstate-25, and Plum Creek. The third offsite improvement is a connection to the 16" proposed Blue Zone water main in Plum Creek Parkway, therefore providing looping to the major water distribution system. The fourth major improvement is the installation of the Blue Zone to Red Zone booster pump located to the northeast of Ike Street and Costco Lane.

D. Phasing

All construction at the Costco site will be in a single phase. Dawson Trails Filing 1 infrastructure, the red zone tank, the red zone pump station, and the Filing 2 water connection to the red zone tank will all be constructed before or concurrent with the Costco construction.

E. Demand Categories, Design Criteria

Water consumption demands from Section 4.4.1 Design Demands were used for the Average Day Demands (ADD) and peaking factors as shown in Table 2.1: Water System Design Values from the Town of Castle Rock Water System Design 2018 Criteria Manual. A Water Efficiency Program for Dawson Trails has been developed by AquaSan Network Inc. This WEP is a guideline for water usage throughout the Dawson Trails Filings. It is anticipated that the actual demand required by Costco, including the landscaping and other areas will be less than the TOCR Criteria and will be consistent with the Dawson Trails WEP.

Table 2.1: Water System Design Values

Criteria	Value
Average Day Demand (ADD) per SFE	400 gallons per day (gpd)
Average Day Demand (ADD) per Multi-Family	260 gallons per day (gpd)
Maximum Daily Demand (MDD) Factor	2.5 times ADD
Peak Hour Demand (PHD) Factor	5.5 times ADD
Minimum Static Pressure with Zero Demand (20% Tank Stage)	43 psi
Minimum Static Pressure with Zero Demand (100% Tank Stage)	125 psi
Minimum Dynamic Pressures (based on 20% Tank Stage)	
Max Daily Demand + Fire Flow	20 psi
Peak Hour Demand	35 psi

The following Single-Family Equivalents were used to calculate water demands.

Table 2.2: Single Family Equivalents

Criteria	Value
Retail/Offices	0.0005 / SqFt
Irrigated Land	9.38 / acre

Domestic Water Demands

Domestic demand parameters for the Costco development are shown below with supporting calculations in Appendix B:

- **Average Day Demand (ADD)** is the total water use during a year divided by the number of days in a year (365).
ADD = 22 gpm
- **Maximum Day Demand (MDD)** is the average demand in the month with the overall highest usage during the year (typically July or August). MDD is used to size water pipelines when combined with fire flows. MDD is also used to size water storage tanks (along with fire flow volumes).
MDD = 56 gpm
- **Peak Hour Demand (PHD)** is the highest hourly demand occurring during the year. PHD is used to evaluate the required size of distribution pipelines.
PHD = 123 gpm

Fire Flow Analysis

Three separate minimum fire flow evaluations have been performed for the project. Two evaluations are for warehouse fire flow, and the third is for fueling station fire flow. Fire flow analysis and calculations are provided in Appendix B.

1. Warehouse: Town of Castle Rock / Castle Rock Fire Flow requirement

The Costco warehouse building will be equipped with a sprinkler systems compliant with NFPA 13. From Table B105.1 of the International Fire Code (IFC), a 162,050 square-foot building requires a fire flow up to 8,000 gpm depending on construction type. Table B105.2 of the IFC allows a reduction of fire flow from the value in Table B105.1 for buildings with an automatic sprinkler system.

Town water criteria defer to the Town Fire Department for verification of allowed reduction in fire flow. The Town Fire Department has stated a fire flow requirement of 4,000 gpm with a 4-hour duration in the Fire Flow Confirmation Memo, signed 08/30-2024 (Fire Review 15065). The 4,000 gpm requirement is a 50% reduction from the maximum applicable value in IFC Table B105.1, which is more stringent than the 75% reduction outlined in IFC Table B105.2. Therefore, a fire flow of 4,000 gpm is used for system modeling in accordance with sections 4.4.1.3 and 3.6.VIII.B.3 of the Town's Water Criteria. The fire confirmation memo is provided in Appendix D.

2. Warehouse: Costco Design Standards

As mentioned previously, Costco requires that two fire flow conditions are satisfied. The first is essentially the same as Castle Rock's requirements (**4,000 gpm** with 20 psi residual pressure per CRW requirements). The second fire flow condition required by Costco is **2,150 gpm** with 65 psi residual pressure. The 2,150-gpm scenario is modeled in the water analysis to demonstrate compliance with Costco standards.

3. Fueling Station:

A 1500 gpm fire flow scenario is modeled from the hydrant at the fueling station. The 1500 gpm flow meets both Town and Costco requirements.

The fire flow evaluations are summarized in the table below.

Criteria	Min. Fire Flow (gpm)	Duration (gpm)	Min. Residual Pressure (psi)
* Castle Rock Fire Memo	4,000	4 hrs	20
Costco Devel. Reqs. 06.C.5.b	4,000	Not specified	20
* Costco Devel. Reqs. 06.C.5.b	2,150	Not specified	65
* Fueling Station	1,500	2 hrs	20

* Starred scenarios are modeled in the Max Day + Fire Flow Analyses

Fire flows and required pressures from the Costco Wholesale Development Requirements, dated October 28, 2022, can be found in Appendix D. In summary, the Costco development has two fire flow conditions to satisfy: 4,000 gpm with 20 psi residual pressure (CRW requirements) and 2,150 gpm with 65 psi residual pressure. CORE has analyzed the water distribution system to meet both CRW and Costco Wholesale requirements. The Fire flow hydraulic analysis and supporting calculations are provided in Appendix B.

Irrigation Demands

The landscape summary on sheet 49 of the Costco construction documents identifies 2.27 acres of irrigated area and an additional 0.82 acres of native seed area within the 19.65-acre lot. Since the native seed area will require temporary irrigation for establishment of growth, the irrigation demand calculations include both permanent (POC 1) and temporary (POC T) irrigation demands. The temporary system will tap off a hydrant in the southeast corner of the parking area and will distribute water through above-ground hoses to temporary sprinkler heads in the water quality pond and along the south perimeter. The permanent irrigation tap is a 1" tap located near the south portion of the project.

The total irrigated area of 3.09 acres corresponds to a SFE of 29 (Town Water Criteria, Section 4.4.1), with an average day demand of 11,588 gpd. This figure is used in the tank storage calculation (Appendix B) and is more conservative than the total permanent and temporary irrigation demands identified on sheet 58 of the construction plans. Per the irrigation plan, permanent irrigation is anticipated to be 38,340-gallons per month and 36,236-gallons per month for temporary irrigation for a month total of 74,576 gallons, or 2486 gpd. All permanent and temporary irrigation zones are rated as **low** use on the composite landscape water use rating chart.

For modeling purposes, the maximum zone rates of 18 gpm and 40 gpm are applied to POC 1 and POC T irrigation tap nodes, respectively. These rates are more conservative and therefore used for hydraulic modeling. For irrigation calculations refer to Appendix B.

Tank storage computation

Storage requirements per Town Water Criteria Section 4.4.2 are calculated from the following three components:

1. Domestic Maximum Day Demand (MDD) is based on the retail use rate is Section 4.4.1 and the 2.5 Peaking Factor in Section 4.4.1.2 of the Town's Water Criteria:
81,118 gallons
2. Irrigation Maximum Day Demand (MDD) is based on the ADD for storage computation as described above, no peaking factor, per Section 4.4.1.2 of the Town's Water Criteria:
11,588 gallons

3. Fire Flow is the total amount necessary to provide flow rate and duration required by the Fire Flow Confirmation Memo (4000 gpm for 4 hours):
960,000 gallons

A total storage volume of approximately **1,053,000 gallons** is for the Costco development. Two tanks, each with 1.80-million-gallon capacity, are proposed with The initial phase of Red Zone water infrastructure in Dawson Trails Filing 2. The combined capacity of 3.6 million gallons meets the 1.053-million-gallon storage requirement for the Costco development. The storage computation is provided in Appendix B.

F. Water System Modeling and Analysis

The water system was modeled by CORE Consultants using WaterCAD software, by Bentley Systems. The WaterCAD results and corresponding schematic map are included in Appendix B. Simulations were run for the following scenarios:

- Minimum and Maximum Static Pressures with Zero Demand (20% and 100% Tank level)
- Peak Hour Demand (PHD)
- Max Day Demand + Warehouse Fire Flow (MDD+FF)
- Max Day Demand + Fuel Station Fire Flow [MDD+FF]

Additionally, separate sub-scenarios of the PHD and MDD+FF cases were modeled with one critical distribution loop out of service.

Both PHD and MDD +FF models include sub-scenarios that take Link 4142 out of service. Link 4142 is the 12" main that connects to the Costco development from the 24" transmission main in Dawson Trails Boulevard. That link is selected as a worst-case because it is a 12" connection, because it is the most direct link from the Red Zone tank, and because it conveys the greatest amount of flow to the site in un-closed scenarios.

The PHD and MDD + FF also model sub-scenarios where the links immediately adjacent to the largest demand are separately taken out of service. For warehouse demands, these are links 2423 and 2122. For fuel station demands, these are links 4244 and 4445.

Static Pressure with Zero Demand

Prior to applying any demands, the static pressures at each junction were evaluated for two conditions: 20% full tank and 100% full tank. The 20% full condition determines the low static pressure, and the 100% full scenario reveals the maximum station pressure. For this analysis, the following tank levels were used:

Table 2.3 Red Zone Tank Water Levels

Tank	20% Full Elevation	100% Full Elevation
Red Zone Tank 19	6662 ft	6680 ft

The majority of the junctions have a static pressure within the required range (43 psi to 125 psi). There are a number of junctions with a pressure over 125 psi, which are being requested as a variance. As described above, the Costco Development sits within the Red Pressure Zone to meet minimum pressure requirements during Peak Hour Demand consistent with Costco Requirements. Results are provided in Appendix B.

Peak Hour Demand

A PHD scenario was performed with the tank levels at 20% full. The PHD factors were applied to average day demands and the model output was evaluated for junction pressure and pipe velocity. Unfactored Irrigation demands corresponding to the maximum zonal flow from each of the irrigations taps (permanent and temporary) were modeled concurrent with the peak domestic flow to the warehouse. For the closed link sub-scenarios, the critical pipes modeled as out-of-service were the site connection from Dawson Trails Boulevard (link 4142), and the water main segments north and south of the warehouse's tap (links 2122 and 2423). A summary of the baseline peak hour scenario is provided below, and full output with closed links is included in Appendix B.

Table 2.4 PHD Results

Scenario	Lowest On-Site Junction Pressure (PSI)	Highest Pipe Velocity (FPS)
Peak Hour Demand	124	0.23 (P-4612)

MDD+FF at Warehouse

A maximum day demand plus fire flow (MDD+FF) scenario for was performed with the tank levels at 20% full. The basis of fire flow demands is detailed above in section 2.E of this report, and the Fire Flow Confirmation Memo from Castle Rock Fire is provided in Appendix D.

All fire demands for the warehouse fire flow (4,000 gpm for the TOCR scenario and 2,150 for the Costco scenario) are modeled at the fire line connection J-22A-FDC. Concurrent maximum day demands are modeled at the domestic tap location J-22-TAP. A 12" water line is provided along the eastern building frontage to ensure that the concentration of flow demands from the building's fire line and neighboring hydrants remains within the operational limits in Section 4.4.3.3 of the Town's water criteria, including when a critical loop is out of service.

The fuel station fire-flow scenario places the full 1500 gpm demand at the hydrant adjacent to the fuel station (J-44). All fire hydrant junctions satisfy the CRW's requirement of a minimum of 20 psi residual pressure. A summary of the baseline results is provided below, with complete results and closed link scenarios provided in Appendix B.

Table 2.5 MDD+FF Results

Scenario	Lowest On-Site Junction Pressure (PSI)	Highest Pipe Velocity (FPS)
MDD + FF at Warehouse (4000 gpm)	113	6.93 (P-2423)
MDD + FF at Fuel Station (2150 gpm)	120	3.76 (P-2423)
MDD + FF at Fuel Station (1500 gpm)	120	6.48 (P-4244)

3. WASTEWATER COLLECTION SYSTEM

A. General

The wastewater collection system will be served with gravity sanitary sewer lines operated by the Town of Castle Rock. The onsite wastewater collection system consists of service laterals connecting to two 8-inch mains that are maintained and operated by the Town of Castle Rock. One connection will be made to the 24" sanitary sewer trunk line in Ike Street with a second connection to an 8" sewer main that parallels the north property line. These runs are graphically shown in the Overall Sanitary Sewer Map in Appendix E. The anticipated total wastewater load for the Site is 16.7 gallons per minute. The ultimate outfall of the Site is a 24" sanitary offsite interceptor to the east within Ike Street.

B. Wastewater Collection System

The plan is in general accordance with the Castle Rock Water 2016 Wastewater Master Plan Update. The main discrepancy from the Master Plan is rather than a 15-inch pipe at the downstream end of the interceptor, further analysis concluded that a 24-inch pipe will be needed to accommodate for the density and magnitude of the overall Dawson Development. Additionally, the Town is responsible for reconnecting the sanitary sewer main across Plum Creek Parkway to tie into the existing wastewater collection system. The Town is anticipating upsizing these interceptors to adequately convey the flows of the ultimate buildout. The overall wastewater collection system serving the Costco and the larger Dawson Trails Development will consist of the following:

- 8"/12"/15"/18"/21"/24" gravity sanitary sewer

Routing

As shown in the Overall Wastewater Map. Flows from the Site will be accepted at Junction 7.02 and taken to Junction 7. The flows will enter a 24" offsite sanitary interceptor to the east and taken north. A hydraulic capacity and routing of the proposed pipes was done using a CORE developed spreadsheet. The results of this analysis can be found in Appendix C.

C. Regional and Offsite Improvements

The Town of Castle Rock currently has an existing 12 and 15-inch sanitary sewer gravity mains serving the southwest quadrant of Town and terminates at Territorial Road and Interstate-25. The existing mains will be removed and replaced with a 24-inch sanitary sewer interceptor running north along the west side of the I-25 Frontage Road to Plum Creek Parkway. See the Overall Wastewater Map in Appendix E for the proposed conceptual alignment.

D. Phasing

All construction with the Costco site will be in a single phase. Dawson Trails Filing 1 infrastructure, and the 24" interceptor under Ike Street will be constructed before or concurrent with the Costco construction.

E. Demand Categories, Design Criteria

Wastewater demands, were taken from 4.4.1.1 Wastewater System Average Daily Flow (ADF) of the Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual.

Table 3.1 – Wastewater Collection System Evaluation Parameters

Flow Parameters	
Average Daily Flow (ADF)	200 gpd / dwelling unit
Peaking Factor (PF)	$PF = 3.65 * [(ADF)^{-0.168}]$ Maximum PF = 5
Infiltration and Inflow (I/I)	$I/I = 0.1 * ADF$
Peak Design Flow (PDF)	$PDF = ADF * PF + (I/I)$
Gravity Flow Pipe Parameters	
Minimum Pipe Size	8-inch
Manning's Roughness Coefficient	0.011
Minimum Velocity	2.0 ft/s
Maximum Velocity	10.0 ft/s
Maximum Flow in Pipe (d/D)	0.75
Force Main Parameters	
Minimum Pipe Size	4-inch
Minimum Velocity	3.0 ft/s
Maximum Velocity	7.0 ft/s

The following Single-Family Equivalents were used to calculate Sanitary Demands.

Criteria	Value
Industrial / Commercial	3.0 / acre

Parameters used with the model of the Costco Warehouse collection system are as follows:

- **Average Daily Flow (ADF)** are the total wastewater flows generated in year divided by the number of days in a year (365). Average Daily Flows, or base flows, are contributed to the collection system from residential, industrial, commercial, and schools.
- **Peak Design Flow (PDF)** is the highest hourly demand occurring during the year. These flows were used for the analysis of the sanitary sewer system.

F. Wastewater System Modeling and Analysis

The wastewater system was modeled using an Excel spreadsheet shown in Appendix C. The runs are included in the Overall Sanitary Sewer Map in Appendix C. Final road grades have been designed, therefore sanitary sewer slopes have been analyzed at proposed final grades.

4. CONCLUSIONS

Executive Summary

This Preliminary Utility Report provides an analysis of water and wastewater demand of the proposed Costco development site and demonstrates compliance of the proposed water and wastewater design with Town of Castle Rock standards.

A variance request is submitted with this report to permit static pressures to exceed the Town's 125 psi limit (Section 4.4.3 of the Town's water criteria) by as much as 7 psi.

Compliance with Master Plans

The proposed water and wastewater layouts presented in the report provide systems which are in substantial conformance with the 2016 and 2017 Master Plan Updates.

The proposed water and wastewater designs also conform to the general design and assumptions stated in the Dawson Trails Filing 1 Final Utility Report.

REFERENCES

Costco Wholesale. October 28, 2020. Costco Wholesale Development Requirements

TOCR (Town of Castle Rock). December 4, 2018. Town of Castle Rock Water System Design Criteria Manual.

TOCR (Town of Castle Rock). December 4, 2018. Town of Castle Rock Wastewater Collection System Design Criteria Manual.

TOCR (Town of Castle Rock). 2016, Town of Castle Rock, 2016 Wastewater Master Plan.

TOCR (Town of Castle Rock). 2017. Town of Castle Rock, 2017 Water Master Plan Update.

Dawson Trails Planned Development Plan. September 2022.

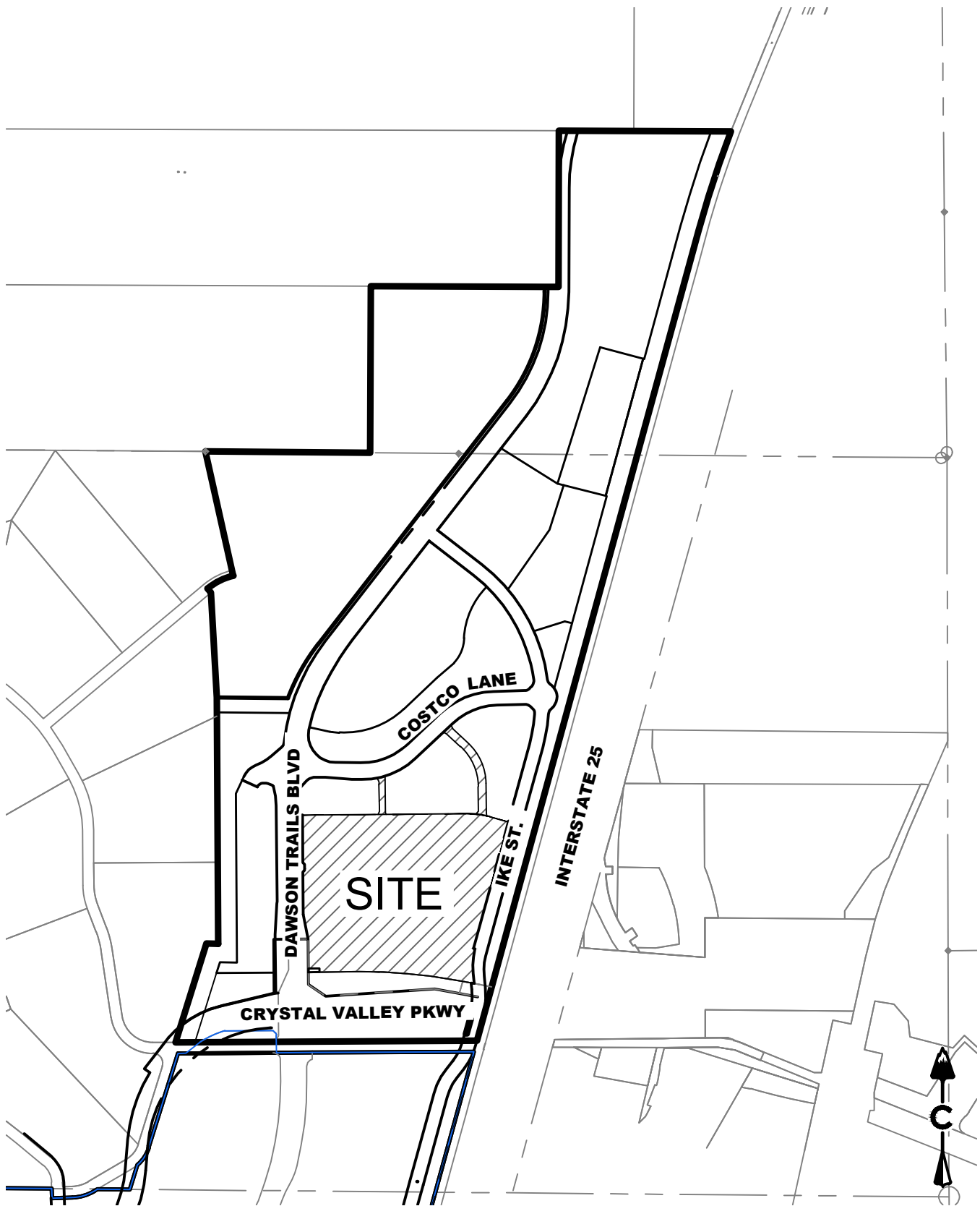
Computer Modeling Programs:

Bentley Systems, Inc., Version 2018. WaterCAD

Excel by Microsoft, Inc.

Appendix A

Figures



10160284 4:44 PM: J:\30-224 DAWSON\DWG\CAD\REF\COSTCO_VICINITY MAP - COSTCO.DWG

Appendix B

Water Modeling / Calculations

Costco Dawson Trails
Water Demand and Storage

DEMAND COMPONENT	RETAIL/ OFFICE			DEMAND								
				SFE	AVG DAY		PEAK HOUR	PEAK HOUR		MAX DAY	MAX DAY	
	SF	SFE / SF	GPD/SFE	(DU)	(GPD)	(GPM)	FACTOR	(GPD)	(GPM)	FACTOR	(GPD)	(GPM)
Costco Building & Fuel Enclosure	162236	0.0005	400	81	32,447	23	5.50	178,460	124	2.50	81,118	56
Fire Flow @ 4000 gpm @ 4 hours	0	0.0		0.0	0	0	0.00	0	0	0.00	960,000	667
IRRIGATED LAND												
				AVG DAY								
IRRIGATION	ACRE	SFE/ACRE		(DU)	(GPD)							
Landscaped Area	3.1	9.38	400	29	11,588	8	1.00	11,588	8	1.00	11,588	8
Total				110	44,035	31		190,047	132		1,052,706	731

TOTAL STORAGE VOLUME (GALLONS) 1,052,706
TOTAL STORAGE VOLUME (MG) 1.05



Irrigation System Hydraulic Worksheet

Project Name: Dawson Trails - Costco Date: Decemeber 20, 2024
Project Location: 1" Irrigation Meter approximately 325-Foot South of the Building Entrance, within Costco Parking Lot

Prepared by: Jason Naughtin Current TOCR Registration # 19-3239

Tap Size 1.00 " Source of Pressure 8" Main in Costco Parking Lot
Static Water Pressure: 145 psi

Hydraulic Grade At Zone: 6376 Company Norris Design

	Ft. of Copper	Pipe Size ("	K Copper	Friction Loss (from chart)	Flow-GPM	Loss/Gain
Service Line (tap to meter):	20 LF	1.00	K Copper	10.47 /100 FT	18	2.09
Water Meter:		1.00		2.00	18	2.00
Service Line (meter to backflow):	5 LF	1.00	K Copper	10.47 /100 FT	18	0.52
Backflow:	1	1.50		12	18	12.00
Master Valve:	1	1 1/2		2	18	2.00

Pressure Required at Head: 45

Lateral Allowance: 4.50

Control Valve Allowance: 1.70

Length of Mainline	Pipe Material	Size	Gals.	GPM	Friction Loss (from chart)	Loss/Gain
1400	LF CL200BE	1.500 "@	18	GPM	0.89 /100 FT	12.46
	LF CL200BE	"@	18	GPM-Looped	/100 FT	0.00

Elevation: Tap elevation 6,376 High/Low: 6,383 3.03

Green shading indicates required information you must provide

Total System requirements (PSI) 85.31

Available System Pressure (PSI) 145.00

Town of Castle Rock provides a minimum of 43 psi

Total irrigated area for tap # _____ is _____ sq. ft.



Irrigation System Hydraulic Worksheet

Project Name: Dawson Trails - Costco Date: Decemeber 20, 2024
Project Location: 2" Temporary Meter located at the South East Corner of Parking Lot

Prepared by: Jason Naughtin Current TOCR Registration # 19-3239

Tap Size 2.00 " Source of Pressure 8" Main in Costco Parking Lot
Static Water Pressure: 145 psi

Hydraulic Grade At Zone: 6376 Company Norris Design

	Ft. of Copper		Pipe Size ("	K Copper	Friction Loss (from chart)	Flow-GPM	Loss/Gain
Service Line (tap	30	LF	2.00	K Copper	4.79 /100 FT	45	1.44
Water Meter:			2.00		2.00	45	2.00
Service Line (meter to backflow):	5	LF	2.00	K Copper	4.79 /100 FT	45	0.24
Backflow:	1		1.50		12	45	12.00
Master Valve:	1		1 1/2		2	45	2.00

Pressure Required at Head: 45

Lateral Allowance: 4.50

Control Valve Allowance: 1.70

Mainline Allowances:							
Length of Mainline	Pipe Material	Size	Gals.				
1400	LF CL200BE	2.000	"@ 45	GPM	1.15 /100 FT		16.10
	LF CL200BE		"@ 45	GPM-Looped	/100 FT		0.00

Elevation: Tap elevation 6,376 High/Low: 6,383 3.03

Green shading indicates required information you must provide

Total System requirements (PSI) 88.01

Available System Pressure (PSI) 145.00

Town of Castle Rock provides a minimum of 43 psi

Total irrigated area for tap # _____ is _____ sq. ft.



IRRIGATION CHART - CONTROLLER 'A'

Registered Professional Jason Naughtin Registration # 19-3239 Date 08.14.2024
 Company Name Norris Design Address 1101 Bannock St., Denver, CO 80204
 Phone 303.892.1166 Email jnaughtin@norris-design.com Clock Make Rain Bird Model ESP-LXIVMP

Zone	Hydrozone	Plant Type (Turf, Native, Shrubs, Perennials, Trees, Annuals, etc.)	Head Type (Rotors, Sprays, Bubblers, Drip, SDI, etc.)	Nozzle (Nozzle/Emitter size)	App. Rate (inches/hour)	Sequence	GPM (Per Zone and/or Seq.)	Inches/Month (Average May - September)	Run Time (Minutes/ Month)
A1	LOW	TREES	RB XFS-CV	0.9	0.6	1	3.50	2	200
A2	LOW	SHRUBS	RB XFS-CV	0.6	0.6		6.70	2	
A3	LOW	TREES	RB XFS-CV	0.9	0.6		3.30	2	
A5	LOW	SHRUBs	RB XFS-CV	0.6	0.6		4.50	2	
							18.00		
A4	LOW	SHRUBS	RB XFS-CV	0.6	0.6	2	13.20	2	200
A10	LOW	SHRUBS	RB XFS-CV	0.6	0.6		3.60	2	
						16.80			
A6	LOW	SHRUBS	RB XFS-CV	0.6	0.6	3	17.30	2	200
							17.30		
A7	LOW	SHRUBS	RB XFS-CV	0.6	0.6	4	18.00	2	200
							18.00		
A8	LOW	SHRUBS	RB XFS-CV	0.6	0.60	5	10.40	2	200
A18	LOW	TREES	RB XFS-CV	0.9	0.60		2.00	2	
A20	LOW	SHRUBS	RB XFS-CV	0.6	0.60		4.90	2	
							17.30		
A9	LOW	SHRUBS	RB XFS-CV	0.6	0.60	6	9.10	2	200
A15	LOW	SHRUBS	RB XFS-CV	0.6	0.60		8.80	2	
							17.90		
A11	LOW	SHRUBS	RB XFS-CV	0.6	0.60	7	9.50	2	200
A16	LOW	SHRUBS	RB XFS-CV	0.6	0.60		3.90	2	
A17	LOW	TREES	RB XFS-CV	0.9	0.60		3.80	2	
							17.20		
A12	LOW	SHRUBS	RB XFS-CV	0.6	0.60	8	9.10	2	200
A14	LOW	SHRUBS	RB XFS-CV	0.6	0.60		8.50	2	
							17.60		
A13	LOW	SHRUBS	RB XFS-CV	0.6	0.60	9	16.60	2	200
							16.60		
A19	LOW	SHRUBS	RB XFS-CV	0.6	0.60	10	17.00	2	200
							17.00		
A21	LOW	SHRUBS	RB XFS-CV	0.6	0.60	11	18.00	2	200
							18.00		
Total									2200
									Min/Month

Run Time (Minutes Every Third Day)	Water Usage (Gallons per month)
20	700
	1340
	660
	900
20	2640
	720
20	3460
20	3600
20	2080
	400
	980
20	1820
	1760
20	1900
	780
	760
20	1820
	1700
20	3320
20	3400
20	3600
220	38340
Min/cycle	Gallons/Month



IRRIGATION CHART - CONTROLLER 'A' TEMPORARY IRRIGATION

Registered Professional Jason Naughtin Registration # 19-3239 Date 08.14.2024
 Company Name Norris Design Address 1101 Bannock St., Denver, CO 80204
 Phone 303.892.1166 Email jnaughtin@norris-design.com Clock Make Rain Bird Model ESP-LXIVMP

Zone	Hydrozone	Plant Type (Turf, Native, Shrubs, Perennials, Trees, Annuals, etc.)	Head Type (Rotors, Sprays, Bubblers, Drip, SDI, etc.)	Nozzle (Nozzle/Emitter size)	App. Rate (inches/hour)	Sequence	GPM (Per Zone and/or Seq.)	Inches/Month (Average May - September)	Run Time (Minutes/ Month)
	Very Low <5" Low 5-10" Medium 10-15" High >15"								
AT 1	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.5	1	29.30	2	240
AT 2	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.5		14.50	2	
							43.80		
AT 3	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.5	2	20.30	2	240
AT 4	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.5		12.70	2	
							33.00		
AT 5	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.5	3	39.30	2	240
							39.30		
AT 6	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.5	4	18.50	2	240
							18.50		
AT 7	LOW	TEMP NATIVE	RB 5000	#2 / #4	0.50	5	18.50	2	240
							18.50		
Total									1200
									Min/Month

Run Time (Minutes Every Third Day)	Water Usage (Gallons per month)
24	7032
	3480
24	4872
	2540
24	9432
24	4440
24	4440
120	36236
Min/cycle	Gallons/Month

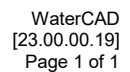
Water Model Results Summary

Scenario	Closed Link?	Min Pressure (psi)			Max Velocity (ft/s)			Max Headloss Rates (ft/1000 ft)								
		Allowable	Actual	Node	Allowable	Actual	Link	24" Transmission Main			20" Transmission Main			16" Transmission Main		
Static - Tank 100% Full	N	43	132	Multiple	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Static - Tank 20% Full	N	43	124	Multiple	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Peak Hour Demand	N	35	124	Multiple	10	0.23	4612	1.0	<0.1	N/A	1.5	<0.1	N/A	2.0	<0.1	N/A
	4142	35	124	Multiple	10	0.37	3033	1.0	<0.1	N/A	1.5	<0.1	N/A	2.0	<0.1	N/A
	2423	35	124	Multiple	10	0.40	2021	1.0	<0.1	N/A	1.5	<0.1	N/A	2.0	<0.1	N/A
	2122A	35	124	Multiple	10	0.35	2423	1.0	<0.1	N/A	1.5	<0.1	N/A	2.0	<0.1	N/A
Max Day Demand + Warehouse Fire Flow * * 4000 gpm Fire Flow Castle Rock Fire (50% Reduction from IFC Table B105.1)	N	20	113	J-22A-FDC	15	6.93	2423	1.0	1.1	5040	1.5	2.1	5540	2.0	0.6	5251
	4142	20	110	J-22A-FDC	15	8.13	3033	1.0	1.4	4030	1.5	2.1	5540	2.0	0.6	5251
	2423	20	95	J-22A-FDC	15	12.96	3231	1.0	1.1	5040	1.5	2.1	5540	2.0	0.6	5251
	2122A	20	107	J-22A-FDC	15	11.51	2423	1.0	1.1	4020	1.5	2.1	5540	2.0	0.6	5251
	T24-5040	20	83	J-22A-FDC	15	11.68	5141	N/A	0.5	4030	N/A	2.0	5540	N/A	0.7	5251
	5141	20	112	J-22A-FDC	15	6.93	2423	N/A	1.4	5040	N/A	2.1	5540	N/A	0.6	5251
Max Day Demand + Warehouse Fire Flow ** ** 2150 gpm Fire Flow per Costco Std. 06.C.5.a	N	65	120	J-22A-FDC	15	3.76	2423	N/A	0.4	5040	N/A	0.7	5540	N/A	0.2	5251
Max Day Demand + Fuel Sta. Fire Flow *** *** 1500 gpm Fire Flow per TOCR	N	20	120	J-44-FH	15	6.48	4244	1.0	0.2	5040	1.5	0.4	5540	2.0	0.1	5251
	4244	20	104	J-44-FH	15	9.98	4612	1.0	0.2	4020	1.5	0.4	5540	2.0	0.1	5251
	4445	20	117	J-44-FH	15	9.57	4244	1.0	0.2	4020	1.5	0.4	5540	2.0	0.1	5251

Shading indicates demand/closure scenarios that are beyond Town's water modelling criteria. These have been evaluated for pressure and velocity limits only, in accordance with Section 4.4.3.

5040 Italicized pipe links and associated headloss gradients are off-site transmission mains that are constructed with Dawson Trails Filing 1 and 2 Infrastructure

Scenario: 100% HGL Static



Scenario: Static - Tank 100% Full

FlexTable: Reservoir Table

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-99	6,680.00	Red	0	6,680.00
R-5	6,680.00	Red	0	6,680.00

Scenario: Static - Tank 100% Full

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,680.00	35
J-52	6,437.00	Red	0	6,680.00	105
J-51	6,390.00	Red	0	6,680.00	125
J-50	6,385.00	Red	0	6,680.00	128
J-46-POC-T	6,376.00	Red	0	6,680.00	132
J-45-POC-1	6,376.00	Red	0	6,680.00	132
J-44-FH	6,376.00	Red	0	6,680.00	132
J-43	6,376.00	Red	0	6,680.00	132
J-42	6,376.00	Red	0	6,680.00	132
J-41	6,383.00	Red	0	6,680.00	128
J-40	6,383.00	Red	0	6,680.00	128
J-37	6,376.00	Red	0	6,680.00	132
J-36-FH	6,376.00	Red	0	6,680.00	132
J-35-FH	6,376.00	Red	0	6,680.00	132
J-34	6,376.00	Red	0	6,680.00	132
J-33	6,376.00	Red	0	6,680.00	132
J-32-FH	6,376.00	Red	0	6,680.00	132
J-31-FH	6,376.00	Red	0	6,680.00	132
J-30	6,373.00	Red	0	6,680.00	133
J-26-FH	6,376.00	Red	0	6,680.00	132
J-25-FH	6,376.00	Red	0	6,680.00	132
J-24	6,376.00	Red	0	6,680.00	132
J-23-FH	6,376.00	Red	0	6,680.00	132
J-22A-FDC	6,376.00	Red	0	6,680.00	132
J-22-TAP	6,376.00	Red	0	6,680.00	132
J-21	6,376.00	Red	0	6,680.00	132
J-20	6,366.00	Red	0	6,680.00	136
J-12	6,376.00	Red	0	6,680.00	132
J-11	6,371.00	Red	0	6,680.00	134
J-10	6,354.00	Red	0	6,680.00	141
J-00 (J16)	6,347.00	Red	0	6,680.00	144

Nodes at Tank
Connection

Max On-site Pressure =
132 psi

Min On-site Pressure =
132 psi

Scenario: Static - Tank 100% Full

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	900	24.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T24-5040	J-40	J-50	5,602	20.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	79	24.0	PVC	120.0	0	0.00	0.00	0.0	True	False
T20-5540	J-50	J-55	2,878	20.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T16-5251	J-51	J-52	948	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T16-5051	J-50	J-51	95	16.0	PVC	120.0	0	0.00	0.00	0.0	False	False
5552	J-52	J-55	2,066	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
5141	J-41	J-51	7,965	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2423	J-23-FH	J-24	297	8.0	PVC	120.0	0	0.00	0.00	0.0	False	True
2412	J-24	J-12	56	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2322	J-22-TAP	J-23-FH	20	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
2222A	J-22A-FDC	J-22-TAP	10	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
2122A	J-21	J-22A-FDC	118	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
2021	J-21	J-20	597	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False

Scenario: Static - Tank 20% Full

FlexTable: Reservoir Table

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-99	6,662.00	Red	0	6,662.00
R-5	6,662.00	Red	0	6,662.00

Scenario: Static - Tank 20% Full

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,662.00	27
J-52	6,437.00	Red	0	6,662.00	97
J-51	6,390.00	Red	0	6,662.00	118
J-50	6,385.00	Red	0	6,662.00	120
J-46-POC-T	6,376.00	Red	0	6,662.00	124
J-45-POC-1	6,376.00	Red	0	6,662.00	124
J-44-FH	6,376.00	Red	0	6,662.00	124
J-43	6,376.00	Red	0	6,662.00	124
J-42	6,376.00	Red	0	6,662.00	124
J-41	6,383.00	Red	0	6,662.00	121
J-40	6,383.00	Red	0	6,662.00	121
J-37	6,376.00	Red	0	6,662.00	124
J-36-FH	6,376.00	Red	0	6,662.00	124
J-35-FH	6,376.00	Red	0	6,662.00	124
J-34	6,376.00	Red	0	6,662.00	124
J-33	6,376.00	Red	0	6,662.00	124
J-32-FH	6,376.00	Red	0	6,662.00	124
J-31-FH	6,376.00	Red	0	6,662.00	124
J-30	6,373.00	Red	0	6,662.00	125
J-26-FH	6,376.00	Red	0	6,662.00	124
J-25-FH	6,376.00	Red	0	6,662.00	124
J-24	6,376.00	Red	0	6,662.00	124
J-23-FH	6,376.00	Red	0	6,662.00	124
J-22A-FDC	6,376.00	Red	0	6,662.00	124
J-22-TAP	6,376.00	Red	0	6,662.00	124
J-21	6,376.00	Red	0	6,662.00	124
J-20	6,366.00	Red	0	6,662.00	128
J-12	6,376.00	Red	0	6,662.00	124
J-11	6,371.00	Red	0	6,662.00	126
J-10	6,354.00	Red	0	6,662.00	133
J-00 (J16)	6,347.00	Red	0	6,662.00	136

Nodes at Tank
Connection

Max On-site Pressure =
124 psi

Min On-site Pressure =
124 psi

Scenario: Static - Tank 20% Full

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	0	0.00	0.00	0.0	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	0	0.00	0.00	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	0	0.00	0.00	0.0	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	0	0.00	0.00	0.0	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False

Scenario: Peak Hour

FlexTable: Reservoir Table

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-99	6,662.00	Red	187	6,662.00
R-5	6,662.00	Red	0	6,662.00

Scenario: Peak Hour

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,662.00	27
J-52	6,437.00	Red	0	6,661.96	97
J-51	6,390.00	Red	0	6,661.96	118
J-50	6,385.00	Red	0	6,661.95	120
J-46-POC-T	6,376.00	Red	45	6,661.92	124
J-45-POC-1	6,376.00	Red	18	6,661.92	124
J-44-FH	6,376.00	Red	0	6,661.93	124
J-43	6,376.00	Red	0	6,661.94	124
J-42	6,376.00	Red	0	6,661.94	124
J-41	6,383.00	Red	0	6,661.95	121
J-40	6,383.00	Red	0	6,661.95	121
J-37	6,376.00	Red	0	6,661.94	124
J-36-FH	6,376.00	Red	0	6,661.94	124
J-35-FH	6,376.00	Red	0	6,661.94	124
J-34	6,376.00	Red	0	6,661.94	124
J-33	6,376.00	Red	0	6,661.94	124
J-32-FH	6,376.00	Red	0	6,661.94	124
J-31-FH	6,376.00	Red	0	6,661.93	124
J-30	6,373.00	Red	0	6,661.95	125
J-26-FH	6,376.00	Red	0	6,661.94	124
J-25-FH	6,376.00	Red	0	6,661.93	124
J-24	6,376.00	Red	0	6,661.93	124
J-23-FH	6,376.00	Red	0	6,661.93	124
J-22A-FDC	6,376.00	Red	0	6,661.93	124
J-22-TAP	6,376.00	Red	124	6,661.93	124
J-21	6,376.00	Red	0	6,661.93	124
J-20	6,366.00	Red	0	6,661.95	128
J-12	6,376.00	Red	0	6,661.93	124
J-11	6,371.00	Red	0	6,661.93	126
J-10	6,354.00	Red	0	6,661.95	133
J-00 (J16)	6,347.00	Red	0	6,661.95	136

Nodes at Tank
Connection

Residual Pressure

Scenario: Peak Hour

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-187	0.13	0.00	0.0	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-165	0.12	0.00	0.0	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	111	0.08	0.00	0.0	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	83	0.06	0.00	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	52	0.04	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-147	0.15	0.04	0.0	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-40	0.06	0.01	0.0	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-18	0.03	0.00	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-40	0.11	0.04	0.0	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-22	0.06	0.00	0.0	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-36	0.23	0.01	0.0	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	9	0.05	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	27	0.17	0.01	0.0	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-39	0.11	0.00	0.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	27	0.17	0.01	0.0	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-66	0.19	0.00	0.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	10	0.06	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-76	0.22	0.01	0.0	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-54	0.15	0.00	0.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	12	0.08	0.00	0.0	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-51	0.15	0.00	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	12	0.08	0.00	0.0	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	12	0.08	0.00	0.0	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-2	0.01	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	26	0.16	0.00	0.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	26	0.16	0.01	0.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	26	0.16	0.00	0.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-28	0.18	0.01	0.0	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-51	0.15	0.00	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-51	0.15	0.00	0.0	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-67	0.19	0.01	0.0	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-16	0.04	0.00	0.0	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-67	0.19	0.00	0.0	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	57	0.16	0.00	0.0	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	57	0.16	0.00	0.0	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-31	0.20	0.02	0.0	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-52	0.15	0.00	0.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	52	0.15	0.01	0.0	False	False

Max Velocity

Scenario: Peak Hour
Link 4142 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,662.00	27
J-52	6,437.00	Red	0	6,661.96	97
J-51	6,390.00	Red	0	6,661.96	118
J-50	6,385.00	Red	0	6,661.95	120
J-46-POC-T	6,376.00	Red	45	6,661.90	124
J-45-POC-1	6,376.00	Red	18	6,661.90	124
J-44-FH	6,376.00	Red	0	6,661.90	124
J-43	6,376.00	Red	0	6,661.91	124
J-42	6,376.00	Red	0	6,661.91	124
J-41	6,383.00	Red	0	6,661.95	121
J-40	6,383.00	Red	0	6,661.95	121
J-37	6,376.00	Red	0	6,661.91	124
J-36-FH	6,376.00	Red	0	6,661.91	124
J-35-FH	6,376.00	Red	0	6,661.91	124
J-34	6,376.00	Red	0	6,661.91	124
J-33	6,376.00	Red	0	6,661.91	124
J-32-FH	6,376.00	Red	0	6,661.91	124
J-31-FH	6,376.00	Red	0	6,661.91	124
J-30	6,373.00	Red	0	6,661.95	125
J-26-FH	6,376.00	Red	0	6,661.91	124
J-25-FH	6,376.00	Red	0	6,661.91	124
J-24	6,376.00	Red	0	6,661.91	124
J-23-FH	6,376.00	Red	0	6,661.90	124
J-22A-FDC	6,376.00	Red	0	6,661.90	124
J-22-TAP	6,376.00	Red	124	6,661.90	124
J-21	6,376.00	Red	0	6,661.90	124
J-20	6,366.00	Red	0	6,661.94	128
J-12	6,376.00	Red	0	6,661.91	124
J-11	6,371.00	Red	0	6,661.91	126
J-10	6,354.00	Red	0	6,661.94	133
J-00 (J16)	6,347.00	Red	0	6,661.94	136

Nodes at Tank
Connection

Residual Pressure

Scenario: Peak Hour
Link 4142 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-187	0.13	0.00	0.0	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-165	0.12	0.00	0.0	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	187	0.13	0.00	0.0	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	129	0.09	0.00	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	84	0.06	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-147	0.15	0.04	0.0	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-40	0.06	0.01	0.0	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-19	0.03	0.00	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-40	0.11	0.04	0.0	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-22	0.06	0.00	0.0	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-41	0.26	0.01	0.1	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	4	0.03	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	22	0.14	0.01	0.0	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	4	0.01	0.00	0.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	22	0.14	0.00	0.0	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-18	0.05	0.00	0.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	-18	0.11	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	0	0.00	0.00	0.0	True	False
4041	J-41	J-40	17	12.0	PVC	120.0	22	0.06	0.00	0.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	18	0.12	0.00	0.0	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-14	0.04	0.00	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	18	0.12	0.00	0.0	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	18	0.12	0.00	0.0	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-36	0.23	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	22	0.14	0.00	0.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	22	0.14	0.00	0.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	22	0.14	0.00	0.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-58	0.37	0.03	0.1	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-14	0.04	0.00	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-14	0.04	0.00	0.0	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-56	0.16	0.00	0.0	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-43	0.12	0.00	0.0	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-56	0.16	0.00	0.0	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	68	0.19	0.00	0.0	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	68	0.19	0.00	0.0	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-45	0.29	0.04	0.1	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-84	0.24	0.00	0.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	84	0.24	0.03	0.0	False	False

Max Velocity

Scenario: Peak Hour
Link 2423 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,662.00	27
J-52	6,437.00	Red	0	6,661.96	97
J-51	6,390.00	Red	0	6,661.96	118
J-50	6,385.00	Red	0	6,661.95	120
J-46-POC-T	6,376.00	Red	45	6,661.93	124
J-45-POC-1	6,376.00	Red	18	6,661.93	124
J-44-FH	6,376.00	Red	0	6,661.94	124
J-43	6,376.00	Red	0	6,661.94	124
J-42	6,376.00	Red	0	6,661.94	124
J-41	6,383.00	Red	0	6,661.95	121
J-40	6,383.00	Red	0	6,661.95	121
J-37	6,376.00	Red	0	6,661.94	124
J-36-FH	6,376.00	Red	0	6,661.94	124
J-35-FH	6,376.00	Red	0	6,661.94	124
J-34	6,376.00	Red	0	6,661.94	124
J-33	6,376.00	Red	0	6,661.94	124
J-32-FH	6,376.00	Red	0	6,661.92	124
J-31-FH	6,376.00	Red	0	6,661.88	124
J-30	6,373.00	Red	0	6,661.95	125
J-26-FH	6,376.00	Red	0	6,661.94	124
J-25-FH	6,376.00	Red	0	6,661.94	124
J-24	6,376.00	Red	0	6,661.94	124
J-23-FH	6,376.00	Red	0	6,661.87	124
J-22A-FDC	6,376.00	Red	0	6,661.87	124
J-22-TAP	6,376.00	Red	124	6,661.87	124
J-21	6,376.00	Red	0	6,661.87	124
J-20	6,366.00	Red	0	6,661.95	128
J-12	6,376.00	Red	0	6,661.94	124
J-11	6,371.00	Red	0	6,661.94	126
J-10	6,354.00	Red	0	6,661.95	133
J-00 (J16)	6,347.00	Red	0	6,661.95	136

Nodes at Tank
Connection

Residual Pressure

Scenario: Peak Hour
Link 2423 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-187	0.13	0.00	0.0	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-165	0.12	0.00	0.0	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	123	0.09	0.00	0.0	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	92	0.07	0.00	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	29	0.02	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-147	0.15	0.04	0.0	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-40	0.06	0.01	0.0	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-18	0.03	0.00	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-40	0.11	0.04	0.0	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-22	0.06	0.00	0.0	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-40	0.26	0.01	0.1	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	5	0.03	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	23	0.14	0.01	0.0	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-24	0.07	0.00	0.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	23	0.14	0.00	0.0	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-47	0.13	0.00	0.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	17	0.11	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-64	0.18	0.01	0.0	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-42	0.12	0.00	0.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	-13	0.08	0.00	0.0	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-11	0.03	0.00	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	-13	0.08	0.00	0.0	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	-13	0.08	0.00	0.0	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	30	0.19	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	62	0.39	0.02	0.1	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	62	0.39	0.03	0.1	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	62	0.39	0.01	0.1	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-31	0.20	0.01	0.0	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-11	0.03	0.00	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-11	0.03	0.00	0.0	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	0	0.00	0.00	0.0	True	False
2412	J-24	J-12	56	12.0	PVC	120.0	11	0.03	0.00	0.0	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	124	0.35	0.00	0.1	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	124	0.35	0.01	0.1	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-62	0.40	0.07	0.1	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-29	0.08	0.00	0.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	29	0.08	0.00	0.0	False	False

Max Velocity

Scenario: Peak Hour
Link 2122A Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,662.00	27
J-52	6,437.00	Red	0	6,661.96	97
J-51	6,390.00	Red	0	6,661.96	118
J-50	6,385.00	Red	0	6,661.95	120
J-46-POC-T	6,376.00	Red	45	6,661.91	124
J-45-POC-1	6,376.00	Red	18	6,661.92	124
J-44-FH	6,376.00	Red	0	6,661.93	124
J-43	6,376.00	Red	0	6,661.94	124
J-42	6,376.00	Red	0	6,661.94	124
J-41	6,383.00	Red	0	6,661.95	121
J-40	6,383.00	Red	0	6,661.95	121
J-37	6,376.00	Red	0	6,661.93	124
J-36-FH	6,376.00	Red	0	6,661.94	124
J-35-FH	6,376.00	Red	0	6,661.94	124
J-34	6,376.00	Red	0	6,661.94	124
J-33	6,376.00	Red	0	6,661.94	124
J-32-FH	6,376.00	Red	0	6,661.94	124
J-31-FH	6,376.00	Red	0	6,661.95	124
J-30	6,373.00	Red	0	6,661.95	125
J-26-FH	6,376.00	Red	0	6,661.93	124
J-25-FH	6,376.00	Red	0	6,661.92	124
J-24	6,376.00	Red	0	6,661.92	124
J-23-FH	6,376.00	Red	0	6,661.90	124
J-22A-FDC	6,376.00	Red	0	6,661.90	124
J-22-TAP	6,376.00	Red	124	6,661.90	124
J-21	6,376.00	Red	0	6,661.95	124
J-20	6,366.00	Red	0	6,661.95	128
J-12	6,376.00	Red	0	6,661.92	124
J-11	6,371.00	Red	0	6,661.92	126
J-10	6,354.00	Red	0	6,661.95	133
J-00 (J16)	6,347.00	Red	0	6,661.95	136

Nodes at Tank
Connection

Residual Pressure

Scenario: Peak Hour
Link 2122A Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-187	0.13	0.00	0.0	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-164	0.12	0.00	0.0	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	104	0.07	0.00	0.0	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	83	0.06	0.00	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	73	0.05	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-147	0.15	0.04	0.0	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-40	0.06	0.01	0.0	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-18	0.03	0.00	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-40	0.11	0.04	0.0	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-23	0.06	0.00	0.0	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-31	0.20	0.01	0.0	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	14	0.09	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	32	0.20	0.01	0.0	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-58	0.17	0.00	0.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	32	0.20	0.01	0.0	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-90	0.26	0.01	0.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	-7	0.05	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-83	0.24	0.01	0.0	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-60	0.17	0.00	0.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	24	0.15	0.00	0.0	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-83	0.23	0.00	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	24	0.15	0.00	0.0	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	24	0.15	0.00	0.0	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-31	0.20	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	-10	0.06	0.00	0.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	-10	0.06	0.00	0.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	-10	0.06	0.00	0.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-21	0.14	0.01	0.0	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-83	0.23	0.01	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-83	0.23	0.00	0.0	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-124	0.35	0.02	0.1	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-41	0.12	0.00	0.0	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-124	0.35	0.00	0.1	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	0	0.00	0.00	0.0	True	False
2021	J-21	J-20	597	8.0	PVC	120.0	-10	0.06	0.00	0.0	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-73	0.21	0.00	0.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	73	0.21	0.03	0.0	False	False

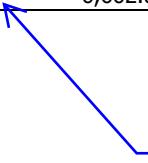
Max Velocity

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)

FlexTable: Reservoir Table

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-99	6,662.00	Red	4,119	6,662.00
R-5	6,662.00	Red	0	6,662.00

No reliance on
booster pump for
fire flows



Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.92	27
J-52	6,437.00	Red	0	6,650.16	92
J-51	6,390.00	Red	0	6,648.14	112
J-50	6,385.00	Red	0	6,648.07	114
J-46-POC-T	6,376.00	Red	45	6,642.03	115
J-45-POC-1	6,376.00	Red	18	6,642.71	115
J-44-FH	6,376.00	Red	0	6,643.44	116
J-43	6,376.00	Red	0	6,643.95	116
J-42	6,376.00	Red	0	6,644.67	116
J-41	6,383.00	Red	0	6,646.81	114
J-40	6,383.00	Red	0	6,646.87	114
J-37	6,376.00	Red	0	6,643.48	116
J-36-FH	6,376.00	Red	0	6,643.52	116
J-35-FH	6,376.00	Red	0	6,643.68	116
J-34	6,376.00	Red	0	6,643.75	116
J-33	6,376.00	Red	0	6,643.72	116
J-32-FH	6,376.00	Red	0	6,641.46	115
J-31-FH	6,376.00	Red	0	6,637.88	113
J-30	6,373.00	Red	0	6,646.27	118
J-26-FH	6,376.00	Red	0	6,642.90	115
J-25-FH	6,376.00	Red	0	6,641.93	115
J-24	6,376.00	Red	0	6,641.50	115
J-23-FH	6,376.00	Red	0	6,637.21	113
J-22A-FDC	6,376.00	Red	4,000	6,636.12	113
J-22-TAP	6,376.00	Red	56	6,636.65	113
J-21	6,376.00	Red	0	6,636.82	113
J-20	6,366.00	Red	0	6,646.13	121
J-12	6,376.00	Red	0	6,641.77	115
J-11	6,371.00	Red	0	6,642.14	117
J-10	6,354.00	Red	0	6,646.06	126
J-00 (J16)	6,347.00	Red	0	6,646.06	129

Nodes at Tank
Connection

Residual Pressure

4000 gpm Total Fire Flow
applied at J-22A-FDC

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-4,119	2.92	0.08	1.4	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-3,626	2.57	1.20	1.1	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	2,541	1.80	0.60	0.6	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	1,921	1.36	0.14	0.3	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	1,073	0.76	0.07	0.1	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-3,227	3.30	13.86	2.1	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-892	1.42	2.02	0.6	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-399	0.64	0.07	0.1	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-892	2.53	11.77	2.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-493	1.40	1.33	0.8	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	225	1.44	0.26	1.3	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	270	1.72	0.68	1.9	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	288	1.84	0.73	2.1	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-992	2.81	0.47	2.9	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	288	1.84	0.52	2.1	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-1,280	3.63	0.71	4.6	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	298	1.90	0.92	2.3	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-1,578	4.48	2.14	6.8	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-1,085	3.08	0.06	3.4	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	152	0.97	0.04	0.7	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-1,144	3.25	0.58	3.8	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	152	0.97	0.15	0.6	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	152	0.97	0.07	0.7	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	146	0.93	0.03	0.6	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	766	4.89	2.26	12.9	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	766	4.89	3.58	12.9	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	766	4.89	1.06	12.9	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-620	3.96	2.55	8.7	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-1,144	3.25	0.97	3.8	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-1,144	3.25	0.43	4.4	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-2,442	6.93	4.29	15.4	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-1,298	3.68	0.27	4.8	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-2,442	6.93	0.56	15.4	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	-2,386	6.77	0.54	14.7	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	1,614	4.58	0.70	7.1	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-848	5.41	9.31	15.6	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-1,073	3.04	0.37	3.4	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	1,073	3.04	3.93	3.3	False	False

No reliance on Red Zone booster pump for fire flow

Max Velocity

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 4142 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.92	27
J-52	6,437.00	Red	0	6,650.16	92
J-51	6,390.00	Red	0	6,648.14	112
J-50	6,385.00	Red	0	6,648.07	114
J-46-POC-T	6,376.00	Red	45	6,634.35	112
J-45-POC-1	6,376.00	Red	18	6,634.37	112
J-44-FH	6,376.00	Red	0	6,634.39	112
J-43	6,376.00	Red	0	6,634.41	112
J-42	6,376.00	Red	0	6,634.46	112
J-41	6,383.00	Red	0	6,646.87	114
J-40	6,383.00	Red	0	6,646.86	114
J-37	6,376.00	Red	0	6,634.38	112
J-36-FH	6,376.00	Red	0	6,634.52	112
J-35-FH	6,376.00	Red	0	6,635.06	112
J-34	6,376.00	Red	0	6,635.30	112
J-33	6,376.00	Red	0	6,635.73	112
J-32-FH	6,376.00	Red	0	6,633.87	112
J-31-FH	6,376.00	Red	0	6,630.93	110
J-30	6,373.00	Red	0	6,645.39	118
J-26-FH	6,376.00	Red	0	6,634.24	112
J-25-FH	6,376.00	Red	0	6,634.00	112
J-24	6,376.00	Red	0	6,633.90	112
J-23-FH	6,376.00	Red	0	6,630.16	110
J-22A-FDC	6,376.00	Red	4,000	6,629.20	110
J-22-TAP	6,376.00	Red	56	6,629.67	110
J-21	6,376.00	Red	0	6,630.05	110
J-20	6,366.00	Red	0	6,645.11	121
J-12	6,376.00	Red	0	6,634.36	112
J-11	6,371.00	Red	0	6,635.26	114
J-10	6,354.00	Red	0	6,644.94	126
J-00 (J16)	6,347.00	Red	0	6,644.94	129

Nodes at Tank
Connection

4000 gpm Total Fire Flow
applied at J-22A-FDC

Residual Pressure

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 4142 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-4,119	2.92	0.08	1.4	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-3,638	2.58	1.21	1.1	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	4,119	2.92	1.47	1.4	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	2,846	2.02	0.29	0.7	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	1,747	1.24	0.17	0.3	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-3,227	3.30	13.86	2.1	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-892	1.42	2.02	0.6	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-411	0.66	0.07	0.1	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-892	2.53	11.76	2.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-481	1.36	1.27	0.8	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-14	0.09	0.00	0.0	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	31	0.20	0.01	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	49	0.31	0.03	0.1	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-236	0.67	0.03	0.2	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	49	0.31	0.02	0.1	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-285	0.81	0.04	0.3	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	-285	1.82	0.85	2.1	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	0	0.00	0.00	0.0	True	False
4041	J-41	J-40	17	12.0	PVC	120.0	481	1.36	0.01	0.8	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	299	1.91	0.14	2.3	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-534	1.52	0.14	0.9	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	299	1.91	0.54	2.3	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	299	1.91	0.25	2.3	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-584	3.73	0.42	7.8	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	689	4.40	1.86	10.6	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	689	4.40	2.94	10.6	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	689	4.40	0.87	10.6	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-1,273	8.13	9.66	33.1	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-534	1.52	0.24	0.9	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-534	1.52	0.10	1.1	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-2,268	6.43	3.74	13.4	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-1,733	4.92	0.46	8.1	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-2,268	6.43	0.49	13.4	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	-2,212	6.27	0.46	12.8	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	1,788	5.07	0.85	8.6	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-1,099	7.02	15.05	25.2	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-1,747	4.96	0.91	8.3	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	1,747	4.96	9.68	8.3	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 2423 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.92	27
J-52	6,437.00	Red	0	6,650.16	92
J-51	6,390.00	Red	0	6,648.14	112
J-50	6,385.00	Red	0	6,648.07	114
J-46-POC-T	6,376.00	Red	45	6,645.69	117
J-45-POC-1	6,376.00	Red	18	6,645.70	117
J-44-FH	6,376.00	Red	0	6,645.72	117
J-43	6,376.00	Red	0	6,645.74	117
J-42	6,376.00	Red	0	6,645.84	117
J-41	6,383.00	Red	0	6,646.85	114
J-40	6,383.00	Red	0	6,646.86	114
J-37	6,376.00	Red	0	6,645.64	117
J-36-FH	6,376.00	Red	0	6,645.19	116
J-35-FH	6,376.00	Red	0	6,643.44	116
J-34	6,376.00	Red	0	6,642.63	115
J-33	6,376.00	Red	0	6,641.13	115
J-32-FH	6,376.00	Red	0	6,627.39	109
J-31-FH	6,376.00	Red	0	6,605.61	99
J-30	6,373.00	Red	0	6,646.01	118
J-26-FH	6,376.00	Red	0	6,645.66	117
J-25-FH	6,376.00	Red	0	6,645.68	117
J-24	6,376.00	Red	0	6,645.69	117
J-23-FH	6,376.00	Red	0	6,595.29	95
J-22A-FDC	6,376.00	Red	4,000	6,595.29	95
J-22-TAP	6,376.00	Red	56	6,595.29	95
J-21	6,376.00	Red	0	6,599.16	97
J-20	6,366.00	Red	0	6,645.83	121
J-12	6,376.00	Red	0	6,645.69	117
J-11	6,371.00	Red	0	6,645.70	119
J-10	6,354.00	Red	0	6,645.83	126
J-00 (J16)	6,347.00	Red	0	6,645.83	129

Nodes at Tank Connection

4000 gpm Total Fire Flow applied at J-22A-FDC

Residual Pressure

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 2423 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-4,119	2.92	0.08	1.4	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-3,633	2.58	1.21	1.1	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	3,073	2.18	0.85	0.8	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	2,193	1.56	0.18	0.4	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	168	0.12	0.00	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-3,227	3.30	13.86	2.1	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-892	1.42	2.02	0.6	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-406	0.65	0.07	0.1	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-892	2.53	11.77	2.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-486	1.38	1.29	0.8	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-19	0.12	0.00	0.0	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	26	0.17	0.01	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	44	0.28	0.02	0.1	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-416	1.18	0.09	0.6	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	44	0.28	0.02	0.1	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-460	1.31	0.11	0.7	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	586	3.74	3.21	7.9	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-1,046	2.97	1.00	3.2	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-560	1.59	0.02	1.0	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	-566	3.61	0.45	7.4	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	149	0.42	0.01	0.1	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	-566	3.61	1.75	7.4	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	-566	3.61	0.81	7.4	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	1,151	7.35	1.50	27.5	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	2,031	12.96	13.75	78.7	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	2,031	12.96	21.78	78.7	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	2,031	12.96	6.45	78.7	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-880	5.62	4.88	16.7	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	149	0.42	0.02	0.1	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	149	0.42	0.01	0.1	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	0	0.00	0.00	0.0	True	False
2412	J-24	J-12	56	12.0	PVC	120.0	-149	0.42	0.00	0.1	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	0	0.00	0.00	0.0	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	56	0.16	0.00	0.0	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	4,056	11.51	3.87	39.3	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-2,025	12.92	46.68	78.2	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-168	0.48	0.01	0.1	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	168	0.48	0.13	0.1	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 2122A Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.92	27
J-52	6,437.00	Red	0	6,650.16	92
J-51	6,390.00	Red	0	6,648.14	112
J-50	6,385.00	Red	0	6,648.07	114
J-46-POC-T	6,376.00	Red	45	6,637.45	113
J-45-POC-1	6,376.00	Red	18	6,639.30	114
J-44-FH	6,376.00	Red	0	6,641.18	115
J-43	6,376.00	Red	0	6,642.53	115
J-42	6,376.00	Red	0	6,644.06	116
J-41	6,383.00	Red	0	6,646.79	114
J-40	6,383.00	Red	0	6,646.87	114
J-37	6,376.00	Red	0	6,641.56	115
J-36-FH	6,376.00	Red	0	6,641.97	115
J-35-FH	6,376.00	Red	0	6,643.56	116
J-34	6,376.00	Red	0	6,644.30	116
J-33	6,376.00	Red	0	6,644.86	116
J-32-FH	6,376.00	Red	0	6,645.07	116
J-31-FH	6,376.00	Red	0	6,645.41	117
J-30	6,373.00	Red	0	6,646.36	118
J-26-FH	6,376.00	Red	0	6,639.94	114
J-25-FH	6,376.00	Red	0	6,637.22	113
J-24	6,376.00	Red	0	6,636.00	112
J-23-FH	6,376.00	Red	0	6,625.03	108
J-22A-FDC	6,376.00	Red	4,000	6,622.20	107
J-22-TAP	6,376.00	Red	56	6,623.59	107
J-21	6,376.00	Red	0	6,645.51	117
J-20	6,366.00	Red	0	6,646.23	121
J-12	6,376.00	Red	0	6,636.63	113
J-11	6,371.00	Red	0	6,637.44	115
J-10	6,354.00	Red	0	6,646.08	126
J-00 (J16)	6,347.00	Red	0	6,646.08	129

Nodes at Tank
Connection

4000 gpm Total Fire Flow
applied at J-22A-FDC

Residual Pressure

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 2122A Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-4,119	2.92	0.08	1.4	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-3,623	2.57	1.20	1.1	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	2,322	1.65	0.51	0.5	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	1,857	1.32	0.13	0.3	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	1,643	1.17	0.15	0.3	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-3,227	3.30	13.86	2.1	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-892	1.42	2.02	0.6	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-395	0.63	0.07	0.1	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-892	2.53	11.77	2.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-496	1.41	1.35	0.8	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	418	2.67	0.82	4.2	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	463	2.96	1.85	5.1	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	481	3.07	1.88	5.5	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-1,458	4.14	0.96	5.9	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	481	3.07	1.34	5.5	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-1,939	5.50	1.54	10.0	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	-142	0.91	0.23	0.6	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-1,797	5.10	2.73	8.7	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-1,300	3.69	0.08	4.8	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	537	3.43	0.41	6.7	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-1,995	5.66	1.62	10.6	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	537	3.43	1.59	6.7	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	537	3.43	0.73	6.7	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-679	4.34	0.56	10.3	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	-214	1.36	0.21	1.2	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	-214	1.36	0.34	1.2	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	-214	1.36	0.10	1.2	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-466	2.97	1.50	5.1	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-1,995	5.66	2.72	10.6	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-1,995	5.66	1.21	12.3	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-4,056	11.51	10.97	39.3	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-2,061	5.85	0.63	11.2	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-4,056	11.51	1.44	39.3	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	-4,000	11.35	1.39	38.3	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	0	0.00	0.00	0.0	True	False
2021	J-21	J-20	597	8.0	PVC	120.0	-214	1.36	0.72	1.2	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-1,643	4.66	0.81	7.4	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	1,643	4.66	8.64	7.4	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 5040 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.92	27
J-52	6,437.00	Red	0	6,647.97	91
J-51	6,390.00	Red	0	6,645.58	111
J-50	6,385.00	Red	0	6,648.74	114
J-46-POC-T	6,376.00	Red	45	6,572.87	85
J-45-POC-1	6,376.00	Red	18	6,573.57	85
J-44-FH	6,376.00	Red	0	6,574.32	86
J-43	6,376.00	Red	0	6,574.85	86
J-42	6,376.00	Red	0	6,575.59	86
J-41	6,383.00	Red	0	6,577.83	84
J-40	6,383.00	Red	0	6,577.56	84
J-37	6,376.00	Red	0	6,574.36	86
J-36-FH	6,376.00	Red	0	6,574.40	86
J-35-FH	6,376.00	Red	0	6,574.54	86
J-34	6,376.00	Red	0	6,574.60	86
J-33	6,376.00	Red	0	6,574.56	86
J-32-FH	6,376.00	Red	0	6,572.29	85
J-31-FH	6,376.00	Red	0	6,568.70	83
J-30	6,373.00	Red	0	6,576.98	88
J-26-FH	6,376.00	Red	0	6,573.77	86
J-25-FH	6,376.00	Red	0	6,572.77	85
J-24	6,376.00	Red	0	6,572.33	85
J-23-FH	6,376.00	Red	0	6,568.04	83
J-22A-FDC	6,376.00	Red	4,000	6,566.93	83
J-22-TAP	6,376.00	Red	56	6,567.47	83
J-21	6,376.00	Red	0	6,567.63	83
J-20	6,366.00	Red	0	6,576.84	91
J-12	6,376.00	Red	0	6,572.60	85
J-11	6,371.00	Red	0	6,572.96	87
J-10	6,354.00	Red	0	6,576.78	96
J-00 (J16)	6,347.00	Red	0	6,576.78	99

Nodes at Tank
Connection

4000 gpm Total Fire Flow
applied at J-22A-FDC

Residual Pressure

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 5040 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-4,119	2.92	0.08	1.4	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	2,504	1.78	0.58	0.5	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	1,901	1.35	0.14	0.3	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	1,058	0.75	0.06	0.1	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-3,141	3.21	13.18	2.0	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-978	1.56	2.40	0.7	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	3,141	5.01	3.17	6.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-978	2.77	13.95	2.8	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-4,119	11.68	67.75	40.4	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	229	1.46	0.27	1.4	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	274	1.75	0.70	1.9	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	292	1.87	0.75	2.2	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-1,013	2.87	0.49	3.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	292	1.87	0.53	2.2	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-1,306	3.70	0.74	4.8	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	310	1.98	0.99	2.4	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-1,615	4.58	2.24	7.1	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	2,504	7.10	0.27	16.1	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	145	0.92	0.04	0.6	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-1,158	3.28	0.59	3.9	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	145	0.92	0.14	0.6	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	145	0.92	0.06	0.6	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	165	1.05	0.04	0.8	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	768	4.90	2.27	13.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	768	4.90	3.59	13.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	768	4.90	1.06	13.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-603	3.85	2.42	8.3	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-1,158	3.28	0.99	3.9	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-1,158	3.28	0.44	4.4	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-2,445	6.94	4.30	15.4	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-1,287	3.65	0.26	4.7	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-2,445	6.94	0.57	15.4	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	-2,389	6.78	0.54	14.7	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	1,611	4.57	0.70	7.1	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-843	5.38	9.21	15.4	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-1,058	3.00	0.36	3.3	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	1,058	3.00	3.82	3.3	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 5141 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.92	27
J-52	6,437.00	Red	0	6,650.31	92
J-51	6,390.00	Red	0	6,648.32	112
J-50	6,385.00	Red	0	6,648.02	114
J-46-POC-T	6,376.00	Red	45	6,641.63	115
J-45-POC-1	6,376.00	Red	18	6,642.31	115
J-44-FH	6,376.00	Red	0	6,643.03	116
J-43	6,376.00	Red	0	6,643.55	116
J-42	6,376.00	Red	0	6,644.26	116
J-41	6,383.00	Red	0	6,646.38	114
J-40	6,383.00	Red	0	6,646.50	114
J-37	6,376.00	Red	0	6,643.08	116
J-36-FH	6,376.00	Red	0	6,643.12	116
J-35-FH	6,376.00	Red	0	6,643.28	116
J-34	6,376.00	Red	0	6,643.35	116
J-33	6,376.00	Red	0	6,643.32	116
J-32-FH	6,376.00	Red	0	6,641.06	115
J-31-FH	6,376.00	Red	0	6,637.49	113
J-30	6,373.00	Red	0	6,645.89	118
J-26-FH	6,376.00	Red	0	6,642.50	115
J-25-FH	6,376.00	Red	0	6,641.53	115
J-24	6,376.00	Red	0	6,641.11	115
J-23-FH	6,376.00	Red	0	6,636.82	113
J-22A-FDC	6,376.00	Red	4,000	6,635.72	112
J-22-TAP	6,376.00	Red	56	6,636.26	113
J-21	6,376.00	Red	0	6,636.43	113
J-20	6,366.00	Red	0	6,645.76	121
J-12	6,376.00	Red	0	6,641.38	115
J-11	6,371.00	Red	0	6,641.74	117
J-10	6,354.00	Red	0	6,645.69	126
J-00 (J16)	6,347.00	Red	0	6,645.69	129

Nodes at Tank
Connection

4000 gpm Total Fire Flow
applied at J-22A-FDC

Residual Pressure

Scenario: Max Day + 4000 gpm Fire Flow (CR Fire)
Link 5141 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-4,119	2.92	0.08	1.4	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-4,119	2.92	1.52	1.4	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	2,548	1.81	0.60	0.6	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	1,925	1.36	0.14	0.3	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	1,076	0.76	0.07	0.1	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-3,234	3.30	13.91	2.1	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-885	1.41	1.99	0.6	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-885	1.41	0.30	0.6	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-885	2.51	11.61	2.3	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	0	0.00	0.00	0.0	True	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	224	1.43	0.26	1.3	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	269	1.72	0.68	1.9	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	287	1.83	0.72	2.1	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-988	2.80	0.47	2.9	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	287	1.83	0.52	2.1	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-1,275	3.62	0.71	4.6	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	296	1.89	0.91	2.2	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-1,571	4.46	2.13	6.8	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-1,571	4.46	0.11	6.8	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	154	0.98	0.04	0.7	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-1,142	3.24	0.58	3.8	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	154	0.98	0.16	0.7	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	154	0.98	0.07	0.7	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	142	0.91	0.03	0.6	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	766	4.89	2.26	12.9	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	766	4.89	3.58	12.9	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	766	4.89	1.06	12.9	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-623	3.98	2.58	8.8	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-1,142	3.24	0.97	3.8	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-1,142	3.24	0.43	4.3	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-2,441	6.93	4.28	15.4	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-1,300	3.69	0.27	4.8	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-2,441	6.93	0.56	15.4	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	-2,385	6.77	0.53	14.7	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	1,615	4.58	0.70	7.1	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-849	5.42	9.33	15.6	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-1,076	3.05	0.37	3.4	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	1,076	3.05	3.94	3.4	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 2150 gpm Fire Flow (Costco)
[2022 Costco Design Standards Section 06.C.5.a]

FlexTable: Reservoir Table

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-99	6,662.00	Red	2,269	6,662.00
R-5	6,662.00	Red	0	6,662.00

No reliance on
booster pump for
fire flows

Scenario: Max Day + 2150 gpm Fire Flow (Costco)
[2022 Costco Design Standards Section 06.C.5.a]

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.97	27
J-52	6,437.00	Red	0	6,658.07	96
J-51	6,390.00	Red	0	6,657.41	116
J-50	6,385.00	Red	0	6,657.38	118
J-46-POC-T	6,376.00	Red	45	6,655.35	121
J-45-POC-1	6,376.00	Red	18	6,655.57	121
J-44-FH	6,376.00	Red	0	6,655.83	121
J-43	6,376.00	Red	0	6,656.01	121
J-42	6,376.00	Red	0	6,656.25	121
J-41	6,383.00	Red	0	6,656.97	119
J-40	6,383.00	Red	0	6,656.98	119
J-37	6,376.00	Red	0	6,655.86	121
J-36-FH	6,376.00	Red	0	6,655.87	121
J-35-FH	6,376.00	Red	0	6,655.93	121
J-34	6,376.00	Red	0	6,655.95	121
J-33	6,376.00	Red	0	6,655.94	121
J-32-FH	6,376.00	Red	0	6,655.21	121
J-31-FH	6,376.00	Red	0	6,654.05	120
J-30	6,373.00	Red	0	6,656.79	123
J-26-FH	6,376.00	Red	0	6,655.67	121
J-25-FH	6,376.00	Red	0	6,655.34	121
J-24	6,376.00	Red	0	6,655.20	121
J-23-FH	6,376.00	Red	0	6,653.82	120
J-22A-FDC	6,376.00	Red	2,150	6,653.47	120
J-22-TAP	6,376.00	Red	56	6,653.64	120
J-21	6,376.00	Red	0	6,653.70	120
J-20	6,366.00	Red	0	6,656.74	126
J-12	6,376.00	Red	0	6,655.29	121
J-11	6,371.00	Red	0	6,655.41	123
J-10	6,354.00	Red	0	6,656.72	131
J-00 (J16)	6,347.00	Red	0	6,656.72	134

Nodes at Tank Connection

Residual Pressure
Min allowable = 65 psi
[2022 Costco Design Standards Section 06.C.5.a]

2150 gpm Total Fire Flow applied at J-22A-FDC

Scenario: Max Day + 2150 gpm Fire Flow (Costco)
[2022 Costco Design Standards Section 06.C.5.a]

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-2,269	1.61	0.03	0.5	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-1,998	1.42	0.40	0.4	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	1,398	0.99	0.20	0.2	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	1,056	0.75	0.05	0.1	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	593	0.42	0.02	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-1,778	1.82	4.59	0.7	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-491	0.78	0.67	0.2	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-220	0.35	0.02	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-491	1.39	3.90	0.8	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-271	0.77	0.44	0.3	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	102	0.65	0.06	0.3	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	147	0.94	0.22	0.6	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	165	1.05	0.26	0.8	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-544	1.54	0.16	1.0	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	165	1.05	0.19	0.8	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-709	2.01	0.24	1.6	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	163	1.04	0.30	0.7	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-871	2.47	0.71	2.3	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-600	1.70	0.02	1.1	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	87	0.55	0.01	0.2	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-630	1.79	0.19	1.2	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	87	0.55	0.05	0.2	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	87	0.55	0.03	0.2	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	76	0.49	0.01	0.2	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	417	2.66	0.73	4.2	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	417	2.66	1.16	4.2	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	417	2.66	0.34	4.2	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-341	2.18	0.84	2.9	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-630	1.79	0.32	1.3	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-630	1.79	0.14	1.4	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	-1,325	3.76	1.38	5.0	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-695	1.97	0.08	1.5	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	-1,325	3.76	0.18	5.0	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	-1,269	3.60	0.17	4.6	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	881	2.50	0.23	2.3	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-463	2.96	3.04	5.1	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-593	1.68	0.12	1.1	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	593	1.68	1.31	1.1	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station

FlexTable: Reservoir Table

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-99	6,662.00	Red	1,619	6,662.00
R-5	6,662.00	Red	0	6,662.00

No reliance on
booster pump for
fire flows

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.99	27
J-52	6,437.00	Red	0	6,659.90	96
J-51	6,390.00	Red	0	6,659.54	117
J-50	6,385.00	Red	0	6,659.53	119
J-46-POC-T	6,376.00	Red	45	6,657.16	122
J-45-POC-1	6,376.00	Red	18	6,655.00	121
J-44-FH	6,376.00	Red	1,500	6,653.10	120
J-43	6,376.00	Red	0	6,658.45	122
J-42	6,376.00	Red	0	6,658.73	122
J-41	6,383.00	Red	0	6,659.30	120
J-40	6,383.00	Red	0	6,659.32	120
J-37	6,376.00	Red	0	6,658.49	122
J-36-FH	6,376.00	Red	0	6,658.52	122
J-35-FH	6,376.00	Red	0	6,658.67	122
J-34	6,376.00	Red	0	6,658.73	122
J-33	6,376.00	Red	0	6,658.77	122
J-32-FH	6,376.00	Red	0	6,658.72	122
J-31-FH	6,376.00	Red	0	6,658.64	122
J-30	6,373.00	Red	0	6,659.24	124
J-26-FH	6,376.00	Red	0	6,658.49	122
J-25-FH	6,376.00	Red	0	6,658.50	122
J-24	6,376.00	Red	0	6,658.51	122
J-23-FH	6,376.00	Red	0	6,658.56	122
J-22A-FDC	6,376.00	Red	0	6,658.58	122
J-22-TAP	6,376.00	Red	56	6,658.57	122
J-21	6,376.00	Red	0	6,658.61	122
J-20	6,366.00	Red	0	6,659.22	127
J-12	6,376.00	Red	0	6,658.50	122
J-11	6,371.00	Red	0	6,658.56	124
J-10	6,354.00	Red	0	6,659.21	132
J-00 (J16)	6,347.00	Red	0	6,659.21	135

Nodes at Tank
Connection

Residual Pressure

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-1,619	1.15	0.01	0.2	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-1,423	1.01	0.21	0.2	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	849	0.60	0.08	0.1	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	600	0.43	0.02	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	406	0.29	0.01	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-1,269	1.30	2.46	0.4	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-350	0.56	0.36	0.1	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-154	0.25	0.01	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-350	0.99	2.09	0.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-196	0.56	0.24	0.1	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-547	3.49	1.34	6.9	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	-502	3.21	2.16	5.9	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	-484	3.09	1.90	5.5	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	242	0.69	0.03	0.2	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	1,016	6.48	5.35	21.8	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-774	2.19	0.28	1.8	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	-4	0.03	0.00	0.0	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-770	2.18	0.57	1.8	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-573	1.63	0.02	1.1	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	146	0.93	0.04	0.6	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	96	0.27	0.01	0.0	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	146	0.93	0.14	0.6	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	146	0.93	0.07	0.6	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-150	0.96	0.03	0.6	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	99	0.63	0.05	0.3	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	99	0.63	0.08	0.3	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	99	0.63	0.02	0.3	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-249	1.59	0.47	1.6	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	96	0.27	0.01	0.0	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	96	0.27	0.00	0.0	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	237	0.67	0.06	0.2	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	142	0.40	0.00	0.1	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	237	0.67	0.01	0.2	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	293	0.83	0.01	0.3	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	293	0.83	0.03	0.3	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-195	1.24	0.61	1.0	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-406	1.15	0.06	0.6	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	406	1.15	0.65	0.6	False	False

No reliance on Red Zone booster pump for fire flow

Max Velocity

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station
Link 4244 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.99	27
J-52	6,437.00	Red	0	6,659.90	96
J-51	6,390.00	Red	0	6,659.54	117
J-50	6,385.00	Red	0	6,659.53	119
J-46-POC-T	6,376.00	Red	45	6,648.48	118
J-45-POC-1	6,376.00	Red	18	6,631.77	111
J-44-FH	6,376.00	Red	1,500	6,616.33	104
J-43	6,376.00	Red	0	6,658.82	122
J-42	6,376.00	Red	0	6,658.95	122
J-41	6,383.00	Red	0	6,659.31	120
J-40	6,383.00	Red	0	6,659.32	120
J-37	6,376.00	Red	0	6,658.68	122
J-36-FH	6,376.00	Red	0	6,658.70	122
J-35-FH	6,376.00	Red	0	6,658.80	122
J-34	6,376.00	Red	0	6,658.84	122
J-33	6,376.00	Red	0	6,658.84	122
J-32-FH	6,376.00	Red	0	6,658.66	122
J-31-FH	6,376.00	Red	0	6,658.37	122
J-30	6,373.00	Red	0	6,659.21	124
J-26-FH	6,376.00	Red	0	6,658.49	122
J-25-FH	6,376.00	Red	0	6,658.18	122
J-24	6,376.00	Red	0	6,658.04	122
J-23-FH	6,376.00	Red	0	6,658.18	122
J-22A-FDC	6,376.00	Red	0	6,658.22	122
J-22-TAP	6,376.00	Red	56	6,658.20	122
J-21	6,376.00	Red	0	6,658.28	122
J-20	6,366.00	Red	0	6,659.18	127
J-12	6,376.00	Red	0	6,657.87	122
J-11	6,371.00	Red	0	6,657.98	124
J-10	6,354.00	Red	0	6,659.16	132
J-00 (J16)	6,347.00	Red	0	6,659.16	135

Nodes at Tank
Connection

Residual Pressure

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station
Link 4244 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-1,619	1.15	0.01	0.2	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-1,426	1.01	0.21	0.2	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	1,017	0.72	0.11	0.1	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	799	0.57	0.03	0.1	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	559	0.40	0.02	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-1,269	1.30	2.46	0.4	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-350	0.56	0.36	0.1	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-157	0.25	0.01	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-350	0.99	2.09	0.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-193	0.55	0.23	0.1	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-1,563	9.98	9.39	48.4	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	-1,518	9.69	16.71	45.9	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	-1,500	9.57	15.44	44.9	False	False
4337	J-37	J-43	163	12.0	PVC	120.0	-508	1.44	0.14	0.8	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	0	0.00	0.00	0.0	True	False
4243	J-43	J-42	154	12.0	PVC	120.0	-508	1.44	0.13	0.8	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	94	0.60	0.11	0.3	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-602	1.71	0.36	1.1	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-409	1.16	0.01	0.6	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	115	0.73	0.02	0.4	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	-623	1.77	0.19	1.2	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	115	0.73	0.09	0.4	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	115	0.73	0.04	0.4	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-21	0.13	0.00	0.0	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	197	1.26	0.18	1.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	197	1.26	0.29	1.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	197	1.26	0.09	1.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-218	1.39	0.37	1.3	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	-623	1.77	0.32	1.2	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	-623	1.77	0.14	1.4	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	381	1.08	0.14	0.5	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	1,004	2.85	0.17	3.0	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	381	1.08	0.02	0.5	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	437	1.24	0.02	0.6	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	437	1.24	0.06	0.6	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-240	1.53	0.90	1.5	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-559	1.59	0.11	1.0	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	559	1.59	1.17	1.0	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station
Link 4445 Closed

FlexTable: Junction Table

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-55	6,600.00	Red	0	6,661.99	27
J-52	6,437.00	Red	0	6,659.90	96
J-51	6,390.00	Red	0	6,659.54	117
J-50	6,385.00	Red	0	6,659.53	119
J-46-POC-T	6,376.00	Red	45	6,658.69	122
J-45-POC-1	6,376.00	Red	18	6,658.69	122
J-44-FH	6,376.00	Red	1,500	6,647.20	117
J-43	6,376.00	Red	0	6,658.22	122
J-42	6,376.00	Red	0	6,658.61	122
J-41	6,383.00	Red	0	6,659.29	120
J-40	6,383.00	Red	0	6,659.32	120
J-37	6,376.00	Red	0	6,658.40	122
J-36-FH	6,376.00	Red	0	6,658.44	122
J-35-FH	6,376.00	Red	0	6,658.61	122
J-34	6,376.00	Red	0	6,658.68	122
J-33	6,376.00	Red	0	6,658.76	122
J-32-FH	6,376.00	Red	0	6,658.75	122
J-31-FH	6,376.00	Red	0	6,658.75	122
J-30	6,373.00	Red	0	6,659.25	124
J-26-FH	6,376.00	Red	0	6,658.49	122
J-25-FH	6,376.00	Red	0	6,658.64	122
J-24	6,376.00	Red	0	6,658.70	122
J-23-FH	6,376.00	Red	0	6,658.73	122
J-22A-FDC	6,376.00	Red	0	6,658.73	122
J-22-TAP	6,376.00	Red	56	6,658.73	122
J-21	6,376.00	Red	0	6,658.75	122
J-20	6,366.00	Red	0	6,659.24	127
J-12	6,376.00	Red	0	6,658.72	122
J-11	6,371.00	Red	0	6,658.76	125
J-10	6,354.00	Red	0	6,659.23	132
J-00 (J16)	6,347.00	Red	0	6,659.23	135

Nodes at Tank
Connection

Residual Pressure

Scenario: Max Day + 1500 gpm Fire Flow at Fuel Station
Link 4445 Closed

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/1000ft)	Is Closed?	Has User Defined Length?
T24-9955	J-55	R-99	56	24.0	PVC	120.0	-1,619	1.15	0.01	0.2	False	False
T24-5040	J-40	J-50	1,100	24.0	PVC	120.0	-1,421	1.01	0.21	0.2	False	True
T24-4030	J-40	J-30	1,060	24.0	PVC	120.0	769	0.55	0.07	0.1	False	False
T24-3020	J-30	J-20	410	24.0	PVC	120.0	514	0.36	0.01	0.0	False	False
T24-2010	J-20	J-10	585	24.0	PVC	120.0	341	0.24	0.01	0.0	False	False
T24-1000	J-10	J-00 (J16)	358	24.0	PVC	120.0	0	0.00	0.00	0.0	False	False
T24-0500	J-00 (J16)	R-5	100	24.0	PVC	120.0	0	0.00	0.00	0.0	True	True
T20-5540	J-50	J-55	6,480	20.0	PVC	120.0	-1,268	1.30	2.46	0.4	False	True
T16-5251	J-51	J-52	3,450	16.0	PVC	120.0	-351	0.56	0.36	0.1	False	True
T16-5051	J-50	J-51	525	16.0	PVC	120.0	-152	0.24	0.01	0.0	False	True
5552	J-52	J-55	4,950	12.0	PVC	120.0	-351	0.99	2.09	0.4	False	True
5141	J-41	J-51	1,675	12.0	PVC	120.0	-198	0.56	0.25	0.1	False	True
4612	J-46-POC-T	J-12	194	8.0	PVC	120.0	-63	0.40	0.02	0.1	False	False
4546	J-45-POC-1	J-46-POC-T	364	8.0	PVC	120.0	-18	0.11	0.00	0.0	False	False
4445	J-44-FH	J-45-POC-1	344	8.0	PVC	120.0	0	0.00	0.00	0.0	True	False
4337	J-37	J-43	163	12.0	PVC	120.0	577	1.64	0.17	1.1	False	False
4244	J-43	J-44-FH	246	8.0	PVC	120.0	1,500	9.57	11.02	44.9	False	False
4243	J-43	J-42	154	12.0	PVC	120.0	-923	2.62	0.39	2.5	False	False
4234	J-42	J-34	409	8.0	PVC	120.0	-73	0.47	0.07	0.2	False	False
4142	J-42	J-41	313	12.0	PVC	120.0	-850	2.41	0.68	2.2	False	False
4041	J-41	J-40	17	12.0	PVC	120.0	-652	1.85	0.02	1.3	False	False
3736	J-36-FH	J-37	61	8.0	PVC	120.0	158	1.01	0.04	0.7	False	False
3726	J-26-FH	J-37	154	12.0	PVC	120.0	418	1.19	0.09	0.6	False	False
3635	J-35-FH	J-36-FH	237	8.0	PVC	120.0	158	1.01	0.17	0.7	False	False
3534	J-34	J-35-FH	110	8.0	PVC	120.0	158	1.01	0.08	0.7	False	False
3433	J-34	J-33	54	8.0	PVC	120.0	-232	1.48	0.08	1.4	False	False
3332	J-33	J-32-FH	175	8.0	PVC	120.0	24	0.15	0.00	0.0	False	False
3231	J-32-FH	J-31-FH	277	8.0	PVC	120.0	24	0.15	0.01	0.0	False	False
3121	J-31-FH	J-21	82	8.0	PVC	120.0	24	0.15	0.00	0.0	False	False
3033	J-33	J-30	292	8.0	PVC	120.0	-255	1.63	0.49	1.7	False	False
2625	J-25-FH	J-26-FH	258	12.0	PVC	120.0	418	1.19	0.15	0.6	False	False
2524	J-24	J-25-FH	99	12.0	PVC	120.0	418	1.19	0.07	0.7	False	False
2423	J-23-FH	J-24	279	12.0	PVC	120.0	141	0.40	0.02	0.1	False	False
2412	J-24	J-12	56	12.0	PVC	120.0	-278	0.79	0.02	0.3	False	False
2322	J-22-TAP	J-23-FH	37	12.0	PVC	120.0	141	0.40	0.00	0.1	False	False
2222A	J-22A-FDC	J-22-TAP	36	12.0	PVC	120.0	197	0.56	0.01	0.1	False	False
2122A	J-21	J-22A-FDC	98	12.0	PVC	120.0	197	0.56	0.01	0.1	False	False
2021	J-21	J-20	597	8.0	PVC	120.0	-173	1.11	0.49	0.8	False	False
1211	J-12	J-11	110	12.0	PVC	120.0	-341	0.97	0.04	0.4	False	False
1110	J-10	J-11	1,172	12.0	PVC	120.0	341	0.97	0.47	0.4	False	False

No reliance on
Red Zone
booster pump
for fire flow

Max Velocity

Appendix C

Sanitary Calculations

Appendix D

Excerpts

Memo

To: Castle Rock Fire and Rescue Department

From: Jeff Killingsworth, P.E.

cc: Ken Torres P.E., Town of Castle Rock – Public Works Utilities

Date: June 17th, 2024

Re: Confirmation of Required Fire Flow – Dawson Trails Project

This memorandum documents the basis of fire flow requirements for the initial design phases of the Dawson Trails Planned Development. Three separate construction plan sets are being processed through Town of Castle Rock development services and are described as follows:

Dawson Trails Filing 1 is an infrastructure package to support future mixed-use and commercial development, including a proposed Costco warehouse. Filing 1 comprises approximately 186 acres within the planned development, generally north of Crystal Valley Parkway

Dawson Trails Filing 2 is an infrastructure package to support future mixed-use, residential and commercial development. Filing 2 encompasses approximately 186 acres of the planned development, generally south of Crystal Valley Parkway.

Costco Dawson Trails is a 19-acre commercial development within the limits of Dawson Trails Filing 1, located in the northwest quadrant of the proposed Crystal Valley Interchange. The Costco project's Site Development Plan (SDP) is SDP23-0020, which proposes a 161,000 square foot retail warehouse.

The water distribution system proposed within the projects described above is modelled as an integrated system with the following controlling criteria for fire flow analysis:

- a. Included projects:
Dawson Trails Filing 1 Infrastructure [CD23-0034]
Dawson Trails Filing 2 Infrastructure [CD23-0045]
Costco Dawson Trails [CD23-0048]

- b. The Costco warehouse building is the largest building that has been planned for the development. The warehouse has a total proposed floor area of **161,000 square feet**.

- c. The building construction type has not been verified. However, the minimum fire flow analysis from IFC Table B105.1 (2) assume a **Type V-B** construction type classification resulting in the most conservative flows

- d. The Costco warehouse building will be sprinklered in accordance with IFC 903.3.1.3.

- e. Required Fire Flow:

Required Fire Flow 4000 gpm at 20 psi

Required Duration 4 Hours

- f. Castle Rock Fire and Rescue Department signature

Kevin Sullivan

Digitally signed by Kevin Sullivan
DN: C=US, E=FPO@CRGOV.COM,
O=Castle Rock Fire and Rescue
Department, OU="Castle Rock Fire and
Life Safety Division ", CN=Kevin Sullivan
Reason: I am approving this document
Contact Info: ksullivan@crgov.com
Date: 2024.10.07 09:03:25-06'00'

08-30-2024

Authorized Signature (Castle Rock Fire and Rescue Department)

FIRE REVIEW 15065



DEVELOPMENT REQUIREMENTS

Version 2022

October 28, 2022

SUMMARY OF CHANGES

(Highlighted)

This document contains information that is confidential and privileged. The information is intended for the sole use of the individual or entity that was directly provided this information by Costco Wholesale. Be advised that any disclosure, copying, distribution or use of the contents of this information is prohibited without the prior written consent of Costco Wholesale



COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

SECTION 06 SITE UTILITIES (WET AND DRY)

- 10) Utility structures, covers, or/ grates shall not be located near the Main Warehouse entrance, in major drive aisles, in front of the Receiving Ramp, or in other areas where customers will have shopping carts.
- 11) Utilities installed parallel with the exterior walls shall not be installed less than ten (10) feet (3.05 m) from the face of the wall.
- 12) Identify and verify all new required easements, as well as all existing easements that will be vacated or relocated.
- 13) Actual utility service locations shall be confirmed and verified prior to final design. All utility sizes are typical and therefore subject to change, as required by site specific conditions and the final design requirements of the Costco Wholesale Civil, Mechanical, and Electrical Engineers.
- 14) Provide a protective casing or sleeve where utility lines cross with less than one (1) feet (0.30 m) vertical separation.
- 15) Fuel Facilities – See Fuel Facility Section 12 for requirements.

B. Temporary Utilities

- 1) For more detailed information, see Temporary Improvements, in Section 02 Site Preparation.
- 2) Temporary utilities are necessary to commence construction on a site and are the responsibility of the developer or General Contractor. Temporary utility services shall be provided to the General Contractor's site trailer, the Costco Wholesale site trailer, and any other locations required to perform their work.
- 3) Required temporary utilities include, but are not limited to, water, electric power, telephone, and storm drainage. Temporary sanitary sewer facilities shall be provided as required by code.
- 4) Unless otherwise noted, Temporary Utilities shall be available at the time the Costco Wholesale General Contractor mobilizes to the site.

C. Wet Utilities

- 1) Wet utilities are necessary to operate a Costco Wholesale Warehouse and Fuel Facility (where included). The responsibility of providing these utility services may involve several different consultants; therefore, documentation of all correspondence with utility providers is essential. See Detail: 06_09 Wet Utility Matrix for purposes of tracking permits and approvals.

COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

SECTION 06 SITE UTILITIES (WET AND DRY)

- a) At the latest, dry utilities shall be in service by the required racking date, or Day sixty-five (65) of the project schedule, whichever is earlier.
 - b) For Building Only Projects (Site Delivery Option #4), wet utilities shall be installed by the Developer and ready for use at the time Costco Wholesale General Contractor mobilizes onto the site.
 - c) Required wet utilities include water (potable, irrigation and fire protection), sanitary sewer, and storm drainage.
 - d) Minimum pipe slope for gravity piping is one-half (0.5%) percent.
 - e) At a minimum, pipe invert elevations shall be set at a depth that provides frost cover protection equal to the local frost depth, as determined by the Costco Wholesale Geotechnical Engineer. See Detail: 06_03 Typical Utility Inverts.
 - f) Gravity service connections must pass beneath the structural footings and provide a minimum six (6") inch separation between the bottom of the footing and the outer wall of the pipe. Coordinate final invert elevations with the Costco Wholesale Mechanical Engineer and Structural Engineer. See Detail: 06_03 Typical Utility Inverts.
- 2) **Sanitary Sewer**
- a) **Sanitary sewer laterals shall be a minimum of six (6) inches (152 mm).**
 - b) Sanitary sewer design shall be in accordance with the authority having jurisdiction, including provisions for oil / water separation, effluent concentrations, flow velocity, and maintenance/operations provisions.
 - c) Confirm depth downstream connection to existing system is at an adequate depth to allow sewer service connections to pass beneath structural footings (below frost).
 - Line inverts shall be sufficiently deep as to receive all building flow by gravity (without pumping).
 - **All gravity sanitary sewer conveyance lines serving the Costco Wholesale facilities must have a gradient of one-half (0.5%) percent or greater.**
 - d) NO PUMP STATIONS – unless prior approval is received from Costco Wholesale.
 - e) At a minimum, provide nine (9) six (6) inch (152 mm) waste connections along the Warehouse exterior. Refer to the utility plan for specific locations. Provide for a Sewer flow range of five

COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

SECTION 06 SITE UTILITIES (WET AND DRY)

thousand and five hundred (5,500) gallons (20,814 L) to eight thousand and five hundred (8,500) gallons (32,173 l) per day of waste.

- See Detail: 06_01 Typical Utility Plan, 06_06 Sewer and Water Service Availability Letter, 06_13 Typical Sanitary Sewer Point of Connection Plan, and 06_13A Typical Sanitary Sewer Point of Connection Plan – with Liquor Sales

- f) Provide two (2) grease interceptors. One minimum volume of one thousand fifteen (1,500) gallons (5,676 L) at the Fresh Line and the second minimum volume of one thousand (1,000) gallons (3,785 L) at the Food Service. Verify with minimum size and acceptable manufacturer and obtain final approval from AHJ prior to installation.
 - g) Provide one (1) oil and sand separator capable of handling a load of approximately eight hundred (800) gallons (3,027 L).
 - h) Provide one (1) oil / water separator, waste oil storage tank and associated piping for the Tire Installation bays in accordance with the local jurisdiction's requirement, where required.
 - i) Evaluate requirements for sanitary sewer service to the Fuel Facility and / or the compactor drain and provide sewer service as required by the jurisdiction.
 - j) Verify with the architect if a sanitary sewer connection needs to be provided to the sprinkler riser room.
- 3) Water – Domestic Service
- a) Provide a Domestic Water service to the Warehouse at the location shown on the Utility Plan, or as determined by Costco Wholesale. Clearly identify the location and type of the Domestic water meter.
 - b) The Domestic water service shall be connected directly to the local public water system infrastructure or onsite (public) water system and shall be metered separately from irrigation and fire service connections and Fuel Facility. Connection of the Costco Wholesale domestic water service to a closed (stagnant) system, with backflow preventing free-flowing circulation with the adjacent public water system is not allowed.
 - c) Clarify whether the Onsite Water System is public (with easements) or private (with backflow at property line).
 - d) Confirm backflow and metering requirements.

COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

SECTION 06 SITE UTILITIES (WET AND DRY)

- e) The Domestic water service shall be a minimum size of three (3) inch (76.2 mm) and have minimum static pressure of seventy (70) pounds per sq. inch (482.6 kPa) downstream of backflow prevention.
- See Detail: 06_01 Typical Utility Plan, 06_07 Water Service Availability Letter, 06_12 Typical Water System Point of Connection Plan, and 06_12A Typical Water System Point of Connection Plan- with Liquor Sales.
 - For Canada projects, domestic water supply is typically provided by a sixty-five (65) mm service delivering three hundred and eighty (380) liters per minute at 5.2 bar.
 - For all other countries, verify availability.
- f) Approval from Costco Wholesale is required for lower pressure service.
- g) Provide a pressure reducing valve (PRV) if required due to high system pressures.
- h) Provide backflow prevention as required by the authority having jurisdiction.
- Identify available water pressure after applying required backflow protection device losses.
 - Coordinate with the Costco Wholesale Architect and Mechanical Engineer.
- 4) Water – Irrigation Service
- a) Provide irrigation water service (separate from domestic service) at a location as determined by Costco Wholesale. Irrigation service is to be metered separately from Domestic and Fire Protection services. Clearly identify the location and type of Irrigation water meter.
- b) The irrigation water service shall be as recommended by the Landscape Architect and approved by Costco Wholesale. Confirm backflow and metering requirements.
- c) Identify anticipated water pressure at the Irrigation System connection and coordinate with the Landscape Architect. Provide a pressure reducing valve (PRV) if required due to high pressure systems. Coordinate with landscape architect for project-specific requirements.
- d) Provide necessary water meter (separate from domestic) and backflow prevention device as required by the authority having jurisdiction. Verify that the irrigation water usage does not impact the sanitary sewer billing.
- 5) Water – Fire Protection Service

COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

SECTION 06 SITE UTILITIES (WET AND DRY)

- a) Verify availability of fire protection water service capable of providing a minimum delivery pressure of seventy-five (75) pounds per square inch (517.11 kPa).
- b) For a non-boosted system, provide a minimum of two thousand one hundred and fifty (2,150) gallons per minute (8,138 Lpm) at a residual pressure of sixty-five (65) pounds per square inch (448 kPa) and a general firefighting flow of four thousand (4,000) gallons per minute (15,142 Lpm) at a residual pressure of twenty (20) pounds per square inch (137.95 kPa), or as required by the jurisdiction.
- c) Verify that a pump is not required.
- d) Verify connection and impact fees and provide a detailed and itemized breakdown to the Costco Wholesale Development Director.
- e) The below referenced criteria shall be conducted by an Engineer certified in the state in which the project is sited. The hydrant flow test information shall be accompanied by the stamp and signature of the professional Engineer certifying that the water flow test has been completed in accordance with NFPA 291.
- f) A hydraulic analysis of the Onsite Water system and corresponding connections to the adjacent water system(s) shall be completed by both the Civil Engineer responsible for onsite water system design and Costco Wholesale Fire Protection consultant to determine the available water pressure at base of riser (BOR).
 - The analysis should clearly identify if the onsite water system is public or private.
 - Hydraulic modeling for design of the onsite water system and determining the available water pressure at the base of riser shall account for required back flow protection location and type, and water meter (if required for Fire flows).
- g) All fire protection designs, plans and Specifications shall be reviewed and approved by the Costco Wholesale Fire Protection Consultant.
- h) Complete all designs in accordance with the Costco Wholesale design criteria and the requirements of the authority having jurisdiction. Where discrepancies occur between the standards, the more restrictive shall apply. For any location where an ESFR Fire System will be installed, Costco Wholesale Risk Management Department is to be notified.
- i) Adequacy of service, site piping design, pressure and flow shall be verified with the regulating authority and these requirements. Provide water mains of sufficient size to adequately supply

COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

SECTION 06 SITE UTILITIES (WET AND DRY)

both fire protection and domestic demands simultaneously, or separate lines, if required by local authorities.

- j) Provide an eight (8) inch (203 mm) minimum onsite water system, with sufficient isolation valves to facilitate maintenance/operations. Include an appropriately sized connection to the fire protection system riser and onsite fire hydrants. The location of the fire protection stub connection and base of riser shall be at a location and elevation specified per Costco Wholesale requirements.
 - k) Hydraulic analysis design of the onsite water system shall evaluate the hydraulic benefits of looping the system around the Warehouse, upsizing of the connections to the existing system and/or onsite water system piping.
 - All available water system design configurations shall be evaluated prior to proposing a pump.
 - Provide a separate meter for the fire protection water service only if required.
 - l) Confirm whether a water meter is required on the Fire Protection service. If required, clearly identify the location and type of the Fire Protection water meter.
 - m) Design Water system so that the fire sprinkler system does not require a pump or onsite storage tank. Any design requiring a pump and/or storage tank must be accepted in writing by Costco Wholesale.
- 6) Water – Fire Hydrants
- a) Provide fire hydrants at a maximum of three hundred (300) foot, (91.44 m) intervals around the building, or as required by the authority having jurisdiction. Confirm whether there is also a minimum distance from the Warehouse.
 - b) Provide one (1) fire hydrant within one hundred (100) feet (30.48 m) of the Costco Wholesale Fire Department Connection (FDC) or as required by the authority having jurisdiction. Verify location of FDC and nearest hydrant with the local fire official.
 - Where a Fuel Facility is included, provide one (1) fire hydrant within one hundred (100) feet (30.48 m) of the Fuel Facility. Verify exact location with Costco Wholesale.
 - Verify with the local fire official if additional hydrants are required. If additional hydrants are required, identify their location and coordinate with Site Utility Plan.

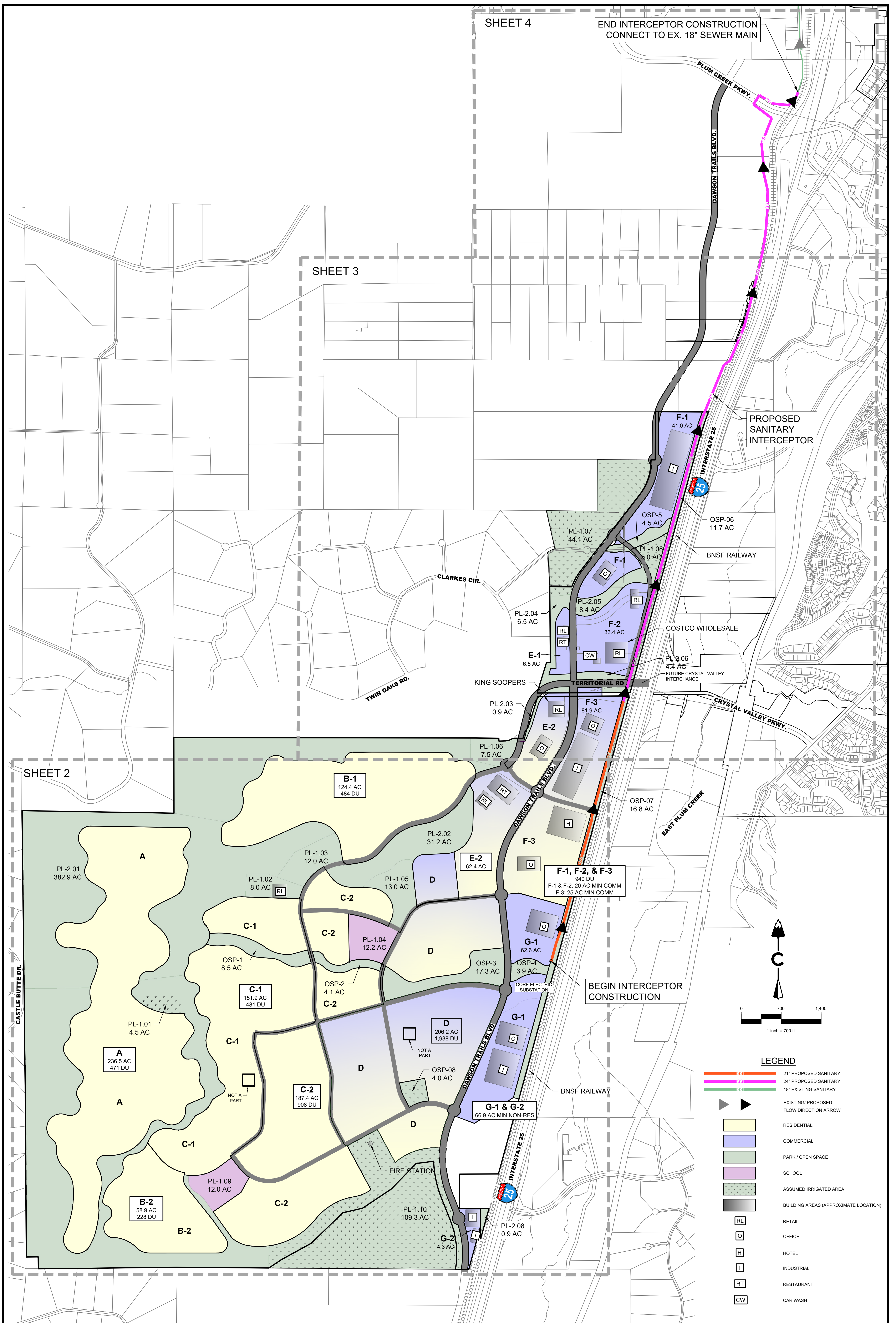
COSTCO WHOLESALE DEVELOPMENT REQUIREMENTS

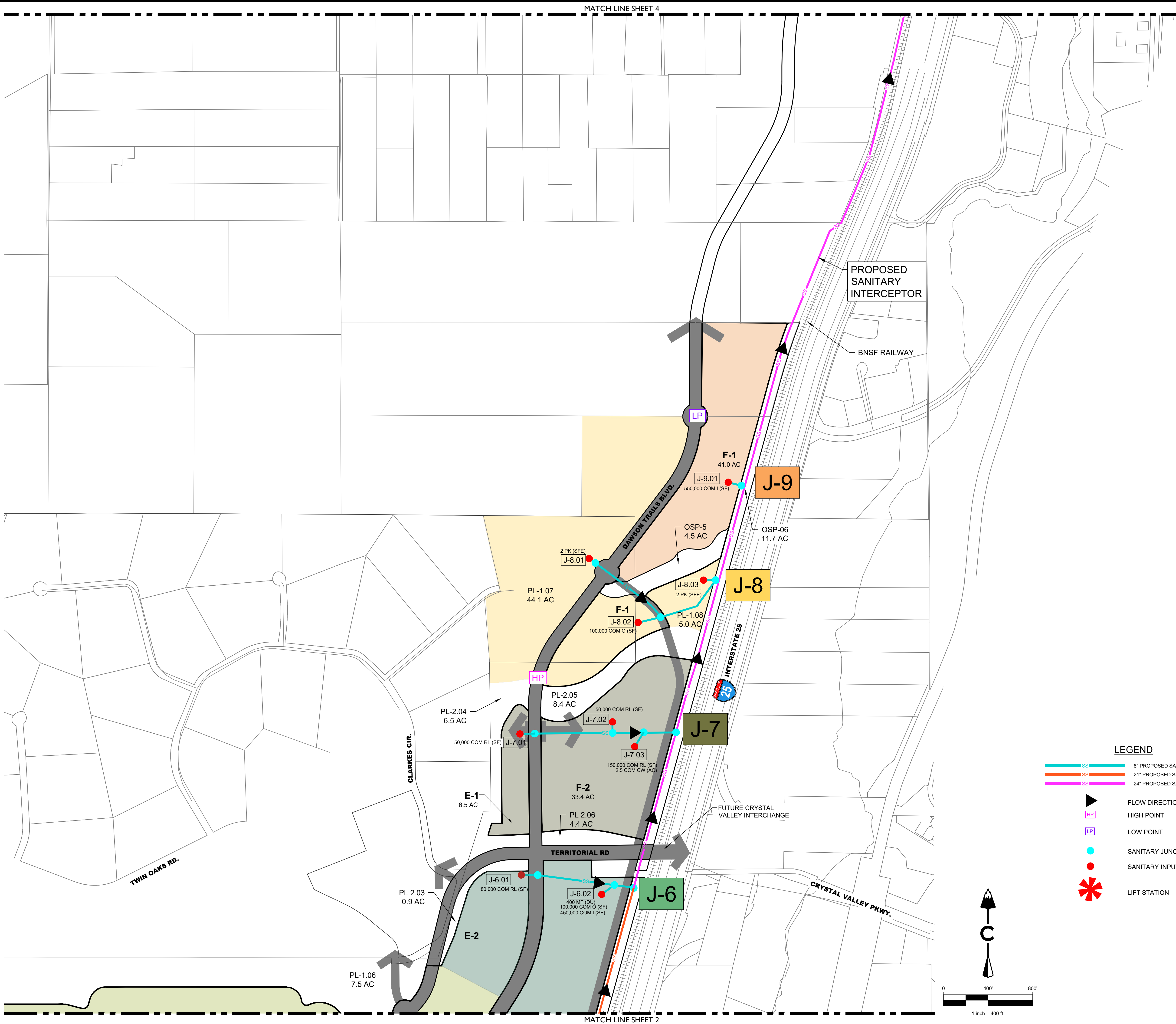
SECTION 06 SITE UTILITIES (WET AND DRY)

- c) Verify with the local fire official if a Post Indicator Valve (PIV) is required, and the type of Fire Hydrant connection(s).
 - Confirm local Fire Protection standards for hydrant nuts and valve.
 - Provide copy of local Fire Hydrant standards and details.
- 7) Water – Fire Backflow Protection
 - a) Provide backflow protection in accordance with the authority having jurisdiction. Identify the size, type, manufacturer and model for the backflow protection device(s) proposed for use.
 - b) Verify if location of backflow is inside Warehouse, or out at property line, and whether the unit is to be installed below grade (in buried vault) or above grade.
 - If above grade, confirm if screening is required.
 - If installed outside of Warehouse, confirm whether frost-protection is required. Identify necessary provisions for an insulated “Hot-Box” structure, and coordinate other utilities (drains, electric power, etc.) as required.
 - The location of the backflow protection device is typically dependent on whether the onsite water system is private, or public (with easements).
 - c) Based on this, it should be determined early in the process whether the onsite water system is to be private or public, so that the appropriate backflow protection and metering can be designed.
- 8) Storm Drainage - See Section 07 Site Storm Drainage for requirements.

D. Dry Utilities

- 1) Dry utilities are necessary to operate a Costco Wholesale Warehouse and Fuel Facility (where included). The responsibility of providing these utility services may involve several different consultants; therefore, documentation of all correspondence with utility providers is essential. See Detail: 06_10 Dry Utility Matrix for purposes of tracking permits and approvals.
 - a) Required dry utilities include electric power, telephone/computer and natural gas. When a Fuel Facility is to be constructed, Communications Conduits between the Controller Enclosure and the Warehouse EDP Room are also required.





JUNCTION TABLE				
JUNCTION	RESIDENTIAL (GPD)	NON-RESIDENTIAL (GPD)	TOTAL PEAK FLOW (GPM)	CUMULATIVE TOTAL PEAK FLOW (GPM)
J-1.01	27,600	-	98	98
J-1.02	13,800	-	48	147
J-1.03	-	3,375	12	159
J-1.04	45,600	-	162	320
J-1.05	18,200	-	65	385
J-1.06	18,200	-	65	449
J-1.07	18,200	-	65	514
J-1.08	-	500	2	516
J-1.09	-	400	2	517
J-1.10	-	551	2	519
J-1	-	-	-	519
J-2.01	19,600	-	70	70
J-2.02	72,600	-	257	327
J-2.03	69,600	-	247	573
J-2.04	-	400	2	575
J-2.05	34,600	-	123	697
J-2.06	-	2,204	8	705
J-2	-	-	-	1,224
J-3A.01	-	400	2	2
J-3A.02	66,600	-	236	237
J-3A	-	-	-	335
J-3.01	5,200	-	19	354
J-3.02	39,200	-	139	493
J-3.03	39,000	-	138	631
J-3.04	31,000	-	110	741
J-3.05	92,340	-	327	327
J-3.05A	-	-	-	1,068
J-3.06	-	20,000	71	1,139
J-3	-	-	-	2,363
J-4.01	18,400	-	65	65
J-4.02	6,800	-	24	89
J-4.03	16,600	-	59	148
J-4.04	-	3,375	12	160
J-4.05	26,600	-	94	254
J-4.06	72,400	-	257	511
J-4.07	-	20,000	71	582
J-4	-	-	-	2,945
J-5.01	-	6,000	21	21
J-5.02	37,000	-	131	152
J-5.03	26,200	-	93	245
J-5.04	33,600	-	119	364
J-5.05	-	9,500	34	398
J-5.06	26,000	-	92	492
J-5.07	26,000	231,000	910	1,400
J-5.08	70,200	63,906	475	1,875
J-5	-	-	-	4,820
J-6.01	-	8,000	28	28
J-6.02	52,000	12,479	228	257
J-6	-	-	-	5,077
J-7.01	-	40,000	142	142
J-7.02	-	5,000	18	160
J-7.03	-	27,500	97	257
J-7	-	-	-	5,334
J-8.01	-	400	2	2
J-8.02	-	10,000	36	37
J-8.03	-	400	2	39
J-8	-	-	-	5,372
J-9.01	-	3,030	11	11
J-9	-	-	-	5,383
TOTAL	1,023,140	468,421	-	5,383

SUMMARY TABLE			
	USE	QUANTITIES	TOTALS
RESIDENTIAL	MULTIFAMILY (DU)	2,098	5,850
	SINGLE FAMILY (DU)	3,752	
NON-RESIDENTIAL	SCHOOL (EA)	2	3,200,000
	PARKS (SFE)	10	
	CAR WASH (AC)	3	
	INDUSTRIAL (SF)	1,500,000	
	HOTEL (SF)	300,000	
	RESTAURANTS (SF)	175,000	
	RETAIL/ OFFICE (SF)	1,225,000	

NOTES:
1. SEE APPENDIX C FOR DETAILED SANITARY SEWER CALCULATIONS

LEGEND

8" PROPOSED SANITARY
21" PROPOSED SANITARY
24" PROPOSED SANITARY

FLOW DIRECTION ARROW

HIGH POINT
LOW POINT

SANITARY JUNCTION
SANITARY INPUT PT.

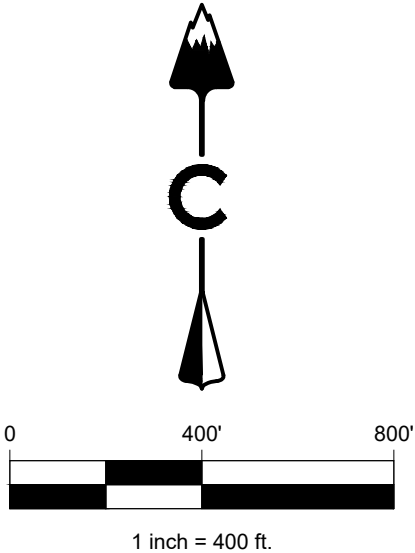
LIFT STATION

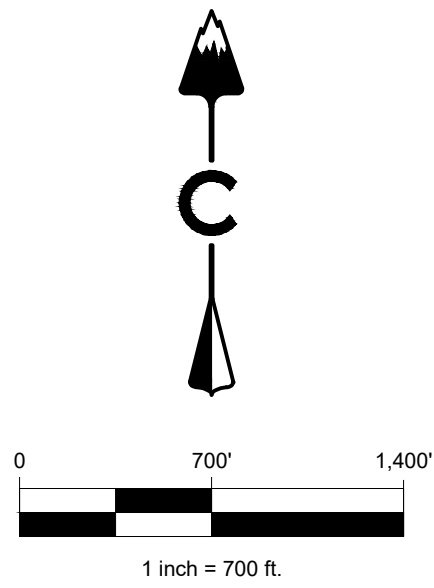
LEGEND

BASIN 1
BASIN 2
BASIN 3A
BASIN 3B
BASIN 4
BASIN 5
BASIN 6
BASIN 7
BASIN 8
BASIN 9

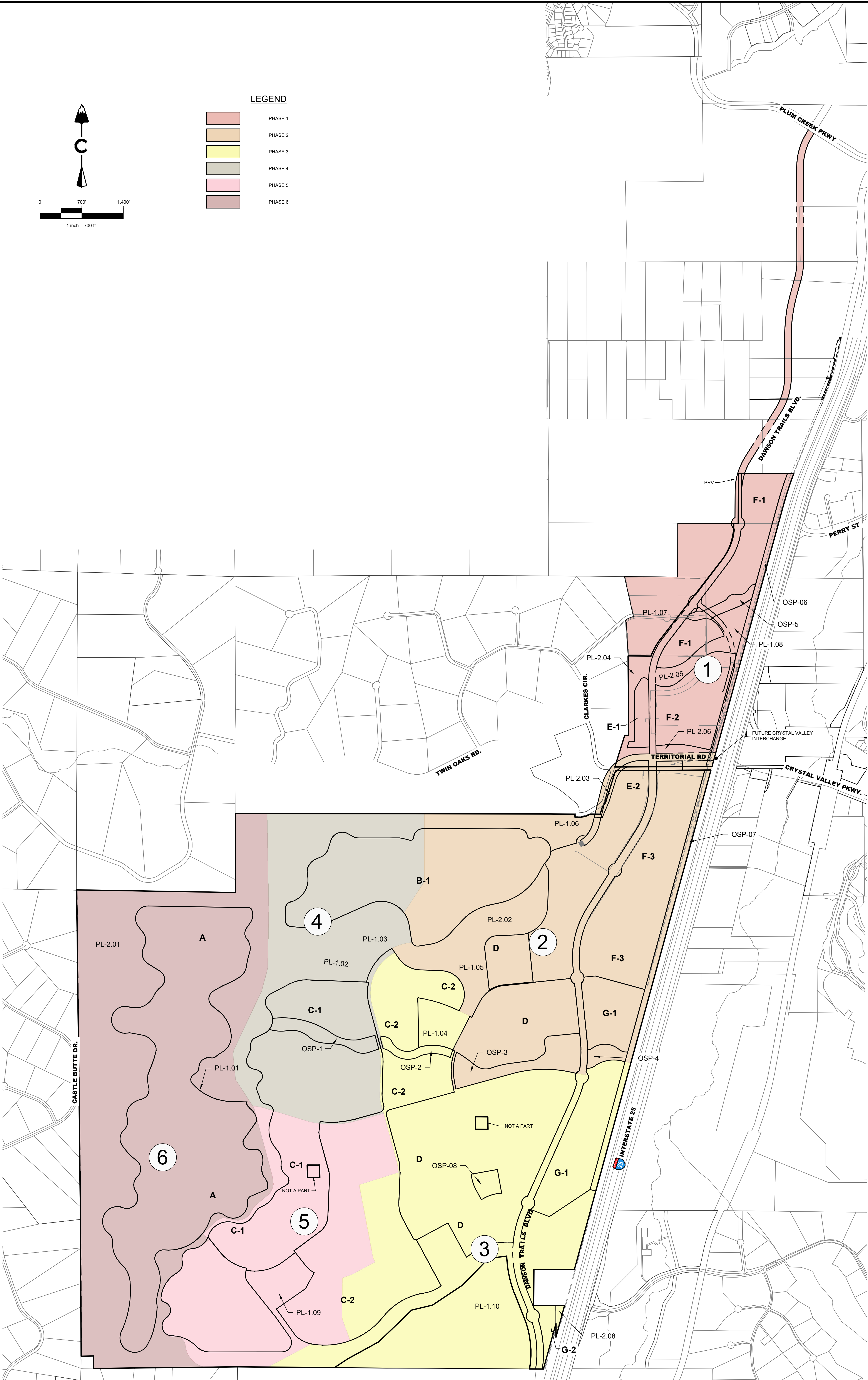
X SFD (DU)
X MF (DU)
X SC (EA)
X COM (SF)
RL
O
H
I
RT
CW
X PK (SFE)

SINGLE FAMILY (UNITS)
MULTI-FAMILY (UNITS)
SCHOOL (UNITS)
COMMERCIAL (UNITS)
RETAIL
OFFICE
HOTEL
INDUSTRIAL
RESTAURANT
CAR WASH
PARK (UNITS)





LEGEND	
	PHASE 1
	PHASE 2
	PHASE 3
	PHASE 4
	PHASE 5
	PHASE 6



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3473 S. BROADWAY
ENGLEWOOD, CO 80113
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LAND DEVELOPMENT
ENERGY
PUBLIC INFRASTRUCTURE

DAWSON TRAILS OFFSITE SANITARY SEWER

FUTURE PHASING MAP

DATE: 3/24/23
CREATED BY: CGV
JOB NO. 20-224
SHEET 5 OF 5

CONCEPTUAL UTILITY LETTER FOR

DAWSON TRAILS
TOWN OF CASTE ROCK, COLORADO
PROJECT NO. PDP21-0001

Prepared for:

Dawson Trails I LLC
Dawson Trails II LLC
Westside Property Investment Company, Inc.
4100 E Mississippi Ave, Ste 500
Glendale, CO 80246
Contact: Lawrence Jacobson
Phone: 303-984-9800

Prepared by:



CORE Consultants, Inc.
3473 South Broadway
Englewood, CO 80113
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Phone: 303-703-4444
CORE Project Number: 20-224

May 2022



I. PROJECT LOCATION AND DESCRIPTION

This Conceptual Utility Letter analyzes the existing and proposed utility infrastructure associated with the development of the Dawson Trails Master Planned Community. Dawson Trails is a proposed Planned Development (PD), consisting of single-family homes, multi-family homes, commercial development, community parks and school sites on approximately 2,061 +/- acres in Castle Rock, Colorado.

Site Location

This Conceptual Utility Letter is prepared for Dawson Trails, hereon referred to as the "Site". The Site is in a part of Sections 15, 21, 22, 27, 28, 29, 32, 33 & 34 of Township 8 South, Range 67 West of the Sixth Principal Meridian, Town of Castle Rock, Douglas County, State of Colorado. The Site is bounded by Interstate 25 to the east, Keene Ranch Filing No. 1 to the west, an undeveloped Douglas County parcel to the south, and the Twin Oaks subdivision to the north. See Appendix B for Vicinity Map.

Description of Property and Land Use

The Site is 2,063.7 ± acres and is generally undeveloped; however, there were previous infrastructure improvements constructed and abandoned in the 1980s. These abandoned improvements include concrete roads, water lines, sanitary sewer lines, storm sewer, and water distribution infrastructure including wells and a tank, all of which may be abandoned in place or removed as part of the proposed development of the Site.

The proposed development of the Site will consist of single-family homes, multi-family homes, commercial use, parks, open space, fire station, school sites and associated infrastructure. Based on Section 4.4.1 of the Town's Water System Design Criteria Manual, the water demand for the entire development will be approximately 7,500 SFE. This number is approximate and may be lower as the project will be developed under a Water Efficiency Plan (WEP).

II. EXISTING WATER SYSTEM

The Site does not currently have an active and operational domestic water system. Portions of an old water system were constructed in the 1980s; however, this infrastructure was never accepted by the Town or put into use. It was abandoned in place and will not be utilized to provide domestic water to the Site.

The Site is included in the Town's water system build-out planning. The Town's Water Master Plan designates the site as PD #54, which accounted for approximately 7,900 residential units. See Figures 4.4a and 4.4b in Appendix A. The proposed development will consist of less units than previously zoned and is in conformance with the Town's Master Plan.

The Site will provide a minimum of two (2) connection points to the Town's existing Water System for the required redundancy and looping. See Appendix A for the Concept Utility Map. The potential connection locations are as follows:

1. A connection to the 12" Blue Zone water main located within Crystal Valley Pkwy on the east side of I-25. This connection may require an extension of the existing 12" water main



The anticipated water demand for the entire development is approximately 7,500 SFE (includes irrigation demand), based on land use demands provided in section 4.4.1 of the Town's Water System Design Criteria Manual. Based on the various land uses and expected SFE's in the three water pressure zones, efforts will be made to reduce the number of booster pumps and Pressure Reducing Valves (PRV) between the different water pressure zones. Infrastructure sizes may need to be increased due to transmission and tank piping alignments during final design. Each planning area will be expected to provide internal looping connections to the backbone water main infrastructure within each pressure zone.

A Water Efficiency Program (WEP) Report has been prepared by AquaSan Network for the development. The Program will provide various efficiencies of the water used on the project. The Program will reduce water demands throughout the project in a manner that is acceptable to the Town as well as the commercial and residential housing industries, while achieving benchmark water use goals in determination of impact fee assessments.

Red Zone

A new Red Zone Water Tank, adjacent to the existing abandoned Tank 19, will be constructed to provide a gravity feed to the Red Zone portions of the Site. The tank will be fed by a proposed Red Zone Booster Pump that will provide redundancy to the Red Zone and interconnect with the Town's Blue Zone through a Pressure Reducing Valve.

Green Zone

The Green Zone, western portion of the Site, will be serviced by an off-site Green Zone Tank, Tank 21, as identified on the Town's Water Master Plan. Due to the required hydraulic water surface elevation required to provide service to the Green Zone, the tank will need to be constructed off-site, to the southwest, so that it has the necessary elevation to serve the Green Zone. The location of the Green Zone tank will be determined during final designs. A water quality analysis will be provided for the green zone tank per Town of Castle Rock's Criteria.

It is anticipated that a booster pump will be constructed near the Red Zone water tank noted above. This will boost the water supply up to the Green Zone and a PRV will connect to the Red Zone to provide additional redundancy.

Any future development of the existing water infrastructure needed to serve this site is the responsibility of the developer. A well site and water treatment facility may be required for this development, based on Town of Castle Rock Water Resources requirements. See the Concept Utility Map for locations in Appendix A. Two ± 3 acre well sites and one 6 acre water treatment facility may be required for this development.

IV. EXISTING WASTEWATER SYSTEM

The Site does not currently have an active or operational sanitary sewer wastewater collection system. Portions of an old sanitary system were constructed in the 1980s; however, this infrastructure was never accepted by the Town or put into use. It was abandoned in place and is not anticipated to be utilized to provide wastewater collection to the Site.

An existing 12" Off-Site Sewer Main, upsized to a 15" west of Perry Street and I-25 were constructed to convey flows north of the Site and ultimately connect to the Town's Wastewater collections system near Plum Creek Parkway and the Interstate 25 Interchange.



This sewer main was not previously accepted by the Town and has never been utilized. It is anticipated that the off-site sewer main will be inspected and tested to see if it could be restored and accepted by the Town as it is currently constructed. If the main, or portions of the main, are deemed unusable then a new sewer main, or portions of the sewer main will be reconstructed within the existing easement to convey wastewater flows to the north and connect to the Town's collection system.

It is understood that during a part of the Plum Creek Parkway interchange project that the off-site sewer main was temporarily disconnected at Plum Creek Parkway. It is the responsibility of the Town to reconnect this line across Plum Creek Parkway and tie it into the existing downstream wastewater collection system.

Per coordination with the Town, it is noted that the existing wastewater collection system downstream from Plum Creek Parkway will be at or near capacity with the buildout of the development. The Town currently plans to upsize these downstream sanitary sewer mains to provide the additional capacity to serve this region of the Town.

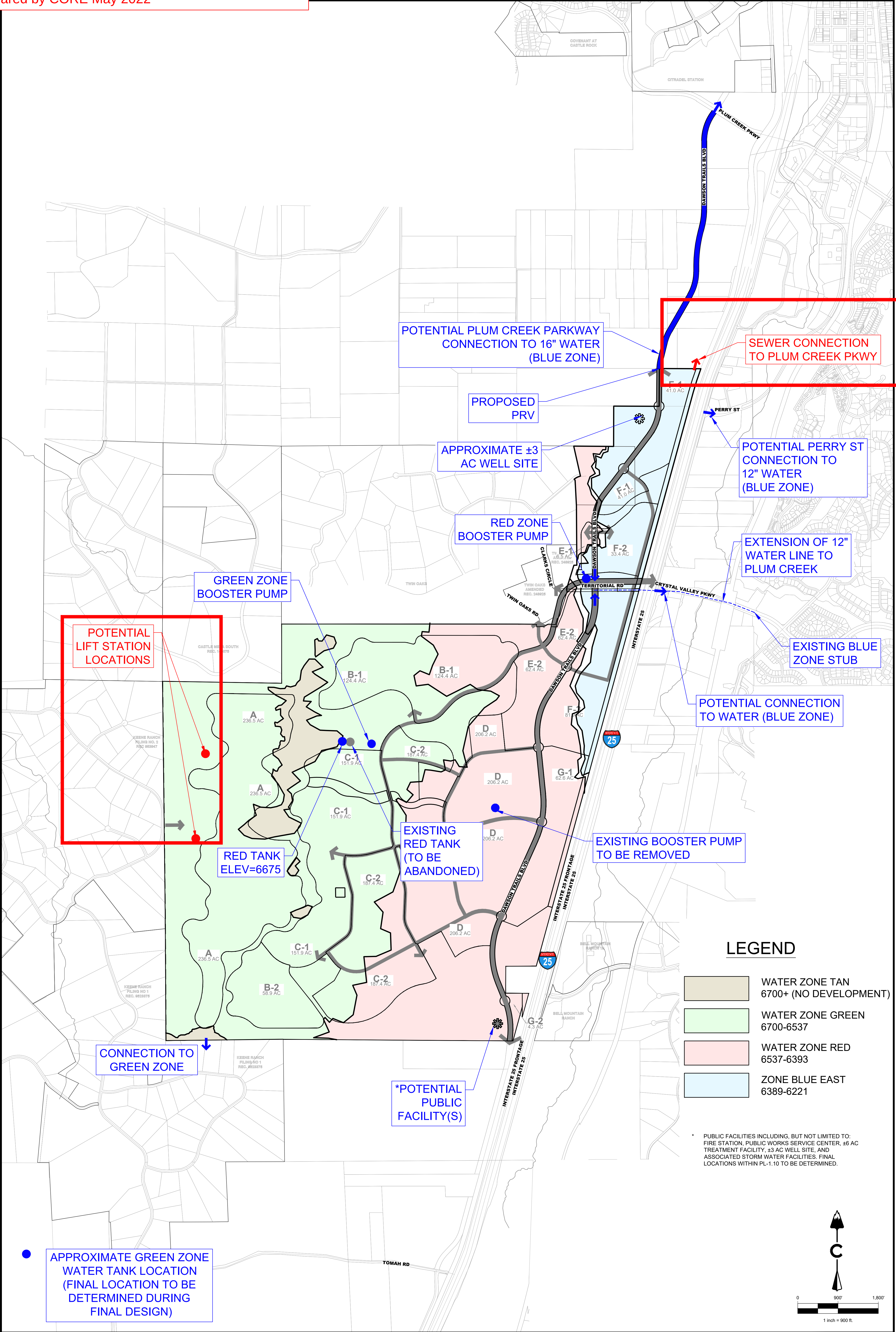
V. PROPOSED WASTEWATER SYSTEM

The Site will be generally served by gravity sanitary sewer mains that will convey the wastewater flows from the west to east and from south to north See Appendix A for Concept Utility Map. The ultimate outfall of the Site is to the North with a connection to the Town's wastewater conveyance system near the Plum Creek Parkway and I-25 Interchange. The anticipated wastewater demand for the entire development is 7,000 SFE, based on land use demands provided in section 4.4.1 of the Town's Wastewater System Design Criteria Manual.

The western portion of the Site slopes from east to west and sanitary sewer flows will not be conveyed via gravity to the main wastewater collection system of the Site. It is anticipated that either one (1) or two (2) sanitary sewer lift stations will be required to serve this portion of the Site. Efforts will be made to minimize the number of Lift Stations required to service the development as operation and maintenance costs will be assessed for lift stations.

The sanitary sewer demands, both on-site and off-site, will be analyzed for the new zoning established with the Planned Development Plan Amendment and sewer mains will be sized according to the Town's standards and criteria.

A Master Utility Study will ultimately be prepared for the development to analyze the various land uses and their locations on the Site to ensure that the backbone infrastructure is sized to handle the build out of the development. Any future development of the existing wastewater infrastructure needed to serve this site is the responsibility of the developer.



5/27/2022 3:00 PM - X:\20-224 DAWSON\DWG\EXHIBITS\OVERALL\2021-06-02 - CONCEPT UTILITY LETTER MAP CONCEPT UTILITY MAP.DWG



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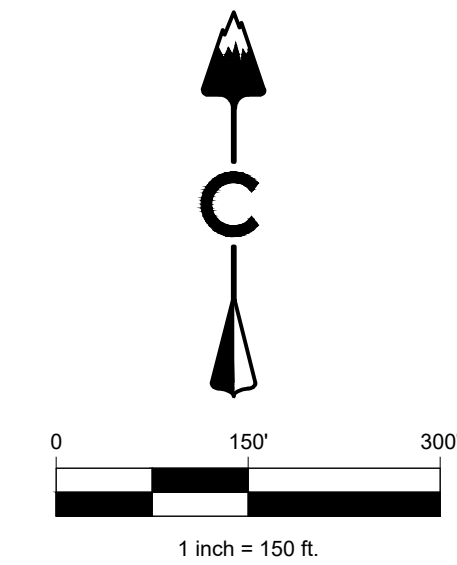
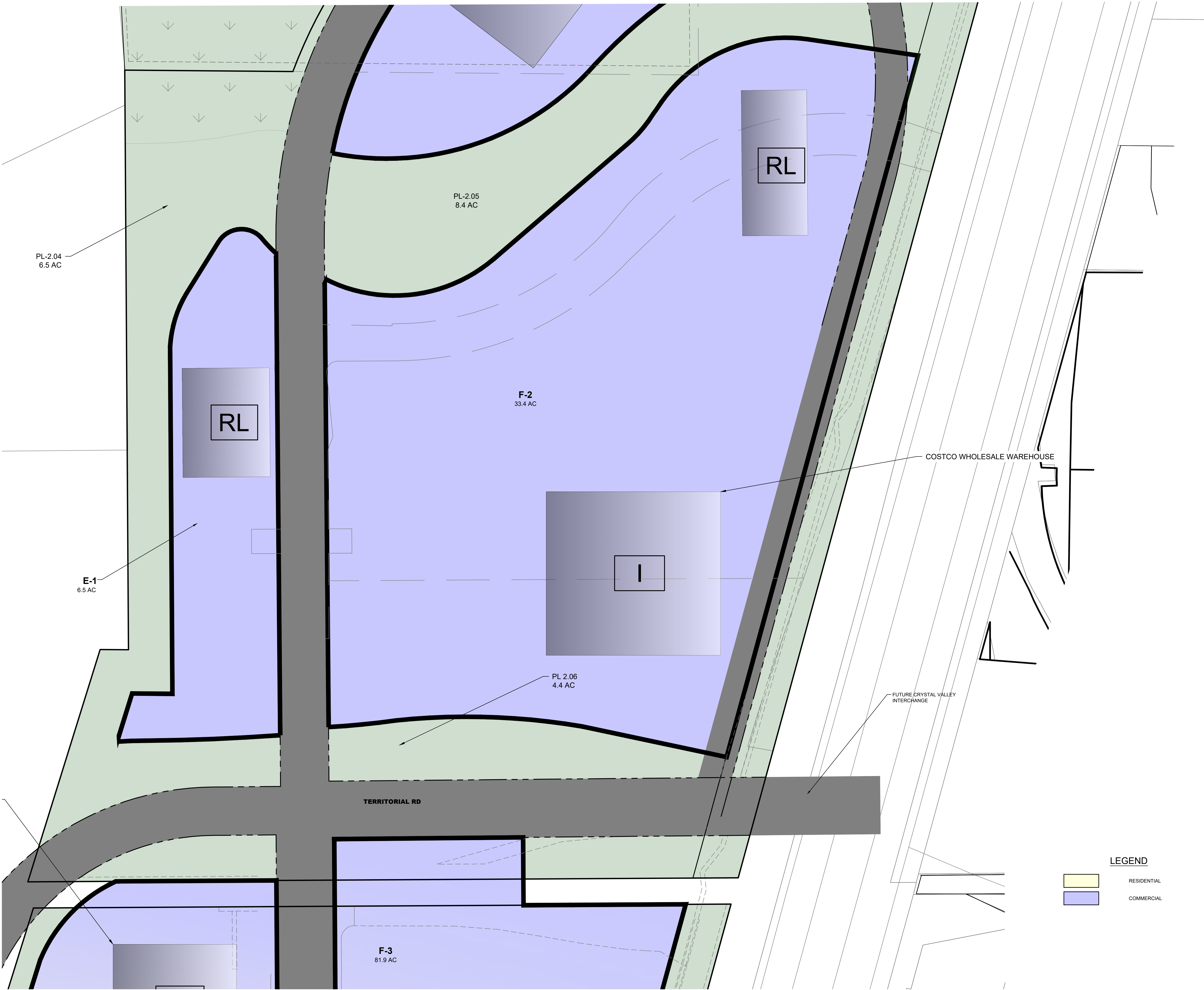
DAWSON RIDGE

CONCEPT UTILITY MAP

DATE: 05/27/22
CREATED BY: JRF
JOB NO. 20-224
SHEET
1

Appendix E

Maps



RESIDENTIAL

COMMERCIAL

RL

RETAIL

O

OFFICE

H

HOTEL

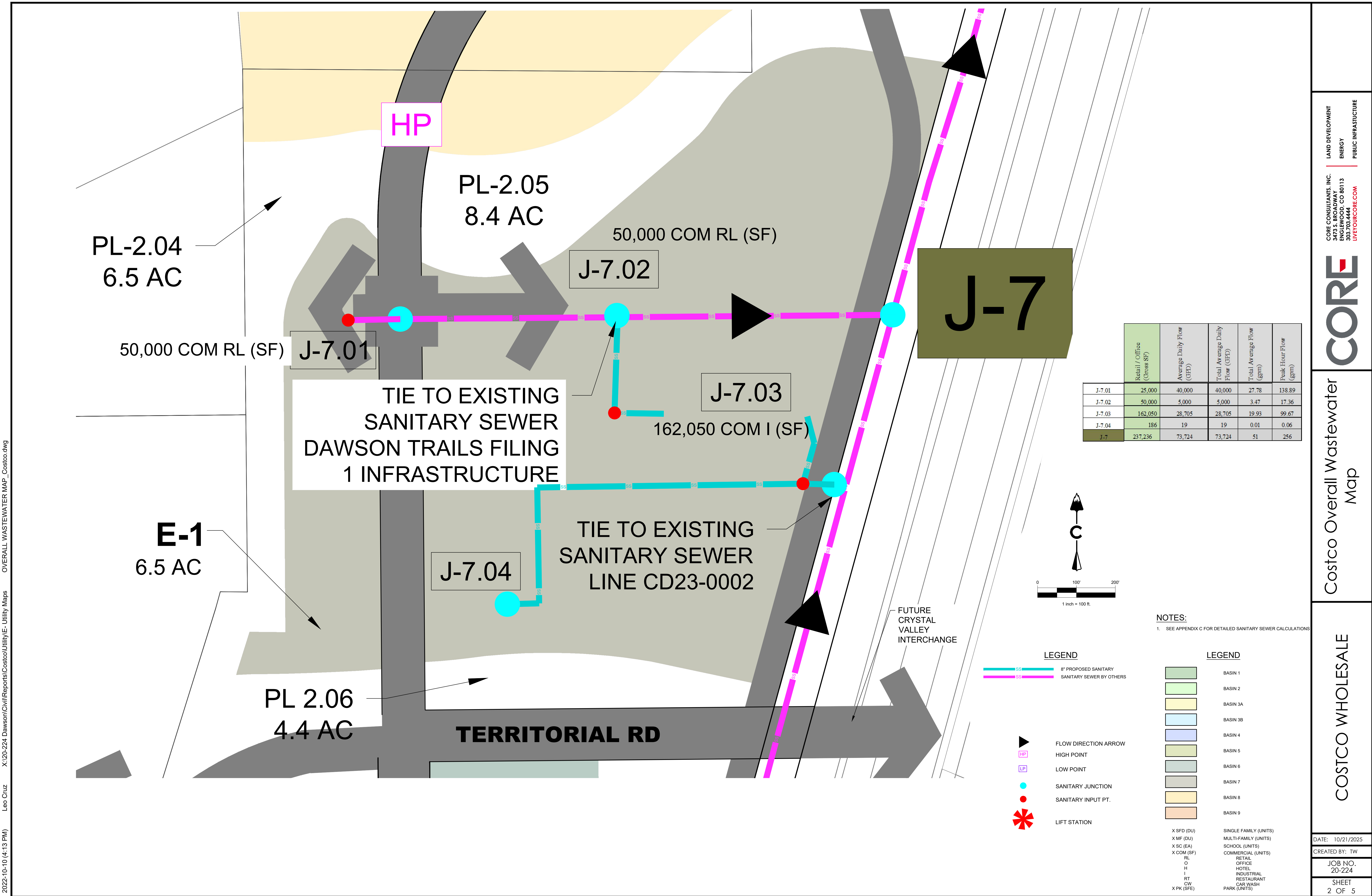
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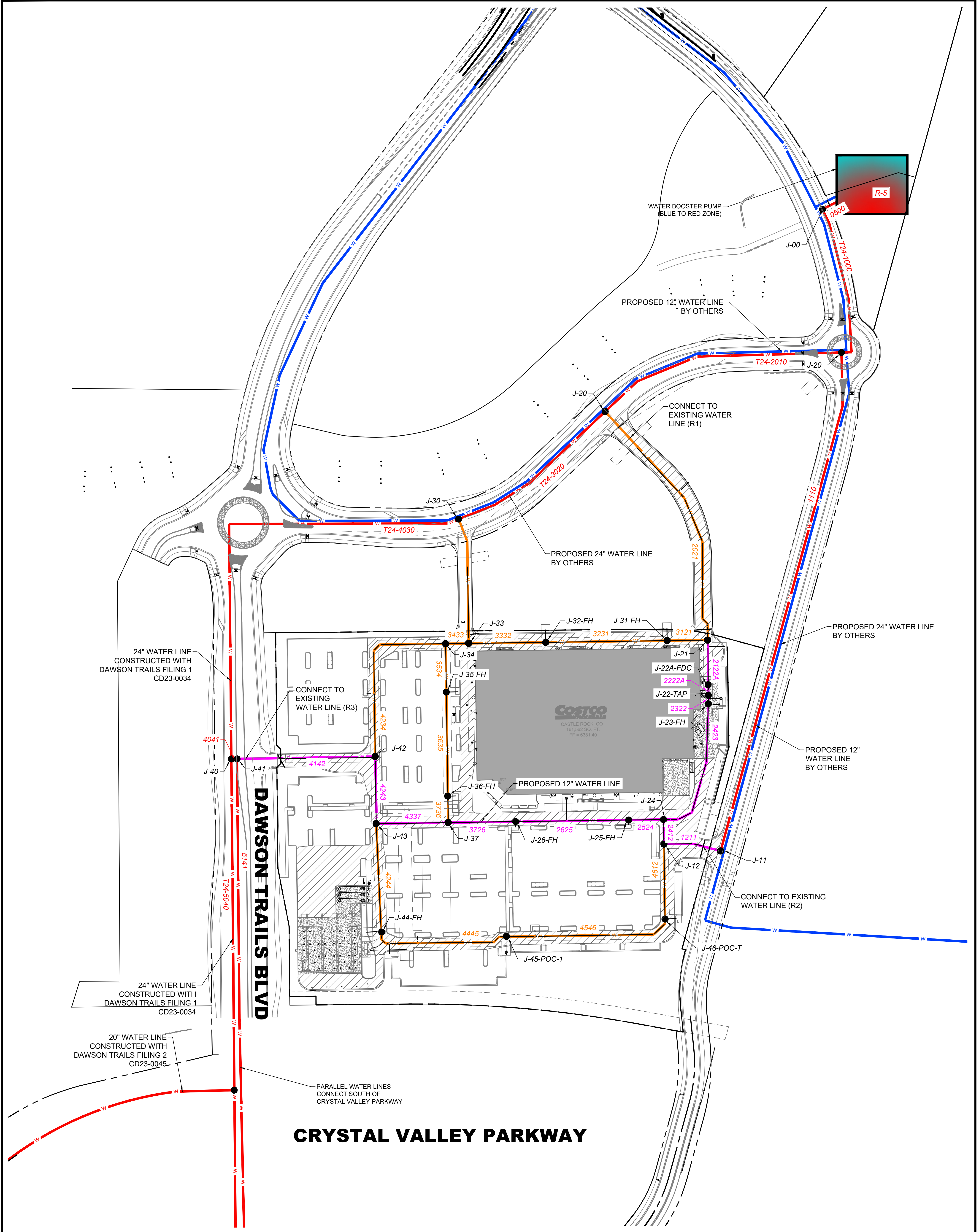
INDUSTRIAL

RT

RESTAURANT

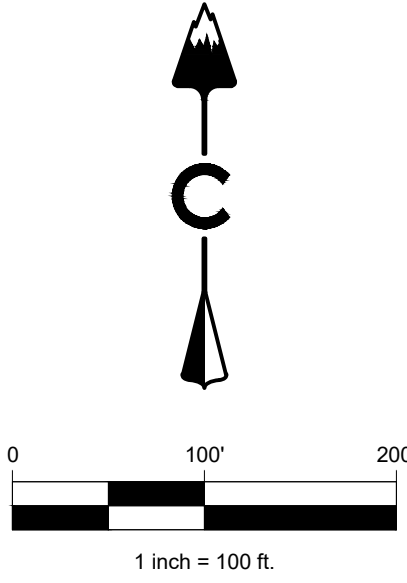
2022-10-10 4:13 PM Leo Cruz X:\20-224 Dawson\Civil\Reports\Costco\UtilityE- Utility Maps OVERALL WASTEWATER MAP _Costco.dwg





LEGEND

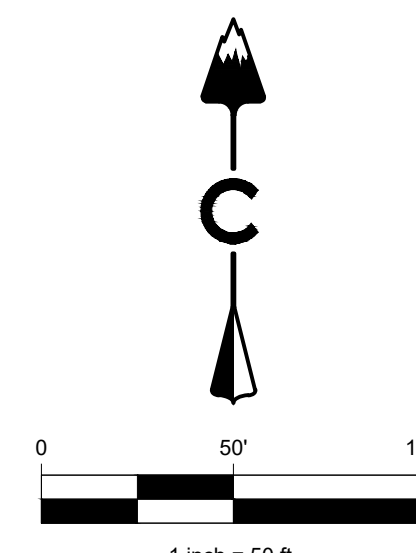
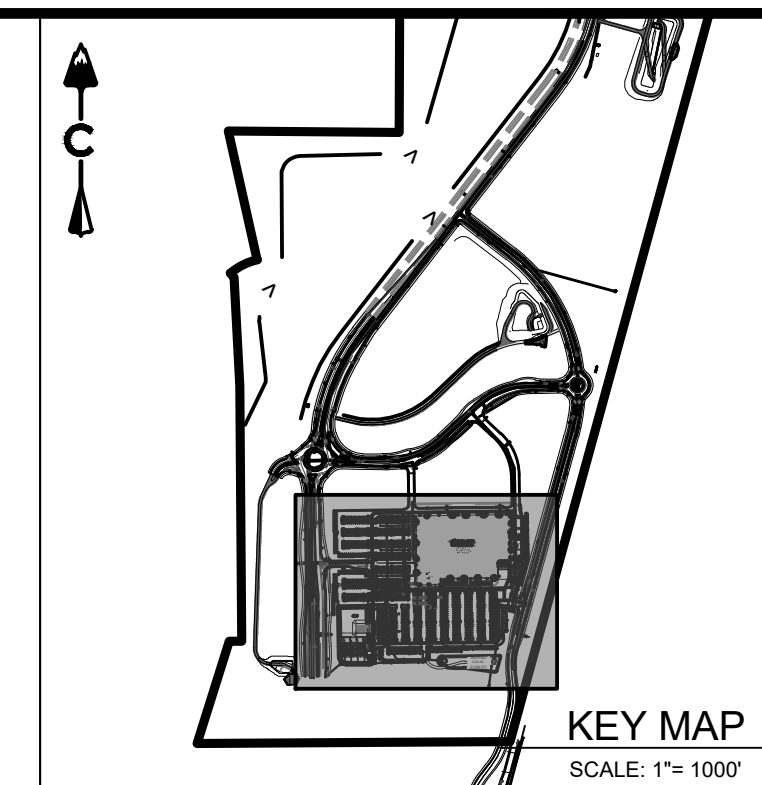
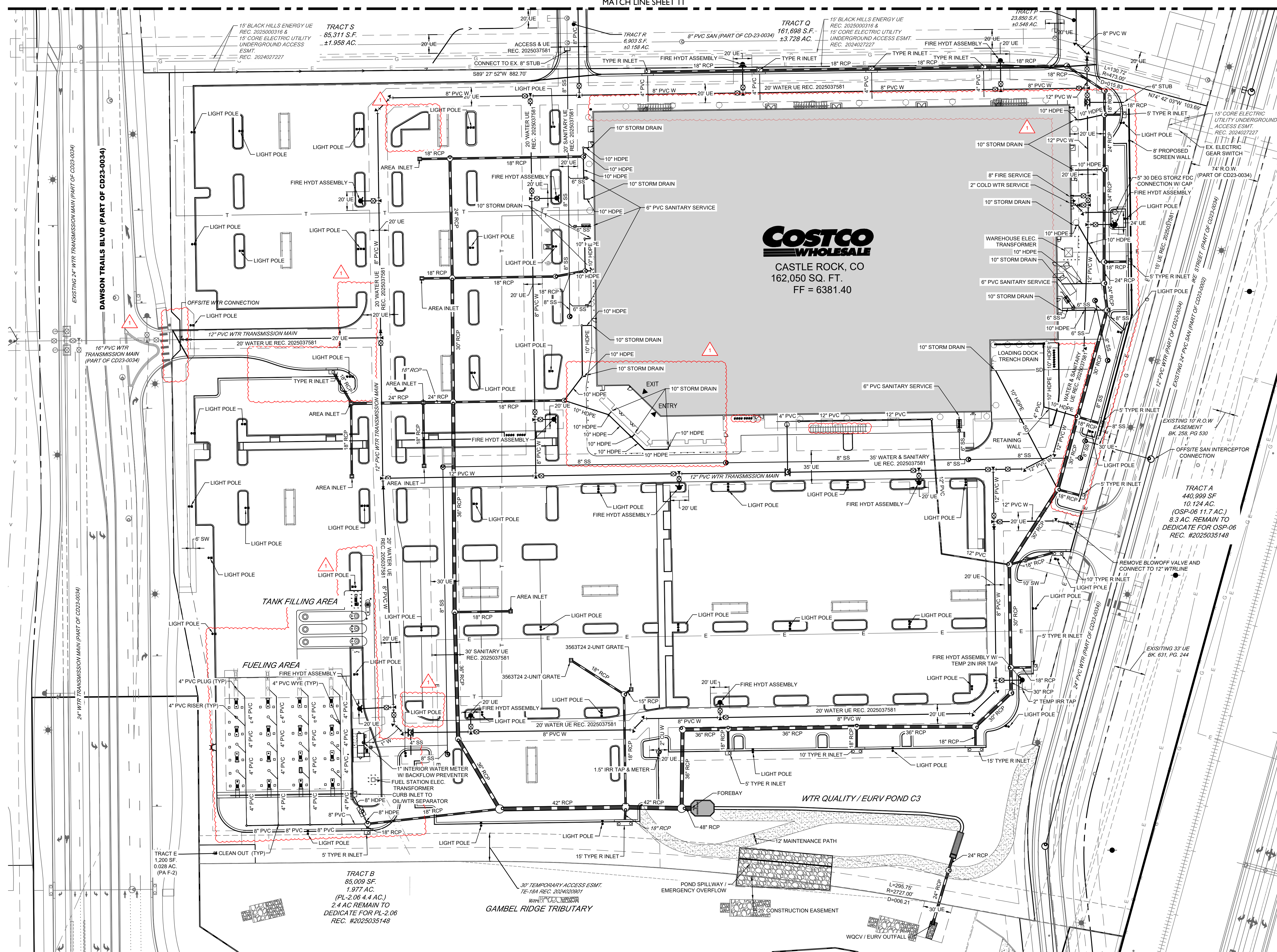
- PROPOSED 12" RED ZONE WATER LINE
- PROPOSED 8" RED ZONE WATER LINE
- RED ZONE WATER LINE BY OTHERS
- BLUE ZONE WATER LINE BY OTHERS
- BOOSTER PUMP (COLOR VARIES BY ZONE)
- WATER DEMAND PT. (COLOR VARIES BY ZONE)
- PROPOSED TANK (COLOR VARIES BY ZONE)
- PRV (COLOR VARIES PER ZONE)



Appendix F

Utility Plans

SITE DEVELOPMENT PLAN
LOT 1, DAWSON TRAILS FILING NO. 1, AMENDMENT 1
COSTCO
LOCATED IN SECTION 22,
TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO



LEGEND

— — — — —	EASEMENT
— — — — —	RIGHT OF WAY (R.O.W.)
— — — — —	CENTERLINE
—————	PROJECT BOUNDARY
=====	PROPOSED CURB & GUTTER
[— — — — —]	PROPOSED IRRIGATION & STUB OUT
[— — — — —]	PROPOSED STORM & STUB OUT
[— — — — —]	PROPOSED SANITARY & STUB OUT
[— — — — —]	PROPOSED WATER & STUB OUT
[— — — — —]	EXISTING IRRIGATION & STUB OUT
[— — — — —]	EXISTING STORM & STUB OUT
[— — — — —]	EXISTING SANITARY & STUB OUT
[— — — — —]	EXISTING WATER & STUB OUT
[— — — — —]	FUTURE IRRIGATION & STUB OUT
[— — — — —]	FUTURE SANITARY & STUB OUT
[— — — — —]	FUTURE STORM & STUB OUT
[— — — — —]	FUTURE WATER & STUB OUT
—————	IRRIGATION SERVICE
S —————	SANITARY SERVICE
W —————	WATER SERVICE

EXISTING	PROPOSED	
		STREET LIGHT POLES
		POWER POLES
		GUY WIRE
		SANITARY MANHOLES
		SANITARY CLEAN OUT
		WATER VALVES
		BEND AND THRUST BLOCK
		FIRE HYDRANTS
		WATERLINE REDUCER
		WATER STUB WITH BLOW OFF
		AIR RELEASE VALVE MH & VENT PIPE
		STORM MANHOLES
		STORM INLETS
		FES, FOREBAY, & TRICKLE CHANNEL
		OUTLET STRUCTURE
		CRUSHER FINES
		MAINTENANCE ACCESS
		RIPRAP
		EXISTING ELECTRIC
		EXISTING TELEPHONE
		EXISTING FIBER OPTIC
		EXISTING GAS
		EXISTING OVER HEAD ELECTRIC
		STORM UNDERDRAIN
		100 YEAR FLOODPLAIN
		WETLAND

- NOTES:**
1. ALL PROPOSED EASEMENTS MUST BE RECORDED PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS.
 2. THE MINIMUM SEPARATION BETWEEN WATERLINES, SANITARY SEWER, AND STORM LINES IS 10 FEET.
 3. THE MINIMUM SEPARATION BETWEEN WATER SERVICE LINES IS 5 FEET.
 4. THIS SITE IS LOCATED WITHIN THE TOWN OF CASTLE ROCK RED WATER PRESSURE ZONE

SITE DEVELOPMENT PLAN
LOT I, DAWSON TRAILS FILING NO. I, AMENDMENT I
COSTCO
LOCATED IN SECTION 22,
TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO

TRACT G
483,511 S.F.
11.001 AC
REC. #2025035148

TRACT HH
913,893 S.F.
7.201 AC
(PL-2.05, 8.4 AC)
REC. #2025035148

TRACT N
158,425 S.F.
±3.637 AC.

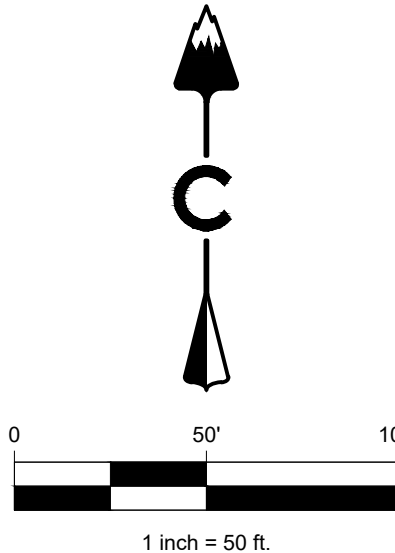
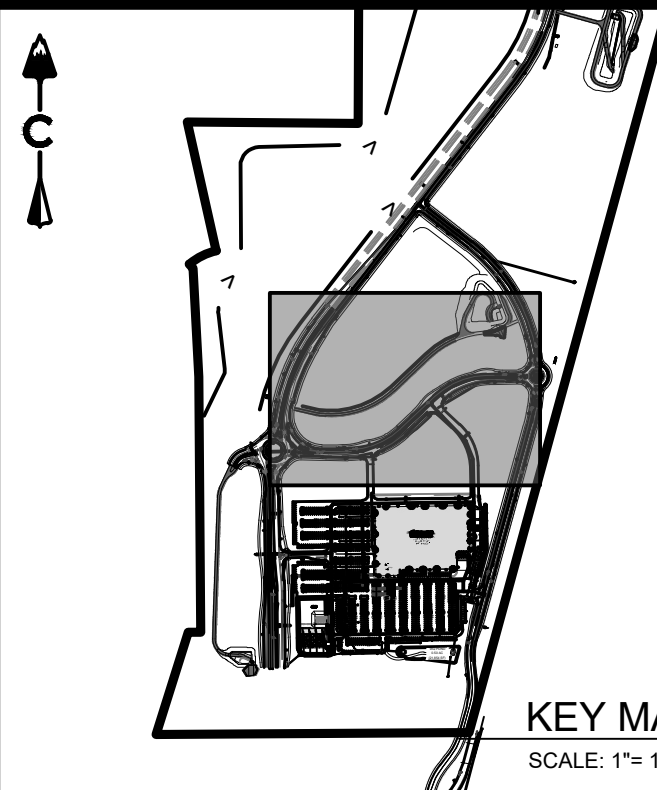
TRACT Q
161,698 S.F.
±3.728 AC.

TRACT P
23,950 S.F.
±0.548 AC.

TRACT A
440,999 S.F.
10.124 AC.
(OSP-06 11.7 AC.)
8.3 AC. REMAIN TO
DEDICATE FOR OSP-06
REC. #2025035148

TRACT S
85,311 S.F.
±1.958 AC.

TRACT R
6,903 S.F.
±0.158 AC.



LEGEND

	EASEMENT
	RIGHT OF WAY (R.O.W.)
	CENTERLINE
	PROJECT BOUNDARY
	PROPOSED CURB & GUTTER
	PROPOSED IRRIGATION & STUB OUT
	PROPOSED STORM & STUB OUT
	PROPOSED SANITARY & STUB OUT
	PROPOSED WATER & STUB OUT
	EXISTING IRRIGATION & STUB OUT
	EXISTING STORM & STUB OUT
	EXISTING SANITARY & STUB OUT
	EXISTING WATER & STUB OUT
	FUTURE IRRIGATION & STUB OUT
	FUTURE SANITARY & STUB OUT
	FUTURE STORM & STUB OUT
	FUTURE WATER & STUB OUT
	IRRIGATION SERVICE
	SANITARY SERVICE
	WATER SERVICE
	EXISTING STREET LIGHT POLES
	PROPOSED STREET LIGHT POLES
	EXISTING POWER POLES
	PROPOSED POWER POLES
	EXISTING GUY WIRE
	PROPOSED GUY WIRE
	EXISTING SANITARY MANHOLES
	PROPOSED SANITARY MANHOLES
	EXISTING SANITARY CLEAN OUT
	PROPOSED SANITARY CLEAN OUT
	EXISTING WATER VALVES
	PROPOSED WATER VALVES
	EXISTING BEND AND THRUST BLOCK
	PROPOSED BEND AND THRUST BLOCK
	EXISTING FIRE HYDRANTS
	PROPOSED FIRE HYDRANTS
	EXISTING WATERLINE REDUCER
	PROPOSED WATERLINE REDUCER
	EXISTING WATER STUB WITH BLOW OFF
	PROPOSED WATER STUB WITH BLOW OFF
	EXISTING AIR RELEASE VALVE MH & VENT PIPE
	PROPOSED AIR RELEASE VALVE MH & VENT PIPE
	EXISTING STORM MANHOLES
	PROPOSED STORM MANHOLES
	EXISTING STORM INLETS
	PROPOSED STORM INLETS
	EXISTING FES, FOREBAY, & TRICKLE CHANNEL
	PROPOSED FES, FOREBAY, & TRICKLE CHANNEL
	EXISTING OUTLET STRUCTURE
	PROPOSED OUTLET STRUCTURE
	EXISTING CRUSHER FINES
	PROPOSED CRUSHER FINES
	EXISTING MAINTENANCE ACCESS
	PROPOSED MAINTENANCE ACCESS
	EXISTING RIPRAP
	PROPOSED RIPRAP
	EXISTING ELECTRIC
	PROPOSED ELECTRIC
	EXISTING TELEPHONE
	PROPOSED TELEPHONE
	EXISTING FIBER OPTIC
	PROPOSED FIBER OPTIC
	EXISTING GAS
	PROPOSED GAS
	EXISTING OVER HEAD ELECTRIC
	PROPOSED OVER HEAD ELECTRIC
	EXISTING STORM UNDERDRAIN
	PROPOSED STORM UNDERDRAIN
	EXISTING 100 YEAR FLOODPLAIN
	PROPOSED 100 YEAR FLOODPLAIN
	EXISTING WETLAND
	PROPOSED WETLAND

- NOTES:
1. ALL PROPOSED EASEMENTS MUST BE RECORDED PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS.
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1	SDP	12.13.24	JP	JP
2	MINOR AMENDMENT 1ST SUBMITTAL	09.04.25	JP	JP
3	MINOR AMENDMENT 2ND SUBMITTAL	10.30.25	JP	JP

COSTCO

CASTLE ROCK, COLORADO

SITE DEVELOPMENT PLAN

UTILITY PLAN (2 OF 2)

DESIGNED BY: LC

DRAWN BY: JP

CHECKED BY: TW

SDP NO. 23-0020

SHEET 11 OF 31