

COTTONWOOD CREEK – FILING 1

UTILITY CONFORMANCE LETTER

AURORA, COLORADO

Prepared for:

Cottonwood Creek Investors, LLC
C/O Marathon Land Company
9750 West Cambridge Place
Littleton, CO 80127
Phone: (303) 920-9400

Prepared by:

Westwood Professional Services
10333 E. Dry Creek Road, Suite 240
Englewood, Colorado 80112
Contact: Thomas Odle, P.E.
Phone: (720) 249-3575
Email: Tom.Odle@westwoodps.com

APPROVED FOR ONE YEAR FROM THIS DATE

City Engineer Date

Water Department Date

Fire Department Date

FACSIMILE

This Electronic Plan is a facsimile of the signed and sealed pdf set

CO Professional Engineer
Thomas J. Odle, P.E. No. 52802

Engineer's statement:

This utility study "Cottonwood Creek – Utility Conformance Letter" was prepared under my direct supervision in accordance with the provisions of the City of Aurora Standards and Specifications regarding Water, Sanitary Sewer and Storm Drainage Infrastructure. I understand that the City of Aurora does not and will not assume liability for facilities designed by others.

Thomas J. Odle, P.E. No. 52802 Date
Westwood Professional Services

Preparation Date:
February 2023

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INTRODUCTION

GENERAL DESCRIPTION

The Cottonwood Creek Development is a mix use development consisting of approximately 1142 acres. This project is primarily residential development which is to include up to 3,768 units that will consist of single family detached homes and single family attached homes product types. Approximately thirteen (13) acres are reserved for commercial development. This project includes three (3) existing oil and gas sites. The remaining improved areas will include roadways, detention ponds, drainage channels, parks, and open space located throughout the development. First Creek intersects the eastern side the property and the Yamaha Draw cuts through the southern part of the property.

Cottonwood Creek Filing 1 contains a total of approximately 331 acres. Harmony CSP 4 is primarily residential with development to include 831 detached single-family units (SFD), a commercial pad, and future townhome pad.

SCOPE OF WORK

The purpose of this Master Utility Report is to design the water distribution and sanitary sewer system as it relates to the Cottonwood Creek Framework Development Plan (FDP). The proposed water and sanitary sewer system must meet the criteria set forth by the guidelines for the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure*** prepared by the City of Aurora (COA). Westwood Professional Services, will work in conjunction with the client and the COA to ensure that the water distribution and sanitary sewer systems are compatible with existing facilities and planned development. The water distribution and sanitary sewer systems have been designed in accordance with the approved Harmony Master Utility Report (216069MU1) and the Eastern Hills Framework Development Plan (468737).

PROJECT LOCATION

Cottonwood Creek is located within a parcel of land located in the Sections 23, 26, 27, and 28, Township 4 South, Range 65 West of the Sixth Principal Meridian, City of Aurora, County of Arapahoe. The project is bounded on the north by Mississippi Avenue and Jewell Avenue, on the south by Yale Avenue, on the east by Hayesmount Road and Hudson Road, and on the west by Monaghan Road. To the west of this project is Coal Creek Reserve. Northwest of the project site is the Parklands/Eastern Hills development. Figure 1 depicts the project in context to the surrounding roadways and known developments.

Currently there are no existing developments bounding the proposed site. There are no current plans for the land immediately in the area. Figure-1 clearly depicts the project in context to the surrounding roadways and known developments.

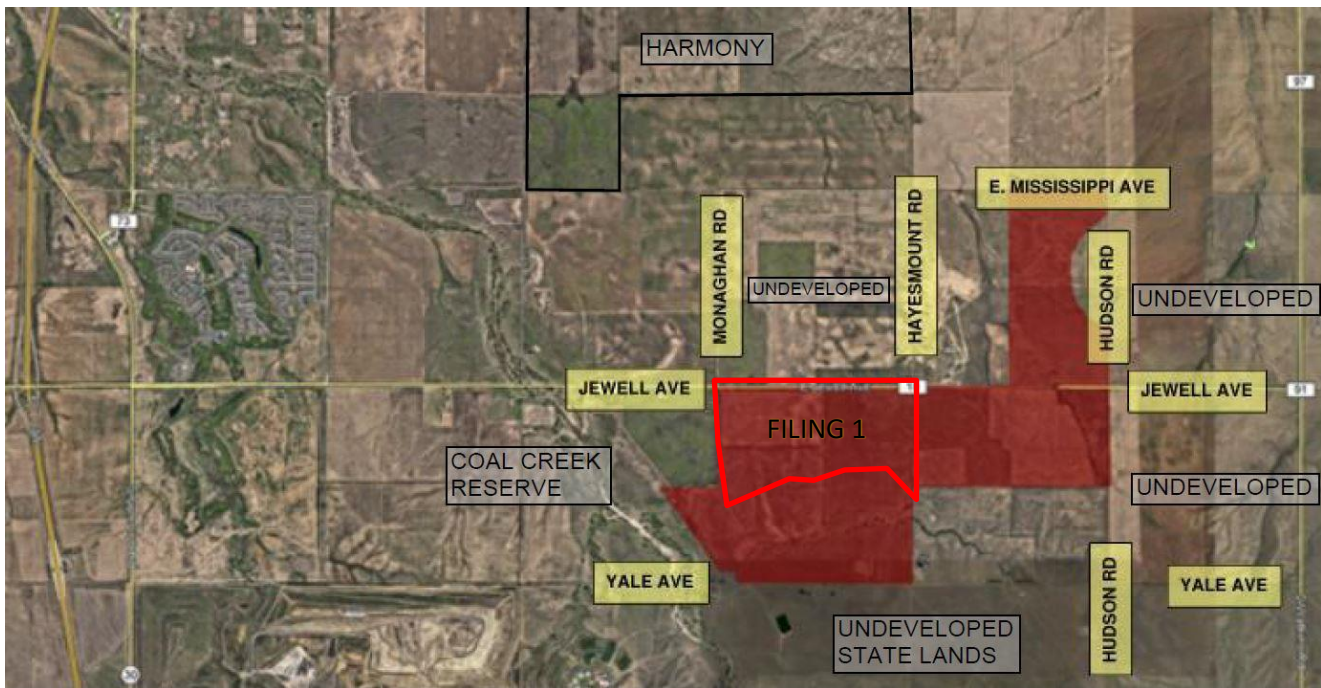


Figure 1
Location Map

Cottonwood Creek Filing 1 is generally located south of I-70, in a part or the north 1/2 of Section 27, Township 4 South, Range 65 West of the 6th Principal Meridian, City of Aurora, County Arapahoe, Colorado. To the north, Cottonwood Creek Filing 1 is bordered by Jewell Ave. To the west it is bordered by Monaghan Road. To the south it is bordered by E Iliff Ave. Additionally, to the east of it is bordered by Haysemount Road.

TOPOGRAPHIC CONDITIONS

The proposed site encompasses approximately 1,263 acres of currently undeveloped land. The western portion of the site slopes from east to west and drains to Yamaha Draw. The remainder of the site slopes from the south to the northwest and drains to First Creek. The total elevation change over the western portion of the site is 130 feet. Elevations range from 5790 feet at the center of the site and drops down to 5660 feet at the western border. The total elevation change over the eastern portion of the site is 120 feet. Elevations range from 5845 feet at the southern border and drop to 5725 feet at the northern border. Two Pressure Reducing Valves (PRVs) will be needed at the western portion of the site where the waterline crosses from Zone 5 to Zone 4.

Table 1 – City of Aurora Pressure Zones

Zone	Static Hydraulic Grade Line, (ft)	Service Elevation Range, (ft)	Static Pressure Range, (psig)
Zone 4	5850	5589-5711	60-113
Zone 5	5950	5710-5811	60-104

From the **City of Aurora Wastewater Utility Plan – Volume I: Report** (Ref. 4) the proposed development falls within the service area Subarea 2 – Environs/Eastern Prairie Developing Area and part of the First Creek drainage basin.

WATER DISTRIBUTION SYSTEM

The Cottonwood Creek development lies primarily in pressure Zone 5, except for the portion of DA-1C west of Monaghan Rd which lies in Zone 4.

DEMANDS

The following is a list of criteria used to develop the water demands for the proposed site:

- Residential Average Day Demand= 0.07gpm/capita
- School Average Day Demand = 1,200 gpd/acre
- Commercial Average Day Demand = 1,500 gpd/acre
- Residential Max Day Factor = 2.8 x average day demand
- Residential Peak Hour Factor = 4.5 x average day demand
- School Max Day Factor = 2.8 x average day demand
- School Peak Hour Factor = 4.5 x average day demand
- Commercial Max Day Factor = 2.8 x average day demand
- Commercial Peak Hour Factor = 4.5 x average day demand

All potable water will be supplied by the City of Aurora's water distribution system. An existing thirty (30) inch diameter water main has been constructed along Jewell Avenue and the future alignment of Powhatan Road to the west of the project site. This development is proposing to connect to the water line within Zone 5. The 30 inch line will be in close proximity to 60 inch critical infrastructure (Prairie Waters Pipeline), 5 feet of vertical clearance will be required.

WATER DEMANDS

The summary of current water demands calculated for the proposed water distribution system for Cottonwood Creek Filing 1 is presented in Table 2. The summary of previous water demands calculated for the proposed water distribution system for Cottonwood Creek is presented in Table 3. As stated previously within this report, the demands were determined using assumptions and requirements outlined in the **Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure** (Ref. 2). The residential populations were based on 3.2 persons per single family detached dwelling unit. Average day demands were calculated average water demand rate. Maximum day and peak hour demands were calculated using peaking factors shown above.

Table 2 – New Calculated Water Demand for Filing 1

Planning Area	Residence Type	Residences/Acreage	Population (Persons/SFD)	Demand (gpd)	Max Population	Average Day Demand (gpm)	Max Day + Fire Flow Demand (gpm)	Max Hour Demand (gpm)
Filing 1	SFD	831 Res	2.77	101	2302	161.21	1951.40	725.46
Filing 1	SFA-TH	255 Res						
Filing 1	Comm	13.9 AC		1500	--	14.46	2565.05	65.05
Filing 1	School	16.7 AC		1200	--	13.92	1538.97	62.62
Filing 1	Park	12.6 AC		1800	--	15.75	--	70.88
Filing 1 Total		1086 AC			2302	205.34		924.01

Table 3 Previously Calculated Water Demand for Cottonwood Creek

Planning Area	Residence Type	Residences/Acreages	Demand (gpd)	Max Population	Average Day Demand (gpm)	Max Day Demand (gpm)	Max Hour Demand (gpm)
1A	SFD	534 Res	101	1424	103.60	290.07	466.18
1A	COMM	9.5 AC	1500		9.88	27.66	44.46
1A	PARK	0.8 AC	1800		1	2.8	4.5
1B	SFD	552 Res	101	1493	107.09	299.85	481.90
1B	COMM	4.4 AC	1500		4.58	12.81	20.59
1B	PARK	11.80 AC	1800		14.75	41.30	66.38
1B	SCHOOL	16.7 AC	1200		13.92	38.97	62.62
Total				2917	254.82	713.46	1146.63

SANITARY SEWER SYSTEM

SANITARY SYSTEM AND FLOWS

The summary of current sanitary sewer demands calculated for the proposed water sanitary sewer system for Cottonwood Creek Filing 1 is presented in Table 4. The summary of previous water demands calculated for the proposed sanitary sewer system for Cottonwood Creek is presented in Table 5. Cottonwood Creek Filing 1 has a total of 831 residences, all detached single-family units. The flows from these residences will be carried by PVC pipes to existing Senac Interceptor 30" line located north of Jewell Avenue and west of S Powhatan rd. Population estimates are based on 3.2 capita per dwelling unit for single-family units.

WASTEWATER DESIGN CRITERIA

This section describes the design criteria incorporated in developing the wastewater collection system for Harmony. These design criteria were adopted from the *Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure* (Ref. 2):

- Residential Average Day Loading = 68 gallons per capita per day
- Residential Population = 2.77 people per unit
- Commercial Average Day loading = 1,500 gallons per day per acre
- Commercial Equivalent Population per acre = 22
- Peaking Factor (PF): $PF = 5 \div P^{0.167}$, where p=population in thousands and PF is no greater than 3.5 and no less than 2.6.
- Infiltration = 10% of the average flow (not peaked)
- The flow velocity shall not exceed ten (10) feet per second flowing full or ½ full using Mannings Formula ($n=0.011$ for PVC or $n=0.013$ for RCP).
- Minimum slope shall be 0.4 percent with a minimum velocity of two (2) feet per second at least once per day.
- Depth of flow in pipes should not exceed 75 percent capacity for pipes 12 inches or smaller and 80 percent for pipes larger than 12 inches.
- Minimum drop through a manhole from inlet to outlet or same diameter pipe shall be:
 - 0.2 feet on straight through run
 - 0.3 feet on deflected bends greater than forty-five degrees. Pipe laid through a manhole shall be at a slope of the same grade as the downstream pipe slope.
 - For pipes of differing diameters, match HGL's or crowns of pipes.
- Minimum of 4-inch diameter pipe for service lines

Table 4 - New Calculated Sanitary Sewer Demand for Filing 1

Residence Type	Demand (gpd/cap)	Residences	Occupancy	Population (Thousands of People)	Average Day Flow (gpd)	Peaking Factor $4 > 5 \div p^{0.167} > 1.7$	Max Day Flow (gpd)
SFD	68	1086	2.77	3.008	204,559	4	818,236
Total		1086		3.008	204,559		818,236

Table 5 – Previously Calculated Sanitary Sewer Demand

Planning Area	Residence Type	Demand (gpd/cap)	Residences	Occupancy	Population (Thousands of People)	Average Day Flow (gpd)	Peaking Factor $4 > 5 \div p^{0.167} > 1.7$	Max Day Flow (gpd)
1A	SFD	68	534	2.77	1.479	100,584	4	402,337
1B	SFD	68	552	2.77	1.529	103,975	4	415,899
	Total		1086		3.008	204,559	4	818,236

CONCLUSION

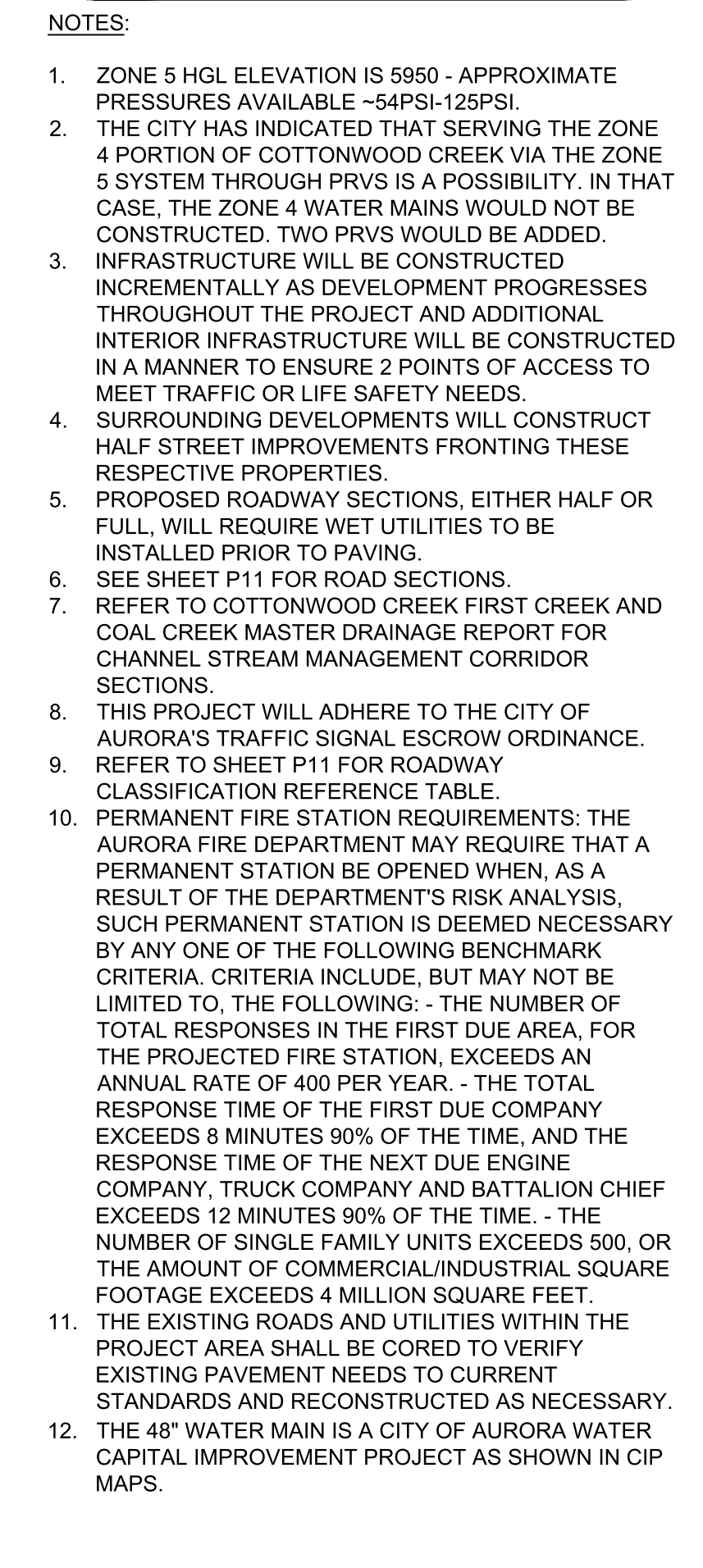
The water distribution system will connect to the existing Zone 5 water system at two (2) off-site points. The first connection at Jewell Avenue and Powhatan Road and once demand requires a second connection will be made at Quincy Avenue and Powhatan Rd. The results of the system analysis indicate that the proposed water system conforms to the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure***. Any subsequent changes to the proposed water distribution system as described within this report will require a reanalysis of the system. Appendix B contains the WaterGEMS results and layout exhibit.

The sanitary sewer system will connect to the existing twenty-seven (27) inch sanitary sewer interceptor west of the project site and to the existing 24 inch sanitary sewer along East 6th Ave north of the site. The results of the system analysis indicate that the proposed sanitary sewer system conforms to the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure***. Appendix C contains the anticipated sewer flow results and layout exhibit.

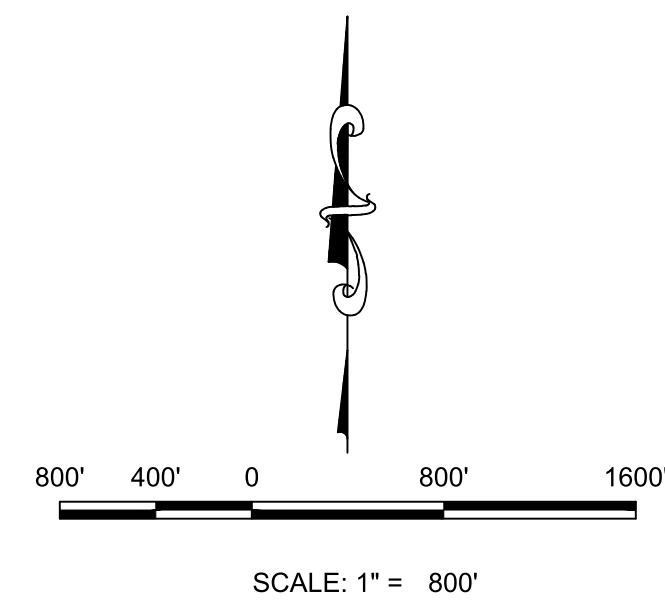
REFERENCES

1. **Master Utility Report**, Westwood Professional Services, inc, April 20, 2022.
2. **Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure**, City of Aurora, January 2012.
3. **Treated Water Distribution System 2025 Capital Improvement Plan**, City of Aurora, February 2009.
4. **City of Aurora Wastewater Utility Plan – Volume I: Report**, Camp Dresser & McKee, Inc., January 15, 2003.




























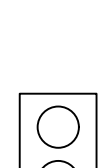
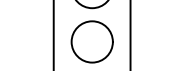

APPENDIX A
PUBLIC IMPROVEMENT PLAN & PHASING PLAN

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APPROVED ON THIS DATE	
PUBLIC WORKS	DATE
WATER	DATE



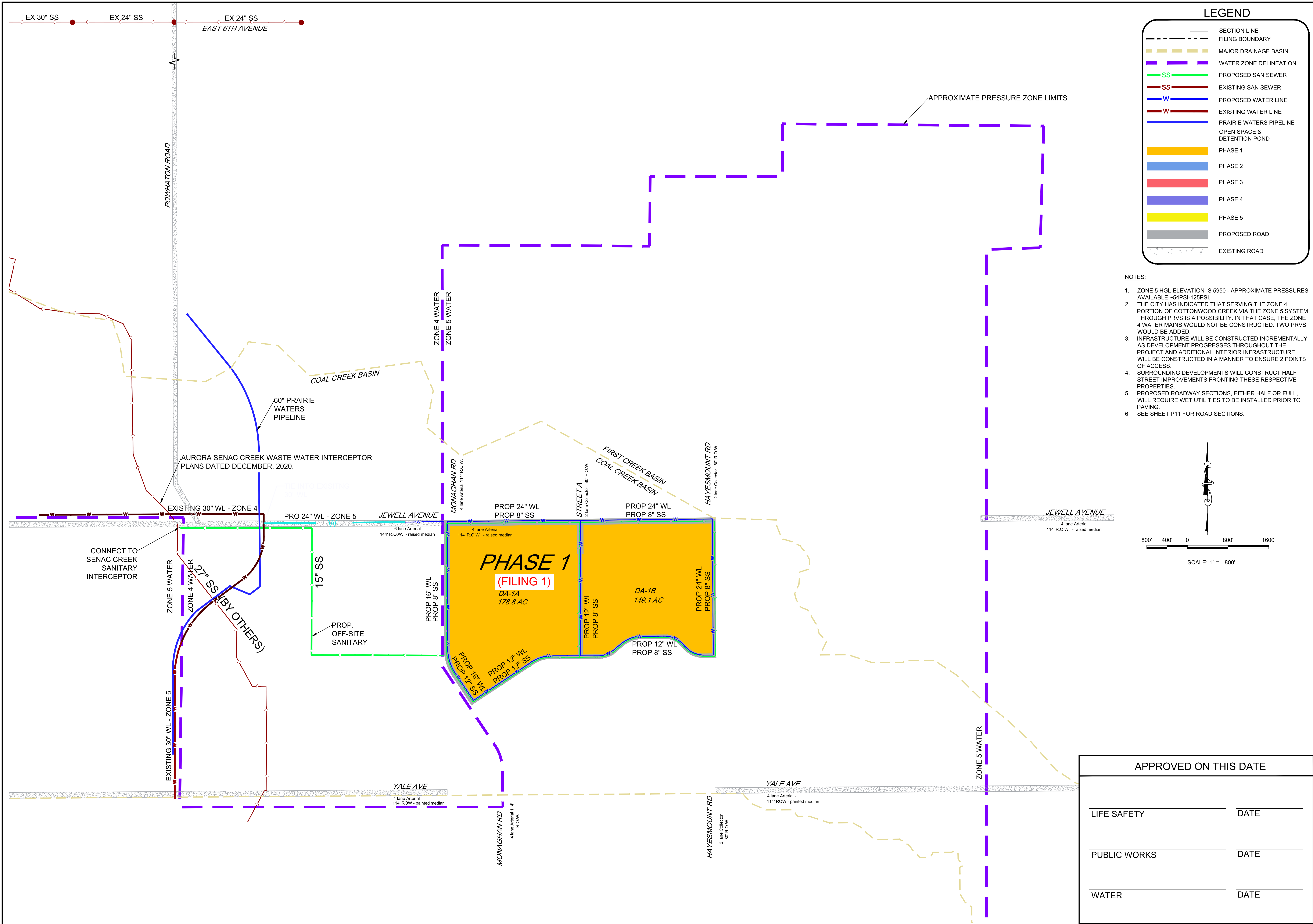
LEGEND

	SECTION LINE
	PROPOSED STORM CULVERT
	EXISTING STORM CULVERT
	*PROPOSED DRAINAGE CHANNEL IMPROVEMENTS (SEE NOTE 7)
	WATER QUALITY POND
	FILING BOUNDARY
	MAJOR DRAINAGE BASIN
	WATER ZONE DELINEATION
	PROPOSED SAN SEWER
	EXISTING SAN SEWER
	PROPOSED WATER LINE
	EXISTING WATER LINE
	PRAIRIE WATERS PIPELINE
	DEVELOPMENT AREA 1A
	DEVELOPMENT AREA 1B
	DEVELOPMENT AREA 1C
	DEVELOPMENT AREA 1D
	DEVELOPMENT AREA 2A
	DEVELOPMENT AREA 2B
	DEVELOPMENT AREA 3A
	DEVELOPMENT AREA 3B
	OIL & GAS (O&G)
	PROPOSED ROAD
	EXISTING ROAD (PAVED)
	EXISTING ROAD (GRAVEL)
	PROPOSED OPEN SPACE
	ROADWAY LIMITS PER PARCEL
	ANTICIPATED TO BE SIGNALIZED INTERSECTION IN THE FUTURE
	FULL TURNING MOVEMENTS
	RIGHT IN - RIGHT OUT TURNING MOVEMENTS

1. ZONE 5 HGL ELEVATION IS 5490 - APPROXIMATE PRESSURES AVAILABLE - 115PSI-125PSI.
2. THE CITY HAS INDICATED THAT SERVING THE ZONE 4 PORTION OF COTTONWOOD CREEK VIA THE ZONE 5 SYSTEM THROUGH PRVS IS A POSSIBILITY. IN THAT CASE, THE ZONE 4 WATER MAINS WOULD NOT BE CONSTRUCTED. TWO PRVS WOULD BE ADDED.
3. INFRASTRUCTURE WILL BE CONSTRUCTED INCREMENTALLY AS DEVELOPMENT PROGRESSES THROUGHOUT THE PROJECT AND ADDITIONAL INTERIOR INFRASTRUCTURE WILL BE CONSTRUCTED IN A MANNER TO ENSURE 2 POINTS OF ACCESS TO MEET TRAFFIC OR LIFE SAFETY NEEDS.
4. SURROUNDING DEVELOPMENTS WILL CONSTRUCT HALF STREET IMPROVEMENTS FRONTING THESE RESPECTIVE PROPERTIES.
5. PROPOSED ROADWAY UTILITIES, EITHER HALF OR FULL, WILL REQUIRE WET SECTIONS TO BE INSTALLED PRIOR TO PAVING.
6. SEE SHEET P11 FOR ROAD SECTIONS.
7. REFER TO COTTONWOOD CREEK FIRST CREEK AND COAL CREEK MASTER DRAINAGE REPORT FOR CHANNEL STREAM MANAGEMENT CORRIDOR SECTIONS.
8. THIS PROJECT WILL ADHERE TO THE CITY OF AURORA'S TRAFFIC SIGNAL ESCROW ORDINANCE.
9. REFER TO SHEET P11 FOR THE ROADWAY CLASSIFICATION REFERENCE TABLE.
10. PERMANENT FIRE STATION REQUIREMENTS: THE AURORA FIRE DEPARTMENT MAY REQUIRE THAT A PERMANENT STATION BE OPENED WHEN, AS A RESULT OF THE DEPARTMENT'S RISK ANALYSIS, SUCH PERMANENT STATION IS DEEMED NECESSARY BY ANY ONE OF THE FOLLOWING BENCHMARK CRITERIA. CRITERIA INCLUDE, BUT MAY NOT BE LIMITED TO, THE FOLLOWING: - THE NUMBER OF TOTAL RESPONSES TO THE PROJECT AREA, FOR THE PROJECTED FIRE STATION, EXCEEDS AN ANNUAL RATE OF 400 PER YEAR. - THE TOTAL RESPONSE TIME OF THE FIRST DUE COMPANY EXCEEDS 8 MINUTES 90% OF THE TIME, AND THE RESPONSE TIME OF THE NEXT DUE ENGINE COMPANY, TRUCK COMPANY AND BATTALION CHIEF EXCEEDS 12 MINUTES 90% OF THE TIME. - THE NUMBER OF SINGLE FAMILY UNITS EXCEEDS 500, OR THE AMOUNT OF COMMERCIAL/INDUSTRIAL SQUARE FOOTAGE EXCEEDS 4 MILLION SQUARE FEET.
11. THE EXISTING ROADWAY WITHIN THE PROJECT AREA SHALL BE CORED TO VERIFY EXISTING PAVEMENT NEEDS TO CURRENT STANDARDS AND RECONSTRUCTED AS NECESSARY.

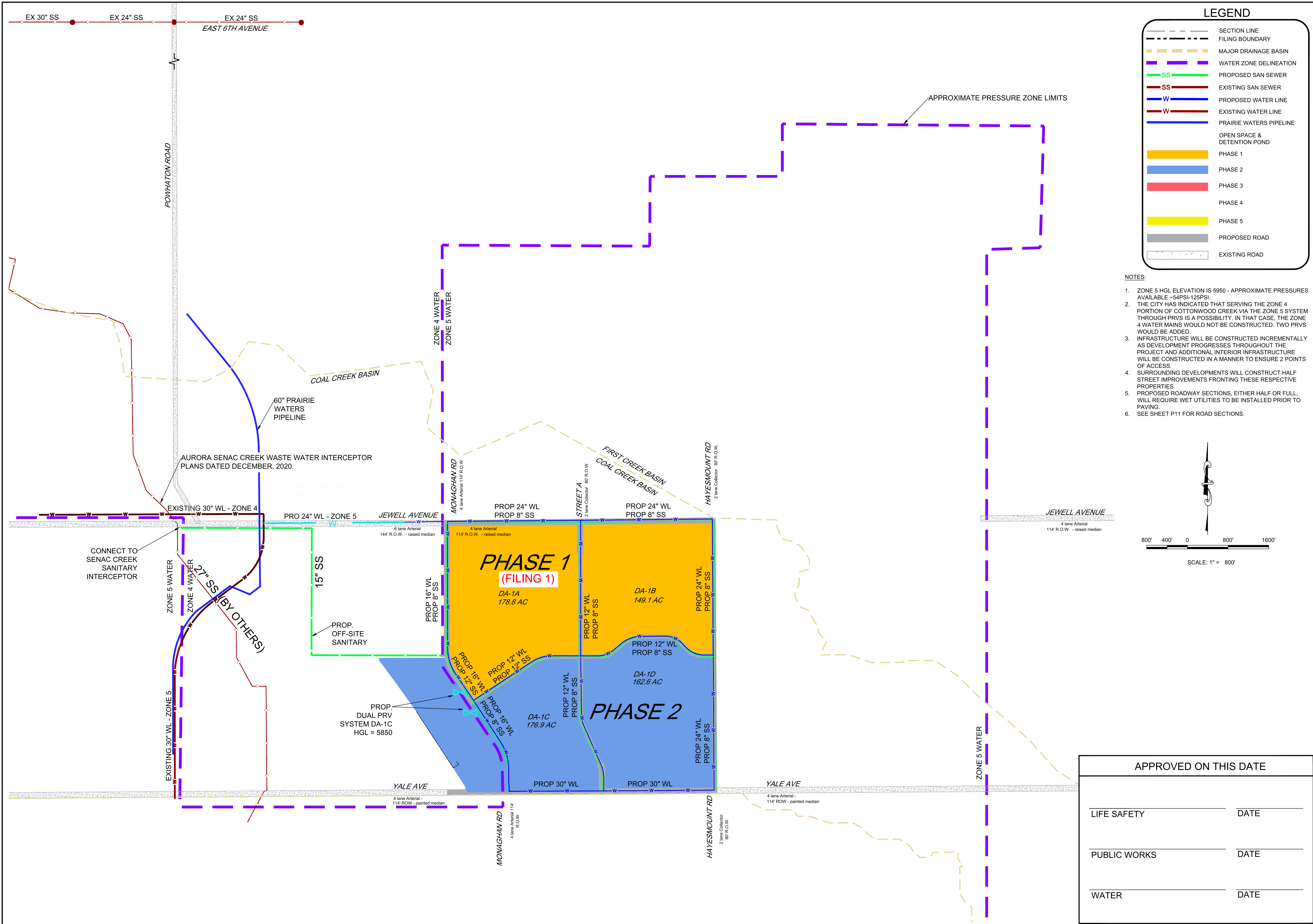
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COTTONWOOD CREEK INVESTORS, LLC C/O MARATHON LAND COMPANY		COTTONWOOD CREEK PHASING PLAN		SHEET NUMBER P4	
10333 E DRY CREEK RD. SUITE 240 ENGLEWOOD, CO 80112 TEL: 720.482.9526		9750 W. CAMBRIDGE PLACE LITTLETON, CO 80127 TEL: (303) 962-9400 FAX: (303) 962-9440		SCALE: TMB AS SHOWN FILE NO: R0031139.00 DATE: JUNE 2021	
Westwood		Westwoodps.com		Westwood Professional Services, Inc.	
No.		Revisions		Date	
Init.		Appr.		Date	

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SUITE 240
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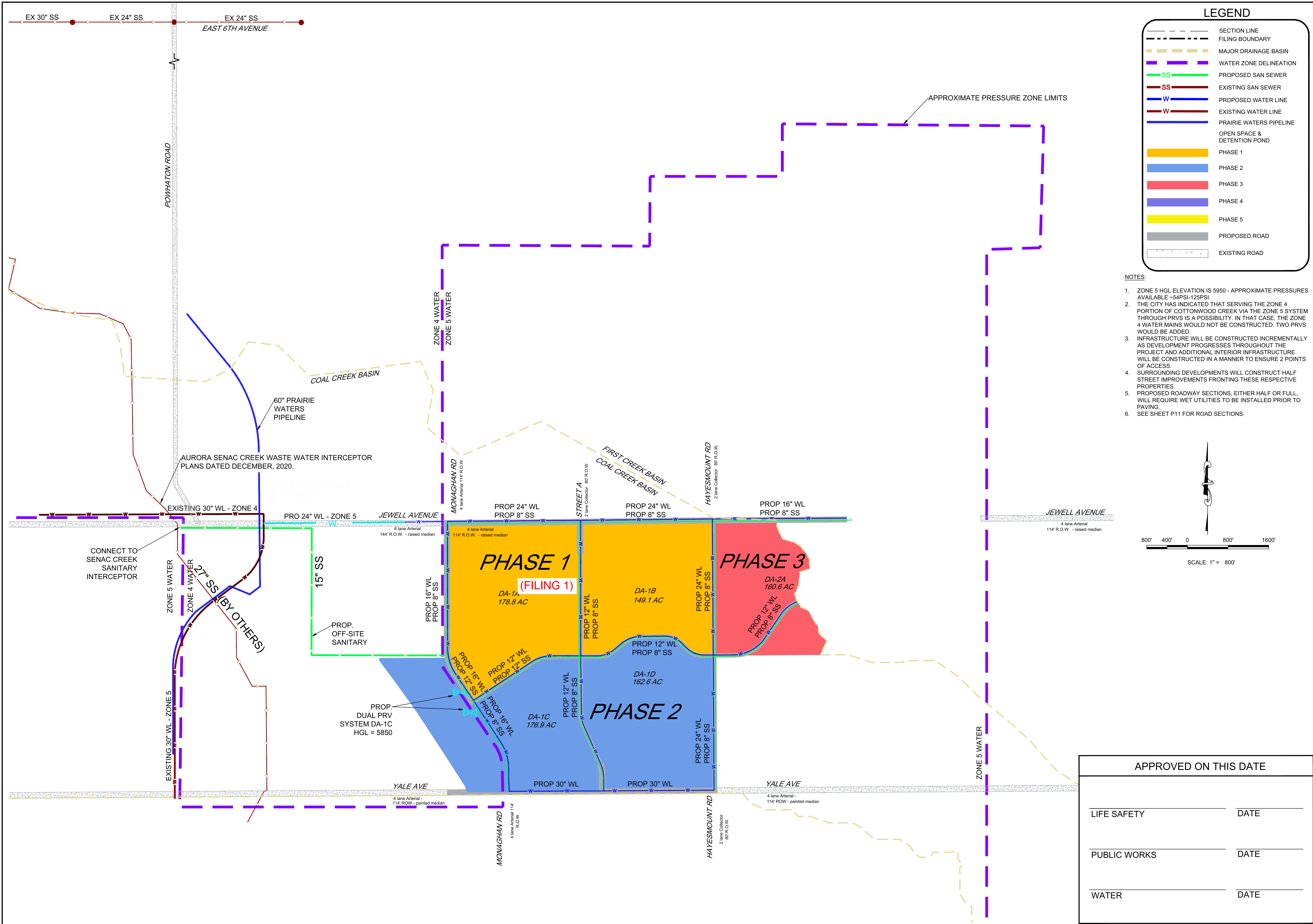
COTTONWOOD CREEK
PHASING PLAN

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DATE:	JUNE 2021	R0031139.00

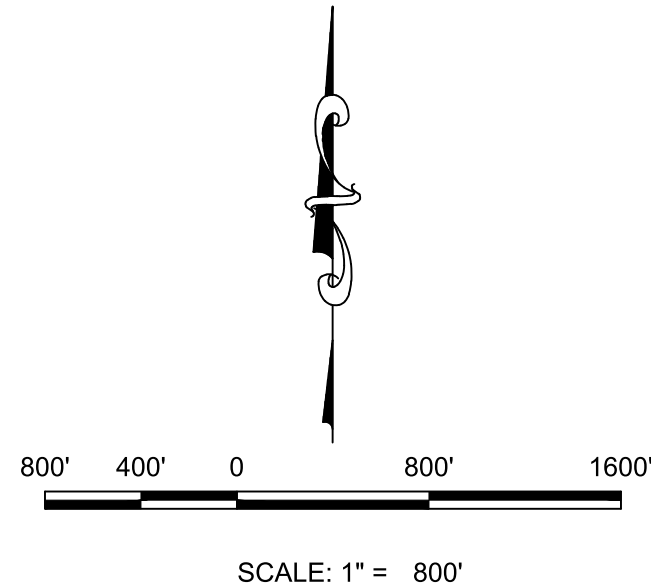
SHEET NUMBER
P5

APPROVED ON THIS DATE

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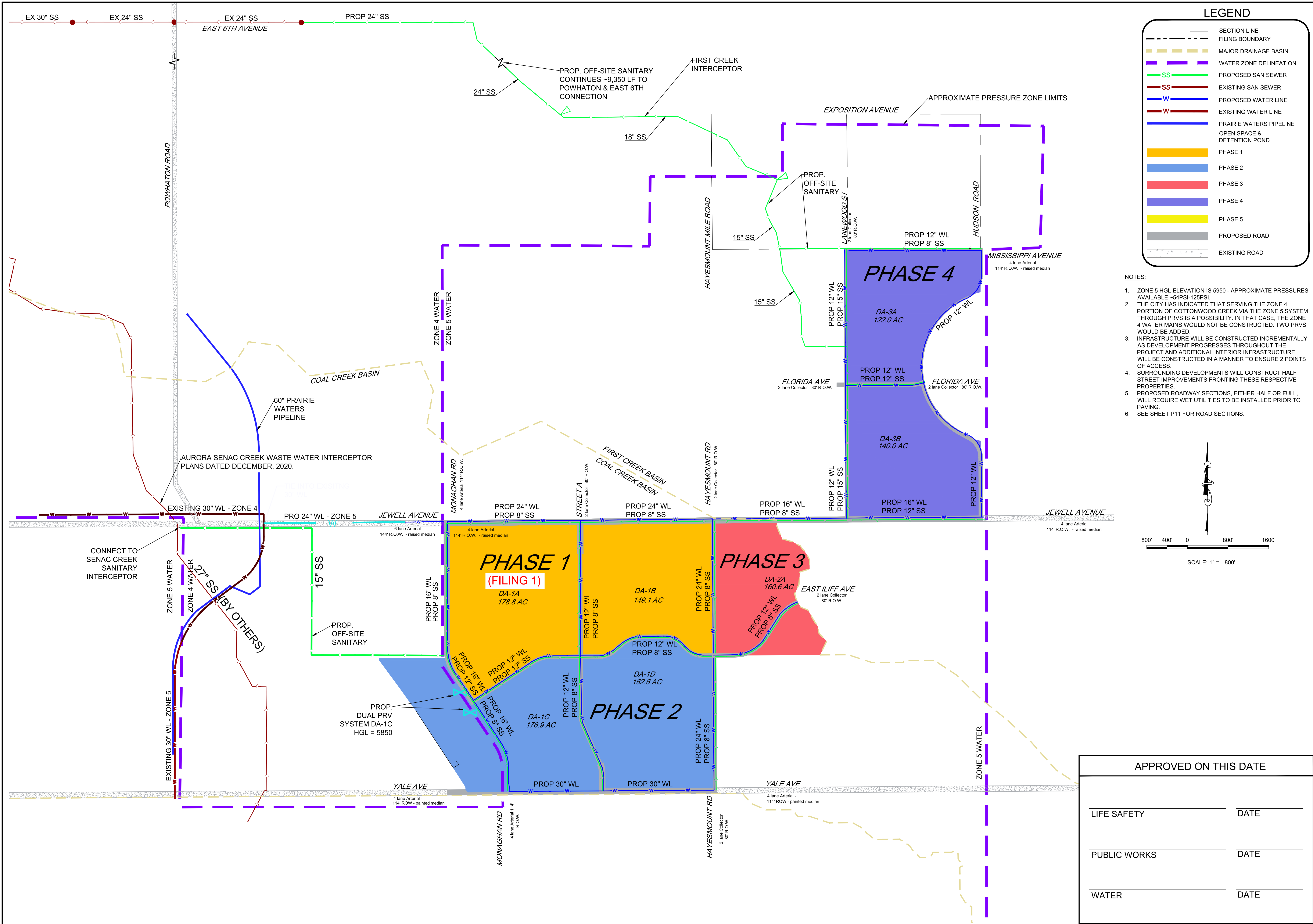
- LEGEND
- SECTION LINE
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 - PROPOSED SAN SEWER
 - EXISTING SAN SEWER
 - PROPOSED WATER LINE
 - EXISTING WATER LINE
 - PRAIRIE WATERS PIPELINE
 - OPEN SPACE & DETENTION POND
 - PHASE 1
 - PHASE 2
 - PHASE 3
 - PHASE 4
 - PHASE 5
 - PROPOSED ROAD
 - EXISTING ROAD
- NOTES:
- ZONE 5 HGL ELEVATION IS 5950 - APPROXIMATE PRESSURES AVAILABLE ~54PSI-125PSI.
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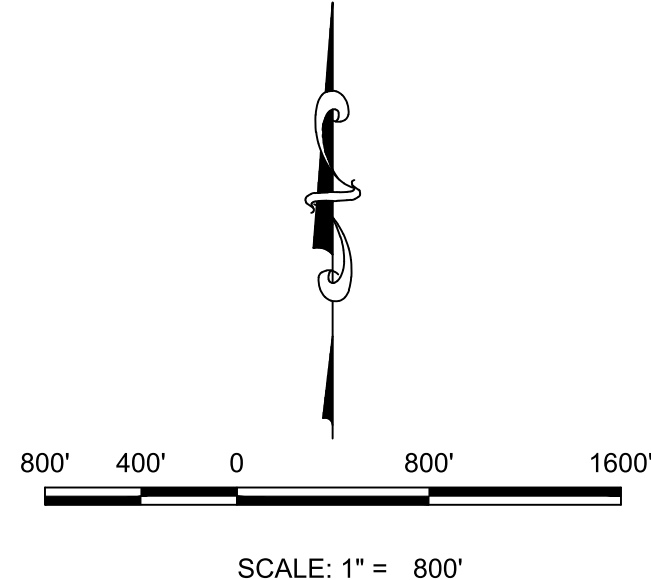
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LIFE SAFETY	DATE
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COTTONWOOD CREEK PHASING PLAN		No.	
SCALE: TMB AS SHOWN		Date	
DRAWN BY: TMB CHECKED BY: TJD DATE: JUNE 2021		Date	
SHEET NUMBER P6		Revisions	

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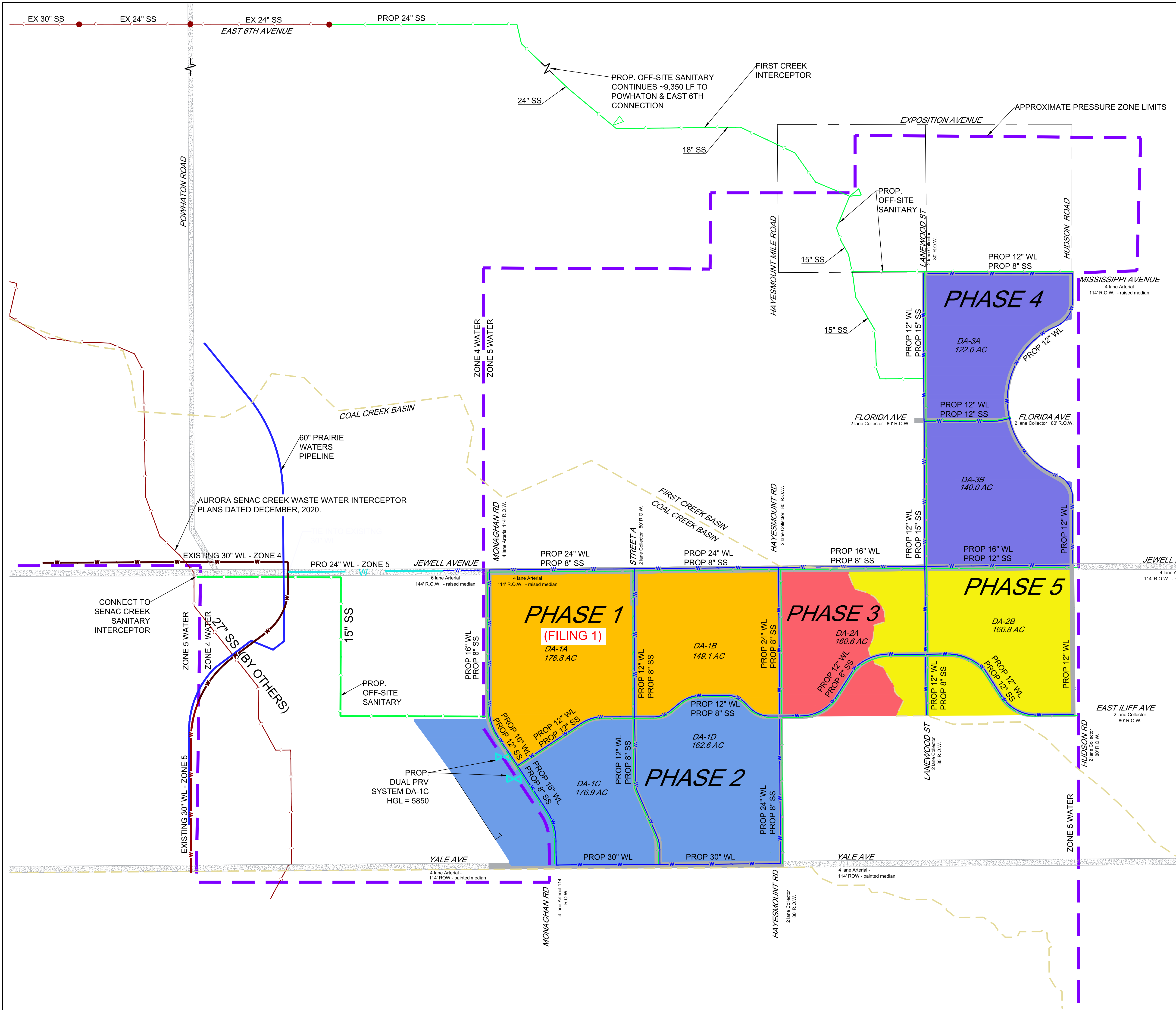
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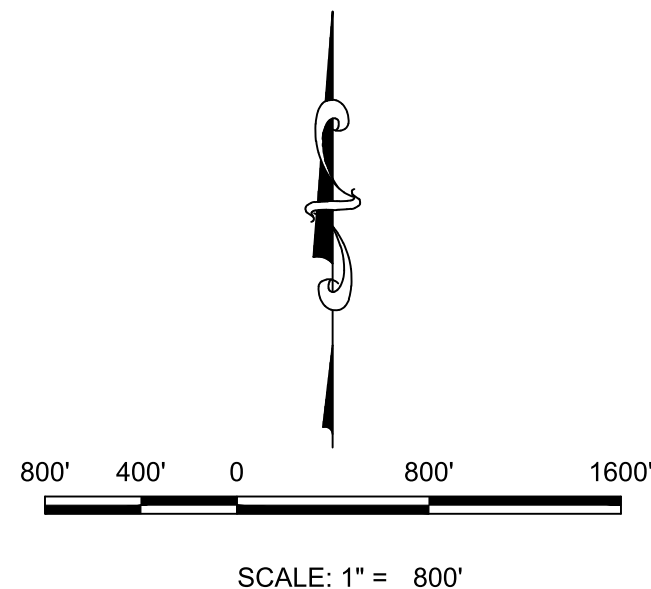
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SCALE: TMB AS SHOWN	
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FILE NO: R0031139.00	
SHEET NUMBER P7	

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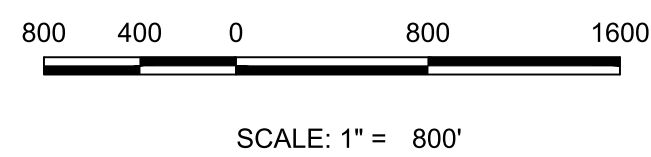
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SCHEMATIC		SCALE: 1"=800'		DATE: JUNE 2021	
DRAWN BY: TMB		CHECKED BY: TJD		FILE NO: R0031139.00	
SHEET NUMBER		P8		DATE: JUNE 2021	
COTTONWOOD CREEK		C/O MARATHON LAND COMPANY		COTTONWOOD CREEK INVESTORS, LLC	
PHASING PLAN		9750 W. CAMBRIDGE PLACE LITTLETON, CO 80127 TEL: (303) 962-9400 FAX: (303) 920-9440		10333 E DRY CREEK RD. SUITE 240 ENGLEWOOD, CO 80112 TEL: 720.482.9526	
Westwood		Westwoodps.com		Westwood Professional Services, Inc.	
No.		Revisions		Date	
Init.		Appr.		Date	

APPENDIX B
WATER DEMANDS, CALCULATIONS, AND LAYOUT



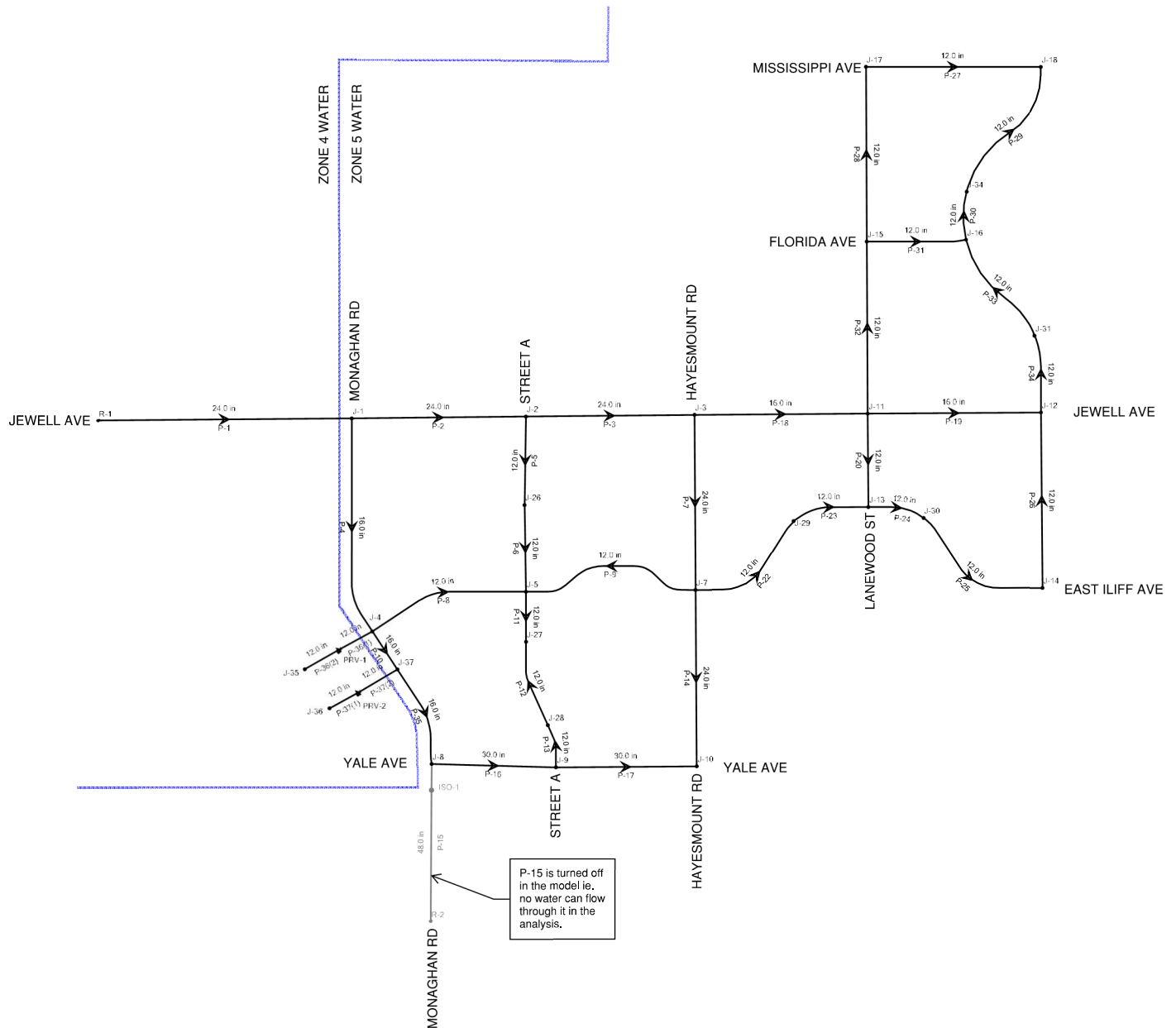
SHEET NUMBER	DRAWN BY:	SCALE:	COTTONWOOD CREEK WATER EXHIBIT	COTTONWOOD CREEK INVESTORS, LLC C/O MARATHON LAND COMPANY 9750 W. CAMBRIDGE PLACE LITTLETON, CO 80127 TEL: (303) 920-9400 FAX: (303) 920-9440	 Westwood 10333 E DRY CREEK RD. SUITE 240 ENGLEWOOD, CO 80112 TEL: 720.482.9526 Westwoods.com Westwood Professional Services, Inc.								
	CHECKED BY:	T1/0											
	FILE NO:												
	DATE:	DECEMBER 2021											
						No.	Revisions	Date	Init.	Appr.	Date		

Water Demands																			
	Land Use				Commercial/Industrial				Residential				School				Irrigation		
Development Area	Use	Acerage	Units/Acre	Residential Units	Average Day (gpm)	Max Day (gpm)	Max Hour (gpm)	Max Day + Fire Flow (gpm)	Average Day (gpm)	Max Day (gpm)	Max Hour (gpm)	Max Day + Fire Flow (gpm)	Average Day (gpm)	Max Day (gpm)	Max Hour (gpm)	Max Day + Fire Flow (gpm)	Average Day (gpm)	Max Day (gpm)	Max Hour (gpm)
1A	Residential	117.80	4.5	534	--	--	--	--	103.60	290.07	466.18	1790.07	--	--	--	--	--	--	--
1A	Commercial (PA-77)	2.50	--	--	2.60	7.28	11.70	2507.28	--	--	--	--	--	--	--	--	--	--	--
1A	Commercial (PA-78)	7.00	--	--	7.28	20.38	32.76	2520.38	--	--	--	--	--	--	--	--	--	--	--
1A	Park	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	2.8	0.00
1B	Residential	86.30	6.4	552	--	--	--	--	107.09	299.85	481.90	1799.85	--	--	--	--	--	--	--
1B	Commercial	4.40	--	--	4.58	12.81	20.59	2512.81	--	--	--	--	--	--	--	--	--	--	--
1B	Park	11.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14.75	41.30	0.00
1B	School	16.70	--	--	--	--	--	--	--	--	--	--	13.92	38.97	62.62	1538.97	--	--	--
1C	Residential	117.40	4.6	541	--	--	--	--	104.95	293.87	472.29	1793.87	--	--	--	--	--	--	--
1C	Park	4.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.75	16.10	0.00
1D	Residential	92.80	5.8	536	--	--	--	--	103.98	291.16	467.93	1791.16	--	--	--	--	--	--	--
1D	Park	3.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.38	12.25	0.00
2A	Residential	89.30	4.3	388	--	--	--	--	75.27	210.76	338.72	1710.76	--	--	--	--	--	--	--
2A	Park	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.00	2.80	0.00
2A	Commercial	3.00	--	--	3.12	8.74	14.04	2508.74	--	--	--	--	--	--	--	--	--	--	--
2B	School	18.00	--	--	--	--	--	--	--	--	--	--	15.00	42.00	67.50	1542.00	--	--	--
2B	Residential	84.70	5.1	428	--	--	--	--	83.03	232.49	373.64	1732.49	--	--	--	--	--	--	--
2B	Park	9.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12.38	34.65	0.00
3A	Residential	83.20	4.5	371	--	--	--	--	71.97	201.53	323.88	1701.53	--	--	--	--	--	--	--
3A	Park	4.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.25	14.70	0.00
3A	Commercial	3.00	--	--	3.12	8.74	14.04	2508.74	--	--	--	--	--	--	--	--	--	--	--
3B	Residential	90.10	5.0	451	--	--	--	--	87.49	244.9832	393.723	1744.98	--	--	--	--	--	--	--
3B	Park	6.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.75	21.70	0.00
Total Demands					20.70	57.95	93.13	2557.95	737.39	2064.70	3318.27	3564.70	28.92	80.97	130.12	1580.97	52.25	146.30	0.00

1. Residential demands based on 101 gpcd and 2.77 people per unit.
2. Commercial demands based on 1,500 gpd per acre
3. School demand based on 1,200 gpd/acre.
4. Irrigation demands based on 1,800 gpd/acre.
5. Max day factor= 2.8 times average daily flow.
6. Max hour factor= 4.5 times average daily flow.

Demand Allocation Table							
Development Area	Residential+Irrigation Total Flow	Residential+Irrigation Junction	Flow Added to Junction	Commercial Junction	Commercial Flow Added	School Junction	School Flow Added
1A	104.60	J-1 J-2 J-4 J-5	26.15 26.15 26.15 26.15	J-26 J-1	2.60 7.28		
1B	121.84	J-2 J-3 J-5 J-7	30.46 30.46 30.46 30.46	J-26	4.58	J-5	13.92
1C	110.70	J-4 J-5 J-8 J-9 J-35 J-36	18.45 18.45 18.45 18.45 18.45 18.45				
1D	108.36	J-5 J-7 J-9 J-10	27.09 27.09 27.09 27.09				
2A	76.27	J-3 J-11 J-13 J-29	19.07 19.07 19.07 19.07	J-11	3.12		
2B	95.41	J-11 J-12 J-13 J-14 J-30	19.08 19.08 19.08 19.08 19.08			J-30	15.00
3A	77.22	J-15 J-16 J-17 J-18	19.31 19.31 19.31 19.31	J-18	3.12		
3B	95.24	J-11 J-12 J-15 J-16	23.81 23.81 23.81 23.81				

Scenario: AVERAGE DAY - ALL PHASES
Active Scenario: AVERAGE DAY - ALL PHASES



FlexTable: Junction Table
Active Scenario: AVERAGE DAY - ALL PHASES

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,701.30	33	5,949.76	107
J-2	5,740.50	57	5,949.67	90
J-3	5,778.20	50	5,949.62	74
J-4	5,689.70	45	5,949.64	112
J-5	5,737.20	116	5,949.62	92
J-7	5,771.30	58	5,949.62	77
J-8	5,680.50	18	5,949.62	116
J-9	5,722.50	46	5,949.62	98
J-10	5,801.50	27	5,949.62	64
J-11	5,784.40	65	5,949.51	71
J-12	5,792.50	43	5,949.49	68
J-13	5,810.90	38	5,949.50	60
J-14	5,816.70	19	5,949.49	57
J-15	5,738.50	43	5,949.45	91
J-16	5,765.00	43	5,949.45	80
J-17	5,725.50	19	5,949.45	97
J-18	5,732.00	22	5,949.45	94
J-26	5,737.22	7	5,949.64	92
J-27	5,732.20	0	5,949.62	94
J-28	5,721.50	0	5,949.62	99
J-29	5,822.00	19	5,949.54	55
J-30	5,796.40	34	5,949.49	66
J-31	5,775.00	0	5,949.47	75
J-34	5,772.50	0	5,949.45	77
J-35	5,684.20	18	5,850.06	72
J-36	5,681.70	18	5,850.06	73
J-37	5,690.70	0	5,949.63	112

FlexTable: Pipe Table

Active Scenario: AVERAGE DAY - ALL PHASES

Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Hazen-Williams C	Material
P-1	R-1	J-1	3,850	24.0	839	0.60	0.000	130.0	PVC
P-2	J-1	J-2	2,644	24.0	587	0.42	0.000	130.0	PVC
P-3	J-2	J-3	2,560	24.0	450	0.32	0.000	130.0	PVC
P-18	J-3	J-11	2,629	16.0	241	0.38	0.000	130.0	PVC
P-19	J-11	J-12	2,630	16.0	91	0.15	0.000	130.0	PVC
P-26	J-12	J-14	2,665	12.0	-6	0.02	0.000	130.0	PVC
P-20	J-13	J-11	1,418	12.0	-11	0.03	0.000	130.0	PVC
P-32	J-11	J-15	2,612	12.0	74	0.21	0.000	130.0	PVC
P-28	J-15	J-17	2,653	12.0	22	0.06	0.000	130.0	PVC
P-27	J-17	J-18	2,653	12.0	3	0.01	0.000	130.0	PVC
P-31	J-15	J-16	1,509	12.0	9	0.02	0.000	130.0	PVC
P-9	J-7	J-5	2,801	12.0	-2	0.01	0.000	130.0	PVC
P-7	J-7	J-3	2,659	24.0	-160	0.11	0.000	130.0	PVC
P-8	J-5	J-4	2,497	12.0	-44	0.13	0.000	130.0	PVC
P-4	J-4	J-1	3,313	16.0	-219	0.35	0.000	130.0	PVC
P-15	J-8	R-2	2,389	48.0	(N/A)	(N/A)	(N/A)	130.0	PVC
P-16	J-9	J-8	1,887	30.0	-74	0.03	0.000	130.0	PVC
P-17	J-9	J-10	2,137	30.0	28	0.01	0.000	130.0	PVC
P-14	J-10	J-7	2,677	24.0	1	0.00	0.000	130.0	PVC
P-6	J-5	J-26	1,317	12.0	-73	0.21	0.000	130.0	PVC
P-5	J-26	J-2	1,343	12.0	-80	0.23	0.000	130.0	PVC
P-11	J-5	J-27	758	12.0	-1	0.00	0.000	130.0	PVC
P-12	J-27	J-28	1,336	12.0	-1	0.00	0.000	130.0	PVC
P-13	J-28	J-9	662	12.0	-1	0.00	0.000	130.0	PVC
P-23	J-13	J-29	1,185	12.0	-86	0.25	0.000	130.0	PVC
P-22	J-29	J-7	1,987	12.0	-106	0.30	0.000	130.0	PVC
P-25	J-14	J-30	2,296	12.0	-25	0.07	0.000	130.0	PVC
P-24	J-30	J-13	876	12.0	-59	0.17	0.000	130.0	PVC
P-33	J-16	J-31	1,824	12.0	-54	0.15	0.000	130.0	PVC
P-34	J-31	J-12	1,179	12.0	-54	0.15	0.000	130.0	PVC
P-29	J-18	J-34	2,298	12.0	-20	0.06	0.000	130.0	PVC
P-30	J-34	J-16	734	12.0	-20	0.06	0.000	130.0	PVC
P-35	J-8	J-37	1,572	16.0	-93	0.15	0.000	130.0	PVC
P-10	J-37	J-4	690	16.0	-111	0.18	0.000	130.0	PVC
P-36(1)	J-4	PRV-1	568	12.0	18	0.05	0.000	130.0	PVC
P-36(2)	PRV-1	J-35	609	12.0	18	0.05	0.000	130.0	PVC
P-37(1)	J-36	PRV-2	510	12.0	-18	0.05	0.000	130.0	PVC
P-37(2)	PRV-2	J-37	677	12.0	-18	0.05	0.000	130.0	PVC

FlexTable: Junction Table
Active Scenario: MAX DAY - ALL PHASES

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,701.30	94	5,948.38	107
J-2	5,740.50	159	5,947.80	90
J-3	5,778.20	139	5,947.46	73
J-4	5,689.70	125	5,947.54	112
J-5	5,737.20	325	5,947.41	91
J-7	5,771.30	161	5,947.41	76
J-8	5,680.50	52	5,947.41	115
J-9	5,722.50	128	5,947.41	97
J-10	5,801.50	76	5,947.41	63
J-11	5,784.40	182	5,946.67	70
J-12	5,792.50	120	5,946.54	67
J-13	5,810.90	107	5,946.67	59
J-14	5,816.70	53	5,946.54	56
J-15	5,738.50	121	5,946.31	90
J-16	5,765.00	121	5,946.31	78
J-17	5,725.50	54	5,946.27	96
J-18	5,732.00	63	5,946.27	93
J-26	5,737.22	20	5,947.59	91
J-27	5,732.20	0	5,947.41	93
J-28	5,721.50	0	5,947.41	98
J-29	5,822.00	53	5,946.88	54
J-30	5,796.40	95	5,946.59	65
J-31	5,775.00	0	5,946.45	74
J-34	5,772.50	0	5,946.30	75
J-35	5,684.20	52	5,850.06	72
J-36	5,681.70	52	5,850.06	73
J-37	5,690.70	0	5,947.49	111

FlexTable: Pipe Table

Active Scenario: MAX DAY - ALL PHASES

Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Hazen-Williams C	Material
P-1	R-1	J-1	3,850	24.0	2,350	1.67	0.000	130.0	PVC
P-2	J-1	J-2	2,644	24.0	1,644	1.17	0.000	130.0	PVC
P-3	J-2	J-3	2,560	24.0	1,261	0.89	0.000	130.0	PVC
P-18	J-3	J-11	2,629	16.0	674	1.08	0.000	130.0	PVC
P-19	J-11	J-12	2,630	16.0	255	0.41	0.000	130.0	PVC
P-26	J-12	J-14	2,665	12.0	-17	0.05	0.000	130.0	PVC
P-20	J-13	J-11	1,418	12.0	-30	0.09	0.000	130.0	PVC
P-32	J-11	J-15	2,612	12.0	207	0.59	0.000	130.0	PVC
P-28	J-15	J-17	2,653	12.0	62	0.18	0.000	130.0	PVC
P-27	J-17	J-18	2,653	12.0	8	0.02	0.000	130.0	PVC
P-31	J-15	J-16	1,509	12.0	24	0.07	0.000	130.0	PVC
P-9	J-7	J-5	2,801	12.0	-6	0.02	0.000	130.0	PVC
P-7	J-7	J-3	2,659	24.0	-448	0.32	0.000	130.0	PVC
P-8	J-5	J-4	2,497	12.0	-124	0.35	0.000	130.0	PVC
P-4	J-4	J-1	3,313	16.0	-612	0.98	0.000	130.0	PVC
P-15	J-8	R-2	2,389	48.0	(N/A)	(N/A)	(N/A)	130.0	PVC
P-16	J-9	J-8	1,887	30.0	-208	0.09	0.000	130.0	PVC
P-17	J-9	J-10	2,137	30.0	79	0.04	0.000	130.0	PVC
P-14	J-10	J-7	2,677	24.0	3	0.00	0.000	130.0	PVC
P-6	J-5	J-26	1,317	12.0	-205	0.58	0.000	130.0	PVC
P-5	J-26	J-2	1,343	12.0	-225	0.64	0.000	130.0	PVC
P-11	J-5	J-27	758	12.0	-2	0.00	0.000	130.0	PVC
P-12	J-27	J-28	1,336	12.0	-2	0.00	0.000	130.0	PVC
P-13	J-28	J-9	662	12.0	-2	0.00	0.000	130.0	PVC
P-23	J-13	J-29	1,185	12.0	-242	0.69	0.000	130.0	PVC
P-22	J-29	J-7	1,987	12.0	-296	0.84	0.000	130.0	PVC
P-25	J-14	J-30	2,296	12.0	-70	0.20	0.000	130.0	PVC
P-24	J-30	J-13	876	12.0	-165	0.47	0.000	130.0	PVC
P-33	J-16	J-31	1,824	12.0	-151	0.43	0.000	130.0	PVC
P-34	J-31	J-12	1,179	12.0	-151	0.43	0.000	130.0	PVC
P-29	J-18	J-34	2,298	12.0	-55	0.16	0.000	130.0	PVC
P-30	J-34	J-16	734	12.0	-55	0.16	0.000	130.0	PVC
P-35	J-8	J-37	1,572	16.0	-260	0.41	0.000	130.0	PVC
P-10	J-37	J-4	690	16.0	-311	0.50	0.000	130.0	PVC
P-36(1)	J-4	PRV-1	568	12.0	52	0.15	0.000	130.0	PVC
P-36(2)	PRV-1	J-35	609	12.0	52	0.15	0.000	130.0	PVC
P-37(1)	J-36	PRV-2	510	12.0	-52	0.15	0.000	130.0	PVC
P-37(2)	PRV-2	J-37	677	12.0	-52	0.15	0.000	130.0	PVC

FlexTable: Junction Table
Active Scenario: MAX HR - ALL PHASES

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,701.30	150	5,946.09	106
J-2	5,740.50	255	5,944.71	88
J-3	5,778.20	223	5,943.89	72
J-4	5,689.70	201	5,944.09	110
J-5	5,737.20	522	5,943.76	89
J-7	5,771.30	259	5,943.76	75
J-8	5,680.50	83	5,943.77	114
J-9	5,722.50	205	5,943.76	96
J-10	5,801.50	122	5,943.76	62
J-11	5,784.40	293	5,941.98	68
J-12	5,792.50	193	5,941.67	65
J-13	5,810.90	172	5,941.97	57
J-14	5,816.70	86	5,941.68	54
J-15	5,738.50	194	5,941.12	88
J-16	5,765.00	194	5,941.11	76
J-17	5,725.50	87	5,941.03	93
J-18	5,732.00	101	5,941.03	90
J-26	5,737.22	32	5,944.19	90
J-27	5,732.20	0	5,943.76	92
J-28	5,721.50	0	5,943.76	96
J-29	5,822.00	86	5,942.49	52
J-30	5,796.40	153	5,941.78	63
J-31	5,775.00	0	5,941.45	72
J-34	5,772.50	0	5,941.09	73
J-35	5,684.20	83	5,850.06	72
J-36	5,681.70	83	5,850.06	73
J-37	5,690.70	0	5,943.97	110

FlexTable: Pipe Table

Active Scenario: MAX HR - ALL PHASES

Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Hazen-Williams C	Material
P-1	R-1	J-1	3,850	24.0	3,777	2.68	0.001	130.0	PVC
P-2	J-1	J-2	2,644	24.0	2,642	1.87	0.001	130.0	PVC
P-3	J-2	J-3	2,560	24.0	2,026	1.44	0.000	130.0	PVC
P-18	J-3	J-11	2,629	16.0	1,084	1.73	0.001	130.0	PVC
P-19	J-11	J-12	2,630	16.0	410	0.65	0.000	130.0	PVC
P-26	J-12	J-14	2,665	12.0	-27	0.08	0.000	130.0	PVC
P-20	J-13	J-11	1,418	12.0	-48	0.14	0.000	130.0	PVC
P-32	J-11	J-15	2,612	12.0	332	0.94	0.000	130.0	PVC
P-28	J-15	J-17	2,653	12.0	99	0.28	0.000	130.0	PVC
P-27	J-17	J-18	2,653	12.0	12	0.04	0.000	130.0	PVC
P-31	J-15	J-16	1,509	12.0	39	0.11	0.000	130.0	PVC
P-9	J-7	J-5	2,801	12.0	-9	0.03	0.000	130.0	PVC
P-7	J-7	J-3	2,659	24.0	-720	0.51	0.000	130.0	PVC
P-8	J-5	J-4	2,497	12.0	-200	0.57	0.000	130.0	PVC
P-4	J-4	J-1	3,313	16.0	-984	1.57	0.001	130.0	PVC
P-15	J-8	R-2	2,389	48.0	(N/A)	(N/A)	(N/A)	130.0	PVC
P-16	J-9	J-8	1,887	30.0	-334	0.15	0.000	130.0	PVC
P-17	J-9	J-10	2,137	30.0	127	0.06	0.000	130.0	PVC
P-14	J-10	J-7	2,677	24.0	5	0.00	0.000	130.0	PVC
P-6	J-5	J-26	1,317	12.0	-329	0.93	0.000	130.0	PVC
P-5	J-26	J-2	1,343	12.0	-362	1.03	0.000	130.0	PVC
P-11	J-5	J-27	758	12.0	-3	0.01	0.000	130.0	PVC
P-12	J-27	J-28	1,336	12.0	-3	0.01	0.000	130.0	PVC
P-13	J-28	J-9	662	12.0	-3	0.01	0.000	130.0	PVC
P-23	J-13	J-29	1,185	12.0	-389	1.10	0.000	130.0	PVC
P-22	J-29	J-7	1,987	12.0	-475	1.35	0.001	130.0	PVC
P-25	J-14	J-30	2,296	12.0	-113	0.32	0.000	130.0	PVC
P-24	J-30	J-13	876	12.0	-266	0.75	0.000	130.0	PVC
P-33	J-16	J-31	1,824	12.0	-243	0.69	0.000	130.0	PVC
P-34	J-31	J-12	1,179	12.0	-243	0.69	0.000	130.0	PVC
P-29	J-18	J-34	2,298	12.0	-88	0.25	0.000	130.0	PVC
P-30	J-34	J-16	734	12.0	-88	0.25	0.000	130.0	PVC
P-35	J-8	J-37	1,572	16.0	-417	0.67	0.000	130.0	PVC
P-10	J-37	J-4	690	16.0	-500	0.80	0.000	130.0	PVC
P-36(1)	J-4	PRV-1	568	12.0	83	0.24	0.000	130.0	PVC
P-36(2)	PRV-1	J-35	609	12.0	83	0.24	0.000	130.0	PVC
P-37(1)	J-36	PRV-2	510	12.0	-83	0.24	0.000	130.0	PVC
P-37(2)	PRV-2	J-37	677	12.0	-83	0.24	0.000	130.0	PVC

Fire Flow Node FlexTable: Fire Flow Results Table
Active Scenario: MAX DAY + FIRE FLOW - ALL PHASES

Label	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?	Velocity of Maximum Pipe (ft/s)	Pipe w/ Maximum Velocity
J-1	2	True	2,500	3,500	2,594	3,594	104	J-29	51	J-29	True	4.15	P-1
J-2	2	True	1,500	3,500	1,659	3,658	85	J-29	50	J-29	True	4.15	P-1
J-3	2	True	2,500	3,500	2,639	3,639	68	J-29	49	J-29	True	4.15	P-1
J-11	2	True	2,500	3,500	2,682	3,682	59	J-14	46	J-14	True	5.10	P-18
J-12	2	True	1,500	3,500	1,620	3,620	52	J-14	43	J-14	True	5.01	P-18
J-14	2	True	1,500	3,500	1,553	3,553	35	J-29	45	J-29	True	5.21	P-24
J-13	2	True	1,500	3,500	1,607	3,607	46	J-29	44	J-29	True	4.58	P-22
J-15	2	True	1,500	3,500	1,621	3,621	67	J-14	45	J-14	True	6.14	P-32
J-17	2	True	1,500	3,500	1,554	3,554	62	J-14	45	J-14	True	6.11	P-28
J-18	2	True	2,500	3,500	2,563	3,563	58	J-14	45	J-14	True	5.84	P-32
J-16	2	True	1,500	3,500	1,621	3,621	55	J-14	45	J-14	True	5.54	P-32
J-7	2	True	1,500	3,500	1,661	3,661	71	J-29	49	J-29	True	4.15	P-1
J-5	2	True	1,500	3,500	1,825	3,825	83	J-29	49	J-29	True	4.15	P-1
J-4	2	True	1,500	3,500	1,625	3,625	106	J-29	49	J-29	True	4.15	P-1
J-8	2	True	1,500	3,500	1,552	3,552	110	J-29	49	J-29	True	4.15	P-1
J-9	2	True	1,500	3,500	1,628	3,627	91	J-29	49	J-29	True	4.15	P-1
J-10	2	True	1,500	3,500	1,576	3,576	57	J-29	49	J-29	True	4.15	P-1
J-26	2	True	1,500	3,500	1,520	3,520	82	J-29	49	J-29	True	5.54	P-5
J-27	2	True	1,500	3,500	1,500	3,500	83	J-29	49	J-29	True	5.77	P-11
J-28	2	True	1,500	3,500	1,500	3,500	89	J-29	49	J-29	True	6.50	P-13
J-29	2	True	1,500	3,500	1,553	3,553	41	J-14	46	J-14	True	5.86	P-22
J-30	2	True	1,500	3,500	1,595	3,595	47	J-14	42	J-14	True	7.15	P-24
J-31	2	True	1,500	3,500	1,500	3,500	54	J-14	44	J-14	True	6.89	P-34
J-34	2	True	1,500	3,500	1,500	3,500	48	J-14	45	J-14	True	7.62	P-30
J-35	2	True	0	1	52	53	72	J-29	54	J-29	True	1.67	P-1
J-36	2	True	0	1	52	53	73	J-29	54	J-29	True	1.67	P-1
J-37	2	True	1,500	3,500	1,500	3,500	105	J-29	49	J-29	True	4.15	P-1

APPENDIX C

SANITARY SEWER DEMANDS, CALCULATIONS, AND LAYOUT

COTTONWOOD CREEK
CITY OF AURORA
SANITARY SEWER ROUTING CALCUATIONS

Routing Design Point	Development Area Added to System	Included Upstream Routing DP's	Average Day Flow (gpm)	Average Day Flow (cfs)	Ave Day Cumulative Flow (cfs)	Population (Thousands)	Cumulative Population (Thousands)	Calculated Peak Factor	Peak Factor	Peak Flow (cfs)	Infiltration 10% of Avg Day Flow (cfs)	Peak Day Flow with Infiltration (cfs)	Pipe Diameter (in)	Min Slope (%)	Max Slope (%)	Min Velocity (ft/s)	Percent Full (%) @Min Slope
A																	
A1	25% DA-2A*	-	7.16	0.02	0.02	0.15	0.15	6.851	4.00	0.06	0.00	0.07	8	0.40	85.00	1.53	18.8
A2	50% DA-1D	-	35.06	0.08	0.08	0.74	0.74	5.255	4.00	0.31	0.01	0.32	8	0.40	22.00	2.37	41.1
A3	25% DA-2A* & 25% DA-1B	-	29.84	0.07	0.07	0.63	0.63	5.396	4.00	0.27	0.01	0.27	8	0.40	26.00	2.26	37.5
A4	N/A Junction	A1-A3	-	0.16	0.16		1.53	4.659	4.00	0.64	0.02	0.66	8	0.40	12.00	2.82	63.5
A5	25% DA-1A & 25% DA-1B	-	42.61	0.09	0.09	0.90	0.90	5.085	4.00	0.38	0.01	0.39	8	0.40	19.00	2.49	45.9
A6	50% DA-1C & 50% DA-1D	-	70.44	0.16	0.16	1.49	1.49	4.677	4.00	0.63	0.02	0.64	8	0.40	12.00	2.81	62.2
A8	A4-A6	A1-A6	-	0.41	0.41		3.92	3.980	3.98	1.64	0.04	1.68	12	0.40	6.60	3.58	57.6
A9	50% DA-1C	-	35.38	0.08	0.08	0.75	0.75	5.247	4.00	0.32	0.01	0.32	8	0.40	22.00	2.37	41.1
A11	A8-A9	A1-A9	-	0.49	0.49		4.67	3.865	3.87	1.90	0.05	1.95	12	0.40	5.80	3.70	63.6
A12	25% DA-2A*	-	7.16	0.02	0.02	0.15	0.15	6.851	4.00	0.06	0.00	0.07	8	0.40	85.00	1.53	18.8
A13	25% DA-2A* & 25% DA-1B	-	29.84	0.07	0.07	0.63	0.63	5.396	4.00	0.27	0.01	0.27	8	0.40	26.00	2.26	37.5
A14	N/A Junction	A12-A13	-	0.57	0.08		0.78	5.206	4.00	0.33	0.01	0.34	8	0.40	22.00	2.41	42.5
A15	25% DA-1A & 25% DA-1B	-	42.61	0.09	0.09	0.90	0.90	5.085	4.00	0.38	0.01	0.39	8	0.40	19.00	2.49	45.9
A16	A14-A15	A12-A15	-	0.67	0.18		1.69	4.581	4.00	0.71	0.02	0.73	8	0.40	11.00	2.88	68.2
A17	25% DA-1A	A16	19.94	0.04	0.22	0.42	2.11	4.414	4.00	0.89	0.02	0.91	8	0.40	9.00	2.95	82.7
A18	25% DA-1A	A17	19.94	0.04	0.27	0.42	2.53	4.281	4.00	1.06	0.03	1.09	12	0.40	9.00	3.22	44.6
A19	A11 & A18	A1-A18	-	0.76	0.76		7.20	3.595	3.60	2.72	0.08	2.80	15	0.40	4.70	4.08	54.7
B																	
OS-B1	50% OS1	-	77.83	0.17	0.17	1.65	1.65	4.600	4.00	0.69	0.02	0.71	12	0.40	13.00	2.87	35.3
B1	50% DA-2A**	-	12.62	0.03	0.03	0.27	0.27	6.233	4.00	0.11	0.00	0.12	8	0.40	53.00	1.80	24.6
B2	50% DA-2B	OS-B1	35.49	0.08	0.25	0.75	2.40	4.319	4.00	1.01	0.03	1.04	12	0.40	9.70	3.18	43.4
B3	B1-B2	B1-B3, OS-B1	-	0.28	0.28		2.67	4.244	4.00	1.12	0.03	1.15	12	0.40	9.00	3.27	45.9
OS-B2	50% OS1	-	77.83	0.17	0.17	1.65	1.65	4.600	4.00	0.69	0.02	0.71	12	0.40	13.00	2.87	35.3
B4	50% DA-2A**	-	12.62	0.03	0.03	0.27	0.27	6.233	4.00	0.11	0.00	0.12	8	0.40	53.00	1.80	24.6
B5	50% DA-2B & 50% DA3B	OS-B2	64.99	0.14	0.32	1.38	3.03	4.156	4.00	1.27	0.03	1.30	12	0.40	8.10	3.37	49.3
B6	B4-B5	B1-B5, OS-B1, OS-B2	-	0.63	0.63		5.96	3.711	3.71	2.33	0.06	2.39	15	0.40	5.20	3.93	49.7
B7	50% DA-3A & 50% DA-3B	-	55.32	0.12	0.12	1.17	1.17	4.870	4.00	0.49	0.01	0.51	12	0.40	17.00	2.61	29.7
B8	B6-B7	B1-B7, OS-B1, OS-B2	-	0.75	0.75		7.14	3.601	3.60	2.70	0.08	2.78	15	0.40	4.60	4.07	54.4
C																	
C1	50% DA-3A	--	25.83	0.06	0.06	0.55	0.55	5.530	4.00	0.23	0.01	0.24	8	0.40	29.00	2.19	35.2

OFFSITE																	
1	DA-2A**, DA-2B, DA-3B, OS1, OS3	B8	524.08	1.17	1.17	11.10	11.10	3.345	3.34	3.91	0.12	4.02	15	0.40	3.50	4.40	69.7
2	DA-3A	C1, 1	51.65	0.12	1.28	1.09	12.20	3.293	3.29	4.22	0.13	4.35	18	0.40	3.40	4.56	53.2
3	OS2	1-2	105.30	0.23	1.52	2.23	14.43	3.202	3.20	4.86	0.15	5.01	18	0.40	3.00	4.71	58.0
4	PA-15, 16, PARK F-1	1-3	447.72	1.00	2.52	8.07	22.50	2.973	2.97	7.48	0.25	7.73	24	0.40	2.30	5.26	47.5
5	PA-3, 12, 13, 14, PARK F-7	1-4	475.81	1.06	3.58	8.57	31.06	2.817	2.82	10.07	0.36	10.43	24	0.40	1.80	5.66	56.8
6	PA-17, SM OFF-1	1-5	112.64	0.25	3.83	2.03	33.09	2.787	2.79	10.66	0.38	11.05	24	0.40	1.70	5.74	58.9
7	PA-21, 22, 23, 26	1-6	140.51	0.31	4.14	2.53	35.62	2.753	2.75	11.40	0.41	11.81	24	0.40	1.60	5.82	61.6
8	SM PA 1, 4, 9, 12, SM OFF-2	1-7	195.64	0.44	4.58	4.40	40.02	2.700	2.70	12.35	0.46	12.81	24	0.40	1.50	5.92	65.1

Notes:
1.Peaking factor based on cumulative population values.
2.Maximum Slope is based on a maximum velocity of 10 ft/s.

COTTONWOOD CREEK											
CITY OF AURORA											
SANITARY SEWER DEMAND CALCUATIONS											
SANITARY SEWER DEMANDS ROUTED TO COAL CREEK/SENAC INTERCEPTOR											
Development Area	Parcel No.	Description	Area (AC)	Units	Maximum Density (DU/AC)	Occupancy (Persons/DU)	Occupancy (Persons/acre)	Avg Day Flow (GPD/CAP)	Avg Day Flow (GPD/acre)	Avg Day Flow (GPD)	Population (Thousands)
1A	PA-1	SFD-STAND	25.9	112	4.3	2.77	-	68	-	21,096.3	0.31
1A	PA-3	SFD-STAND	91.9	422	4.6	2.77	-	68	-	79,487.9	1.17
1A	PA-78	AAC	7	-	-	-	22	-	1500	10,500.0	0.15
1A	PA-77	MUNICIPAL	2.5	-	-	-	22	-	1500	3,750.0	0.06
1B	PA-2	SFD-STAND	58.2	297	5.1	2.77	-	68	-	55,942.9	0.82
1B	PA-84	SFA-TH	28.8	255	8.9	2.77	-	68	-	48,031.8	0.71
1B	PA-74	COMM CTR	4.4	-	-	-	22	-	1500	6,600.0	0.10
1B	PA-75	SCHOOL	16.7	-	-	-	18	-	1200	20,040.0	0.30
1C	PA-4	SFD-STAND	44.7	145	3.2	2.77	-	68	-	27,312.2	0.40
1C	PA-5	SFD-STAND	46.2	194	4.2	2.77	-	68	-	36,541.8	0.54
1C	PA-7	SFA-DUPLEX	26.5	202	7.6	2.77	-	68	-	38,048.7	0.56
1D	PA-6	SFD-STAND	53.3	228	4.3	2.77	-	68	-	42,946.1	0.63
1D	PA-8	SFA-DUPLEX	39.5	308	7.8	2.77	-	68	-	58,014.9	0.85
2A*	57% of PA-9	SFD-STAND	32.9	145	4.4	2.77	-	68	-	27,312.2	0.40
2A*	55% of PA-10	SFD-STAND	17.3	74	4.3	2.77	-	68	-	13,938.6	0.20
TOTAL										489,563.5	7.20
SANITARY SEWER DEMANDS ROUTED TO FIRST CREEK INTERCEPTOR											
Development Area	Parcel No.	Description	Area (AC)	Units	Maximum Density (DU/AC)	Occupancy (Persons/DU)	Occupancy (Persons/acre)	Avg Day Flow (GPD/CAP)	Avg Day Flow (GPD/acre)	Avg Day Flow (GPD)	Population (Thousands)
2A**	43% of PA-9	SFD-STAND	24.9	109	4.4	2.77	-	68	-	20,531.2	0.30
2A**	45% of PA-10	SFD-STAND	14.2	60	4.2	2.77	-	68	-	11,301.6	0.17
2A**	PA-79	AAC	3	-	-	-	22	-	1500	4,500.0	0.07
2B	PA-11	SFD-STAND	31.6	132	4.2	2.77	-	68	-	24,863.5	0.37
2B	PA-12	SFD-STAND	32.6	141	4.3	2.77	-	68	-	26,558.8	0.39
2B	PA-13	SFA-DUPLEX	20.5	155	7.6	2.77	-	68	-	29,195.8	0.43
2B	PA-76	SCHOOL	18	-	-	-	18	-	1200	21,600.0	0.32
3A	PA-16	SFD-STAND	83.2	371	4.5	2.77	-	68	-	69,881.6	1.03
3A	PA-80	AAC	3	-	-	-	22	-	1500	4,500.0	0.07
3B	PA-15	SFD-STAND	76.9	353	4.6	2.77	-	68	-	66,491.1	0.98
3B	PA-14	SFA-DUPLEX	13.2	98	7.4	2.77	-	68	-	18,459.3	0.27
TOTAL										297,882.8	4.39
OFFSITE BASINS											
Development Area	Parcel No.	Description	Area (AC)	Units	Maximum Density (DU/AC)	Occupancy (Persons/DU)	Occupancy (Persons/acre)	Avg Day Flow (GPD/CAP)	Avg Day Flow (GPD/acre)	Avg Day Flow (GPD)	Population (Thousands)
OS1	-	-	238	1190	5.0	2.77	-	68	-	224,148.4	3.30
OS2	-	-	161	805	5.0	2.77	-	68	-	151,629.8	2.23
OS3	-	-	326	1630	5.0	2.77	-	68	-	307,026.8	4.52
TOTAL										682,805.0	10.04

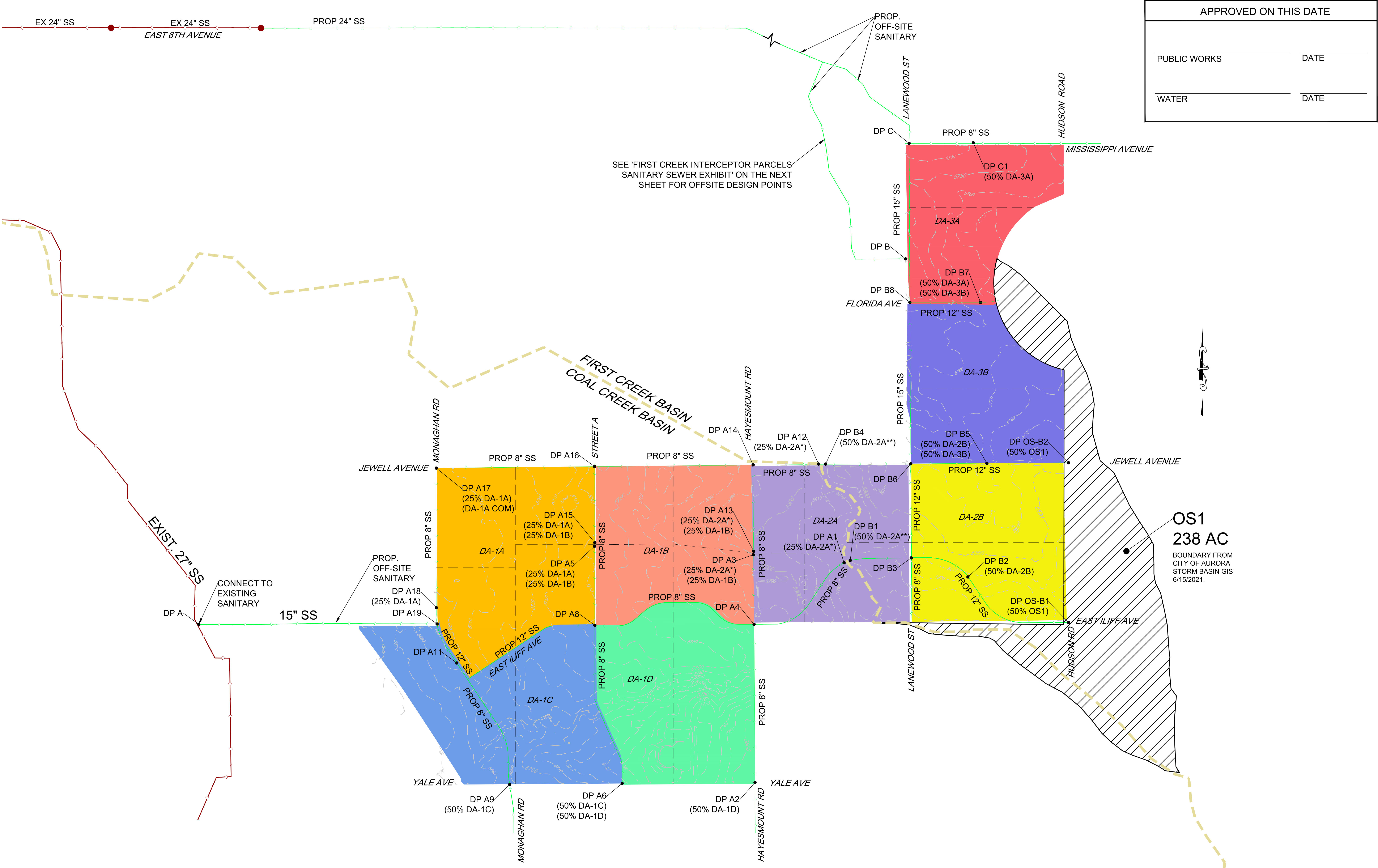
1. Offsite development areas assumed to be at a max potential density of 5 DU/AC. Please see sewer exhibits for location.
2. AAC(Admistrative Activity Center), MUNICIPAL, and COMM CTR land use types are considered commercial for this analysis. Equivalent population per acre for commercial use assumed to be 22.
3. Equivalent population per acre for school use assumed to be 18.
4. The First Creek/Coal Creek Basin divide line splits development area 2A into 2A* and 2A**. DA-2A* goes to Coal Creek Basin, and DA-2A** goes to First Creek Basin.

Cottonwood Creek - Sanitary Sewer Routing Report

Label	Roughness Coefficient	Channel Slope (ft/ft)	Normal Depth (in)	Diameter (in)	Discharge (cfs)	Percent Full (%)	Velocity (ft/s)	Maximum Discharge (cfs)	Flow Type
DESIGN POINT A1	0.011	0.004	1.5	8.0	0.07	18.8	1.53	0.97	Subcritical
DESIGN POINT A2	0.011	0.004	3.3	8.0	0.32	41.1	2.37	0.97	Subcritical
DESIGN POINT A3	0.011	0.004	3.0	8.0	0.27	37.5	2.26	0.97	Subcritical
DESIGN POINT A4	0.011	0.004	5.1	8.0	0.66	63.5	2.82	0.97	Subcritical
DESIGN POINT A5	0.011	0.004	3.7	8.0	0.39	45.9	2.49	0.97	Subcritical
DESIGN POINT A6	0.011	0.004	5.0	8.0	0.64	62.2	2.81	0.97	Subcritical
DESIGN POINT A8	0.011	0.004	6.9	12.0	1.68	57.6	3.58	2.86	Subcritical
DESIGN POINT A9	0.011	0.004	3.3	8.0	0.32	41.1	2.37	0.97	Subcritical
DESIGN POINT A11	0.011	0.004	7.6	12.0	1.95	63.6	3.70	2.86	Subcritical
DESIGN POINT A12	0.011	0.004	1.5	8.0	0.07	18.8	1.53	0.97	Subcritical
DESIGN POINT A13	0.011	0.004	3.0	8.0	0.27	37.5	2.26	0.97	Subcritical
DESIGN POINT A14	0.011	0.004	3.4	8.0	0.34	42.5	2.41	0.97	Subcritical
DESIGN POINT A15	0.011	0.004	3.7	8.0	0.39	45.9	2.49	0.97	Subcritical
DESIGN POINT A16	0.011	0.004	5.5	8.0	0.73	68.2	2.88	0.97	Subcritical
DESIGN POINT A17	0.011	0.004	6.6	8.0	0.91	82.7	2.95	0.97	Subcritical
DESIGN POINT A18	0.011	0.004	5.3	12.0	1.09	44.6	3.22	2.86	Subcritical
DESIGN POINT B1	0.011	0.004	2.0	8.0	0.12	24.6	1.80	0.97	Subcritical
DESIGN POINT B2	0.011	0.004	5.2	12.0	1.04	43.4	3.18	2.86	Subcritical
DESIGN POINT B3	0.011	0.004	5.5	12.0	1.15	45.9	3.27	2.86	Subcritical
DESIGN POINT B4	0.011	0.004	2.0	8.0	0.12	24.6	1.80	0.97	Subcritical
DESIGN POINT B5	0.011	0.004	5.9	12.0	1.30	49.3	3.37	2.86	Subcritical
DESIGN POINT B6	0.011	0.004	7.5	15.0	2.39	49.7	3.93	5.19	Subcritical
DESIGN POINT B7	0.011	0.004	3.6	12.0	0.51	29.7	2.61	2.86	Subcritical
DESIGN POINT B8	0.011	0.004	8.2	15.0	2.78	54.4	4.07	5.19	Subcritical
DESIGN POINT C1	0.011	0.004	2.8	8.0	0.24	35.2	2.19	0.97	Subcritical
DESIGN POINT OS-B1	0.011	0.004	4.2	12.0	0.71	35.3	2.87	2.86	Subcritical
DESIGN POINT OS-B2	0.011	0.004	4.2	12.0	0.71	35.3	2.87	2.86	Subcritical
DESIGN POINT A19	0.011	0.004	8.2	15.0	2.80	54.7	4.08	5.19	Subcritical
DESIGN POINT 1	0.011	0.004	10.5	15.0	4.02	69.7	4.40	5.19	Subcritical
DESIGN POINT 2	0.011	0.004	9.6	18.0	4.35	53.2	4.56	8.45	Supercritical
DESIGN POINT 3	0.011	0.004	10.4	18.0	5.01	58.0	4.71	8.45	Subcritical
DESIGN POINT 4	0.011	0.004	11.4	24.0	7.73	47.5	5.26	18.19	Supercritical
DESIGN POINT 5	0.011	0.004	13.6	24.0	10.43	56.8	5.66	18.19	Supercritical

Cottonwood Creek - Sanitary Sewer Routing Report

Label	Roughness Coefficient	Channel Slope (ft/ft)	Normal Depth (in)	Diameter (in)	Discharge (cfs)	Percent Full (%)	Velocity (ft/s)	Maximum Discharge (cfs)	Flow Type
DESIGN POINT 6	0.011	0.004	14.1	24.0	11.05	58.9	5.74	18.19	Supercritical
DESIGN POINT 7	0.011	0.004	14.8	24.0	11.81	61.6	5.82	18.19	Supercritical
DESIGN POINT 8	0.011	0.004	15.6	24.0	12.81	65.1	5.92	18.19	Subcritical



APPROVED ON THIS DATE	
PUBLIC WORKS	DATE
WATER	DATE

COTTONWOOD CREEK SANITARY SEWER DESIGN POINTS