Per phone call on 12/17/19 with Sarah and Scott of CVL, please provide documentation from Villages at Murphy Creek ownership team(s) authorizing the modifications to basin boundaries and peak flow rates. Letter should also acknowledge that any future changes in density or use that results in an increase of flows will be that ownership team's responsibility to accommodate (i.e. up-sizing, paralleling, etc.). Please update all tables and reports as necessary, and include the documentation as an appendix to this report.

CVL Job No. 8.13.03237.01

AURORA, COLORADO

AMENDMENT TO THE MASTER UTILITY REPORT
URPHY CREEK EAST DEVELOPMENT

CVL has been in communication with the consulting team of Villages at Murphy Creek. CVL has incorporated their total number of units and flow rates that will need to flow through the Murphy Creek East development. Those updated flows are reflected in the sanitary sewer calculations.

Prepared for:
Lennar Corporation
Meridian Blvd., Suite 120
glewood, CO 80112
ontact: Joseph Huey
720.369.3835

Prepared by:
nsultants of Colorado, Inc.
10333 East Dry Creek Road, Suite 240
Englewood, Colorado 80112
Contact: Sarah Kolz
720.482.9526

Report Date:
November 2018
January 2019
Revised: March 2019
Revised: June 2019
Revised: November 2019

MASTER UTILITY STUDY
FOR
MURPHY CREEK EAST DEVELOPMENT

APPROVED FOR ONE YEAR FROM THIS DATE _____

_____

City Engineer **Date**

_____

Water Department **Date**

_____

Fire Department **Date**

ENGINEER'S STATEMENT:

This "Master Utility Study for Murphy Creek East Development" 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.

_____ _____

Jason Mann CO P.E. 42735 Date
CVL Consultants of Colorado, Inc.

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Introduction

General Description

The Murphy Creek East Development contains a total of 1,342 acres and is comprised primarily of residential construction. Additional uses include a golf course, schools, and commercial. The remaining areas are for roadways, detention/water quality ponds, drainage channels, parks, and open space located throughout the development.

Scope of Work

This report is an amendment to the previously submitted Master Utility Study for Murphy Creek Development approved in 2001. Modifications to this report pertain only to changes in the areas previously designated as Filings 8 and 9, which are included in the Murph Creek East Framework Development Plan (FDP). Items from the previous version of the study are shown here in italics. The purpose of this report is to update the designs for a water distribution system and sanitary sewer system as they pertain to the Murphy Creek East Development in support of the FDP. CVL Consultants of Colorado, Inc (CVL) will work in conjunction with the client and the City of Aurora (COA) to ensure that the water distribution and sanitary sewer systems are compatible with existing facilities and planned development.

Project Location

The 1,342-acre Murphy Creek development *comprises all of Section 30 and Section 19, T4S, R65W, 6* P.M. together with a 62 acre triangular portion of Section 24, T4S, R 66W, 6* P.M. adjacent to the west line of Section 19, north and east of Gun Club Road except the electrical transmission and roadway rights of way. The property is bounded on the south by E. Yale Ave., on the west by Gun Club Road, on north by E. Mississippi Ave., and on the east by Harvest Road.* Refer to Figure 1 below for the project location.

For the latest revision of the FDP and this report, Filings have been changed to coincide with the CSP, and future civil plans, see Figure 2 Location Map. Project phasing is discussed in more detail later in this report.

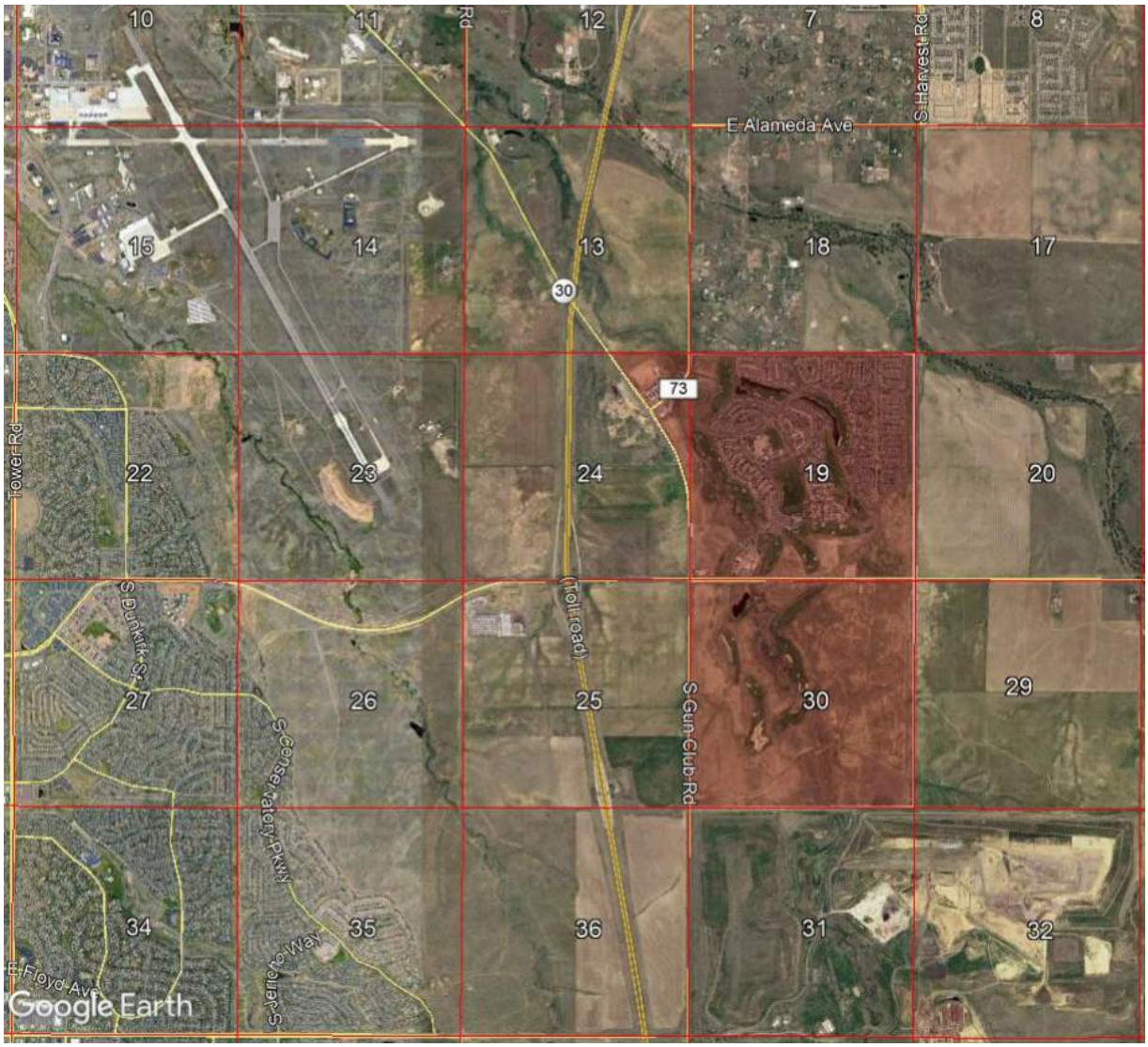


Figure-1
Vicinity Map

10333 East Dry Creek Road, Suite 240 | Englewood, Colorado 80112 | 720.482.9526 | www.cvlinc.net

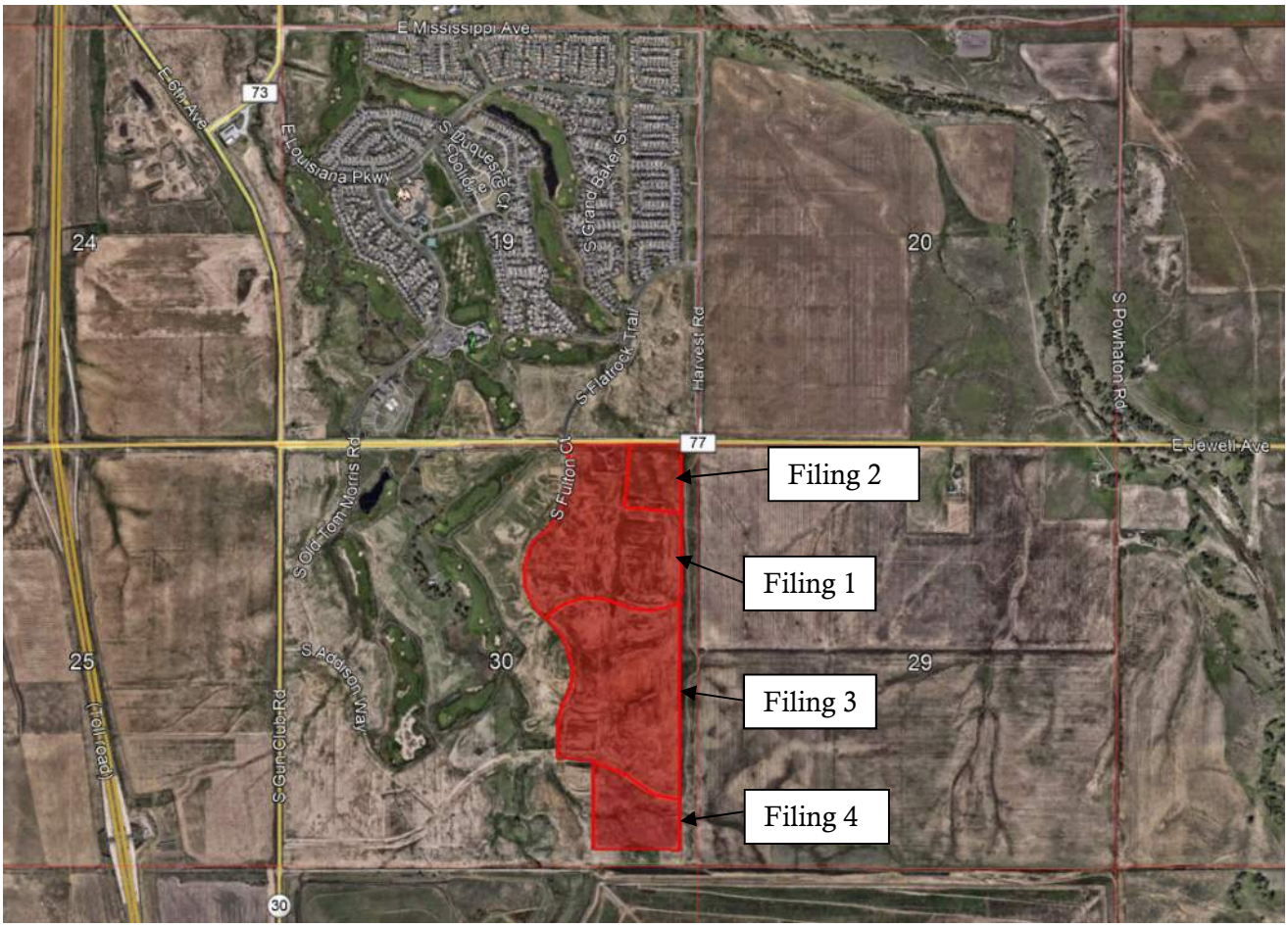


Figure-2
Location Map

Topographic Conditions

The development generally slopes from the southeast to the northwest as evidenced by the flow of Murphy Creek. *This stream divides the property by about 20% on the west bank and 80% on the east bank. The stream has a gradient of approximately 1 % flowing to the north. The ground slopes down to the creek at approximately 1% on the west bank and 1.5% on the east bank. The highest contour is 5724 at E. Warren Place and Harvest Road. The lowest elevation is located at the north end of the project at E. Mississippi Ave and Gun Club Road. The elevation at that point is 5576. The two locations are approximately 2 miles apart and reflect the fact that the site is relatively flat. The major sanitary sewer mains follow the alignment of Murphy Creek.*

As mentioned above, the overall development consists of 1,342 acres and is roughly split in half by Jewell Avenue. The area north of Jewell is approximately 702 acres and is mostly developed. The area south of Jewell Avenue is approximately 640 acres and, with the exception of the golf course, is mostly undeveloped. Generally, the site slopes from south to north with the western and eastern sides sloping towards the center of the property as they drain into Murphy Creek.

More specifically, there is a highpoint between Filings 1 and 3 at the proposed location of Warren Place and Harvest Road. The northwest and southern portions of Filing 1 flow to the west before entering Murphy Creek. The northeast portion of Filing 1 flows north to an existing double 5'x5' box culvert. The highest elevation of Filing 1 is approximately 5720 at the southeast corner of the filing. The lowest portion of Filing 1 is approximately 5662, which is in the northwest portion of the site, roughly 600 feet south of Jewell Ave. The northwest portion of Filing 3 drains to the west, while the remainder of the area drains to the south before heading west and entering Murphy Creek. The highest point of Filing 3 is approximately 5722 which is at the northeast corner of the filing. The lowest point is approximately 5660 and is at the southwest corner of the site. The site drops approximately 60 feet from the east to the northwest and southwest. Since these areas have been previously rough-graded, these elevations are anticipated to be close to the final grades of the site.

Based on the ***City of Aurora's Integrated Water Master Plan (IWMP)***, (Ref. 3) dated 2016, the proposed development is within pressure Zones 4 and 5. However, this analysis indicates that the entire development can be within Zone 4. Table 1 below presents the pressures provided for Zone 4.

Zone	Static Hydraulic Grade Line, (ft)	Site Elevation Range, (ft)	Static Pressure Range, (psig)
Zone 4	5850	5722-5656	56-84

Table 1 – City of Aurora Pressure Zone 4

Due to the topography described above, the Murphy Creek development is divided into four major sanitary sewer basins. As described in the previous report, Filings 1 and 3 fall within Basin 2. Filing 4 also falls within Basin 2, which will follow the same drainage pattern described in the previous report, flowing to the northwest and connecting to the existing sanitary main that crosses Jewell Ave midway between S. Old Tom Morris Road and S. Flatrock Trail. Filing 2 falls within Basin 4, which drains to the north ultimately connecting to the existing sanitary main in S. Flatrock Trail north of Jewell Ave.

Water Distribution System

Land Use and Population

The original report lists a total of 52 planning areas in the Murphy Creek development. Of those, 9 are located in Filings 1 and 3. The proposed areas include single family units and townhomes. Three of the planning areas in Filing 3 are now planned to be used for a school and a park. A land use-by-acre tabulation is shown in Table 2. Population estimates are based on 2.77 capita per dwelling unit for both single family detached (SFD) and single family attached-units (SFA). These population densities were adopted from the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4).

Land Use	Area (Acres)	Max DU/Acre	Max Total DU'S*	Max Res. Population
Single Family Attached	30.2	9	269	745
Single Family Detached	116.2	5	631	1748
TOTALS	146.4	N/A	900	2493

Table 2 – Land Use and Population Estimates

*Note: per approved FDP, issued 4/16/01, revised 7/16/01 and 8/20/01

As previously stated, only the areas in Filings 1 and 3 have been modified from the previous report. The modification to the proposed land usage is shown in Table 3.

Land Use	Previous Number of Units	Proposed Number of Units	Percent Change	
Multi-Family[1,2]	519	269	48.2%	Decrease
Single Family Detached	470	541	15.1%	Increase
TOTALS	989	810	18.1%	Decrease

Table 3 - Modifications in Filings 1 and 3

1. Filings 1 and 3 contain no Multi-Family housing. Multi-Family units are contained within Filings 2 and 4.
2. Multi-family includes Single Family Attached units and townhouses.

Water Design Criteria

This section describes the design criteria incorporated in developing the water distribution system for the proposed development. These design criteria were adopted from the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure*** (Ref. 2) and the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4).

Demands

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

- Single Family Average Day demand = 101 gpcd
- Multi Family Average Day demand = 101 gpcd
- School Average Day Demand = 0.1 gpm/capita
- Single Family Max Day Factor = 2.8 x average day demand
- Single Family Peak Hour Factor = 4.5 x average day demand
- Multi Family Max Day Factor = 2.8 x average day demand
- Multi Family 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

Pressures

The system has been analyzed to meet the maximum day plus fire flow demand with a residual pressure of no less than 20 psig at any point in the water distribution system.

Distribution System

The following constraints will be used to model the water distribution system:

- Max Hour Velocity for 6-inch line = 2.5 fps
- Max Hour Velocity for 8-12-inch line = 3 fps
- Max Hour Velocity for 16-24-inch = 4.5 fps
- Max Hour Velocity for >24-inch = 7.8 fps
- Residential Fire Flow = 1500 gpm
- Multifamily Fire Flow = 2500gpm
- Hazen Williams Coefficient, C = 150
- Sufficient looping will be incorporated to minimize the effects of main breaks

Existing Infrastructure and Supply

Murphy Creek is located in the City of Aurora's service area. All potable water will be supplied by the City of Aurora's water distribution system. The proposed water distribution system will connect to the COA's system in several locations.

Water Demands

The summary of water demands calculated for the proposed water distribution system is presented in Table 4. As stated previously within this report, the demands were determined using assumptions and requirements outlined in the ***Murphy Creek Master Utilities Report*** (Ref. 1), the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure*** (Ref. 2), and the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4). The residential populations were based on 2.77 persons per single family detached dwelling unit and single family attached townhomes. Average day demands were calculated from developable acreage, population density, dwelling units per acre, and the average water demand rate. Maximum day and peak hour demands were calculated using the peaking factors shown above. For more detailed demand calculations please refer to Appendix A.

Land Use	Area (acres)	Units	Average Day (gpm)	Max Day (gpm)	Max Hour (gpm)
SFD	116	541	105	294	473
SFA	30	269	52	146	235
School (700 Students)*	10	1	49	137	221
Total	**156**	**810**	**206**	**578**	**929**

*This report uses a conservative approach of calculating demand based on student population rather than school acreage.

Table 4 – Water Demand Summary

Onsite Water Facilities

Filings 7, 1 and 4 have been rough-graded with water lines installed in South Flatrock Trail, East Warren Place, and East Yale Ave. Water lines serving the site will connect to these existing lines and will be sized to accommodate peak flow requirements for each planning area at full build-out based on the land use and population estimates described in this report. A 12" connection will be provided in S. Harvest Road from the existing 8" line in E. Atlantic Dr to the existing 16" line in E. Yale Ave. A preliminary water distribution system layout is shown in

Appendix A of this report (see Exhibit WL1). The minimum line sizes are based on this layout. If the distribution system is developed differently from that shown, line sizes may change. This Master Utility Amendment and accompanying WaterGEMS model should be updated if alignments, layouts, or planning estimates change.

Offsite Water Facilities

Several offsite areas are accounted for in this report to ensure adequate capacity and compliance with the previously approved report. These areas are shown on Exhibit WL1. The demands in these areas have been calculated using current criteria and are detailed in the appendix.

There will be additional offsite demands for the Villages at Murphy Creek development to the east. Refer to the ***Master Utility Report for Villages at Murphy Creek*** (Ref. 5). These demands have been provided by the developer and are accounted for in the calculations in the appendix.

Phasing

Construction of the water facilities will begin during Phase 1Filings 1 and 2 and extend south to Filings 3 and 4 to support the development of Phase 2. Refer to Exhibit WL2 in Appendix A for project phasing.

Modeling Criteria

The modeling criteria incorporated in the water distribution system network analysis was adopted from ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure*** (Ref. 2) and the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4) and is shown in detail earlier in this report.

Network Analysis

Flows were allocated to each node (pipe junction of external demand) based on tributary areas mapped to each node within the site. Demands were then determined by land use and unit counts, and distributed across the nodes within the respective planning areas. The water supply connections were modeled as reservoirs (see Exhibit W1). The hydraulic grades for these reservoirs were taken from the ***City of Aurora's Integrated Water Master Plan***, dated 2016.

The model was analyzed, and several scenarios were computed to match the design criteria. Final pipe sizing was based on the results of this analysis. A roughness coefficient of 150 (Hazen-Williams C value) was used for all simulations. A fire flow of 1,500 gpm was assigned to every node servicing single-family residential areas. A fire flow of 2,500 gpm was assigned to every node servicing multi-family residential areas. The system was then evaluated for fire flow as required by the COA. Output tables for each modeled scenario can be found in Appendix A.

Within the model, several cases were included to fully analyze how peak flows and fire demands will affect the system.

The general cases are as follows:

1. Average Day Demand (AD)

2. Maximum Day Demand (MD)
3. Maximum Hour Demand (MH)
4. Maximum Day Demand with coincident fire flow (MD+FF)

Input Parameters of the water distribution system modeled above include the following:

1. Pipe Diameters (inches)
2. Pipe Lengths (feet)
3. Node Elevations (feet)
4. System Demands (as outlined above)
5. Fire Flows (1,500 gpm for SFD and 2,500 pgm for SFA)
6. Pipe Friction Coefficient, C = 150

Output Parameters Include:

1. Velocities (fps)
2. Pressure (psig)
3. Head Loss (feet)
4. Flow Rates (gpm)

Modeling Results

The results of the WaterGEMS analysis for the proposed planning areas are presented in Appendix A. This analysis represents the proposed water distribution system, including node locations, pipe locations and pipe sizes that serve the project site. See Table 5 for a summary of the WaterGEMS analysis.

Scenario		Minimum Pressure		Maximum Pressure		Maximum	Pipe
		(psig)	Node	(psig)	Node	Velocity (fps)	ID
1	AD	56	J-27, J-28	84	J-4, J-13	0.52	P-9
2	MD	56	J-27, J-28	84	J-4, J-13	1.45	P-9
3	MH	56	J-27, J-28	84	J-4, J-13	2.32	P-9
4	MD+FF (All Demand Nodes)	54	J-27, J-28	83	J-4, J-13	11.71	P-84

Table 5 – Results of WaterGEMS Analysis
(See Appendix A for detailed output)

Sanitary Sewer System

Land Use and Population

As mentioned above, the Murphy Creek development has a total of 52 residential planning areas (per the original Master Utility Study). Of these, 9 are contained within Filings 1 and 3. The proposed areas include single and multi-family residential units, parks, and a school site. A use-by-acre tabulation of land use is shown in Table 2 above. Population estimates are based on 2.77 capita per dwelling unit for both single-family detached and single-family attached units per ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4). The land use table is a combination of updated Filings 2 and 3, new Filings 2 and 4, and existing information from the

Master Utilities Report for Murphy Creek (Ref. 1) prepared by Costin Engineering Consultants, Inc.

Existing Sewer Basins

The planned sewer collection for the site is split into four separate service basins. Filings 1 and 3 fall within Basin 2, as noted in the ***Master Utilities Report for Murphy Creek*** (Ref. 1). Planning area 31 (Filing 2) is the exception, which drains to Basin 4. Portions of the sanitary system have been installed throughout Filings 7, 1 and 3 with intermittent connectivity. The majority of the system north of Jewell Ave has been installed, which is what the system in Murphy Creek East will connect to. Per the previous report, this system has been sized to accept the flows from the Murphy Creek East development. As shown in the previous report, all basins converge at the northwest corner of the development near E Mississippi Ave and S Gun Club Road.

Wastewater Design Criteria

This section describes the design criteria used to develop the wastewater collection system. These design criteria were adopted from the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4):

- Population –2.77 people per SFD and SFA.
- Average Daily Flow – 68 gpcd for residential areas, and 10 gpcd for schools.
- Peaking Factor (PF) = $5 \div p^{0.167}$, where p = population in thousands and PF is no greater than 4.0 and no less than 1.7.
- The flow velocity shall not exceed ten (10) fps flowing full or ½ full using Manning's Formula and (n=0.011 for PVC) or (n=0.013 for RCP). Minimum slope shall be 0.4% with a minimum velocity of two (2) fps at least once per day.
- Depth of flow in pipes should not exceed 75% of capacity for pipes 12 inches or smaller and 80% for pipes larger than 12 inches.
- Minimum drop through a manhole from inlet to outlet or same diameter pipe shall be:
    1. 0.2 ft. on straight through run
    2. 0.3 ft. on deflected bends greater than 45 degrees.
- Minimum of diameter pipe for service lines is 4 inches.

Wastewater Demands

Per the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4), average day wastewater generation rates are 68 gallons per capita per day (gpcd) for residential areas and 10 gpcd for schools. Peak Flow factors are based on population. Please refer to Appendix B for detailed wastewater generation calculations.

Existing Infrastructure

Wastewater Collection

As noted above, the wastewater collection infrastructure north of Jewell has been installed. Portions of the sanitary system south of Jewell Ave have been installed with limited connectivity. There is an existing 12" PVC pipe crossing Jewell Ave midway between S. Old Tom Morris Road and S. Flatrock Trail. This line will be extended south through Planning Area

20 where it will connect to the 12" PVC pipe crossing the golf course. From there it will be extended through Filing 7 to collect flows from Filings 1, 3, and 4. Other portions of the sanitary system were installed during rough-grading operations for Filings 7, 1 and 3 including a section in E. Warren Place and a section in S. Flatrock Trail north of E. Yale Ave. An 8" PVC pipe was also installed across Jewell Ave just west of South Harvest Road to service Planning Area 31. This pipe does not connect to any other pipes north of Jewell Ave at this time and will need to be connected to the existing system in S. Flatrock Trail north of Jewell.

Proposed Wastewater Facilities

Onsite Facilities

The proposed onsite wastewater collection infrastructure is designed to serve the Murphy Creek East Development. The onsite collection system will consist of 8" PVC gravity sewer lines running internal to the project development. They will connect to the existing portions of the sanitary system that were installed during rough-grading operations (See Exhibit SS1). Preliminary sewer design calculations are shown in Appendix B of this report.

Offsite Facilities

As stated above, portions of the sanitary system south of Jewell Ave were installed during the rough-grading of Filings 7, 1 and 3. Because the majority of the site is included in Basin 2, which drains northwest through the golf course, the existing sections of the system will need to be connected and extended through Planning Area 28 (Filing 7) and into Planning Area 20 (See Exhibit SS1).

Additionally, the existing 8" PVC sanitary line crossing Jewell Ave to collect flows for Planning Area 31 will need to be extended north through Planning Area 14 to connect to the existing manhole in S. Flatrock Trail.

Planning Area 26 is not a part of the Filing 3 but is accounted for in this report to ensure adequate capacity. A population of 2.77 persons per multi-family unit was used for this area. Similarly, Planning Area 14 is not a part of Filing 1 but is accounted for in this report. A population of 2.77 persons per multi-family unit was used for the area as well.

There is existing sanitary sewer infrastructure on-site which will be utilized if the integrity of the manholes and pipes has not been compromised, there are portions of this existing system filled with water. Demolition of existing facilities should be minimal as the flow patterns are generally being maintained from the original development plans. Downstream lines will be sized for future development per the previously approved Master Utility Study and existing line capacities are confirmed in the calculations attached to this report.

Comparing 2001 flows to proposed yields increased flows at DP20 (Basin 2) and DP31 (Basin 4). Flows from DP20 increased from 1.57cfs to 1.78cfs (PF included), this 0.21cfs has been added to Basin 2. The Villages at Murphy Creek (Ref. 5) development to the east will need to route sanitary flows through the Murphy Creek East development. Refer to Exhibit V-1 for the approximate basin delineations. The sanitary demands have been provided by the developer and are accounted for in the calculations in the appendix. DP31 flows increased from 0.18cfs to

0.49cfs (PF included). The additional 0.31cfs has been added to Basin 4 in addition to Basin 2 increased flows 0.21cfs. A summary of the increased loading on the downstream system is shown in Table 6 below. Proposed flows are cumulative and unrouted making them higher than is to be expected. All pipes are still within capacity (under 75% for pipes up to 12", under 80% 12" and over).

Basin	Previous MUS Flows (cfs)	Proposed Flows (cfs)
1+2	4.45	4.66
2+3	5.13	5.34
3+4	6.47	6.99

Table 6 – Summary of Proposed Sanitary Loading Increases
(See Appendix A for detailed calculations)

Phasing

Construction of the sanitary system will be phased with construction beginning in Filings 1 and 2, which will be developed concurrently. The system will be extended to the south as Filings 3 and 4 come online, which will also be developed concurrently. The sanitary system will incorporate the existing facilities that were previously installed to the extent possible. Refer to Exhibit SS2 in Appendix B for project phasing.

Conclusion

Much of the water distribution system was installed during the rough-grading of Filings 7. The remaining portions of the system to be built are interior to Filings 1 and 3. They will connect to the existing Zone 4 water system at several points in S. Flatrock Trail, E. Warren Place, and E. Yale Ave as required for the development of each phase.

The results of the system analysis indicate that the proposed water system conforms to the ***Master Utility Study for Murphy Creek Development*** (Ref. 1), the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure*** (Ref. 2), and the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4). Any subsequent changes to the proposed water distribution system as described within this report will require a reanalysis of the system. The Appendix contains the WaterGEMS results and layout exhibit.

The sanitary sewer system for Murphy Creek East serves Filings 1, 3 and 4, and connects to the system that serves the rest of the Murphy Creek Development. The results of the system analysis indicate that the proposed sanitary sewer system conforms to the ***Master Utility Study for Murphy Creek Development*** (Ref. 1), the ***Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure*** (Ref. 2), and the ***Master Utility Design Criteria for Water and Sanitary Sewer*** (Ref. 4). The Appendix contains the anticipated sewer flow results and layout exhibits.

References

1. **Master Utility Study for Murphy Creek Development,** Costin Engineering Consultants, Inc., March, 29 2001. (COA# 201064)

2. **Standards and Specifications Regarding Water, Sanitary Sewer and Storm Drainage Infrastructure,** City of Aurora, January 2012.

3. **Integrated Water Master Plan,** City of Aurora, 2016.

4. **Master Utility Design Criteria for Water and Sanitary Sewer,** City of Aurora, April 19, 2018.

5. **Master Utility Report for Villages at Murphy Creek**, Peak Civil Consultants, revised May 2006. (COA #206105).

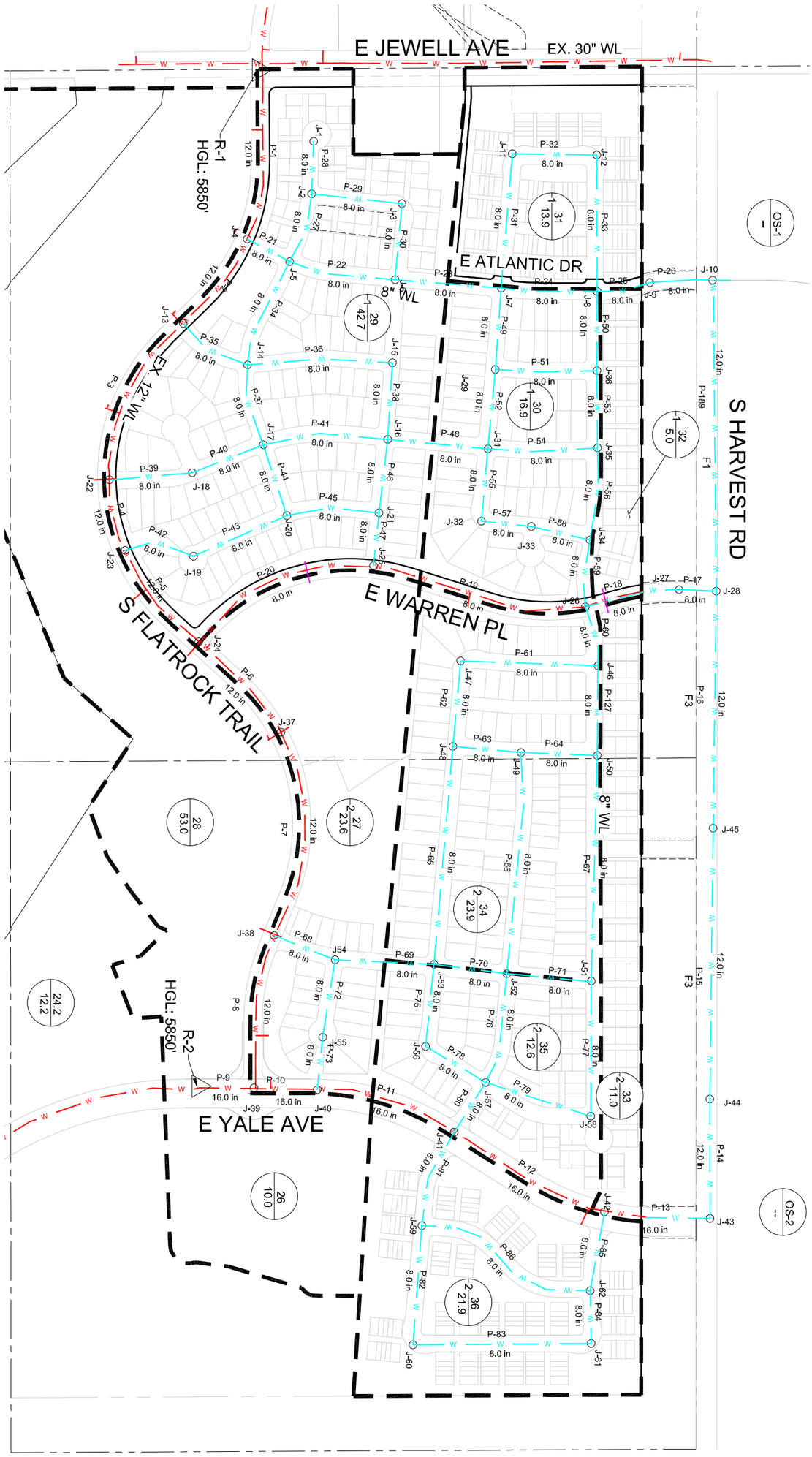
Appendix A

Water Distribution Demands and WaterGEMS Results

MURPHY CREEK
CITY OF AURORA
WATER CALCULATIONS

Basin/Planning Area	Node	Use	Single Family Detatched		Townhomes (Single Family Attached)		Other		Total Population	Average Day (GPM)	Max Day (GPM)	Max Hour (GPM)	Required Fire Flow (GPM)	Max Day + Fire Flow (GPM)	Number of Nodes/Notes	Combined Demand	Combined Avg. Day Demand to Each Node	Combined Max Day Demand 2.8	Combined Max Hour 4.5
			Units	Population (DU*2.77)	Units	Population (DU*2.77)	Units	Population											
24.2	J-39	SFA		0	246	681.42			681	47.79	133.82	215.07	2500.00	2633.82					
26	J-39	SFA		0	202	559.54			560	39.25	109.89	176.60	2500.00	2609.89					
27		SFD, School	20	55.4		0	1	700	755	52.98	148.35	238.42	2500.00	2648.35	2	52.98	26.49	74.18	119.21
29		SFD	171	473.67		0			474	33.22	93.02	149.50	1500.00	1593.02	13	33.22	2.56	7.16	11.50
30		SFD	61	168.97		0			169	11.85	33.18	53.33	1500.00	1533.18	7	20.01	2.86	8.00	12.86
31		SFA		0	119	329.63			330	23.12	64.74	104.04	2500.00	2564.74	4	23.12	5.78	16.18	26.01
32		SFD	42	116.34		0			116	8.16	22.85	36.72	1500.00	1522.85	Combine w/ 30				
33		SFD	81	224.37		0			224	15.74	44.06	70.82	1500.00	1544.06	11	47.99	4.36	12.22	19.63
34		SFD	100	277		0			277	19.43	54.40	87.43	1500.00	1554.40	Combine w/ 33, 35				
35		SFD	66	182.82		0			183	12.82	35.90	57.70	1500.00	1535.90	Combine w/ 33, 34				
36		SFA		0	150	415.5			416	29.14	81.60	131.14	2500.00	2581.60	4	29.14	7.29	20.40	32.79
28.A	J-4	SFD	83	229.91		0			230	16.13	45.15	72.57	1500.00	1545.15					
28.B	J-24	SFD	73	202.21		0			202	14.18	39.71	63.82	1500.00	1539.71					
OS-1	J-10	SFD/SFA	227	628.79	114	315.78			945	66.25	185.50	298.13	2500.00	2685.50					
OS-2	J-43	SFD	224	620.48		0			620	43.52	121.86	195.84	1500.00	1621.86					

Note: SFD = Single Family Detached, SFA = Single Family Attached



LEGEND

- SERVICE AREA ACRES
- Z= PHASE
- POINT OF WATER CONNECTION TO CITY OF AURORA SERVICE
- PROPOSED WATER LINE
- EXISTING WATER LINE
- SERVICE AREA BOUNDARY
- JUNCTION
- EXISTING WATER LINE TO BE REMOVED

SCALE: 1" = 200'

200 100 0 200 400

SHEET NUMBER: WL1	DRAWN BY: SCL	SCALE: AS SHOWN	MURPHY CREEK EAST SUBDIVISION MASTER UTILITY REPORT WATER MODEL LAYOUT	LENNAR CORPORATION 9781 S. MERIDIAN BLVD., SUITE 120 ENGLEWOOD, CO 80112 TEL: (303)-754-0600	CVL CONSULTANTS 10333 E. Dry Creek Rd Suite 240 Englewood, CO 80112 Tel: 720-482-9526 CVLINC.NET	No.	Revisions	Date	Init.
	CHECKED BY: SJK	FILE NO: 8130323701							
	DATE: JUNE 2019								

SHEET NUMBER: WL2	DRAWN BY: CAA	SCALE: AS SHOWN	MURPHY CREEK EAST SUBDIVISION MASTER UTILITY REPORT WATER MODEL LAYOUT	LENNAR CORPORATION 9781 S. MERIDIAN BLVD., SUITE 120 ENGLEWOOD, CO 80112 TEL: (303)-754-0600	CVL CONSULTANTS 10333 E. Dry Creek Rd Suite 240 Englewood, CO 80112 Tel: 720-482-9526 CVLINC.NET	No.	Revisions	Date	Init.	Appr.	Date
	CHECKED BY: SJK	FILE NO: 8130323701									
	DATE: JUNE 2019										

FlexTable: Pipe Table

Active Scenario: AVERAGE DAY

Label	Start Node	Length (Scaled) (ft)	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	R-1	661	J-4	12.0	PVC	150.0	103	0.29
P-2	J-4	412	J-13	12.0	PVC	150.0	48	0.14
P-3	J-13	689	J-22	12.0	PVC	150.0	26	0.07
P-4	J-22	281	J-23	12.0	PVC	150.0	12	0.03
P-5	J-23	457	J-24	12.0	PVC	150.0	-2	0.01
P-6	J-24	471	J-37	12.0	PVC	150.0	-31	0.09
P-7	J-37	816	J-38	12.0	PVC	150.0	-31	0.09
P-8	J-38	594	J-39	12.0	PVC	150.0	-65	0.18
P-9	R-2	203	J-39	16.0	PVC	150.0	330	0.53
P-10	J-39	243	J-40	16.0	PVC	150.0	178	0.28
P-11	J-40	560	J-41	16.0	PVC	150.0	138	0.22
P-12	J-41	655	J-42	16.0	PVC	150.0	85	0.14
P-13	J-42	408	J-43	16.0	PVC	150.0	75	0.12
P-14	J-43	458	J-44	12.0	PVC	150.0	32	0.09
P-15	J-44	1,038	J-45	12.0	PVC	150.0	32	0.09
P-16	J-45	909	J-28	12.0	PVC	150.0	32	0.09
P-17	J-27	143	J-28	8.0	PVC	150.0	13	0.08
P-18	J-26	367	J-27	8.0	PVC	150.0	13	0.08
P-19	J-25	839	J-26	8.0	PVC	150.0	17	0.11
P-20	J-24	769	J-25	8.0	PVC	150.0	15	0.09
P-21	J-5	184	J-4	8.0	PVC	150.0	-40	0.25
P-22	J-5	413	J-6	8.0	PVC	150.0	20	0.13
P-23	J-6	408	J-7	8.0	PVC	150.0	27	0.17
P-24	J-7	369	J-8	8.0	PVC	150.0	14	0.09
P-25	J-8	207	J-9	8.0	PVC	150.0	22	0.14
P-26	J-9	257	J-10	8.0	PVC	150.0	22	0.14
P-27	J-2	277	J-5	8.0	PVC	150.0	-17	0.11
P-28	J-2	201	J-1	8.0	PVC	150.0	3	0.02
P-29	J-3	348	J-2	8.0	PVC	150.0	-12	0.08
P-30	J-6	293	J-3	8.0	PVC	150.0	-9	0.06
P-31	J-11	516	J-7	8.0	PVC	150.0	-11	0.07
P-32	J-12	324	J-11	8.0	PVC	150.0	-5	0.03
P-33	J-8	523	J-12	8.0	PVC	150.0	1	0.00
P-34	J-5	432	J-14	8.0	PVC	150.0	0	0.00
P-35	J-14	302	J-13	8.0	PVC	150.0	-22	0.14
P-36	J-15	556	J-14	8.0	PVC	150.0	-12	0.07
P-37	J-14	318	J-17	8.0	PVC	150.0	8	0.05
P-38	J-16	295	J-15	8.0	PVC	150.0	-9	0.06
P-39	J-22	318	J-18	8.0	PVC	150.0	14	0.09
P-40	J-17	293	J-18	8.0	PVC	150.0	-12	0.07
P-41	J-17	482	J-16	8.0	PVC	150.0	13	0.08
P-42	J-19	278	J-23	8.0	PVC	150.0	-14	0.09
P-43	J-20	390	J-19	8.0	PVC	150.0	-11	0.07
P-44	J-17	286	J-20	8.0	PVC	150.0	4	0.03
P-45	J-20	357	J-21	8.0	PVC	150.0	13	0.08
P-46	J-21	284	J-16	8.0	PVC	150.0	8	0.05
P-47	J-21	203	J-25	8.0	PVC	150.0	3	0.02

FlexTable: Pipe Table

Active Scenario: AVERAGE DAY

Label	Start Node	Length (Scaled) (ft)	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-48	J-16	386	J-31	8.0	PVC	150.0	27	0.17
P-49	J-7	312	J-29	8.0	PVC	150.0	-4	0.03
P-50	J-8	303	J-36	8.0	PVC	150.0	-14	0.09
P-51	J-29	390	J-36	8.0	PVC	150.0	6	0.04
P-52	J-29	306	J-31	8.0	PVC	150.0	-13	0.08
P-53	J-36	296	J-35	8.0	PVC	150.0	-11	0.07
P-54	J-31	421	J-35	8.0	PVC	150.0	7	0.05
P-55	J-31	279	J-32	8.0	PVC	150.0	4	0.03
P-56	J-35	355	J-34	8.0	PVC	150.0	-7	0.04
P-57	J-32	192	J-33	8.0	PVC	150.0	1	0.01
P-58	J-33	231	J-34	8.0	PVC	150.0	-2	0.01
P-59	J-34	258	J-26	8.0	PVC	150.0	-11	0.07
P-60	J-26	234	J-46	8.0	PVC	150.0	-7	0.04
P-61	J-46	527	J-47	8.0	PVC	150.0	-3	0.02
P-62	J-47	329	J-48	8.0	PVC	150.0	-8	0.05
P-63	J-48	262	J-49	8.0	PVC	150.0	-1	0.01
P-64	J-49	293	J-50	8.0	PVC	150.0	4	0.02
P-65	J-48	838	J-53	8.0	PVC	150.0	-11	0.07
P-66	J-49	851	J-52	8.0	PVC	150.0	-9	0.06
P-67	J-50	865	J-51	8.0	PVC	150.0	-9	0.05
P-68	J-54	251	J-38	8.0	PVC	150.0	-34	0.22
P-69	J-53	380	J-54	8.0	PVC	150.0	-21	0.14
P-70	J-52	281	J-53	8.0	PVC	150.0	-10	0.06
P-71	J-51	327	J-52	8.0	PVC	150.0	-6	0.04
P-72	J-54	301	J-55	8.0	PVC	150.0	-14	0.09
P-73	J-55	201	J-40	8.0	PVC	150.0	-41	0.26
P-75	J-53	316	J-56	8.0	PVC	150.0	-4	0.02
P-76	J-57	430	J-52	8.0	PVC	150.0	11	0.07
P-77	J-58	579	J-51	8.0	PVC	150.0	6	0.04
P-78	J-56	268	J-57	8.0	PVC	150.0	-8	0.05
P-79	J-57	310	J-58	8.0	PVC	150.0	11	0.07
P-80	J-57	226	J-41	8.0	PVC	150.0	-34	0.21
P-81	J-41	387	J-59	8.0	PVC	150.0	19	0.12
P-82	J-59	458	J-60	8.0	PVC	150.0	8	0.05
P-83	J-60	682	J-61	8.0	PVC	150.0	0	0.00
P-84	J-61	202	J-62	8.0	PVC	150.0	-7	0.04
P-85	J-62	307	J-42	8.0	PVC	150.0	-10	0.06
P-86	J-62	730	J-59	8.0	PVC	150.0	-4	0.03
P-127	J-50	344	J-46	8.0	PVC	150.0	8	0.05
P-189	J-10	1,189	J-28	12.0	PVC	150.0	-44	0.13

FlexTable: Junction Table

Active Scenario: AVERAGE DAY

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,664.03	3	5,849.97	80
J-2	5,661.85	3	5,849.97	81
J-3	5,671.20	3	5,849.97	77
J-4	5,656.91	16	5,849.98	84
J-5	5,660.16	3	5,849.97	82
J-6	5,672.52	3	5,849.97	77
J-7	5,686.42	6	5,849.96	71
J-8	5,682.14	6	5,849.96	73
J-9	5,686.20	0	5,849.96	71
J-10	5,688.06	66	5,849.96	70
J-11	5,674.10	6	5,849.96	76
J-12	5,668.90	6	5,849.96	78
J-13	5,656.02	0	5,849.98	84
J-14	5,666.42	3	5,849.97	79
J-15	5,680.16	3	5,849.97	73
J-16	5,687.70	3	5,849.97	70
J-17	5,674.05	3	5,849.97	76
J-18	5,681.41	3	5,849.97	73
J-19	5,688.57	3	5,849.97	70
J-20	5,682.40	3	5,849.97	73
J-21	5,691.44	3	5,849.97	69
J-22	5,672.45	0	5,849.98	77
J-23	5,673.32	0	5,849.98	76
J-24	5,669.13	14	5,849.98	78
J-25	5,695.15	0	5,849.97	67
J-26	5,715.76	0	5,849.97	58
J-27	5,719.43	0	5,849.96	56
J-28	5,720.86	0	5,849.96	56
J-29	5,692.29	3	5,849.96	68
J-31	5,698.69	3	5,849.96	65
J-32	5,701.83	3	5,849.96	64
J-33	5,704.71	3	5,849.96	63
J-34	5,708.37	3	5,849.96	61
J-35	5,697.75	3	5,849.96	66
J-36	5,688.99	3	5,849.96	70
J-37	5,673.82	0	5,849.98	76
J-38	5,665.19	0	5,849.98	80
J-39	5,660.34	87	5,849.99	82
J-40	5,671.04	0	5,849.98	77
J-41	5,686.08	0	5,849.98	71
J-42	5,693.68	0	5,849.97	68
J-43	5,695.02	44	5,849.97	67
J-44	5,716.02	0	5,849.97	58
J-45	5,713.79	0	5,849.97	59
J-46	5,713.55	4	5,849.97	59
J-47	5,703.74	4	5,849.97	63
J-48	5,697.85	4	5,849.97	66

FlexTable: Junction Table

Active Scenario: AVERAGE DAY

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-49	5,702.74	4	5,849.97	64
J-50	5,710.64	4	5,849.97	60
J-51	5,703.22	4	5,849.97	63
J-52	5,694.01	4	5,849.97	67
J-53	5,681.95	4	5,849.97	73
J-54	5,670.21	26	5,849.97	78
J-55	5,666.91	26	5,849.98	79
J-56	5,685.39	4	5,849.97	71
J-57	5,689.19	4	5,849.97	70
J-58	5,694.74	4	5,849.97	67
J-59	5,673.57	7	5,849.97	76
J-60	5,666.75	7	5,849.97	79
J-61	5,683.54	7	5,849.97	72
J-62	5,684.22	7	5,849.97	72

FlexTable: Pipe Table

Active Scenario: MAX DAY (AVG x 2.8)

Label	Start Node	Length (Scaled) (ft)	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	R-1	661	J-4	12.0	PVC	150.0	290	0.82
P-2	J-4	412	J-13	12.0	PVC	150.0	134	0.38
P-3	J-13	689	J-22	12.0	PVC	150.0	72	0.20
P-4	J-22	281	J-23	12.0	PVC	150.0	33	0.09
P-5	J-23	457	J-24	12.0	PVC	150.0	-6	0.02
P-6	J-24	471	J-37	12.0	PVC	150.0	-87	0.25
P-7	J-37	816	J-38	12.0	PVC	150.0	-87	0.25
P-8	J-38	594	J-39	12.0	PVC	150.0	-181	0.51
P-9	R-2	203	J-39	16.0	PVC	150.0	924	1.48
P-10	J-39	243	J-40	16.0	PVC	150.0	500	0.80
P-11	J-40	560	J-41	16.0	PVC	150.0	386	0.62
P-12	J-41	655	J-42	16.0	PVC	150.0	238	0.38
P-13	J-42	408	J-43	16.0	PVC	150.0	210	0.34
P-14	J-43	458	J-44	12.0	PVC	150.0	88	0.25
P-15	J-44	1,038	J-45	12.0	PVC	150.0	88	0.25
P-16	J-45	909	J-28	12.0	PVC	150.0	88	0.25
P-17	J-27	143	J-28	8.0	PVC	150.0	36	0.23
P-18	J-26	367	J-27	8.0	PVC	150.0	36	0.23
P-19	J-25	839	J-26	8.0	PVC	150.0	48	0.31
P-20	J-24	769	J-25	8.0	PVC	150.0	41	0.26
P-21	J-5	184	J-4	8.0	PVC	150.0	-111	0.71
P-22	J-5	413	J-6	8.0	PVC	150.0	55	0.35
P-23	J-6	408	J-7	8.0	PVC	150.0	74	0.47
P-24	J-7	369	J-8	8.0	PVC	150.0	39	0.25
P-25	J-8	207	J-9	8.0	PVC	150.0	61	0.39
P-26	J-9	257	J-10	8.0	PVC	150.0	61	0.39
P-27	J-2	277	J-5	8.0	PVC	150.0	-47	0.30
P-28	J-2	201	J-1	8.0	PVC	150.0	7	0.05
P-29	J-3	348	J-2	8.0	PVC	150.0	-33	0.21
P-30	J-6	293	J-3	8.0	PVC	150.0	-26	0.17
P-31	J-11	516	J-7	8.0	PVC	150.0	-30	0.19
P-32	J-12	324	J-11	8.0	PVC	150.0	-14	0.09
P-33	J-8	523	J-12	8.0	PVC	150.0	2	0.01
P-34	J-5	432	J-14	8.0	PVC	150.0	1	0.00
P-35	J-14	302	J-13	8.0	PVC	150.0	-62	0.39
P-36	J-15	556	J-14	8.0	PVC	150.0	-33	0.21
P-37	J-14	318	J-17	8.0	PVC	150.0	23	0.14
P-38	J-16	295	J-15	8.0	PVC	150.0	-26	0.16
P-39	J-22	318	J-18	8.0	PVC	150.0	39	0.25
P-40	J-17	293	J-18	8.0	PVC	150.0	-32	0.21
P-41	J-17	482	J-16	8.0	PVC	150.0	36	0.23
P-42	J-19	278	J-23	8.0	PVC	150.0	-38	0.25
P-43	J-20	390	J-19	8.0	PVC	150.0	-31	0.20
P-44	J-17	286	J-20	8.0	PVC	150.0	11	0.07
P-45	J-20	357	J-21	8.0	PVC	150.0	36	0.23
P-46	J-21	284	J-16	8.0	PVC	150.0	21	0.13
P-47	J-21	203	J-25	8.0	PVC	150.0	7	0.05

FlexTable: Pipe Table

Active Scenario: MAX DAY (AVG x 2.8)

Label	Start Node	Length (Scaled) (ft)	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-48	J-16	386	J-31	8.0	PVC	150.0	76	0.48
P-49	J-7	312	J-29	8.0	PVC	150.0	-11	0.07
P-50	J-8	303	J-36	8.0	PVC	150.0	-40	0.26
P-51	J-29	390	J-36	8.0	PVC	150.0	16	0.10
P-52	J-29	306	J-31	8.0	PVC	150.0	-35	0.23
P-53	J-36	296	J-35	8.0	PVC	150.0	-32	0.20
P-54	J-31	421	J-35	8.0	PVC	150.0	20	0.13
P-55	J-31	279	J-32	8.0	PVC	150.0	12	0.08
P-56	J-35	355	J-34	8.0	PVC	150.0	-19	0.12
P-57	J-32	192	J-33	8.0	PVC	150.0	4	0.02
P-58	J-33	231	J-34	8.0	PVC	150.0	-4	0.03
P-59	J-34	258	J-26	8.0	PVC	150.0	-32	0.20
P-60	J-26	234	J-46	8.0	PVC	150.0	-19	0.12
P-61	J-46	527	J-47	8.0	PVC	150.0	-9	0.06
P-62	J-47	329	J-48	8.0	PVC	150.0	-22	0.14
P-63	J-48	262	J-49	8.0	PVC	150.0	-3	0.02
P-64	J-49	293	J-50	8.0	PVC	150.0	11	0.07
P-65	J-48	838	J-53	8.0	PVC	150.0	-31	0.20
P-66	J-49	851	J-52	8.0	PVC	150.0	-26	0.17
P-67	J-50	865	J-51	8.0	PVC	150.0	-24	0.15
P-68	J-54	251	J-38	8.0	PVC	150.0	-94	0.60
P-69	J-53	380	J-54	8.0	PVC	150.0	-60	0.38
P-70	J-52	281	J-53	8.0	PVC	150.0	-27	0.17
P-71	J-51	327	J-52	8.0	PVC	150.0	-18	0.11
P-72	J-54	301	J-55	8.0	PVC	150.0	-40	0.25
P-73	J-55	201	J-40	8.0	PVC	150.0	-114	0.73
P-75	J-53	316	J-56	8.0	PVC	150.0	-10	0.06
P-76	J-57	430	J-52	8.0	PVC	150.0	30	0.19
P-77	J-58	579	J-51	8.0	PVC	150.0	18	0.12
P-78	J-56	268	J-57	8.0	PVC	150.0	-22	0.14
P-79	J-57	310	J-58	8.0	PVC	150.0	30	0.19
P-80	J-57	226	J-41	8.0	PVC	150.0	-94	0.60
P-81	J-41	387	J-59	8.0	PVC	150.0	54	0.35
P-82	J-59	458	J-60	8.0	PVC	150.0	21	0.13
P-83	J-60	682	J-61	8.0	PVC	150.0	1	0.00
P-84	J-61	202	J-62	8.0	PVC	150.0	-20	0.13
P-85	J-62	307	J-42	8.0	PVC	150.0	-28	0.18
P-86	J-62	730	J-59	8.0	PVC	150.0	-13	0.08
P-127	J-50	344	J-46	8.0	PVC	150.0	22	0.14
P-189	J-10	1,189	J-28	12.0	PVC	150.0	-125	0.35

FlexTable: Junction Table

Active Scenario: MAX DAY (AVG x 2.8)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,664.03	7	5,849.81	80
J-2	5,661.85	7	5,849.81	81
J-3	5,671.20	7	5,849.80	77
J-4	5,656.91	45	5,849.87	83
J-5	5,660.16	7	5,849.83	82
J-6	5,672.52	7	5,849.80	77
J-7	5,686.42	16	5,849.75	71
J-8	5,682.14	16	5,849.74	73
J-9	5,686.20	0	5,849.72	71
J-10	5,688.06	186	5,849.70	70
J-11	5,674.10	16	5,849.74	76
J-12	5,668.90	16	5,849.74	78
J-13	5,656.02	0	5,849.85	84
J-14	5,666.42	7	5,849.83	79
J-15	5,680.16	7	5,849.81	73
J-16	5,687.70	7	5,849.81	70
J-17	5,674.05	7	5,849.82	76
J-18	5,681.41	7	5,849.83	73
J-19	5,688.57	7	5,849.83	70
J-20	5,682.40	7	5,849.82	72
J-21	5,691.44	7	5,849.81	69
J-22	5,672.45	0	5,849.84	77
J-23	5,673.32	0	5,849.84	76
J-24	5,669.13	40	5,849.84	78
J-25	5,695.15	0	5,849.81	67
J-26	5,715.76	0	5,849.77	58
J-27	5,719.43	0	5,849.76	56
J-28	5,720.86	0	5,849.75	56
J-29	5,692.29	8	5,849.75	68
J-31	5,698.69	8	5,849.76	65
J-32	5,701.83	8	5,849.76	64
J-33	5,704.71	8	5,849.76	63
J-34	5,708.37	8	5,849.76	61
J-35	5,697.75	8	5,849.76	66
J-36	5,688.99	8	5,849.75	70
J-37	5,673.82	0	5,849.85	76
J-38	5,665.19	0	5,849.87	80
J-39	5,660.34	244	5,849.92	82
J-40	5,671.04	0	5,849.88	77
J-41	5,686.08	0	5,849.84	71
J-42	5,693.68	0	5,849.82	68
J-43	5,695.02	122	5,849.80	67
J-44	5,716.02	0	5,849.79	58
J-45	5,713.79	0	5,849.77	59
J-46	5,713.55	12	5,849.77	59
J-47	5,703.74	12	5,849.77	63
J-48	5,697.85	12	5,849.77	66

FlexTable: Junction Table

Active Scenario: MAX DAY (AVG x 2.8)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-49	5,702.74	12	5,849.78	64
J-50	5,710.64	12	5,849.77	60
J-51	5,703.22	12	5,849.79	63
J-52	5,694.01	12	5,849.79	67
J-53	5,681.95	12	5,849.79	73
J-54	5,670.21	74	5,849.82	78
J-55	5,666.91	74	5,849.83	79
J-56	5,685.39	12	5,849.79	71
J-57	5,689.19	12	5,849.80	69
J-58	5,694.74	12	5,849.79	67
J-59	5,673.57	20	5,849.81	76
J-60	5,666.75	20	5,849.81	79
J-61	5,683.54	20	5,849.81	72
J-62	5,684.22	20	5,849.81	72

FlexTable: Pipe Table

Active Scenario: MAX HOUR (AVG x 4.5)

Label	Start Node	Length (Scaled) (ft)	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	R-1	661	J-4	12.0	PVC	150.0	466	1.32
P-2	J-4	412	J-13	12.0	PVC	150.0	215	0.61
P-3	J-13	689	J-22	12.0	PVC	150.0	116	0.33
P-4	J-22	281	J-23	12.0	PVC	150.0	52	0.15
P-5	J-23	457	J-24	12.0	PVC	150.0	-10	0.03
P-6	J-24	471	J-37	12.0	PVC	150.0	-139	0.40
P-7	J-37	816	J-38	12.0	PVC	150.0	-139	0.40
P-8	J-38	594	J-39	12.0	PVC	150.0	-291	0.83
P-9	R-2	203	J-39	16.0	PVC	150.0	1,486	2.37
P-10	J-39	243	J-40	16.0	PVC	150.0	803	1.28
P-11	J-40	560	J-41	16.0	PVC	150.0	620	0.99
P-12	J-41	655	J-42	16.0	PVC	150.0	382	0.61
P-13	J-42	408	J-43	16.0	PVC	150.0	338	0.54
P-14	J-43	458	J-44	12.0	PVC	150.0	142	0.40
P-15	J-44	1,038	J-45	12.0	PVC	150.0	142	0.40
P-16	J-45	909	J-28	12.0	PVC	150.0	142	0.40
P-17	J-27	143	J-28	8.0	PVC	150.0	58	0.37
P-18	J-26	367	J-27	8.0	PVC	150.0	58	0.37
P-19	J-25	839	J-26	8.0	PVC	150.0	78	0.50
P-20	J-24	769	J-25	8.0	PVC	150.0	66	0.42
P-21	J-5	184	J-4	8.0	PVC	150.0	-178	1.14
P-22	J-5	413	J-6	8.0	PVC	150.0	89	0.57
P-23	J-6	408	J-7	8.0	PVC	150.0	119	0.76
P-24	J-7	369	J-8	8.0	PVC	150.0	63	0.40
P-25	J-8	207	J-9	8.0	PVC	150.0	98	0.63
P-26	J-9	257	J-10	8.0	PVC	150.0	98	0.63
P-27	J-2	277	J-5	8.0	PVC	150.0	-76	0.49
P-28	J-2	201	J-1	8.0	PVC	150.0	12	0.07
P-29	J-3	348	J-2	8.0	PVC	150.0	-53	0.34
P-30	J-6	293	J-3	8.0	PVC	150.0	-42	0.27
P-31	J-11	516	J-7	8.0	PVC	150.0	-49	0.31
P-32	J-12	324	J-11	8.0	PVC	150.0	-23	0.14
P-33	J-8	523	J-12	8.0	PVC	150.0	3	0.02
P-34	J-5	432	J-14	8.0	PVC	150.0	1	0.01
P-35	J-14	302	J-13	8.0	PVC	150.0	-99	0.63
P-36	J-15	556	J-14	8.0	PVC	150.0	-53	0.34
P-37	J-14	318	J-17	8.0	PVC	150.0	36	0.23
P-38	J-16	295	J-15	8.0	PVC	150.0	-41	0.26
P-39	J-22	318	J-18	8.0	PVC	150.0	63	0.40
P-40	J-17	293	J-18	8.0	PVC	150.0	-52	0.33
P-41	J-17	482	J-16	8.0	PVC	150.0	58	0.37
P-42	J-19	278	J-23	8.0	PVC	150.0	-62	0.39
P-43	J-20	390	J-19	8.0	PVC	150.0	-50	0.32
P-44	J-17	286	J-20	8.0	PVC	150.0	18	0.12
P-45	J-20	357	J-21	8.0	PVC	150.0	57	0.37
P-46	J-21	284	J-16	8.0	PVC	150.0	34	0.22
P-47	J-21	203	J-25	8.0	PVC	150.0	12	0.08

FlexTable: Pipe Table

Active Scenario: MAX HOUR (AVG x 4.5)

Label	Start Node	Length (Scaled) (ft)	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-48	J-16	386	J-31	8.0	PVC	150.0	122	0.78
P-49	J-7	312	J-29	8.0	PVC	150.0	-18	0.11
P-50	J-8	303	J-36	8.0	PVC	150.0	-65	0.41
P-51	J-29	390	J-36	8.0	PVC	150.0	26	0.17
P-52	J-29	306	J-31	8.0	PVC	150.0	-57	0.36
P-53	J-36	296	J-35	8.0	PVC	150.0	-51	0.33
P-54	J-31	421	J-35	8.0	PVC	150.0	33	0.21
P-55	J-31	279	J-32	8.0	PVC	150.0	19	0.12
P-56	J-35	355	J-34	8.0	PVC	150.0	-31	0.20
P-57	J-32	192	J-33	8.0	PVC	150.0	6	0.04
P-58	J-33	231	J-34	8.0	PVC	150.0	-7	0.04
P-59	J-34	258	J-26	8.0	PVC	150.0	-51	0.33
P-60	J-26	234	J-46	8.0	PVC	150.0	-31	0.20
P-61	J-46	527	J-47	8.0	PVC	150.0	-15	0.10
P-62	J-47	329	J-48	8.0	PVC	150.0	-35	0.22
P-63	J-48	262	J-49	8.0	PVC	150.0	-5	0.03
P-64	J-49	293	J-50	8.0	PVC	150.0	17	0.11
P-65	J-48	838	J-53	8.0	PVC	150.0	-49	0.32
P-66	J-49	851	J-52	8.0	PVC	150.0	-42	0.27
P-67	J-50	865	J-51	8.0	PVC	150.0	-38	0.24
P-68	J-54	251	J-38	8.0	PVC	150.0	-152	0.97
P-69	J-53	380	J-54	8.0	PVC	150.0	-96	0.61
P-70	J-52	281	J-53	8.0	PVC	150.0	-43	0.27
P-71	J-51	327	J-52	8.0	PVC	150.0	-29	0.18
P-72	J-54	301	J-55	8.0	PVC	150.0	-64	0.41
P-73	J-55	201	J-40	8.0	PVC	150.0	-183	1.17
P-75	J-53	316	J-56	8.0	PVC	150.0	-16	0.10
P-76	J-57	430	J-52	8.0	PVC	150.0	47	0.30
P-77	J-58	579	J-51	8.0	PVC	150.0	29	0.19
P-78	J-56	268	J-57	8.0	PVC	150.0	-35	0.23
P-79	J-57	310	J-58	8.0	PVC	150.0	49	0.31
P-80	J-57	226	J-41	8.0	PVC	150.0	-151	0.97
P-81	J-41	387	J-59	8.0	PVC	150.0	87	0.55
P-82	J-59	458	J-60	8.0	PVC	150.0	34	0.22
P-83	J-60	682	J-61	8.0	PVC	150.0	1	0.01
P-84	J-61	202	J-62	8.0	PVC	150.0	-32	0.20
P-85	J-62	307	J-42	8.0	PVC	150.0	-44	0.28
P-86	J-62	730	J-59	8.0	PVC	150.0	-20	0.13
P-127	J-50	344	J-46	8.0	PVC	150.0	36	0.23
P-189	J-10	1,189	J-28	12.0	PVC	150.0	-200	0.57

FlexTable: Junction Table

Active Scenario: MAX HOUR (AVG x 4.5)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,664.03	12	5,849.55	80
J-2	5,661.85	12	5,849.55	81
J-3	5,671.20	12	5,849.53	77
J-4	5,656.91	73	5,849.69	83
J-5	5,660.16	12	5,849.58	82
J-6	5,672.52	12	5,849.52	77
J-7	5,686.42	26	5,849.41	71
J-8	5,682.14	26	5,849.37	72
J-9	5,686.20	0	5,849.34	71
J-10	5,688.06	298	5,849.29	70
J-11	5,674.10	26	5,849.38	76
J-12	5,668.90	26	5,849.37	78
J-13	5,656.02	0	5,849.64	84
J-14	5,666.42	12	5,849.58	79
J-15	5,680.16	12	5,849.55	73
J-16	5,687.70	12	5,849.54	70
J-17	5,674.05	12	5,849.57	76
J-18	5,681.41	12	5,849.59	73
J-19	5,688.57	12	5,849.59	70
J-20	5,682.40	12	5,849.57	72
J-21	5,691.44	12	5,849.55	68
J-22	5,672.45	0	5,849.62	77
J-23	5,673.32	0	5,849.61	76
J-24	5,669.13	64	5,849.61	78
J-25	5,695.15	0	5,849.54	67
J-26	5,715.76	0	5,849.44	58
J-27	5,719.43	0	5,849.41	56
J-28	5,720.86	0	5,849.40	56
J-29	5,692.29	13	5,849.41	68
J-31	5,698.69	13	5,849.43	65
J-32	5,701.83	13	5,849.43	64
J-33	5,704.71	13	5,849.43	63
J-34	5,708.37	13	5,849.43	61
J-35	5,697.75	13	5,849.42	66
J-36	5,688.99	13	5,849.40	69
J-37	5,673.82	0	5,849.64	76
J-38	5,665.19	0	5,849.68	80
J-39	5,660.34	392	5,849.80	82
J-40	5,671.04	0	5,849.72	77
J-41	5,686.08	0	5,849.61	71
J-42	5,693.68	0	5,849.56	67
J-43	5,695.02	196	5,849.53	67
J-44	5,716.02	0	5,849.51	58
J-45	5,713.79	0	5,849.45	59
J-46	5,713.55	20	5,849.45	59
J-47	5,703.74	20	5,849.45	63
J-48	5,697.85	20	5,849.46	66

FlexTable: Junction Table

Active Scenario: MAX HOUR (AVG x 4.5)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-49	5,702.74	20	5,849.46	63
J-50	5,710.64	20	5,849.46	60
J-51	5,703.22	20	5,849.49	63
J-52	5,694.01	20	5,849.49	67
J-53	5,681.95	20	5,849.50	72
J-54	5,670.21	119	5,849.57	78
J-55	5,666.91	119	5,849.60	79
J-56	5,685.39	20	5,849.51	71
J-57	5,689.19	20	5,849.51	69
J-58	5,694.74	20	5,849.50	67
J-59	5,673.57	33	5,849.55	76
J-60	5,666.75	33	5,849.54	79
J-61	5,683.54	33	5,849.54	72
J-62	5,684.22	33	5,849.54	72

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: MAX DAY & FIRE FLOW

Label	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Static) (psi)	Flow (Total Needed) (gpm)	Residual Pressure (Total Needed) (psi)	Flow (Total Available) (gpm)	Residual Pressure (Total Available) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Junction w/ Minimum Pressure (System)	Pressure (Calculated System Lower Limit) (psi)	Pipe w/ Maximum Velocity	Velocity of Maximum Pipe (ft/s)
J-1	2	True	1,500	1,600	80	1,507	75	1,607	75	55	J-28	J-28	55	P-28	10.26
J-2	2	True	1,500	1,600	81	1,507	78	1,607	78	55	J-28	J-28	55	P-27	6.42
J-3	2	True	1,500	1,600	77	1,507	74	1,607	74	55	J-28	J-28	55	P-30	5.79
J-4	2	True	1,500	1,600	83	1,545	83	1,645	83	55	J-28	J-28	55	P-1	3.20
J-5	2	True	1,500	1,600	82	1,507	81	1,607	81	55	J-28	J-28	55	P-21	5.23
J-6	2	True	1,500	1,600	77	1,507	75	1,607	75	55	J-28	J-28	55	P-21	4.37
J-7	2	True	2,500	2,600	71	2,516	66	2,616	66	54	J-28	J-28	54	P-23	5.80
J-8	2	True	2,500	2,600	73	2,516	68	2,616	68	54	J-28	J-28	54	P-50	5.19
J-9	2	True	1,500	1,600	71	1,500	68	1,600	68	55	J-28	J-28	55	P-25	5.89
J-10	2	True	2,500	2,600	70	2,685	64	2,786	64	53	J-28	J-28	53	P-26	6.93
J-11	2	True	2,500	2,600	76	2,516	66	2,616	66	54	J-28	J-28	54	P-31	9.49
J-12	2	True	2,500	2,600	78	2,516	68	2,616	68	54	J-28	J-28	54	P-33	9.41
J-13	2	True	1,500	1,600	84	1,500	83	1,600	83	55	J-28	J-28	55	P-1	2.97
J-14	2	True	1,500	1,600	79	1,507	78	1,607	78	55	J-28	J-28	55	P-35	3.41
J-15	2	True	1,500	1,600	73	1,507	71	1,607	71	55	J-28	J-28	55	P-38	5.83
J-16	2	True	1,500	1,600	70	1,507	69	1,607	69	55	J-28	J-28	55	P-46	3.08
J-17	2	True	1,500	1,600	76	1,507	75	1,607	75	55	J-28	J-28	55	P-37	2.95
J-18	2	True	1,500	1,600	73	1,507	71	1,607	71	55	J-28	J-28	55	P-39	5.19
J-19	2	True	1,500	1,600	70	1,507	68	1,607	68	55	J-28	J-28	55	P-42	5.85
J-20	2	True	1,500	1,600	72	1,507	71	1,607	71	55	J-28	J-28	55	P-44	3.96
J-21	2	True	1,500	1,600	69	1,507	67	1,607	67	55	J-28	J-28	55	P-46	3.61
J-22	2	True	1,500	1,600	77	1,500	76	1,600	76	55	J-28	J-28	55	P-9	2.93
J-23	2	True	1,500	1,600	76	1,500	75	1,600	75	55	J-28	J-28	55	P-9	2.98
J-24	2	True	2,500	2,600	78	2,540	76	2,640	76	55	J-28	J-28	55	P-9	4.08
J-25	2	True	1,500	1,600	67	1,500	65	1,600	65	55	J-28	J-28	55	P-47	4.59
J-26	2	True	1,500	1,600	58	1,500	57	1,600	57	55	J-28	J-28	55	P-9	3.22
J-27	2	True	1,500	1,600	56	1,500	54	1,600	55	54	J-28	J-28	54	P-17	5.59
J-28	2	True	1,500	1,600	56	1,500	54	1,600	54	55	J-27	J-27	55	P-17	3.41
J-29	2	True	1,500	1,600	68	1,508	66	1,608	66	55	J-28	J-28	55	P-52	3.88
J-31	2	True	1,500	1,600	65	1,508	64	1,608	64	55	J-28	J-28	55	P-48	3.84
J-32	2	True	1,500	1,600	64	1,508	61	1,608	61	55	J-28	J-28	55	P-55	5.73
J-33	2	True	1,500	1,600	63	1,508	60	1,608	60	55	J-28	J-28	55	P-58	5.91
J-34	2	True	1,500	1,600	61	1,508	59	1,608	59	55	J-28	J-28	55	P-59	4.86
J-35	2	True	1,500	1,600	66	1,508	64	1,608	64	55	J-28	J-28	55	P-59	3.57
J-36	2	True	1,500	1,600	70	1,508	67	1,608	67	55	J-28	J-28	55	P-53	3.65
J-37	2	True	1,500	1,600	76	1,500	75	1,600	75	55	J-28	J-28	55	P-9	3.20
J-38	2	True	1,500	1,600	80	1,500	79	1,600	79	55	J-28	J-28	55	P-9	3.42
J-39	2	True	2,500	2,600	82	2,744	82	2,844	82	55	J-28	J-28	55	P-9	5.11
J-40	2	True	1,500	1,600	77	1,500	77	1,600	77	56	J-28	J-28	56	P-9	3.65
J-41	2	True	1,500	1,600	71	1,500	70	1,600	70	55	J-28	J-28	55	P-9	3.56
J-42	2	True	1,500	1,600	68	1,500	67	1,600	67	55	J-28	J-28	55	P-9	3.53
J-43	2	True	1,500	1,600	67	1,622	66	1,722	66	55	J-28	J-28	55	P-9	3.52
J-44	2	True	1,500	1,600	58	1,500	57	1,600	57	55	J-28	J-28	55	P-9	3.48
J-45	2	True	1,500	1,600	59	1,500	57	1,600	57	54	J-28	J-28	54	P-9	3.39
J-46	2	True	1,500	1,600	59	1,512	57	1,612	57	55	J-28	J-28	55	P-60	5.28
J-47	2	True	1,500	1,600	63	1,512	60	1,612	60	55	J-28	J-28	55	P-62	5.45
J-48	2	True	1,500	1,600	66	1,512	63	1,612	63	55	J-28	J-28	55	P-63	4.32
J-49	2	True	1,500	1,600	64	1,512	61	1,612	61	55	J-28	J-28	55	P-80	4.03
J-50	2	True	1,500	1,600	60	1,512	58	1,612	58	55	J-28	J-28	55	P-60	4.29

Fire Flow Node FlexTable: Fire Flow Report
Active Scenario: MAX DAY & FIRE FLOW

Label	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Static) (psi)	Flow (Total Needed) (gpm)	Residual Pressure (Total Needed) (psi)	Flow (Total Available) (gpm)	Residual Pressure (Total Available) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Junction w/ Minimum Pressure (System)	Pressure (Calculated System Lower Limit) (psi)	Pipe w/ Maximum Velocity	Velocity of Maximum Pipe (ft/s)
J-51	2	True	1,500	1,600	63	1,512	61	1,612	61	55	J-28	J-28	55	P-80	4.60
J-52	2	True	1,500	1,600	67	1,512	66	1,612	66	55	J-28	J-28	55	P-80	4.65
J-53	2	True	1,500	1,600	73	1,512	71	1,612	71	55	J-28	J-28	55	P-80	4.27
J-54	2	True	1,500	1,600	78	1,574	77	1,674	77	55	J-28	J-28	55	P-68	4.58
J-55	2	True	1,500	1,600	79	1,574	78	1,674	78	55	J-28	J-28	55	P-73	6.44
J-56	2	True	1,500	1,600	71	1,512	69	1,612	71	55	J-28	J-28	55	P-78	5.39
J-57	2	True	1,500	1,600	69	1,512	68	1,612	69	55	J-28	J-28	55	P-80	5.38
J-58	2	True	1,500	1,600	67	1,512	64	1,612	64	55	J-28	J-28	55	P-79	6.26
J-59	2	True	2,500	2,600	76	2,520	70	2,620	70	55	J-28	J-28	55	P-81	9.46
J-60	2	True	2,500	2,600	79	2,520	68	2,620	68	55	J-28	J-28	55	P-82	9.74
J-61	2	True	2,500	2,600	72	2,520	63	2,620	63	55	J-28	J-28	55	P-84	11.71
J-62	2	True	2,500	2,600	72	2,520	66	2,620	66	55	J-28	J-28	55	P-85	10.10

Appendix B

Wastewater Demands and Routing Calculations

No.	Revisions	Date	Init.	Appr.	Date

CVL CONSULTANTS
10333 E. Dry Creek Rd
Suite 240
Englewood, CO 80112
Tel: 720-482-9526
CVLINC.NET

LENNAR CORPORATION
9781 S. MERIDIAN BLVD., SUITE 120
ENGLEWOOD, CO 80112
TEL: (303)-754-0600

MURPHY CREEK EAST SUBDIVISION
MASTER UTILITY REPORT
SANITARY MODEL LAYOUT

SCALE:	FILE NO:
AS SHOWN	8130323701

DRAWN BY:	CHECKED BY:	DATE:
CAA	SJK	NOVEMBER 2019

SHEET NUMBER
SS1

No.	Revisions	Date	Init.	Appr.	Date

CVL CONSULTANTS
10333 E. Dry Creek Rd
Suite 240
Englewood, CO 80112
Tel: 720-482-9526
CVLINC.NET

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9781 S. MERIDIAN BLVD., SUITE 120
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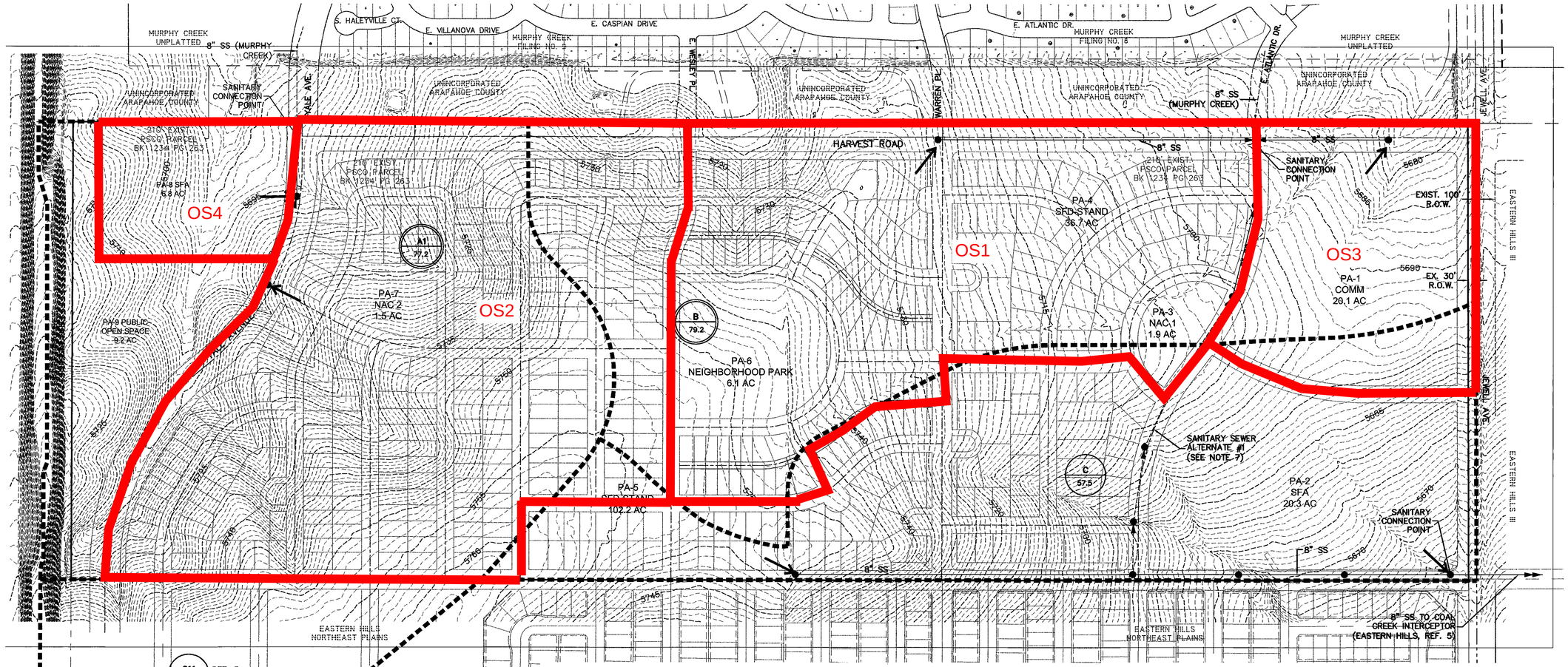
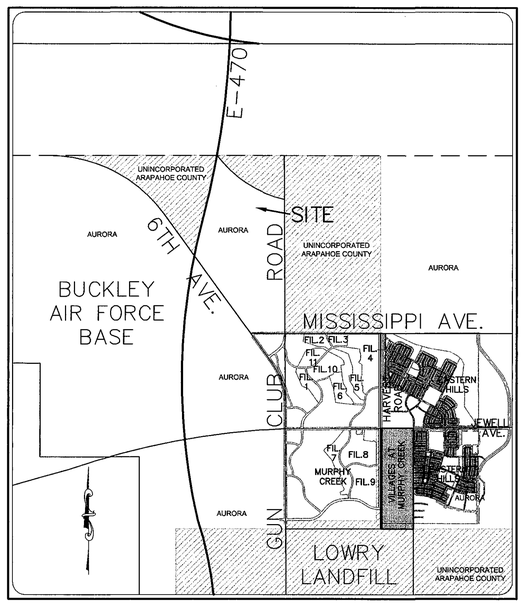
MURPHY CREEK EAST SUBDIVISION
MASTER UTILITY REPORT
SANITARY MODEL LAYOUT

SCALE:	FILE NO:
AS SHOWN	8130323701

DRAWN BY:	CHECKED BY:	DATE:
SCL	SJK	MARCH 2019

SHEET NUMBER
SS2





VICINITY MAP

4000 0 4000 8000 Feet

Scale: 1" = 4000'

NOTES:
1. SANITARY SEWER AND WATER LAYOUTS SHOWN HEREON ARE CONCEPTUAL ONLY. ACTUAL LAYOUTS WILL BE ALIGNED ACCORDING TO THE FINAL LAYOUT OF THE DEVELOPMENT.
2. REFER TO MASTER DRAINAGE REPORT FOR STORM SEWER INFORMATION.
3. REFER TO PUBLIC IMPROVEMENTS PLAN FOR UTILITY PHASING INFORMATION.
4. THE LOCAL STREET ALIGNMENT SHOWN HEREON IS NOT APPROVED BY THIS PLAN.
5. LOTS SHOWN ON THIS PLAN ARE CONCEPTUAL AND FOR INFORMATION ONLY. LOT LAYOUT MAY BE SUBJECT TO CHANGE DURING THE CSP PROCESS.
6. PER REFERENCE 5, OFFSITE BASIN 911 SEWAGE FLOWS ARE NOT CONVEYED THROUGH THE VILLAGES AT MURPHY CREEK SITE. OFFSITE BASIN 911 IS PART OF BASIN C8 WITHIN REFERENCE 5.
7. REFER TO MASTER UTILITY REPORT TEXT FOR ALTERNATIVE NO. 1 DISCUSSION.

Per phone call on 12/17/19 with Sarah and Scott of CVL, please provide documentation from Villages at Murphy Creek ownership team(s) authorizing the modifications to basin boundaries and peak flow rates. Letter should also acknowledge that any future changes in density or use that results in an increase of flows will be that ownership team's responsibility to accommodate (i.e. up-sizing, paralleling, etc.). Please update all tables and reports as necessary, and include the documentation as an appendix to this report.

CVL has been in communication with the consulting team of Villages at Murphy Creek. CVL has incorporated their total number of units and flow rates that will need to flow through the Murphy Creek East development. Those updated flows are reflected in the sanitary sewer calculations.

200 0 200 400

(IN FEET)
1 inch = 200 ft.

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SEWER (BY OTHERS)
- A / 1.57 — BASIN DESIGNATION / AREA IN ACRES
- SANITARY SEWER BASIN BOUNDARY
- 6500 — EXISTING CONTOUR

CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS, AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOBSITE. THE CITY OF AURORA THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO OTHER RESPONSIBILITY OTHER THAN AS STATED ABOVE FOR COMPLETENESS AND/OR ACCURACY.

Approved for One Year From this Date
08-24-06

City Engineer		5-12-06 Date
Department		5-10-06 Date

NO.	REVISION	DATE	BY
1	CITY COMMENTS	01/13/06	BK
2	CITY COMMENTS/ FINAL PLAN CHECK	05/01/06	BK

VILLAGES AT MURPHY CREEK
MASTER SANITARY SEWER PLAN

DEVELOPER
VILLAGES AT MURPHY CREEK, LLC
30 CHERRY HILLS FARM DR.
ENGLEWOOD, COLORADO 80110
(303) 761-3667
(303) 762-0390 FAX
CONTACT: LARRY SUMMERS

PEAK CIVIL CONSULTANTS
CIVIL ENGINEERING & LAND DEVELOPMENT SERVICES
2828 SPEER BLVD., SUITE 201
DENVER, COLORADO 80211
720.855.3859 720.855.3860 FAX
CONTACT: BOB KELSEY

COLORADO REGISTERED ROBERT F. KELSEY 31697 PROFESSIONAL ENGINEER 05/01/06

DATE: 08/12/05
JOB NO: 05.15
DRAWN BY: GMV
APPROVED:
CADD FILE: 05.15\..\0515 MASTER UTIL

MURPHY CREEK
CITY OF AURORA
ON-SITE SANITARY SEWER PEAK ROUTING CALCULATIONS (BY ACREAGE)

Please update all tables and reports as necessary to accommodate offsite flows. (typ.)

Calculations have been updated to reflect the 3 connections to Villages at Murphy Creek. They will be called OS-1, OS-2, and OS-3 respectively.

PLANNING AREA	TYPE OF DEVELOPMENT	AREA (AC)	UNITS*	OCCUPANCY (PERSONS/DU)	AVG DAY FLOW (GPD/CAP)	AVG DAY FLOW (GPD)	POPULATION (THOUSANDS)	PEAKING FACTOR (PF)	PEAKING FACTOR (PF) USED	PEAK DAILY FLOW (GPD)	PEAK DAILY FLOW (CFS)	INFILTRATION 10% OF AVG DAY FLOW (GPD	PEAK DAY FLOW WITH INFILTRATION
14	MF	8.1	*112*	2.77	68	21,096	0.31	6.08	4.00	84,385	0.13	2,110	
20	SFD	11.5	*42*	2.77	68	7,911	0.12	7.16	4.00	31,644	0.05	791	
26	MF	10.0	*202*	2.77	68	38,049	0.56	5.51	4.00	152,195	0.24	3,805	156,000
27	SCHOOL SFD	11.1 12.5	1 20	700 2.77	10 68	7,000 3,767	0.70 0.06	5.31 8.11	4.00 4.00	28,000 15,069	0.04 0.02	700 377	28,700 15,446
28A	SFD	26.5	83	2.77	68	15,634	0.23	6.39	4.00	62,536	0.10	1,563	64,099
28B	SFD	26.5	73	2.77	68	13,750	0.20	6.53	4.00	55,001	0.09	1,375	56,376
29	SFD	14.4	67	2.77	68	12,620	0.19	6.62	4.00	50,480	0.08	1,262	51,742
29A	SFD	31.9	116	2.77	68	21,850	0.32	6.04	4.00	87,399	0.14	2,185	89,584
29B	SFD	5.4	17	2.77	68	3,202	0.05	8.33	4.00	12,808	0.02	320	13,129
30	SFD	6.5	61	2.77	68	11,490	0.17	6.73	4.00	45,960	0.07	1,149	47,109
31	SFA	13.9	119	2.77	68	22,415	0.33	6.02	4.00	89,659	0.14	2,241	91,901
32	SFD	5.0	42	2.77	68	7,911	0.12	7.16	4.00	31,644	0.05	791	32,436
33	SFD	11.0	81	2.77	68	15,257	0.22	6.42	4.00	61,029	0.09	1,526	62,554
34	SFD	23.9	100	2.77	68	18,836	0.28	6.20	4.00	75,344	0.12	1,884	77,228
35	SFD	12.6	66	2.77	68	12,432	0.18	6.64	4.00	49,727	0.08	1,243	50,970
36	SFA	20.2	150	2.77	68	28,254	0.42	5.79	4.00	113,016	0.17	2,825	115,841
OS-1	SFR/SFA	45.0	133	2.77	68	25,052	0.37	5.91	4.00	100,208	0.16	2,505	102,713
OS-2	SFR	68.0	254	2.77	68	47,843	0.70	5.30	4.00	191,374	0.30	4,784	196,158
OS-3	COMM	20.1		(P/AC) 22	(GDP/AC) 1500	30,150	0.44	5.73	4.00	120,600	0.19	3,015	123,615
OS-4	SFA	6.8	81	2.77	68	15,257	0.22	6.42	4.00	61,029	0.09	1,526	62,554

NOTES:
*Values in italics indicate information from previously approved Master Utility Study.

MURPHY CREEK
CITY OF AURORA
SANITARY SEWER PEAK ROUTING CALCULATIONS

DESIGN POINT	PLANNING AREAS	TYPE OF DEVELOPMENT	BASIN	PHASE	AREA (AC)	UNITS	DENSITY (DU/AC)	OCCUPANCY (PERSONS/DU)	AVG DAY FLOW (GPD/CAP)	AVG DAY FLOW (GPD)	POPULATION (THOUSANDS)	PEAKING FACTOR (PF)	PEAK DAILY FLOW (GPD)	INFILTRATION 10% OF AVG DAY FLOW (GPD)	PEAK DAY FLOW WITH INFILTRATION (GPD)	PEAK DAY FLOW WITH INFILTRATION (CFS)	CUMULATIVE FLOWS (CFS)	COMMENTS
BASIN 2																		
OS1	OS-1	SFR/SFA	4		45.0	133	3.0	2.77	68	25,052	0.368	4.0	100,208	2,505	102,713	0.16	0.16	TO DP 31
OS1	OS-3	COMM	2		20.1		22.0	22	1500	30,150	0.442	4.0	120,600	3,015	123,615	0.19	0.35	TO DP 31
	32	SFD	2	1	5.0	42	5.0	2.77	68	7,911	0.116	4.0	31,644	791	32,436	0.05	0.05	TO DP 30
30	30	SFD	2	1	6.5	61	5.0	2.77	68	11,490	0.169	4.0	45,960	1,149	47,109	0.07	0.12	TO DP29
29A	29A	SFD	2	1	31.9	116	4.0	2.77	68	21,850	0.321	4.0	87,399	2,185	89,584	0.14	0.14	TO DP28C
29B	29B	SFD			5.4	17	4.0	2.77	68	3,202	0.047	4.0	12,808	320	13,129	0.02	0.02	TO DP25
29	29	SFD	2	1	14.4	67	5.0	2.77	68	12,620	0.186	4.0	50,480	1,262	51,742	0.08	0.20	CONNECT TO EXISTING 8"
28C																	0.34	TO DP 28A
	OS-2	SFR	2		68.0	254	5.0	2.77	68	47,843	0.704	4.0	191,374	4,784	196,158	0.30	0.30	TO DP OS2
OS2	OS-4	SFA	2		6.8	81	11.9	2.77	68	15,257	0.224	4.0	61,029	1,526	62,554	0.10	0.40	TO DP 36
36	36	SFA	2		20.2	150	7.4	2.77	68	28,254	0.416	4.0	113,016	2,825	115,841	0.18	0.58	TO DP 26
26	26	MF	2	FUTURE	10.0	202	20.0	2.77	68	38,049	0.560	4.0	152,195	3,805	156,000	0.24	0.82	TO DP 33
	33	SFD	2	2	11.0	81	5.0	2.77	68	15,257	0.224	4.0	61,029	1,526	62,554	0.10	0.10	TO DP 33
	34	SFD	2	2	23.9	100	5.0	2.77	68	18,836	0.277	4.0	75,344	1,884	77,228	0.12	0.22	TO DP 33
33	35	SFD	2	2	12.6	66	5.0	2.77	68	12,432	0.183	4.0	49,727	1,243	50,970	0.08	0.30	TO DP 27
27	27		2	2	23.6	11				10,767	0.755	4.0	43,069	1,077	44,146	0.07	1.18	TO DP 28B
	27.1	SCHOOL	2	2	11.1	1	1.0	700	10	7,000	0.700	4.0	28,000	700	28,700	0.04		TO DP 28B
	27.2	SFD	2	2	12.5	20	5.0	2.77	68	3,767	0.055	4.0	15,069	377	15,446	0.02		TO DP 28B
28B	28B	SFD	2	2	26.5	73	4.0	2.77	68	13,750	0.202	4.0	55,001	1,375	56,376	0.09	1.27	TO DP 25
25																	1.29	TO 28A
28A	28A	SFD	2	1	26.5	83	4.0	2.77	68	15,634	0.230	4.0	62,536	1,563	64,099	0.10	1.73	CONNECT TO EXISTING 12"
20	20	SFD	2	1	11.5	42	4.0	2.77	68	7,911	0.116	4.0	31,644	791	32,436	0.05	1.78	CONNECT TO EXISTING 12"
BASIN 4																		
31	31	SFA	4	1	13.9	119	7.4	2.77	68	22,415	0.330	4.0	89,659	2,241	91,901	0.14	0.49	CONNECT TO EXISTING 8"
14	14	MF	4	1	8.1	112	13.9	2.77	68	21,096	0.310	4.0	84,385	2,110	86,495	0.13	0.63	CONNECT TO EXISTING 10"

Note: Sanitary Sewer loading rates, factors, and calculations based on City of Aurora Master Utility Design Criteria for Water and Sanitary Sewer, April 19, 2018.

DP 14 - 10" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	10.00	in
Discharge	0.63	ft³/s

Results

Normal Depth	4.30	in
Flow Area	0.22	ft²
Wetted Perimeter	1.19	ft
Hydraulic Radius	2.26	in
Top Width	0.83	ft
Critical Depth	0.35	ft
Percent Full	43.0	%
Critical Slope	0.00443	ft/ft
Velocity	2.81	ft/s
Velocity Head	0.12	ft
Specific Energy	0.48	ft
Froude Number	0.95	
Maximum Discharge	1.76	ft³/s
Discharge Full	1.64	ft³/s
Slope Full	0.00059	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.02	%
Downstream Velocity	Infinity	ft/s

DP 14 - 10" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.30	in
Critical Depth	0.35	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00443	ft/ft

DP 20 - 12" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	12.00	in
Discharge	1.78	ft³/s

Results

Normal Depth	7.18	in
Flow Area	0.49	ft²
Wetted Perimeter	1.77	ft
Hydraulic Radius	3.33	in
Top Width	0.98	ft
Critical Depth	0.57	ft
Percent Full	59.8	%
Critical Slope	0.00470	ft/ft
Velocity	3.63	ft/s
Velocity Head	0.20	ft
Specific Energy	0.80	ft
Froude Number	0.91	
Maximum Discharge	2.86	ft³/s
Discharge Full	2.66	ft³/s
Slope Full	0.00179	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	59.81	%
Downstream Velocity	Infinity	ft/s

DP 20 - 12" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	7.18	in
Critical Depth	0.57	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00470	ft/ft

DP 25 - 12" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	12.00	in
Discharge	1.29	ft³/s

Results

Normal Depth	5.89	in
Flow Area	0.38	ft²
Wetted Perimeter	1.55	ft
Hydraulic Radius	2.96	in
Top Width	1.00	ft
Critical Depth	0.48	ft
Percent Full	49.1	%
Critical Slope	0.00433	ft/ft
Velocity	3.37	ft/s
Velocity Head	0.18	ft
Specific Energy	0.67	ft
Froude Number	0.96	
Maximum Discharge	2.86	ft³/s
Discharge Full	2.66	ft³/s
Slope Full	0.00094	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	49.06	%
Downstream Velocity	Infinity	ft/s

DP 25 - 12" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.89	in
Critical Depth	0.48	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00433	ft/ft

DP 26 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.82	ft³/s

Results

Normal Depth	5.98	in
Flow Area	0.28	ft²
Wetted Perimeter	1.39	ft
Hydraulic Radius	2.41	in
Top Width	0.58	ft
Critical Depth	0.43	ft
Percent Full	74.7	%
Critical Slope	0.00594	ft/ft
Velocity	2.93	ft/s
Velocity Head	0.13	ft
Specific Energy	0.63	ft
Froude Number	0.74	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00330	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	74.74	%
Downstream Velocity	Infinity	ft/s

DP 26 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.98	in
Critical Depth	0.43	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00594	ft/ft

DP 27 - 10" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	10.00	in
Discharge	1.18	ft³/s

Results

Normal Depth	6.29	in
Flow Area	0.36	ft²
Wetted Perimeter	1.53	ft
Hydraulic Radius	2.84	in
Top Width	0.81	ft
Critical Depth	0.48	ft
Percent Full	62.9	%
Critical Slope	0.00508	ft/ft
Velocity	3.27	ft/s
Velocity Head	0.17	ft
Specific Energy	0.69	ft
Froude Number	0.86	
Maximum Discharge	1.76	ft³/s
Discharge Full	1.64	ft³/s
Slope Full	0.00208	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	62.88	%
Downstream Velocity	Infinity	ft/s

DP 27 - 10" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	6.29	in
Critical Depth	0.48	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00508	ft/ft

DP 28A - 12" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	12.00	in
Discharge	1.73	ft³/s

Results

Normal Depth	7.05	in
Flow Area	0.48	ft²
Wetted Perimeter	1.75	ft
Hydraulic Radius	3.29	in
Top Width	0.98	ft
Critical Depth	0.56	ft
Percent Full	58.7	%
Critical Slope	0.00466	ft/ft
Velocity	3.61	ft/s
Velocity Head	0.20	ft
Specific Energy	0.79	ft
Froude Number	0.91	
Maximum Discharge	2.86	ft³/s
Discharge Full	2.66	ft³/s
Slope Full	0.00169	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.72	%
Downstream Velocity	Infinity	ft/s

DP 28A - 12" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	7.05	in
Critical Depth	0.56	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00466	ft/ft

DP 28B - 12" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	12.00	in
Discharge	1.27	ft³/s

Results

Normal Depth	5.83	in
Flow Area	0.38	ft²
Wetted Perimeter	1.54	ft
Hydraulic Radius	2.95	in
Top Width	1.00	ft
Critical Depth	0.48	ft
Percent Full	48.6	%
Critical Slope	0.00431	ft/ft
Velocity	3.35	ft/s
Velocity Head	0.17	ft
Specific Energy	0.66	ft
Froude Number	0.96	
Maximum Discharge	2.86	ft³/s
Discharge Full	2.66	ft³/s
Slope Full	0.00091	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.62	%
Downstream Velocity	Infinity	ft/s

DP 28B - 12" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.83	in
Critical Depth	0.48	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00431	ft/ft

DP 28C - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.34	ft³/s

Results

Normal Depth	3.40	in
Flow Area	0.14	ft²
Wetted Perimeter	0.95	ft
Hydraulic Radius	1.79	in
Top Width	0.66	ft
Critical Depth	0.27	ft
Percent Full	42.5	%
Critical Slope	0.00473	ft/ft
Velocity	2.41	ft/s
Velocity Head	0.09	ft
Specific Energy	0.37	ft
Froude Number	0.92	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00057	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	42.51	%
Downstream Velocity	Infinity	ft/s

DP 28C - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.40	in
Critical Depth	0.27	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00473	ft/ft

DP 29 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.20	ft³/s

Results

Normal Depth	2.56	in
Flow Area	0.10	ft²
Wetted Perimeter	0.80	ft
Hydraulic Radius	1.44	in
Top Width	0.62	ft
Critical Depth	0.21	ft
Percent Full	32.0	%
Critical Slope	0.00459	ft/ft
Velocity	2.08	ft/s
Velocity Head	0.07	ft
Specific Energy	0.28	ft
Froude Number	0.93	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00020	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	32.01	%
Downstream Velocity	Infinity	ft/s

DP 29 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.56	in
Critical Depth	0.21	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00459	ft/ft

DP 29A - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00450	ft/ft
Diameter	8.00	in
Discharge	0.14	ft³/s

Results

Normal Depth	2.07	in
Flow Area	0.07	ft²
Wetted Perimeter	0.71	ft
Hydraulic Radius	1.21	in
Top Width	0.58	ft
Critical Depth	0.17	ft
Percent Full	25.8	%
Critical Slope	0.00461	ft/ft
Velocity	1.96	ft/s
Velocity Head	0.06	ft
Specific Energy	0.23	ft
Froude Number	0.99	
Maximum Discharge	1.03	ft³/s
Discharge Full	0.96	ft³/s
Slope Full	0.00010	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	25.83	%
Downstream Velocity	Infinity	ft/s

DP 29A - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.07	in
Critical Depth	0.17	ft
Channel Slope	0.00450	ft/ft
Critical Slope	0.00461	ft/ft

DP 29B - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00450	ft/ft
Diameter	8.00	in
Discharge	0.02	ft³/s

Results

Normal Depth	0.80	in
Flow Area	0.02	ft²
Wetted Perimeter	0.43	ft
Hydraulic Radius	0.51	in
Top Width	0.40	ft
Critical Depth	0.06	ft
Percent Full	10.0	%
Critical Slope	0.00541	ft/ft
Velocity	1.10	ft/s
Velocity Head	0.02	ft
Specific Energy	0.09	ft
Froude Number	0.91	
Maximum Discharge	1.03	ft³/s
Discharge Full	0.96	ft³/s
Slope Full	0.00000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	10.00	%
Downstream Velocity	Infinity	ft/s

DP 29B - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	in
Critical Depth	0.06	ft
Channel Slope	0.00450	ft/ft
Critical Slope	0.00541	ft/ft

DP 30 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00450	ft/ft
Diameter	8.00	in
Discharge	0.12	ft³/s

Results

Normal Depth	1.91	in
Flow Area	0.06	ft²
Wetted Perimeter	0.68	ft
Hydraulic Radius	1.13	in
Top Width	0.57	ft
Critical Depth	0.16	ft
Percent Full	23.9	%
Critical Slope	0.00467	ft/ft
Velocity	1.88	ft/s
Velocity Head	0.05	ft
Specific Energy	0.21	ft
Froude Number	0.99	
Maximum Discharge	1.03	ft³/s
Discharge Full	0.96	ft³/s
Slope Full	0.00007	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	23.87	%
Downstream Velocity	Infinity	ft/s

DP 30 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.91	in
Critical Depth	0.16	ft
Channel Slope	0.00450	ft/ft
Critical Slope	0.00467	ft/ft

DP 31 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.49	ft³/s

Results

Normal Depth	4.20	in
Flow Area	0.19	ft²
Wetted Perimeter	1.08	ft
Hydraulic Radius	2.06	in
Top Width	0.67	ft
Critical Depth	0.33	ft
Percent Full	52.5	%
Critical Slope	0.00500	ft/ft
Velocity	2.64	ft/s
Velocity Head	0.11	ft
Specific Energy	0.46	ft
Froude Number	0.88	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00118	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.49	%
Downstream Velocity	Infinity	ft/s

DP 31 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.20	in
Critical Depth	0.33	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00500	ft/ft

DP 33 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.30	ft³/s

Results

Normal Depth	3.18	in
Flow Area	0.13	ft²
Wetted Perimeter	0.91	ft
Hydraulic Radius	1.70	in
Top Width	0.65	ft
Critical Depth	0.25	ft
Percent Full	39.7	%
Critical Slope	0.00468	ft/ft
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.35	ft
Froude Number	0.92	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00044	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	39.72	%
Downstream Velocity	Infinity	ft/s

DP 33 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.18	in
Critical Depth	0.25	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00468	ft/ft

DP 36 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.58	ft³/s

Results

Normal Depth	4.66	in
Flow Area	0.21	ft²
Wetted Perimeter	1.16	ft
Hydraulic Radius	2.19	in
Top Width	0.66	ft
Critical Depth	0.36	ft
Percent Full	58.3	%
Critical Slope	0.00521	ft/ft
Velocity	2.75	ft/s
Velocity Head	0.12	ft
Specific Energy	0.51	ft
Froude Number	0.85	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00165	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.28	%
Downstream Velocity	Infinity	ft/s

DP 36 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.66	in
Critical Depth	0.36	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00521	ft/ft

DP OS1+OS3 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.35	ft³/s

Results

Normal Depth	3.28	in
Flow Area	0.13	ft²
Wetted Perimeter	0.93	ft
Hydraulic Radius	1.74	in
Top Width	0.66	ft
Critical Depth	0.27	ft
Percent Full	41.0	%
Critical Slope	0.00391	ft/ft
Velocity	2.60	ft/s
Velocity Head	0.11	ft
Specific Energy	0.38	ft
Froude Number	1.01	
Maximum Discharge	1.07	ft³/s
Discharge Full	0.99	ft³/s
Slope Full	0.00050	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	40.96	%
Downstream Velocity	Infinity	ft/s

DP OS1+OS3 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.28	in
Critical Depth	0.27	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00391	ft/ft

DP OS2 - 8" PVC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	0.40	ft³/s

Results

Normal Depth	3.73	in
Flow Area	0.16	ft²
Wetted Perimeter	1.00	ft
Hydraulic Radius	1.91	in
Top Width	0.67	ft
Critical Depth	0.29	ft
Percent Full	46.6	%
Critical Slope	0.00482	ft/ft
Velocity	2.51	ft/s
Velocity Head	0.10	ft
Specific Energy	0.41	ft
Froude Number	0.90	
Maximum Discharge	0.97	ft³/s
Discharge Full	0.90	ft³/s
Slope Full	0.00078	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	46.59	%
Downstream Velocity	Infinity	ft/s

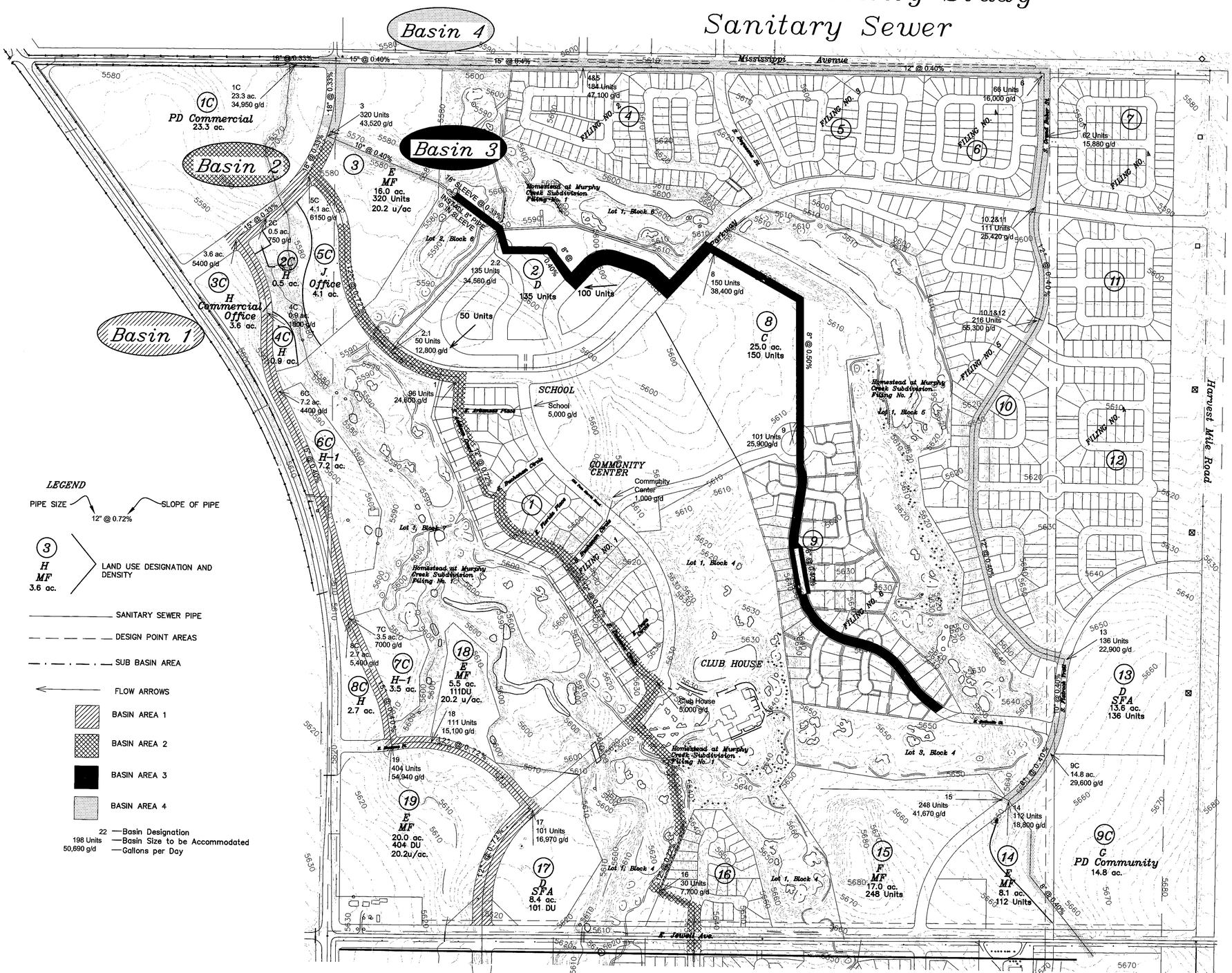
DP OS2 - 8" PVC

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.73	in
Critical Depth	0.29	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00482	ft/ft

Murphy Creek Subdivisions
Master Utility Study
Sanitary Sewer

2010649



LEGEND

PIPE SIZE — 12" @ 0.72% — SLOPE OF PIPE

3 / H / MF / 3.6 ac. — LAND USE DESIGNATION AND DENSITY

SANITARY SEWER PIPE

DESIGN POINT AREAS

SUB BASIN AREA

FLOW ARROWS

BASIN AREA 1

BASIN AREA 2

BASIN AREA 3

BASIN AREA 4

22 — Basin Designation
198 Units — Basin Size to be Accommodated
50,690 g/d — Gallons per Day

Match Line See Sheet 4

1.57 cfs (PF INCLUDED)

0.18 cfs
(PF INCLUDED)

I HEREBY AFFIRM THAT THE MASTER UTILITY PLANS FOR MURPHY CREEK WERE PREPARED BY ME IN CONFORMANCE WITH THE REQUIREMENTS OF THE PUBLIC UTILITY IMPROVEMENTS RULE AND REGULATIONS REGARDING STANDARDS AND SPECIFICATIONS OF THE CITY OF AURORA.

BENCHMARK: 21 – 070 3" Diam. Cap atop a 30" long stl. pipe in conc. 0.5 ft. north of S. R/W FE. for E. Jewell Ave. & in line with the West Right-of-way fence for Harvest Road to north. AKA 0-100. ELEVATION = 5680.24

Approved for One Year From this Date
5-2-2001

TEP 4-17-01 MW 4-17-01 MW

Director of Public Works — Date 4-18-01

Director of Utilities — Date 4/17/01

REVISION	DATE
COMMENTS	03/01/01
COMMENTS	03/30/01

COSTIN ENGINEERING CONSULTANTS, INC
ENGINEERING
LAND SURVEYING
CONSTRUCTION MANAGEMENT
6801 S. Emporia Street, Suite 205
Englewood, Colorado 80112
PH (303) 790-4989

COLORADO REGISTERED WILLIAM E. WHITE 19039 PROFESSIONAL ENGINEER

Murphy Creek Subdivision
Master Utility Study
Sanitary Sewer Mains

DATE 11-14-2000
DES/DFT/CHK WEM/PDN
PROJ. NO. 1970039
SHEET 5 OF 5

2010649

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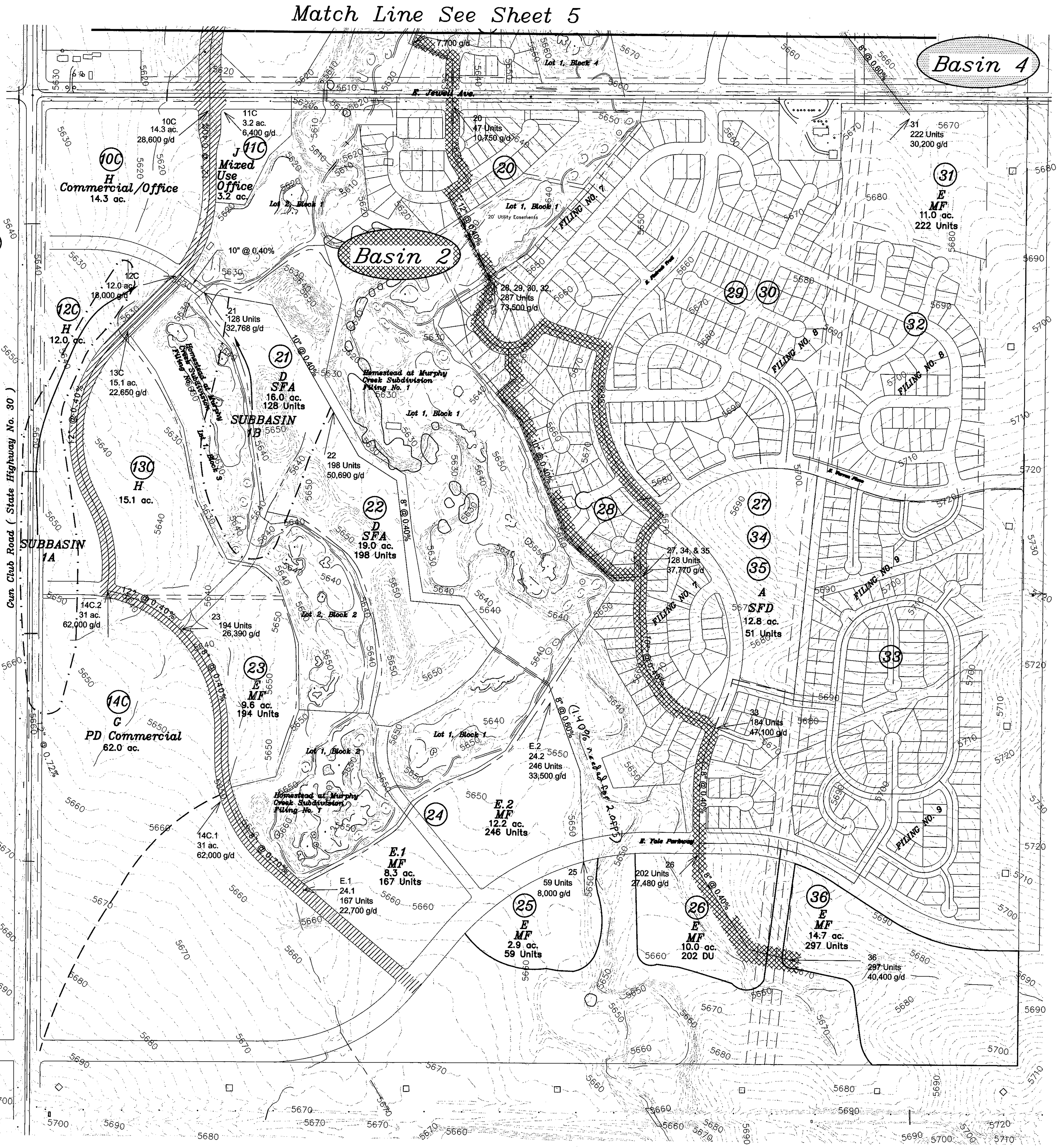
201064 4/5

Murphy Creek Subdivisions
Master Utility Study
Sanitary Sewer



LEGEND

PIPE SIZE — 12" @ 0.72% — SLOPE OF PIPE

3 / H / MF / 3.6 ac. — LAND USE DESIGNATION AND DENSITY

SANITARY SEWER PIPE

DESIGN POINT AREAS

SUB BASIN AREA

FLOW ARROWS

BASIN AREA 1

BASIN AREA 2

BASIN AREA 3

BASIN AREA 4

22 —Basin Designation
198 Units —Basin Size to be Accommodated
50,690 g/d —Gallons per Day

Slopes and pipe sizes shown on the Master Study are minimum. Actual pipe size and slopes may vary once the final design is completed for each subdivision.

I HEREBY AFFIRM THAT THE MASTER UTILITY PLANS FOR MURPHY CREEK WERE PREPARED BY ME IN CONFORMANCE WITH THE REQUIREMENTS OF THE PUBLIC UTILITY IMPROVEMENTS RULE AND REGULATIONS REGARDING STANDARDS AND SPECIFICATIONS OF THE CITY OF AURORA.

BENCHMARK: 21 – 070 3" Diam. Cap atop a 30" long stl. pipe in conc. 0.5 ft. north of S. R/W FE. for E. Jewell Ave. & in line with the West Right-of-way fence for Harvest Road to north. AKA 0-100. ELEVATION = 5680.24

300 0 300 600
Scale 1" = 300'

Approved for One Year From this Date
8-2-2001

Director of Public Works — Date 4-17-01
Director of Utilities — Date 4/17/01

REVISION	DATE
COMMENTS	03/01/01
COMMENTS	03/30/01

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Murphy Creek Subdivision
Master Utility Study
Sanitary Sewer Mains

DATE 11-14-2000
DES/DFT/CHK WEM/PDN
PROJ. NO. 1970039
SHEET 4 OF 5

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201064 4/5

Basin 1+2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00330	ft/ft
Diameter	18.00	in
Discharge	4.66	ft³/s

Results

Normal Depth	10.61	in
Flow Area	1.08	ft²
Wetted Perimeter	2.63	ft
Hydraulic Radius	4.95	in
Top Width	1.48	ft
Critical Depth	0.83	ft
Percent Full	58.9	%
Critical Slope	0.00404	ft/ft
Velocity	4.30	ft/s
Velocity Head	0.29	ft
Specific Energy	1.17	ft
Froude Number	0.88	
Maximum Discharge	7.67	ft³/s
Discharge Full	7.13	ft³/s
Slope Full	0.00141	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.94	%
Downstream Velocity	Infinity	ft/s

Basin 1+2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	10.61	in
Critical Depth	0.83	ft
Channel Slope	0.00330	ft/ft
Critical Slope	0.00404	ft/ft

Basin 2+3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00330	ft/ft
Diameter	18.00	in
Discharge	5.36	ft³/s

Results

Normal Depth	11.65	in
Flow Area	1.21	ft²
Wetted Perimeter	2.80	ft
Hydraulic Radius	5.18	in
Top Width	1.43	ft
Critical Depth	0.89	ft
Percent Full	64.7	%
Critical Slope	0.00424	ft/ft
Velocity	4.43	ft/s
Velocity Head	0.30	ft
Specific Energy	1.28	ft
Froude Number	0.85	
Maximum Discharge	7.67	ft³/s
Discharge Full	7.13	ft³/s
Slope Full	0.00186	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	64.73	%
Downstream Velocity	Infinity	ft/s

Basin 2+3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	11.65	in
Critical Depth	0.89	ft
Channel Slope	0.00330	ft/ft
Critical Slope	0.00424	ft/ft

Basin 3+4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.00330	ft/ft
Diameter	18.00	in
Discharge	6.96	ft³/s

Results

Normal Depth	14.38	in
Flow Area	1.51	ft²
Wetted Perimeter	3.32	ft
Hydraulic Radius	5.48	in
Top Width	1.20	ft
Critical Depth	1.02	ft
Percent Full	79.9	%
Critical Slope	0.00483	ft/ft
Velocity	4.60	ft/s
Velocity Head	0.33	ft
Specific Energy	1.53	ft
Froude Number	0.72	
Maximum Discharge	7.67	ft³/s
Discharge Full	7.13	ft³/s
Slope Full	0.00314	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	79.86	%
Downstream Velocity	Infinity	ft/s

Basin 3+4

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	14.38	in
Critical Depth	1.02	ft
Channel Slope	0.00330	ft/ft
Critical Slope	0.00483	ft/ft