

July 15, 2024

Aurora Water  
Attn: Casey Ballard, P.E.  
15151 E. Alameda Pkwy.  
Aurora, CO 50012

RE: Gaylord Rockies Guestroom Expansion and Soundwaves Utility Conformance

Dear Casey,

This letter is provided to Aurora Water to confirm that utility design for Gaylord Rockies Guestroom Expansion and Soundwaves, herein after called Gaylord Rockies Expansion or the Project, conforms to the *Utility Report for Rockies Village* (EDN #217020). This Utility Report did not specify layouts or sizes for the sanitary and water systems inside the Gaylord Rockies property so this letter will compare demands for the Gaylord Rockies Hotel and Conference Room with the proposed expansion to what was anticipated in the Utility Report to ensure existing infrastructure will not be exceed.

The Gaylord Rockies Expansion is located in the southwest quarter of Section 2, Township 3 South, Range 66 West of the 6<sup>th</sup> Principal Meridian, City of Aurora, Adams County, State of Colorado inside the existing property boundary for the Gaylord Rockies Hotel and Conference Center. The site is bounded on the west by Himalaya Road, on the east by Gaylord Rockies Boulevard, on the north by the existing Gaylord Rockies Hotel and Convention Center, and on the south by Rockies Village Planning Area 4. The *Utility Report for Rockies Village* (EDN #217020) and the *High Point at DIA – FDP Amendment No. 4 – Master Utility Study Amendment* (EDN #220127) were referenced while reviewing for utility design conformance.

The *High Point at DIA Commercial Site – Offsite Improvements – Road A* (EDN #215149) constructed an 8-inch sanitary sewer line in Gaylord Rockies Boulevard and a 12-inch sanitary sewer line in Himalaya Road. Proposed on-site sanitary sewer will consist of an 8-inch and 10-inch lines that will connect to the existing sanitary sewer lines mentioned above to convey sewage off-site to the High Point Lift Station. The *High Point at DIA Commercial Site – Offsite Improvements – Road A* also constructed a 12-inch water line in Gaylord Rockies Boulevard and a 16" water line in Himalaya Road. The *Construction Plans for Gaylord Rockies* (EDN #215091) constructed 12" water lines throughout the existing Gaylord Rockies Hotel and Convention Center.

The Gaylord Rockies Expansion is tributary to the High Point Lift Station on Dunkirk Street on the north side of the West Fork of Second Creek as noted in *Utility Report for Rockies Village* (EDN #217020) revised February 2017. The *Utility Report for Rockies Village* calculated average daily flows for the hotel land use by utilizing the *Southgate Sanitation District Sanitary Sewer System Specifications* at the request of Aurora Water. These specifications use an average daily flow per unit of 140 gallons per day for hotel land use. There was a total of 1500 units (guestrooms). The Utility Report utilized the *Aurora Water's Standards and Specifications for Water, Sanitary Sewer and Storm Drainage Infrastructure* for the rest of the criteria including a maximum peaking factor of 4.0 and maximum pipe full percentages for peak flows. With this Project, the number of units is increasing by 478 units to a new total of 1978. These additional units will outfall to the same design point (DP11) as the rest of the Gaylord Rockies Hotel and Conference Room. While this increase was not anticipated in the *High Point at DIA – FDP Amendment No. 4 – Master Utility Study Amendment*, the total flow at downstream design points is less than what was expected. This is because in the High Point MUS, a total peak design flow of 1.53 cfs from the Prairie Point MUS (by CVL, approved 04/2020, EDN #220059) was expected at Basin OS1, however an equivalent population was not included with the High Point MUS and so the peaking factor at all the downstream design points was higher than it should be. Once this equivalent population is added, the peaking factor is reduced and reduces the sanitary flows in the system even though this project is adding additional flow. Calculations have been provided in the appendix.

This Project will consist of 8-inch water lines that will connect to the existing water line in the Gaylord Rockies Hotel and Convention Center to provide a looped system. The guestroom expansion will have its water demands met by the existing building and so will require no new water taps. Our consultants are still reviewing anticipated water demands for the Soundwaves building. Their analysis will determine if the existing 8" water meter constructed with the Gaylord Rockies Hotel and Convention Center has enough capacity for Soundwaves, or if a new meter off the proposed 8-inch water line will be required. This letter reanalyzed the existing water system in the Gaylord Rockies Hotel and Convention Center to make sure that the new demand can be met with the existing system and that residual pressure in the fire hydrants are met, while also providing fire hydrant coverage for the buildings. The *Utility Report for Rockies Village* used the *Aurora Water's Standards and Specifications for Water, Sanitary Sewer and Storm Drainage Infrastructure* while basing the max hour usage for the Gaylord Rockies Hotel and Conference Center on the maximum demand on an 8" water meter at 10 feet per second.

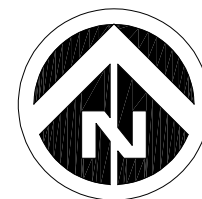
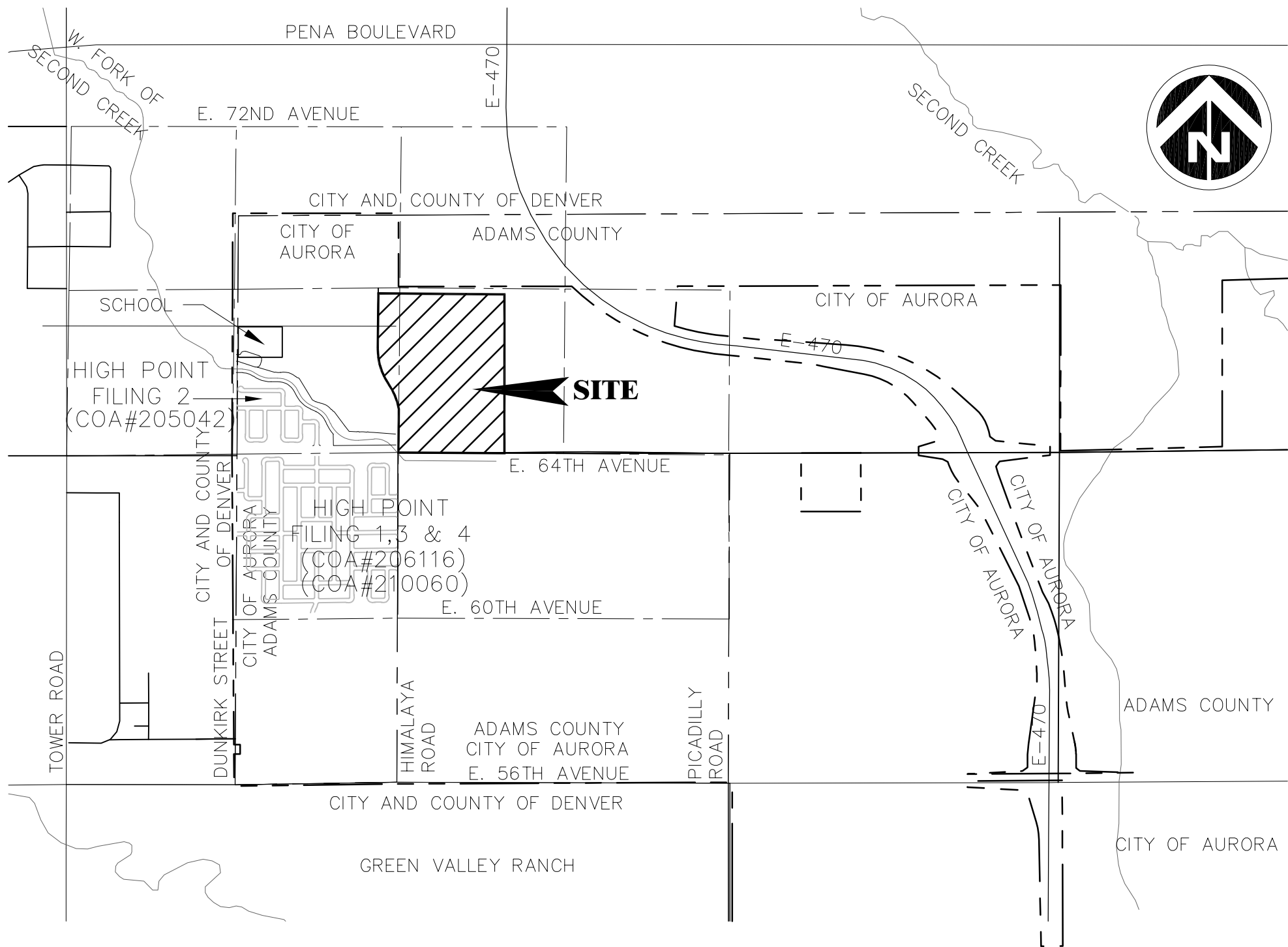
We conclude that the proposed sanitary sewer and domestic water infrastructure for the Gaylord Rockies Expansion, and the overall Gaylord Rockies Hotel and Convention Center, conforms to requirements determined by the *Utility Report for Rockies Village* (EDN #217020) and the *High Point at DIA – FDP Amendment No. 4 – Master Utility Study Amendment* (EDN #220127).

Sincerely,

Sue Sibel, PE

Senior Associate, Assistant Department Manager

# Project Vicinity Map

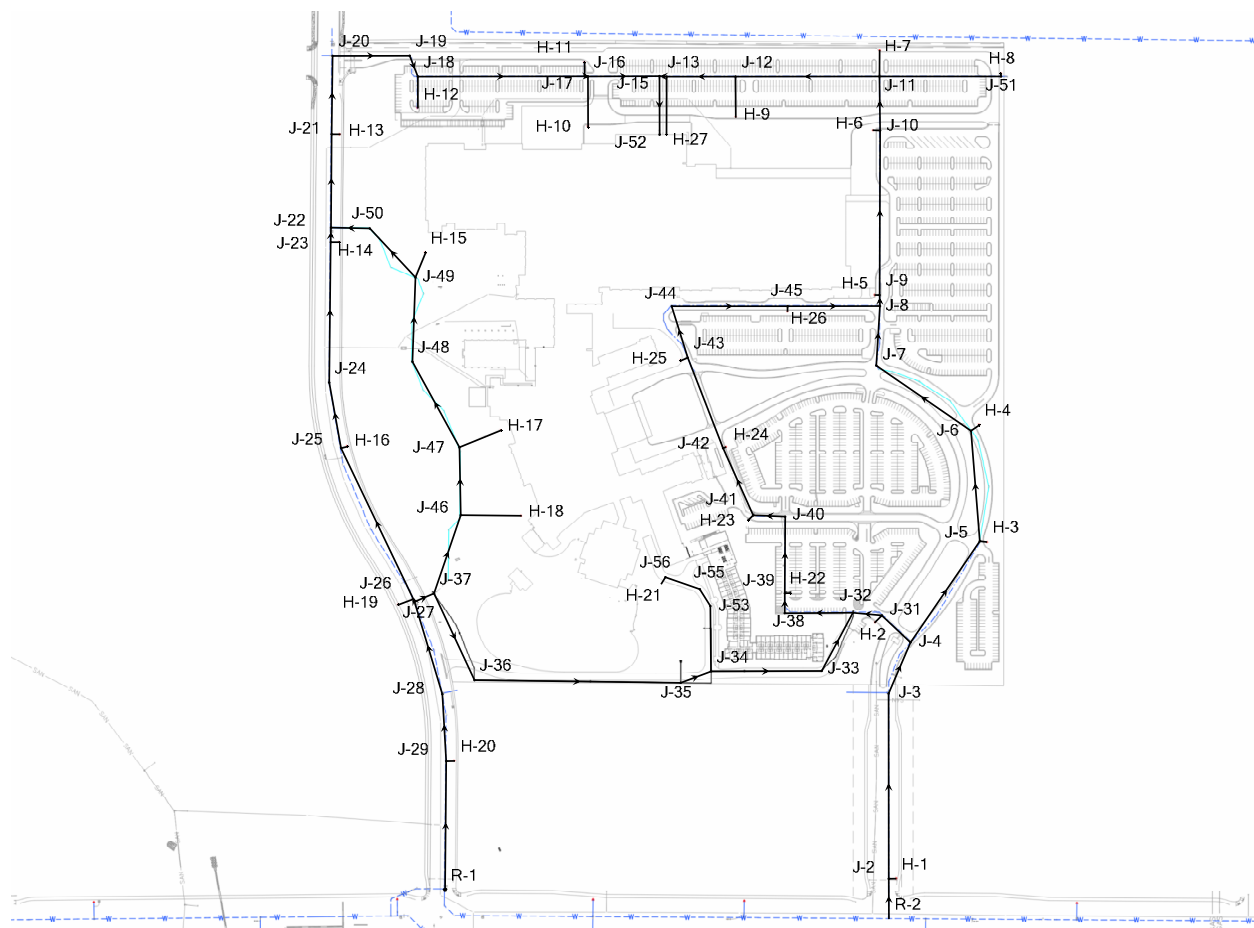


**VICINITY MAP**

1"=2000'

# Water System Results

**WaterGEMS v. 10.03.02.75**



Average Day: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	5,405.28	0	5,600.00	84
J-3	5,413.69	0	5,599.98	81
J-4	5,415.37	0	5,599.97	80
J-5	5,419.83	0	5,599.96	78
J-6	5,422.06	0	5,599.95	77
J-7	5,424.76	0	5,599.95	76
J-8	5,427.46	0	5,599.94	75
J-9	5,428.31	0	5,599.94	74
J-10	5,429.97	0	5,599.91	74
J-11	5,429.05	0	5,599.90	74
J-12	5,424.33	0	5,599.88	76
J-13	5,422.31	0	5,599.87	77
J-15	5,422.11	0	5,599.87	77
J-16	5,420.30	0	5,599.88	78
J-17	5,420.24	0	5,599.88	78
J-18	5,410.06	0	5,599.93	82
J-19	5,410.68	0	5,599.93	82
J-20	5,409.39	0	5,599.95	82
J-21	5,405.43	0	5,599.96	84
J-22	5,402.89	0	5,599.96	85
J-23	5,402.60	0	5,599.96	85
J-24	5,399.94	0	5,599.97	87
J-25	5,398.26	0	5,599.97	87
J-26	5,397.35	0	5,599.98	88
J-27	5,397.25	0	5,599.98	88
J-28	5,391.31	0	5,599.98	90
J-29	5,386.52	0	5,599.99	92
J-31	5,416.15	0	5,599.97	80
J-32	5,417.21	0	5,599.97	79
J-33	5,412.45	0	5,599.97	81
J-34	5,411.22	0	5,599.97	82
J-35	5,407.46	0	5,599.97	83
J-36	5,398.33	0	5,599.97	87
J-37	5,398.71	0	5,599.97	87
J-38	5,416.60	0	5,599.97	79
J-39	5,417.47	0	5,599.96	79
J-40	5,423.34	0	5,599.96	76
J-41	5,424.62	0	5,599.96	76
J-42	5,428.16	0	5,599.96	74
J-43	5,427.19	0	5,599.95	75
J-44	5,428.49	0	5,599.95	74
J-45	5,428.56	0	5,599.95	74
J-46	5,408.34	0	5,599.97	83
J-47	5,409.86	0	5,599.97	82
J-48	5,407.89	0	5,599.97	83
J-49	5,406.42	0	5,599.97	84
J-50	5,406.06	0	5,599.96	84
J-51	5,431.83	0	5,599.90	73
J-52	5,430.00	333	5,599.54	73
J-53	5,412.71	0	5,599.97	81
J-55	5,413.36	0	5,599.97	81
J-56	5,415.42	0	5,599.97	80

Average Day: Pipe Table

Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	12.0	117	0.33	0.000
P-2	12.0	117	0.33	0.000
P-3	12.0	117	0.33	0.000
P-4	12.0	84	0.24	0.000
P-5	12.0	84	0.24	0.000
P-6	12.0	84	0.24	0.000
P-7	12.0	84	0.24	0.000
P-8	12.0	151	0.43	0.000
P-9	12.0	151	0.43	0.000
P-10	12.0	151	0.43	0.000
P-11	12.0	151	0.43	0.000
P-12	12.0	151	0.43	0.000
P-15	12.0	-183	0.52	0.000
P-16	12.0	-183	0.52	0.000
P-17	12.0	-183	0.52	0.000
P-18	12.0	-183	0.52	0.000
P-19	12.0	-183	0.52	0.000
P-20	16.0	-183	0.29	0.000
P-21	16.0	-183	0.29	0.000
P-22	16.0	-130	0.21	0.000
P-23	16.0	-130	0.21	0.000
P-24	16.0	-130	0.21	0.000
P-25	16.0	-130	0.21	0.000
P-26	16.0	-130	0.21	0.000
P-27	16.0	-216	0.35	0.000
P-28	16.0	-216	0.35	0.000
P-29	16.0	-216	0.35	0.000
P-30	12.0	33	0.09	0.000
P-31	12.0	33	0.09	0.000
P-32	12.0	-34	0.10	0.000
P-33	12.0	-34	0.10	0.000
P-34	12.0	-34	0.10	0.000
P-35	12.0	-34	0.10	0.000
P-36	12.0	-34	0.10	0.000
P-37	12.0	-87	0.25	0.000
P-38	12.0	67	0.19	0.000
P-39	12.0	67	0.19	0.000
P-40	12.0	67	0.19	0.000
P-41	12.0	67	0.19	0.000
P-42	12.0	67	0.19	0.000
P-43	12.0	67	0.19	0.000
P-44	12.0	67	0.19	0.000
P-45	12.0	67	0.19	0.000
P-46	12.0	67	0.19	0.000
P-47	12.0	53	0.15	0.000
P-48	12.0	53	0.15	0.000
P-49	12.0	53	0.15	0.000
P-50	12.0	53	0.15	0.000
P-51	12.0	53	0.15	0.000
P-52	12.0	53	0.15	0.000
P-53	12.0	0	0.00	0.000
P-54	6.0	0	0.00	0.000
P-55	6.0	0	0.00	0.000
P-56	6.0	0	0.00	0.000
P-57	8.0	333	2.13	0.002
P-58	6.0	0	0.00	0.000
P-59	6.0	0	0.00	0.000
P-60	6.0	0	0.00	0.000
P-61	6.0	0	0.00	0.000
P-62	6.0	0	0.00	0.000
P-63	6.0	0	0.00	0.000
P-64	6.0	0	0.00	0.000
P-65	6.0	0	0.00	0.000
P-66	6.0	0	0.00	0.000
P-67	6.0	0	0.00	0.000
P-68	6.0	0	0.00	0.000
P-69	6.0	0	0.00	0.000
P-70	8.0	0	0.00	0.000
P-71	8.0	0	0.00	0.000
P-72	6.0	0	0.00	0.000
P-72	8.0	0	0.00	0.000
P-73	6.0	0	0.00	0.000
P-73	6.0	0	0.00	0.000
P-74	6.0	0	0.00	0.000
P-75	6.0	0	0.00	0.000
P-76	6.0	0	0.00	0.000
P-77	6.0	0	0.00	0.000
P-78	12.0	151	0.43	0.000
P-79	8.0	0	0.00	0.000
P-80	6.0	0	0.00	0.000
P-81	6.0	0	0.00	0.000
P-82	6.0	0	0.00	0.000
P-83	6.0	0	0.00	0.000



Maximum Day: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	5,405.28	0	5,599.97	84
J-3	5,413.69	0	5,599.83	81
J-4	5,415.37	0	5,599.79	80
J-5	5,419.83	0	5,599.74	78
J-6	5,422.06	0	5,599.70	77
J-7	5,424.76	0	5,599.65	76
J-8	5,427.46	0	5,599.62	74
J-9	5,428.31	0	5,599.61	74
J-10	5,429.97	0	5,599.42	73
J-11	5,429.05	0	5,599.35	74
J-12	5,424.33	0	5,599.18	76
J-13	5,422.31	0	5,599.10	76
J-15	5,422.11	0	5,599.09	77
J-16	5,420.30	0	5,599.21	77
J-17	5,420.24	0	5,599.22	77
J-18	5,410.06	0	5,599.50	82
J-19	5,410.68	0	5,599.54	82
J-20	5,409.39	0	5,599.67	82
J-21	5,405.43	0	5,599.71	84
J-22	5,402.89	0	5,599.75	85
J-23	5,402.60	0	5,599.75	85
J-24	5,399.94	0	5,599.78	86
J-25	5,398.26	0	5,599.80	87
J-26	5,397.35	0	5,599.83	88
J-27	5,397.25	0	5,599.83	88
J-28	5,391.31	0	5,599.89	90
J-29	5,386.52	0	5,599.93	92
J-31	5,416.15	0	5,599.79	79
J-32	5,417.21	0	5,599.79	79
J-33	5,412.45	0	5,599.79	81
J-34	5,411.22	0	5,599.80	82
J-35	5,407.46	0	5,599.80	83
J-36	5,398.33	0	5,599.82	87
J-37	5,398.71	0	5,599.82	87
J-38	5,416.60	0	5,599.77	79
J-39	5,417.47	0	5,599.76	79
J-40	5,423.34	0	5,599.74	76
J-41	5,424.62	0	5,599.74	76
J-42	5,428.16	0	5,599.72	74
J-43	5,427.19	0	5,599.69	75
J-44	5,428.49	0	5,599.67	74
J-45	5,428.56	0	5,599.64	74
J-46	5,408.34	0	5,599.81	83
J-47	5,409.86	0	5,599.80	82
J-48	5,407.89	0	5,599.78	83
J-49	5,406.42	0	5,599.77	84
J-50	5,406.06	0	5,599.75	84
J-51	5,431.83	0	5,599.35	72
J-52	5,430.00	933	5,596.93	72
J-53	5,412.71	0	5,599.80	81
J-55	5,413.36	0	5,599.80	81
J-56	5,415.42	0	5,599.80	80

Maximum Day: Pipe Table

Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	12.0	327	0.93	0.000
P-2	12.0	327	0.93	0.000
P-3	12.0	327	0.93	0.000
P-4	12.0	235	0.67	0.000
P-5	12.0	235	0.67	0.000
P-6	12.0	235	0.67	0.000
P-7	12.0	235	0.67	0.000
P-8	12.0	422	1.20	0.000
P-9	12.0	422	1.20	0.000
P-10	12.0	422	1.20	0.000
P-11	12.0	422	1.20	0.000
P-12	12.0	422	1.20	0.000
P-15	12.0	-512	1.45	0.001
P-16	12.0	-512	1.45	0.001
P-17	12.0	-512	1.45	0.001
P-18	12.0	-512	1.45	0.001
P-19	12.0	-512	1.45	0.001
P-20	16.0	-512	0.82	0.000
P-21	16.0	-512	0.82	0.000
P-22	16.0	-363	0.58	0.000
P-23	16.0	-363	0.58	0.000
P-24	16.0	-363	0.58	0.000
P-25	16.0	-363	0.58	0.000
P-26	16.0	-363	0.58	0.000
P-27	16.0	-606	0.97	0.000
P-28	16.0	-606	0.97	0.000
P-29	16.0	-606	0.97	0.000
P-30	12.0	92	0.26	0.000
P-31	12.0	92	0.26	0.000
P-32	12.0	-94	0.27	0.000
P-33	12.0	-94	0.27	0.000
P-34	12.0	-94	0.27	0.000
P-35	12.0	-94	0.27	0.000
P-36	12.0	-94	0.27	0.000
P-37	12.0	-243	0.69	0.000
P-38	12.0	187	0.53	0.000
P-39	12.0	187	0.53	0.000
P-40	12.0	187	0.53	0.000
P-41	12.0	187	0.53	0.000
P-42	12.0	187	0.53	0.000
P-43	12.0	187	0.53	0.000
P-44	12.0	187	0.53	0.000
P-45	12.0	187	0.53	0.000
P-46	12.0	187	0.53	0.000
P-47	12.0	148	0.42	0.000
P-48	12.0	148	0.42	0.000
P-49	12.0	148	0.42	0.000
P-50	12.0	148	0.42	0.000
P-51	12.0	148	0.42	0.000
P-52	12.0	148	0.42	0.000
P-53	12.0	0	0.00	0.000
P-54	6.0	0	0.00	0.000
P-55	6.0	0	0.00	0.000
P-56	6.0	0	0.00	0.000
P-57	8.0	933	5.96	0.012
P-58	6.0	0	0.00	0.000
P-59	6.0	0	0.00	0.000
P-60	6.0	0	0.00	0.000
P-61	6.0	0	0.00	0.000
P-62	6.0	0	0.00	0.000
P-63	6.0	0	0.00	0.000
P-64	6.0	0	0.00	0.000
P-65	6.0	0	0.00	0.000
P-66	6.0	0	0.00	0.000
P-67	6.0	0	0.00	0.000
P-68	6.0	0	0.00	0.000
P-69	6.0	0	0.00	0.000
P-70	8.0	0	0.00	0.000
P-71	8.0	0	0.00	0.000
P-72	6.0	0	0.00	0.000
P-72	8.0	0	0.00	0.000
P-73	6.0	0	0.00	0.000
P-73	6.0	0	0.00	0.000
P-74	6.0	0	0.00	0.000
P-75	6.0	0	0.00	0.000
P-76	6.0	0	0.00	0.000
P-77	6.0	0	0.00	0.000
P-78	12.0	422	1.20	0.000
P-79	8.0	0	0.00	0.000
P-80	6.0	0	0.00	0.000
P-81	6.0	0	0.00	0.000
P-82	6.0	0	0.00	0.000
P-83	6.0	0	0.00	0.000

Maximum Day with Fire Flows at H21 and H27: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	5,405.28	0	5,598.88	84
J-3	5,413.69	0	5,593.72	78
J-4	5,415.37	0	5,592.12	76
J-5	5,419.83	0	5,591.57	74
J-6	5,422.06	0	5,591.06	73
J-7	5,424.76	0	5,590.52	72
J-8	5,427.46	0	5,590.25	70
J-9	5,428.31	0	5,590.14	70
J-10	5,429.97	0	5,588.39	69
J-11	5,429.05	0	5,587.82	69
J-12	5,424.33	0	5,586.29	70
J-13	5,422.31	0	5,585.55	71
J-15	5,422.11	0	5,585.60	71
J-16	5,420.30	0	5,587.19	72
J-17	5,420.24	0	5,587.27	72
J-18	5,410.06	0	5,590.97	78
J-19	5,410.68	0	5,591.55	78
J-20	5,409.39	0	5,593.26	80
J-21	5,405.43	0	5,593.69	81
J-22	5,402.89	0	5,594.20	83
J-23	5,402.60	0	5,594.24	83
J-24	5,399.94	0	5,594.69	84
J-25	5,398.26	0	5,594.90	85
J-26	5,397.35	0	5,595.44	86
J-27	5,397.25	0	5,595.45	86
J-28	5,391.31	0	5,596.96	89
J-29	5,386.52	0	5,598.01	91
J-31	5,416.15	0	5,591.65	76
J-32	5,417.21	0	5,591.31	75
J-33	5,412.45	0	5,590.95	77
J-34	5,411.22	0	5,590.37	78
J-35	5,407.46	0	5,590.94	79
J-36	5,398.33	0	5,593.69	85
J-37	5,398.71	0	5,594.98	85
J-38	5,416.60	0	5,591.19	76
J-39	5,417.47	0	5,591.16	75
J-40	5,423.34	0	5,591.03	73
J-41	5,424.62	0	5,590.98	72
J-42	5,428.16	0	5,590.85	70
J-43	5,427.19	0	5,590.69	71
J-44	5,428.49	0	5,590.58	70
J-45	5,428.56	0	5,590.38	70
J-46	5,408.34	0	5,594.83	81
J-47	5,409.86	0	5,594.71	80
J-48	5,407.89	0	5,594.54	81
J-49	5,406.42	0	5,594.39	81
J-50	5,406.06	0	5,594.26	81
J-51	5,431.83	0	5,587.82	67
J-52	5,430.00	933	5,583.44	66
J-53	5,412.71	0	5,576.45	71
J-55	5,413.36	0	5,571.94	69
J-56	5,415.42	0	5,560.62	63

Maximum Day with Fire Flows at H21 and H27: Pipe Table

Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	12.0	2,321	6.59	0.009
P-2	12.0	2,321	6.59	0.009
P-3	12.0	2,321	6.59	0.009
P-4	12.0	866	2.46	0.001
P-5	12.0	866	2.46	0.001
P-6	12.0	866	2.46	0.001
P-7	12.0	866	2.46	0.001
P-8	12.0	1,379	3.91	0.004
P-9	12.0	1,379	3.91	0.004
P-10	12.0	1,379	3.91	0.004
P-11	12.0	1,379	3.91	0.004
P-12	12.0	1,379	3.91	0.004
P-15	12.0	-2,054	5.83	0.007
P-16	12.0	-2,054	5.83	0.007
P-17	12.0	-2,054	5.83	0.007
P-18	12.0	-2,054	5.83	0.007
P-19	12.0	-2,054	5.83	0.007
P-20	16.0	-2,054	3.28	0.002
P-21	16.0	-2,054	3.28	0.002
P-22	16.0	-1,539	2.46	0.001
P-23	16.0	-1,539	2.46	0.001
P-24	16.0	-1,539	2.46	0.001
P-25	16.0	-1,539	2.46	0.001
P-26	16.0	-1,539	2.46	0.001
P-27	16.0	-3,612	5.76	0.005
P-28	16.0	-3,612	5.76	0.005
P-29	16.0	-3,612	5.76	0.005
P-30	12.0	1,456	4.13	0.004
P-31	12.0	1,456	4.13	0.004
P-32	12.0	942	2.67	0.002
P-33	12.0	942	2.67	0.002
P-34	12.0	-1,558	4.42	0.004
P-35	12.0	-1,558	4.42	0.004
P-36	12.0	-1,558	4.42	0.004
P-37	12.0	-2,073	5.88	0.008
P-38	12.0	514	1.46	0.001
P-39	12.0	514	1.46	0.001
P-40	12.0	514	1.46	0.001
P-41	12.0	514	1.46	0.001
P-42	12.0	514	1.46	0.001
P-43	12.0	514	1.46	0.001
P-44	12.0	514	1.46	0.001
P-45	12.0	514	1.46	0.001
P-46	12.0	514	1.46	0.001
P-47	12.0	516	1.46	0.001
P-48	12.0	516	1.46	0.001
P-49	12.0	516	1.46	0.001
P-50	12.0	516	1.46	0.001
P-51	12.0	516	1.46	0.001
P-52	12.0	516	1.46	0.001
P-53	12.0	0	0.00	0.000
P-54	6.0	0	0.00	0.000
P-55	6.0	0	0.00	0.000
P-56	6.0	0	0.00	0.000
P-57	8.0	933	5.96	0.012
P-58	6.0	0	0.00	0.000
P-59	6.0	0	0.00	0.000
P-60	6.0	0	0.00	0.000
P-61	6.0	0	0.00	0.000
P-62	6.0	0	0.00	0.000
P-63	6.0	0	0.00	0.000
P-64	6.0	0	0.00	0.000
P-65	6.0	0	0.00	0.000
P-66	6.0	0	0.00	0.000
P-67	6.0	0	0.00	0.000
P-68	6.0	0	0.00	0.000
P-69	6.0	0	0.00	0.000
P-70	8.0	2,500	15.96	0.076
P-71	8.0	2,500	15.96	0.076
P-72	6.0	0	0.00	0.000
P-72	8.0	2,500	15.96	0.076
P-73	6.0	0	0.00	0.000
P-73	6.0	2,500	28.37	0.405
P-74	6.0	0	0.00	0.000
P-75	6.0	0	0.00	0.000
P-76	6.0	0	0.00	0.000
P-77	6.0	0	0.00	0.000
P-78	12.0	-1,121	3.18	0.002
P-79	8.0	2,500	15.96	0.076
P-80	6.0	0	0.00	0.000
P-81	6.0	0	0.00	0.000
P-82	6.0	0	0.00	0.000
P-83	6.0	0	0.00	0.000

Maximum Day with Fire Flows at H21 and H27: Hydrant Table

Label	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	0	5,598.88	84
H-2	0	5,591.65	76
H-3	0	5,591.57	74
H-4	0	5,591.06	72
H-5	0	5,590.14	70
H-6	0	5,588.39	69
H-7	0	5,587.82	69
H-8	0	5,587.82	67
H-9	0	5,586.29	70
H-10	0	5,587.19	70
H-11	0	5,587.27	73
H-12	0	5,590.97	79
H-13	0	5,593.69	81
H-14	0	5,594.24	83
H-15	0	5,594.39	80
H-16	0	5,594.90	85
H-17	0	5,594.71	78
H-18	0	5,594.83	79
H-19	0	5,595.44	86
H-20	0	5,598.01	92
H-21	2,500	5,542.67	55
H-22	0	5,591.16	75
H-23	0	5,590.98	72
H-24	0	5,590.85	70
H-25	0	5,590.69	70
H-26	0	5,590.38	70
H-27	2,500	5,559.08	56

Peak Hour: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	5,405.28	0	5,599.93	84
J-3	5,413.69	0	5,599.60	80
J-4	5,415.37	0	5,599.50	80
J-5	5,419.83	0	5,599.38	78
J-6	5,422.06	0	5,599.27	77
J-7	5,424.76	0	5,599.15	75
J-8	5,427.46	0	5,599.09	74
J-9	5,428.31	0	5,599.06	74
J-10	5,429.97	0	5,598.59	73
J-11	5,429.05	0	5,598.44	73
J-12	5,424.33	0	5,598.03	75
J-13	5,422.31	0	5,597.83	76
J-15	5,422.11	0	5,597.81	76
J-16	5,420.30	0	5,598.10	77
J-17	5,420.24	0	5,598.12	77
J-18	5,410.06	0	5,598.80	82
J-19	5,410.68	0	5,598.90	81
J-20	5,409.39	0	5,599.22	82
J-21	5,405.43	0	5,599.30	84
J-22	5,402.89	0	5,599.39	85
J-23	5,402.60	0	5,599.40	85
J-24	5,399.94	0	5,599.47	86
J-25	5,398.26	0	5,599.51	87
J-26	5,397.35	0	5,599.60	88
J-27	5,397.25	0	5,599.60	88
J-28	5,391.31	0	5,599.73	90
J-29	5,386.52	0	5,599.82	92
J-31	5,416.15	0	5,599.49	79
J-32	5,417.21	0	5,599.48	79
J-33	5,412.45	0	5,599.50	81
J-34	5,411.22	0	5,599.52	81
J-35	5,407.46	0	5,599.52	83
J-36	5,398.33	0	5,599.56	87
J-37	5,398.71	0	5,599.58	87
J-38	5,416.60	0	5,599.44	79
J-39	5,417.47	0	5,599.43	79
J-40	5,423.34	0	5,599.38	76
J-41	5,424.62	0	5,599.36	76
J-42	5,428.16	0	5,599.32	74
J-43	5,427.19	0	5,599.25	74
J-44	5,428.49	0	5,599.21	74
J-45	5,428.56	0	5,599.14	74
J-46	5,408.34	0	5,599.54	83
J-47	5,409.86	0	5,599.51	82
J-48	5,407.89	0	5,599.47	83
J-49	5,406.42	0	5,599.44	84
J-50	5,406.06	0	5,599.41	84
J-51	5,431.83	0	5,598.44	72
J-52	5,430.00	1,500	5,592.62	70
J-53	5,412.71	0	5,599.52	81
J-55	5,413.36	0	5,599.52	81
J-56	5,415.42	0	5,599.52	80

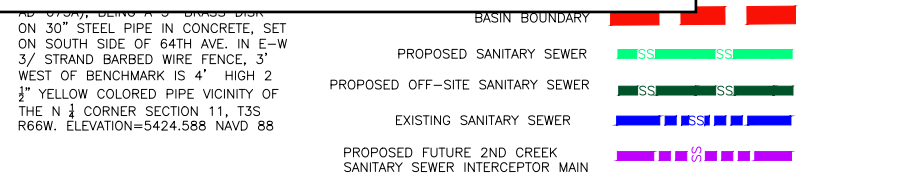
Peak Hour: Pipe Table

Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	12.0	526	1.49	0.001
P-2	12.0	526	1.49	0.001
P-3	12.0	526	1.49	0.001
P-4	12.0	378	1.07	0.000
P-5	12.0	378	1.07	0.000
P-6	12.0	378	1.07	0.000
P-7	12.0	378	1.07	0.000
P-8	12.0	678	1.92	0.001
P-9	12.0	678	1.92	0.001
P-10	12.0	678	1.92	0.001
P-11	12.0	678	1.92	0.001
P-12	12.0	678	1.92	0.001
P-15	12.0	-822	2.33	0.001
P-16	12.0	-822	2.33	0.001
P-17	12.0	-822	2.33	0.001
P-18	12.0	-822	2.33	0.001
P-19	12.0	-822	2.33	0.001
P-20	16.0	-822	1.31	0.000
P-21	16.0	-822	1.31	0.000
P-22	16.0	-584	0.93	0.000
P-23	16.0	-584	0.93	0.000
P-24	16.0	-584	0.93	0.000
P-25	16.0	-584	0.93	0.000
P-26	16.0	-584	0.93	0.000
P-27	16.0	-974	1.55	0.000
P-28	16.0	-974	1.55	0.000
P-29	16.0	-974	1.55	0.000
P-30	12.0	149	0.42	0.000
P-31	12.0	149	0.42	0.000
P-32	12.0	-152	0.43	0.000
P-33	12.0	-152	0.43	0.000
P-34	12.0	-152	0.43	0.000
P-35	12.0	-152	0.43	0.000
P-36	12.0	-152	0.43	0.000
P-37	12.0	-390	1.11	0.000
P-38	12.0	300	0.85	0.000
P-39	12.0	300	0.85	0.000
P-40	12.0	300	0.85	0.000
P-41	12.0	300	0.85	0.000
P-42	12.0	300	0.85	0.000
P-43	12.0	300	0.85	0.000
P-44	12.0	300	0.85	0.000
P-45	12.0	300	0.85	0.000
P-46	12.0	300	0.85	0.000
P-47	12.0	238	0.68	0.000
P-48	12.0	238	0.68	0.000
P-49	12.0	238	0.68	0.000
P-50	12.0	238	0.68	0.000
P-51	12.0	238	0.68	0.000
P-52	12.0	238	0.68	0.000
P-53	12.0	0	0.00	0.000
P-54	6.0	0	0.00	0.000
P-55	6.0	0	0.00	0.000
P-56	6.0	0	0.00	0.000
P-57	8.0	1,500	9.57	0.030
P-58	6.0	0	0.00	0.000
P-59	6.0	0	0.00	0.000
P-60	6.0	0	0.00	0.000
P-61	6.0	0	0.00	0.000
P-62	6.0	0	0.00	0.000
P-63	6.0	0	0.00	0.000
P-64	6.0	0	0.00	0.000
P-65	6.0	0	0.00	0.000
P-66	6.0	0	0.00	0.000
P-67	6.0	0	0.00	0.000
P-68	6.0	0	0.00	0.000
P-69	6.0	0	0.00	0.000
P-70	8.0	0	0.00	0.000
P-71	8.0	0	0.00	0.000
P-72	6.0	0	0.00	0.000
P-72	8.0	0	0.00	0.000
P-73	6.0	0	0.00	0.000
P-73	6.0	0	0.00	0.000
P-74	6.0	0	0.00	0.000
P-75	6.0	0	0.00	0.000
P-76	6.0	0	0.00	0.000
P-77	6.0	0	0.00	0.000
P-78	12.0	678	1.92	0.001
P-79	8.0	0	0.00	0.000
P-80	6.0	0	0.00	0.000
P-81	6.0	0	0.00	0.000
P-82	6.0	0	0.00	0.000
P-83	6.0	0	0.00	0.000

# Sanitary Sewer System Calculations

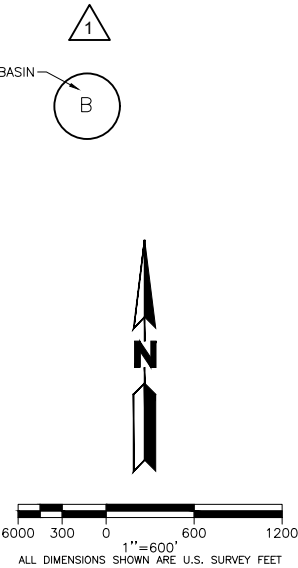


For reference only. Approved sheet from High Point at DIA - FDP Amendment No. 4 - Master Utility Study Amendment (EDN #220127)



NOTES:

- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- IF THE OFF-SITE SANITARY SEWER SYSTEM INFRASTRUCTURE HAS NOT YET BEEN INSTALLED, THE DEVELOPING PLANNING AREA WILL BE RESPONSIBLE FOR BUILDING THE NECESSARY OFF-SITE SANITARY SEWER REQUIRED TO SUPPORT THE PLANNING AREA. THE PLANNING AREA DEVELOPMENT SHALL WORK WITH THE CITY OF AURORA DURING THE CSP PROCESS TO DETERMINE THE BEST OPTION FOR CONNECTING TO THE CITY'S EXISTING SANITARY SEWER SYSTEM, BY EXTENDING THE EXISTING SANITARY SEWER SYSTEM, UPDATING THE ROUTING AND DESIGN POINTS DESCRIBED IN THIS REPORT, PERFORM SIGNIFICANT OVER LOT GRADING, UTILIZE LIFT STATIONS AND FORCES MAINS, ETC. THE PROPOSED SANITARY INFRASTRUCTURE MAY NEED TO BE EXTENDED INTO EACH PROPOSED BASIN TO ROUTE PROPOSED FLOWS FROM INDIVIDUAL PLANNING AREAS TO THE DESIGN POINTS DESCRIBED IN THIS REPORT. THIS REPORT, THE DESIGN POINT LOCATIONS, OR THE ROUTING CAN BE UPDATED OR AMENDED IF NECESSARY, TO SUPPORT THE SANITARY NEEDS FOR PLANNING AREAS DETERMINED IN THE FUTURE.
- DASHED CONNECTION FROM DP 15 TO DP 20 UTILIZED FOR INTERIM CONDITION AND INITIAL BUILD OUT UNTIL THE 2ND CREEK INTERCEPTOR IS CONSTRUCTED AND ONLINE. INITIAL DEVELOPMENT CAN UTILIZE INTERIM CONNECTION UNTIL CAPACITY OF PIPE DOWNSTREAM OF DP 20 IS EXCEEDED.



BASIN A SUMMARY TABLE:

From Design Point:	To Design Point:	Peak Flow + Infiltration (MGD)	Peak Flow + Infiltration (cfs)	Required Pipe Size for min slope (in)	Min Pipe Slope (%)	Pipe Percent Full**
DP-6	DP-7	0.414	0.641	12	0.40	33.4%
DP-7	DP-8	1.370	2.119	15	0.40	46.2%
DP-8	DP-9	1.822	2.819	15	0.40	54.9%
DP-9	DP-10	1.915	2.963	15	0.40	56.6%
DP-10	DP-12	2.904	4.493	15	0.40	76.3%
DP-11	DP-12	0.849	1.313	12	0.40	49.5%
DP-12	DP-13	3.493	5.403	15	0.60	75.1%
DP-13	DP-14	3.699	5.722	15	0.60	79.2%
DP-14	LIFT STAT	4.081	6.314	15	0.70	80.8%
DP-2	DP-3	0.304	0.471	12	0.40	28.4%
DP-3	DP-4	0.598	0.925	12	0.40	40.8%
DP-1	DP-5	0.537	0.831	8	0.40	74.7%
DP-4	DP-5	0.780	1.207	12	0.40	47.1%
DP-5	LIFT STAT	1.264	1.955	12	0.40	61.3%

- 1 OS-2 which is DP-20 from Avelon Development MUS prepared by Dewberry/J3 dated 8/9/2019 0.101 MGD & 1,483 population for 0.64 cfs
- 2 RV4 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.15 MGD & 25.8 acres of 22 equivalent population per acre (568) plus 800 units at 2.77 people per unit (2216) = (2784 population)
- 3 RV3 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.03 MGD & 19.3 acres of 22 equivalent population per acre (425 population)
- 4 OS-1 from Painted Prairie MUS, prepared by CVL approved 04/13/2020 design points A, F, & I 1.53 CFS
- 5 RV2 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.21 MGD & 1500 units at 2.77 people per unit (4155 population)
- 6 RV1 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.14 MGD & 600 units at 2.77 people per unit (1662) plus 36.1 acres of 22 equivalent populations per acre (795) = (2457 population)
- \*\*Pipes exceeding 80% full were designed to previous City of Aurora Criteria for pipes which was 90% full for pipes larger than 12". Also these lines were constructed at greater than the minimum slope to increase capacity and Painted Prairie MUS comment from COA that proposed 15" parallel line to be constructed.

BASIN B SUMMARY TABLE:

From Design Point:	To Design Point:	Peak Flow + Infiltration (MGD)	Peak Flow + Infiltration (cfs)	Required Pipe Size at min slope (in)	Min Pipe Slope (%)	Pipe Percent Full
DP-24	DP-22	0.35	0.54	12	0.40	30.5
DP-23	DP-22	0.68	1.05	12	0.40	43.7
DP-22	DP-15	1.03	1.59	12	0.40	55.7
DP-16	DP-17	4.10	6.34	21	0.40	52.1
DP-17	DP-19	4.22	6.54	21	0.40	53.1
DP-18	DP-19	0.51	0.79	12	0.40	41.2
DP-15	DP-20	1.72	2.66	15	0.40	53
DP-19	DP-20	4.55	7.04	21	0.40	55.5
DP-20	DP-25	5.97	9.24	12	0.40	16.6
DP-26	DP-25	0.10	0.16	21	0.40	68
DP-25	DP-21	6.16	9.54	21	0.00	68

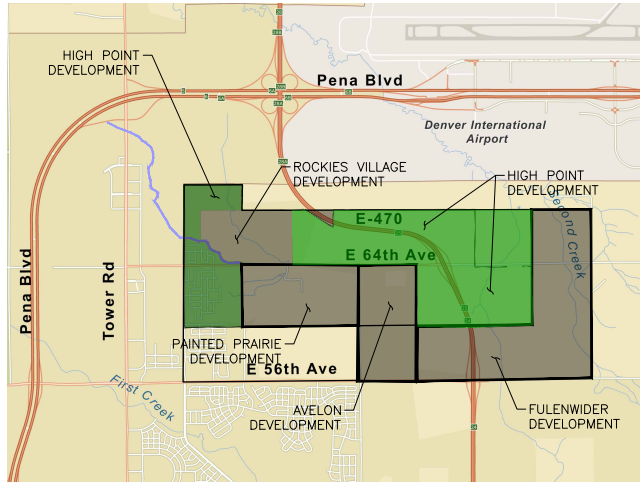
- 1 Offsite from Fulemwidder MUS prepared by Martin/Martin Inc. dated 05/2020 currently under COA Review: Node Q-5.813 CFS
- 2 Offsite from Avelon Development MUS prepared by Dewberry/J3 dated 8/9/2019 currently under COA Review: DP-19 0.362 MGD & 5,327 Population
- 3 Offsite from 310 West Development MUS prepared by Calibre Engineering Inc. dated 10/2017 currently under COA Review: DP-1 0.444 MGD & 5,928 Population

CITY OF AURORA APPROVAL BLOCK

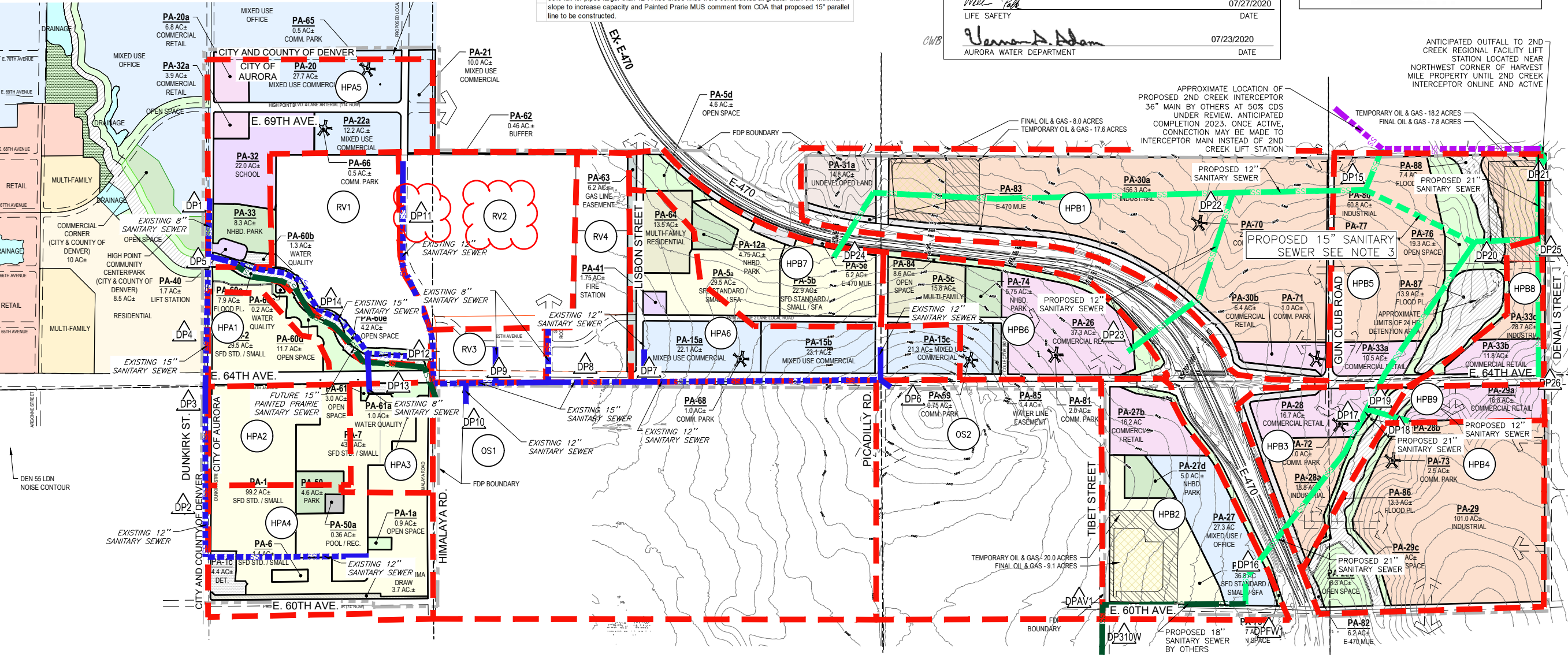
CITY ENGINEER	DATE
<i>Will P...</i>	07/27/2020
LIFE SAFETY	DATE
<i>Vernon A. Adam</i>	07/23/2020
AURORA WATER DEPARTMENT	DATE

FACSIMILE  
THIS ELECTRONIC PLAN IS A FACSIMILE  
OF THE SIGNED AND SEALED PDF PLAN

(PE SIGNATURE) DATE 05/11/2020  
PATRICK F. HORN  
(PRINTED NAME)



VICINITY MAP  
1"=4000'



# Sanitary Sewer Demands

BASIN CHARACTERISTICS					RESIDENTIAL				NON-RESIDENTIAL	TOTAL	
BASIN	DESIGN POINT	PLANNING AREA	LAND USE	AREA (ACRES)	GROSS DENSITY UNITS PER ACRE	NO. UNITS	AVERAGE DAILY FLOW PER UNIT (gpd)	AVERAGE FLOW (gpd)	AVERAGE DAILY FLOW PER ACRE	AVERAGE FLOW (gpd)	TOTAL AVERAGE SEWAGE FLOW (gpd)
HPA-6 <sup>(1)</sup>	DP-7	PA-5	SFD <sup>(2)</sup>	60.8	5	304	217.6	66150.40	1500	73500	
		PA-15	SFD	9.5	5	48	217.6	10336.00			
		PA-25	OFF/MU	49							
		PA-26 (part)	OFF/MU	5							
		PA-41	FIRE STA	1.75							
TOTAL				126.05	76486.40			81000.00		157486.40	
HPA-3	DP-13	PA-1	SFD	14.8	5	74	217.6	16102.40			
		PA-7	SFD	17.72	5	89	217.6	19279.36			
TOTAL				32.52	35381.76					35381.76	
RV-1	DP-14	PA-1	OFF/MU	18					1500	27000	
		PA-3	COM/RET	18.1							
		PA-2	MF <sup>(3)</sup>	33.3							
TOTAL				69.4	85680.00			54150.00		139830.00	
RV-2	DP-11	HOTEL	HOTEL <sup>(4)</sup>	80.4	1500 140 210000.00			210000			
TOTAL				80.4				210000.00		210000.00	
RV-3	DP-9	PA-4	COM/RET	19.3				1500	28950		
		TOTAL			19.3	28950.00					28950.00
RV-4	DP-8	PA-5	COM/RET	13.5		800	140	112000.00	1500	20250	
		PA-6	HOTEL/MU	14							
		PA-7	OFF/MU	12.3							
TOTAL				39.8	112000.00			38700.00		150700.00	
OS-1 <sup>(5)</sup>	DP-10			176				204192			
		TOTAL		176				204192.00		204192.00	
OS-2	DP-6			53				1500	79500		
		TOTAL		53							79500.00

1. HPA-6 part of High Point at DIA Master Utility Study  
2. Based on 68 gallons per capita per day, 3.2 people per SFD residence  
3. Based on 68 gallons per capita per day, 2.1 people per unit  
4. Based on 140 gallons per day per room (Southgate)  
5. Painted Prairie Master Utility Study, COA #207016, 2/2007

**HIGH POINT  
SANITARY SEWER PEAK FLOW CALCULATIONS  
BASIN A ROUTING**

Design Point	Basins Added to System	Total Avg. Daily Flow @ Node (MGD)	Total Upstream Population	Peaking Factor = $5/p^{0.167}$	Peak Flow (MGD)	Infiltration (MGD)	Peak Flow + Infiltration (MGD)	Peak Flow + Infiltration (cfs)
DP-1	HP-A5	0.131	2,023	4.00	0.524	0.013	0.537	0.831
DP-2	HP-A4	0.074	1,092	4.00	0.297	0.007	0.304	0.471
DP-3	DP-2 + HP-A2	0.146	2,144	4.00	0.583	0.015	0.598	0.925
DP-4	DP-3 + HP-A1	0.190	2,798	4.00	0.761	0.019	0.780	1.207
DP-5	DP-1 + DP-2 + DP-3 + DP-4	0.321	4,821	3.84	1.235	0.032	1.268	1.961
1 DP-6	OS-2	0.101	1,483	4.00	0.404	0.010	0.414	0.641
DP-7	DP-6 + HP-A6	0.351	5,156	3.80	1.334	0.035	1.369	2.119
2 DP-8	DP-7 + RV4	0.501	7,940	3.54	1.772	0.050	1.822	2.819
3 DP-9	DP-8 + RV3	0.531	8,365	3.51	1.862	0.053	1.915	2.963
4 DP-10	DP-9 + OS1	0.531	8,365	3.51	1.862	0.053	1.915	4.493
5 DP-11	RV2	0.210	4,155	3.94	0.828	0.021	0.849	1.313
DP-12	DP-10 + DP-11	0.741	12,520	3.28	2.429	0.074	2.503	5.403
DP-13	DP-12 + HP-A3	0.813	13,573	3.23	2.628	0.081	2.709	5.722
6 DP-14	DP-13 + RV1	0.953	16,030	3.15	2.997	0.095	3.092	6.314

1 OS-2 which is DP-20 from Avelon Development MUS prepared by Dewberry/J3 dated 8/9/2019 0.101 MGD & 1,483 population for 0.64 cfs

2 RV4 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.15 MGD & 25.8 acres of 22 equivalent population per acre (568) plus 800 units at 2.77 people per unit (2216) = (2784 population)

3 RV3 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.03 MGD & 19.3 acres of 22 equivalent population per acre (425 population)

4 OS-1 from Painted Prairie MUS, prepared by CVL approved 04/13/2020 design points A, F, & I 1.53 CFS

5 RV2 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.21 MGD & 1500 units at 2.77 people per unit (4155 population)

6 RV1 from Rockies Village MUS prepared by J3 dated 02/03/2017, COA #21702 - 0.14 MGD & 600 units at 2.77 people per unit (1662) plus 36.1 acres of 22 equivalent populations per acre (795) = (2457 population)



BASIN CHARACTERISTICS					RESIDENTIAL				NON-RESIDENTIAL		TOTAL
BASIN	DESIGN POINT	PLANNING AREA	LAND USE	AREA (ACRES)	GROSS DENSITY UNITS PER ACRE	NO. UNITS	AVERAGE DAILY FLOW PER UNIT (gpd)	AVERAGE FLOW (gpd)	AVERAGE DAILY FLOW PER ACRE	AVERAGE FLOW (gpd)	TOTAL AVERAGE SEWAGE FLOW (gpd)
HPA-1	DP-4	PA-2 <sup>(1)</sup>	SFD <sup>(2)</sup>	29.5		95	217.6	20672.00			
			<b>TOTAL</b>	29.5				20672.00			20672.00
HPA-2	DP-3	PA-1 <sup>(1)</sup>	SFD	18.07		72	217.6	15667.20			
		PA-7 <sup>(1)</sup>	SFD	13.68		55	217.6	11968.00			
		<b>TOTAL</b>		31.75				27635.20			27635.20
HPA-3	DP-13	PA-1	SFD	14.8	8	118	188.36	22301.82			
		PA-7	SFD	17.72	8	142	188.36	26701.91			
		<b>TOTAL</b>		32.52				49003.74			49003.74
HPA-4	DP-2	PA-1	SFD	65.63	5	328	217.6	71405.44			
		PA-6	SFD	1.4	5	7	217.6	1523.20			
		PA-7	SFD	10.5	5	53	217.6	11424.00			
		PA-50a	POOL	1					1500	1500	
		<b>TOTAL</b>		78.53				84352.64		1500.00	85852.64
HPA-5	DP-1	PA-32	SCHOOL <sup>(3)</sup>	6.9						11265	
		PA-20	OFF/RETAIL	27.9					1500	41850	
		PA-21	OFF/RETAIL	15.8					1500	23700	
		PA-22	OFF/RETAIL	32.1					1500	48150	
		<b>TOTAL</b>		6.9						124965.00	124965.00
HPA-6 (7)	DP-7	PA-5a	RESIDENTIAL	9.74	8	78	188.36	14669.48			
		PA-15a	RES/COMM	22	30	165	188.36	31079.40	1500	33000	
		PA-15b	RES/COMM	23.1	30	173	188.36	32633.37	1500	33150	
		PA-15c	RES/COMM	14.06	30	105	188.36	19859.74	1500	21087	
		PA-41	FIRE STA	1.75		0			1200	2100	
		PA-64	RESIDENTIAL	10.8	30	324	188.36	61028.64			
		PA-68	PARK	1		0			1200	1200	
		<b>TOTAL</b>		82.443				159270.62		90537.00	249807.62
RV-1	DP-14	PA-1	OFF/MU	18					1500	27000	
		PA-2	COM/RET	18.1					1500	27150	
		PA-3	MF <sup>(4)</sup>	33.3	600	142.8	85680.00				
		<b>TOTAL</b>		69.4				85680.00		54150.00	139830.00
RV-2	DP-11	HOTEL	HOTEL <sup>(5)</sup>	80.4		1978	140	276920.00		276920	
		<b>TOTAL</b>		80.4						276920.00	276920.00
RV-3	DP-9	PA-4	COM/RET	19.3					1500	28950	
		<b>TOTAL</b>		19.3						28950.00	28950.00
RV-4	DP-8	PA-5	COM/RET	13.5					1500	20250	
		PA-6	HOTEL/MU	14							
		PA-7	OFF/MU	12.3	800		188.36	150688.00	1500	18450	
		<b>TOTAL</b>		39.8				150688.00		38700.00	189388.00
HPB-1	DP-15	PA-30	OFF/MU	114.7					1500	172050	
		PA-31	OFF	69.7					1500	104550	
		<b>TOTAL</b>		184.4						276600.00	276600.00
HPB-2	DP-16	PA-27	OFF/MU	29.7					1500	44550	
		PA-27A	SFD	40.2	5	201	217.6	43737.60			
		PA-27B	COM/RET	20.8					1500	31200	
		<b>TOTAL</b>		90.7				43737.60		75750.00	119487.60
HPB-3	DP-17	PA-28	OFF/MU	27					1500	40500	
		PA-29	OFF/MU	18.9					1500	28350	
		<b>TOTAL</b>		45.9						68850.00	68850.00
HPB-4	DP-18	PA-28	OFF/MU	77.3					1500	115950	
		PA-29	OFF/MU	44					1500	66000	
		<b>TOTAL</b>		121.3						181950.00	181950.00
HPB-5	DP-21	PA-26	OFF/MU	80.4					1500	120600	
		<b>TOTAL</b>		80.4						120600.00	120600.00
OS-1 <sup>(6)</sup>	DP-10			176						242000	
		<b>TOTAL</b>		176						242000.00	242000.00
OS-2(7)	DP-6		COM/RET	14.1		423	188.36	79676.28	1500	21150	
		<b>TOTAL</b>	RESIDENTIAL	53				79676.28		21150.00	100826.28

Number of units for RV-2 has been increased to reflect the updates proposed with this project.

Average daily flow per unit for PA-6 changed to 188.36 gpd (68gpd \* 2.77 people) instead of 140 gpd to obtain a more conversation estimate for the usage of PA-6.

Average daily flow and equivalent population determined by peak design flow of 1.53cfs from Painted Prairie MUS

1. Number of units from approved site plan
2. Based on 68 gallons per capita per day, 3.2 people per SFD residence
3. Based on a capacity of 751 units at 15 gpd/student
4. Based on 68 gallons per capita per day, 2.1 people per unit
5. Based on 140 gallons per Day per room (Southgate)
6. Painted Prairie Master Utility Study, EDN #220095, 2/2020
7. Based on Avelon MUS (8/9/2019)

# Basin A Routing

Design Point	Basin(s)	Average Daily Flow (gpd)	Cumulative Equivalent Pop <sup>(1)</sup>	Peak Factor	Peak Flow (gpd)	Inflow and Infiltration (gpd)	Design Flow (gpd)	Design Flow (mgd)	Design Flow (cfs)	Req'd Pipe Diameter (in)
DP-1	HPA-5	124965.00								
<b>Total</b>		<b>124965.00</b>	<b>1837.72</b>	<b>4.00</b>	<b>499860.00</b>	<b>12496.50</b>	<b>512356.50</b>	<b>0.51</b>	<b>0.79</b>	<b>8.00</b>

Design Point	Basin(s)	Average Daily Flow (gpd)	Cumulative Equivalent Pop	Peak Factor	Peak Flow (gpd)	Inflow and Infiltration (gpd)	Design Flow (gpd)	Design Flow (mgd)	Design Flow (cfs)	Req'd Pipe Diameter (in)
DP-2	HPA-4	85852.64								
<b>Total</b>		<b>85852.64</b>	<b>1262.54</b>	<b>4.00</b>	<b>343410.56</b>	<b>8585.26</b>	<b>351995.82</b>	<b>0.35</b>	<b>0.54</b>	<b>8.00</b>
DP-3	HPA-4	85852.64								
	HPA-2	27635.20								
<b>Total</b>		<b>113487.84</b>	<b>1668.94</b>	<b>4.00</b>	<b>453951.36</b>	<b>11348.78</b>	<b>465300.14</b>	<b>0.47</b>	<b>0.72</b>	<b>8.00</b>
DP-4	HPA-4	85852.64								
	HPA-2	27635.20								
	HPA-1	20672.00								
<b>Total</b>		<b>134159.84</b>	<b>1972.94</b>	<b>4.00</b>	<b>536639.36</b>	<b>13415.98</b>	<b>550055.34</b>	<b>0.55</b>	<b>0.85</b>	<b>12.00</b>
DP-5	HPA-5	124965.00								
	HPA-4	85852.64								
	HPA-2	27635.20								
	HPA-1	20672.00								
<b>Total</b>		<b>259124.84</b>	<b>3810.66</b>	<b>4.00</b>	<b>1036220.14</b>	<b>25912.48</b>	<b>1062132.62</b>	<b>1.06</b>	<b>1.64</b>	<b>12.00</b>

Design Point	Basin(s)	Average Daily Flow (gpd)	Cumulative Equivalent Pop	Peak Factor	Peak Flow (gpd)	Inflow and Infiltration (gpd)	Design Flow (gpd)	Design Flow (mgd)	Design Flow (cfs)	Req'd Pipe Diameter (in)
DP-6	OS-2	100826.28								
<b>Total</b>		<b>100826.28</b>	<b>1482.74</b>	<b>4.00</b>	<b>403305.12</b>	<b>10082.63</b>	<b>413387.75</b>	<b>0.41</b>	<b>0.64</b>	<b>12.00</b>
DP-7	OS-2	100826.28								
	HPA-6	249807.62								
<b>Total</b>		<b>350633.90</b>	<b>5156.38</b>	<b>3.80</b>	<b>1333098.68</b>	<b>35063.39</b>	<b>1368162.07</b>	<b>1.37</b>	<b>2.12</b>	<b>12.00</b>
DP-8	OS-2	100826.28								
	HPA-6	249807.62								
	RV-4	189388.00								
<b>Total</b>		<b>540021.90</b>	<b>7941.50</b>	<b>3.54</b>	<b>1910282.81</b>	<b>54002.19</b>	<b>1964285.00</b>	<b>1.96</b>	<b>3.04</b>	<b>15.00</b>
DP-9	OS-2	100826.28								
	HPA-6	249807.62								
	RV-4	189388.00								
	RV-3	28950.00								
<b>Total</b>		<b>568971.90</b>	<b>8367.23</b>	<b>3.51</b>	<b>1995214.75</b>	<b>56897.19</b>	<b>2052111.94</b>	<b>2.05</b>	<b>3.18</b>	<b>15.00</b>
DP-10	OS-2	100826.28								
	HPA-6	249807.62								
	RV-4	189388.00								
	RV-3	28950.00								
	OS-1	242000.00								
<b>Total</b>		<b>810971.90</b>	<b>11926.06</b>	<b>3.31</b>	<b>2680407.54</b>	<b>81097.19</b>	<b>2761504.73</b>	<b>2.76</b>	<b>4.27</b>	<b>15.00</b>

Design Point	Basin(s)	Average Daily Flow (gpd)	Cumulative Equivalent Pop	Peak Factor	Peak Flow (gpd)	Inflow and Infiltration (gpd)	Design Flow (gpd)	Design Flow (mgd)	Design Flow (cfs)	Req'd Pipe Diameter (in)
DP-11	RV-2	276920.00								
<b>Total</b>		<b>276920.00</b>	<b>4072.35</b>	<b>3.95</b>	<b>1095166.48</b>	<b>27692.00</b>	<b>1122858.48</b>	<b>1.12</b>	<b>1.74</b>	<b>12.00</b>
DP-12	OS-2	100826.28								
	HPA-6	249807.62								
	RV-4	189388.00								
	RV-3	28950.00								
	OS-1	242000.00								
	RV-2	276920.00								
<b>Total</b>		<b>1087891.90</b>	<b>15998.41</b>	<b>3.15</b>	<b>3423536.15</b>	<b>108789.19</b>	<b>3532325.34</b>	<b>3.53</b>	<b>5.47</b>	<b>15.00</b>
DP-13	OS-2	100826.28								
	HPA-6	249807.62								
	RV-4	189388.00								
	RV-3	28950.00								
	OS-1	242000.00								
	RV-2	276920.00								
	HPA-3	49003.74								
<b>Total</b>		<b>1136895.64</b>	<b>16719.05</b>	<b>3.12</b>	<b>3551519.91</b>	<b>113689.56</b>	<b>3665209.47</b>	<b>3.67</b>	<b>5.67</b>	<b>15.00</b>
DP-14	OS-2	100826.28								
	HPA-6	249807.62								
	RV-4	189388.00								
	RV-3	28950.00								
	OS-1	242000.00								
	RV-2	276920.00								
	HPA-3	49003.74								
	RV-1	139830.00								
<b>Total</b>		<b>1276725.64</b>	<b>18775.38</b>	<b>3.06</b>	<b>3911814.73</b>	<b>127672.56</b>	<b>4039487.29</b>	<b>4.04</b>	<b>6.25</b>	<b>15.00</b>

## DP11 Capacity

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.004 ft/ft
Diameter	12.0 in
Discharge	1.74 cfs
Results	
Normal Depth	7.1 in
Flow Area	0.5 ft <sup>2</sup>
Wetted Perimeter	1.8 ft
Hydraulic Radius	3.3 in
Top Width	0.98 ft
Critical Depth	6.7 in
Percent Full	58.9 %
Critical Slope	0.005 ft/ft
Velocity	3.61 ft/s
Velocity Head	0.20 ft
Specific Energy	0.79 ft
Froude Number	0.911
Maximum Discharge	2.86 cfs
Discharge Full	2.66 cfs
Slope Full	0.002 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	7.1 in
Critical Depth	6.7 in
Channel Slope	0.004 ft/ft
Critical Slope	0.005 ft/ft

## DP12 Capacity

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.006 ft/ft
Diameter	15.0 in
Discharge	5.47 cfs
Results	
Normal Depth	11.4 in
Flow Area	1.0 ft <sup>2</sup>
Wetted Perimeter	2.6 ft
Hydraulic Radius	4.5 in
Top Width	1.07 ft
Critical Depth	11.4 in
Percent Full	75.9 %
Critical Slope	0.006 ft/ft
Velocity	5.47 ft/s
Velocity Head	0.47 ft
Specific Energy	1.41 ft
Froude Number	0.997
Maximum Discharge	6.36 cfs
Discharge Full	5.91 cfs
Slope Full	0.005 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	73.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.4 in
Critical Depth	11.4 in
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft

## DP13 Capacity

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.006 ft/ft
Diameter	15.0 in
Discharge	5.67 cfs
Results	
Normal Depth	11.8 in
Flow Area	1.0 ft <sup>2</sup>
Wetted Perimeter	2.7 ft
Hydraulic Radius	4.6 in
Top Width	1.03 ft
Critical Depth	11.6 in
Percent Full	78.5 %
Critical Slope	0.006 ft/ft
Velocity	5.49 ft/s
Velocity Head	0.47 ft
Specific Energy	1.45 ft
Froude Number	0.964
Maximum Discharge	6.36 cfs
Discharge Full	5.91 cfs
Slope Full	0.006 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	22.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.8 in
Critical Depth	11.6 in
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft



## DP14 Capacity

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.007 ft/ft
Diameter	15.0 in
Discharge	6.25 cfs
Results	
Normal Depth	12.0 in
Flow Area	1.1 ft <sup>2</sup>
Wetted Perimeter	2.8 ft
Hydraulic Radius	4.6 in
Top Width	1.00 ft
Critical Depth	12.1 in
Percent Full	80.1 %
Critical Slope	0.007 ft/ft
Velocity	5.93 ft/s
Velocity Head	0.55 ft
Specific Energy	1.55 ft
Froude Number	1.018
Maximum Discharge	6.87 cfs
Discharge Full	6.39 cfs
Slope Full	0.007 ft/ft
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	80.1 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	12.0 in
Critical Depth	12.1 in
Channel Slope	0.007 ft/ft
Critical Slope	0.007 ft/ft