



D E V E L O P M E N T

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June 18, 2024

City of Aurora
Aurora Water – Planning and Engineering
15151 E. Alameda Pkwy
Aurora, CO 80012

RE: The Aurora Highlands Master Utility Report – Amendment 3

The purpose of this Amendment 3 to the approved *The Aurora Highlands Master Utility Report – Amendment 2* (EDN 219069MU3) is to update the report for the anticipated change in water and sanitary demands associated with the Planning Areas (PA). Changes include:

- An increase in allowable densities in PA 1, 2, 3, 10, 14, 17 and 25.
- Updated unit counts for PAs that have been approved by the City of Aurora to date. These PAs are noted by the presence of an EDN on the Conceptual Lotting Exhibit prepared by Matrix Design Group, Inc.
- Aerotropolis Logistics Center (ALC) is a mixed use planned development consisting of commercial and industrial uses. It is directly east of the current Aurora Highlands (TAH) development boundary and contributes demand to both the TAH water and sanitary sewer systems. This Amendment updates the demand calculations to what has been presented in the most recent submittal for the ALC Master Utility Report. There is potential for the owner/developer to pursue a zoning change along the western edge of the site revising a portion of the commercial/industrial parcels to residential land use. In order to ensure that master planned utilities are sized appropriately to handle this potential land use change, infrastructure sizing was reviewed for both the current Land Use Plan (commercial / industrial / mixed-use) and the residential alternative. The more conservative land use designation, residential for sanitary and industrial for water, was used for infrastructure sizing included in this Report.

In general, the increase in demands for a change in allowable densities in the PAs noted above is offset by the update of true lot counts for PAs that have been approved to date.

Updated calculations included with this Amendment:

- Sanitary Sewer Demands
- FlowMaster Calculations
- Domestic Water Demands
- WaterGems Modeling

If there are any questions or comments regarding this request, please do not hesitate to contact me directly at 303-390-4235. Sincerely,

HR GREEN DEVELOPMENT, INC

A handwritten signature in blue ink that reads 'Kristine House'.

Kristine House, P.E

Associate | Lead Engineer – Land Development

The Aurora Highlands

Master Utility Report – Amendment 3

June 2024

HR Green Project No: 181211.50

Prepared For:



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APPROVED FOR ONE YEAR FROM THIS DATE	
Aurora Water – Utilities Department	Date
Fire Department	Date



Engineer's Statement:

I hereby certify that this Master Utility Report – Amendment 3 and plan for the development, The Aurora Highlands, was prepared by me (or under my direction supervision) in accordance with the provisions of the Aurora Water, Sanitary Sewer, and Storm Drainage Infrastructure Standards and Specifications for the owners thereof.

Kristine L. House, P.E. Date
State of Colorado No. 38890
For and on behalf of HR Green Development, LLC

Table of Contents

Scope.....	4
A. Introduction	5
1. Location	5
2. Proposed Development	5
B. Domestic Water	6
1. Existing Water Infrastructure	6
2. Water System Design Criteria	6
3. Water Demand Calculations	7
4. Hydraulic Model	8
5. Hydraulic Modeling Results	8
C. Sanitary Sewer	9
1. Existing Sanitary Sewer Infrastructure.....	9
2. Sanitary Sewer Design Criteria.....	9
3. Sanitary Sewer Flow Generations	10
4. Sanitary System Sewer Sizing.....	10
5. Wastewater Master Plan / Lift Station Capacity.....	10
D. Conclusions	12
1. Recommendations and Phasing.....	12
2. Summary of Concept.....	12
E. List of References	13

List of Tables

Table 1: Non-residential Water Demands.....	7
Table 2: System Wide Demands	7
Table 3: Hydraulic Modeling Results	8

List of Figures & Maps

Figure 1: Vicinity Map	5
Figure 2: Master Report Project Area.....	16
Figure 3: Composite Land Use Map.....	17
Figure 4: Infrastructure Density Plan.....	18
Figure 5: Updated Conceptual Lotting Exhibit.....	19
Figure 6: Existing Utility Infrastructure.....	20
Figure 7: Master Water Plan.....	21
Figure 8: Water Schematic.....	22
Figure 9: Overall Sanitary Basin Map.....	23
Figure 10: Master Sanitary Sewer Plan.....	24

Scope

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In general, the increase in demands for a change in allowable densities in the PAs noted above is offset by the update of true lot counts for PAs that have been approved to date.

The review of sanitary sewer demands and resultant line sizing analysis further downstream in the First Creek basin that was created at the request of the City with Amendment 2 is included with this Report. All other assumptions, calculations and conceptual designs remain unchanged.

The Master Utility Report – Amendment 3 for The Aurora Highlands reviews at a conceptual level the feasibility, design characteristics, and layout of the proposed development with regards to water distribution and sanitary sewer infrastructure.

Portions of the site were previously discussed within the approved *Master Utility Report for Green Valley* and the *Master Utility Report for Sagebrush Farm*. This report references the Green Valley Ranch East (GVRE) utility study completed in 2006 (amended by Calibre Engineering Inc. as *Green Valley – Amendment 1 Master Utility Report*, EDN 218184) and discusses the conceptual design and layout of the proposed infrastructure for The Aurora Highlands. Concepts from previous reports have been updated based on current land use and updated water and sanitary standards and specifications.

The intent of this report is to provide conceptual design for The Aurora Highlands only, other adjacent properties/developments may be included in the calculations for continuity. However, the Master Utility Reports for those properties/developments should be referred to for conceptual sizing and design.

A. Introduction

1. Location

- The Aurora Highlands is located within northeastern Aurora, Colorado. The site is located east of E-470, south of 48th Avenue, north of 26th Avenue, and west of Monaghan Road. The site encompasses a portion or all of Sections 19, 20, 29 and 30, Township 3 south, Range 65 west of the Sixth Principal Meridian, City of Aurora, Adams County Colorado. Today, access to the site is challenging because significant infrastructure improvements are required to gain entry onto the property.
- The proposed development consists of approximately +/- 2,505 total acres. The site is surrounded by E-470 Airport Corporate, Distribution, and I-70 Corridor uses to the north. Light industrial uses are permitted to the south, and I-70 Corridor uses are permitted to the east. West of the site within portions or all of Sections 13, 24 and 25, T3S R65W are the current GVRE, Windler and Majestic Commercenter developments.

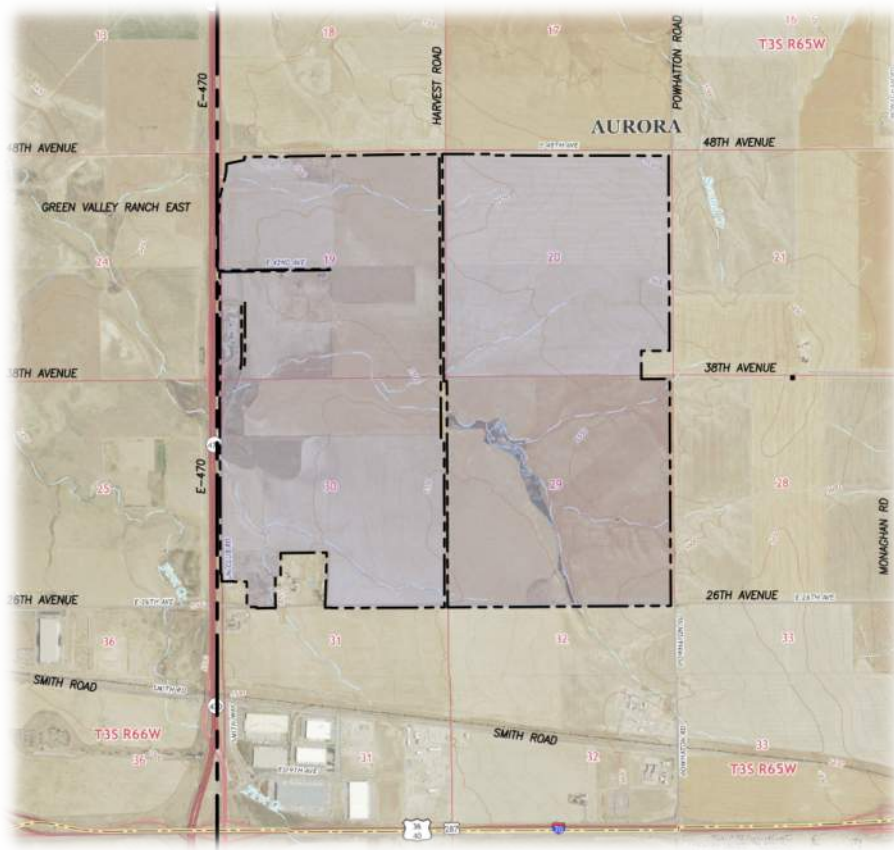


FIGURE 1: VICINITY MAP

2. Proposed Development

- The Aurora Highlands is a mixed use planned development consisting of a variety of proposed land uses that include: residential housing options, neighborhood commercial, mixed-use, corporate campus, medical campus, civic campus, schools, parks and open space and a large regional activity center. The predominant land use will be a variety of residential dwelling units with an average gross density of approximately 5.0 dwelling units per acre. Housing varieties include single-family detached, single-family attached and multi-family options.

- Please see the Land Use Map and Conceptual Lotting Exhibit included in Appendix A.

B. Domestic Water

1. Existing Water Infrastructure

- The Aurora Highlands will be served by the City of Aurora (COA) water system with the proposed development integrating into Pressure Zone 3 and Zone 4.
- Water transmission to the proposed development area is currently conveyed by means of three (3) 24" waterlines:

North Picadilly Road Transmission Line:

- 24" waterline extending from the 24" ductile iron pipe (DIP) water transmission line running east-west along the I-70 corridor north along N. Picadilly Road. As the existing waterline proceeds north parallel to N Picadilly Road, it transitions to polyvinyl chloride (PVC) pipe at approximately E 26th Avenue. The 24" PVC water transmission line continues north to E 64th before proceeding west to serve the High Point, Single Tree, and The Meadows at Dunkirk subdivisions.

East 48th Avenue Transmission Line:

- 24" PVC water line that branches off the N Picadilly Road water transmission line at E 48th Avenue and proceeds east to N Harvest Road before continuing north to E 56th Avenue. The 24" water transmission line then proceeds east along E 56th Avenue for approximately 2,000' before extending north along N Jackson Gap Street and terminating at 68th.

East 26th Avenue Transmission Line:

- 24" DIP water line which branches off the N Picadilly Road water transmission line at E 26th Avenue and proceeds east to E-470 before reducing to a 12" DIP waterline that continues north to serve the E-470 Toll Plaza "C".
- To facilitate expansion, two (2) 36" steel casings have been installed crossing under E-470 approximately 1,450' south and 3,200' north of E 48th Avenue.
- The Zone 3 hydraulic grade line (HGL) of the N Picadilly Road transmission line at E 26th Avenue is estimated at approximately 5,720'. Pressures generally increase towards the northwest boundary and reduce towards the southeast boundary of the proposed project area. Existing grades range from 5,660' to 5,420'.
- The City of Aurora's Capital Improvement Plan (CIP project numbers 233 and 219) shows future connections from the south to serve the Zone 4 portion of the site. Currently the Zone 4 connection is modeled at one location near Powhaton and E 26th Avenue at an HGL of 5,850'.

2. Water System Design Criteria

- The proposed water system to serve The Aurora Highlands development is designed in accordance with Section 5.00 – Utility Design Criteria and Construction Plans of the *City of Aurora Water, Sanitary Sewer and Storm Drainage Infrastructure Standards and Specifications (COA Standards and Specifications)*.
 - DIP or PVC pipe shall be used exclusively.
 - The water distribution system must be designed to meet the Maximum Hour Demand to Average Day Demand ratio of 4.5:1 gallons per capita per day (gpcpd).

- The water distribution system has been analyzed to meet the Maximum Day demand plus Fire Flow demand with a residual pressure of no less than 20 psi at any point within the water distribution system.
- The maximum velocity in mains larger than 24" during the Maximum Hour Demand shall not exceed 7.8 feet per second (fps).
- The maximum velocity in mains 16" to 24" Maximum Hour Demand shall not exceed 4.5 feet per second (fps).
- The maximum velocity in 8" to 12" mains during the Maximum Hour demand shall not exceed 3.0 fps.
- The maximum velocity in waterlines 6" or smaller during the Maximum Hour demand shall not exceed 2.5 fps.
- The minimum diameter for water mains in a single family detached residential area shall be 8". 6" water mains may be used as directed by COA for potential water quality issues.
- 4", 10" and 14" water mains are not allowed.
- 12" feeder lines shall be spaced between transmission lines at a maximum distance of 3,000' apart and looped.

3. Water Demand Calculations

- Water demand calculations have been completed and applied to the proposed water system in accordance with *COA Standards and Specifications*. In calculating demands, the total number of units were estimated within each planning area using multi-family and single-family lots (2.77 people/unit).
- Domestic water demand for residential loading is based on **101 gpcpd** with respective Maximum Day and Maximum Hour factors of 2.8 and 4.5.

TABLE 1: NON-RESIDENTIAL WATER DEMANDS

Zoning	Commercial Demands		
	Average Day	Max Day	Max Hour
	(gpd/acre)	(gpd/acre)	(gpd/acre)
Commercial	1,500	4,200	6,750
Industrial/Schools	1,200	3,360	5,400
Parks and Greenbelts	1,800	5,040	N/A

- Note medical campus demands and peaking factors were provided directly from the site design team and differ from the standard demands noted here.

TABLE 2: SYSTEM WIDE DEMANDS

Zoning	System Wide Demands					
	Average Day		Max Day		Max Hour	
	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)	(mgd)
Residential	2,002	2.9	5,605	8.1	9,008	13.0
Commercial	901	1.3	2,702	3.9	4,056	5.8
School	61	0.1	171	0.2	275	0.4
Parks	147	0.2	413	0.6	N/A	0.0
Total	3,111	4.5	8,891	12.8	13,338	19.2

- Portions of The Aurora Highlands previously studied in the *Master Utility Report for Green Valley* have been recalculated based on updated land use and unit densities. The areas of GVRE which have not been absorbed by The Aurora Highlands development will utilize land use and densities from the *Green Valley – Amendment 1 Master Utility Report*, updated for current COA loading and population density criteria. Refer to Appendix B for complete demand calculations.

4. Hydraulic Model

- The proposed water distribution system for The Aurora Highlands has been modeled using Bentley WaterGEMS. Utilizing the calculated demands, several scenarios were run within the model to accurately capture proposed operating conditions of the water system:
 - Average Day Demand
 - Max Day Demand
 - Max Hour Demand
 - Max Day Demand Fire Flow Analysis
- The fire flow analysis associated with the Max Day Demand scenario is an integrated function that analyzes a selection designated as fire hydrants. This analysis provides the maximum available fire flow at the selected hydrants with a minimum pressure residual of 20 psi.
- The connection to the existing system utilized an assumed Zone 3 HGL of 5,720' and a Zone 4 HGL of 5,850'. Incoming water was modeled by means of inserting four Zone 3 and one Zone 4 reservoir with elevations matching the HGL where the 24" water transmission lines begin to provide service to the area. Pressure reducing valves (PRVs) are located along all water lines that transition between the two zones.
- Water system elevations were assigned to junctions according to the existing elevations. These preliminary or existing elevations may change due to project design requirements.
- A Hazen-Williams factor of C=130 was applied to existing waterlines with C=150 being applied to proposed PVC waterlines.

5. Hydraulic Modeling Results

Average / Max Day / Max Hour Analysis

TABLE 3: HYDRAULIC MODELING RESULTS

Scenario	Minimum Pressure (psi)	Node	Maximum Pressure (psi)	Node	Maximum Velocity (fps)	Pipe
Average Day	55	PA-40.1	115	J-16	0.6	WT-4
Max Day	55	PA-40.1	115	J-16	1.7	WT-4
Max Hour	54	PA-40.1	115	J-16	2.5	WT-4

Fire Flow Analysis

- In accordance with *COA Standards and Specifications* the Max Day Demand Fire Flow Scenario was run to verify adequate fire flow system wide with a residual pressure of no less than 20 psi. The scenario was run utilizing all junctions representing residential, commercial, and industrial fire flow availability. The following fire flow requirements were used:
 - Residential, 1,500 gal/minute for 2 hours
 - Commercial, 2,500 gal/minute for 2 hours
 - Schools/Industrial, 3,500 gal/minute for 3 hours

- The Fire Flow analysis indicated that the proposed water system satisfies the fire flow constraints of the minimum flow needed per zoning designation and a minimum pressure residual of 20 psi. Multiple pipes show velocities at or above 10 fps in this scenario. Each of these locations was reviewed and it was determined that the higher velocities are driven by the overall nature of the model, large demands placed at single nodes for simplicity in modeling. When the development is constructed, these demands will be more evenly dispersed throughout the system and not create the higher velocities seen at this stage of modeling. Complete fire flow results are provided in Appendix B
- Exhibit WT1 and WT2 show the proposed water system layout with line sizes corresponding to the water model.

C. Sanitary Sewer

1. Existing Sanitary Sewer Infrastructure

- The Aurora Highlands will be served by the City of Aurora (COA) sanitary sewer system. Existing sanitary infrastructure is minimal in the project area. COA has anticipated growth and development in this area and constructed the First Creek Lift Station and approximately 9,730 linear feet (LF) of 36" PVC sanitary sewer line. The lift station is located off of N Rome Street approximately 600' south of E 48th Avenue. The 36" sanitary sewer line proceeds east from the lift station in a dedicated easement and terminates on E 48th Avenue approximately 1,180' west of N Harvest Road.
- There are additional 15" sanitary gravity lines within 48th Avenue and parallel 10" and 12" force mains within Harvest Road north of the site.
- The First Creek Lift Station (FCLS) has a current capacity of 1.7 mgd. The City is currently designing improvements to increase the FCLS capacity. The capacity of the FCLS will be taken into account for phasing and layout of the proposed sanitary sewer system.
- The Second Creek Interceptor (SDI) is currently constructed to approximately Harvest Road and 56th Ave. The Sun Empire development is extending the SDI to approximately Jackson Gap Rd and Second Creek. A separate development will extend the SDI to approximately Powhaton and Second Creek and King Ranch will extend the SDI to approximately 48th Ave and Second Creek.

2. Sanitary Sewer Design Criteria

- The proposed sanitary sewer system to serve The Aurora Highlands development is designed in accordance with Section 5.00 – Utility Design Criteria and Construction Plans of the *City of Aurora Water, Sanitary Sewer and Storm Drainage Infrastructure Standards and Specifications* (COA Standards and Specifications) and is consistent with the City of Aurora Wastewater Master Plan (WWMP).
 - Maximum and minimum peaking factors of 4 and 1.7, respectively.
 - Assume infiltration at 10% of average flow.
 - Flow velocity shall not exceed 10 fps flowing full.
 - A Manning's "n" value of 0.011 for new PVC pipe.
 - A minimum slope of 0.4% was utilized for the majority of the analysis, a lower slope may be used on a limited basis where dictated by topographic constraints. Any proposed slope less than 0.4% must be approved by the City on a case-by-case basis.
 - Depth of flow in pipes 12 inches or smaller should not exceed 75% of capacity.
 - Depth of flow in pipes larger than 12 inches should not exceed 80% of capacity.

- Minimum velocity of 2 fps at least once per day. Minimum slope of 0.4% will be analyzed for pipes to meet the 2 fps requirement.

3. Sanitary Sewer Flow Generations

- Sanitary sewer loading calculations have been completed and applied to the proposed sanitary system in accordance with *COA Standards and Specifications*. In calculating residential loading rates, the total number of units were estimated within each planning area using multi-family and single-family lots (2.77 people/unit).
 - Average flow generation of 68 gallons per capita per day (gpcpd).
 - Commercial sanitary loading rates are based on 1,500 gallons per acre per day.
 - School/Industrial sanitary loading rates are based on 1,200 gallons per acre per day.
 - Peak factors were based on Curve “A” of Figure 3-1 of *ASCE Manuals and Reports on Engineering Practice No. 60, Gravity Sanitary Sewer Design and Construction*. Sanitary sewer flow calculations are provided in Appendix C.
- Sanitary basin boundaries for The Aurora Highlands were determined based on the existing grade and flow direction of the site. Four major on-site sanitary basins were identified. There are multiple offsite basins contributing sanitary flows to The Aurora Highlands proposed development. The sanitary sewer system has been analyzed to determine the requirements to accommodate these offsite basin flows, if necessary, with contributing flows based on areas and land uses from the *Master Utility Report for Green Valley*. Offsite loading rates have been updated to incorporate the COA criteria included herein. These offsite basins are included with the sanitary sewer flow calculations and provided in Appendix C.

4. Sanitary System Sewer Sizing

- Preliminary sanitary sewer system sizing was determined in accordance with the *COA Standards and Specifications* for maximum depth of flow of 75% capacity for all pipe sizes 12 inches and smaller and 80% for pipe sizes larger than 12 inches.
- Pipe capacities and velocity requirements were verified in Bentley FlowMaster.
- Design points were established based on existing grades and flow direction, proposed grades are not known at this time but are expected to generally follow existing. Design point and flow routing calculations are provided in Appendix C. The existing 36” sanitary sewer line which routes flow to the First Creek Lift Station is capable of collecting flows generated in The Aurora Highlands Basins 1 and 2, all ALC tributary basins and from Offsite Basins 2, 5, 6 and 7.
- Flow generated by The Aurora Highlands Basin 3 are within the Second Creek watershed and are tributary to the planned Second Creek Regional Lift Station, see additional discussion below.
- Refer to Exhibits SS-1 and SS-2 for The Aurora Highlands and offsite basin designations and the recommended layout for full buildout of The Aurora Highlands project area. Sizes shown are based on industry standard line sizes and of typical availability of pipe and appurtenances.

5. Wastewater Master Plan / Lift Station Capacity

- The Aurora Highlands lies within the First Creek and Second Creek watersheds. Off-site basins within the Box Elder watershed have been included in this analysis at the request of the City. In general, the proposed development can be fully supported by the existing First Creek Lift Station (FCLS). However, since the area that lies within the Second Creek and Box Elder watersheds are lower in elevation than the existing system, temporary lift stations and force main(s) may be required to immediately serve these areas. Per the Aurora “Master Sewer Plans as of August 26, 2009”, a

permanent gravity sewer system will be provided and funded by Aurora Capital Improvement Projects, thus, ultimate sewer flows from the Second Creek watershed will be re-directed to the north to the new treatment facility. A timetable for these improvements has yet to be determined.

- The following information on the City of Aurora's Wastewater Master Plan was provided by Aurora Water (Alicia Dupree via email 8/16/2017):
 - The City of Aurora Wastewater Master Plan (currently under review) evaluated three major infrastructure alternatives necessary to accommodate future planned development. The selected alternative is consistent with Metro Wastewater Reclamation District's (MWRD) current plan to construct the Second Creek Interceptor (SDI). The SDI will convey wastewater flows from northern Aurora via gravity to MWRD's Northern Treatment Plant (NTP) in Brighton.
 - In the absence of the SDI, temporary lift stations will be needed to accommodate wastewater flows in northern Aurora. The City of Aurora is currently designing and planning to construct a temporary Second Creek Regional Lift Station (SCRLS). The SCRLS is designed to accommodate a maximum 3.5 mgd of flow from the Second Creek Basin. This lift station will be located on Second Creek at 68th Avenue and will pump wastewater south to the First Creek Lift Station (FCLS) that has a current capacity of 1.7 mgd. The City is currently designing improvements to increase the FCLS capacity.
 - Once the SDI is complete, SCRLS will be decommissioned and all wastewater will flow by gravity to MWRD's NTP. Additionally, current plans also call for a First Creek Interceptor branch to MWRD's SDI. This interceptor would convey wastewater flows from FCLS north to the SDI. Once the First Creek Interceptor is complete, FCLS will also be decommissioned.
- For areas tributary to First Creek Lift Station and the Second Creek Regional Lift Station, the City of Aurora will need to build master planned interceptors to the respective station. If wastewater flows exceed lift station capacities ahead of the SDI and First Creek Interceptor to be built by year 2023 by the City of Aurora, service to the Second Creek and Box Elder watersheds within The Aurora Highlands will be provided by either:
 - The developer may construct the ultimate sanitary sewer outfall. Any infrastructure built by developer(s) outside their property may be subject to reimbursement by the City per the applicable reimbursement, development or annexation agreement associated with the developer(s) property.
 - The existing lift stations may be upsized to accommodate the additional flow. The City of Aurora will not participate in interim/temporary improvements beyond what the City had planned/budgeted for to date.
 - If the Box Elder watershed does not have an available outfall, an interim lift station may be constructed in the northeast corner of Section 21 along with a forcemain to lift west along the northern border of Section 21 to the Second Creek Watershed.
- The capacity of the First Creek Lift Station will be taken into account for phasing and layout of the proposed sanitary sewer system.
- Based on the updated offsite basin calculations from the approved *Master Utility Report for Green Valley* total sanitary flows generated by The Aurora Highlands and noted offsite upstream tributary basins are:
 - First Creek Watershed: 13.0 mgd
 - Second Creek Watershed: 2.2 mgd
 - Box Elder Watershed: 2.9 mgd

D. Conclusions

1. Recommendations and Phasing

- The water system will utilize pressures from Zone 3 and Zone 4 with connections to adjacent transmission lines.
- Waterline alignments and sizes are subject to change depending on the timing of construction of specific phases. Additional looping may be required.
 - Initial development will begin surrounding the 38th Avenue and Main Street intersection. At all times two points of connection (a looped system) will be required as consecutive planning areas come on-line.
 - Interim wastewater improvements will move outwards (north and south) from 38th Avenue/The Aurora Highlands Parkway.
- Sanitary sewer lines and any proposed temporary lift stations are subject to change depending on when specific areas are developed.
 - Initial development will begin surrounding the 38th Avenue and Main Street intersection. To serve the first filling(s) 24" to 36" lines will have to be constructed from this area north to the existing 36" line connecting to the FCLS.
 - Interim wastewater improvements will move outwards (north and south) from 38th Avenue/The Aurora Highlands Parkway.
- Any proposed layout and sizing changes are required to meet the intent of the infrastructure shown in this Master Utility Report and must remain in compliance with the City's Master Plans.

2. Summary of Concept

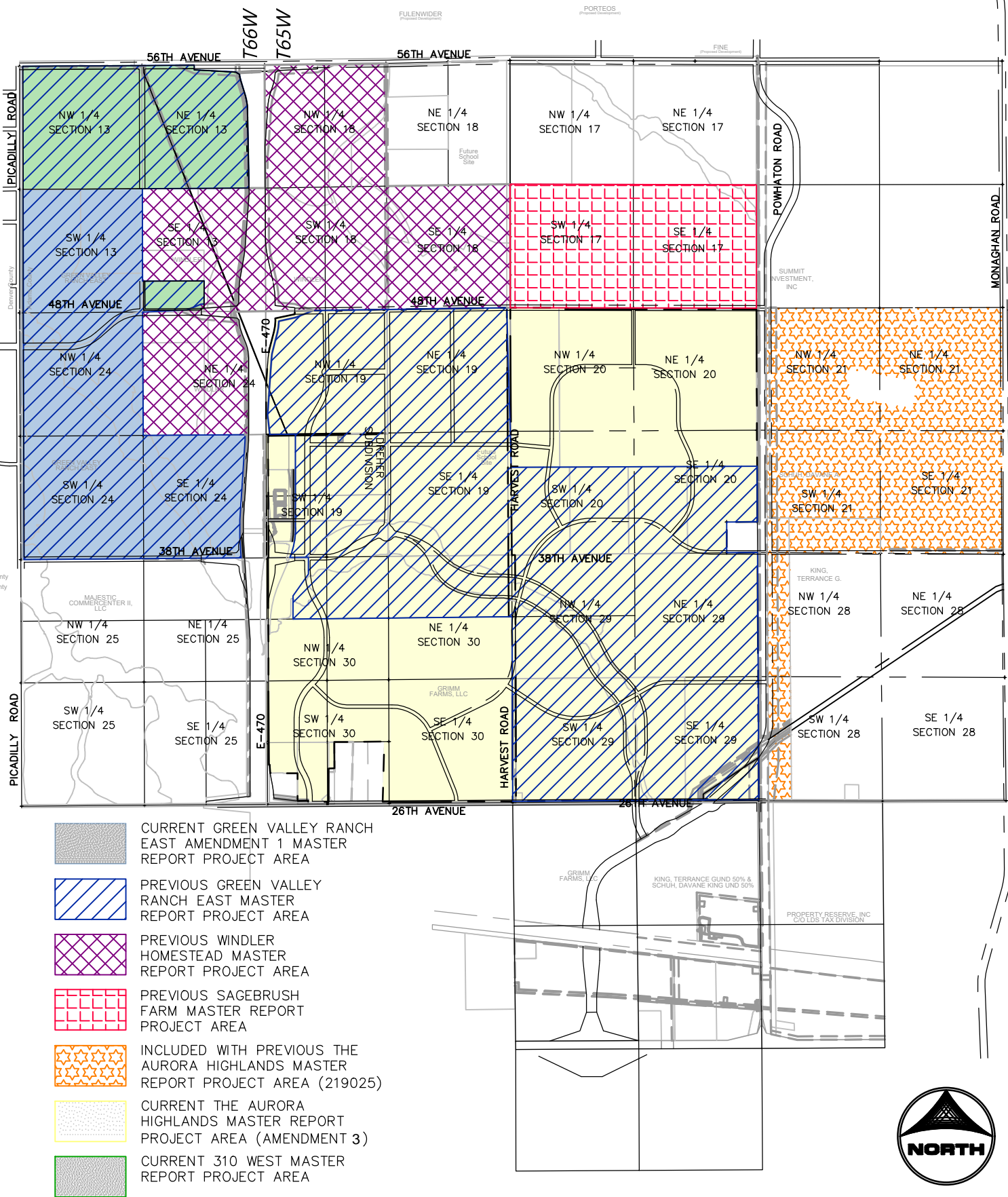
- This Master Utility Report is in compliance with the City of Aurora design criteria.
- The following conclusions are drawn based on this study:
 - A potable water system comprised of 6", 8", 12", 16", 24" and 36" lines is proposed to tie into the existing network and will satisfy the requirements for the Max Day plus Fire Flow scenario.
 - Proposed 8" local sanitary sewer lines will tie into larger 10", 12", 15", 18", 24" and 30" proposed and existing sanitary trunk lines out-falling to the First Creek Lift Station and the planned Second Creek Regional Lift Station.
 - The sanitary alignment can maintain minimum slopes and acceptable design depths for the proposed development within the majority of the project area. The outfall trunk line from DP 8 to DP 19 will have slopes less than minimum (0.25%) but will maintain minimum velocities.

E. List of References

1. Water, Sanitary Sewer and Storm Drainage Infrastructure Standards and Specifications, 2022 Edition, City of Aurora, Colorado.
2. *The Aurora Highlands Master Utility Report*, HR Green Development LLC, January 2019, EDN 219069MU1.
3. *The Aurora Highlands Master Utility Report – Amendment 1*, HR Green Development LLC, October 2019, EDN 219069MU2.
4. *The Aurora Highlands Master Utility Report – Amendment 2*, HR Green Development LLC, March 2023, EDN 219069MU3.
5. *Aerotropolis Logistics Center Master Utility Report*, HR Green Development LLC, February 2024, in process.
6. *Master Utility Report for Green Valley*, The Lund Partnership, May 2006, EDN 206120.
7. *Green Valley – Amendment 1 Master Utility Report*, Calibre Engineering Inc., EDN 218184.
8. *Master Utility Report Windler Homestead*, Carter & Burgess, Inc. January 2004, EDN 204061.
9. *Master Utility Report Addendum 1 Windler Homestead*, Carter & Burgess, Inc. November 7, 2005, EDN 204061.
10. *Porteos, Harvest Road and 56th Avenue Master Utility Report*, Martin/Martin Consulting Engineers, March 2016, EDN 216043MU.
11. *Master Utility Report for Sagebrush Farm*, Carroll & Lange, Inc. August 31, 2006, EDN 206194.
12. *Gravity Sanitary Sewer Design and Construction: Second Edition*, American Society of Civil Engineers, 2007.

APPENDIX A MAPS

Xrefs: 01Base - FDP; 00BoundaryHatch; 00EMA_REV1



HRGreen.com

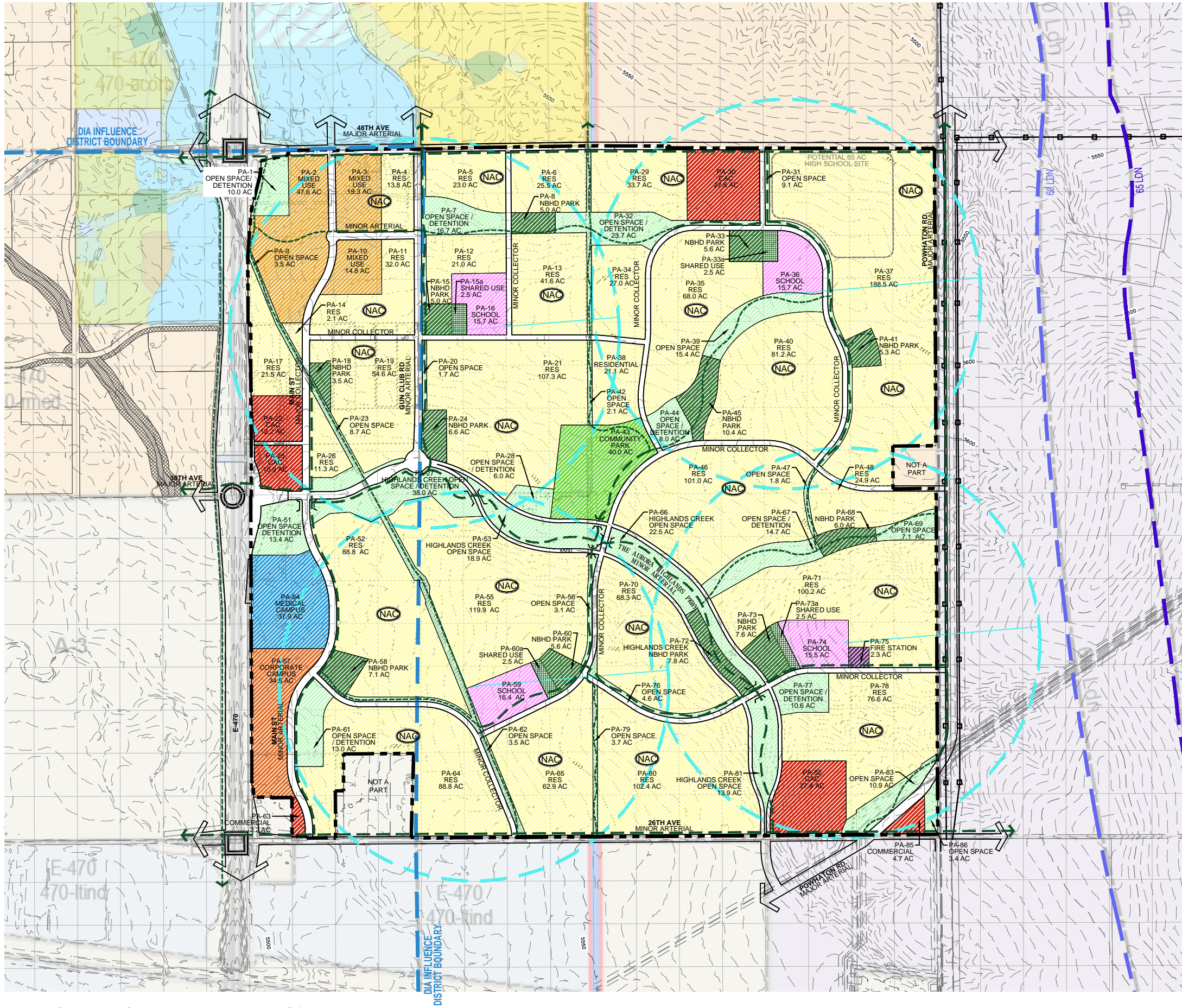
THE AURORA HIGHLANDS MASTER REPORT – AMENDMENT 3 PROJECT AREA



SHEET
X1
SCALE: NTS
OCTOBER 2024

CHECKED BY: EM, DR
DRAWN BY: DJ

(PLAN USED FOR INITIAL MUS)

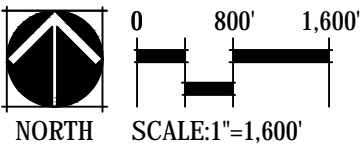


LEGEND

- PROPERTY BOUNDARY
- EXISTING/PROPOSED ARTERIAL & COLLECTOR ROAD
- POWERLINES
- WHELEN SIREN SERVICE RADIUS
- EASEMENT
- 10' REGIONAL TRAIL
- 14' REGIONAL TRAIL
- EXISTING OVERPASS
- FUTURE OVERPASS
- RESIDENTIAL
- MIXED USE
- OPEN SPACE/DETENTION
- COMMUNITY PARK
- NEIGHBORHOOD PARK
- SCHOOL / PARK SHARED USE
- SCHOOL
- COMMERCIAL
- CORPORATE CAMPUS
- MEDICAL OFFICE
- FIRE STATION

NOTES:

- 1) CONTOURS SHOWN REPRESENT 5' INTERVAL SPACING.
- 2) APPROXIMATELY 26 ACRES OF NAC WILL BE LOCATED WITHIN THE AURORA HIGHLANDS PROPERTY BOUNDARY TO SERVE A 1/4 MILE WALKABLE SERVICE RADIUS. LOCATIONS SHOWN IN THIS FDP ARE CONCEPTUAL. FINAL SIZE (GENERALLY .05 - 3 ACRES) AND LOCATION SHALL BE REFLECTED IN FUTURE CSP SUBMITTALS AND SHALL NOT TRIGGER A FDP AMENDMENT IF NAC LOCATIONS CHANGE. THE DISTRICT SHALL OWN AND MAINTAIN ALL NACS.
- 3) 10' AND 14' REGIONAL TRAILS ARE SHOWN. ADDITIONAL WIDTHS SHALL BE IDENTIFIED WITH INDIVIDUAL ISP/CSPS.
- 4) PA-49, PA-50, AND PA-84 ARE NOT USED.



HIGHLANDS

AURORA, COLORADO

THE AURORA

MASTER FRAMEWORK DEVELOPMENT PLAN

Owner:
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CIVIL ENGINEER:

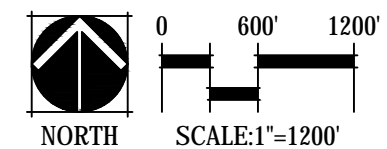
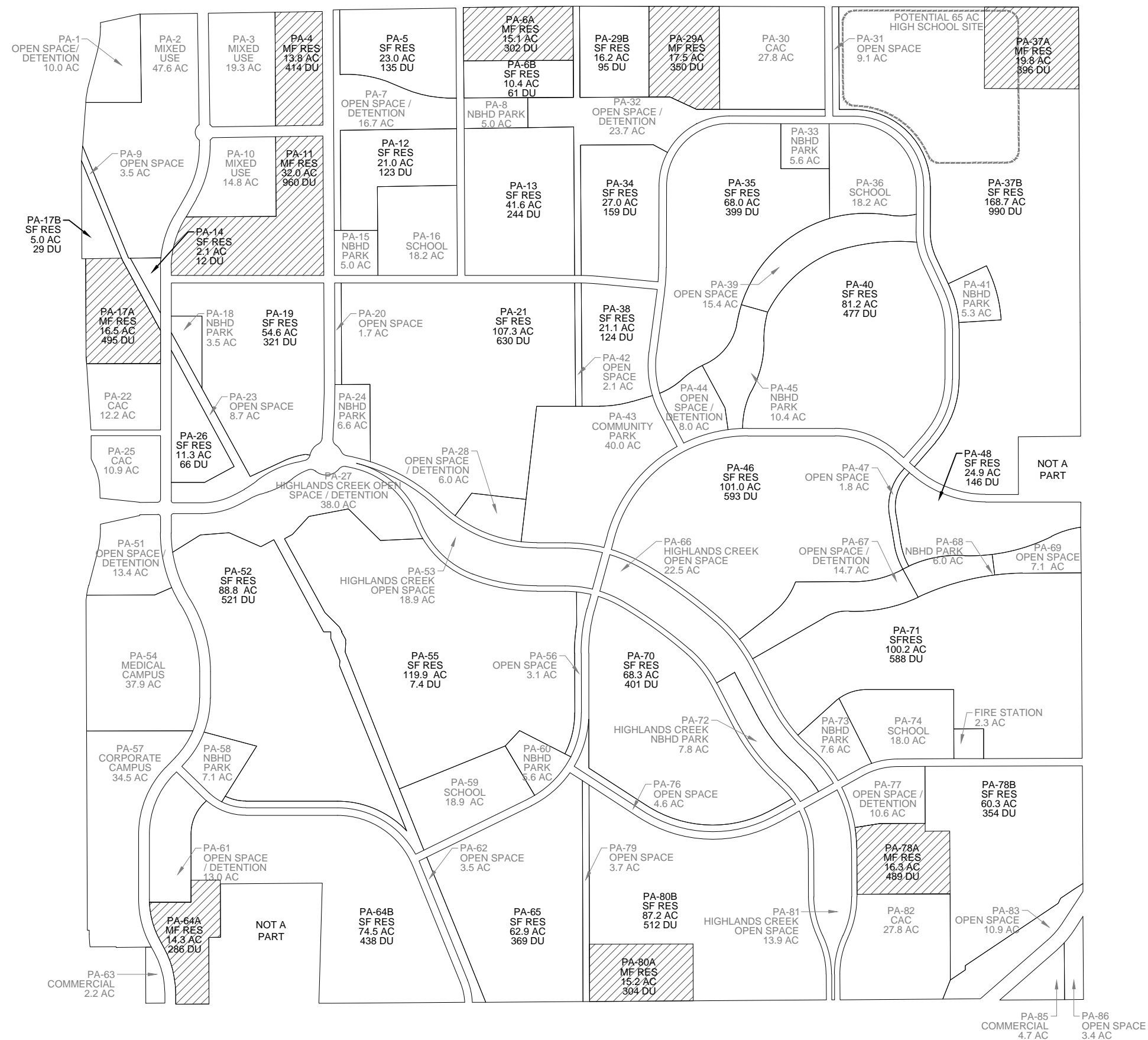


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JUNE 9, 2017
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DECEMBER 21, 2018
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MAY 3, 2019

Sheet Title
OVERALL
LAND USE MAP

Sheet Number

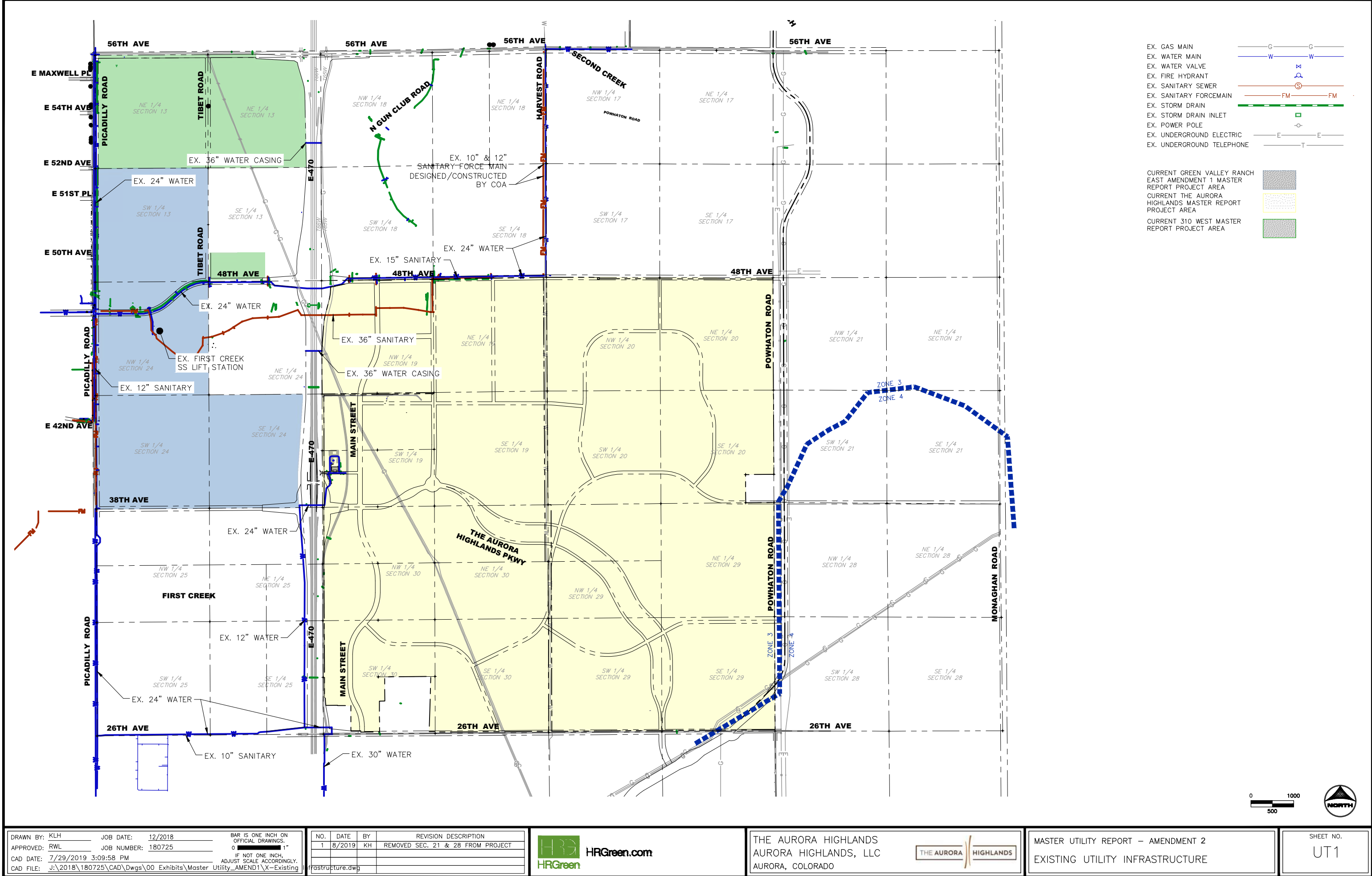
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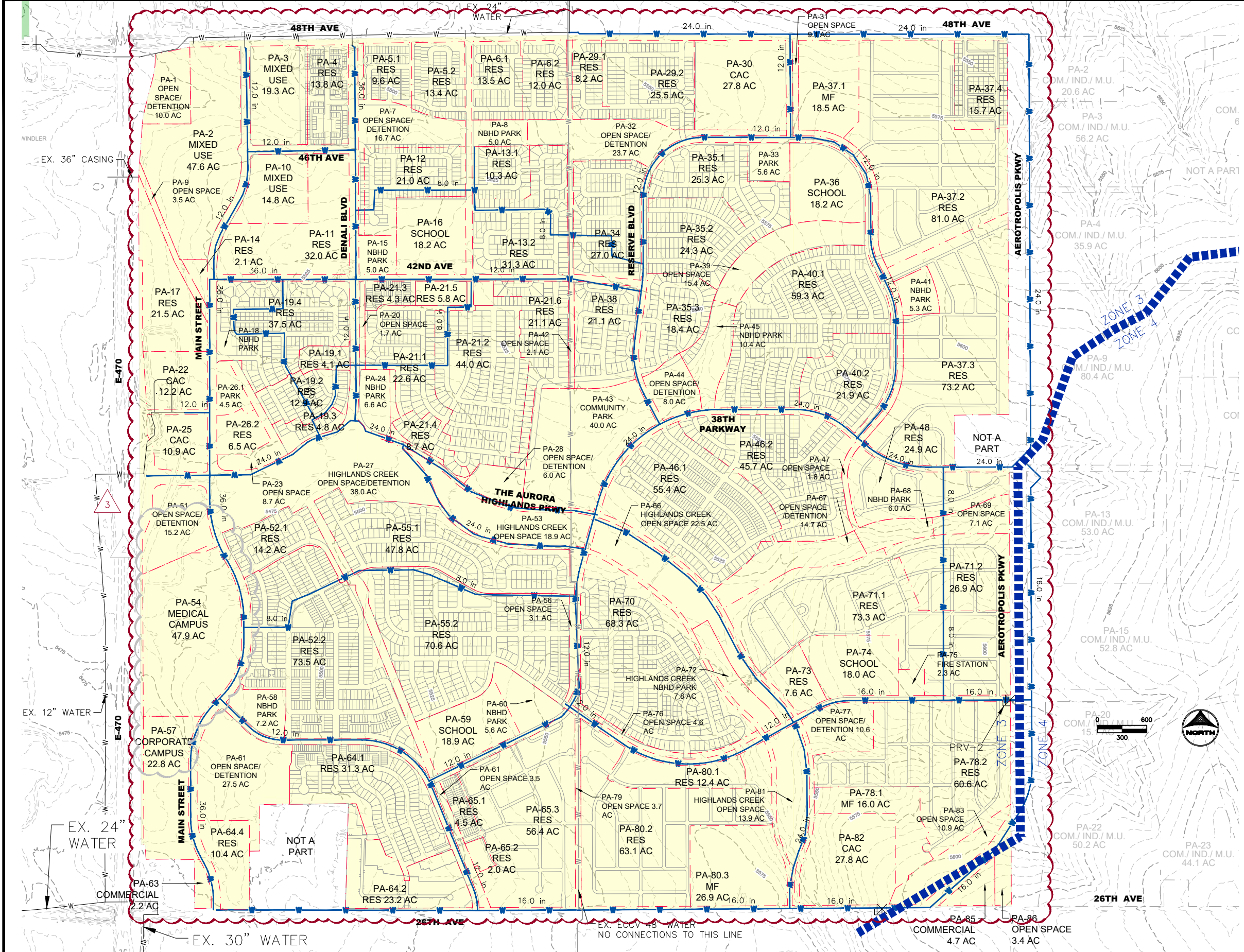
THE AURORA HIGHLANDS :: INFRASTRUCTURE DENSITY PLAN (PLAN USED FOR INITIAL MUS)

06/27/18

PREVIOUS NORRIS VERSION - SEPTEMBER 2021											CURRENT MATRIX VERSION							
2021 CONCEPTUAL LOTTING PLAN											2023 CONCEPTUAL LOTTING PLAN COMPARISON							
Village Name	Parcel Number	Actual Builder/Product Type	Unit Count	Phase	PA total	Small Lots	Actual Parcel Acreage	Actual PA Density	Status	Village Unit Total	Parcel Number	Conceptual Product Type	Conceptual Unit PA Count	Conceptual PA Total	Conceptual PA Acreage	Conceptual PA Density	Yield Difference	
NORTH HIGHLANDS MARKET	PA-4	Chryscape 31x55'	143				13.8	10.4			PA-4	Chryscape 31x55'	143	143	13.8	10.4	-295	
	PA-21	Multi Family 30 DU/2c	885				32.0	30.7			PA-21	Multi Family 30 DU/2c	885	885	32.0	30.7	0	
	PA-37	Multi Family 20 DU/AC	669				21.5	30.8			PA-37	Multi Family 20 DU/AC	669	669	21.5	30.8	0	
48th PLACE	PA-5.1	Elly Loaded 35'x60'	69				26.0	7.3			PA-5.1	Elly Loaded 35'x60'	69	69	26.0	7.3	-229	
	PA-5.2	Brownstone 40'x80'	98				7.8	23.0			PA-5.2	Brownstone 40'x80'	98	98	7.8	23.0	0	
	PA-6.1	45'x100'	71				25.5	5.2			PA-6.1	45'x100'	71	132	25.5	5.2	-123	
	PA-29.1	Multi Family 20 DU/AC	50				12.7	5.0			PA-29.1	45'x100'	50	168	33.7	5.0	-273	
	PA-29.2	Multi Family 20 DU/AC	118				27.6	3.0			PA-29.2	50'x100'	118	168	33.7	5.0	-273	
HIGHLANDS GREEN	PA-18	Pulte: Motor Court 50' x 55'	8	08-PP	17	8	3.5	4.9	In Process		PA-18	Pulte: Motor Court 50' x 55'	8	17	3.5	4.9	-12	
	PA-18.1	Pulte: 60' x 110'	3								PA-18.1	60' x 110'	3	9	4.1	2.2	0	
	PA-19.1	Pulte: 50' x 110'	3	04-PP	9	0	4.1	2.2	Admin Approval		PA-19.1	50' x 110'	3	9	4.1	2.2	0	
	PA-19.2	Pulte: 60' x 110'	32	05-PP	47	0	15.6	3.0	Admin Approval		PA-19.2	60' x 110'	32	47	15.6	3.0	0	
	PA-19.3	Pulte: 60' x 110'	15								PA-19.3	60' x 110'	15	13	13	2.1	6.2	0
	PA-18.3	Pulte: Motor Court 50' x 55'	64								PA-18.3	Motor Court	72	72	72	2.1	6.2	0
	PA-18.4	Pulte: 50' x 110'	37	08-PP	157	64	37.7	4.2	In Process		PA-18.4	50' x 110'	40	174	37.7	4.6	0	
	PA-21.1	Richmond: SFD 60' x 120'	54								PA-21.1	60' x 110'	54	62	62	5.9	10.5	0
	PA-21.2	Richmond: SFD 60' x 120'	30	01-CSP	84	0	27.6	3.0	Approved		PA-21.2	60' x 110'	30	84	27.6	3.0	0	
	PA-21.3	Richmond: SFD 60' x 120'	73								PA-21.3	50' x 110'	73	50	50	11.0	4.4	-6
	PA-21.4	Richmond: SFD 60' x 120'	105	02-CSP	182	0	52.9	3.4	Approved		PA-21.4	60' x 110'	105	182	52.9	3.4	0	
	PA-21.5	Richmond: Duplex 20'x80'	44	02-CSP	46	44	4.4	10.0	Approved		PA-21.5	Duplex 20' x 80'	44	44	4.4	10.0	0	
	PA-21.6	Richmond: SFD 60' x 120'	26	06-PP	26	0	5.1	5.1	Approved		PA-21.6	60' x 110'	26	26	5.1	5.1	0	
	PA-21.7	Richmond: Duplex 20'x80'	62	14-PP	62	62	5.9	10.5	Admin Approval		PA-21.7	Duplex 20' x 80'	62	62	5.9	10.5	0	
	PA-21.8	Richmond: SFD 50' x 110'	69								PA-21.8	50' x 110'	69	69	69	5.1	5.1	0
	PA-21.9	Richmond: SFD 60' x 120'	24	14-PP	93	0	21.7	4.3	Admin Approval		PA-21.9	60' x 110'	24	93	21.7	4.3	0	
	PA-38	Richmond: 50' x 110'	12	14-PP	62	0	21.1	3.0	Admin Approval		PA-38	Motor Court	48	154	27.7	5.6	17	
		PA-38	Richmond: 60' x 120'	51								PA-38	50' x 110'	32	63	21.1	3.0	0
												PA-38	60' x 120'	51	63	21.1	3.0	0
	THE RESERVE	PA-35.1										PA-35.1	64' x 120'	79				
PA-35.2											PA-35.2	52' x 120'	107	259	70.3	3.7	-107	
PA-35.3											PA-35.3	60' x 100'	73	73				
PA-37.1		Multi Family 20 DU/AC	124								PA-37.1	Multi Family 20 DU/AC	124	124				
PA-37.2		60' x 105'	138								PA-37.2	60' x 105'	138	138				
PA-37.3		35' x 90' (Alley Loaded)	230								PA-37.3	35' x 90' (Alley Loaded)	230	230				
PA-37.4		45' x 105'	124								PA-37.4	45' x 105'	124	1,254	188.5	6.7	122	
PA-37.5		45' x 105'	258								PA-37.5	45' x 105'	258	258				
PA-37.6		50' x 55' (motor court)	136								PA-37.6	50' x 55' (motor court)	136	136				
PA-40		Tri-Pointe: 45' x 115'	135								PA-40	Tri-Pointe: 45' x 115'	135	135				
	Tri-Pointe: 50' x 115'	143									Tri-Pointe: 50' x 115'	143	143					
	Century: 50' x 115'	40									Century: 50' x 115'	40	352	81.2	4.3	77		
	Century: 60' x 115'	34									Century: 60' x 115'	34	34					
HIGHLANDS CREEK EAST	PA-46	Century: 50' x 115'	74								PA-46	Century: 50' x 115'	74					
	PA-46	Century: 60' x 115'	46								PA-46	Century: 60' x 115'	46	384	101.0	3.8	-52	
	PA-47	Century: Motor Court	92								PA-47	Century: Motor Court	92	92				
	PA-48	Bridgewater: 50' x 110'	72								PA-48	Bridgewater: 50' x 110'	72	72				
	PA-48	Bridgewater: 70' x 120'	100								PA-48	70' x 120'	73	73	24.9	2.9	-3	
	PA-71	60' x 120'	204								PA-71	60' x 120'	204	204				
	PA-71	45' x 110'	161								PA-71	45' x 110'	161	584	100.2	5.8	-59	
	PA-71	28' x 80' (Alley Loaded)	170								PA-71	28' x 80' (Alley Loaded)	170	170				
	PA-78.1	Multi Family 14.5 DU/AC	402								PA-78.1	Multi Family 14.5 DU/AC	402	402				
	PA-78.2	40' x 120' (Dugies)	118								PA-78.2	40' x 120' (Dugies)	118	118				
	45' x 105'	115									45' x 105'	115	115					
	32' x 95' (Alley Loaded)	172									32' x 95' (Alley Loaded)	172	807	76.6	10.5	-80		
West Village WEST VILLAGE	PA-52.1	Bridgewater: 60'x110'	23	10-PP	40	0	11.9	3.4	Admin Approval	630	PA-52.1	60' x 110'	23	40	14.2	2.8	0	
	PA-52.2	Taylor Morrison: Dup 40'x120'	122	15-PP	417	207	73.5	5.7	In Process		PA-52.2	Taylor Morrison: Dup 40' x 120'	207	207				
	PA-52.3	Taylor Morrison: SFD Rear 42'x90'	307								PA-52.3	Taylor Morrison: Duplex 40' x 120'	29	417	73.5	5.7	0	
	PA-52.4	Taylor Morrison: SFD 45'x100'	29								PA-52.4	Taylor Morrison: 45' x 100'	58	58				
PA-64.1	DR Horton: Dup 25'x80'	94	07-PP	94	94	8.8	7.5	Conceptual		PA-64.1	Horton Rear 25' x 80'	70	70					
PA-64.2	DR Horton: SFD 50'x110'	81	07-PP	307	0	56.6	1.9	Conceptual		PA-64.2	Horton 50' x 110'	106	179	31.3	5.7	6		
PA-64.3	DR Horton: SFD 60'x110'	26								PA-64.3	Horton 60' x 110'	3	3					
PA-64.4	DR Horton:Townhomes	TBD	TBD				10.1		Conceptual		PA-64.4	Local Homes Stacked Flats	368	368			87	
PA-64.5	Orion Frederix: Tri 20'x70'	TBD	TBD								PA-64.5	Multi Family 20 DU/AC	300	300	10.4	28.8	-37	
Highlands Creek West	PA-55.1	Bridgewater: 60'x110'	69	10-PP	136	0	47.1	2.9	Admin Approval	1,365	PA-55.1	60' x 110'	69	137	47.8	2.9	1	
	PA-55.2	Tri Pointe: SFD Rear 42'x90'	46	16-PP	273	46	72.8	3.8	In Process		PA-55.2	70' x 120'	68	68				
	PA-55.3	Tri Pointe: SFD 55'x115'	113								PA-55.3	60' x 115'	113	113				
	PA-55.4	Tri Pointe: SFD 60'x115'	114								PA-55.4	60' x 115'	114	273	70.6	3.9	0	
	PA-65.1	DR Horton: Dup 25'x80'	94	07-PP	94	94	10.1	8.7	Conceptual		PA-65.1	Rear 42' x 90'	46	46				
	PA-65.2	DR Horton: SFD 50'x110'	147	15-PP	222	0	55.5	4.0	Conceptual		PA-65.2	Horton Rear 25' x 80'	44	44	27.0	1.6	-44	
	PA-65.3	DR Horton: SFD 60'x110'	75								PA-65.3	Horton Rear 25'x80'	24	24				
	PA-70	Century: Motor Court 50'x55'	96	TBD	284	185	68.3	4.2	Conceptual		PA-70	60' x 110'	0	0				
	PA-70	Century: SFD 50'x115'	89								PA-70	60' x 110'	0	24	35.9	0.7	-198	
	PA-70	Century: SFD 60'x115'	99															
PA-80.1	DR Horton: Dup 25'x80'	94	18-PP	94	94	9.7	9.7	Conceptual		PA-80.1	Horton Duplex 25' x80'	0						
PA-80.2	DR Horton: SFD 50'x110'	178	21-PP	268	0	65.8	4.1	Conceptual		PA-80.2	Horton 50' x 110'	135	202					
PA-80.3	DR Horton: SFD 60'x110'	90								PA-80.3	Horton 60' x 110'	67						
PA-80.4	DR Horton: Dup 25'x80'	94								PA-80.4	Motor Court	86						
PA-80.5	DR Horton: SFD 50'x110'	147								PA-80.5	50' x 115'	93	285	68.3	4.2	1		
PA-80.6	DR Horton: SFD 60'x110'	90								PA-80.6	60' x 115'	97						
PA-80.7	DR Horton: Dup 25'x80'	94								PA-80.7	Horton Duplex 25' x80'	94	94	12.4	7.58	0		
PA-80.8	DR Horton: SFD 50'x110'	178								PA-80.8	Horton 50' x 110'	135						
PA-80.9	DR Horton: SFD 60'x110'	90								PA-80.9	Horton 60' x 110'	86						
PA-80.10	DR Horton: Dup 25'x80'	94								PA-80.10	Horton Duplex 25' x80'	94						
PA-80.11	DR Horton: SFD 50'x110'	178								PA-80.11	Horton 50' x 110'	135						
PA-80.12	DR Horton: SFD 60'x110'	90								PA-80.12	Horton 60' x 110'	86						
PA-80.13	DR Horton: Dup 25'x80'	94	</															



Xref: 00UT; 00EPN; 01Base - FDP; 00ANNO; 00BoundaryHatch; W-GIS-EXWATER; 00EMA_REV1



CURRENT THE AURORA
HIGHLANDS MASTER REPORT
PROJECT AREA

- NOTES:
1. CONSTRUCTION OF A ZONE 4 CONNECTION WILL BE REQUIRED IF IT IS NOT ALREADY IN PLACE WHEN DEVELOPMENT IN ZONE 4 OCCURS.
 2. LINE AND PRV LOCATIONS ARE APPROXIMATE AND WILL BE FINALIZED WITH THE CSP FOR EACH PLANNING AREAS.

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NO.	DATE	BY	REVISION DESCRIPTION
1	8/2019	KH	REMOVED SEC. 21 & 28 FROM PROJECT
2	11/2022	KH	REVISED AREA AND LAND USE IN PA-55
3	5/2024	KH	REVISED AREAS, UNIT COUNTS AND LAND USES

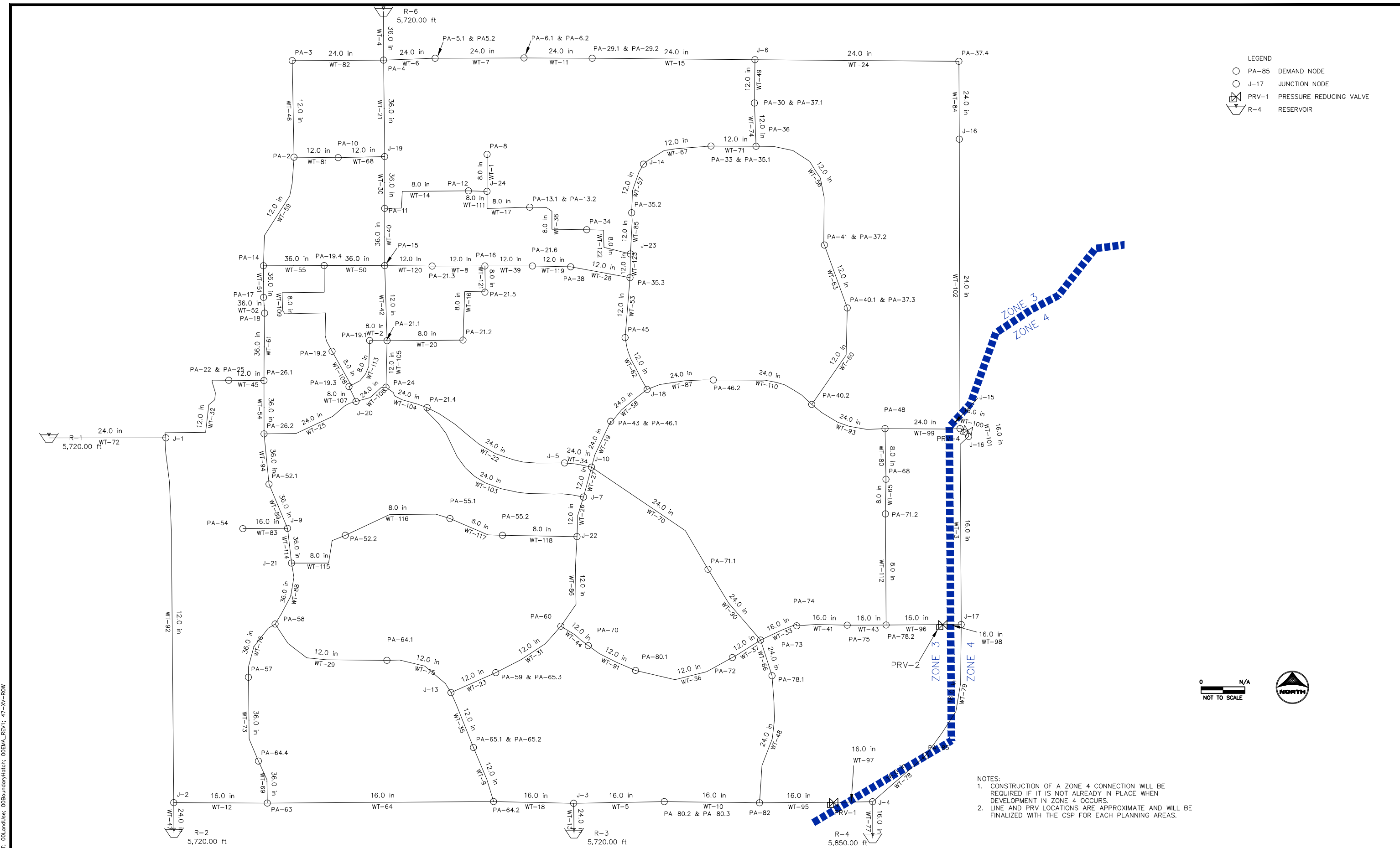


THE AURORA HIGHLANDS
AURORA HIGHLANDS, LLC
AURORA, COLORADO

THE AURORA HIGHLANDS

MASTER UTILITY REPORT – AMENDMENT 3
MASTER WATER PLAN

SHEET NO.
WT1

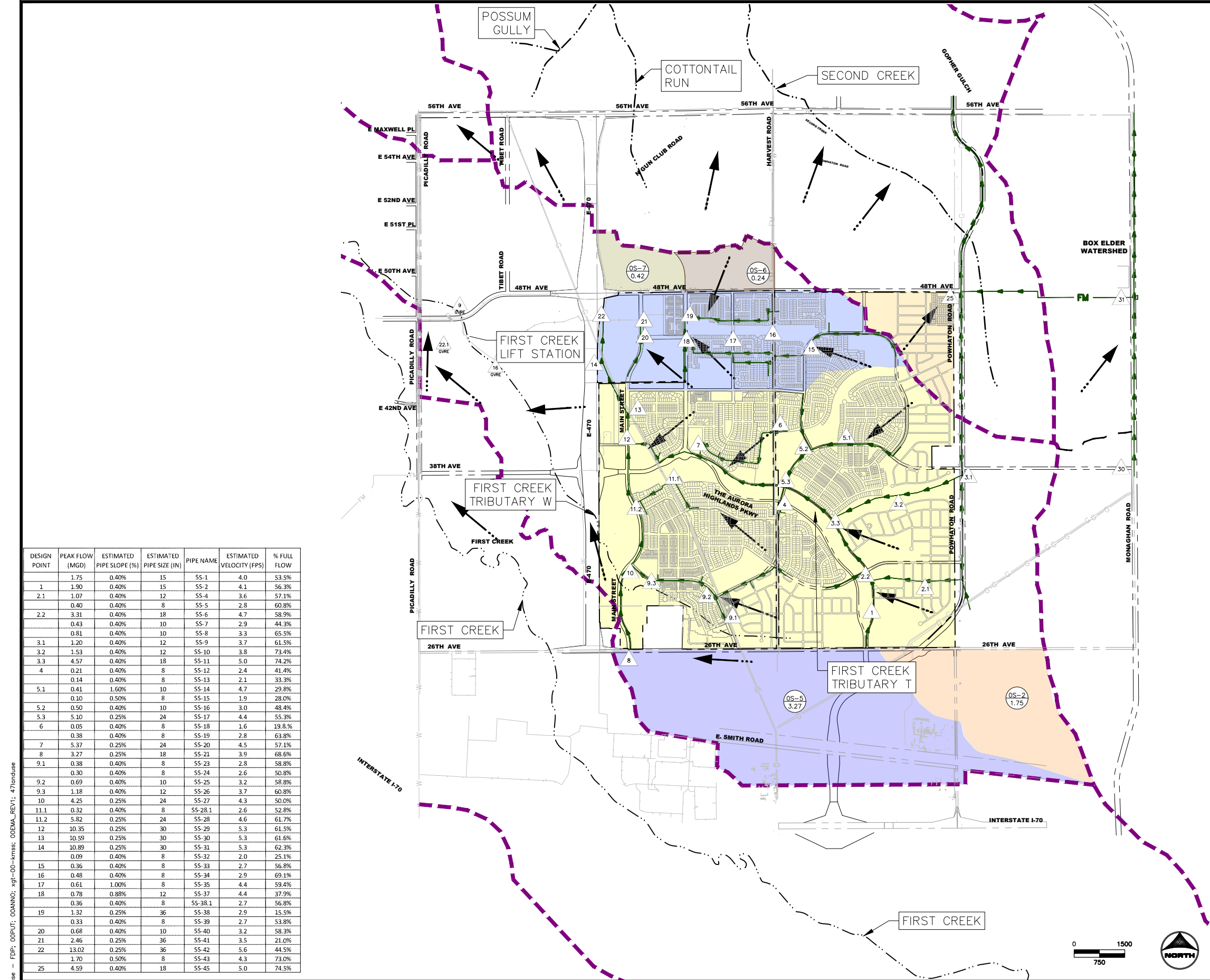


- LEGEND
- PA-85 DEMAND NODE
 - J-17 JUNCTION NODE
 - ⊠ PRV-1 PRESSURE REDUCING VALVE
 - ▽ R-4 RESERVOIR



- NOTES:
1. CONSTRUCTION OF A ZONE 4 CONNECTION WILL BE REQUIRED IF IT IS NOT ALREADY IN PLACE WHEN DEVELOPMENT IN ZONE 4 OCCURS.
 2. LINE AND PRV LOCATIONS ARE APPROXIMATE AND WILL BE FINALIZED WITH THE CSP FOR EACH PLANNING AREAS.

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NO.	DATE	BY	REVISION DESCRIPTION																								
1	8/2019	KH	REMOVED SEC. 21 & 28 FROM PROJECT																								
2	11/2022	KH	REVISED AREA AND LAND USE IN PA-55																								
3	5/2024	KH	REVISED AREAS, UNIT COUNTS AND LAND USES																								



LEGEND

PR. SANITARY SEWER LINE ———— S ———— 12" ————
EX. SANITARY SEWER LINE ———— ————
PR. FORCE MAIN ———— FM ———— FM ————
ROW/PROPERTY LINE ———— ————
PLANNING AREA BOUNDARY ———— ————
PROPERTY BOUNDARY ———— ————
EX. MAJOR CONTOUR (25') ———— - 5050 ————
EX. MINOR CONTOUR (5') ———— - 5045 ————
FLOW DIRECTION ———— ————
WATERSHED BOUNDARY ———— ————
DEMAND BASIN BOUNDARY ———— ————
DESIGN POINT ———— ————

OFFSITE BASIN DESIGNATION

OS-1
BASIN FLOW (MGD) 6.35

BASIN LEGEND

TAH BASIN 1
TAH BASIN 2
TAH BASIN 3

OFFSITE BASIN SUMMARY

BASIN	APPROXIMATE ACERAGE	PEAK FLOW + INFIL (MGD)
OS-2	364.0	1.75
OS-5	730.0	3.27
OS-6	56.4	0.24
OS-7	67.8	0.42

DESIGN POINT	PEAK FLOW (MGD)	ESTIMATED PIPE SLOPE (%)	ESTIMATED PIPE SIZE (IN)	PIPE NAME	ESTIMATED VELOCITY (FPS)	% FULL FLOW
1	1.75	0.40%	15	SS-1	4.0	53.5%
2.1	1.90	0.40%	15	SS-2	4.1	56.3%
2.2	1.07	0.40%	12	SS-4	3.6	57.1%
2.2	0.40	0.40%	8	SS-5	2.8	60.8%
2.2	3.31	0.40%	18	SS-6	4.7	58.9%
2.2	0.43	0.40%	10	SS-7	2.9	44.3%
2.2	0.81	0.40%	10	SS-8	3.3	65.5%
3.1	1.20	0.40%	12	SS-9	3.7	61.5%
3.2	1.53	0.40%	12	SS-10	3.8	73.4%
3.3	4.57	0.40%	18	SS-11	5.0	74.2%
4	0.21	0.40%	8	SS-12	2.4	41.4%
4	0.14	0.40%	8	SS-13	2.1	33.3%
5.1	0.41	1.60%	10	SS-14	4.7	29.8%
5.1	0.10	0.50%	8	SS-15	1.9	28.0%
5.2	0.50	0.40%	10	SS-16	3.0	48.4%
5.3	5.10	0.25%	24	SS-17	4.4	55.3%
6	0.05	0.40%	8	SS-18	1.6	19.8%
6	0.38	0.40%	8	SS-19	2.8	63.8%
7	5.37	0.25%	24	SS-20	4.5	57.1%
8	3.27	0.25%	18	SS-21	3.9	68.6%
9.1	0.38	0.40%	8	SS-23	2.8	58.8%
9.1	0.30	0.40%	8	SS-24	2.6	50.8%
9.2	0.69	0.40%	10	SS-25	3.2	58.8%
9.3	1.18	0.40%	12	SS-26	3.7	60.8%
10	4.25	0.25%	24	SS-27	4.3	50.0%
11.1	0.32	0.40%	8	SS-28.1	2.6	52.8%
11.2	5.82	0.25%	24	SS-28	4.6	61.7%
12	10.35	0.25%	30	SS-29	5.3	61.5%
13	10.59	0.25%	30	SS-30	5.3	61.6%
14	10.89	0.25%	30	SS-31	5.3	62.3%
14	0.09	0.40%	8	SS-32	2.0	25.1%
15	0.36	0.40%	8	SS-33	2.7	56.8%
16	0.48	0.40%	8	SS-34	2.9	69.1%
17	0.61	1.00%	8	SS-35	4.4	59.4%
18	0.78	0.88%	12	SS-37	4.4	37.9%
18	0.36	0.40%	8	SS-38.1	2.7	56.8%
19	1.32	0.25%	36	SS-38	2.9	15.5%
19	0.33	0.40%	8	SS-39	2.7	53.8%
20	0.68	0.40%	10	SS-40	3.2	58.3%
21	2.46	0.25%	36	SS-41	3.5	21.0%
22	13.02	0.25%	36	SS-42	5.6	44.5%
22	1.70	0.50%	8	SS-43	4.3	73.0%
25	4.59	0.40%	18	SS-45	5.0	74.5%

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1	10/2019	KH	REMOVED SEC. 21 & 28 FROM PROJECT
2	11/2022	KH	REVISED AREA AND LAND USE IN PA-55
3	4/2024	KH	REVISED AREA AND LAND USE

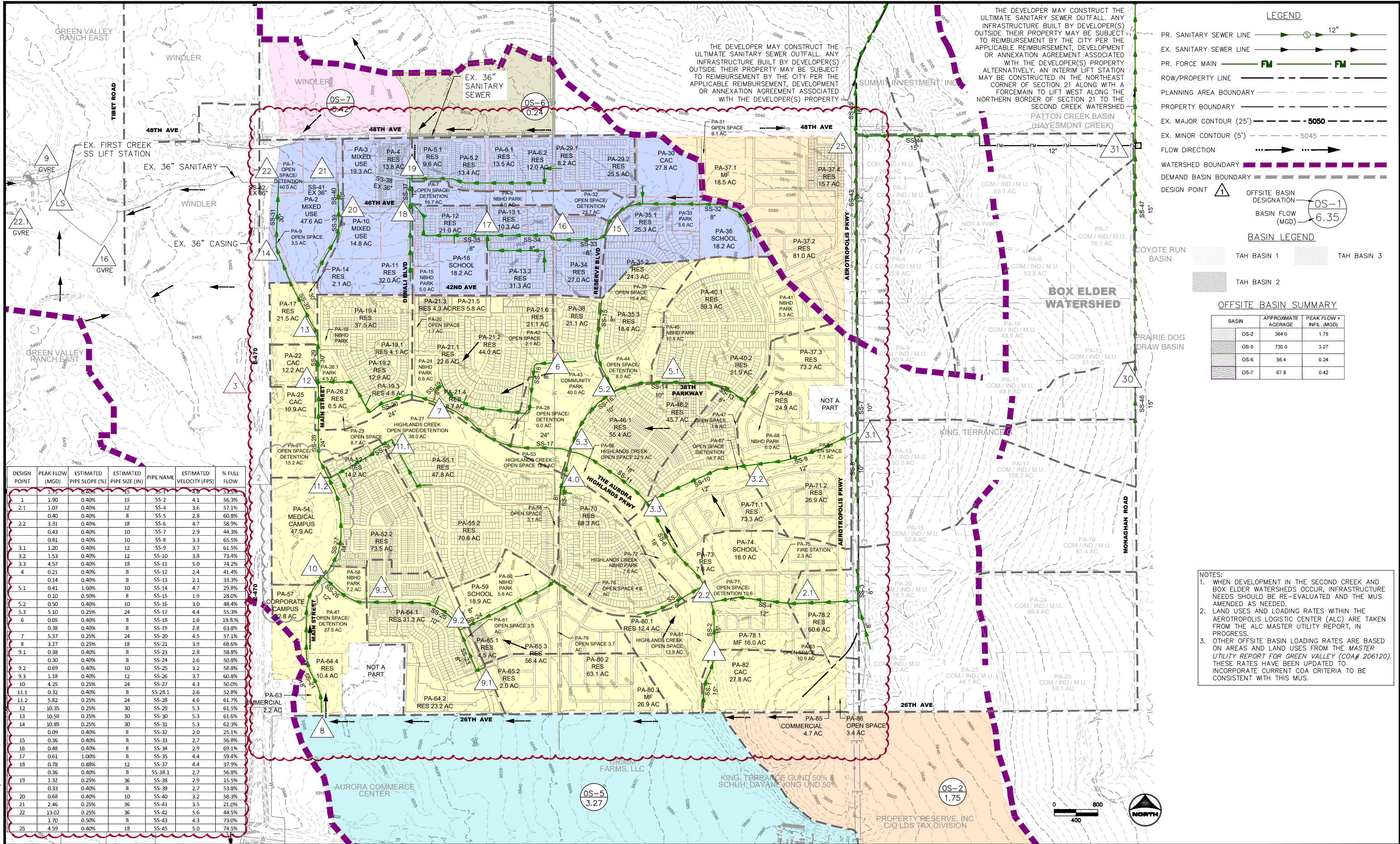


THE AURORA HIGHLANDS
AURORA HIGHLANDS, LLC
AURORA, COLORADO



MASTER UTILITY REPORT - AMENDMENT 3
OVERALL SANITARY BASIN MAP

SHEET NO.
SS1



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JOB DATE: 4/2024

JOB NUMBER: 181211.47

IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

BAR IS ONE INCH ON OFFICIAL DRAWINGS.

0" = 1"

NO. 1

DATE 8/2019

BY KH

REVISION DESCRIPTION REMOVED SEC. 21 & 28 FROM PROJECT

NO. 2

DATE 11/2022

BY KH

REVISION DESCRIPTION REVISED AREA AND LAND USE IN PA-55

NO. 3

DATE 5/2024

BY KH

REVISION DESCRIPTION REVISED AREAS, UNIT COUNTS AND LAND USES

HRGreen

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THE AURORA HIGHLANDS

AURORA HIGHLANDS, LLC

AURORA, COLORADO

THE AURORA HIGHLANDS

MASTER UTILITY REPORT – AMENDMENT 3

SANITARY SEWER PLAN

SHEET NO.

SS2

Xrefs: 00EUT; 01Bse – FDP; 00PUT; xgt-00-kmsst; 47onduse; 47-XV-S0W; 47-XV-SAN

APPENDIX B

WATER SYSTEM CALCULATIONS



PROJECTED WATER DEMAND GENERATION

Project #: **181211.50**
Project: **The Aurora Highlands**
Location: **Aurora, CO**
Plan Date: **Master Utility Report - Amendment 3**

By **K House** Date **6/18/2024**
Checked **R Littleton** Date

RESIDENTIAL WATER USE	101	GPCD	SINGLE-FAMILY POPULATION DENSITY	2.77	PERSONS/UNIT
COMMERCIAL/MIXED USE/CIVIC	1,500	GPD/ACRE	MULTI-FAMILY POPULATION DENSITY	2.77	PERSONS/UNIT
SCHOOL (INDUSTRIAL) WATER USE	1,200	GPD/ACRE			
PARKS & GREEN BELTS	1,800	GPD/ACRE			
			RESIDENTIAL FIRE FLOW	1,500	GPM FOR 2 HRS
MAX. DAY / AVG. DAY	2.80		COMMERCIAL / MULTIFAMILY	2,500	GPM FOR 2 HRS
MAX. HOUR / FLOW RATIO	4.50		SCHOOL (INDUSTRIAL) FIRE FLOW	3,500	GPM FOR 3 HRS

BASIN (PLANNING AREA)	FILING NO.	EDN	LAND USE	ACRES	NO. OF SF UNITS	NO. OF MF UNITS	AVG. DAY DEMAND (GPD)	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	MAX. HOUR DEMAND (GPM)	MAX. DAY + FIRE FLOW (GPM)	DEMAND POINT
PA-1			OPEN SPACE / DETENTION	10.0			N/A	N/A	N/A	N/A	N/A	N/A
PA-2			RESIDENTIAL	47.6		833	233,048	162	453	728	2,953	DP PA-2
PA-3			RESIDENTIAL	19.3		502	140,445	98	273	439	2,773	DP PA-3
PA-4			RESIDENTIAL	13.8	143		40,007	28	78	125	1,578	DP PA-4
PA-5.1			RESIDENTIAL	9.6	69		19,304	13	38	60	1,538	DP PA-5.1
PA-5.2			RESIDENTIAL	13.4	98		27,417	19	53	86	1,553	DP PA-5.2
PA-6.1			RESIDENTIAL	13.5	71		19,864	14	39	62	1,539	DP PA-6.1
PA-6.2			RESIDENTIAL	12.0	61		17,066	12	33	53	1,533	DP PA-6.2
PA-7			OPEN SPACE	16.7			N/A	N/A	N/A	N/A	N/A	N/A
PA-8			NEIGHBORHOOD PARK	5.0			9,000	6	18	N/A	N/A	DP PA-8
PA-9			OPEN SPACE	3.5			N/A	N/A	N/A	N/A	N/A	N/A
PA-10			RESIDENTIAL	14.8		451	126,176	88	245	394	2,745	DP PA-10
PA-11			RESIDENTIAL	32.0		864	241,721	168	470	755	1,970	DP PA-11
PA-12			RESIDENTIAL	24.2	106		29,656	21	58	93	1,558	DP PA-12
PA-13.1	24	224093	RESIDENTIAL	10.3	46		12,869	9	25	40	1,525	DP PA-13.1
PA-13.2	24	224093	RESIDENTIAL	31.3	117		32,733	23	64	102	1,564	DP PA-13.2
PA-14			RESIDENTIAL (INCLUDED IN PA-2)	2.1			N/A	N/A	N/A	N/A	N/A	N/A
PA-15			NEIGHBORHOOD PARK	5.0			9,000	6	18	N/A	N/A	DP PA-15
PA-16	3		SCHOOL	18.2			21,840	15	42	68	3,542	DP PA-16
PA-17			RESIDENTIAL	21.5		742	207,589	144	404	649	1,904	DP PA-17
PA-18	8	221068	NEIGHBORHOOD PARK	1.3			2,340	2	5	N/A	N/A	DP PA-18
PA-19.1	4	221037	RESIDENTIAL	4.1	9		2,518	2	5	8	1,505	DP PA-19.1
PA-19.2	5	221002	RESIDENTIAL	15.6	47		13,149	9	26	41	1,526	DP PA-19.2
PA-19.3	13	223228	RESIDENTIAL	2.1	13		3,637	3	7	11	1,507	DP PA-19.3
PA-19.4	8	221068	RESIDENTIAL	37.7	174		48,680	34	95	152	1,595	DP PA-19.4
PA-20			OPEN SPACE	1.7			N/A	N/A	N/A	N/A	N/A	N/A
PA-21.1	1	219183	RESIDENTIAL	27.6	84		23,501	16	46	73	1,546	DP PA-21.1
PA-21.2	2	220212	RESIDENTIAL	52.9	182		50,918	35	99	159	1,599	DP PA-21.2
PA-21.3			RESIDENTIAL	4.4	44		12,310	9	24	38	1,524	DP PA-21.3
PA-21.4	6	223264	RESIDENTIAL	5.1	26		7,274	5	14	23	1,514	DP PA-21.4
PA-21.5			RESIDENTIAL	5.9	62		17,346	12	34	54	1,534	DP PA-21.5
PA-21.6	14	221291	RESIDENTIAL	21.7	93		26,019	18	51	81	1,551	DP PA-21.6
PA-22			CIVIC	12.2		473	150,631	105	293	471	2,793	DP PA-22
PA-23			OPEN SPACE	8.7			N/A	N/A	N/A	N/A	N/A	N/A
PA-24			NEIGHBORHOOD PARK	6.6			11,880	8	23	N/A	N/A	DP PA-24
PA-25			CIVIC	10.9		474	148,961	103	290	466	2,790	DP PA-25
PA-26.1	18		NEIGHBORHOOD PARK	4.5			8,100	6	16	N/A	N/A	DP PA-26.1
PA-26.2			RESIDENTIAL	11.3		56	15,667	11	30	49	1,530	DP PA-26.2
PA-27			OPEN SPACE / DETENTION	38.0			N/A	N/A	N/A	N/A	N/A	N/A
PA-28			OPEN SPACE / DETENTION	6.0			N/A	N/A	N/A	N/A	N/A	N/A
PA-29.1			RESIDENTIAL	8.2	50		13,989	10	27	44	1,527	DP PA-29.1
PA-29.2			RESIDENTIAL	25.5	118		33,013	23	64	103	1,564	DP PA-29.2
PA-30			COMMERCIAL	27.8			41,700	29	81	130	2,581	DP PA-30
PA-31			OPEN SPACE	9.1			N/A	N/A	N/A	N/A	N/A	N/A
PA-32			OPEN SPACE / DETENTION	23.7			N/A	N/A	N/A	N/A	N/A	N/A
PA-33			NEIGHBORHOOD PARK	5.6			10,080	7	20	N/A	N/A	DP PA-33
PA-34			RESIDENTIAL	27.0	154		43,085	30	84	135	1,584	DP PA-34
PA-35.1			RESIDENTIAL	25.3	79		22,102	15	43	69	1,543	DP PA-35.1
PA-35.2			RESIDENTIAL	24.3	107		29,935	21	58	94	1,558	DP PA-35.2
PA-35.3			RESIDENTIAL	18.4	73		20,423	14	40	64	1,540	DP PA-35.3
PA-36			SCHOOL	18.2			21,840	15	42	68	3,542	DP PA-36
PA-37.1			RESIDENTIAL	18.5		274	76,657	53	149	240	1,649	DP PA-37.1
PA-37.2			RESIDENTIAL	81.0	462		129,254	90	251	404	1,751	DP PA-37.2
PA-37.3			RESIDENTIAL	73.2	382		106,872	74	208	334	1,708	DP PA-37.3
PA-37.4			RESIDENTIAL	15.7	136		38,049	26	74	119	1,574	DP PA-37.4
PA-38	14	221291	RESIDENTIAL	21.1	63		17,626	12	34	55	1,534	DP PA-38
PA-39			OPEN SPACE	15.4			N/A	N/A	N/A	N/A	N/A	N/A
PA-40.1			RESIDENTIAL	59.3	278		77,776	54	151	243	1,651	DP PA-40.1
PA-40.2			RESIDENTIAL	21.9	74		20,703	14	40	65	1,540	DP PA-40.2
PA-41			NEIGHBORHOOD PARK	5.3			9,540	7	19	N/A	N/A	DP PA-41
PA-42			OPEN SPACE	2.1			N/A	N/A	N/A	N/A	N/A	N/A
PA-43			COMMUNITY PARK	40.0			72,000	50	140	N/A	N/A	DP PA-43
PA-44			OPEN SPACE	8.0			N/A	N/A	N/A	N/A	N/A	N/A
PA-45			NEIGHBORHOOD PARK	10.4			18,720	13	36	N/A	N/A	DP PA-45
PA-46.1			RESIDENTIAL	55.4	218		60,990	42	119	191	1,619	DP PA-46.1
PA-46.2			RESIDENTIAL	45.7	249		69,663	48	135	218	1,635	DP PA-46.2
PA-47			OPEN SPACE	1.8			N/A	N/A	N/A	N/A	N/A	N/A
PA-48			RESIDENTIAL	24.9	71		19,864	14	39	62	1,539	DP PA-48
PA-49			NOT USED									
PA-50			NOT USED									
PA-51			OPEN SPACE / DETENTION	15.2			N/A	N/A	N/A	N/A	N/A	N/A



PROJECTED WATER DEMAND GENERATION

Project #: **181211.50**
 Project: **The Aurora Highlands**
 Location: **Aurora, CO**
 Plan Date: **Master Utility Report - Amendment 3**

By **K House** Date **6/18/2024**
 Checked **R Littleton** Date

RESIDENTIAL WATER USE	101	GPCD	SINGLE-FAMILY POPULATION DENSITY	2.77	PERSONS/UNIT
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SCHOOL (INDUSTRIAL) WATER USE	1,200	GPD/ACRE			
PARKS & GREEN BELTS	1,800	GPD/ACRE			
			RESIDENTIAL FIRE FLOW	1,500	GPM FOR 2 HRS
MAX. DAY / AVG. DAY	2.80		COMMERCIAL / MULTIFAMILY	2,500	GPM FOR 2 HRS
MAX. HOUR / FLOW RATIO	4.50		SCHOOL (INDUSTRIAL) FIRE FLOW	3,500	GPM FOR 3 HRS

BASIN (PLANNING AREA)	FILING NO.	EDN	LAND USE	ACRES	NO. OF SF UNITS	NO. OF MF UNITS	AVG. DAY DEMAND (GPD)	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	MAX. HOUR DEMAND (GPM)	MAX. DAY + FIRE FLOW (GPM)	DEMAND POINT
PA-52.1	10	221131	RESIDENTIAL	14.2	40		11,191	8	22	35	1,522	DP PA-52.1
PA-52.2	15	222118	RESIDENTIAL	73.5	417		116,664	81	227	365	1,727	DP PA-52.2
PA-53			OPEN SPACE	18.9			N/A	N/A	N/A	N/A	N/A	N/A
PA-54	22		MEDICAL CAMPUS*	47.9			367,200	255	893	1,148	3,393	DP PA-54
PA-55.1	10	221131	RESIDENTIAL	47.8	136		38,049	26	74	119	1,574	DP PA-55.1
PA-55.2	16	221389	RESIDENTIAL	70.6	273		76,377	53	149	239	1,649	DP PA-55.2
PA-56			OPEN SPACE	3.1			N/A	N/A	N/A	N/A	N/A	N/A
PA-57			CORPORATE CAMPUS	22.8			34,200	24	67	107	2,567	DP PA-57
PA-58			NEIGHBORHOOD PARK	7.2			12,960	9	25	N/A	N/A	DP PA-58
PA-59			SCHOOL	18.9			22,680	16	44	71	3,544	DP PA-59
PA-60			NEIGHBORHOOD PARK	5.6			10,080	7	20	N/A	N/A	DP PA-60
PA-61			OPEN SPACE	3.5			N/A	N/A	N/A	N/A	N/A	N/A
PA-62			NOT USED									
PA-63			COMMERCIAL	2.2			3,300	2	6	10	2,506	DP PA-63
PA-64.1	7	223239	RESIDENTIAL	31.3	179		50,079	35	97	156	1,597	DP PA-64.1
PA-64.2			RESIDENTIAL	23.2	368		102,955	71	200	322	1,700	DP PA-64.2
PA-64.4			RESIDENTIAL	10.4		170	47,561	33	92	149	1,592	DP PA-64.4
PA-65.1			RESIDENTIAL	4.5	44		12,310	9	24	38	1,524	DP PA-65.1
PA-65.2			RESIDENTIAL	2.0	24		6,714	5	13	21	1,513	DP PA-65.2
PA-65.3			RESIDENTIAL	56.4	202		56,514	39	110	177	1,610	DP PA-65.3
PA-66			OPEN SPACE	22.5			N/A	N/A	N/A	N/A	N/A	N/A
PA-67			OPEN SPACE	14.7			N/A	N/A	N/A	N/A	N/A	N/A
PA-68			NEIGHBORHOOD PARK	6.0			10,800	8	21	N/A	N/A	DP PA-68
PA-69			OPEN SPACE	7.1			N/A	N/A	N/A	N/A	N/A	N/A
PA-70	17	223115	RESIDENTIAL		96		26,858	19	52	84	1,552	DP PA-70
PA-70	21	223115	RESIDENTIAL	68.3	179		50,079	35	97	156	1,597	DP PA-70
PA-71.1			RESIDENTIAL	73.3	427		119,462	83	232	373	1,732	DP PA-71.1
PA-71.2			RESIDENTIAL	26.9	170		47,561	33	92	149	1,592	DP PA-71.2
PA-72			NEIGHBORHOOD PARK	7.8			14,040	10	27	N/A	N/A	DP PA-72
PA-73			NEIGHBORHOOD PARK	7.6			13,680	10	27	N/A	N/A	DP PA-73
PA-74			SCHOOL	18.0			21,600	15	42	68	3,542	DP PA-74
PA-75			FIRE STATION	2.3			3,450	2	7	11	2,507	DP PA-75
PA-76			OPEN SPACE	4.6			N/A	N/A	N/A	N/A	N/A	N/A
PA-77			OPEN SPACE	10.6			N/A	N/A	N/A	N/A	N/A	N/A
PA-78.1			RESIDENTIAL	16.0		203	56,793	39	110	177	1,610	DP PA-78.1
PA-78.2			RESIDENTIAL	60.6	459		128,414	89	250	401	1,750	DP PA-78.2
PA-79			OPEN SPACE	3.7			N/A	N/A	N/A	N/A	N/A	N/A
PA-80.1			RESIDENTIAL	12.4	94		26,298	18	51	82	1,551	DP PA-80.1
PA-80.2			RESIDENTIAL	63.1	267		74,699	52	145	233	1,645	DP PA-80.2
PA-80.3			RESIDENTIAL	26.9		660	184,648	128	359	577	1,859	DP PA-80.3
PA-81			OPEN SPACE	13.9			N/A	N/A	N/A	N/A	N/A	N/A
PA-82			COMMERCIAL	27.8			41,700	29	81	130	2,581	DP PA-82
PA-83			OPEN SPACE	10.9			N/A	N/A	N/A	N/A	N/A	N/A
PA-84			NOT USED									
PA-85			COMMERCIAL	4.7			7,050	5	14	22	2,514	DP PA-85
PA-86			OPEN SPACE	3.4			N/A	N/A	N/A	N/A	N/A	N/A
TOTALS			RESIDENTIAL	1,599	7,334	5,702	2,882,470	2,002	5,605	9,008		
			COMMERCIAL / CIVIC	240			1,297,861	901	2,702	4,056		
			SCHOOL	73			87,960	61	171	275		
			PARKS / OPEN SPACE	395			212,220	147	413	N/A		
TOTALS				2,307	7,334	5,702	4,480,512	3,111	8,891	13,338	0	

* MEDICAL CAMPUS DEMANDS AND PEAKING FACTORS PROVIDED BY PROJECT DESIGNER

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Average Day

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
982	WT-1	8.0	PVC	150	0.04	0.00	6.25
984	WT-2	8.0	PVC	150	0.01	0.00	-1.42
873	WT-3	16.0	PVC	150	0.00	0.00	0.00
841	WT-4	36.0	PVC	150	0.64	0.02	2,044.76
130	WT-5	16.0	PVC	150	0.56	0.09	352.94
763	WT-6	24.0	PVC	130	0.33	0.02	464.28
764	WT-7	24.0	PVC	130	0.31	0.02	431.88
953	WT-8	12.0	PVC	150	0.33	0.03	-115.24
694	WT-9	12.0	PVC	150	0.28	0.02	99.93
462	WT-10	16.0	PVC	150	0.28	0.03	173.10
144	WT-11	24.0	PVC	130	0.29	0.02	406.28
825	WT-12	16.0	PVC	150	0.49	0.07	306.15
515	WT-13	24.0	PVC	150	0.44	0.01	614.78
968	WT-14	8.0	PVC	150	0.35	0.09	55.59
140	WT-15	24.0	PVC	150	0.27	0.02	-373.68
958	WT-16	8.0	PVC	150	0.03	0.00	4.12
981	WT-17	8.0	PVC	150	0.18	0.02	28.78
677	WT-18	16.0	PVC	150	0.42	0.05	-261.84
882	WT-19	24.0	PVC	150	0.16	0.00	221.64
888	WT-20	8.0	PVC	150	0.20	0.02	-31.19
165	WT-21	36.0	PVC	150	0.42	0.02	1,346.10
891	WT-22	24.0	PVC	150	0.19	0.01	270.62
687	WT-23	12.0	PVC	150	0.31	0.02	107.64
706	WT-24	24.0	PVC	150	0.14	0.01	200.63
895	WT-25	24.0	PVC	150	0.27	0.02	-382.72
948	WT-26	12.0	PVC	150	0.23	0.01	-80.15
837	WT-27	12.0	PVC	150	0.24	0.01	83.36
416	WT-28	12.0	PVC	150	0.15	0.01	-53.67
692	WT-29	12.0	PVC	150	0.16	0.02	-55.62
766	WT-30	36.0	PVC	150	0.39	0.01	1,224.34
688	WT-31	12.0	PVC	150	0.15	0.01	52.70
641	WT-32	12.0	PVC	150	0.39	0.08	136.99
701	WT-33	16.0	PVC	150	0.19	0.01	-117.58
466	WT-34	24.0	PVC	150	0.19	0.00	-270.62
695	WT-35	12.0	PVC	150	0.25	0.02	86.74
802	WT-36	12.0	PVC	150	0.05	0.00	-17.42
803	WT-37	12.0	PVC	150	0.08	0.00	-27.17
977	WT-38	8.0	PVC	150	0.02	0.00	-2.84
951	WT-39	12.0	PVC	150	0.24	0.01	-83.94
767	WT-40	36.0	PVC	150	0.32	0.01	1,001.13
718	WT-41	16.0	PVC	150	0.16	0.00	-102.58
886	WT-42	12.0	PVC	150	0.30	0.03	105.19
717	WT-43	16.0	PVC	150	0.16	0.00	-100.19
697	WT-44	12.0	PVC	150	0.15	0.00	54.17
158	WT-45	12.0	PVC	150	0.20	0.01	70.80
151	WT-46	12.0	PVC	150	0.31	0.04	109.25
64	WT-47	24.0	PVC	130	0.21	0.00	300.21
656	WT-48	24.0	PVC	150	0.10	0.00	144.13
710	WT-49	12.0	PVC	150	0.49	0.05	-173.05
591	WT-50	36.0	PVC	150	0.24	0.00	765.92
769	WT-51	36.0	PVC	150	0.22	0.00	693.69
770	WT-52	36.0	PVC	150	0.17	0.00	549.74
475	WT-53	12.0	PVC	150	0.13	0.01	-47.18

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Average Day

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
504	WT-54	36.0	PVC	150	0.15	0.00	-471.70
592	WT-55	36.0	PVC	150	0.22	0.00	711.78
407	WT-56	12.0	PVC	150	0.25	0.04	-86.65
819	WT-57	12.0	PVC	150	0.09	0.00	-33.21
883	WT-58	24.0	PVC	150	0.09	0.00	129.35
426	WT-59	12.0	PVC	150	0.05	0.00	-18.09
649	WT-60	12.0	PVC	150	0.39	0.08	137.64
608	WT-61	36.0	PVC	150	0.17	0.00	548.12
577	WT-62	12.0	PVC	150	0.17	0.01	-60.18
479	WT-63	12.0	PVC	150	0.03	0.00	9.60
676	WT-64	16.0	PVC	150	0.14	0.02	-90.52
919	WT-65	8.0	PVC	150	0.14	0.01	21.84
658	WT-66	24.0	PVC	150	0.07	0.00	104.75
818	WT-67	12.0	PVC	150	0.09	0.00	-33.21
611	WT-68	12.0	PVC	150	0.35	0.03	-121.75
752	WT-69	36.0	PVC	150	0.12	0.00	394.37
797	WT-70	24.0	PVC	150	0.09	0.00	-132.33
739	WT-71	12.0	PVC	150	0.03	0.00	-10.88
839	WT-72	24.0	PVC	150	0.10	0.00	142.93
753	WT-73	36.0	PVC	150	0.11	0.00	361.39
709	WT-74	12.0	PVC	150	0.26	0.01	-90.93
691	WT-75	12.0	PVC	150	0.06	0.00	-20.90
453	WT-76	36.0	PVC	150	0.11	0.00	337.84
74	WT-77	16.0	PVC	150	0.01	0.00	4.90
580	WT-78	16.0	PVC	150	0.01	0.00	-4.90
644	WT-79	16.0	PVC	150	0.00	0.00	0.00
779	WT-80	8.0	PVC	150	0.19	0.01	-29.34
610	WT-81	12.0	PVC	150	0.10	0.00	-34.26
149	WT-82	24.0	PVC	130	0.15	0.01	-206.64
645	WT-83	16.0	PVC	150	0.41	0.02	-255.01
777	WT-84	24.0	PVC	150	0.12	0.00	-174.25
970	WT-85	12.0	PVC	150	0.15	0.00	-53.97
936	WT-86	12.0	PVC	150	0.02	0.00	8.47
911	WT-87	24.0	PVC	150	0.05	0.00	69.17
922	WT-88	36.0	PVC	150	0.09	0.00	273.22
603	WT-89	36.0	PVC	150	0.02	0.00	-70.35
796	WT-90	24.0	PVC	150	0.04	0.00	-49.50
698	WT-91	12.0	PVC	150	0.00	0.00	0.82
106	WT-92	12.0	PVC	130	0.02	0.00	-5.93
909	WT-93	24.0	PVC	150	0.09	0.00	-131.13
604	WT-94	36.0	PVC	150	0.02	0.00	-78.11
781	WT-95	16.0	PVC	150	0.00	0.00	0.00
785	WT-96	16.0	PVC	150	0.00	0.00	0.00
782	WT-97	16.0	PVC	150	0.00	0.00	0.00
784	WT-98	16.0	PVC	150	0.00	0.00	0.00
876	WT-99	24.0	PVC	150	0.12	0.00	-174.24
862	WT-100	16.0	PVC	150	0.00	0.00	0.00
875	WT-101	16.0	PVC	150	0.00	0.00	0.00
877	WT-102	24.0	PVC	150	0.12	0.01	-174.25

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Average Day

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
892	WT-103	24.0	PVC	150	0.12	0.01	163.50
890	WT-104	24.0	PVC	150	0.31	0.01	439.17
887	WT-105	12.0	PVC	150	0.16	0.01	56.29
894	WT-106	24.0	PVC	150	0.28	0.01	-391.13
897	WT-107	8.0	PVC	150	0.05	0.00	-8.41
899	WT-108	8.0	PVC	150	0.07	0.00	-11.26
983	WT-109	8.0	PVC	150	0.13	0.03	-20.38
912	WT-110	24.0	PVC	150	0.01	0.00	20.87
980	WT-111	8.0	PVC	150	0.22	0.01	35.03
920	WT-112	8.0	PVC	150	0.07	0.01	-11.14
914	WT-113	8.0	PVC	150	0.00	0.00	0.33
923	WT-114	36.0	PVC	150	0.06	0.00	184.65
939	WT-115	8.0	PVC	150	0.57	0.17	88.56
943	WT-116	8.0	PVC	150	0.05	0.00	7.67
946	WT-117	8.0	PVC	150	0.12	0.01	-18.72
947	WT-118	8.0	PVC	150	0.46	0.11	-71.68
950	WT-119	12.0	PVC	150	0.19	0.01	-65.89
954	WT-120	12.0	PVC	150	0.35	0.03	-123.78
957	WT-121	8.0	PVC	150	0.10	0.00	16.15
978	WT-122	8.0	PVC	150	0.21	0.02	-32.72
971	WT-123	12.0	PVC	150	0.25	0.01	-86.69

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Average Day

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,460.50	0.00	5,720.00	112
J-2	5,501.04	0.00	5,720.00	95
J-3	5,551.65	0.00	5,719.99	73
J-4	5,609.10	0.00	5,850.00	104
J-5	5,501.88	0.00	5,719.88	94
J-6	5,556.96	0.00	5,719.90	70
J-7	5,500.28	0.00	5,719.88	95
J-9	5,484.42	0.00	5,719.92	102
J-10	5,505.26	0.00	5,719.87	93
J-13	5,524.10	0.00	5,719.90	85
J-14	5,551.96	0.00	5,719.84	73
J-15	5,581.42	0.00	5,719.87	60
J-16	5,537.99	0.00	5,719.88	79
J-16	5,584.25	0.00	5,850.00	115
J-17	5,602.52	0.00	5,850.00	107
J-18	5,526.61	0.00	5,719.87	84
J-19	5,500.42	0.00	5,719.95	95
J-20	5,479.73	0.00	5,719.90	104
J-21	5,487.05	0.00	5,719.92	101
J-22	5,525.73	0.00	5,719.87	84
J-23	5,555.73	0.00	5,719.85	71
J-24	5,528.87	0.00	5,719.84	83
PA-2	5,497.57	161.60	5,719.93	96
PA-3	5,495.46	97.39	5,719.97	97
PA-4	5,510.37	27.74	5,719.98	91
PA-5.1 & PA5.2	5,516.14	32.40	5,719.96	88
PA-6.1 & PA-6.2	5,532.21	25.61	5,719.94	81
PA-8	5,510.31	6.25	5,719.84	91
PA-10	5,493.13	87.49	5,719.93	98
PA-11	5,519.05	167.62	5,719.94	87
PA-12	5,526.97	20.56	5,719.85	83
PA-13.1 & PA-13.2	5,538.27	31.62	5,719.83	79
PA-14	5,498.69	0.00	5,719.93	96
PA-15	5,529.65	6.25	5,719.94	82
PA-16	5,536.59	15.16	5,719.88	79
PA-17	5,496.30	143.95	5,719.93	97
PA-18	5,496.19	1.63	5,719.92	97
PA-19.1	5,497.23	1.75	5,719.90	96
PA-19.2	5,494.88	9.12	5,719.91	97
PA-19.3	5,481.50	2.52	5,719.90	103
PA-19.4	5,522.80	33.76	5,719.93	85
PA-21.1	5,499.31	16.30	5,719.90	95
PA-21.2	5,509.48	35.31	5,719.88	91
PA-21.3	5,532.12	8.54	5,719.91	81
PA-21.4	5,484.36	5.04	5,719.89	102
PA-21.5	5,532.85	12.03	5,719.88	81
PA-21.6	5,543.82	18.04	5,719.87	76
PA-22 & PA-25	5,479.27	207.79	5,719.91	104
PA-24	5,484.37	8.25	5,719.90	102
PA-26.1	5,483.60	5.63	5,719.92	102
PA-26.2	5,472.88	10.86	5,719.92	107

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Average Day

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
PA-29.1 & PA-29.2	5,547.67	32.59	5,719.92	75
PA-30 & PA-37.1	5,569.62	82.12	5,719.85	65
PA-33 & PA-35.1	5,563.70	22.33	5,719.84	68
PA-34	5,552.99	29.88	5,719.83	72
PA-35.2	5,556.01	20.76	5,719.84	71
PA-35.3	5,549.72	14.16	5,719.85	74
PA-36	5,575.28	15.16	5,719.84	63
PA-37.4	5,534.13	26.38	5,719.89	80
PA-38	5,545.15	12.22	5,719.86	76
PA-40.1 & PA-37.3	5,592.41	128.04	5,719.79	55
PA-40.2	5,564.45	14.36	5,719.87	67
PA-41 & PA-37.2	5,592.30	96.25	5,719.79	55
PA-43 & PA-46.1	5,524.12	92.29	5,719.87	85
PA-45	5,534.03	13.00	5,719.86	80
PA-46.2	5,545.47	48.31	5,719.87	75
PA-48	5,577.31	13.77	5,719.87	62
PA-52.1	5,469.57	7.76	5,719.92	108
PA-52.2	5,494.68	80.90	5,719.75	97
PA-54	5,473.42	255.01	5,719.90	107
PA-55.1	5,523.03	26.38	5,719.75	85
PA-55.2	5,522.64	52.96	5,719.76	85
PA-57	5,481.46	23.55	5,719.92	103
PA-58	5,483.15	9.00	5,719.92	102
PA-59 & PA-65.3	5,538.82	54.93	5,719.88	78
PA-60	5,554.80	7.00	5,719.87	71
PA-63	5,500.98	2.29	5,719.92	95
PA-64.1	5,508.25	34.73	5,719.90	92
PA-64.2	5,531.77	71.39	5,719.94	81
PA-64.4	5,495.16	32.98	5,719.92	97
PA-65.1 & PA-65.2	5,524.26	13.19	5,719.92	85
PA-68	5,552.41	7.50	5,719.86	72
PA-70	5,560.06	53.35	5,719.87	69
PA-71.1	5,519.82	82.84	5,719.87	87
PA-71.2	5,573.14	32.98	5,719.85	63
PA-72	5,530.03	9.75	5,719.87	82
PA-73	5,530.59	9.50	5,719.87	82
PA-74	5,552.36	14.99	5,719.86	72
PA-75	5,570.66	2.40	5,719.86	65
PA-78.1	5,545.51	39.38	5,719.87	75
PA-78.2	5,580.91	89.05	5,719.85	60
PA-80.1	5,564.24	18.24	5,719.87	67
PA-80.2 & PA-80.3	5,568.11	179.84	5,719.90	66
PA-82	5,568.91	28.97	5,719.87	65
PA-85	5,605.03	4.90	5,850.00	106

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
982	WT-1	8.0	PVC	150	0.11	0.00	17.50
984	WT-2	8.0	PVC	150	0.05	0.00	-7.97
873	WT-3	16.0	PVC	150	0.00	0.00	0.00
841	WT-4	36.0	PVC	150	1.84	0.17	5,848.03
130	WT-5	16.0	PVC	150	1.59	0.62	998.78
763	WT-6	24.0	PVC	130	0.93	0.11	1,311.25
764	WT-7	24.0	PVC	130	0.87	0.16	1,220.40
953	WT-8	12.0	PVC	150	0.92	0.18	-323.44
694	WT-9	12.0	PVC	150	0.81	0.16	283.94
462	WT-10	16.0	PVC	150	0.79	0.18	494.50
144	WT-11	24.0	PVC	130	0.81	0.11	1,148.59
825	WT-12	16.0	PVC	150	1.41	0.51	884.93
515	WT-13	24.0	PVC	150	1.24	0.08	1,750.94
968	WT-14	8.0	PVC	150	1.00	0.64	156.01
140	WT-15	24.0	PVC	150	0.75	0.17	-1,057.20
958	WT-16	8.0	PVC	150	0.08	0.00	12.56
981	WT-17	8.0	PVC	150	0.52	0.11	80.85
677	WT-18	16.0	PVC	150	1.20	0.32	-752.16
882	WT-19	24.0	PVC	150	0.43	0.02	612.28
888	WT-20	8.0	PVC	150	0.55	0.16	-86.44
165	WT-21	36.0	PVC	150	1.22	0.16	3,872.59
891	WT-22	24.0	PVC	150	0.53	0.08	746.85
687	WT-23	12.0	PVC	150	0.85	0.15	300.91
706	WT-24	24.0	PVC	150	0.40	0.07	570.44
895	WT-25	24.0	PVC	150	0.74	0.10	-1,050.38
948	WT-26	12.0	PVC	150	0.63	0.07	-223.74
837	WT-27	12.0	PVC	150	0.65	0.06	229.33
416	WT-28	12.0	PVC	150	0.43	0.05	-149.82
692	WT-29	12.0	PVC	150	0.43	0.11	-151.34
766	WT-30	36.0	PVC	150	1.11	0.07	3,526.14
688	WT-31	12.0	PVC	150	0.42	0.06	146.93
641	WT-32	12.0	PVC	150	1.11	0.58	393.03
701	WT-33	16.0	PVC	150	0.53	0.04	-329.52
466	WT-34	24.0	PVC	150	0.53	0.02	-746.85
695	WT-35	12.0	PVC	150	0.70	0.12	246.95
802	WT-36	12.0	PVC	150	0.15	0.01	-51.17
803	WT-37	12.0	PVC	150	0.22	0.01	-78.47
977	WT-38	8.0	PVC	150	0.05	0.00	-7.82
951	WT-39	12.0	PVC	150	0.67	0.09	-234.69
767	WT-40	36.0	PVC	150	0.91	0.05	2,900.11
718	WT-41	16.0	PVC	150	0.46	0.03	-287.52
886	WT-42	12.0	PVC	150	0.85	0.22	298.84
717	WT-43	16.0	PVC	150	0.45	0.02	-280.81
697	WT-44	12.0	PVC	150	0.42	0.03	149.56
158	WT-45	12.0	PVC	150	0.54	0.04	189.52
151	WT-46	12.0	PVC	150	0.89	0.31	313.31
64	WT-47	24.0	PVC	130	0.61	0.03	866.05
656	WT-48	24.0	PVC	150	0.29	0.02	413.40
710	WT-49	12.0	PVC	150	1.38	0.32	-486.76
591	WT-50	36.0	PVC	150	0.70	0.04	2,236.39
769	WT-51	36.0	PVC	150	0.64	0.02	2,045.38
770	WT-52	36.0	PVC	150	0.52	0.00	1,641.73
475	WT-53	12.0	PVC	150	0.37	0.04	-131.62

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
504	WT-54	36.0	PVC	150	0.45	0.01	-1,431.91
592	WT-55	36.0	PVC	150	0.66	0.03	2,084.12
407	WT-56	12.0	PVC	150	0.69	0.29	-243.50
819	WT-57	12.0	PVC	150	0.26	0.02	-91.93
883	WT-58	24.0	PVC	150	0.25	0.01	353.68
426	WT-59	12.0	PVC	150	0.11	0.01	-38.74
649	WT-60	12.0	PVC	150	1.09	0.51	385.42
608	WT-61	36.0	PVC	150	0.52	0.02	1,637.18
577	WT-62	12.0	PVC	150	0.48	0.06	-168.02
479	WT-63	12.0	PVC	150	0.07	0.00	26.38
676	WT-64	16.0	PVC	150	0.43	0.14	-268.03
919	WT-65	8.0	PVC	150	0.39	0.04	61.36
658	WT-66	24.0	PVC	150	0.21	0.00	302.97
818	WT-67	12.0	PVC	150	0.26	0.02	-91.93
611	WT-68	12.0	PVC	150	0.98	0.18	-346.45
752	WT-69	36.0	PVC	150	0.36	0.01	1,146.54
797	WT-70	24.0	PVC	150	0.26	0.02	-363.91
739	WT-71	12.0	PVC	150	0.08	0.00	-29.35
839	WT-72	24.0	PVC	150	0.29	0.02	411.91
753	WT-73	36.0	PVC	150	0.33	0.01	1,054.06
709	WT-74	12.0	PVC	150	0.73	0.10	-256.61
691	WT-75	12.0	PVC	150	0.15	0.01	-53.97
453	WT-76	36.0	PVC	150	0.31	0.01	987.56
74	WT-77	16.0	PVC	150	0.02	0.00	13.72
580	WT-78	16.0	PVC	150	0.02	0.00	-13.71
644	WT-79	16.0	PVC	150	0.00	0.00	0.00
779	WT-80	8.0	PVC	150	0.53	0.10	-82.36
610	WT-81	12.0	PVC	150	0.29	0.02	-101.10
149	WT-82	24.0	PVC	130	0.42	0.04	-586.40
645	WT-83	16.0	PVC	150	1.42	0.25	-892.48
777	WT-84	24.0	PVC	150	0.35	0.02	-496.46
970	WT-85	12.0	PVC	150	0.43	0.03	-150.13
936	WT-86	12.0	PVC	150	0.06	0.00	22.23
911	WT-87	24.0	PVC	150	0.13	0.00	185.66
922	WT-88	36.0	PVC	150	0.26	0.01	811.01
603	WT-89	36.0	PVC	150	0.10	0.00	-329.30
796	WT-90	24.0	PVC	150	0.09	0.00	-131.62
698	WT-91	12.0	PVC	150	0.00	0.00	-0.04
106	WT-92	12.0	PVC	130	0.05	0.01	-18.89
909	WT-93	24.0	PVC	150	0.27	0.01	-375.47
604	WT-94	36.0	PVC	150	0.11	0.00	-351.06
781	WT-95	16.0	PVC	150	0.00	0.00	0.00
785	WT-96	16.0	PVC	150	0.00	0.00	0.00
782	WT-97	16.0	PVC	150	0.00	0.00	0.00
784	WT-98	16.0	PVC	150	0.00	0.00	0.00
876	WT-99	24.0	PVC	150	0.35	0.02	-496.45
862	WT-100	16.0	PVC	150	0.00	0.00	0.00
875	WT-101	16.0	PVC	150	0.00	0.00	0.00
877	WT-102	24.0	PVC	150	0.35	0.08	-496.46

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
892	WT-103	24.0	PVC	150	0.32	0.04	453.07
890	WT-104	24.0	PVC	150	0.86	0.06	1,214.07
887	WT-105	12.0	PVC	150	0.45	0.04	158.74
894	WT-106	24.0	PVC	150	0.76	0.04	-1,078.43
897	WT-107	8.0	PVC	150	0.18	0.00	-28.05
899	WT-108	8.0	PVC	150	0.20	0.01	-32.05
983	WT-109	8.0	PVC	150	0.37	0.17	-57.62
912	WT-110	24.0	PVC	150	0.04	0.00	50.20
980	WT-111	8.0	PVC	150	0.63	0.05	98.35
920	WT-112	8.0	PVC	150	0.20	0.04	-31.12
914	WT-113	8.0	PVC	150	0.02	0.00	-3.07
923	WT-114	36.0	PVC	150	0.18	0.00	563.18
939	WT-115	8.0	PVC	150	1.58	1.12	247.83
943	WT-116	8.0	PVC	150	0.13	0.02	20.99
946	WT-117	8.0	PVC	150	0.34	0.05	-53.00
947	WT-118	8.0	PVC	150	1.29	0.77	-201.51
950	WT-119	12.0	PVC	150	0.52	0.05	-184.09
954	WT-120	12.0	PVC	150	0.99	0.19	-347.37
957	WT-121	8.0	PVC	150	0.30	0.01	46.29
978	WT-122	8.0	PVC	150	0.58	0.15	-91.60
971	WT-123	12.0	PVC	150	0.69	0.05	-241.73

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,460.50	0.00	5,719.98	112
J-2	5,501.04	0.00	5,719.97	95
J-3	5,551.65	0.00	5,719.92	73
J-4	5,609.10	0.00	5,850.00	104
J-5	5,501.88	0.00	5,719.14	94
J-6	5,556.96	0.00	5,719.29	70
J-7	5,500.28	0.00	5,719.18	95
J-9	5,484.42	0.00	5,719.43	102
J-10	5,505.26	0.00	5,719.12	93
J-13	5,524.10	0.00	5,719.32	84
J-14	5,551.96	0.00	5,718.90	72
J-15	5,581.42	0.00	5,719.12	60
J-16	5,537.99	0.00	5,719.20	78
J-16	5,584.25	0.00	5,850.00	115
J-17	5,602.52	0.00	5,850.00	107
J-18	5,526.61	0.00	5,719.10	83
J-19	5,500.42	0.00	5,719.68	95
J-20	5,479.73	0.00	5,719.32	104
J-21	5,487.05	0.00	5,719.43	101
J-22	5,525.73	0.00	5,719.11	84
J-23	5,555.73	0.00	5,718.95	71
J-24	5,528.87	0.00	5,718.92	82
PA-2	5,497.57	453.15	5,719.48	96
PA-3	5,495.46	273.09	5,719.79	97
PA-4	5,510.37	77.79	5,719.83	91
PA-5.1 & PA5.2	5,516.14	90.85	5,719.73	88
PA-6.1 & PA-6.2	5,532.21	71.81	5,719.57	81
PA-8	5,510.31	17.50	5,718.91	90
PA-10	5,493.13	245.34	5,719.49	98
PA-11	5,519.05	470.02	5,719.61	87
PA-12	5,526.97	57.66	5,718.97	83
PA-13.1 & PA-13.2	5,538.27	88.67	5,718.80	78
PA-14	5,498.69	0.00	5,719.48	96
PA-15	5,529.65	17.50	5,719.55	82
PA-16	5,536.59	42.46	5,719.18	79
PA-17	5,496.30	403.65	5,719.47	97
PA-18	5,496.19	4.55	5,719.46	97
PA-19.1	5,497.23	4.90	5,719.33	96
PA-19.2	5,494.88	25.57	5,719.34	97
PA-19.3	5,481.50	7.07	5,719.33	103
PA-19.4	5,522.80	94.66	5,719.52	85
PA-21.1	5,499.31	45.70	5,719.33	95
PA-21.2	5,509.48	99.01	5,719.17	91
PA-21.3	5,532.12	23.94	5,719.37	81
PA-21.4	5,484.36	14.14	5,719.22	102
PA-21.5	5,532.85	33.73	5,719.17	81
PA-21.6	5,543.82	50.59	5,719.09	76
PA-22 & PA-25	5,479.27	582.55	5,719.40	104
PA-24	5,484.37	23.10	5,719.29	102
PA-26.1	5,483.60	15.75	5,719.44	102
PA-26.2	5,472.88	30.46	5,719.43	107

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
PA-29.1 & PA-29.2	5,547.67	91.39	5,719.46	74
PA-30 & PA-37.1	5,569.62	230.15	5,718.97	65
PA-33 & PA-35.1	5,563.70	62.58	5,718.88	67
PA-34	5,552.99	83.78	5,718.80	72
PA-35.2	5,556.01	58.21	5,718.92	70
PA-35.3	5,549.72	39.71	5,719.00	73
PA-36	5,575.28	42.46	5,718.87	62
PA-37.4	5,534.13	73.98	5,719.22	80
PA-38	5,545.15	34.27	5,719.05	75
PA-40.1 & PA-37.3	5,592.41	359.04	5,718.58	55
PA-40.2	5,564.45	40.26	5,719.09	67
PA-41 & PA-37.2	5,592.30	269.88	5,718.58	55
PA-43 & PA-46.1	5,524.12	258.59	5,719.10	84
PA-45	5,534.03	36.40	5,719.04	80
PA-46.2	5,545.47	135.46	5,719.09	75
PA-48	5,577.31	38.62	5,719.10	61
PA-52.1	5,469.57	21.76	5,719.43	108
PA-52.2	5,494.68	226.85	5,718.31	97
PA-54	5,473.42	892.48	5,719.18	106
PA-55.1	5,523.03	73.98	5,718.29	84
PA-55.2	5,522.64	148.51	5,718.34	85
PA-57	5,481.46	66.51	5,719.44	103
PA-58	5,483.15	25.20	5,719.43	102
PA-59 & PA-65.3	5,538.82	153.98	5,719.17	78
PA-60	5,554.80	19.60	5,719.11	71
PA-63	5,500.98	6.42	5,719.46	95
PA-64.1	5,508.25	97.38	5,719.33	91
PA-64.2	5,531.77	200.19	5,719.60	81
PA-64.4	5,495.16	92.48	5,719.45	97
PA-65.1 & PA-65.2	5,524.26	36.99	5,719.44	84
PA-68	5,552.41	21.00	5,719.00	72
PA-70	5,560.06	149.60	5,719.08	69
PA-71.1	5,519.82	232.29	5,719.10	86
PA-71.2	5,573.14	92.48	5,718.97	63
PA-72	5,530.03	27.30	5,719.09	82
PA-73	5,530.59	26.60	5,719.10	82
PA-74	5,552.36	41.99	5,719.06	72
PA-75	5,570.66	6.71	5,719.03	64
PA-78.1	5,545.51	110.43	5,719.10	75
PA-78.2	5,580.91	249.70	5,719.00	60
PA-80.1	5,564.24	51.14	5,719.08	67
PA-80.2 & PA-80.3	5,568.11	504.29	5,719.30	65
PA-82	5,568.91	81.09	5,719.12	65
PA-85	5,605.03	13.71	5,850.00	106

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Hour

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
982	WT-1	8.0	PVC	150	0.00	0.00	0.00
984	WT-2	8.0	PVC	150	0.03	0.00	-4.73
873	WT-3	16.0	PVC	150	0.00	0.00	0.00
841	WT-4	36.0	PVC	150	2.77	0.36	8,780.18
130	WT-5	16.0	PVC	150	2.39	1.31	1,499.94
763	WT-6	24.0	PVC	130	1.39	0.22	1,963.45
764	WT-7	24.0	PVC	130	1.29	0.33	1,817.49
953	WT-8	12.0	PVC	150	1.37	0.38	-484.62
694	WT-9	12.0	PVC	150	1.20	0.33	424.22
462	WT-10	16.0	PVC	150	1.10	0.33	689.74
144	WT-11	24.0	PVC	130	1.21	0.23	1,702.12
825	WT-12	16.0	PVC	150	2.09	1.06	1,311.19
515	WT-13	24.0	PVC	150	1.86	0.17	2,627.95
968	WT-14	8.0	PVC	150	1.46	1.29	228.29
140	WT-15	24.0	PVC	150	1.10	0.35	-1,555.29
958	WT-16	8.0	PVC	150	0.14	0.01	22.30
981	WT-17	8.0	PVC	150	0.87	0.30	135.65
677	WT-18	16.0	PVC	150	1.80	0.68	-1,128.02
882	WT-19	24.0	PVC	150	0.56	0.03	792.75
888	WT-20	8.0	PVC	150	0.87	0.38	-136.77
165	WT-21	36.0	PVC	150	1.82	0.33	5,777.75
891	WT-22	24.0	PVC	150	0.76	0.17	1,077.56
687	WT-23	12.0	PVC	150	1.26	0.30	445.52
706	WT-24	24.0	PVC	150	0.58	0.13	814.93
895	WT-25	24.0	PVC	150	1.08	0.21	-1,526.05
948	WT-26	12.0	PVC	150	1.00	0.16	-352.50
837	WT-27	12.0	PVC	150	0.91	0.11	322.38
416	WT-28	12.0	PVC	150	0.58	0.09	-203.54
692	WT-29	12.0	PVC	150	0.67	0.25	-237.18
766	WT-30	36.0	PVC	150	1.65	0.15	5,238.84
688	WT-31	12.0	PVC	150	0.56	0.11	198.10
641	WT-32	12.0	PVC	150	1.68	1.25	593.44
701	WT-33	16.0	PVC	150	0.82	0.08	-516.66
466	WT-34	24.0	PVC	150	0.76	0.03	-1,077.56
695	WT-35	12.0	PVC	150	1.03	0.25	364.79
802	WT-36	12.0	PVC	150	0.28	0.04	-99.33
803	WT-37	12.0	PVC	150	0.28	0.01	-99.33
977	WT-38	8.0	PVC	150	0.04	0.00	-6.81
951	WT-39	12.0	PVC	150	0.96	0.18	-339.88
767	WT-40	36.0	PVC	150	1.34	0.11	4,255.41
718	WT-41	16.0	PVC	150	0.72	0.08	-449.16
886	WT-42	12.0	PVC	150	1.24	0.45	435.50
717	WT-43	16.0	PVC	150	0.70	0.06	-438.37
697	WT-44	12.0	PVC	150	0.63	0.06	223.18
158	WT-45	12.0	PVC	150	0.97	0.13	342.53
151	WT-46	12.0	PVC	150	1.35	0.68	475.25
64	WT-47	24.0	PVC	130	0.91	0.06	1,283.01
656	WT-48	24.0	PVC	150	0.40	0.04	559.42
710	WT-49	12.0	PVC	150	2.10	0.69	-740.36
591	WT-50	36.0	PVC	150	1.04	0.07	3,296.84
769	WT-51	36.0	PVC	150	0.93	0.03	2,952.60
770	WT-52	36.0	PVC	150	0.73	0.01	2,304.09
475	WT-53	12.0	PVC	150	0.68	0.12	-239.20

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Hour

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
504	WT-54	36.0	PVC	150	0.62	0.02	-1,961.56
592	WT-55	36.0	PVC	150	0.96	0.06	3,060.66
407	WT-56	12.0	PVC	150	1.07	0.66	-377.27
819	WT-57	12.0	PVC	150	0.41	0.04	-144.01
883	WT-58	24.0	PVC	150	0.43	0.02	602.22
426	WT-59	12.0	PVC	150	0.31	0.05	-108.06
649	WT-60	12.0	PVC	150	1.71	1.17	603.36
608	WT-61	36.0	PVC	150	0.73	0.04	2,304.09
577	WT-62	12.0	PVC	150	0.68	0.11	-239.20
479	WT-63	12.0	PVC	150	0.08	0.00	26.52
676	WT-64	16.0	PVC	150	0.61	0.26	-382.16
919	WT-65	8.0	PVC	150	0.71	0.12	111.37
658	WT-66	24.0	PVC	150	0.27	0.01	381.99
818	WT-67	12.0	PVC	150	0.41	0.06	-144.01
611	WT-68	12.0	PVC	150	1.53	0.41	-538.91
752	WT-69	36.0	PVC	150	0.53	0.02	1,683.04
797	WT-70	24.0	PVC	150	0.43	0.06	-607.19
739	WT-71	12.0	PVC	150	0.21	0.01	-74.96
839	WT-72	24.0	PVC	150	0.44	0.05	621.61
753	WT-73	36.0	PVC	150	0.48	0.02	1,534.46
709	WT-74	12.0	PVC	150	1.05	0.19	-370.56
691	WT-75	12.0	PVC	150	0.23	0.02	-80.74
453	WT-76	36.0	PVC	150	0.45	0.02	1,427.57
74	WT-77	16.0	PVC	150	0.04	0.00	22.04
580	WT-78	16.0	PVC	150	0.04	0.00	-22.04
644	WT-79	16.0	PVC	150	0.00	0.00	0.00
779	WT-80	8.0	PVC	150	0.71	0.17	-111.37
610	WT-81	12.0	PVC	150	0.41	0.03	-144.74
149	WT-82	24.0	PVC	130	0.65	0.10	-914.00
645	WT-83	16.0	PVC	150	1.83	0.39	-1,147.49
777	WT-84	24.0	PVC	150	0.49	0.04	-696.07
970	WT-85	12.0	PVC	150	0.67	0.08	-237.52
936	WT-86	12.0	PVC	150	0.07	0.00	25.08
911	WT-87	24.0	PVC	150	0.26	0.01	363.02
922	WT-88	36.0	PVC	150	0.38	0.01	1,190.39
603	WT-89	36.0	PVC	150	0.11	0.00	-351.60
796	WT-90	24.0	PVC	150	0.17	0.01	-233.99
698	WT-91	12.0	PVC	150	0.05	0.00	-17.17
106	WT-92	12.0	PVC	130	0.08	0.01	-28.17
909	WT-93	24.0	PVC	150	0.37	0.02	-522.64
604	WT-94	36.0	PVC	150	0.12	0.00	-386.56
781	WT-95	16.0	PVC	150	0.00	0.00	0.00
785	WT-96	16.0	PVC	150	0.00	0.00	0.00
782	WT-97	16.0	PVC	150	0.00	0.00	0.00
784	WT-98	16.0	PVC	150	0.00	0.00	0.00
876	WT-99	24.0	PVC	150	0.49	0.04	-696.07
862	WT-100	16.0	PVC	150	0.00	0.00	0.00
875	WT-101	16.0	PVC	150	0.00	0.00	0.00
877	WT-102	24.0	PVC	150	0.49	0.14	-696.07

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Hour

FlexTable: Pipe Table

ID	Label	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)	Headloss (ft)	Flow (gpm)
892	WT-103	24.0	PVC	150	0.48	0.09	674.89
890	WT-104	24.0	PVC	150	1.26	0.13	1,775.17
887	WT-105	12.0	PVC	150	0.63	0.08	220.58
894	WT-106	24.0	PVC	150	1.10	0.07	-1,554.59
897	WT-107	8.0	PVC	150	0.18	0.00	-28.54
899	WT-108	8.0	PVC	150	0.27	0.02	-43.03
983	WT-109	8.0	PVC	150	0.54	0.35	-84.11
912	WT-110	24.0	PVC	150	0.10	0.00	145.40
980	WT-111	8.0	PVC	150	0.87	0.09	135.65
920	WT-112	8.0	PVC	150	0.24	0.05	-37.21
914	WT-113	8.0	PVC	150	0.02	0.00	3.13
923	WT-114	36.0	PVC	150	0.25	0.00	795.89
939	WT-115	8.0	PVC	150	2.52	2.65	394.50
943	WT-116	8.0	PVC	150	0.19	0.03	30.04
946	WT-117	8.0	PVC	150	0.57	0.13	-88.82
947	WT-118	8.0	PVC	150	2.09	1.89	-327.43
950	WT-119	12.0	PVC	150	0.73	0.09	-258.60
954	WT-120	12.0	PVC	150	1.48	0.40	-523.07
957	WT-121	8.0	PVC	150	0.49	0.04	76.49
978	WT-122	8.0	PVC	150	0.90	0.33	-141.41
971	WT-123	12.0	PVC	150	1.07	0.11	-378.93

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Hour

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,460.50	0.00	5,719.95	112
J-2	5,501.04	0.00	5,719.94	95
J-3	5,551.65	0.00	5,719.83	73
J-4	5,609.10	0.00	5,850.00	104
J-5	5,501.88	0.00	5,718.24	94
J-6	5,556.96	0.00	5,718.51	70
J-7	5,500.28	0.00	5,718.31	94
J-9	5,484.42	0.00	5,718.81	101
J-10	5,505.26	0.00	5,718.21	92
J-13	5,524.10	0.00	5,718.56	84
J-14	5,551.96	0.00	5,717.70	72
J-15	5,581.42	0.00	5,718.20	59
J-16	5,537.99	0.00	5,718.34	78
J-16	5,584.25	0.00	5,850.00	115
J-17	5,602.52	0.00	5,850.00	107
J-18	5,526.61	0.00	5,718.16	83
J-19	5,500.42	0.00	5,719.32	95
J-20	5,479.73	0.00	5,718.61	103
J-21	5,487.05	0.00	5,718.82	100
J-22	5,525.73	0.00	5,718.15	83
J-23	5,555.73	0.00	5,717.82	70
J-24	5,528.87	0.00	5,717.78	82
PA-2	5,497.57	728.04	5,718.87	96
PA-3	5,495.46	438.75	5,719.55	97
PA-4	5,510.37	124.98	5,719.64	91
PA-5.1 & PA5.2	5,516.14	145.96	5,719.42	88
PA-6.1 & PA-6.2	5,532.21	115.37	5,719.09	81
PA-8	5,510.31	0.00	5,717.78	90
PA-10	5,493.13	394.17	5,718.90	98
PA-11	5,519.05	755.14	5,719.17	87
PA-12	5,526.97	92.64	5,717.88	83
PA-13.1 & PA-13.2	5,538.27	142.46	5,717.49	78
PA-14	5,498.69	0.00	5,718.92	95
PA-15	5,529.65	0.00	5,719.06	82
PA-16	5,536.59	68.25	5,718.28	79
PA-17	5,496.30	648.51	5,718.89	96
PA-18	5,496.19	0.00	5,718.88	96
PA-19.1	5,497.23	7.87	5,718.61	96
PA-19.2	5,494.88	41.08	5,718.64	97
PA-19.3	5,481.50	11.36	5,718.61	103
PA-19.4	5,522.80	152.08	5,718.99	85
PA-21.1	5,499.31	73.42	5,718.61	95
PA-21.2	5,509.48	159.07	5,718.23	90
PA-21.3	5,532.12	38.46	5,718.66	81
PA-21.4	5,484.36	22.72	5,718.40	101
PA-21.5	5,532.85	54.19	5,718.24	80
PA-21.6	5,543.82	81.28	5,718.10	75
PA-22 & PA-25	5,479.27	935.97	5,718.71	104
PA-24	5,484.37	0.00	5,718.53	101
PA-26.1	5,483.60	0.00	5,718.84	102
PA-26.2	5,472.88	48.94	5,718.82	106

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Hour

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
PA-29.1 & PA-29.2	5,547.67	146.83	5,718.86	74
PA-30 & PA-37.1	5,569.62	369.80	5,717.82	64
PA-33 & PA-35.1	5,563.70	69.05	5,717.64	67
PA-34	5,552.99	134.60	5,717.49	71
PA-35.2	5,556.01	93.52	5,717.74	70
PA-35.3	5,549.72	63.80	5,717.93	73
PA-36	5,575.28	68.25	5,717.63	62
PA-37.4	5,534.13	118.86	5,718.38	80
PA-38	5,545.15	55.06	5,718.01	75
PA-40.1 & PA-37.3	5,592.41	576.84	5,716.97	54
PA-40.2	5,564.45	64.68	5,718.14	66
PA-41 & PA-37.2	5,592.30	403.79	5,716.97	54
PA-43 & PA-46.1	5,524.12	190.53	5,718.18	84
PA-45	5,534.03	0.00	5,718.04	80
PA-46.2	5,545.47	217.63	5,718.15	75
PA-48	5,577.31	62.05	5,718.17	61
PA-52.1	5,469.57	34.96	5,718.81	108
PA-52.2	5,494.68	364.46	5,716.17	96
PA-54	5,473.42	1,147.49	5,718.42	106
PA-55.1	5,523.03	118.86	5,716.14	84
PA-55.2	5,522.64	238.60	5,716.26	84
PA-57	5,481.46	106.89	5,718.84	103
PA-58	5,483.15	0.00	5,718.83	102
PA-59 & PA-65.3	5,538.82	247.42	5,718.26	78
PA-60	5,554.80	0.00	5,718.15	71
PA-63	5,500.98	10.31	5,718.88	94
PA-64.1	5,508.25	156.45	5,718.58	91
PA-64.2	5,531.77	321.63	5,719.15	81
PA-64.4	5,495.16	148.58	5,718.87	97
PA-65.1 & PA-65.2	5,524.26	59.43	5,718.82	84
PA-68	5,552.41	0.00	5,717.99	72
PA-70	5,560.06	240.35	5,718.09	68
PA-71.1	5,519.82	373.20	5,718.15	86
PA-71.2	5,573.14	148.58	5,717.87	63
PA-72	5,530.03	0.00	5,718.13	81
PA-73	5,530.59	0.00	5,718.14	81
PA-74	5,552.36	67.50	5,718.06	72
PA-75	5,570.66	10.78	5,717.98	64
PA-78.1	5,545.51	177.42	5,718.15	75
PA-78.2	5,580.91	401.17	5,717.92	59
PA-80.1	5,564.24	82.16	5,718.09	67
PA-80.2 & PA-80.3	5,568.11	810.20	5,718.52	65
PA-82	5,568.91	130.33	5,718.19	65
PA-85	5,605.03	22.03	5,850.00	106

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

Fire Flow Node FlexTable: Fire Flow Results Table

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Pipe w/ Maximum Velocity	Velocity of Maximum Pipe (ft/s)
J-1	True	3,500.00	3,500.00	5,000.00	112	55	PA-40.1 & PA-37.3	WT-72	3.12
J-2	True	1,500.00	1,500.00	4,000.00	94	55	PA-40.1 & PA-37.3	WT-47	3.01
J-3	True	1,500.00	1,500.00	4,000.00	73	55	PA-40.1 & PA-37.3	WT-13	3.66
J-4	True	1,500.00	1,500.00	4,000.00	103	55	PA-40.1 & PA-37.3	WT-77	6.40
J-5	True	1,500.00	1,500.00	4,000.00	93	54	PA-40.1 & PA-37.3	WT-5	2.64
J-6	True	1,500.00	1,500.00	4,000.00	69	54	PA-40.1 & PA-37.3	WT-4	2.77
J-7	True	1,500.00	1,500.00	4,000.00	94	54	PA-40.1 & PA-37.3	WT-27	3.07
J-9	True	1,500.00	1,500.00	4,000.00	101	54	PA-40.1 & PA-37.3	WT-4	2.63
J-10	True	1,500.00	1,500.00	4,000.00	92	54	PA-40.1 & PA-37.3	WT-5	2.66
J-13	True	1,500.00	1,500.00	4,000.00	80	54	PA-40.1 & PA-37.3	WT-9	4.82
J-14	True	1,500.00	1,500.00	4,000.00	64	52	PA-41 & PA-37.2	WT-85	6.12
J-15	True	1,500.00	1,500.00	4,000.00	58	53	PA-40.1 & PA-37.3	WT-4	2.71
J-16	True	3,500.00	3,500.00	5,000.00	76	53	PA-40.1 & PA-37.3	WT-4	2.97
J-16	True	1,500.00	1,500.00	4,000.00	98	55	PA-40.1 & PA-37.3	WT-77	6.40
J-17	True	3,500.00	3,500.00	5,000.00	93	55	PA-40.1 & PA-37.3	WT-77	8.00
J-18	True	1,500.00	1,500.00	4,000.00	82	54	PA-40.1 & PA-37.3	WT-4	2.66
J-19	True	1,500.00	1,500.00	4,000.00	95	54	PA-40.1 & PA-37.3	WT-4	2.87
J-20	True	1,500.00	1,500.00	4,000.00	103	54	PA-40.1 & PA-37.3	WT-4	2.65
J-21	True	1,500.00	1,500.00	4,000.00	100	54	PA-40.1 & PA-37.3	WT-4	2.63
J-22	True	1,500.00	1,500.00	4,000.00	80	54	PA-40.1 & PA-37.3	WT-26	7.42
J-23	True	1,500.00	1,500.00	4,000.00	65	53	PA-41 & PA-37.2	WT-123	7.38
J-24	True	1,500.00	1,500.00	4,000.00	31	39	PA-8	WT-14	15.27
PA-2	True	2,500.00	2,953.15	5,453.15	92	54	PA-40.1 & PA-37.3	WT-68	5.95
PA-3	True	2,500.00	2,773.09	5,273.09	96	54	PA-40.1 & PA-37.3	WT-82	3.37
PA-4	True	2,500.00	2,577.79	5,077.79	90	54	PA-40.1 & PA-37.3	WT-4	3.28
PA-5.1 & PA5.2	True	1,500.00	1,590.85	4,090.85	88	54	PA-40.1 & PA-37.3	WT-6	3.26

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

Fire Flow Node FlexTable: Fire Flow Results Table

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Pipe w/ Maximum Velocity	Velocity of Maximum Pipe (ft/s)
PA-6.1 & PA-6.2	True	2,500.00	2,571.81	5,071.81	80	54	PA-40.1 & PA-37.3	WT-6	3.24
PA-8	True	1,500.00	1,517.50	3,441.08	20	44	J-24	WT-1	21.96
PA-10	True	2,500.00	2,745.34	5,245.34	93	54	PA-40.1 & PA-37.3	WT-68	8.66
PA-11	True	2,500.00	2,970.02	5,470.02	86	54	PA-40.1 & PA-37.3	WT-4	3.06
PA-12	True	1,500.00	1,557.66	4,057.66	35	38	J-24	WT-14	16.11
PA-13.1 & PA-13.2	True	1,500.00	1,588.67	4,088.67	24	46	PA-34	WT-122	14.37
PA-14	True	1,500.00	1,500.00	4,000.00	95	54	PA-40.1 & PA-37.3	WT-4	2.71
PA-15	True	1,500.00	1,517.50	4,017.50	82	54	PA-40.1 & PA-37.3	WT-4	2.78
PA-16	True	3,500.00	3,542.46	5,042.46	71	54	PA-41 & PA-37.2	WT-120	7.69
PA-17	True	1,500.00	1,903.65	4,403.65	96	54	PA-40.1 & PA-37.3	WT-4	2.70
PA-18	True	2,500.00	2,504.55	5,004.55	96	54	PA-40.1 & PA-37.3	WT-4	2.90
PA-19.1	True	1,500.00	1,504.90	4,004.90	86	54	PA-40.1 & PA-37.3	WT-2	16.89
PA-19.2	True	1,500.00	1,525.57	4,025.57	70	54	PA-40.1 & PA-37.3	WT-108	16.93
PA-19.3	True	1,500.00	1,507.07	4,007.07	95	54	PA-40.1 & PA-37.3	WT-107	15.09
PA-19.4	True	1,500.00	1,594.66	4,094.66	85	54	PA-40.1 & PA-37.3	WT-4	2.74
PA-21.1	True	1,500.00	1,545.70	4,045.70	93	54	PA-40.1 & PA-37.3	WT-105	5.10
PA-21.2	True	1,500.00	1,599.01	4,099.01	62	54	PA-40.1 & PA-37.3	WT-20	14.00
PA-21.3	True	1,500.00	1,523.94	4,023.94	77	54	PA-40.1 & PA-37.3	WT-120	7.92
PA-21.4	True	1,500.00	1,514.14	4,014.14	101	54	PA-40.1 & PA-37.3	WT-4	2.64
PA-21.5	True	1,500.00	1,533.73	4,033.73	63	54	PA-40.1 & PA-37.3	WT-121	18.73
PA-21.6	True	1,500.00	1,550.59	4,050.59	70	54	PA-41 & PA-37.2	WT-39	6.24
PA-22 & PA-25	True	2,500.00	3,082.55	5,582.55	99	54	PA-40.1 & PA-37.3	WT-45	10.25
PA-24	True	1,500.00	1,523.10	4,023.10	101	54	PA-40.1 & PA-37.3	WT-4	2.65
PA-26.1	True	1,500.00	1,515.75	4,015.75	102	54	PA-40.1 & PA-37.3	WT-4	2.67
PA-26.2	True	1,500.00	1,530.46	4,030.46	106	54	PA-40.1 & PA-37.3	WT-4	2.65

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

Fire Flow Node FlexTable: Fire Flow Results Table

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Pipe w/ Maximum Velocity	Velocity of Maximum Pipe (ft/s)
PA-29.1 & PA-29.2	True	2,500.00	2,591.39	5,091.39	73	54	PA-40.1 & PA-37.3	WT-4	3.06
PA-30 & PA-37.1	True	2,500.00	2,730.15	5,230.15	58	51	PA-41 & PA-37.2	WT-49	9.88
PA-33 & PA-35.1	True	1,500.00	1,562.58	4,062.58	60	51	PA-41 & PA-37.2	WT-71	6.98
PA-34	True	1,500.00	1,583.78	4,083.78	33	49	PA-13.1 & PA-13.2	WT-122	17.93
PA-35.2	True	1,500.00	1,558.21	4,058.21	63	53	PA-41 & PA-37.2	WT-85	7.13
PA-35.3	True	1,500.00	1,539.71	4,039.71	69	53	PA-41 & PA-37.2	WT-62	4.86
PA-36	True	3,500.00	3,542.46	5,042.46	55	49	PA-41 & PA-37.2	WT-49	7.95
PA-37.4	True	2,500.00	2,573.98	5,073.98	78	53	PA-40.1 & PA-37.3	WT-4	2.98
PA-38	True	1,500.00	1,534.27	4,034.27	69	54	PA-41 & PA-37.2	WT-28	6.22
PA-40.1 & PA-37.3	True	1,500.00	1,859.04	4,359.04	45	47	PA-41 & PA-37.2	WT-60	7.93
PA-40.2	True	1,500.00	1,540.26	4,040.26	66	53	PA-40.1 & PA-37.3	WT-4	2.69
PA-41 & PA-37.2	True	1,500.00	1,769.88	4,269.88	44	47	PA-40.1 & PA-37.3	WT-60	6.87
PA-43 & PA-46.1	True	1,500.00	1,758.59	4,258.59	83	54	PA-40.1 & PA-37.3	WT-4	2.65
PA-45	True	1,500.00	1,536.40	4,036.40	76	53	PA-41 & PA-37.2	WT-62	6.93
PA-46.2	True	1,500.00	1,635.46	4,135.46	74	54	PA-40.1 & PA-37.3	WT-4	2.67
PA-48	True	1,500.00	1,538.62	4,038.62	60	53	PA-40.1 & PA-37.3	WT-4	2.70
PA-52.1	True	1,500.00	1,521.76	4,021.76	108	54	PA-40.1 & PA-37.3	WT-4	2.64
PA-52.2	True	1,500.00	1,726.85	4,226.85	53	54	PA-40.1 & PA-37.3	WT-115	18.07
PA-54	True	2,500.00	3,392.48	5,892.48	102	54	PA-40.1 & PA-37.3	WT-83	9.40
PA-55.1	True	1,500.00	1,573.98	4,073.98	30	51	PA-55.2	WT-118	15.13
PA-55.2	True	1,500.00	1,648.51	4,148.51	40	49	PA-55.1	WT-118	17.68
PA-57	True	2,500.00	2,566.51	5,066.51	102	54	PA-40.1 & PA-37.3	WT-4	2.79
PA-58	True	1,500.00	1,525.20	4,025.20	102	54	PA-40.1 & PA-37.3	WT-4	2.62

The Aurora Highlands - Master Utility Report Amendment 3

Active Scenario: Max Day

Fire Flow Node FlexTable: Fire Flow Results Table

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Pipe w/ Maximum Velocity	Velocity of Maximum Pipe (ft/s)
PA-59 & PA-65.3	True	3,500.00	3,653.98	5,153.98	70	54	PA-40.1 & PA-37.3	WT-23	8.15
PA-60	True	1,500.00	1,519.60	4,019.60	67	54	PA-40.1 & PA-37.3	WT-26	4.62
PA-63	True	2,500.00	2,506.42	5,006.42	94	54	PA-40.1 & PA-37.3	WT-12	2.87
PA-64.1	True	1,500.00	1,597.38	4,097.38	85	54	PA-40.1 & PA-37.3	WT-75	5.85
PA-64.2	True	1,500.00	1,700.19	4,200.19	80	54	PA-40.1 & PA-37.3	WT-18	3.97
PA-64.4	True	1,500.00	1,592.48	4,092.48	97	54	PA-40.1 & PA-37.3	WT-4	2.60
PA-65.1 & PA-65.2	True	1,500.00	1,536.99	4,036.99	80	54	PA-40.1 & PA-37.3	WT-9	6.83
PA-68	True	0.00	21.00	22.00	72	55	PA-40.1 & PA-37.3	WT-4	1.84
PA-70	True	1,500.00	1,649.60	4,149.60	63	54	PA-40.1 & PA-37.3	WT-44	7.40
PA-71.1	True	1,500.00	1,732.29	4,232.29	85	54	PA-40.1 & PA-37.3	WT-5	3.01
PA-71.2	True	1,500.00	1,592.48	4,092.48	30	52	PA-68	WT-80	14.26
PA-72	True	1,500.00	1,527.30	4,027.30	78	54	PA-40.1 & PA-37.3	WT-37	8.66
PA-73	True	1,500.00	1,526.60	4,026.60	80	54	PA-40.1 & PA-37.3	WT-5	3.16
PA-74	True	3,500.00	3,541.99	5,041.99	68	54	PA-40.1 & PA-37.3	WT-33	7.88
PA-75	True	2,500.00	2,506.71	5,006.71	58	53	PA-78.2	WT-33	7.65
PA-78.1	True	2,500.00	2,610.43	5,110.43	73	54	PA-40.1 & PA-37.3	WT-5	3.68
PA-78.2	True	1,500.00	1,749.70	4,249.70	54	54	PA-40.1 & PA-37.3	WT-33	6.10
PA-80.1	True	1,500.00	1,551.14	4,051.14	60	54	PA-40.1 & PA-37.3	WT-44	6.18
PA-80.2 & PA-80.3	True	2,500.00	3,004.29	5,504.29	63	54	PA-40.1 & PA-37.3	WT-5	5.49
PA-82	True	2,500.00	2,581.09	5,081.09	63	54	PA-40.1 & PA-37.3	WT-5	4.01
PA-85	True	2,500.00	2,513.71	5,013.71	100	55	PA-40.1 & PA-37.3	WT-77	8.00

APPENDIX C

SANITARY SEWER CALCULATIONS



SANITARY SEWER DEMAND CALCULATIONS

Project #: 181211.47
Project: The Aurora Highlands

Location: Aurora, CO
Plan Date: 6/2024

By K House
Checked R Littleton
Date 6/18/2024
Date 6/18/2024

POPULATION DENSITY		
Multi-Family	2.77	People per Unit
Single-Family	2.77	People per Unit
Average Flow Generation	68	gpcpd

COMMERCIAL / SCHOOLS / INDUSTRIAL			
	Commercial	Schools / Industrial	
Average Flow Generation	1,500	1,200	gpd/acre
	0.0023	0.0019	cfs/acre
Equivalent Population	22	18	capita

PEAKING FACTOR			
PF = 5/(p^0.167)		Where p = Population in thousands	
Min. PF =	1.7	Max. PF =	4.0

PIPE CAPACITY (mgd) (n=.011)		
75 % FULL	PIPE SIZE (IN)	0.4% SLOPE
	8	0.53
	10	0.97
	12	1.57

PIPE CAPACITY (mgd) (n=.011)			
80 % FULL	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
	15	3.05	2.41
	18	4.96	3.92
	24	10.68	8.44
	30	19.37	15.31
	36	31.49	24.90

Design Point	Planning Area	Flow Split	RESIDENTIAL SINGLE FAMILY							Average Day Flow (gpm)	RESIDENTIAL MULTI FAMILY							COMMERCIAL / SCHOOLS / INDUSTRIAL						CUMMULATIVE TOTALS						PIPE PARAMETERS				
			Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)		Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)	Land Use	Total Acres	Population Density	Equivalent Population	Average Flow Generation (gpd/acre)	Average Day Flow (mgd)	Total Acres	Infil. @ 10% (mgd)	Cumulative Population	Peak Factor	Peak Flow (mgd)	Peak Flow + Infil. (mgd)	Estimated Pipe Slope (%)	Estimated Size at Given Slope	Pipe Name	Velocity (ft/sec)	Percent Full at Given Slope
First Creek Watershed																																		
1	OS-2 (GVRE OFS-2)		161.8	5.5	890	3.20	2,847	80	0.228								Com.	202.2	31.25	6,319	2,500	0.506	364.0	0.073	9,166	3.5	2.53	2.61						
	Updated ⁽¹⁾		161.8	5.5	890	2.77	2,465	68	0.168								Com.	202.2	22	4,448	1,500	0.303	364.0	0.047	6,913	3.6	1.70	1.75						
	Total		161.8		890		2,465		0.168								202.2		4,448		0.303	364.0	0.047	6,913	3.6	1.70	1.75	0.40%	15	SS-1	4.0	53.5%		
	PA-82	100%	0.0		0				0.000	0.0		0			0.000	Com.	27.8	22	612	1,500	0.042	27.8	0.004	612	4.0	0.17	0.17	0.40%	8					
	PA-85	100%	0.0		0				0.000	0.0		0			0.000	Com.	4.7	22	103	1,500	0.007	4.7	0.001	103	4.0	0.03	0.03	0.40%	8					
	On-Site Total																32.5		715		0.049	32.5	0.005	715	4.0	0.20	0.20	0.40%	8					
	Design Point Total		161.8	5.5	890		2,465		0.168	0.0		0		0		0.000	234.7		5,163		0.352	396.5	0.052	7,628	3.6	1.85	1.90	0.40%	15	SS-2	4.1	56.3%		
2.1	ALC PA-15	50%	26.4	11.0	290	2.77	803	68	0.055	38	0.0	0			0.000							26.4	0.005	803	4.0	0.22	0.22							
	ALC PA-20	100%	0.0		0				0.000	0	0.0	0			0.000	Com.	15.1	22	332	1,500	0.023	15.1	0.002	332	4.0	0.09	0.09							
	ALC PA-22	100%	0.0		0				0.000	0	0.0	0			0.000	Com.	50.2	22	1,104	1,500	0.075	50.2	0.008	1,104	4.0	0.30	0.31							
	ALC PA-23	100%	0.0		0				0.000	0	0.0	0			0.000	Com.	44.1	22	970	1,500	0.066	44.1	0.007	970	4.0	0.26	0.27							
	PA-78.2	50%	30.3	7.6	229	2.77	634	68	0.043	30	0.0	0			0.000							30.3	0.004	634	4.0	0.17	0.18	0.40%	8					
	On-Site Total		30.3		229		634		0.043	30							0.0		0		0.000	30.3	0.004	634	4.0	0.17	0.18	0.40%	8					
	Design Point Total		56.7	9.2	519		1,438		0.098	68	0.0	0		0		0.000	109.4		2,407		0.164	166.1	0.026	3,844	4.0	1.05	1.07	0.40%	12	SS-4	3.6	57.1%		
2.2	PA-71.1	25%	18.3	5.8	106	2.77	294	68	0.020			0			0.000							18.3	0.002	294	4.0	0.08	0.08	0.40%	8					
	PA-74	100%	0.0		0				0.000		0.0	0			0.000	School	18.0	18	324	1,200	0.022	18.0	0.002	324	4.0	0.09	0.09	0.40%	8					
	PA-75	100%	0.0		0				0.000		0.0	0			0.000	Fire	2.3	18	41	1,200	0.003	2.3	0.000	41	4.0	0.01	0.01	0.40%	8					
	PA-78.1	100%	0.0		0				0.000	16.0	12.7	203	2.77	562	68	0.038						16.0	0.004	562	4.0	0.15	0.16	0.40%	8					
	PA-78.2	50%	30.3	7.6	230	2.77	637	68	0.043			0			0.000							30.3	0.004	637	4.0	0.17	0.18	0.40%	8					
	PA-80.1	50%	6.2	7.6	47	2.77	130	68	0.009			0		0		0.000						6.2	0.001	130	4.0	0.04	0.04	0.40%	8					
	PA-80.2	30%	18.9	4.2	80	2.77	222	68	0.015			0		0		0.000						18.9	0.002	222	4.0	0.06	0.06	0.40%	8		SS-5	2.8	60.8%	
	PA-80.3	60%	0.0		0				0.000		16.1	24.5	396	2.77	1,097	68	0.075					16.1	0.007	1,097	4.0	0.30	0.31	0.40%	8					
	On-Site Total	DP1 - DP2.2	104.1		692		1,917		0.130		32.2	18.6	599		1,659		0.113	52.8		1,080		0.073	189.0	0.032	4,656	3.9	1.22	1.25	0.40%	12				
	Design Point Total		292.2	6.4	1,872		5,185		0.353		32.2	18.6	599		1,659		0.113	364.4		7,936		0.541	688.8	0.101	14,780	3.2	3.21	3.31	0.40%	18	SS-6	4.7	58.9%	
3.1	ALC PA-09	40%	32.2	11.0	353	2.77	978	68	0.066			0		0		0.000						32.2	0.007	978	4.0	0.27	0.27	0.40%		10	SS-7	2.9	44.3%	
	ALC PA-11	50%										0		0		0.000	Com.	24.9	22	548	1,500	0.037	24.9	0.004	548	4.0	0.15	0.15	0.40%					
	ALC PA-13	100%	53.0	11.0	583	2.77	1,615	68	0.110			0		0		0.000						53.0	0.011	1,615	4.0	0.44	0.45	0.40%						
	ALC PA-15	50%	26.4	11.0	290	2.77	803	68	0.055			0		0		0.000						26.4	0.005	803	4.0	0.22	0.22	0.40%		10	SS-8	3.3	65.5%	
	ALC PA-17	20%										0		0		0.000	Com.	21.6	22	476	1,500	0.032	21.6	0.003	476	4.0	0.13	0.13	0.40%					
	On-Site Total		0.0		0		0		0.000		0.0		0		0.000			0.0		0		0.000	0.0	0.000	0	0.0	0.00	0.00						
Design Point Total		111.6	11.0	1,226		3,396		0.231	0.0		0		0		0.000	46.5		1,024		0.070	158.1	0.030	4,420	3.9	1.17	1.20	0.40%	12	SS-9	3.7	61.5%			
3.2	PA-37.3	50%	36.6	5.2	191	2.77	529	68	0.036			0		0		0.000						36.6	0.004	529	4.0	0.14	0.15	0.40%	8					
	PA-48	100%	24.9	2.9	71	2.77	197	68	0.013			0		0		0.000						24.9	0.001	197	4.0	0.05	0.05	0.40%	8					
	PA-71.1	25%	18.3	5.8	106	2.77	294	68	0.020			0		0		0.000						18.3	0.002	294	4.0	0.08	0.08	0.40%	8					
	PA-71.2	100%	26.9	6.3	170	2.77	471	68	0.032			0		0		0.000						26.9	0.003	471	4.0	0.13	0.13	0.40%	8					
	On-Site Total	DP3.1 - DP3.2	106.7		538		1,490		0.101	0.0		0		0		0.000	0.0		0		0.000	106.7	0.010	1,490	4.0	0.41	0.42	0.40%	8					
	Design Point Total		218.3	8.1	1,764		4,886		0.332	0.0		0		0		0.000	46.5		1,024		0.070	264.8	0.040	5,910	3.7	1.49	1.53	0.40%	12	SS-10	3.8	73.4%		
3.3	PA-46.1	20%	11.1	3.9	43	2.77	119	68	0.008			0		0		0.000						11.1	0.001	119	4.0	0.03	0.03	0.40%	8					
	PA-46.2	50%	23.1	5.4	124	2.77	343	68	0.023			0		0		0.000						23.1	0.002	343	4.0	0.09	0.10	0.40%	8					
	PA-71.1	50%	36.7	5.9	215	2.77	596	68	0.040			0		0		0.000						36.7	0.004	596	4.0	0.16	0.17	0.40%	8					
	On-Site Total	DP1 - DP3.3	281.6		1,612		4,465		0.304	32.2		599		1,659		0.113	52.8		1,080		0.073	366.6	0.049	7,205	3.6	1.76	1.81	0.40%	15					
Design Point Total		581.4	6.9	4,018		11,129		0.757	32.2	18.6	599																							



SANITARY SEWER DEMAND CALCULATIONS

Project #: 181211.47
Project: The Aurora Highlands

Location: Aurora, CO
Plan Date: 6/2024

By K House
Checked R Littleton
Date 6/18/2024
Date 6/18/2024

POPULATION DENSITY		
Multi-Family	2.77	People per Unit
Single-Family	2.77	People per Unit
Average Flow Generation	68	gpcpd

COMMERCIAL / SCHOOLS / INDISTRIAL			
Average Flow Generation	Commercial	Schools / Industrial	
	1,500	1,200	gpd/acre
	0.0023	0.0019	cfs/acre
Equivalent Population	22	18	capita

PEAKING FACTOR			
PF = 5/(p^0.167)		Where p = Population in thousands	
Min. PF =	1.7	Max. PF =	4.0

PIPE CAPACITY (mgd) (n=.011)		
75 % FULL	PIPE SIZE (IN)	0.4% SLOPE
	8	0.53
	10	0.97
	12	1.57

PIPE CAPACITY (mgd) (n=.011)			
80 % FULL	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
	15	3.05	2.41
	18	4.96	3.92
	24	10.68	8.44
	30	19.37	15.31
	36	31.49	24.90

Design Point	Planning Area	Flow Split	RESIDENTIAL SINGLE FAMILY							Average Day Flow (gpm)	RESIDENTIAL MULTI FAMILY							COMMERCIAL / SCHOOLS / INDUSTRIAL						CUMMULATIVE TOTALS						PIPE PARAMETERS				
			Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)		Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)	Land Use	Total Acres	Population Density	Equivalent Population	Average Flow Generation (gpd/acre)	Average Day Flow (mgd)	Total Acres	Infl. @ 10% (mgd)	Cumulative Population	Peak Factor	Peak Flow (mgd)	Peak Flow + Infl. (mgd)	Estimated Pipe Slope (%)	Estimated Size at Given Slope	Pipe Name	Velocity (ft/sec)	Percent Full at Given Slope
7	PA-21.1	100%	22.6	3.7	84	2.77	233	68	0.016													22.6	0.002	233	4.0	0.06	0.06	0.40%	8	SS-19	2.8	63.8%		
	PA-21.2	100%	44.0	4.1	182	2.77	504	68	0.034													44.0	0.003	504	4.0	0.14	0.14	0.40%	8					
	PA-21.3	100%	4.3	10.2	44	2.77	122	68	0.008													4.3	0.001	122	4.0	0.03	0.03	0.40%	8					
	PA-21.4	100%	8.7	3.0	26	2.77	72	68	0.005													8.7	0.000	72	4.0	0.02	0.02	0.40%	8					
	PA-21.5	100%	5.8	10.7	62	2.77	172	68	0.012													5.8	0.001	172	4.0	0.05	0.05	0.40%	8					
	PA-21.6	100%	21.1	4.4	93	2.77	258	68	0.018														21.1	0.002	258	4.0	0.07	0.07	0.40%				8	
	On-Site Total	DP1 - DP7	683.1		3,394		9,401		0.639		32.2		599		1,659		0.113	52.8		1,080		0.073	768.1	0.083	12,141	3.3	2.72	2.80	0.40%	15				
	Design Point Total		959.7	5.9	5,675		15,719		1.069		32.2	18.6	599		1,659		0.113	410.9		8,959		0.610	1,402.8	0.179	26,338	2.9	5.19	5.37	0.25%	24	SS-20	4.5	57.1%	
8	OS-5 (part of GVRE OFS-8)		219.0	5.5	1,205	3.20	3,854	80	0.308								Com.	511.0	31.25	15,969	2,500	1.278	730.0	0.159	19,823	3.0	4.82	4.97	0.25%	24				
			219.0	5.5	1,205	2.77	3,336	68	0.227								Com.	511.0	22.000	11,242	1,500.000	0.767	730.0	0.099	14,578	3.2	3.18	3.27	0.25%	18	SS-21	3.9	68.6%	
9.1	PA-65.2	100%	2.0	12.0	24	2.77	66	68	0.005													2.0	0.000	66	4.0	0.02	0.02	0.40%	8					
	PA-65.3	50%	28.2	3.6	101	2.77	280	68	0.019													28.2	0.002	280	4.0	0.08	0.08	0.40%	8					
	PA-80.2	40%	25.2	4.2	106	2.77	294	68	0.020													25.2	0.002	294	4.0	0.08	0.08	0.40%	8					
	PA-80.3	40%	0.0		0				0.000		10.8	24.5	264	2.77	731	68	0.050	0.0		0		0.000	10.8	0.005	731	4.0	0.20	0.20	0.40%	8				
	Design Point Total	DP9.1	55.4	4.2	231		640		0.044		10.8	24.5	264		731		0.050	18.9		0		0.000	66.2	0.009	1,371	4.0	0.37	0.38	0.40%	8	SS-23	2.8	58.8%	
9.2	PA-59	100%	0.0		0				0.00								School	18.9	18	340	1,200	0.023	18.9	0.002	340	4.0	0.09	0.09	0.40%	8	SS-24	2.6	50.8%	
	PA-65.1	100%	4.5	9.8	44	2.77	122	68	0.008													4.5	0.001	122	4.0	0.03	0.03	0.40%	8					
	PA-65.3	50%	28.2	3.6	101	2.77	280	68	0.019													28.2	0.002	280	4.0	0.08	0.08	0.40%	8					
	PA-80.1	50%	6.2	7.6	47	2.77	130	68	0.009													6.2	0.001	130	4.0	0.04	0.04	0.40%	8					
	PA-80.2	30%	18.9	4.3	81	2.77	224	68	0.015													18.9	0.002	224	4.0	0.06	0.06	0.40%	8					
	Design Point Total	DP9.1 - 9.2	113.3	4.4	504		1,396		0.095		10.8	24.5	264		731		0.050	18.9		340		0.023	142.9	0.017	2,468	4.0	0.67	0.69	0.40%	10	SS-25	3.2	58.8%	
9.3	PA-64.1	100%	40.0	4.5	179	2.77	496	68	0.034													40.0	0.003	496	4.0	0.13	0.14	0.40%	8					
	PA-64.2	100%	23.8	15.5	368	2.77	1,019	68	0.069													23.8	0.007	1,019	4.0	0.28	0.28	0.40%	8					
	PA-52.2	30%	22.1	5.7	125	2.77	346	68	0.024													22.1	0.002	346	4.0	0.09	0.10	0.40%	8					
	Design Point Total	DP9.1 - 9.3	199.1	5.9	1,176		3,258		0.222		10.8	24.5	264		731		0.050	18.9		340		0.023	228.8	0.029	4,329	3.9	1.15	1.18	0.40%	12	SS-26	3.7	60.8%	
10	PA-63	100%	0.0		0				0.00								Com.	2.2	22	48	1,500	0.003	2.2	0.000	48	4.0	0.01	0.01	0.40%	8				
	PA-64.4	100%	0.0		0				0.00		10.4	16.3	170	2.77	471	68	0.032					10.4	0.003	471	4.0	0.13	0.13	0.40%	8					
	PA-57	100%	0.0		0				0.00								Com.	22.8	22	501	1,500	0.034	22.8	0.003	501	4.0	0.14	0.14	0.40%	8				
	On-Site Total	DP8 - DP10	199.1		1,176		3,258		0.222		21.2		434		1,202		0.082	43.9		890		0.060	264.2	0.036	5,349	3.8	1.37	1.41	0.25%	15				
	Design Point Total		418.1	5.7	2,381		6,594		0.448		21.2	20.5	434		1,202		0.082	554.9		12,132		0.827	994.2	0.136	19,928	3.0	4.12	4.25	0.25%	24	SS-27	4.3	50.0%	
11.1	PA-55.1	100%	47.8	2.8	136	2.8	377	68.0	0.026													47.8	0.0	376.7	4.0	0.1	0.11	0.40%	8					
	PA-55.2	100%	72.8	3.8	273	2.8	756	68.0	0.051													72.8	0.0	756.2	4.0	0.2	0.21	0.40%	8					
	Design Point Total	DP11.1	120.6	3.4	409		1,133		0.077		0.0		0		0		0.000	0.0		0		0.000	120.6	0.008	1,133	4.0	0.31	0.32	0.40%	8	SS-28.1	2.6	52.8%	
11.2	PA-52.1	100%	11.9	3.4	40	2.77	111	68	0.008													11.9	0.001	111	4.0	0.03	0.03	0.40%	8					
	PA-52.2	70%	51.5	5.7	292	2.8	809	68.0	0.055													51.5	0.006	809	4.0	0.22	0.23	0.40%	8					
	PA-54	100%	0.0		0				0.00								Hospital	47.9	22	1,053	8,443	0.404	47.9	0.040	1,053	4.0	1.62	1.66	0.25%	15				
	On-Site Total	DP8 - DP11.2	383.1		1,917		5,310		0.361		21.2		434		1,202		0.082	91.8		1,943		0.464	496.0	0.091	8,455	3.5	3.18	3.27	0.25%	18				
	Design Point Total		602.1	5.2	3,122		8,647		0.588		21.2	20.5	434		1,202		0.082	602.8		13,185		1.231	1,226.0	0.190	23,034	3.0	5.63	5.82	0.25%	24	SS-28	4.6	60.1%	
	PA-19.1	100%	4.1	2.2	9	2.77	25	68	0.002													4.1	0.000	25	4.0	0.01	0.01	0.25%	8					
	PA-19.2	100%	12.9	3.6	47	2.77	130	68	0.009													12.9	0.001	130	4.0	0.04	0.04	0.25%	8					
	PA-19.3	100%	4.8	2.7	13	2.77	36	68	0.002													4.8	0.000	36	4.0	0.01	0.01	0.25%	8					
	PA-19.4	100%	37.5	4.6	174	2.77	482	68	0.033													37.5	0.003	482	4.0	0.13	0.13	0.25%	8					
	PA-25	100%	0.0		0				0.00		10.9	43.5	474	2.77	1,313	68	0.089	Civic	10.9	18	196	1,200	0.013	21.8	0.010	1,509	4.0	0.41	0.42	0.25%	8			
	PA-26.2	100%	0.0		0				0.00		6.5	8.6	56	2.77	155	68	0.011					6.5	0.001	155	4.0	0.04	0.04	0.25%	8					
	On-Site Total	DP1 - DP12	1,125.5		5,554		15,385		1.046		70.7		1,563		4,330		0.294	155.5		3,220		0.551	1											



SANITARY SEWER DEMAND CALCULATIONS

Project #: 181211.47
Project: The Aurora Highlands

Location: Aurora, CO
Plan Date: 6/2024

By K House
Checked R Littleton
Date 6/18/2024
Date 6/18/2024

POPULATION DENSITY		
Multi-Family	2.77	People per Unit
Single-Family	2.77	People per Unit
Average Flow Generation	68	gpcpd

COMMERCIAL / SCHOOLS / INDISTRIAL			
	Commercial	Schools / Industrial	
Average Flow Generation	1,500	1,200	gpd/acre
	0.0023	0.0019	cfs/acre
Equivalent Population	22	18	capita

PEAKING FACTOR			
PF = 5/(p^0.167)		Where p = Population in thousands	
Min. PF =	1.7	Max. PF =	4.0

PIPE CAPACITY (mgd) (n=.011)		
75 % FULL	PIPE SIZE (IN)	0.4% SLOPE
	8	0.53
	10	0.97
	12	1.57

PIPE CAPACITY (mgd) (n=.011)			
80 % FULL	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
	15	3.05	2.41
	18	4.96	3.92
	24	10.68	8.44
	30	19.37	15.31
	36	31.49	24.90

Design Point	Planning Area	Flow Split	RESIDENTIAL SINGLE FAMILY								Average Day Flow (gpm)	RESIDENTIAL MULTI FAMILY								COMMERCIAL / SCHOOLS / INDUSTRIAL						CUMMULATIVE TOTALS						PIPE PARAMETERS				
			Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)	Total Acres		Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)	Land Use	Total Acres	Population Density	Equivalent Population	Average Flow Generation (gpd/acre)	Average Day Flow (mgd)	Total Acres	Infil. @ 10% (mgd)	Cumulative Population	Peak Factor	Peak Flow (mgd)	Peak Flow + Infil. (mgd)	Estimated Pipe Slope (%)	Estimated Size at Given Slope	Pipe Name	Velocity (ft/sec)	Percent Full at Given Slope		
15	PA-30	100%	25.3	3.1	79	2.77	219	68	0.015	0.0	0				0.00	Com.	27.8	22	612	1,500	0.042	27.8	0.004	612	4.0	0.17	0.17	0.40%	8							
	PA-35.1	100%	25.3	3.1	79	2.77	219	68	0.015	0.0	0				0.00						25.3	0.001	219	4.0	0.06	0.06	0.40%	8								
	PA-35.2	50%	12.2	4.4	54	2.77	150	68	0.010	0.0	0				0.00					12.2	0.001	150	4.0	0.04	0.04	0.40%	8									
	PA-36	100%	0.0		0				0.00	0.0	0				0.00	School	18.2	18	328	1,200	0.022	18.2	0.002	328	4.0	0.09	0.09	0.40%	8	SS-32	2.0	25.1%				
	Design Point Total	DP15	37.5	3.6	133		368		0.025	0.0	0		0		0.000		46.0		939		0.064	83.5	0.009	1,308	4.0	0.35	0.36	0.40%	8	SS-33	2.7	56.8%				
17	PA-34	100%	27.0	5.7	154	2.77	427	68	0.029	0.0	0				0.00						27.0	0.003	427	4.0	0.12	0.12	0.40%	8								
	Design Point Total	DP15 + DP16	64.5	4.5	287		795		0.054	0.0	0		0		0.000		46.0		939		0.064	110.5	0.012	1,734	4.0	0.47	0.48	0.40%	8	SS-34	2.9	69.1%				
	PA-13.1	100%	10.3	4.5	46	2.77	127	68	0.009	0.0	0				0.00					10.3	0.001	127	4.0	0.03	0.04	0.40%	8									
	PA-13.2	100%	31.3	3.7	117	2.77	324	68	0.022	0.0	0				0.00					31.3	0.002	324	4.0	0.09	0.09	0.40%	8									
	Design Point Total	DP15 - DP17	106.1	4.2	450		1,247		0.085	0.0	0		0		0.000		46.0		939		0.064	152.1	0.015	2,186	4.0	0.59	0.61	1.00%	8	SS-35	4.4	59.4%				
18	PA-12	100%	21.0	5.0	106	2.77	294	68	0.020	0.0	0				0.00	School	18.2	18	328	1,200	0.022	21.0	0.002	294	4.0	0.08	0.08	0.40%	8							
	PA-16	100%	0.0		0			0.00	0.0	0				0.00	18.2		0.002	328	4.0	0.09	0.09	0.50%	8													
	Design Point Total	DP15 - DP18	127.1	4.4	556		1,540		0.105	0.0	0		0		0.000		64.2		1,267		0.085	191.3	0.019	2,807	4.0	0.76	0.78	0.88%	12	SS-37	4.4	37.9%				
19	OS-6 (GVRE OFS-10)		51.0	5.0	255	3.20	816	80	0.065	0.0	0				0.00	NAC	5.4	31.25	169	13,068	0.071	56.4	0.014	985	4.0	0.54	0.56									
	Updated		51.0	5.5	281	2.77	777	68	0.053	0.0	0				0.00	NAC	5.4	18	97	1,200	0.006	56.4	0.006	874	4.0	0.24	0.24	0.40%	8							
	PA-5.1	100%	9.6	7.2	69	2.77	191	68	0.013	0.0	0				0.00						9.6	0.001	191	4.0	0.05	0.05	0.40%									
	PA-5.2	100%	13.4	7.3	98	2.77	271	68	0.018	0.0	0				0.00						13.4	0.002	271	4.0	0.07	0.08	0.40%									
	PA-6.1	100%	13.5	5.3	71	2.77	197	68	0.013	0.0	0				0.00						13.5	0.001	197	4.0	0.05	0.05	0.40%									
	PA-6.2	100%	12.0	5.1	61	2.77	169	68	0.011	0.0	0				0.00						12.0	0.001	169	4.0	0.05	0.05	0.40%									
	PA-29.1	100%	8.2	6.1	50	2.77	139	68	0.009	0.0	0				0.00						8.2	0.001	139	4.0	0.04	0.04	0.40%									
	PA-29.2	100%	25.5	4.6	118	2.77	327	68	0.022	0.0	0				0.00						25.5	0.002	327	4.0	0.09	0.09	0.40%									
	On-Site Total	DP15 - DP19	209.3		1,023		2,834		0.193								64.2		1,267		0.085	273.5	0.028	4,101	4.0	1.10	1.13	0.40%	12							
	Design Point Total		260.3	5.0	1,304		3,611		0.246	0.0	0		0		0.000		69.6		1,364		0.092	329.9	0.034	4,975	3.8	1.29	1.32	0.25%	36	SS-38	2.9	15.5%				
20	PA-10	100%	0.0		0				0.00	14.8	30.5	451	2.77	1,249	68	0.085						14.8	0.008	1,249	4.0	0.34	0.35	0.40%	8							
	PA-11	50%	0.0		0				0.00	16.0	27.0	432	2.77	1,197	68	0.081						16.0	0.008	1,197	4.0	0.33	0.33	0.40%	8	SS-39	2.7	53.8%				
	Design Point Total	DP20	0.0		0		0		0.000	30.8	28.7	883		2,446		0.166		0.0		0.000	30.8	0.017	2,446	4.0	0.67	0.68	0.40%	10	SS-40	3.2	58.3%					
21	PA-3	100%	0.0		0				0.00	19.3	26.0	502	2.77	1,391	68	0.095						19.3	0.009	1,391	4.0	0.38	0.39	0.40%	8							
	PA-4	100%	13.8	10.4	143	2.77	396	68	0.027								0.0					13.8	0.003	396	4.0	0.11	0.11	0.40%	8							
	PA-11	50%	0.0		0				0.00	16.0	27.0	432	2.77	1,197	68	0.081						16.0	0.008	1,197	4.0	0.33	0.33	0.40%	8							
	On-Site Total	DP14 - DP21	223.1		1,166		3,230		0.220	66.1		1,817		5,033		0.342		64.2		1,267		0.085	353.4	0.065	9,530	3.4	2.22	2.29	0.40%	15						
	Design Point Total		274.1	5.3	1,447		4,007		0.272	66.1	27.5	1,817		5,033		0.342		69.6		1,364		0.092	409.8	0.071	10,404	3.4	2.39	2.46	0.25%	36	SS-41	3.5	21.0%			
22	OS-7 (GVRE OFS-11)		0.0		0				0.00	0.0		0				0.00	Com.	67.8	15	1,043	2,600	0.176	67.8	0.018	1,043	4.0	0.71	0.72	0.40%	10						
	Updated		0.0		0				0.00	0.0		0				0.00	Com.	67.8	22	1,492	1,500	0.102	67.8	0.010	1,492	4.0	0.41	0.42	0.40%	8						
	PA-2		0.0		0				0.00	47.6	17.5	833	2.77	2,307	68	0.16												0.40%	8							
	On-Site Total	DP1 - DP22	1,350.6		6,720		18,614		1.266	218.1		5,428		15,036		1.022		231.9		4,755		0.654	1,800.6	0.294	38,405	2.7	8.00	8.29	0.40%	24						
	Off-Site Total		569.7		3,891		10,777		0.733	0.000		0.000		0.000		0.000		942.3		20,710		1.412	1,512.1	0.214	31,487	2.8	6.03	6.24	0.40%	24						
	Design Point Total	DP1 - DP22	1,920.3	5.5	10,611		29,392		1.999	218.1	24.9	5,428		15,036		1.022		1,174.2		25,465		2.066	3,312.7	0.509	69,892	2.5	12.51	13.02	0.25%	36	SS-42	5.6	50.7%			

GVRE 9	Design Point Total																	Mixed	385.9		10,934	2,030	0.783	385.9	0.078	10,934	3.4	2.63	2.71	
GVRE 10	OS-310-4																	Com.	18.5	22	407	1,500	0.028	18.5	0.003	407	4.0	0.11	0.11	
GVRE 12	OS-5		62.8				1,423	85	0.121	84													62.8	0.012	1,423	4.0	0.48	0.50		
GVRE 13	Basin 5		70.4	6.3	443	2.77	1,227	68	0.083	58													70.4	0.008	1,227	4.0	0.33	0.34		
GVRE 14	OS-6																													
																		Mixed	64.0		1,408	1,755	0.112	64.0	0.011	1,408	4.0	0.45	0.46	
GVRE 16	Basin 6		25.6	4.1	104	2.77	288	68	0.020	14													25.6	0.002	288	4.0	0.08	0.08		
	Design Point Total		2,079.1		11,158		32,330		2.223	1,543	218.1	24.9	5,428		15,036		1.022		1,256.7		27,280		2.206	3,554.0	0.545	74,645	2.4	13.26	13.81	
GVRE 17	OS-12																	Mixed	87.4		1,981	1,812	0.158	87.4	0.016	1,981	4.0	0.63	0.65	
GVRE 18	Basin 7		28.5	6.3	179	2.77	496	68	0.034	23														0.000	28.5	0.003	496	4.0	0.13	0.14
GVRE 19	Basin 8																	School	18.0	18	324	1,200	0.022	18.0	0.002	324	4.0	0.09	0.09	
GVRE 20	OS-13																	Mixed							information not given, sum directly				10.30	
GVRE 21	Basin 9		90.9	6.3	572	2.77	1,584	68	0.108	75															90.9	0.011	1,584	4.0	0.43	0.44
GVRE 21.1	Basin 9.1		33.6	6.3	212	2.77	586	68	0.040	28															33.6	0.004	586	4.0	0.16	0.16
GVRE 22	Basin 10		47.2	6.3	297	2.77	824	68	0.056	39															47.2	0.006	824	4.0	0.22	0.23
GVRE 22.1	Design Point Total		200.2		1,260		3,490		0.237	165									105.4		2,305		0.180	305.6	0.042	5,795	3.7	1.56	11.90	
LS	Lift Station Total		2,279.3		12,418		35,820		2.460	1,708	218.1	24.9	5,428		15,036		1.022		1,748.0		40,519		3.170	4,245.5	0.665	91,375	2.4	15.65	16.31	



SANITARY SEWER DEMAND CALCULATIONS

Project #: 181211.47
Project: The Aurora Highlands

Location: Aurora, CO
Plan Date: 6/2024

By K House
Checked R Littleton
Date 6/18/2024
Date 6/18/2024

POPULATION DENSITY		
Multi-Family	2.77	People per Unit
Single-Family	2.77	People per Unit
Average Flow Generation	68	gpcpd

COMMERCIAL / SCHOOLS / INDISTRIAL			
Average Flow Generation	Commercial	Schools / Industrial	
	1,500	1,200	gpd/acre
	0.0023	0.0019	cfs/acre
Equivalent Population	22	18	capita

PEAKING FACTOR			
PF = 5/(p^0.167)		Where p = Population in thousands	
Min. PF =	1.7	Max. PF =	4.0

PIPE CAPACITY (mgd) (n=.011)		
75 % FULL	PIPE SIZE (IN)	0.4% SLOPE
	8	0.53
	10	0.97
	12	1.57

PIPE CAPACITY (mgd) (n=.011)			
80 % FULL	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
	15	3.05	2.41
	18	4.96	3.92
	24	10.68	8.44
	30	19.37	15.31
	36	31.49	24.90

Design Point	Planning Area	Flow Split	RESIDENTIAL SINGLE FAMILY									RESIDENTIAL MULTI FAMILY								COMMERCIAL / SCHOOLS / INDUSTRIAL						CUMMULATIVE TOTALS						PIPE PARAMETERS				
			Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)	Average Day Flow (gpm)		Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)	Land Use	Total Acres	Population Density	Equivalent Population	Average Flow Generation (gpd/acre)	Average Day Flow (mgd)	Total Acres	Infil. @ 10% (mgd)	Cumulative Population	Peak Factor	Peak Flow (mgd)	Peak Flow + Infil. (mgd)	Estimated Pipe Slope (%)	Estimated Size at Given Slope	Pipe Name	Velocity (ft/sec)	Percent Full at Given Slope	
Second Creek Watershed																																				
25	PA-37.1	100%		0.0		0				0.00	18.1	15.1	274	2.77	759	68	0.052		0.0		0		0.000	18.1	0.005	759	4.0	0.21	0.21	0.40%	8					
	PA-37.2	90%	72.9	5.7	416	2.77	1,152	68	0.078									0.0		0		0.000	72.9	0.008	1,152	4.0	0.31	0.32	0.40%	8						
	PA-37.3	25%	18.3	3.4	62	2.77	172	68	0.012									0.0				0.000	18.3	0.001	172	4.0	0.05	0.05	0.40%	8						
	PA-37.4	100%	15.7	8.7	136	2.77	377	68	0.026									0.0				0.000	15.7	0.003	377	4.0	0.10	0.11	0.40%	8						
	ALC PA-02	100%								0.0			0		0		0.000	Com.	20.6	22	453	1,500	0.031	20.6	0.003	453	4.0	0.12	0.13	0.50%	12	SS-43	4.3	73.0%		
	ALC PA-03	100%								0.0			0		0		0.000	Com.	56.2	22	1,236	1,500	0.084	56.2	0.008	1,236	4.0	0.34	0.35							
	ALC PA-04	100%								35.9	24.0	861	2.77	2,385	68	0.162		0.0		0		0.000	35.9	0.016	2,385	4.0	0.65	0.66								
	ALC PA-05	50%								0.0			0		0		0.000	Com.	32.6	22	717	1,500	0.049	32.6	0.005	717	4.0	0.20	0.20							
	ALC PA-09	60%	48.2	11.0	530	2.77	1,468	68	0.100		0.0		0		0		0.000		0.0		0		48.2	0.010	1,468	4.0	0.40	0.41								
	ALC PA-10	50%								0.0			0		0		0.000	Com.	24.8	22	546	1,500	0.037	24.8	0.004	546	4.0	0.15	0.15						0.50%	
Design Point Total			155.1		1,144		3,169		0.215		54.0		1,135		3,144		0.214		134.2		2,952		0.201	343.3	0.063	9,265	3.4	2.17	2.24	0.40%	15					
Alternate w/ BEC Flows			155.1		1,144		3,169		0.215		54.0		1,135		3,144		0.214		703.8		15,484		1.056	912.9	0.148	21,797	3.0	4.44	4.59	0.40%	18	SS-45	5.0	74.5%		
Box Elder Creek (BEC) Watershed																																				
30	ALC PA-19	100%																Com.	61.4	22	1,351	1,500	0.092	61.4	0.009	1,351	4.0	0.37	0.38	0.40%	8					
	ALC PA-24	100%																Com.	89.4	22	1,967	1,500	0.134	89.4	0.013	1,967	4.0	0.54	0.55	0.40%	10					
	ALC PA-25	100%																Com.	59.1	22	1,300	1,500	0.089	59.1	0.009	1,300	4.0	0.35	0.36	0.40%	8					
	Design Point Total		0.0				0		0.000		0.000		0.000		0.000		0.000		209.9		4,618		0.315	209.9	0.031	4,618	3.9	1.22	1.25	0.40%	12					
31	ALC PA-11	25%																Com.	12.5	22	274	1,500	0.019	12.5	0.002	274	4.0	0.07	0.08	0.40%	8					
	ALC PA-12	20%																Com.	12.2	22	268	1,500	0.018	12.2	0.002	268	4.0	0.07	0.08	0.40%	8					
	ALC PA-17	80%																Com.	86.6	22	1,904	1,500	0.130	86.6	0.013	1,904	4.0	0.52	0.53	0.40%	10					
	Design Point Total		0.0				0		0.000		0.000		0.000		0.000		0.000		321.1		7,064		0.482	321.1	0.048	7,064	3.6	1.74	1.79	0.40%	15					
32	ALC PA-05	50%																Com.	32.6	22	716	1,500	0.049	32.6	0.005	716	4.0	0.20	0.20	0.40%	8					
	ALC PA-06	100%																Com.	53.8	22	1,184	1,500	0.081	53.8	0.008	1,184	4.0	0.32	0.33	0.40%	8					
	ALC PA-07	100%																Com.	76.1	22	1,674	1,500	0.114	76.1	0.011	1,674	4.0	0.46	0.47	0.40%	8					
	ALC PA-10	50%																Com.	24.8	22	546	1,500	0.037	24.8	0.004	546	4.0	0.15	0.15	0.40%	8					
	ALC PA-11	25%																Com.	12.5	22	274	1,500	0.019	12.5	0.002	274	4.0	0.07	0.08	0.40%	8					
	ALC PA-12	80%																Com.	48.8	22	1,074	1,500	0.073	48.8	0.007	1,074	4.0	0.29	0.30	0.40%	8					
	Design Point Total		0.0				0		0.000		0.000		0.000		0.000		0.000		569.6		12,531		0.854	569.6	0.085	12,531	3.3	2.80	2.89	0.40%	15					

Worksheet for SS-1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	15	in
Discharge	1.75	mgd

Results

Normal Depth	8.0	in
Flow Area	0.67	ft ²
Wetted Perimeter	2.05	ft
Hydraulic Radius	3.9	in
Top Width	1.25	ft
Critical Depth	0.66	ft
Percent Full	53.5	%
Critical Slope	0.42	%
Velocity	4.05	ft/s
Velocity Head	0.25	ft
Specific Energy	0.92	ft
Froude Number	0.97	
Maximum Discharge	3.36	mgd
Discharge Full	3.12	mgd
Slope Full	0.13	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	53.55	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.0	in
Critical Depth	0.66	ft
Channel Slope	0.40	%
Critical Slope	0.42	%

HR Green

Worksheet for SS-2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	15	in
Discharge	1.90	mgd

Results

Normal Depth	8.5	in
Flow Area	0.71	ft²
Wetted Perimeter	2.12	ft
Hydraulic Radius	4.0	in
Top Width	1.24	ft
Critical Depth	0.69	ft
Percent Full	56.3	%
Critical Slope	0.43	%
Velocity	4.13	ft/s
Velocity Head	0.26	ft
Specific Energy	0.97	ft
Froude Number	0.96	
Maximum Discharge	3.36	mgd
Discharge Full	3.12	mgd
Slope Full	0.15	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	56.34	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.5	in
Critical Depth	0.69	ft
Channel Slope	0.40	%
Critical Slope	0.43	%

HR Green

Worksheet for SS-4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	12	in
Discharge	1.07	mgd

Results

Normal Depth	6.9	in
Flow Area	0.46	ft ²
Wetted Perimeter	1.71	ft
Hydraulic Radius	3.2	in
Top Width	0.99	ft
Critical Depth	0.55	ft
Percent Full	57.1	%
Critical Slope	0.46	%
Velocity	3.57	ft/s
Velocity Head	0.20	ft
Specific Energy	0.77	ft
Froude Number	0.92	
Maximum Discharge	1.85	mgd
Discharge Full	1.72	mgd
Slope Full	0.15	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.09	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.9	in
Critical Depth	0.55	ft
Channel Slope	0.40	%
Critical Slope	0.46	%

HR Green

Worksheet for SS-5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.40	mgd

Results

Normal Depth	4.9	in
Flow Area	0.22	ft²
Wetted Perimeter	1.19	ft
Hydraulic Radius	2.2	in
Top Width	0.65	ft
Critical Depth	0.37	ft
Percent Full	60.8	%
Critical Slope	0.53	%
Velocity	2.79	ft/s
Velocity Head	0.12	ft
Specific Energy	0.53	ft
Froude Number	0.84	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.19	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	60.78	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.9	in
Critical Depth	0.37	ft
Channel Slope	0.40	%
Critical Slope	0.53	%

HR Green

Worksheet for SS-6

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient 0.011
Channel Slope 0.40 %
Diameter 18 in
Discharge 3.31 mgd

Results

Normal Depth 10.6 in
Flow Area 1.08 ft²
Wetted Perimeter 2.62 ft
Hydraulic Radius 4.9 in
Top Width 1.48 ft
Critical Depth 0.87 ft
Percent Full 58.9 %
Critical Slope 0.42 %
Velocity 4.73 ft/s
Velocity Head 0.35 ft
Specific Energy 1.23 ft
Froude Number 0.97
Maximum Discharge 5.46 mgd
Discharge Full 5.07 mgd
Slope Full 0.17 %
Flow Type SubCritical

GVF Input Data

Downstream Depth 0.0 in
Length 0.00 ft
Number Of Steps 0

GVF Output Data

Upstream Depth 0.0 in
Profile Description
Profile Headloss 0.00 ft
Average End Depth Over Rise 0.00 %
Normal Depth Over Rise 58.87 %
Downstream Velocity Infinity ft/s
Upstream Velocity Infinity ft/s
Normal Depth 10.6 in
Critical Depth 0.87 ft
Channel Slope 0.40 %
Critical Slope 0.42 %

HR Green

Worksheet for SS-7

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	10	in
Discharge	0.43	mgd

Results

Normal Depth	4.4	in
Flow Area	0.23	ft ²
Wetted Perimeter	1.21	ft
Hydraulic Radius	2.3	in
Top Width	0.83	ft
Critical Depth	0.36	ft
Percent Full	44.3	%
Critical Slope	0.44	%
Velocity	2.85	ft/s
Velocity Head	0.13	ft
Specific Energy	0.50	ft
Froude Number	0.95	
Maximum Discharge	1.14	mgd
Discharge Full	1.06	mgd
Slope Full	0.07	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.34	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.4	in
Critical Depth	0.36	ft
Channel Slope	0.40	%
Critical Slope	0.44	%

HR Green

Worksheet for SS-8

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	10	in
Discharge	0.81	mgd

Results

Normal Depth	6.6	in
Flow Area	0.38	ft ²
Wetted Perimeter	1.57	ft
Hydraulic Radius	2.9	in
Top Width	0.79	ft
Critical Depth	0.50	ft
Percent Full	65.5	%
Critical Slope	0.52	%
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energy	0.72	ft
Froude Number	0.84	
Maximum Discharge	1.14	mgd
Discharge Full	1.06	mgd
Slope Full	0.23	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	65.54	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.6	in
Critical Depth	0.50	ft
Channel Slope	0.40	%
Critical Slope	0.52	%

HR Green

Worksheet for SS-9

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	12	in
Discharge	1.20	mgd

Results

Normal Depth	7.4	in
Flow Area	0.51	ft²
Wetted Perimeter	1.80	ft
Hydraulic Radius	3.4	in
Top Width	0.97	ft
Critical Depth	0.58	ft
Percent Full	61.5	%
Critical Slope	0.48	%
Velocity	3.66	ft/s
Velocity Head	0.21	ft
Specific Energy	0.82	ft
Froude Number	0.90	
Maximum Discharge	1.85	mgd
Discharge Full	1.72	mgd
Slope Full	0.19	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	61.49	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.4	in
Critical Depth	0.58	ft
Channel Slope	0.40	%
Critical Slope	0.48	%

HR Green

Worksheet for SS-10

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	12	in
Discharge	1.53	mgd

Results

Normal Depth	8.8	in
Flow Area	0.62	ft ²
Wetted Perimeter	2.06	ft
Hydraulic Radius	3.6	in
Top Width	0.88	ft
Critical Depth	0.66	ft
Percent Full	73.4	%
Critical Slope	0.53	%
Velocity	3.83	ft/s
Velocity Head	0.23	ft
Specific Energy	0.96	ft
Froude Number	0.81	
Maximum Discharge	1.85	mgd
Discharge Full	1.72	mgd
Slope Full	0.32	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	73.41	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.8	in
Critical Depth	0.66	ft
Channel Slope	0.40	%
Critical Slope	0.53	%

HR Green

Worksheet for SS-11

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	18	in
Discharge	4.57	mgd

Results

Normal Depth	13.4	in
Flow Area	1.41	ft ²
Wetted Perimeter	3.11	ft
Hydraulic Radius	5.4	in
Top Width	1.31	ft
Critical Depth	1.03	ft
Percent Full	74.2	%
Critical Slope	0.49	%
Velocity	5.03	ft/s
Velocity Head	0.39	ft
Specific Energy	1.51	ft
Froude Number	0.86	
Maximum Discharge	5.46	mgd
Discharge Full	5.07	mgd
Slope Full	0.32	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	74.21	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.4	in
Critical Depth	1.03	ft
Channel Slope	0.40	%
Critical Slope	0.49	%

HR Green

Worksheet for SS-12

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.21	mgd

Results

Normal Depth	3.3	in
Flow Area	0.14	ft ²
Wetted Perimeter	0.93	ft
Hydraulic Radius	1.8	in
Top Width	0.66	ft
Critical Depth	0.26	ft
Percent Full	41.4	%
Critical Slope	0.47	%
Velocity	2.38	ft/s
Velocity Head	0.09	ft
Specific Energy	0.36	ft
Froude Number	0.92	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.05	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	41.44	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.3	in
Critical Depth	0.26	ft
Channel Slope	0.40	%
Critical Slope	0.47	%

HR Green

Worksheet for SS-13

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.14	mgd

Results

Normal Depth	2.7	in
Flow Area	0.10	ft²
Wetted Perimeter	0.82	ft
Hydraulic Radius	1.5	in
Top Width	0.63	ft
Critical Depth	0.21	ft
Percent Full	33.3	%
Critical Slope	0.46	%
Velocity	2.13	ft/s
Velocity Head	0.07	ft
Specific Energy	0.29	ft
Froude Number	0.93	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.02	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	33.32	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.7	in
Critical Depth	0.21	ft
Channel Slope	0.40	%
Critical Slope	0.46	%

HR Green

Worksheet for SS-14

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	1.60	%
Diameter	10	in
Discharge	0.41	mgd

Results

Normal Depth	3.0	in
Flow Area	0.14	ft ²
Wetted Perimeter	0.96	ft
Hydraulic Radius	1.7	in
Top Width	0.76	ft
Critical Depth	0.35	ft
Percent Full	29.8	%
Critical Slope	0.44	%
Velocity	4.65	ft/s
Velocity Head	0.34	ft
Specific Energy	0.58	ft
Froude Number	1.94	
Maximum Discharge	2.28	mgd
Discharge Full	2.12	mgd
Slope Full	0.06	%
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.83	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.0	in
Critical Depth	0.35	ft
Channel Slope	1.60	%
Critical Slope	0.44	%

HR Green

Worksheet for SS-15

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.10	mgd

Results

Normal Depth	2.2	in
Flow Area	0.08	ft ²
Wetted Perimeter	0.74	ft
Hydraulic Radius	1.3	in
Top Width	0.60	ft
Critical Depth	0.18	ft
Percent Full	28.0	%
Critical Slope	0.46	%
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.24	ft
Froude Number	0.93	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.01	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	28.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.2	in
Critical Depth	0.18	ft
Channel Slope	0.40	%
Critical Slope	0.46	%

HR Green

Worksheet for SS-16

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	10	in
Discharge	0.50	mgd

Results

Normal Depth	4.8	in
Flow Area	0.26	ft²
Wetted Perimeter	1.28	ft
Hydraulic Radius	2.4	in
Top Width	0.83	ft
Critical Depth	0.39	ft
Percent Full	48.4	%
Critical Slope	0.45	%
Velocity	2.96	ft/s
Velocity Head	0.14	ft
Specific Energy	0.54	ft
Froude Number	0.93	
Maximum Discharge	1.14	mgd
Discharge Full	1.06	mgd
Slope Full	0.09	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.35	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.8	in
Critical Depth	0.39	ft
Channel Slope	0.40	%
Critical Slope	0.45	%

HR Green

Worksheet for SS-17

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	24	in
Discharge	5.10	mgd

Results

Normal Depth	13.3	in
Flow Area	1.78	ft ²
Wetted Perimeter	3.35	ft
Hydraulic Radius	6.4	in
Top Width	1.99	ft
Critical Depth	1.00	ft
Percent Full	55.3	%
Critical Slope	0.35	%
Velocity	4.43	ft/s
Velocity Head	0.31	ft
Specific Energy	1.41	ft
Froude Number	0.83	
Maximum Discharge	9.29	mgd
Discharge Full	8.64	mgd
Slope Full	0.09	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	55.26	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.3	in
Critical Depth	1.00	ft
Channel Slope	0.25	%
Critical Slope	0.35	%

HR Green

Worksheet for SS-18

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.05	mgd

Results

Normal Depth	1.6	in
Flow Area	0.05	ft²
Wetted Perimeter	0.61	ft
Hydraulic Radius	1.0	in
Top Width	0.53	ft
Critical Depth	0.13	ft
Percent Full	19.8	%
Critical Slope	0.48	%
Velocity	1.58	ft/s
Velocity Head	0.04	ft
Specific Energy	0.17	ft
Froude Number	0.92	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.00	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	19.78	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.6	in
Critical Depth	0.13	ft
Channel Slope	0.40	%
Critical Slope	0.48	%

HR Green

Worksheet for SS-19

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.43	mgd

Results

Normal Depth	5.1	in
Flow Area	0.24	ft ²
Wetted Perimeter	1.23	ft
Hydraulic Radius	2.3	in
Top Width	0.64	ft
Critical Depth	0.38	ft
Percent Full	63.8	%
Critical Slope	0.54	%
Velocity	2.83	ft/s
Velocity Head	0.12	ft
Specific Energy	0.55	ft
Froude Number	0.82	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.22	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.83	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.1	in
Critical Depth	0.38	ft
Channel Slope	0.40	%
Critical Slope	0.54	%

HR Green

Worksheet for SS-20

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	24	in
Discharge	5.37	mgd

Results

Normal Depth	13.7	in
Flow Area	1.85	ft ²
Wetted Perimeter	3.43	ft
Hydraulic Radius	6.5	in
Top Width	1.98	ft
Critical Depth	1.03	ft
Percent Full	57.1	%
Critical Slope	0.35	%
Velocity	4.48	ft/s
Velocity Head	0.31	ft
Specific Energy	1.45	ft
Froude Number	0.82	
Maximum Discharge	9.29	mgd
Discharge Full	8.64	mgd
Slope Full	0.10	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.08	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.7	in
Critical Depth	1.03	ft
Channel Slope	0.25	%
Critical Slope	0.35	%

HR Green

Worksheet for SS-21

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	18	in
Discharge	3.27	mgd

Results

Normal Depth	12.3	in
Flow Area	1.29	ft ²
Wetted Perimeter	2.93	ft
Hydraulic Radius	5.3	in
Top Width	1.39	ft
Critical Depth	0.87	ft
Percent Full	68.6	%
Critical Slope	0.42	%
Velocity	3.92	ft/s
Velocity Head	0.24	ft
Specific Energy	1.27	ft
Froude Number	0.72	
Maximum Discharge	4.32	mgd
Discharge Full	4.01	mgd
Slope Full	0.17	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	68.60	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.3	in
Critical Depth	0.87	ft
Channel Slope	0.25	%
Critical Slope	0.42	%

HR Green

Worksheet for SS-23

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.38	mgd

Results

Normal Depth	4.7	in
Flow Area	0.21	ft²
Wetted Perimeter	1.17	ft
Hydraulic Radius	2.2	in
Top Width	0.66	ft
Critical Depth	0.36	ft
Percent Full	58.8	%
Critical Slope	0.52	%
Velocity	2.76	ft/s
Velocity Head	0.12	ft
Specific Energy	0.51	ft
Froude Number	0.85	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.17	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.79	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.7	in
Critical Depth	0.36	ft
Channel Slope	0.40	%
Critical Slope	0.52	%

HR Green

Worksheet for SS-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.30	mgd

Results

Normal Depth	4.1	in
Flow Area	0.18	ft ²
Wetted Perimeter	1.06	ft
Hydraulic Radius	2.0	in
Top Width	0.67	ft
Critical Depth	0.32	ft
Percent Full	50.8	%
Critical Slope	0.49	%
Velocity	2.61	ft/s
Velocity Head	0.11	ft
Specific Energy	0.44	ft
Froude Number	0.89	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.11	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.81	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.1	in
Critical Depth	0.32	ft
Channel Slope	0.40	%
Critical Slope	0.49	%

HR Green

Worksheet for SS-25

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	10	in
Discharge	0.69	mgd

Results

Normal Depth	5.9	in
Flow Area	0.33	ft²
Wetted Perimeter	1.46	ft
Hydraulic Radius	2.7	in
Top Width	0.82	ft
Critical Depth	0.46	ft
Percent Full	58.8	%
Critical Slope	0.49	%
Velocity	3.20	ft/s
Velocity Head	0.16	ft
Specific Energy	0.65	ft
Froude Number	0.88	
Maximum Discharge	1.14	mgd
Discharge Full	1.06	mgd
Slope Full	0.17	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.85	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.9	in
Critical Depth	0.46	ft
Channel Slope	0.40	%
Critical Slope	0.49	%

HR Green

Worksheet for SS-26

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient 0.011
Channel Slope 0.40 %
Diameter 12 in
Discharge 1.18 mgd

Results

Normal Depth 7.3 in
Flow Area 0.50 ft²
Wetted Perimeter 1.79 ft
Hydraulic Radius 3.4 in
Top Width 0.98 ft
Critical Depth 0.58 ft
Percent Full 60.8 %
Critical Slope 0.47 %
Velocity 3.65 ft/s
Velocity Head 0.21 ft
Specific Energy 0.82 ft
Froude Number 0.90
Maximum Discharge 1.85 mgd
Discharge Full 1.72 mgd
Slope Full 0.19 %
Flow Type SubCritical

GVF Input Data

Downstream Depth 0.0 in
Length 0.00 ft
Number Of Steps 0

GVF Output Data

Upstream Depth 0.0 in
Profile Description
Profile Headloss 0.00 ft
Average End Depth Over Rise 0.00 %
Normal Depth Over Rise 60.81 %
Downstream Velocity Infinity ft/s
Upstream Velocity Infinity ft/s
Normal Depth 7.3 in
Critical Depth 0.58 ft
Channel Slope 0.40 %
Critical Slope 0.47 %

HR Green

Worksheet for DP 10 SS-27

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	24	in
Discharge	4.32	mgd

Results

Normal Depth	12.0	in
Flow Area	1.57	ft ²
Wetted Perimeter	3.14	ft
Hydraulic Radius	6.0	in
Top Width	2.00	ft
Critical Depth	0.92	ft
Percent Full	50.0	%
Critical Slope	0.34	%
Velocity	4.25	ft/s
Velocity Head	0.28	ft
Specific Energy	1.28	ft
Froude Number	0.85	
Maximum Discharge	9.29	mgd
Discharge Full	8.64	mgd
Slope Full	0.06	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.01	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.0	in
Critical Depth	0.92	ft
Channel Slope	0.25	%
Critical Slope	0.34	%

HR Green

Worksheet for SS-28.1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.32	mgd

Results

Normal Depth	4.2	in
Flow Area	0.19	ft²
Wetted Perimeter	1.08	ft
Hydraulic Radius	2.1	in
Top Width	0.67	ft
Critical Depth	0.33	ft
Percent Full	52.8	%
Critical Slope	0.50	%
Velocity	2.65	ft/s
Velocity Head	0.11	ft
Specific Energy	0.46	ft
Froude Number	0.88	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.12	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.82	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.2	in
Critical Depth	0.33	ft
Channel Slope	0.40	%
Critical Slope	0.50	%

HR Green

Worksheet for DP 11.2 SS-28

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	24	in
Discharge	5.82	mgd

Results

Normal Depth	14.4	in
Flow Area	1.97	ft²
Wetted Perimeter	3.55	ft
Hydraulic Radius	6.7	in
Top Width	1.96	ft
Critical Depth	1.07	ft
Percent Full	60.1	%
Critical Slope	0.36	%
Velocity	4.57	ft/s
Velocity Head	0.32	ft
Specific Energy	1.53	ft
Froude Number	0.80	
Maximum Discharge	9.29	mgd
Discharge Full	8.64	mgd
Slope Full	0.11	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	60.11	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	14.4	in
Critical Depth	1.07	ft
Channel Slope	0.25	%
Critical Slope	0.36	%

HR Green

Worksheet for DP 12 SS-29

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	30	in
Discharge	10.35	mgd

Results

Normal Depth	17.8	in
Flow Area	3.04	ft ²
Wetted Perimeter	4.40	ft
Hydraulic Radius	8.3	in
Top Width	2.46	ft
Critical Depth	1.35	ft
Percent Full	59.4	%
Critical Slope	0.34	%
Velocity	5.27	ft/s
Velocity Head	0.43	ft
Specific Energy	1.92	ft
Froude Number	0.84	
Maximum Discharge	16.85	mgd
Discharge Full	15.66	mgd
Slope Full	0.11	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	59.36	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	17.8	in
Critical Depth	1.35	ft
Channel Slope	0.25	%
Critical Slope	0.34	%

HR Green

Worksheet for DP 13 SS-30

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	30	in
Discharge	10.59	mgd

Results

Normal Depth	18.1	in
Flow Area	3.09	ft ²
Wetted Perimeter	4.44	ft
Hydraulic Radius	8.3	in
Top Width	2.45	ft
Critical Depth	1.37	ft
Percent Full	60.3	%
Critical Slope	0.34	%
Velocity	5.30	ft/s
Velocity Head	0.44	ft
Specific Energy	1.94	ft
Froude Number	0.83	
Maximum Discharge	16.85	mgd
Discharge Full	15.66	mgd
Slope Full	0.11	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	60.25	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	18.1	in
Critical Depth	1.37	ft
Channel Slope	0.25	%
Critical Slope	0.34	%

HR Green

Worksheet for DP 14 SS-31

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	30	in
Discharge	10.89	mgd

Results

Normal Depth	18.4	in
Flow Area	3.16	ft ²
Wetted Perimeter	4.50	ft
Hydraulic Radius	8.4	in
Top Width	2.43	ft
Critical Depth	1.39	ft
Percent Full	61.4	%
Critical Slope	0.34	%
Velocity	5.33	ft/s
Velocity Head	0.44	ft
Specific Energy	1.98	ft
Froude Number	0.83	
Maximum Discharge	16.85	mgd
Discharge Full	15.66	mgd
Slope Full	0.12	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	61.37	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	18.4	in
Critical Depth	1.39	ft
Channel Slope	0.25	%
Critical Slope	0.34	%

HR Green

Worksheet for SS-32

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.50	%
Diameter	8	in
Discharge	0.09	mgd

Results

Normal Depth	2.0	in
Flow Area	0.07	ft²
Wetted Perimeter	0.70	ft
Hydraulic Radius	1.2	in
Top Width	0.58	ft
Critical Depth	0.17	ft
Percent Full	25.1	%
Critical Slope	0.46	%
Velocity	2.03	ft/s
Velocity Head	0.06	ft
Specific Energy	0.23	ft
Froude Number	1.04	
Maximum Discharge	0.70	mgd
Discharge Full	0.65	mgd
Slope Full	0.01	%
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	25.08	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.0	in
Critical Depth	0.17	ft
Channel Slope	0.50	%
Critical Slope	0.46	%

HR Green

Worksheet for SS-33

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.36	mgd

Results

Normal Depth	4.5	in
Flow Area	0.20	ft²
Wetted Perimeter	1.14	ft
Hydraulic Radius	2.2	in
Top Width	0.66	ft
Critical Depth	0.35	ft
Percent Full	56.8	%
Critical Slope	0.52	%
Velocity	2.72	ft/s
Velocity Head	0.12	ft
Specific Energy	0.49	ft
Froude Number	0.86	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.15	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	56.80	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.5	in
Critical Depth	0.35	ft
Channel Slope	0.40	%
Critical Slope	0.52	%

HR Green

Worksheet for SS-34

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.48	mgd

Results

Normal Depth	5.5	in
Flow Area	0.26	ft ²
Wetted Perimeter	1.31	ft
Hydraulic Radius	2.4	in
Top Width	0.62	ft
Critical Depth	0.41	ft
Percent Full	69.1	%
Critical Slope	0.57	%
Velocity	2.89	ft/s
Velocity Head	0.13	ft
Specific Energy	0.59	ft
Froude Number	0.79	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.27	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	69.08	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.5	in
Critical Depth	0.41	ft
Channel Slope	0.40	%
Critical Slope	0.57	%

HR Green

Worksheet for SS-35

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	1.00	%
Diameter	8	in
Discharge	0.61	mgd

Results

Normal Depth	4.7	in
Flow Area	0.22	ft²
Wetted Perimeter	1.17	ft
Hydraulic Radius	2.2	in
Top Width	0.65	ft
Critical Depth	0.46	ft
Percent Full	59.4	%
Critical Slope	0.64	%
Velocity	4.37	ft/s
Velocity Head	0.30	ft
Specific Energy	0.69	ft
Froude Number	1.34	
Maximum Discharge	0.99	mgd
Discharge Full	0.92	mgd
Slope Full	0.44	%
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	59.37	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.7	in
Critical Depth	0.46	ft
Channel Slope	1.00	%
Critical Slope	0.64	%

HR Green

Worksheet for SS-37

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.88	%
Diameter	12	in
Discharge	0.78	mgd

Results

Normal Depth	4.5	in
Flow Area	0.27	ft²
Wetted Perimeter	1.33	ft
Hydraulic Radius	2.5	in
Top Width	0.97	ft
Critical Depth	0.46	ft
Percent Full	37.9	%
Critical Slope	0.43	%
Velocity	4.42	ft/s
Velocity Head	0.30	ft
Specific Energy	0.68	ft
Froude Number	1.47	
Maximum Discharge	2.75	mgd
Discharge Full	2.55	mgd
Slope Full	0.08	%
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	37.92	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.5	in
Critical Depth	0.46	ft
Channel Slope	0.88	%
Critical Slope	0.43	%

HR Green

Worksheet for SS-38.1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.36	mgd

Results

Normal Depth	4.5	in
Flow Area	0.20	ft ²
Wetted Perimeter	1.14	ft
Hydraulic Radius	2.2	in
Top Width	0.66	ft
Critical Depth	0.35	ft
Percent Full	56.8	%
Critical Slope	0.52	%
Velocity	2.72	ft/s
Velocity Head	0.12	ft
Specific Energy	0.49	ft
Froude Number	0.86	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.15	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	56.80	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.5	in
Critical Depth	0.35	ft
Channel Slope	0.40	%
Critical Slope	0.52	%

HR Green

Worksheet for SS-38

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	36	in
Discharge	1.32	mgd

Results

Normal Depth	5.6	in
Flow Area	0.70	ft²
Wetted Perimeter	2.43	ft
Hydraulic Radius	3.4	in
Top Width	2.17	ft
Critical Depth	0.44	ft
Percent Full	15.5	%
Critical Slope	0.30	%
Velocity	2.94	ft/s
Velocity Head	0.13	ft
Specific Energy	0.60	ft
Froude Number	0.91	
Maximum Discharge	27.40	mgd
Discharge Full	25.47	mgd
Slope Full	0.00	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	15.47	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.6	in
Critical Depth	0.44	ft
Channel Slope	0.25	%
Critical Slope	0.30	%

HR Green

Worksheet for SS-39

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	8	in
Discharge	0.33	mgd

Results

Normal Depth	4.3	in
Flow Area	0.19	ft²
Wetted Perimeter	1.10	ft
Hydraulic Radius	2.1	in
Top Width	0.66	ft
Critical Depth	0.33	ft
Percent Full	53.8	%
Critical Slope	0.51	%
Velocity	2.67	ft/s
Velocity Head	0.11	ft
Specific Energy	0.47	ft
Froude Number	0.88	
Maximum Discharge	0.63	mgd
Discharge Full	0.58	mgd
Slope Full	0.13	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	53.81	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.3	in
Critical Depth	0.33	ft
Channel Slope	0.40	%
Critical Slope	0.51	%

HR Green

Worksheet for SS-40

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	10	in
Discharge	0.68	mgd

Results

Normal Depth	5.8	in
Flow Area	0.33	ft ²
Wetted Perimeter	1.45	ft
Hydraulic Radius	2.7	in
Top Width	0.82	ft
Critical Depth	0.46	ft
Percent Full	58.3	%
Critical Slope	0.49	%
Velocity	3.19	ft/s
Velocity Head	0.16	ft
Specific Energy	0.64	ft
Froude Number	0.89	
Maximum Discharge	1.14	mgd
Discharge Full	1.06	mgd
Slope Full	0.17	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.30	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.8	in
Critical Depth	0.46	ft
Channel Slope	0.40	%
Critical Slope	0.49	%

HR Green

Worksheet for SS-41

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	36	in
Discharge	2.46	mgd

Results

Normal Depth	7.6	in
Flow Area	1.08	ft ²
Wetted Perimeter	2.86	ft
Hydraulic Radius	4.5	in
Top Width	2.44	ft
Critical Depth	0.61	ft
Percent Full	21.0	%
Critical Slope	0.29	%
Velocity	3.53	ft/s
Velocity Head	0.19	ft
Specific Energy	0.82	ft
Froude Number	0.94	
Maximum Discharge	27.40	mgd
Discharge Full	25.47	mgd
Slope Full	0.00	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	20.99	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.6	in
Critical Depth	0.61	ft
Channel Slope	0.25	%
Critical Slope	0.29	%

HR Green

Worksheet for DP 22 SS-42

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.25	%
Diameter	36	in
Discharge	13.02	mgd

Results

Normal Depth	18.2	in
Flow Area	3.59	ft ²
Wetted Perimeter	4.75	ft
Hydraulic Radius	9.1	in
Top Width	3.00	ft
Critical Depth	1.44	ft
Percent Full	50.7	%
Critical Slope	0.30	%
Velocity	5.61	ft/s
Velocity Head	0.49	ft
Specific Energy	2.01	ft
Froude Number	0.90	
Maximum Discharge	27.40	mgd
Discharge Full	25.47	mgd
Slope Full	0.07	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.66	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	18.2	in
Critical Depth	1.44	ft
Channel Slope	0.25	%
Critical Slope	0.30	%

HR Green

Worksheet for SS-43

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.50	%
Diameter	12	in
Discharge	1.70	mgd

Results

Normal Depth	8.8	in
Flow Area	0.61	ft ²
Wetted Perimeter	2.05	ft
Hydraulic Radius	3.6	in
Top Width	0.89	ft
Critical Depth	0.70	ft
Percent Full	73.0	%
Critical Slope	0.57	%
Velocity	4.28	ft/s
Velocity Head	0.28	ft
Specific Energy	1.01	ft
Froude Number	0.91	
Maximum Discharge	2.07	mgd
Discharge Full	1.92	mgd
Slope Full	0.39	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	73.04	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.8	in
Critical Depth	0.70	ft
Channel Slope	0.50	%
Critical Slope	0.57	%

HR Green

Worksheet for SS-45 (Alternate w/ BEC Flow)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.40	%
Diameter	18	in
Discharge	4.59	mgd

Results

Normal Depth	13.4	in
Flow Area	1.41	ft²
Wetted Perimeter	3.12	ft
Hydraulic Radius	5.4	in
Top Width	1.31	ft
Critical Depth	1.03	ft
Percent Full	74.5	%
Critical Slope	0.49	%
Velocity	5.03	ft/s
Velocity Head	0.39	ft
Specific Energy	1.51	ft
Froude Number	0.85	
Maximum Discharge	5.46	mgd
Discharge Full	5.07	mgd
Slope Full	0.33	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	74.48	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.4	in
Critical Depth	1.03	ft
Channel Slope	0.40	%
Critical Slope	0.49	%

HR Green

APPENDIX D REFERENCED REPORTS

206120
99u.v
rpt-206120
1900-3013

MASTER UTILITY REPORT FOR

GREEN VALLEY

City of Aurora, Colorado

May 4, 2006

For:

**C&H Ranch Company, LLC
4908 Tower Road
Denver, CO 80249**

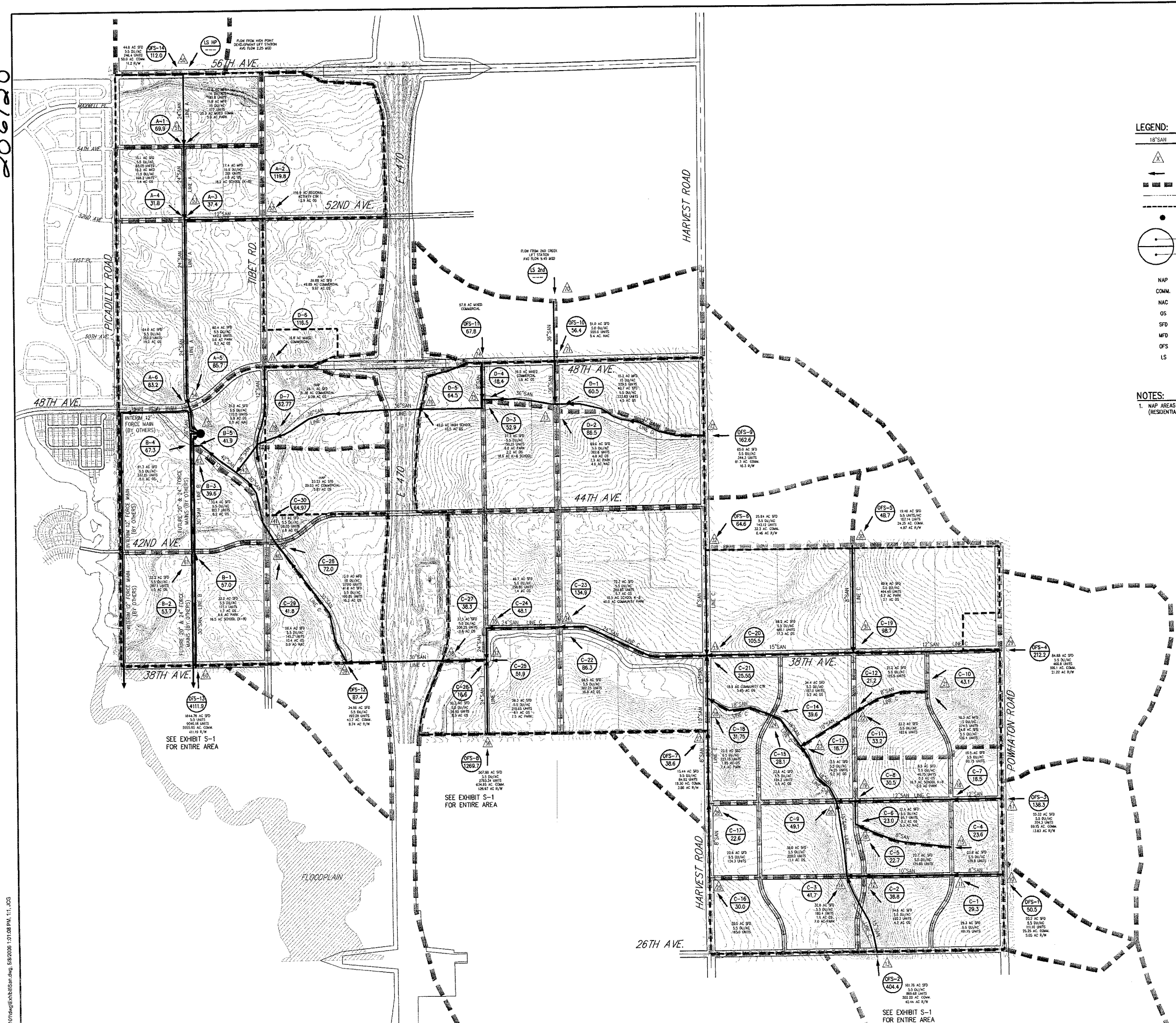
By:

**The Lund Partnership, Inc.
12265 West Bayaud Avenue, Suite 130
Lakewood, Colorado 80228
Contact: Jamie Overgaard
303-989-1461**

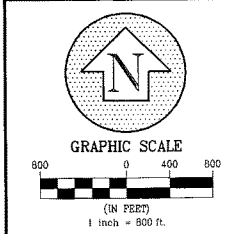
Project No. 395-0101

[illegible]

206120



- LEGEND:**
- 18" SAN - SANITARY SEWER LINE
 - DESIGN POINT
 - FLOW ARROW
 - BASIN BOUNDARIES
 - SECTION LINES
 - DISTRICT BOUNDARY LINES
 - SANITARY LIFT STATION (BY OTHERS)
 - BASIN DESIGNATION
 - TOTAL BASIN AREA (ACRES)
- NOTES:**
1. NAP AREAS AND OFFSITE AREAS HAVE ASSUMED A 40/50/10 PERCENT DEVELOPMENT RATIO (RESIDENTIAL/COMMERCIAL/RIGHT OF WAY AND OPEN SPACE) FOR CALCULATING FLOWS.



GREEN VALLEY

SANITARY SEWER STUDY

PREPARED FOR: OAKWOOD HOMES
6130 GREENWOOD PLAZA BLVD. #100
ENGLEWOOD, COLORADO 80111

THE LUND PARTNERSHIP INC.

12265 W. BAYAUD AVE.
SUITE 130
LAKEWOOD, CO. 80228
(303) 989-1461
(303) 989-4094 FAX

No.	Revision	Date	By

Design Engineer:	Date	By

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

DATE: 12/05/2005
JOB NUMBER: 395-0101
SCALE: 1"=800'

SHEET
1 OF 1

APPROVED FOR ONE YEAR FROM THIS DATE
6-21-06

City Engineer: *[Signature]* Date: **6-14-06**
Utilities Department: *[Signature]* Date: **6-7-06**
Fire Department: *[Signature]* Date: **6-9-06**

COLORADO REGISTERED PROFESSIONAL ENGINEER
32256
[Signature]
5/4/06

218184MU1
2017-3032
97S



GREEN VALLEY – AMENDMENT 1

MASTER UTILITY REPORT

MAY 2018

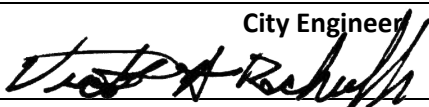

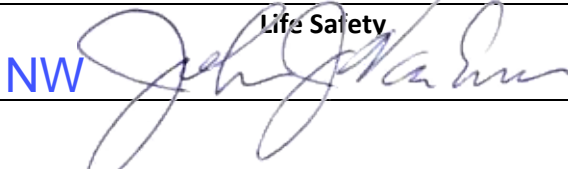
REVISED SEP. 2018

For:

Oakwood Homes
4908 Tower Road
Denver, CO 80249
Contact: Bruce Rau
303.486.8556

Prepared by:

Calibre Engineering Inc.
Contact: Russell L Burrows P.E.
303.730.0434

APPROVED FOR ONE YEAR FROM THIS DATE	
<i>10.24.18</i>	
City Engineer 	Date 09/28/2018
Aurora Water Department 	Date 09/20/2018
NW Life Safety 	Date 09/21/2018



GREEN VALLEY - AMENDMENT 1
SANITARY SEWER GENERATION

RESIDENTIAL		
Single-Family Population Density	2.77	People per Unit
Age Restricted Population Density	2.50	People per Unit
Average Flow Generation	68	gpcpd

MIXED USE	
Unit density of 10 units/acre was assumed and equivalent population was calculated with the Single-Family residential population density of 2.77	

COMMERCIAL		
Average Flow Generation	1,500	gpd/acre
	0.0023	cfs/acre
Equivalent Population	22	capita/acre

PEAKING FACTOR			
PF = 5/(p^0.167)	Where p = Population in thousands		
Min. PF =	1.7	Max. PF =	4.0

SCHOOLS / INDUSTRIAL		
Average Flow Generation	1,200	gpd/acre
	0.0019	cfs/acre
Equivalent Population	18	capita/acre

	PIPE CAPACITY (cfs) n = 0.011		
	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
75 % FULL	8	0.82	0.65
	10	1.49	1.18
	12	2.43	1.92
80 % FULL	15	4.72	3.73
	18	7.67	6.07
	24	16.53	13.07
	30	29.97	23.69
	36	48.73	38.52
	42	73.50	58.11

DESIGN POINT	BASIN	LAND USE	TOTAL ACRES	DENSITY (UNITS/AC)	NO. OF LOTS	EQUIVALENT POPULATION	AVG. DAY FLOW (CFS)	AVG. DAY FLOW (GPD)	AVG. DAY FLOW (GPM)	INFILTRATION @ 10% (GPM)	PEAKING FACTOR	PEAK FLOW (GPM)	PEAK FLOW + INFILTRATION (GPM)	PEAK FLOW + INFILTRATION (CFS)	Estimated Size at 0.4% (IN)	Pipe Percent Full at 0.4% (%)	Existing Pipe Size (IN)	COMMENTS
1	Offsite Basin 310-1	Mixed Use	142.4		-	3,227	0.246	158,994	110	11.0	4.0	442	453	1.01	10	57		Offsite Basin 310-1
2	Offsite Basin 310-2	SF Residential	57.9	5.0	290	802	0.084	54,530	38	3.8	4.0	151	155	0.35	8	43		Offsite Basin 310-2
3	Offsite Basin 310-3	SF Residential	70.4	5.0	352	975	0.103	66,303	46	4.6	4.0	184	189	0.42	8	48		Offsite Basin 310-3
3a	Design Point Total (Option 2 w/ 310-2)					1,777	0.187	120,833	84	8.4	4.0	336	344	0.77	8	71		Offsite Basin 310-2 + 310-3 (see Notes 1 and 4)
4	Basin 1	SF Resid. (Age Restricted)	47.6	5.8	276	690	0.073	46,920	33	3.3	4.0	130	134	0.30	8	40		Basin 1
	Design Point Total					690	0.073	46,920	33	3.3	4.0	130	134	0.30	8	40		
5	Basin 2	SF Resid. (Age Restricted)	32.6	5.8	189	473	0.050	32,130	22	2.2	4.0	89	91	0.20	8	32		Basin 1 + 2
	Design Point Total					1,163	0.122	79,050	55	5.5	4.0	220	225	0.50	8	53		
6	Offsite Basin 4 (GVR D-6)	Mixed Use	106.5		-	2,785	0.345	222,979	155	15.5	4.0	619	635	1.41	10	72		Offsite Basin 4 (GVR D-6)
	Design Point Total (Option 2 w/ 310-1)					6,012	0.591	381,973	265	26.5	3.7	983	1,010	2.25	12	71		Offsite Basin 4 + 310-1 (see Note 2)
7	Basin 3	SF Resid. (Age Restricted)	29.3	5.8	169	423	0.044	28,730	20	2.0	4.0	80	82	0.18	8	30		Offsite Basin 4 + Basin 1 + 2 + 3
	Design Point Total					3,208	0.337	218,110	151	15.1	4.0	606	621	1.38	10	70		
	Design Point Total (Option 2 w/ 310-1)					6,435	0.677	437,546	304	30.4	3.7	1,113	1,144	2.55	15	52		
7a	Design Point Total					4,370	0.512	330,759	230	23.0	3.9	898	921	2.05	12	66		Offsite Basin 4 + Basin 1 + 2 + 3
	Design Point Total (Option 2 w/ 310-1)					7,597	0.758	489,753	340	34.0	3.6	1,212	1,246	2.78	15	54		
8	Basin 4	SF Resid. (Age Restricted)	27.5	5.8	159	398	0.042	27,030	19	1.9	4.0	75	77	0.17	8	29		Offsite Basin 310-3 + Basin 4 (see Note 4)
	Design Point Total					1,373	0.144	93,333	65	6.5	4.0	259	266	0.59	8	59		
	Design Point Total (Option 2 w/ 310-2)					2,174	0.229	147,863	103	10.3	4.0	411	421	0.94	10	54		
9	Design Point Total					6,905	0.778	503,142	349	34.9	3.6	1,265	1,300	2.90	15	56		Design Point 5 + Design Point 7 + Design Point 8 (see Note 4)
	Design Point Total (Option 2 w/ 310-2)					7,707	0.965	623,975	433	43.3	3.6	1,541	1,584	3.53	15	64		(see Notes 1 and 4)
	Design Point Total (Option 2 w/ 310-1 & 310-2)					10,934	1.211	782,969	544	54.4	3.4	1,823	1,878	4.18	15	72		(see Notes 1, 2 and 4)
10	Offsite Basin 310-4	Commercial	18.5			407	0.043	27,676	19	1.9	4.0	77	79	0.18	8	30		Offsite Basin 310-4
11	TAH (DP 18)	Mixed Use	2,109.0			104,435	7.425	4,798,903	3333	333.3	2.3	7,667	8,000	17.82	30	55		From The Aurora Highlands (TAH) Master Utility Report
12	Offsite Basin 5 (GVR D-7)	Mixed Use	62.8			1,423	0.187	120,861	84	8.4	4.0	336	344	0.77	8	71		From Lund Green Valley Report (GVR D-7)
	Design Point Total		2,190.3			106,265	7.655	4,947,440	3436	343.6	2.3	7,881	8,225	18.32	30	56		TAH (see Note 3)
13	Basin 5	SF Residential	70.4	6.3	443	1,227	0.129	83,443	58	5.8	4.0	232	238	0.53	8	55		Basin 5
14	Offsite Basin 6 (GVR C-30)	Mixed Use	64.0			1,408	0.174	112,459	78	7.8	4.0	312	320	0.71	8	67		From Lund Green Valley Report (GVR C-30)
	Design Point Total		134.4			2,635	0.303	195,903	136	13.6	4.0	544	558	1.24	10	65		Offsite Basin 6 + Basin 5
15	Design Point Total		2,324.7			108,900	7.958	5,143,343	3572	357.2	2.3	8,160	8,517	18.98	30	57	36"	TAH + Offsite Basin 5 + 6 + Basin 5 (see Note 3)
16	Basin 6	SF Residential	25.6	4.1	104	288	0.030	19,589	14	1.4	4.0	54	56	0.12	8	25		Basin 6
	Design Point Total		2,350.3			109,188	7.988	5,162,932	3585	358.5	2.3	8,187	8,546	19.04	30	57	42"	TAH + Offsite Basin 5 + 6 + Basin 5 + 6 (see Note 3)
17	Offsite Basin 12 (GV OFS-12)	Mixed Use	87.4		-	1,981	0.245	158,348	110	11.0	4.0	440	451	1.00	10	56		Offsite Basin 12 (GV OFS-12)
18	Basin 7	SF Residential	28.5	6.3	179	496	0.052	33,716	23	2.3	4.0	94	96	0.21	8	33		Basin 7
	Design Point Total		115.9			2,477	0.297	192,064	133	13.3	4.0	534	547	1.22	10	64		Basin 7 + Offsite Basin 12
19	Basin 8	School	18.0	-	-	324	0.033	21,600	15	1.5	4.0	60	62	0.14	8	27		Basin 8
	Design Point Total		133.9			2,801	0.331	213,664	148	14.8	4.0	594	608	1.36	10	70		Basins 7+8 + Offsite Basin 12
20	Offsite Basin 13	Mixed Use		-	-							5,157	11.49	24	61	30" @ 0.15%		Offsite Basin 13
21	Basin 9	SF Residential	90.9	6.3	572	1,584	0.167	107,742	75	7.5	4.0	299	307	0.68	8	65		Basin 9
	Design Point Total											5,464	12.17	24	63	30" @ 0.15%		Basin 9 + Offsite Basin 13
21.1	Basin 9.1	SF Residential	33.6	6.3	212	587	0.062	39,932	28	2.8	4.0	111	114	0.25	8	36		Basin 9.1
	Design Point Total		125									5,577	12.43	24	64	30" @ 0.15%		
22	Basin 10	SF Residential	47.2	6.3	297	823	0.087	55,943	39	3.9	4.0	155	159	0.35	8	43		Basin 10
	Design Point Total		297.0			3,624	0.714	246,399	171	17.1	4.0	684	702	1.56	12	55		Basins 7+8+10 and Offsite Basin 12
22.1	Design Point Total											6,279	13.99	24	69	30" @ 0.15%		Basins 7+8+9+9.1+10 + Offsite Basins 12+13
LS	Design Point Total												16,702	37.21	42	64		All Basins
SITE TOTALS		SF Resid. (Age Restricted)	137.0		793	1,983	0.209	134,810	94	9.4	4.0	374	384	0.86				
		SF Residential	296.3		1807	5,005	0.465	340,367	236	23.6	3.8	903	927	2.06				
		School	18.0		-	324	0.033	21600	15	1.5	4.0	60	62	0.14				

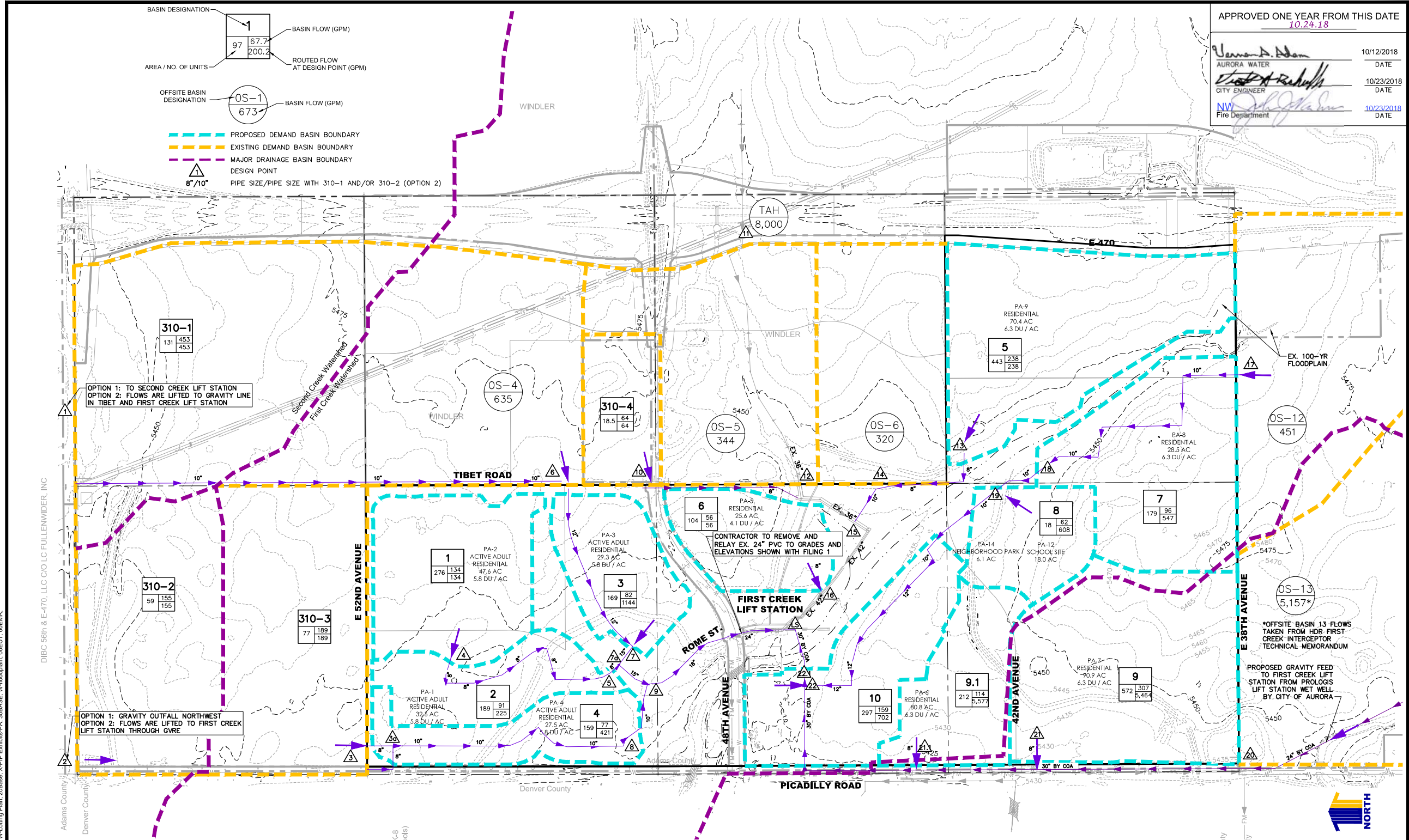
NOTE 1: For analysis purposes, Option 2 requires a lift station to convey flows from Basin 310-2 along Picadilly Rd to Design Point 3a
NOTE 2: For analysis purposes, Option 2 requires a lift station to convey flows from Basin 310-1 along Tibet Rd to Design Point 6
NOTE 3: There is an existing 36" or 42" sanitary sewer main in this area
NOTE 4: Sanitary Sewer Pipe runs at 0.25% slope near and along Rome St (Design Points 7a, 8 and 9)

AVERAGE DAY FLOW for Offsite Basin 310-1 and TRIBUTARY AREA for Offsite Basins 310-2 and 310-3 taken from 310 West Master Utility Report by Calibre Engineering
AVERAGE DAY FLOW for Offsite Basins 4, 5, 6 and 12 taken from Master Utility Report for Green Valley by The Lund Partnership, Inc. (2006)
PEAK FLOW + INFILTRATION for Offsite Basin 13 taken from HDR First Creek Interceptor Technical Memorandum 3 provided by COA (Parcels 26 and Parcels 32-38) with peaking factor of 2.25
AVERAGE DAY FLOW for Offsite Basin TAH taken from Master Utility Report for The Aurora Highlands by Calibre Engineering (2018)
SITE TOTALS are flows from Green Valley - Amendment 1 only

218184

1

PATH: P:\OAKWOOD GVRE\DDICADD\EXHIBITS\FDP_SS1.DWG
PLOT BY: MICHAEL LOFFES, PLOT DATE: 10/23/2018 10:56 AM
XREFS: 20WPUT, 30PUT, W-Letting Plan, 20Base, X-PIP Exhibits-PA, 30Base, W-floodplain, 00EWA.



APPROVED ONE YEAR FROM THIS DATE
10.24.18

Vernon D. Adam
AURORA WATER
CITY ENGINEER
10/12/2018
DATE

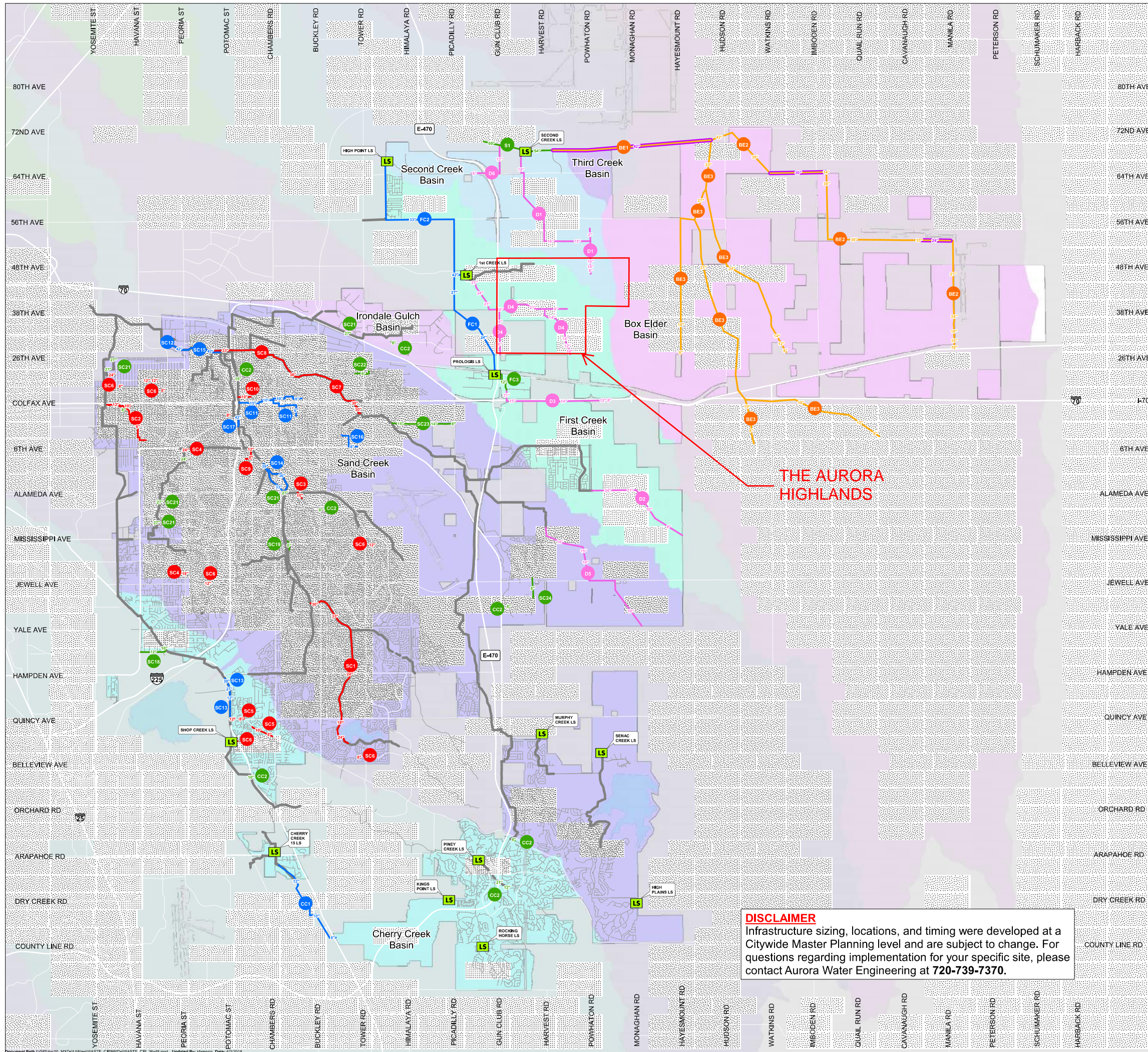
10/23/2018
DATE

10/23/2018
DATE

DATE		REVISION DESCRIPTION		Drawing Name X-FDP_SS1.dwg		Job Number Oakwood GVRE FDP F1&2		Prepared For CITY OF AURORA		Designer LMA		Drafter LMA		Checked TAJ		Calibre Calibre Engineering, Inc. 9090 South Ridgeline Boulevard, Suite 105 Highlands Ranch, CO 80129 (303) 730-0434 www.calibre-engineering.com Construction Management Civil Engineering Surveying		GREEN VALLEY - AMENDMENT 1 MASTER UTILITY REPORT OVERALL MAP		Sheet SS1 Date SEPTEMBER 2018	
																				1 of 2	

APPROVED ON 10.24.18





Legend

System Improvement Projects by Year

- 0-5 Years (Project Number & Diameter) SC4
- 5-10 Years (Project Number & Diameter) SC17
- 10-20 Years (Project Number & Diameter) SC21
- Box Elder Creek (Project Number & Diameter) BE3
- Developer (Project Number & Diameter) D1

Force Main — — — — —

Existing Wastewater Infrastructure

Main —

Interceptor —

Lift Station LS

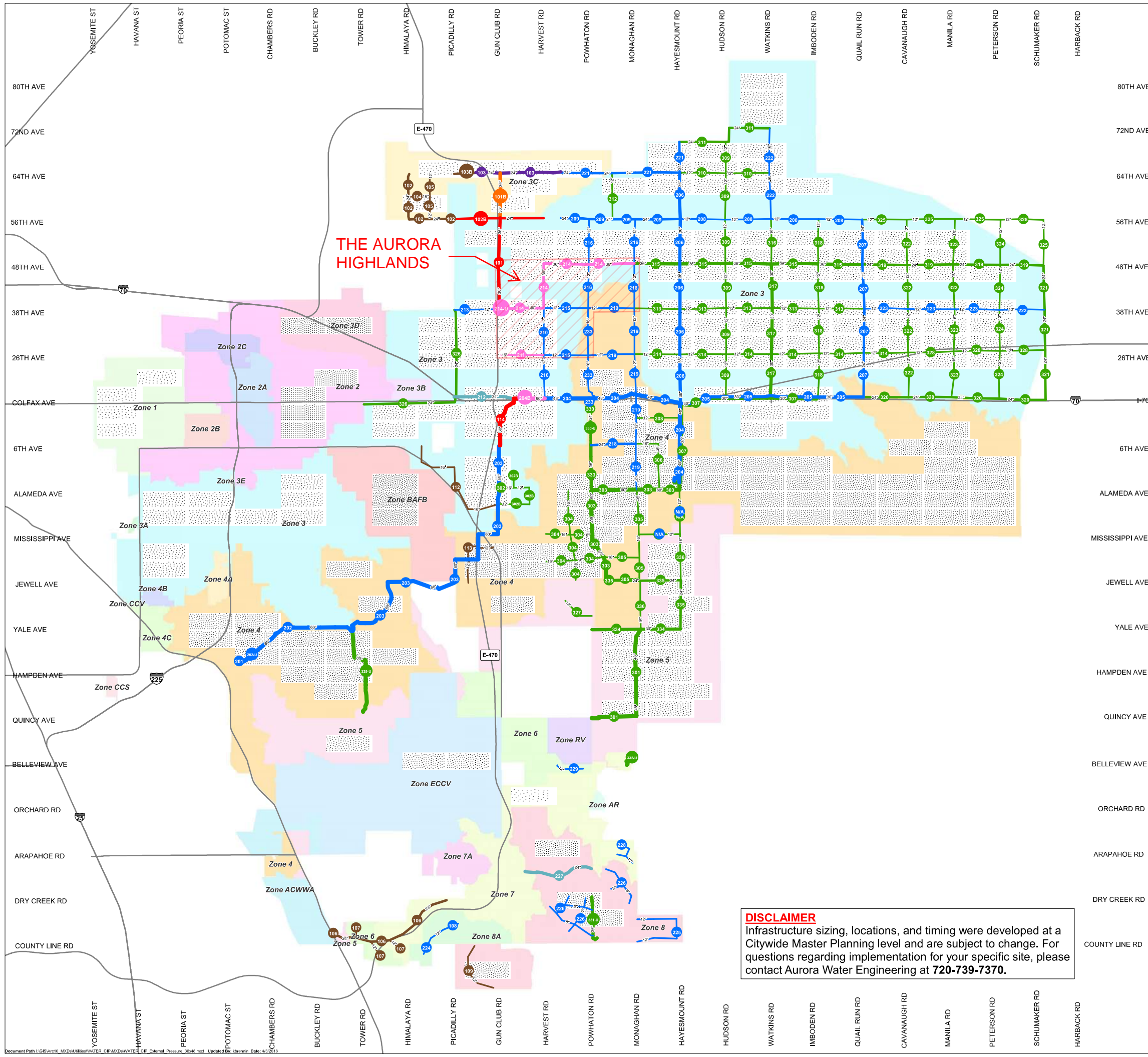


City of Aurora Aurora Wastewater Capital Improvement Plan

Infrastructure
Improvements

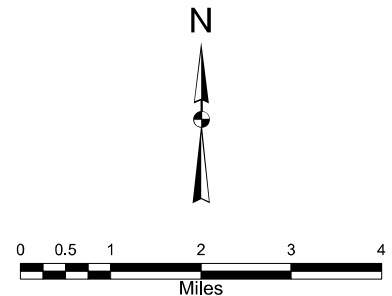
DISCLAIMER

Infrastructure sizing, locations, and timing were developed at a Citywide Master Planning level and are subject to change. For questions regarding implementation for your specific site, please contact Aurora Water Engineering at 720-739-7370.



Legend

- City Limit
- System Improvement Projects by Year
 - Year 2018 (Project Number & Diameter)
 - Year 2019 (Project Number & Diameter)
 - Year 2020 (Project Number & Diameter)
 - Year 2021 (Project Number & Diameter)
 - Year 2022 (Project Number & Diameter)
 - Year 2035 (Project Number & Diameter)
 - Build Out (Project Number & Diameter)
 - Developer Projects



City of Aurora
Aurora Water
Capital Improvement Plan
Infrastructure Improvements

April, 2018

DISCLAIMER
Infrastructure sizing, locations, and timing were developed at a Citywide Master Planning level and are subject to change. For questions regarding implementation for your specific site, please contact Aurora Water Engineering at 720-739-7370.

Kristine House

Subject: FW: The Aurora Highlands Master Utility Comments

From: DuPree, Alicia <adupree@auroragov.org>
Sent: Wednesday, August 16, 2017 9:54 AM
To: Kristine House <KHouse@calibre-engineering.com>
Subject: RE: The Aurora Highlands Master Utility Comments

Hi Kristin,

We discussed the details with Todd when we met. For the MUS write up you can include the following.

The City of Aurora Wastewater Master Plan currently under review evaluated three major infrastructure alternatives necessary to accommodate future planned development. The selected alternative is consistent with Metro Wastewater Reclamation District's (MWRD) current plan to construct the Second Creek Interceptor (SDI). The SDI will convey wastewater flows from northern Aurora via gravity to MWRD's Northern Treatment Plant (NTP) in Brighton.

In the absence of the SDI, temporary lift stations will be needed to accommodate wastewater flows in northern Aurora. The City of Aurora is currently designing and planning to construct a temporary Second Creek Regional Lift Station (SCRLS). The SCRLS is designed to accommodate a maximum 3.5MGD of flow from the Second Creek Basin. This lift station will be located on Second Creek at 68th Avenue and will pump wastewater south to the First Creek Lift Station (FCLS) which has a current capacity of 1.7MGD. The City is currently designing improvements to increase the FCLS capacity.

Once the SDI is complete, SCRLS will be decommissioned and all wastewater will flow by gravity to MWRD's NTP. Additionally, current plans also call for a First Creek Interceptor branch to MWRD's SDI. This interceptor would convey wastewater flows from FCLS north to the SDI. Once the First Creek Interceptor is complete, FCLS will also be decommissioned.

For areas tributary to FCLS and SCRLS, developers will need to build master planned interceptors to the respective station. If wastewater flows exceed lift station capacities ahead of the SDI and First Creek Interceptor, then developers will be responsible for upsizing the stations to accommodate the additional flow.

Thanks,

Alicia DuPree

Project Engineer | City of Aurora | Aurora Water
office 303.739.7499 | cell 303.818.8186



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November 23, 2022

Vernon A. Adam, P.E.
Engineering Services Manager – Aurora Water Department
15151 E. Alameda Pkwy
Aurora, CO 80012

RE: The Aurora Highlands Master Utility Report – Amendment 2, Supplemental Analysis

Amendment 2 to the approved *The Aurora Highlands Master Utility Report – Amendment 1* (EDN 219069MU2) has been submitted to update the report for the anticipated increase in demands associated with a hospital site within Planning Area (PA) 54. PA-54 was 37.9 acres with the previous reports and is now shown as 47.9 acres. In conjunction with the increased area to PA-54, the areas of adjacent PA-51 (open space / detention) and PA-57 (corporate campus) were also adjusted.

Due to the increase in sanitary sewer demands, the City also requested review of cumulative sanitary sewer demands and resultant line sizing analysis further downstream in the First Creek basin that was not a part of previous Aurora Highlands Reports. The downstream locations reviewed include Design Points (DP) identified on the *Green Valley – Amendment 1* Overall Map (EDN 218184) as 16, 22.1 and the First Creek Lift Station (LS).

To facilitate this review Average Flow Demands for the development tributary to the First Creek Lift Station were added to the Aurora Highlands demands calculation worksheet directly from the *Green Valley – Amendment 1* report. One other change made at the request of the City was to update the peak flows coming from the Prologis Lift Station (Basin OS-13) from 11.5 MGD used in the *Green Valley – Amendment 1* to 10.3 MGD as shown on the First Creek Interceptor Map dated December, 20, 2021.

Calculations of peak flow in the *Green Valley – Amendment 1* report did not consistently factor in the direct relationship between an increase in cumulative population and a decrease to the Peaking Factor. Therefore, the peak demands were re-calculated with this Amendment. The difference to resultant peak flows is most evident at the Lift Station Design Point where an adjusted Peaking Factor results in a large decrease to estimated Peak Flow.



Results and a comparison to the previous report are summarized in the following table:

Design Point	Peak Flow (including Infiltration)					% Full at Master Plan Slope		
	TAH MUS Amend. 1 (EDN 219069 MU2)		Revised w/ Amend. 2		Difference	Pipe Size	TAH MUS Amend. 1	Revised w/ Amend. 2
	MGD	GPM	MGD	GPM	MGD	IN	%	%
11.2	5.06	3,514	6.06	4,209	1.00	24	55.0%	61.7%
12	10.04	6,972	10.92	7,582	0.88	30	58.2%	61.5%
13	10.07	6,993	10.95	7,604	0.88	30	58.3%	61.6%
14	10.28	7,139	11.15	7,744	0.87	30	59.1%	62.3%
22	12.31	8,549	13.16	9,136	0.85	36	42.9%	44.5%
	GVRE Master Plan (EDN 218184)		Reviewed w/ Amend. 2		Difference	GVRE Master Plan		
GVRE 16	12.31	8,546	13.94	9,681	1.63	42	37.1%	36.7%
GVRE 22.1	9.04	6,279	11.90	8,262	2.86	N/A		
GVRE LS	24.05	16,702	16.44	11,417	-7.61	N/A		

If there are any questions or comments on the contents, please do not hesitate to contact me directly at 720-602-4938. Sincerely,

Kristine House, P.E., CFM

Associate | Lead Engineer – Land Development

HR GREEN DEVELOPMENT, INC