

To: Aurora Water

From: Kurtis Williams, PE

Date: January 17, 2023

Subject: Foundry Community Center and Park– Potable Water, Irrigation and Sanitary Sewer Conformance with Master Plans

This memo has been prepared to summarize how the potable water, irrigation and sanitary sewer lines proposed with the Foundry Community Center and Park project are in conformance with master planning documents.

Design Criteria

All proposed infrastructure is consistent with the *GIS Water Information* (City of Aurora, 2024) and *Water, Sanitary Sewer and Storm Drainage Infrastructure Manual* (January 2022) Section 5.03 design criteria. Furthermore, the proposed system demands were compared to the *Foundry Master Utility Report* prepared by JR Engineering in June 2023 (attached) to determine conformance.

Proposed Infrastructure

The overall utility plan sheet (attached) shows the extent of the proposed improvements for the Community Center and Park. The street improvements consist of adding a parking lot to connect the Community Center to the proposed East Iliff Place from Foundry Filing 1. On the west side of the community building, service pipes are to connect to the respective 12" water and sanitary sewer mains running along E. Iliff Place. The service lines are to include a 1.5" water, a 4" fire, and a 6" sanitary sewer pipe. Additionally, another 6" sewer line shall connect the pool building to a sanitary running along South Muscadine Way. A secondary 2" irrigation meter connects the south fields to the 12" water line on Caspian Avenue. Finally, a fire hydrant assembly with a 6" water line and a 2" irrigation meter are to run from the 12" water main running along Iliff Place.

Sanitary sewer and water lines are to be approved along East Iliff Place, South Muscadine Way, and East Caspian Avenue prior to the construction of the Community Center. According to the Foundry master plan, all proposed potable water for the Community Center is located in Pressure Zone 4. Fixture totals for the buildings can be seen in the attached documents.

The proposed utility systems within this phase are in conformance with the *Foundry Master Utility Report* prepared by JR Engineering in June 2023.

Projected Demands

The utility lines running adjacent to the site were designed and sized to include the Community Center as shown in the Foundry master report Sanitary Sewer and Water Demand tables. In the master utility report, the Community Center (Parcel PA-9) is rated for commercial/recreational use. Therefore, the projected demands are adequate.

Conclusion

The sanitary, irrigation and water infrastructure connecting to Foundry Community Center and Park were previously included in the master report and found to meet the standards set forth by the City of Aurora. We anticipate no adverse impact to existing or proposed infrastructure resulting from the sanitary, irrigation or water demands of the Community Center and Park.

FOUNDRY COMMUNITY CENTER & PARK
SITE PLAN
AURORA, CO

OWNER:
CENTURY HOMES

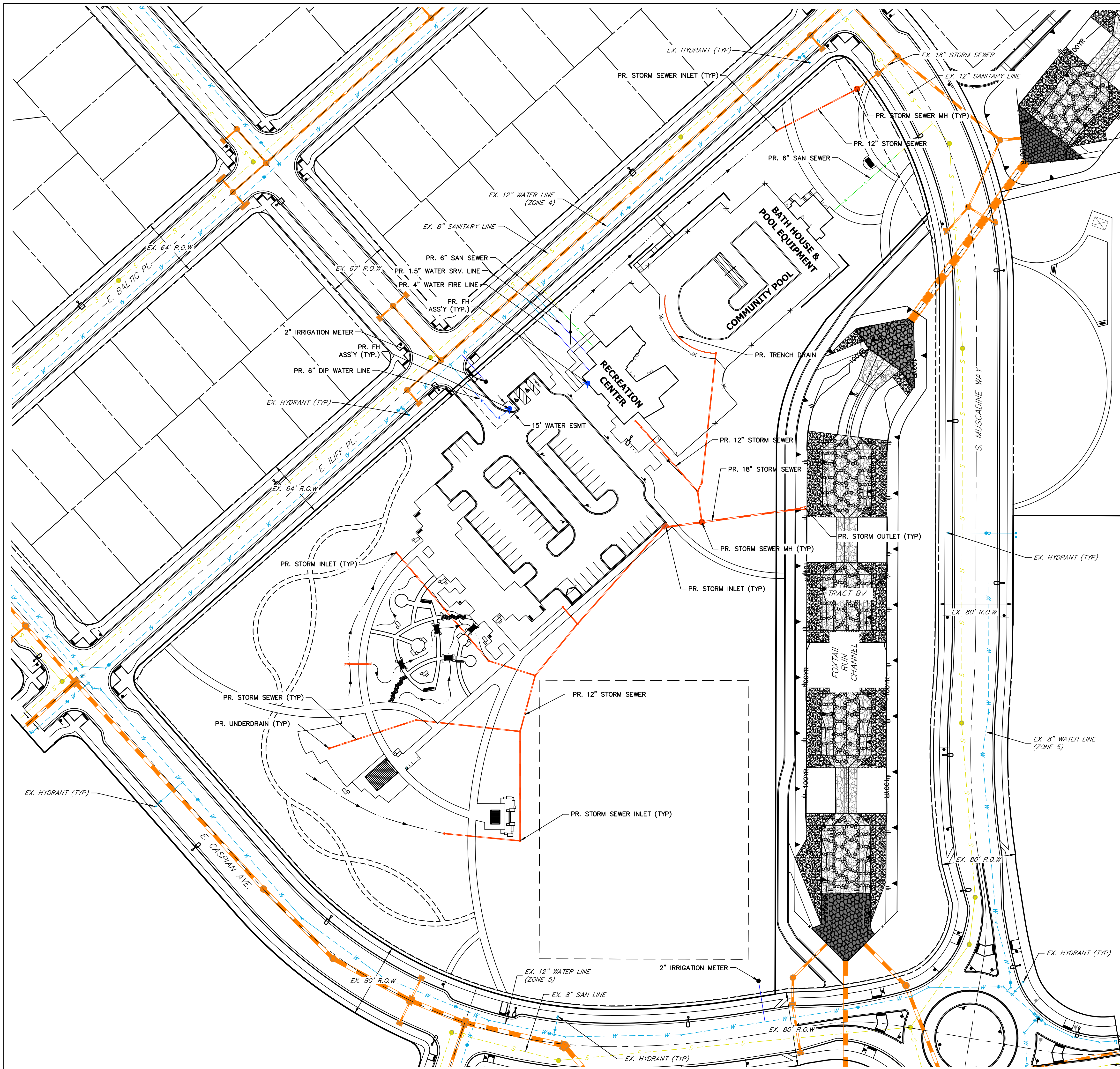
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1/17/24

DATE:
01/19/24 SDP 01

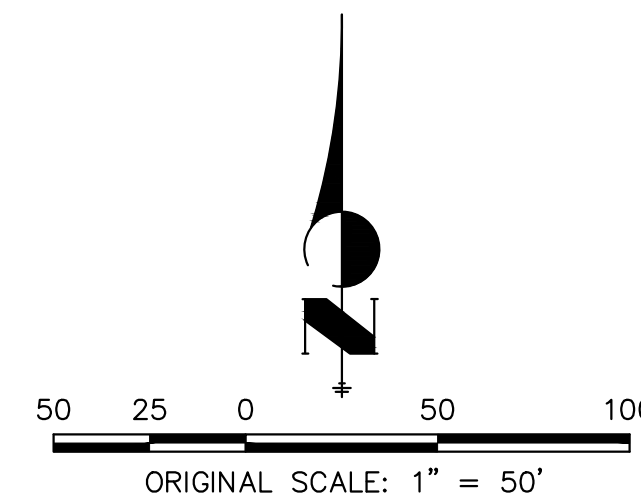
SHEET TITLE:
OVERALL UTILITY
PLAN

3 OF 6



LEGEND

1.5"-6" WATER LINE	
6" SANITARY LINE	
STORM PIPE	
EXISTING WTR	
EXISTING SAN	
EXISTING STORM PIPE	



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Water Demand Estimate and Meter Sizing Using Fixture Values

(Based on AWWA M22 Manual, Second Edition)

Project Number 1614605 Foundry Recreation Center

Building address or number Community Center

Residential or Non-Residential Non-Residential ▼

Pressure Zone at Project 65 ▼

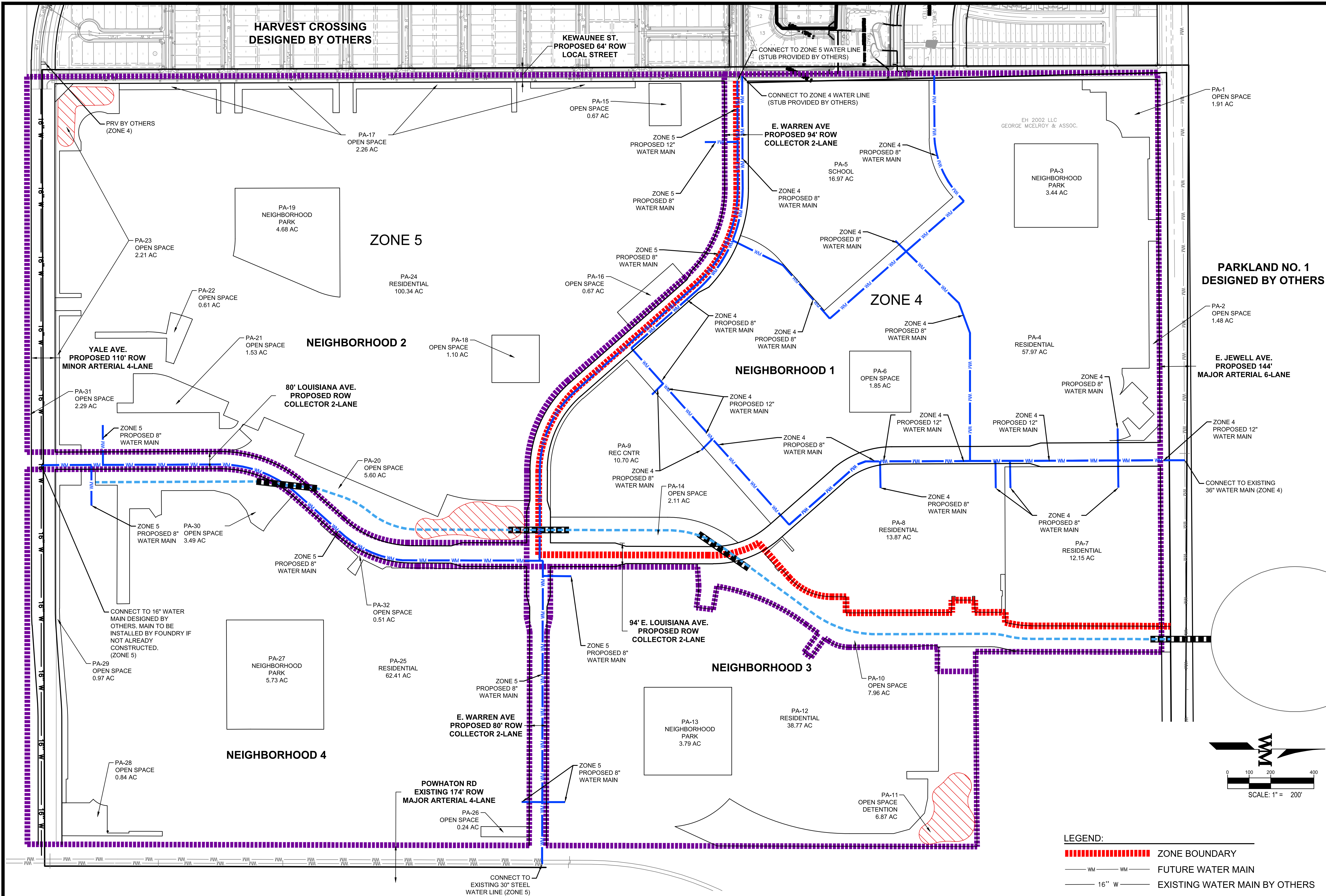
Fixture or Appliance	Fixture Value (at 60 psi)	Number of Fixtures	Subtotal Fixture Value
Toilet (tank)	4	7	28
Toilet (flush valve)	35		0
Urinal (wall or stall)	16	2	32
Urinal (flush valve)	35		0
Bidet	2		0
Shower (single head)	2.5	4	10
Sink (lavatory)	1.5	6	9
Kitchen Sink	2.2	1	2.2
Utility Sink	4		0
Dishwasher	2		0
Bathtub	8		0
Clothes Washer	6		0
Hose connections (with 50 ft of hose)			
1/2 in.	5		0
5/8 in.	9		0
3/4 in.	12		0
Miscellaneous			
Bedpan washers	10		0
Drinking fountains	2	4	8
Dental units	2		0
Combined Fixture Value			89.2
Demand (gpm)			48
Pressure Adjustment Factor			1.05
Total Adjusted demand (gpm)			50.4
Preliminary Demand Size			1 1/2"
Velocity (fps)			9.2
Required Meter Size			1-1/2"

Review by: _____

Approved by: _____

1

223146



- LEGEND:
- ZONE BOUNDARY
 - FUTURE WATER MAIN
 - EXISTING WATER MAIN BY OTHERS
 - EXISTING WATER MAIN
 - CONCEPTUAL WATERMAIN
 - CONCEPTUAL WATERMAIN SPECIFIC TO PLANNING AREA
 - NEIGHBORHOOD BOUNDARY

FACSIMILE

This electronic plan is a facsimile of the signed and sealed pdf set

[Signature] 05/26/2023
Signature Date

APPROVED FOR ONE YEAR FROM THIS DATE

06/13/2023

[Signature] 06/09/2023
WATER DEPARTMENT DATE

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suite 320
denver, co 80209
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FOR AND ON BEHALF
OF WARE MALCOMB

FOUNDRY
AURORA COLORADO

CONCEPT WATER PLAN

NO.	DATE	REMARKS

JOB NO.:	DCS21-9005
PA / PM:	J. MANN
DESIGNED:	X. XXXXX
DATE:	05/22/2023
PLOT DATE:	---

SHEET

WA-1

Sheet 1 of 1



Sheet 1 of 1

1000

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MASTER UTILITY REPORT A PART OF SECTION 29, TOWNSHIP 4 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN COUNTY OF ARAPAHOE, STATE OF COLORADO

Foundry

Prepared: April 6, 2022
Revised: October 24, 2022
Revised: January 20, 2023
Revised: March 9, 2023
Revised: April 11, 2023
Revised: May 22, 2023
WM: DCS21-9005

Prepared for:
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c/o Jerry Richmond
Integrity Land Solutions
7200 S. Alton Way
Centennial, CO 80112

Prepared by:
Ware Malcomb
900 South Broadway Suite 320
Denver, CO 80209
P: 303.561.3333

Approved for one year from this date 06/13/2023	
	06/13/2023
Fire Department	Date
	06/09/2023
Water Department	Date

Jason Mann, PE No. 42735

CERTIFICATION

I hereby certify that this Master Utility Report for Foundry was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Aurora Standard Specifications regarding Water and Sanitary Infrastructure.

FACSIMILE

This electronic plan is a facsimile of the
signed and sealed pdf set



05/26/2023

Signature

Date

Jason Mann
State of Colorado Registration No. 42735
Ware Malcomb

Date

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Concept Sewer Design/Plan

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Land Use Plan

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Consultant Coordination Communication

I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

The Foundry development (Site) is a part of Section 29, Township 4 South, Range 65 West of the Sixth Principal Meridian, County of Arapahoe, State of Colorado. More specifically, the Site is proposed south of Jewell Avenue and between S. Harvest Road and S. Powhatan Road in Aurora, CO. The Site is bounded by the Village at Murphy Creek residential subdivision to the west, E. Jewell Avenue to the north, S. Powhatan Road to the east and Yale Avenue to the south.



Vicinity Map

B. Description of Development

The Site is planned to be a mixed-use development of 2,232 residential lots, recreation center, elementary school and parks/open space. The backbone roadways and utilities will be constructed to provide service for future developments within the 4 neighborhoods. See Appendix D for the Land Use Plan.

II. WATER

A. Existing Infrastructure

Domestic water is currently available along the north and east sides of the property. A 36" steel water main is located within the right of way of E. Jewel Avenue. A 60" and a 30" water line are located within future S. Powhaton Road. The property lies within the City of Aurora pressure Zones 4 and 5. The static pressure ranges are shown in the table below.

ZONE	HYDRAULIC GRADE LINE (FT)	ZONE ELEVATION RANGE (FT)	STATIC PRESSURE RANGE (PSI)
4	5850	5670-5730	52-77
5	5950	5720-5765	80-99

The adjacent development to the west, Harvest Crossing, will be installing two 12" water stubs in Warren Ave. One stub will be a Zone 4 stub, and one will be for Zone 5. Harvest Crossing will also be installing a Zone 5 16" water line and PRV in Yale that will connect to the 30" line in the Powhaton right of way. These improvements are anticipated to be complete prior to construction of this development.

B. Proposed Infrastructure

The Foundry project is proposing to extend a network of 8" and 12" water mains throughout the site for the future residential developments. Only collector and arterial roads are shown at this time, so only the 8" and 12" lines in those roads are analyzed in this report. This network will connect to the existing 36" main in E. Jewel Ave, the existing 30" main in Powhaton Road, and the future 12" stubs in Warren Ave and future 16" main in Yale to be installed by Harvest Crossing to the west. If these lines are not installed by the time this project is developed, the mains will be installed by Foundry.

Multiple 8" mains will be extended internal to the development to service the associated planning areas. At this time, only the mains in the primary roads are shown. See Appendix A for a map of the existing and proposed improvements.

C. Anticipated Demand & Design Criteria

The *Water, Sanitary Sewer and Storm Drainage Infrastructure Manual*, City of Aurora, CO, effective January 2022 Section 5.02 was referenced for all design criteria. The proposed water demands are broken down in Appendix B and taken from Section 5.02.3 Domestic Water Demand per Zoning Classification, City of Aurora Standards and Specifications. The scenarios modeled include, average day, maximum day, maximum hour, and maximum day plus fire flow demands.

The average day demands were calculated using 1,500 gpd/acre for the Multi-Family and Rec Center areas, 1,200 gpd/acre for the school, and 1,800 gpd/acre for the parks.

Average day demands for the Single-Family Residential areas were calculated using 2.77 people/unit with a per capita flow of 101 gpd.

Fire flow demands were based on Use Classifications in Section 5.02.3. Residential areas were calculated at 1,500 gpm while Commercial and Multi-Family areas were calculated at 2,500 gpm. The proposed school was calculated at 3,500 gpm. Residual pressures and velocities conform to the requirements within Section 5.02 of the City of Aurora Standards and Specifications. See Appendix B for water demands and model reporting.

III. SANITARY SEWER

A. Adjacent Infrastructure

This site is expected to connect to the Senac interceptor. Property ownership groups are in discussions with the City regarding the timing of when this line will be installed. It is anticipated that it will be constructed prior to the development of the Foundry site.

A small portion of the site will drain to the southwest and connect to a stub provided by the Harvest Crossing development to the west (EDN 221354). This stub is anticipated to be 8" PVC and located in the right of way of E. Kewaunee Street. Coordination efforts are underway to ensure this main will have sufficient depth and capacity to service this portion of the development. Refer to the communication provided in Appendix E regarding the capacity of this line.

B. Proposed Infrastructure

The Foundry development was broken up into four basins connecting to the sanitary mains described above. A series of 8", 10", 12" and 15" mains will be extended throughout the development to service each Planning Area.

BASIN A

Basin A encompasses the northwest portion of the site which includes Planning Areas 1-6, 9, and 14. This basin includes a school, a rec center, and a single-family residential area. Sanitary flows from Basins B, C, and D will combine at the north end of this basin and connect to the Senac interceptor.

BASIN B

Basin B encompasses a portion of the southwest corner of the site which includes Planning Areas 15, 16, 18, 19, 20, 21, 22 and portions of Planning Areas 17, 23 & 24. This basin includes a single-family residential area. Sanitary flows from this basin will be routed north to combine with flows from basins A, C, and D and outfall at the north end of the site.

BASIN C

Basin C encompasses the northeast portion of the site which includes Planning Areas 7, 8, 10, 11, 12, and 13. This basin includes a multi-family residential area and two single-family

residential areas. Sanitary flows from this basin will be routed north to combine with flows from Basins A, B and D, and outfall at the north end of the site.

BASIN D

Basin D encompasses the southeast portion of the site which includes Planning Areas 25-30, 32, and a portion of Planning Area 31. This basin includes a single-family residential area. Sanitary flows from this basin will be routed north to combine with Basin C before out-falling at the north end of the site with Basins A and B.

BASIN E

Basin E encompasses the southwest corner of the site which includes Planning Area 23, and portions of Planning Areas 17, 24 and 31. The basin includes a single-family residential area. The sanitary design is being coordinated with the adjacent developments to the west. Sanitary flows from this basin will be routed west and connect to a sanitary stub provided near the Yale and Kewaunee intersection provided by the Harvest Crossing development. This line will connect to the system that routes through the Murphy Creek development designed with the Murphy Creek Master Utility Report (EDN 220132). Per discussions with those developments, the system as currently designed has capacity to convey flows from 75 lots on the Foundry site. It is anticipated that this line will be installed by the time the Planning Areas in Basin B (Neighborhood/Phase 2) are developed.

C. Design Standards

The *Water, Sanitary Sewer and Storm Drainage Infrastructure Manual*, City of Aurora, CO, effective January 2022 Section 5.03 was referenced for all design criteria. Sanitary average and peak demands, design slopes, pipe sizes, and pipe capacities have been provided within Appendix C.

IV. CONCLUSION

A. Conclusions

As described above, there will be adequate infrastructure to provide utility services for the Foundry development per the City of Aurora criteria.

V. REFERENCES

1. *Amendment to the “Master Utility Report for Villages at Murphy Creek” for Harvest Crossing* – ILC, Inc., approved November 15, 2021 (EDN #22135).
2. *Master Utility Report for Parklands* – CORE Consultants Inc., under review.
3. *Water, Sanitary Sewer and Storm Drainage Infrastructure Manual*, City of Aurora, CO, effective January 2022.
4. *GIS Water Information* – Aurora Water, City of Aurora, CO, Sent via email February 24, 2022.

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APPENDIX A Water and Sewer Master Plans

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FOR AND ON BEHALF
OF WARE MALCOMB

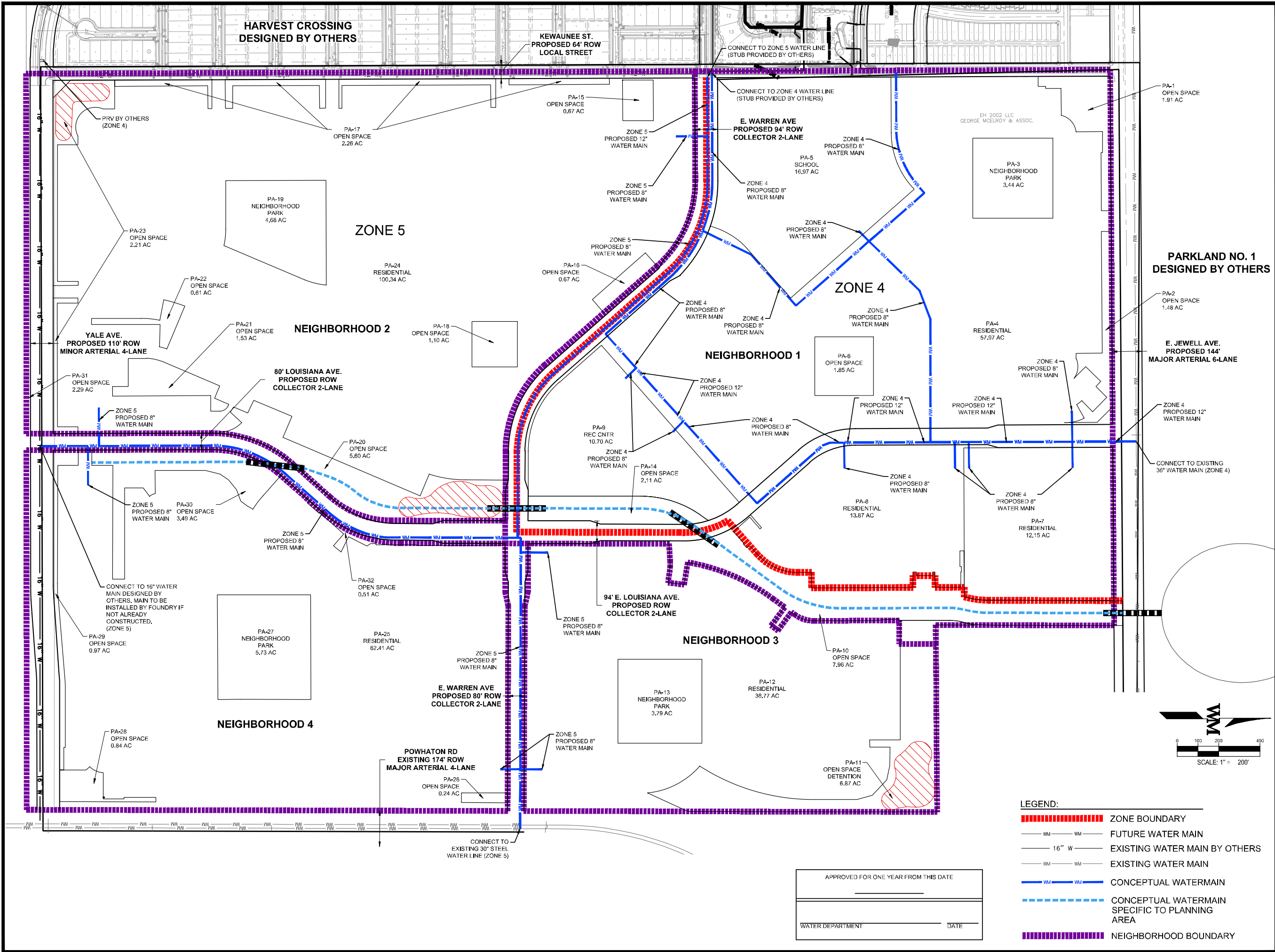
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CONCEPT WATER PLAN

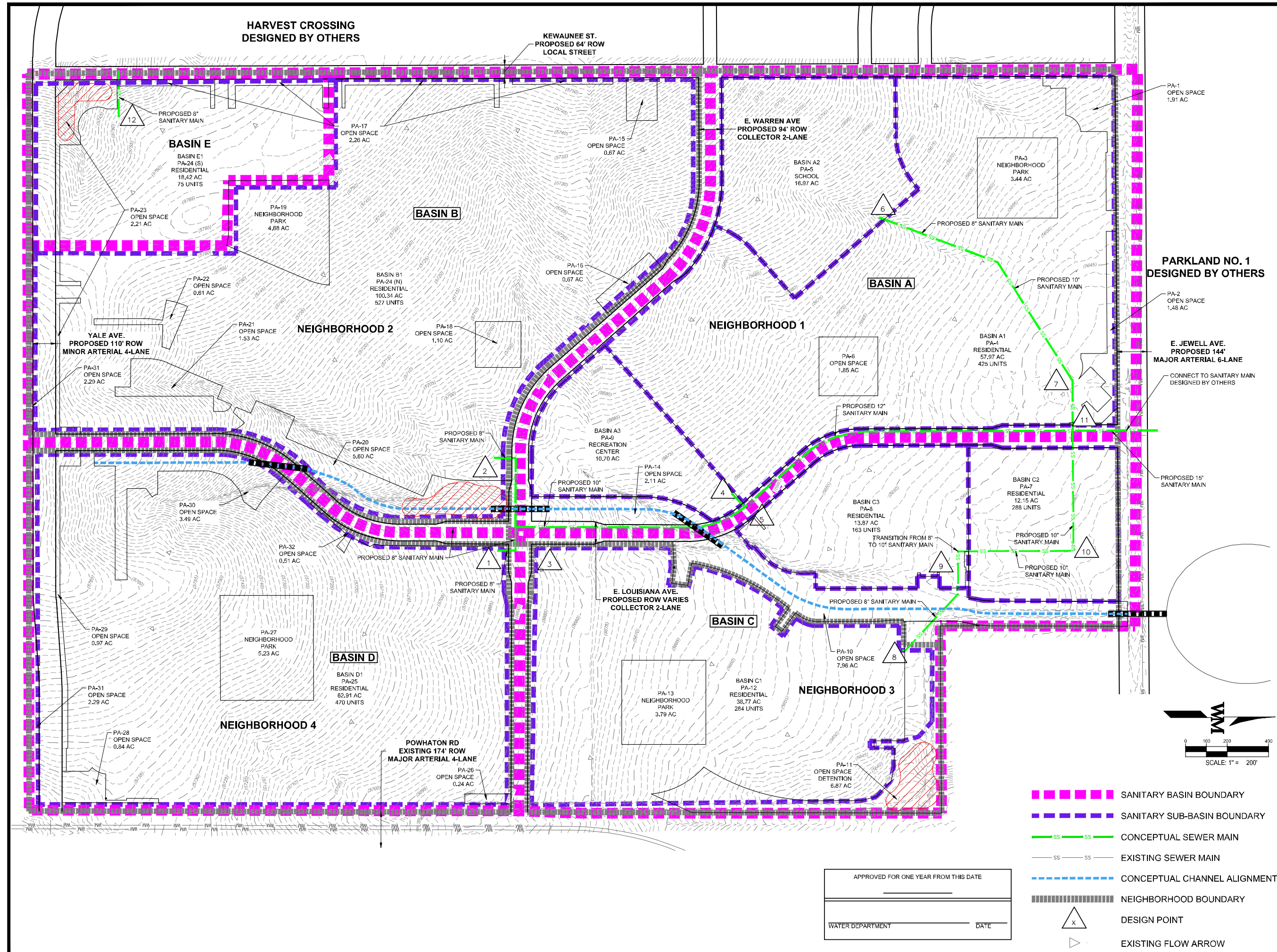
REMARKS

JOB NO.:	DCS21-9005
PA / PM:	J. MANN
DESIGNED:	X. XXXXX
DATE:	05/22/2023
PLOT DATE:	---

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WA-1
Sheet 1 of 1

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APPENDIX B Preliminary Water Demand Calculations

Foundry
Water Demand Calculations

Date: 5/22/2023
Prepared by: JMM

Domestic Water Demand			
Persons/Unit =	2.77	Residential	
Residential Average Day Demand =	101	gdpdp	
Commercial Average Day Demand =	1,500	gpd/acre	
Industrial Average Day Demand =	1,200	gpd/acre	
Parks Average Day Demand =	1800	gpd/acre	
Max Day to Average Day Ratios			
Maximum Daily Demand =	3	x Average Day Demand (Residential)	
Maximum Hourly Demand =	5	x Average Day Demand (Residential)	
Fire Flow Demands			
Commercial/Multifamily Fire Demand =	2500	gpm	gpm for 2 hours
Residential Fire Demand =	1500	gpm	gpm for 2 hours
Industrial Fire Demand =	3500	gpm	gpm for 3 hours

PLANNING AREA	AREA (AC)	ZONING/LAND USE	UNITS	PEOPLE/ UNIT	AVERAGE DAY FACTOR	AVERAGE DAY DEMAND (gpd)	AVERAGE DAY (gpm)	MAX DAY FACTOR	MAX DAY DEMAND (gpd)	MAX DAY DEMAND (gpm)	MAX HOUR FACTOR	MAX HOUR DEMAND (gpd)	MAX HOUR DEMAND (gpm)	MAX DAY + FIRE FLOW DEMAND (gpm)
Neighborhood 1														
PA-1	2	Open Space			1800	3438	2	3	9626	7	0	0	0	0
PA-2	1	Open Space			1800	2664	2	3	7459	5	0	0	0	0
PA-3	3	Neighborhood Park			1800	6192	4	3	17338	12	0	0	0	0
PA-4	58	Residential	425	2.77	101	118902	83	3	332926	231	5	535060	372	1731
PA-5	17	School (Industrial)			1200	20364	14	3	57019	40	5	91638	64	3540
PA-6	2	Open Space			1800	3330	2	3	9324	6	0	0	0	0
PA-7	12	Multi-Family (Commercial)			1500	18225	13	3	51030	35	5	82013	57	2535
PA-8	14	Residential	163	2.77	101	45603	32	3	127687	89	5	205211	143	1589
PA-9	11	Recreation (Commercial)			1500	16050	11	3	44940	31	5	72225	50	2531
PA-10	8	Open Space			1800	14328	10	3	40118	28	0	0	0	0
PA-14	2	Open Space			1800	3798	3	3	10634	7	0	0	0	0
Neighborhood 2														
PA-15	1	Open Space			1800	1206	1	3	3377	2	0	0	0	0
PA-16	1	Open Space			1800	1206	1	3	3377	2	0	0	0	0
PA-17	2	Open Space			1800	4068	3	3	11390	8	0	0	0	0
PA-18	1	Open Space			1800	1980	1	3	5544	4	0	0	0	0
PA-19	5	Neighborhood Park			1800	8424	6	3	23587	16	0	0	0	0
PA-20	6	Open Space			1800	10080	7	3	28224	20	0	0	0	0
PA-21	2	Open Space			1800	2754	2	3	7711	5	0	0	0	0
PA-22	1	Open Space			1800	1098	1	3	3074	2	0	0	0	0
PA-23	2.2	Open Space			1,800	3,978	2.8	2.8	11,138	7.7	0	-	-	-
PA-24	100.3	Residential	602	2.77	101	168,422	117.0	2.8	471,580	327.5	4.5	757,897	526	1,827.5
Neighborhood 3														
PA-11	6.9	Open Space			1,800	12,366	8.6	2.8	34,625	24.0	0	-	-	-
PA-12	38.8	Residential	284	2.77	101	79,455	55.2	2.8	222,473	154.5	4.5	357,546	248	1,654.5
PA-13	3.8	Neighborhood Park			1,800	6,822	4.7	2.8	19,102	13.3	0	-	-	-
Neighborhood 4														
PA-25	62.4	Residential	470	2.77	101	131,492	91.3	2.8	368,177	255.7	4.5	591,714	411	1,755.7
PA-26	0.2	Open Space			1,800	432	0.3	2.8	1,210	0.8	0	-	-	-
PA-27	5.7	Neighborhood Park			1,800	10,314	7.2	2.8	28,879	20.1	0	-	-	-
PA-28	0.8	Open Space			1,800	1,512	1.1	2.8	4,234	2.9	0	-	-	-
PA-29	1.0	Open Space			1,800	1,746	1.2	2.8	4,889	3.4	0	-	-	-
PA-30	3.5	Open Space			1,800	6,282	4.4	2.8	17,590	12.2	0	-	-	-
Yale Ave														
PA-31	2.3	Open Space			1,800	4,122	2.9	2.8	11,542	8.0	0	-	-	-
Totals	285.5	Residential ¹	1,944	2.77	101	543,873	377.7	2.8	1,522,844	1,057.5	4.5	2,447,428	1,700	
	17.6	Neighborhood Park			1,800	31,752	22.1	2.8	88,906	61.7	0	-	-	
	36.7	Open Space			1,800	66,060	45.9	2.8	184,968	128.5	0	-	-	
	12.2	Multi-Family (Commercial)			1,500	18,225	12.7	2.8	51,030	35.4	4.5	82,013	57	
	10.7	Recreation (Commercial)			1,500	16,050	11.1	2.8	44,940	31.2	4.5	72,225	50	
	17.0	School (Industrial)			1,200	20,364	14.1	2.8	57,019	39.6	4.5	91,638	64	
Totals						696,324	483.6	2.8	1,949,707	1,354.0	4.5	3,133,457	2,176	-

1. Does not include 288 multi-family units. Total unit count is 2232.

Junction Distribution

Date: 3/13/2023
Prepared by: JMM

[illegible]

Foundry

Average Day Demand (gpm)

Date: 5/22/2023
Prepared by: JM

	Junction/Node															
PLANNING AREA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
PA-1	1							1								2
PA-2	1							1								2
PA-3	2							2								4
PA-4	41							41								83
PA-5									14							14
PA-6	1							1								2
PA-7							13									13
PA-8				16		16										32
PA-9		6	6													11
PA-10				5	5											10
PA-11												4	4			9
PA-12												28	28			55
PA-13												2	2			5
PA-14		1	1													3
PA-15										0				0		1
PA-16										0				0		1
PA-17										1				1		3
PA-18										1				1		1
PA-19										3				3		6
PA-20										4				4		7
PA-21										1				1		2
PA-22										0				0		1
PA-23										1				1		3
PA-24										58				58		117
PA-25													46		46	91
PA-26													0		0	0
PA-27													4		4	7
PA-28													1		1	1
PA-29													1		1	1
PA-30													2		2	4
PA-31														1	1	3
TOTAL	47	7	7	21	5	16	13	47	14	71	0	34	87	72	54	494

Foundry
Max Day Demand (gpm)
+ Fire Flow

Date: 5/22/2023
Prepared by: JMM

PLANNING AREA	Junction/Node															TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
PA-1	3							3								7
PA-2	3							3								5
PA-3	6							6								12
PA-4	116							116								231
PA-5									40							40
PA-6	3							3								6
PA-7							35									35
PA-8				44		44										89
PA-9		16	16													31
PA-10				14	14											28
PA-11												12	12			24
PA-12												77	77			154
PA-13												7	7			13
PA-14		4	4													7
PA-15										1				1		2
PA-16										1				1		2
PA-17										4				4		8
PA-18										2				2		4
PA-19										8				8		16
PA-20										10				10		20
PA-21										3				3		5
PA-22										1				1		2
PA-23										4				4		8
PA-24										164				164		327
PA-25													128		128	256
PA-26													0		0	1
PA-27													10		10	20
PA-28													1		1	3
PA-29													2		2	3
PA-30													6		6	12
PA-31														4	4	8
TOTAL	131	19	19	58	14	44	35	131	40	198	0	96	243	202	152	1382
FIRE FLOW	1500	2500	2500	1500	1500	1500	2500	1500	3500	1500		1500	1500	1500	1500	
MH + FF	1631	2519	2519	1558	1514	1544	2535	1631	3540	1698	0	1596	1743	1702	1652	

Foundry

Max Hour Demand (gpm)

Date: 5/22/2023
Prepared by: JMM

	Junction/Node															
PLANNING AREA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
PA-1																0
PA-2																0
PA-3																0
PA-4	186							186								372
PA-5									64							64
PA-6																0
PA-7							57									57
PA-8				71		71										143
PA-9		25	25													50
PA-10																0
PA-11																0
PA-12												124	124			248
PA-13																0
PA-14																0
PA-15																0
PA-16																0
PA-17																0
PA-18																0
PA-19																0
PA-20																0
PA-21																0
PA-22																0
PA-23																0
PA-24										263				263		526
PA-25													205		205	411
PA-26																0
PA-27																0
PA-28																0
PA-29																0
PA-30																0
PA-31																0
TOTAL	186	25	25	71	0	71	57	186	64	263	0	124	330	263	205	1870

Average Day: Junction Table

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,698.52	Zone - 4	<Collection: 5 items>	47	5,849.96	66
J-2	5,693.90	Zone - 4	<Collection: 2 items>	7	5,849.96	68
J-3	5,678.16	Zone - 4	<Collection: 2 items>	7	5,849.96	74
J-4	5,656.52	Zone - 4	<Collection: 2 items>	21	5,849.96	84
J-5	5,650.13	Zone - 4	<Collection: 1 items>	5	5,849.96	86
J-6	5,648.57	Zone - 4	<Collection: 1 items>	16	5,849.96	87
J-7	5,647.64	Zone - 4	<Collection: 1 items>	13	5,849.96	88
J-8	5,641.61	Zone - 4	<Collection: 5 items>	46	5,849.97	90
J-9	5,673.86	Zone - 4	<Collection: 1 items>	14	5,849.96	76
J-10	5,717.54	Zone - 5	<Collection: 7 items>	69	5,949.98	101
J-12	5,686.83	Zone - 5	<Collection: 3 items>	33	5,949.84	114
J-13	5,684.97	Zone - 5	<Collection: 9 items>	86	5,949.84	115
J-14	5,761.80	Zone - 5	<Collection: 8 items>	70	5,949.81	81
J-15	5,763.06	Zone - 5	<Collection: 7 items>	54	5,949.81	81

DCS21-
9005_Water
1/24/2023

Average Day: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)	Has User Defined Length?
P-1	857	R-2	J-1	8.0	PVC	150.0	42	0.27	0.039	1,000	True
P-2	907	J-1	J-2	8.0	PVC	150.0	5	0.03	0.001	1,000	True
P-3	330	J-2	J-3	12.0	PVC	150.0	-2	0.00	0.000	330	False
P-4	1,058	J-3	J-4	8.0	PVC	150.0	-9	0.06	0.002	1,058	False
P-5	426	J-4	J-5	12.0	PVC	150.0	-30	0.08	0.002	426	False
P-6	110	J-6	J-5	12.0	PVC	150.0	31	0.09	0.004	110	False
P-7	164	J-7	J-6	12.0	PVC	150.0	47	0.13	0.006	164	False
P-8	396	J-8	J-7	12.0	PVC	150.0	60	0.17	0.011	396	False
P-9	289	R-5	J-8	12.0	PVC	150.0	106	0.30	0.031	1,000	True
P-10	487	R-1	J-10	12.0	PVC	150.0	123	0.35	0.040	487	False
P-11	1,051	J-1	J-9	8.0	PVC	150.0	-10	0.07	0.003	1,051	False
P-11A	2,262	J-10	J-12	8.0	PVC	150.0	54	0.34	0.063	2,262	False
P-12	1,081	J-9	J-5	8.0	PVC	150.0	3	0.02	0.000	1,081	False
P-13	1,120	J-12	J-13	8.0	PVC	150.0	-4	0.02	0.000	1,120	False
P-14	244	J-13	R-4	8.0	PVC	150.0	-90	0.57	0.162	1,000	True
P-15	2,146	J-14	J-12	8.0	PVC	150.0	-25	0.16	0.015	2,146	False
P-16	55	J-15	J-14	12.0	PVC	150.0	45	0.13	0.009	55	False
P-17	233	R-3	J-15	8.0	PVC	150.0	99	0.63	0.194	1,000	True
P-18	964	J-9	R-6	8.0	PVC	150.0	-28	0.18	0.018	2,000	True

Max Day: Junction Table

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,698.52	Zone - 4	<Collection: 5 items>	131	5,849.74	65
J-2	5,693.90	Zone - 4	<Collection: 2 items>	20	5,849.73	67
J-3	5,678.16	Zone - 4	<Collection: 2 items>	20	5,849.73	74
J-4	5,656.52	Zone - 4	<Collection: 2 items>	59	5,849.75	84
J-5	5,650.13	Zone - 4	<Collection: 1 items>	14	5,849.75	86
J-6	5,648.57	Zone - 4	<Collection: 1 items>	45	5,849.76	87
J-7	5,647.64	Zone - 4	<Collection: 1 items>	36	5,849.76	87
J-8	5,641.61	Zone - 4	<Collection: 5 items>	129	5,849.79	90
J-9	5,673.86	Zone - 4	<Collection: 1 items>	39	5,849.76	76
J-10	5,717.54	Zone - 5	<Collection: 7 items>	193	5,949.87	101
J-12	5,686.83	Zone - 5	<Collection: 3 items>	92	5,948.91	113
J-13	5,684.97	Zone - 5	<Collection: 9 items>	241	5,948.91	114
J-14	5,761.80	Zone - 5	<Collection: 8 items>	196	5,948.69	81
J-15	5,763.06	Zone - 5	<Collection: 7 items>	151	5,948.69	80

Max Day: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)	Has User Defined Length?
P-1	857	R-2	J-1	8.0	PVC	150.0	117	0.75	0.264	1,000	True
P-2	907	J-1	J-2	8.0	PVC	150.0	15	0.09	0.005	1,000	True
P-3	330	J-2	J-3	12.0	PVC	150.0	-5	0.01	0.000	330	False
P-4	1,058	J-3	J-4	8.0	PVC	150.0	-24	0.16	0.014	1,058	False
P-5	426	J-4	J-5	12.0	PVC	150.0	-83	0.24	0.019	426	False
P-6	110	J-6	J-5	12.0	PVC	150.0	88	0.25	0.022	110	False
P-7	164	J-7	J-6	12.0	PVC	150.0	133	0.38	0.048	164	False
P-8	396	J-8	J-7	12.0	PVC	150.0	169	0.48	0.071	396	False
P-9	289	R-5	J-8	12.0	PVC	150.0	298	0.85	0.207	1,000	True
P-10	487	R-1	J-10	12.0	PVC	150.0	344	0.98	0.271	487	False
P-11	1,051	J-1	J-9	8.0	PVC	150.0	-29	0.18	0.020	1,051	False
P-11A	2,262	J-10	J-12	8.0	PVC	150.0	151	0.97	0.424	2,262	False
P-12	1,081	J-9	J-5	8.0	PVC	150.0	9	0.06	0.002	1,081	False
P-13	1,120	J-12	J-13	8.0	PVC	150.0	-11	0.07	0.003	1,120	False
P-14	244	J-13	R-4	8.0	PVC	150.0	-252	1.61	1.087	1,000	True
P-15	2,146	J-14	J-12	8.0	PVC	150.0	-70	0.44	0.101	2,146	False
P-16	55	J-15	J-14	12.0	PVC	150.0	126	0.36	0.044	55	False
P-17	233	R-3	J-15	8.0	PVC	150.0	278	1.77	1.305	1,000	True
P-18	964	J-9	R-6	8.0	PVC	150.0	-77	0.49	0.122	2,000	True

Max Hour: Junction Table

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,698.52	Zone - 4	<Collection: 5 items>	211	5,849.37	65
J-2	5,693.90	Zone - 4	<Collection: 2 items>	32	5,849.35	67
J-3	5,678.16	Zone - 4	<Collection: 2 items>	32	5,849.35	74
J-4	5,656.52	Zone - 4	<Collection: 2 items>	95	5,849.39	83
J-5	5,650.13	Zone - 4	<Collection: 1 items>	23	5,849.41	86
J-6	5,648.57	Zone - 4	<Collection: 1 items>	72	5,849.41	87
J-7	5,647.64	Zone - 4	<Collection: 1 items>	59	5,849.43	87
J-8	5,641.61	Zone - 4	<Collection: 5 items>	207	5,849.50	90
J-9	5,673.86	Zone - 4	<Collection: 1 items>	63	5,849.41	76
J-10	5,717.54	Zone - 5	<Collection: 7 items>	310	5,949.68	100
J-12	5,686.83	Zone - 5	<Collection: 3 items>	148	5,947.37	113
J-13	5,684.97	Zone - 5	<Collection: 9 items>	387	5,947.38	114
J-14	5,761.80	Zone - 5	<Collection: 8 items>	315	5,946.85	80
J-15	5,763.06	Zone - 5	<Collection: 7 items>	243	5,946.86	80

NOTE: DEMANDS INCLUDE OPEN SPACE AREAS, WHICH SHOULD BE DEDUCTED.

Max Hour: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)	Has User Defined Length?
P-1	857	R-2	J-1	8.0	PVC	150.0	188	1.20	0.635	1,000	True
P-2	907	J-1	J-2	8.0	PVC	150.0	24	0.15	0.014	1,000	True
P-3	330	J-2	J-3	12.0	PVC	150.0	-8	0.02	0.000	330	False
P-4	1,058	J-3	J-4	8.0	PVC	150.0	-39	0.25	0.035	1,058	False
P-5	426	J-4	J-5	12.0	PVC	150.0	-134	0.38	0.047	426	False
P-6	110	J-6	J-5	12.0	PVC	150.0	142	0.40	0.053	110	False
P-7	164	J-7	J-6	12.0	PVC	150.0	214	0.61	0.110	164	False
P-8	396	J-8	J-7	12.0	PVC	150.0	272	0.77	0.175	396	False
P-9	289	R-5	J-8	12.0	PVC	150.0	479	1.36	0.498	1,000	True
P-10	487	R-1	J-10	12.0	PVC	150.0	554	1.57	0.651	487	False
P-11	1,051	J-1	J-9	8.0	PVC	150.0	-46	0.29	0.047	1,051	False
P-11A	2,262	J-10	J-12	8.0	PVC	150.0	243	1.55	1.021	2,262	False
P-12	1,081	J-9	J-5	8.0	PVC	150.0	15	0.09	0.005	1,081	False
P-13	1,120	J-12	J-13	8.0	PVC	150.0	-17	0.11	0.008	1,120	False
P-14	244	J-13	R-4	8.0	PVC	150.0	-404	2.58	2.619	1,000	True
P-15	2,146	J-14	J-12	8.0	PVC	150.0	-112	0.71	0.243	2,146	False
P-16	55	J-15	J-14	12.0	PVC	150.0	203	0.58	0.097	55	False
P-17	233	R-3	J-15	8.0	PVC	150.0	446	2.85	3.143	1,000	True
P-18	964	J-9	R-6	8.0	PVC	150.0	-124	0.79	0.293	2,000	True

MAX DAY

Max Day + Fire Flow Report

Label	Zone	Satisfies Fire Flow Constraints?	Demand (gpm)	Fire Flow (Needed) (gpm)	Flow (Total Needed) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual @ Total Flow Needed) (psi)	Junction w/ Minimum Pressure (System)	Pressure (Calculated Zone Lower Limit @ Total Flow Needed) (psi)	Junction w/ Minimum Pressure (Zone)	Velocity of Maximum Pipe (ft/s)	Pipe w/ Maximum Velocity	Is Fire Flow Run Balanced?
J-1	Zone - 4	True	131	1,500	1,631	20	62	J-2	65	J-2	6.06	P-1	True
J-2	Zone - 4	True	20	2,500	2,520	20	53	J-3	60	J-3	9.75	P-4	True
J-3	Zone - 4	True	20	2,500	2,520	20	60	J-2	54	J-2	9.93	P-4	True
J-4	Zone - 4	True	59	1,500	1,559	20	81	J-1	64	J-1	4.85	P-5	True
J-5	Zone - 4	True	14	1,500	1,514	20	84	J-1	64	J-1	4.55	P-9	True
J-6	Zone - 4	True	45	1,500	1,545	20	85	J-1	64	J-1	4.60	P-9	True
J-7	Zone - 4	True	36	2,500	2,536	20	83	J-1	63	J-1	6.63	P-9	True
J-8	Zone - 4	True	129	1,500	1,629	20	89	J-1	65	J-1	4.93	P-9	True
J-9	Zone - 4	True	39	3,500	3,539	20	62	J-1	60	J-1	9.25	P-12	True
J-10	Zone - 5	True	193	1,500	1,693	20	100	J-1	80	J-15	5.86	P-10	True
J-12	Zone - 5	True	92	1,500	1,592	20	108	J-1	77	J-15	6.20	P-14	True
J-13	Zone - 5	True	241	1,500	1,741	20	108	J-1	78	J-15	8.71	P-14	True
J-14	Zone - 5	True	196	1,500	1,696	20	73	J-1	72	J-15	9.70	P-17	True
J-15	Zone - 5	True	151	1,500	1,651	20	72	J-1	73	J-14	9.72	P-17	True

Reservoir Table

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
290	R-1	5,950.00	Zone - 5	344	5,950.00
291	R-2	5,850.00	Zone - 4	117	5,850.00
292	R-3	5,950.00	Zone - 5	278	5,950.00
293	R-4	5,950.00	Zone - 5	252	5,950.00
294	R-5	5,850.00	Zone - 4	298	5,850.00
365	R-6	5,850.00	Zone - 4	77	5,850.00

APPENDIX C Preliminary Sanitary Demand Calculations

Sanitary Sewer Flows for Foundry

DATE: 3/2/2023
BY: JMM

SANITARY FLOW SUMMARY (LOCAL)

Basin	PLANNING AREA	LAND USE	Design Point	AVG. DAY FLOW	DENSITY	TOTAL AREA	EQUIVALENT TOTAL POPULATION (P)	LOCAL AVG. FLOW	LOCAL PEAK FACTOR	LOCAL PEAK FLOW		I/I	TOTAL LOCAL AVERAGE FLOW		TOTAL LOCAL PEAK FLOW	
					PEOPLE/UNIT	ACRES OR UNITS		GPD	MAX PF= 4.0 MIN PF = 1.7	GPD	CFS	0.1* LOCAL AVG FLOW	GPD	CFS	GPD	CFS
Basin A																
A1	PA-4	Residential SF	7	68	2.77	425	1,177	80,053	4.0	320,212	0.50	8,005	88,058	0.14	328,217	0.51
A2	PA-5	Industrial (School)	6	1,200	18	16.97	305	20,364	4.0	81,456	0.13	2,036	22,400	0.03	83,492	0.13
A3	PA-9	Commercial	4	1,500	22	10.70	235	16,050	4.0	64,200	0.10	1,605	17,655	0.03	65,805	0.10
Subtotal Basin A							1,718	116,467	4.0	465,868	0.72	11,647	128,114	0.20	477,515	0.74
Basin B																
B1	PA-24 (N)	Residential SF	2	68	2.77	527	1,460	99,266	4.0	397,063	0.61	9,927	109,192	0.17	406,989	0.63
Subtotal Basin 2							1,460	99,266	4.0	397,063	0.61	9,927	109,192	0.17	406,989	0.63
Basin C																
C1	PA-12	Residential SF	8	68	2.77	284	787	53,494	4.0	213,977	0.33	5,349	58,844	0.09	219,326	0.34
C2	PA-7	Residential MF	10	68	2.77	288	798	54,248	4.0	216,991	0.34	5,425	59,672	0.09	222,415	0.34
C3	PA-8	Residential SF	9	68	2.77	163	452	30,703	4.0	122,811	0.19	3,070	33,773	0.05	125,881	0.19
Subtotal Basin C							2,036	138,445	4.0	553,778	0.86	13,844	152,289	0.24	567,623	0.88
Basin D																
D1	PA-25	Residential MF and SF	1	68	2.77	470	1,302	88,529	4.0	354,117	0.55	8,853	97,382	0.15	362,970	0.56
Subtotal Basin D							1,302	88,529	4.0	354,117	0.55	8,853	97,382	0.15	362,970	0.56
Basin E																
E1	PA-24 (S)	Residential MF	12	68	2.77	75	208	14,127	4.0	56,508	0.09	1,413	15,540	0.02	57,921	0.09
Subtotal Basin E							208	14,127	4.0	56,508	0.09	1,413	15,540	0.02	57,921	0.09

$Avg\ Flow = AREA\ (AC) \times AVG.\ DAY\ FLOW\ (\frac{GDP}{AC}) =$

$Peak\ Flow = Peak\ Factor \times Avg\ Flow =$

$I/I = Avg\ Flow \times 0.1 =$

$Peak\ Factor\ (PF) = \frac{5}{P^{0.167}} =$

where P=Population in thousands

$TOTAL\ AVERAGE\ FLOW = Avg\ Flow + (Avg\ Flow \times 0.1) =$

$TOTAL\ PEAK\ FLOW = Peak\ Flow(Avg\ Flow \times 0.1) =$

Use	Average Day	Equivalent Population
Commercial	1,500 gpd/acre	22
Industrial (School)	1,200 gpd/acre	18
People per Unit	2.77	
Loading Rate (gpcd)	68	

Sanitary Calculations for Foundry

City of Aurora Standards		
City of Aurora residential density:	2.77	people/unit
Residential average loading:	68	gal/person/day
Commercial loading:	1,500 gpd/acre	22 people/acre
Industrial (School) loading	1,200 gpd/acre	18 people/acre

Design Point	Basins	Average Daily Flow (gpd)	Population	Used Peaking Factor	Peak Flow (gpd)	I + I (gpd)	Peak Flow + (I+I) (gpd)	Peak flow (q) (cfs)	Pipe Size (in)	Minimum Pipe Slope (%)	Q _{full} (cfs)	Full Flow Capacity (%)	Q _{cap.} (cfs)	q/Q _{full} (%)	V _{peak} (fps)
1	D	88,529	1,302	4.0	354,117	8,853	362,970	0.56	8	0.50%	1.01	75%	0.76	55.6%	2.97
2	B	99,266	1,460	4.0	397,063	9,927	406,989	0.63	8	0.40%	0.90	75%	0.68	69.7%	2.80
3	B + D	187,795	2,762	4.0	751,180	18,779	769,959	1.19	10	0.50%	1.83	75%	1.37	65.1%	3.57
4	A3	16,050	235	4.0	64,200	1,605	65,805	0.10	8	0.63%	1.13	75%	0.85	9.0%	2.00
5	A3 + B + D	203,845	2,997	4.0	815,380	20,384	835,764	1.29	12	0.40%	2.66	75%	2.00	48.6%	3.37
6	A2	20,364	305	4.0	81,456	2,036	83,492	0.13	8	0.51%	1.02	75%	0.76	12.7%	2.00
7	A1 + A2	100,417	1,483	4.0	401,668	10,042	411,710	0.64	10	0.40%	1.64	75%	1.23	38.9%	2.82
8	C1	53,494	787	4.0	213,977	5,349	219,326	0.34	8	0.40%	0.90	75%	0.68	37.6%	2.41
9	C1 + C3	84,197	1,238	4.0	336,788	8,420	345,207	0.53	10	0.40%	1.64	75%	1.23	32.6%	2.68
10	C1 + C2 + C3	138,445	2,036	4.0	553,778	13,844	567,623	0.88	10	0.40%	1.64	75%	1.23	53.6%	3.06
11	A + B + C + D	442,707	6,516	3.7	1,618,653	44,271	1,662,924	2.57	15	0.40%	4.83	80%	3.86	53.3%	4.00
12	E	14,127	208	4.0	56,508	1,413	57,921	0.09	8	0.68%	1.18	75%	0.88	7.6%	2.00

Worksheet for DP 1: Basin D - 8"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.50 %
Diameter	8.0 in
Discharge	0.56 cfs
Results	
Normal Depth	4.3 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.1 ft
Hydraulic Radius	2.1 in
Top Width	0.67 ft
Critical Depth	4.2 in
Percent Full	53.2 %
Critical Slope	0.52 %
Velocity	2.97 ft/s
Velocity Head	0.14 ft
Specific Energy	0.49 ft
Froude Number	0.983
Maximum Discharge	1.09 cfs
Discharge Full	1.01 cfs
Slope Full	0.15 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	44.2 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.3 in
Critical Depth	4.2 in
Channel Slope	0.50 %
Critical Slope	0.52 %

Worksheet for DP 2: Basin B - 8"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	8.0 in
Discharge	0.63 cfs
Results	
Normal Depth	4.9 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.2 ft
Hydraulic Radius	2.2 in
Top Width	0.65 ft
Critical Depth	4.5 in
Percent Full	61.5 %
Critical Slope	0.53 %
Velocity	2.80 ft/s
Velocity Head	0.12 ft
Specific Energy	0.53 ft
Froude Number	0.837
Maximum Discharge	0.97 cfs
Discharge Full	0.90 cfs
Slope Full	0.19 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.9 in
Critical Depth	4.5 in
Channel Slope	0.40 %
Critical Slope	0.53 %

Worksheet for DP 3: Basin B+D - 10"

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.50 %
Diameter	10.0 in
Discharge	1.19 cfs
Results	
Normal Depth	5.9 in
Flow Area	0.3 ft ²
Wetted Perimeter	1.5 ft
Hydraulic Radius	2.7 in
Top Width	0.82 ft
Critical Depth	5.8 in
Percent Full	58.7 %
Critical Slope	0.51 %
Velocity	3.57 ft/s
Velocity Head	0.20 ft
Specific Energy	0.69 ft
Froude Number	0.989
Maximum Discharge	1.97 cfs
Discharge Full	1.83 cfs
Slope Full	0.21 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	44.2 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.9 in
Critical Depth	5.8 in
Channel Slope	0.50 %
Critical Slope	0.51 %

Worksheet for DP 4: Basin A3 - 8"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.63 %
Diameter	8.0 in
Discharge	0.10 cfs
Results	
Normal Depth	1.6 in
Flow Area	0.0 ft ²
Wetted Perimeter	0.6 ft
Hydraulic Radius	1.0 in
Top Width	0.53 ft
Critical Depth	1.7 in
Percent Full	20.1 %
Critical Slope	0.47 %
Velocity	2.00 ft/s
Velocity Head	0.06 ft
Specific Energy	0.20 ft
Froude Number	1.154
Maximum Discharge	1.22 cfs
Discharge Full	1.13 cfs
Slope Full	0.00 %
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	20.1 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.6 in
Critical Depth	1.7 in
Channel Slope	0.63 %
Critical Slope	0.47 %

Worksheet for DP 5: Basin A3+B+D - 12"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	10.0 in
Discharge	1.29 cfs
Results	
Normal Depth	6.7 in
Flow Area	0.4 ft ²
Wetted Perimeter	1.6 ft
Hydraulic Radius	2.9 in
Top Width	0.78 ft
Critical Depth	6.1 in
Percent Full	66.9 %
Critical Slope	0.53 %
Velocity	3.32 ft/s
Velocity Head	0.17 ft
Specific Energy	0.73 ft
Froude Number	0.833
Maximum Discharge	1.76 cfs
Discharge Full	1.64 cfs
Slope Full	0.25 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.7 in
Critical Depth	6.1 in
Channel Slope	0.40 %
Critical Slope	0.53 %

Worksheet for DP 6: Basin A2 - 8"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.51 %
Diameter	8.0 in
Discharge	0.13 cfs
Results	
Normal Depth	1.9 in
Flow Area	0.1 ft ²
Wetted Perimeter	0.7 ft
Hydraulic Radius	1.1 in
Top Width	0.57 ft
Critical Depth	2.0 in
Percent Full	24.1 %
Critical Slope	0.46 %
Velocity	2.00 ft/s
Velocity Head	0.06 ft
Specific Energy	0.22 ft
Froude Number	1.046
Maximum Discharge	1.10 cfs
Discharge Full	1.02 cfs
Slope Full	0.01 %
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	24.1 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.9 in
Critical Depth	2.0 in
Channel Slope	0.51 %
Critical Slope	0.46 %

Worksheet for DP 7: Basin A1+A2 - 10"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	10.0 in
Discharge	0.64 cfs
Results	
Normal Depth	4.3 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.2 ft
Hydraulic Radius	2.3 in
Top Width	0.83 ft
Critical Depth	4.2 in
Percent Full	43.4 %
Critical Slope	0.44 %
Velocity	2.82 ft/s
Velocity Head	0.12 ft
Specific Energy	0.49 ft
Froude Number	0.948
Maximum Discharge	1.76 cfs
Discharge Full	1.64 cfs
Slope Full	0.06 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.3 in
Critical Depth	4.2 in
Channel Slope	0.40 %
Critical Slope	0.44 %

Worksheet for DP 8: Basin C1 - 8"

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	8.0 in
Discharge	0.34 cfs
Results	
Normal Depth	3.4 in
Flow Area	0.1 ft ²
Wetted Perimeter	0.9 ft
Hydraulic Radius	1.8 in
Top Width	0.66 ft
Critical Depth	3.2 in
Percent Full	42.5 %
Critical Slope	0.47 %
Velocity	2.41 ft/s
Velocity Head	0.09 ft
Specific Energy	0.37 ft
Froude Number	0.916
Maximum Discharge	0.97 cfs
Discharge Full	0.90 cfs
Slope Full	0.06 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	40.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.4 in
Critical Depth	3.2 in
Channel Slope	0.40 %
Critical Slope	0.47 %

Worksheet for DP 9: Basin C1+C3 - 10"

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	10.0 in
Discharge	0.53 cfs
Results	
Normal Depth	3.9 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.1 ft
Hydraulic Radius	2.1 in
Top Width	0.81 ft
Critical Depth	3.8 in
Percent Full	39.2 %
Critical Slope	0.43 %
Velocity	2.68 ft/s
Velocity Head	0.11 ft
Specific Energy	0.44 ft
Froude Number	0.957
Maximum Discharge	1.76 cfs
Discharge Full	1.64 cfs
Slope Full	0.04 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.9 in
Critical Depth	3.8 in
Channel Slope	0.40 %
Critical Slope	0.43 %

Worksheet for DP 10: Basin C1+C2+C3 - 10"

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	10.0 in
Discharge	0.88 cfs
Results	
Normal Depth	5.2 in
Flow Area	0.3 ft ²
Wetted Perimeter	1.3 ft
Hydraulic Radius	2.6 in
Top Width	0.83 ft
Critical Depth	5.0 in
Percent Full	52.2 %
Critical Slope	0.47 %
Velocity	3.06 ft/s
Velocity Head	0.15 ft
Specific Energy	0.58 ft
Froude Number	0.916
Maximum Discharge	1.76 cfs
Discharge Full	1.64 cfs
Slope Full	0.12 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.2 in
Critical Depth	5.0 in
Channel Slope	0.40 %
Critical Slope	0.47 %

Worksheet for DP 11: Basin A+B+C+D - 15"

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.40 %
Diameter	15.0 in
Discharge	2.57 cfs
Results	
Normal Depth	7.8 in
Flow Area	0.6 ft ²
Wetted Perimeter	2.0 ft
Hydraulic Radius	3.8 in
Top Width	1.25 ft
Critical Depth	7.7 in
Percent Full	51.9 %
Critical Slope	0.41 %
Velocity	4.00 ft/s
Velocity Head	0.25 ft
Specific Energy	0.90 ft
Froude Number	0.982
Maximum Discharge	5.19 cfs
Discharge Full	4.83 cfs
Slope Full	0.11 %
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	34.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	7.8 in
Critical Depth	7.7 in
Channel Slope	0.40 %
Critical Slope	0.41 %

Worksheet for DP 12: Basin E - 8"

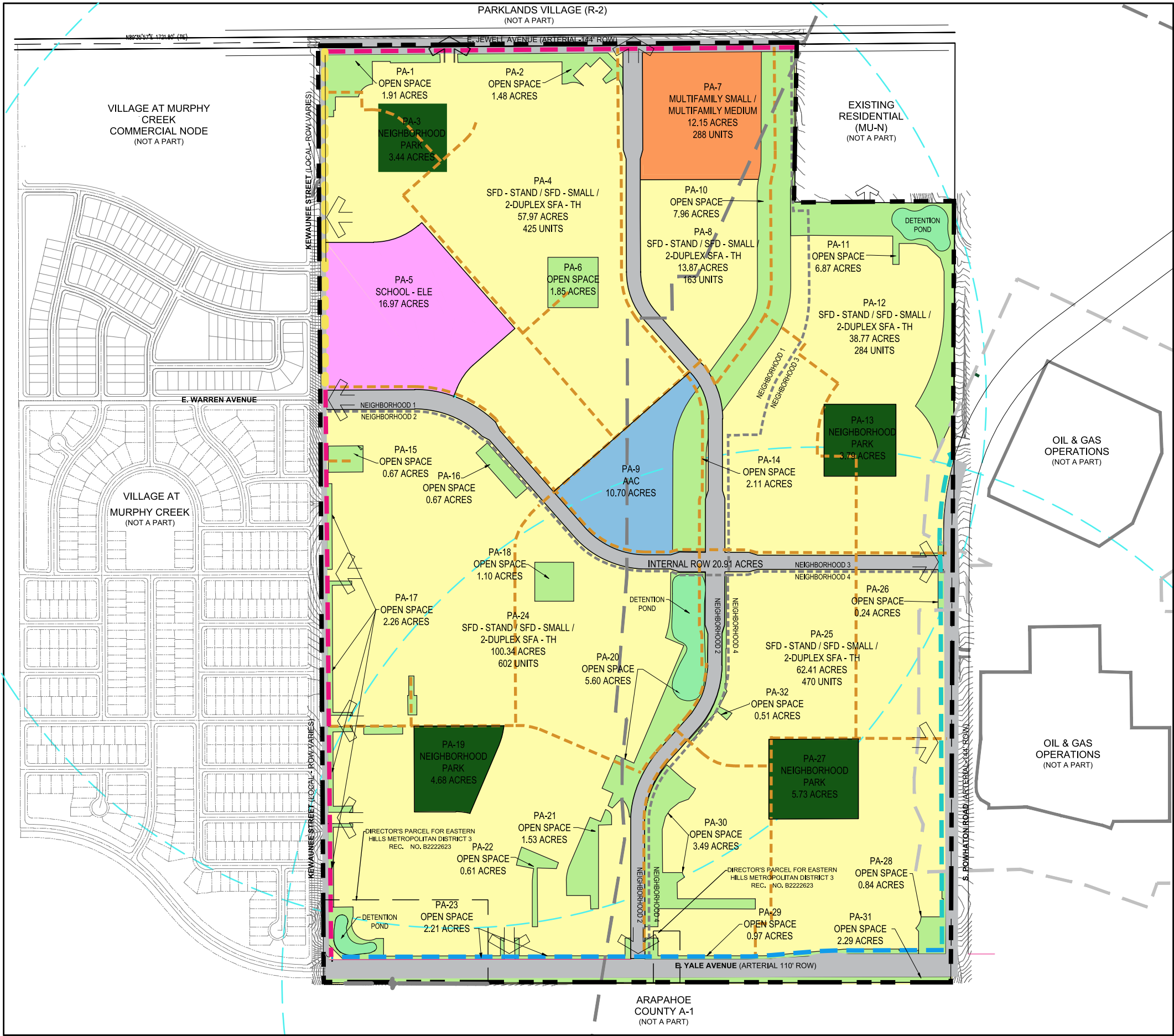
Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.68 %
Diameter	8.0 in
Discharge	0.09 cfs
Results	
Normal Depth	1.5 in
Flow Area	0.0 ft ²
Wetted Perimeter	0.6 ft
Hydraulic Radius	0.9 in
Top Width	0.52 ft
Critical Depth	1.6 in
Percent Full	18.7 %
Critical Slope	0.47 %
Velocity	2.00 ft/s
Velocity Head	0.06 ft
Specific Energy	0.19 ft
Froude Number	1.195
Maximum Discharge	1.27 cfs
Discharge Full	1.18 cfs
Slope Full	0.00 %
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	18.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.5 in
Critical Depth	1.6 in
Channel Slope	0.68 %
Critical Slope	0.47 %

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APPENDIX D Land Use Map

CHECKED BY: EM, DR
DRAWN BY: DJ



LEGEND

- PROPERTY BOUNDARY
- EXISTING/PROPOSED RIGHT OF WAY
- WHELEN SIREN SERVICE RADIUS
- NEIGHBORHOOD BOUNDARY
- PLANNING AREA BOUNDARY
- SINGLE FAMILY
- MULTIFAMILY
- OPEN SPACE/DETENTION
- NEIGHBORHOOD PARK
- RECREATION CENTER
- SCHOOL
- KEWAUNEE STREET/ E. JEWELL AVENUE TRAIL CORRIDOR (MIN. 10' WIDTH)
- KEWAUNEE STREET SIDEWALK (MIN. 5.5' WIDTH)
- YALE AVENUE TRAIL (MIN. 14' WIDTH)
- POWHATON ROAD TRAIL (MIN. 14' WIDTH)
- INTERNAL PEDESTRIAN CORRIDOR WITH 8' CONCRETE TRAIL (ENHANCED STREET SECTION WHERE ADJACENT TO STREET, MINIMUM 30' WIDE LANDSCAPED CORRIDOR OTHERWISE)

NOTES:
1) PLANNING AREAS NOTED AS RESIDENTIAL MAY INCLUDE THE FOLLOWING TYPES OF HOUSING: SINGLE-FAMILY DETACHED STANDARD (SFD-STAND), SINGLE-FAMILY DETACHED SMALL (SFD-SMALL), TWO-FAMILY (2-FAMILY), SINGLE-FAMILY ATTACHED TOWNHOMES (SF-TH) OR MULTI-FAMILY (MF-SMALL/MF-MED)

NORRIS DESIGN
Planning | Landscape Architecture | Project Presentation

1101 Bannock Street
Denver, Colorado 80204
P 303.882.1188
F 303.882.1188
www.norris-design.com

THE PARKLANDS
Master Plan - Aurora, Colorado

NOT FOR CONSTRUCTION

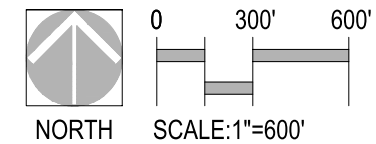
Owner: Century Homes

CIVIL ENGINEER:

Issue Date

Sheet Title
LAND USE MAP

Sheet Number
XX



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Appendix E Consultant Coordination Communication

Jason Mann

From: Farrell, Trey <Trey.Farrell@kimley-horn.com>
Sent: Thursday, January 19, 2023 8:43 AM
To: Jason Mann
Subject: FW: MCE Sanitary MUS
Attachments: Approved Murphy Creek East MUS - KH Markup (V2) - CVL Markup 6-7-2022 (002).pdf

CAUTION: External Email Alert!

FYI see below

From: Farrell, Trey
Sent: Thursday, October 20, 2022 12:06 PM
To: Benjamin Johnk <Benjamin.Johnk@Pulte.com>
Subject: FW: MCE Sanitary MUS

FYI – see below for the sewer coordination and updated markup that shows routing.

Thanks!

Trey Farrell, P.E. (AZ, CO, NM, UT)
Kimley-Horn | 4582 South Ulster Street, Suite 1500, Denver, CO 80237
Direct: (720) 464-1861 | Mobile: (303) 549-7255

From: Farrell, Trey
Sent: Wednesday, June 8, 2022 10:04 AM
To: daniel@dfrankinc.com; Pock, Jason J. <Jason.Pock@mdch.com>; Johnk, Benjamin <Benjamin.Johnk@mdch.com>; Glenn Nier <Glenn.Nier@PulteGroup.com>; Cory Hunsader <Cory.Hunsader@PulteGroup.com>; Allison Hibbs <ahibbs@planwest.com>
Cc: Connolly, Tamara <Tamara.Connolly@kimley-horn.com>; Kennedy, Haley <Haley.Kennedy@kimley-horn.com>
Subject: FW: MCE Sanitary MUS

Hey Team,

Please see the below analysis and attached PDF from Neil and his team at Westwood. Good news – our project is in compliance with the approved MUS.

Essentially, Murphy Creek East can accommodate all of our wastewater flows without triggering an upsizing. The 481 total lots mentioned below include 309 PA-5 lots, 72 PA-8 duplex lots (no longer proposed), and 100 future Eastern Hills lots (Century). We do need to reduce this 481 lots by 22 per Neil's note below, but that can easily be done by the removal of PA-8 and/or a reduction of Century's allowable lots.

Century originally communicated they would like to send ~70-80 lots, so the 100 lots I provided to Westwood was slightly conservative.

Please feel free to give me a call to discuss if needed – thanks!

Trey Farrell, P.E. (AZ, CO, NM, UT)
Kimley-Horn | 4582 South Ulster Street, Suite 1500, Denver, CO 80237
Direct: (720) 464-1861 | Mobile: (303) 549-7255