Project No: 221-10826-00

August 29, 2023

Anthony Girolami
Fengate Asset Management
2275 Upper Middle Road East, Unit 700
Oakville, ON L6H 0C3

Subject: 3054 Homestead Drive Development – Watermain Hydraulic Analysis

Dear Mr. Girolami,

WSP Canada Inc. (WSP) is pleased to present the updated results of the watermain hydraulic analysis for the proposed 3054 Homestead Drive development in the City of Hamilton. This analysis addresses the City's comments dated May 17, 2023, and reflects the most up-to-date water servicing plan for the development.

The analysis in this report includes hydraulic simulation of the Average Day, Maximum Day, Maximum Day plus Fire Flow and the Peak Hour demand scenarios at the proposed development for 2021 (present) and 2031 (future) planning horizons. The hydraulic analysis was completed using a WaterGEMS model of the Hamilton water distribution network for Pressure District (PD) 6, and the existing PD6 demands were updated in June 2023 to reflect the ongoing Master Plan.

The modelling shows that the development can achieve the pressure requirements prescribed by the City of Hamilton, the Ministry of the Environment, Conservation and Parks (MECP) watermain design criteria and the Ontario Building Code (OBC) Compendium under all conditions. WSP conducted baseline analyses without the proposed development to examine the impact on the existing network capacity to deliver fire flow. If any changes or discrepancies are contemplated with the final design plan, the analysis in this report should be updated with the required fire flows.

If you have any questions, please do not hesitate to call.

Yours truly,

WSP Canada Inc.

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# 1 INTRODUCTION

The 3054 Homestead Drive development will be located at the northwest corner of Homestead Drive and Airport Road and at 9174&9166 Airport Road West in the City of Hamilton, Ontario. The purpose of this report is to complete the water servicing analysis for the proposed development, consisting of 4 industrial buildings.

The proposed development is located within Pressures District 6 (PD6) of the City of Hamilton water distribution network and will be built in two phases. Building D will be built as part of Phase 1 while Building A, B, and C will be built as part of Phase 2. The Phase 1 development will be serviced by a 300mm connection to the existing 400mm watermain along Airport Road to the south. The ultimate buildout of the development will be serviced by the proposed 300mm network with two connections to the existing 400mm watermains on Airport Road and Homestead Drive. Alternatively, the 300mm network will tie into the future Rice Group development to the north and eventually connect to the existing 400mm watermain on Homestead Dr (Option 2). Figure 1-1 and Figure 1-2 show the two concept site plans of the proposed development.

The proposed water servicing system layout, including the proposed pipe diameters, can be found in Appendix A of the report.

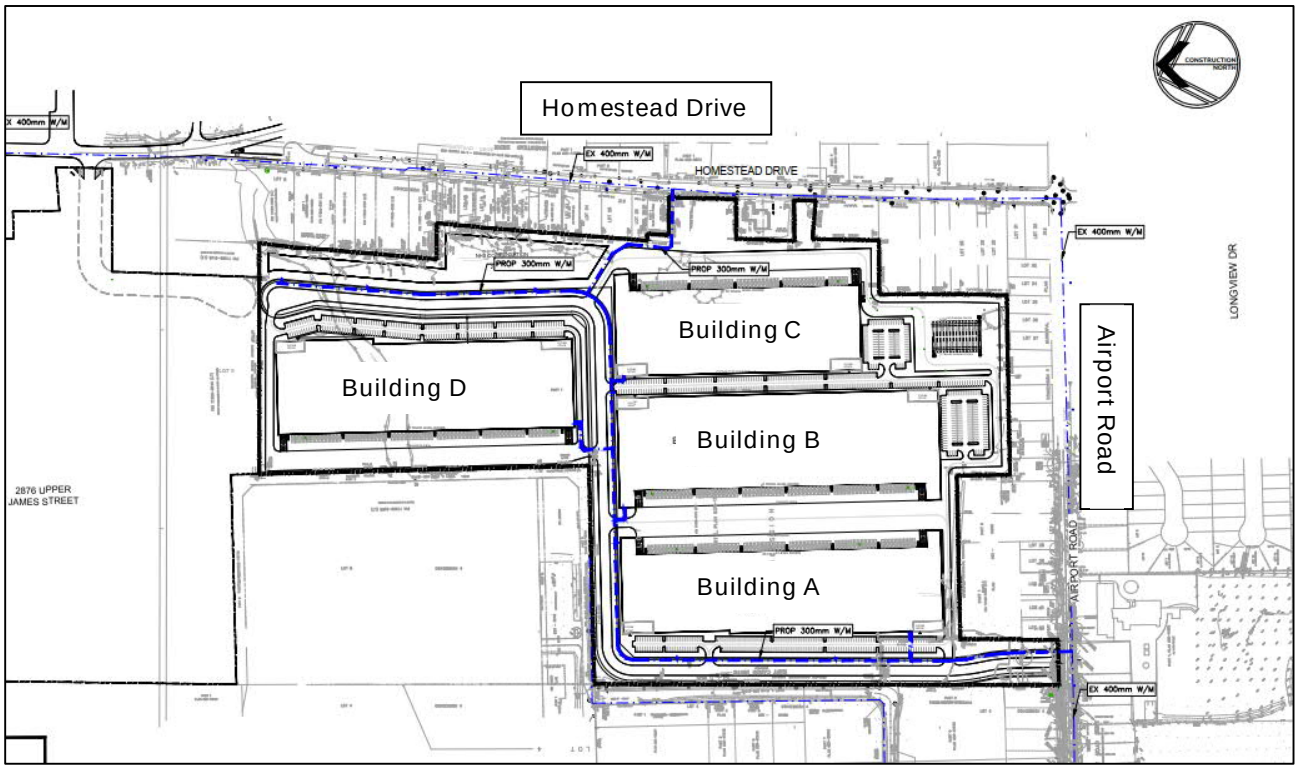



Figure 1- 1: The Proposed 3054 Homestead Drive Development Site Plan

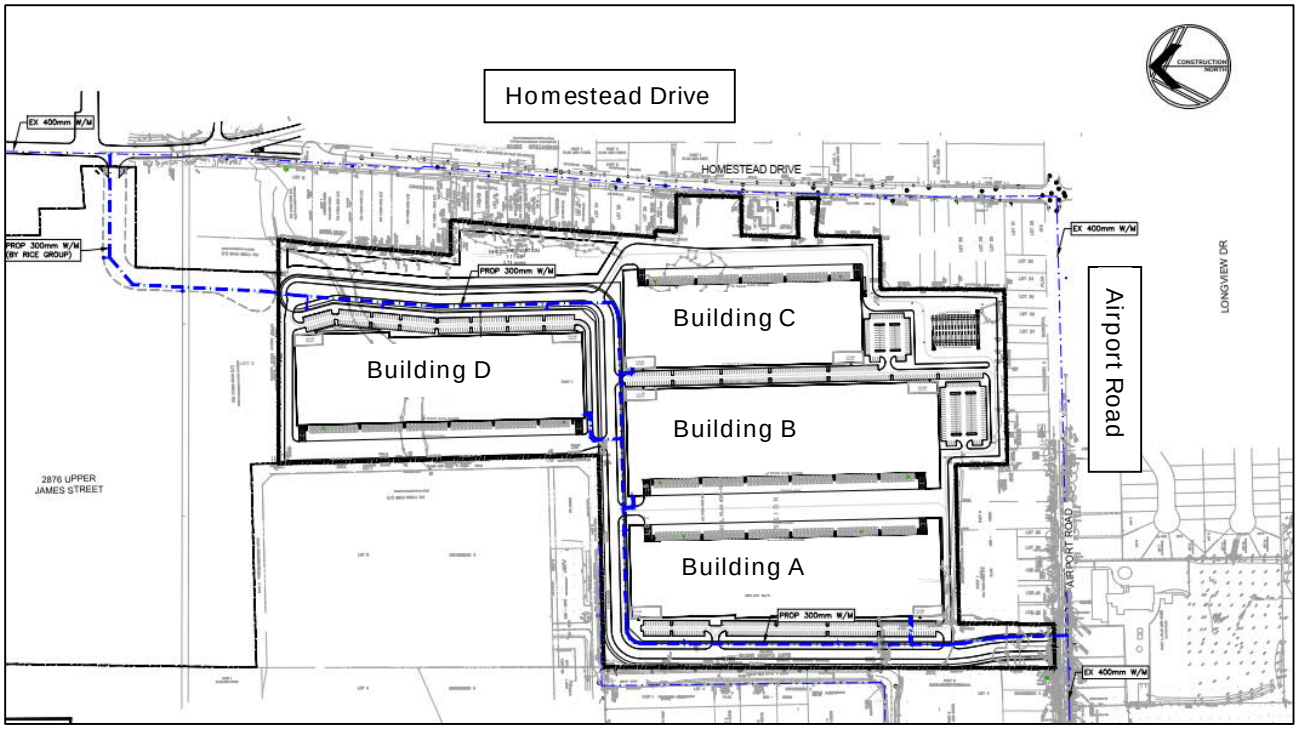



Figure 1- 2: The Proposed 3054 Homestead Drive Development Site Plan (Option 2)

# 2 DESIGN CRITERIA

## 2.1 DOMESTIC WATER DEMANDS

The domestic demands for the 3054 Homestead Drive development were calculated using the City of Hamilton's Engineering Guidelines for Servicing Land under Development Applications, December 2012. Population density for industrial units were determined according to the City of Hamilton Development Charge Background Study by Watson & Associates Economists Ltd, October 2019. Accordingly, the density for Industrial properties of 125 persons/ha was applied for the calculation. Table 2–1 lists the factors used to determine the demands for the development.

Table 2–1: Demand Factors and Inputs

| DEMAND FACTORS AND INPUTS | VALUE |
|---|---|
| Single Family Detached Homes | 3.39 persons/unit |
| Townhomes | 2.45 persons/unit |
| Industrial | 125 persons/ha |
| Residential Average Day Demand | 360 L/Person/day |
| ICI Average Day Demand | 260 L/Perons/day |
| Maximum Day Peaking Factor | 1.9 |
| Peak Hour Factor | 3.0 |

Detailed calculations of domestic demands are shown in Appendix A. Domestic demands for the development were calculated by multiplying the estimated footprint area for the each building and the population density for industrial sites, and allocated to the closest junctions along the proposed watermains in the water model. Demands external to the development, including the Dickenson and Shelby Developments, were unchanged.

## 2.2 PRESSURES

As outlined in the City of Hamilton Water and Wastewater Master Plan, 2006 (WWWMP), the acceptable pressures under normal conditions are between 275 kPa (40 psi) and 690 kPa (100 psi).

The minimum allowable pressure under Maximum Day Demand plus Fire Flow is 140 kPa at the location of the fire and/or everywhere else in the pressure district.

## 2.3 REQUIRED FIRE FLOW

Required Fire Flow calculations were not available at the time of this analysis. As part of the City of Hamilton's fire flow requirement, the RFF targets for this development should be the higher of the calculated fire flows using the OBC method or the fire flow targets from the City's policy as shown in Table 2–2.

Table 2–2: Summary of Target Available Fire Flow

| LAND USE | TARGET AVAILABLE FIRE FLOW (L/S) |
|---|---|
| Commercial | 150 |
| Small I/I (<1800m$^3$) [1] | 100 |
| Industrial | 250 |
| Institutional | 150 |
| Residential Multi [2] | 150 |
| Residential Medium (3 or less units) [3] | 125 |
| Residential Single | 75 |
| Residential Single (Dead End) | 50 |

1) 1800m$^3$ represents a maximum building volume that qualifies as "Small ICI"
2) Residential Multi is defined as a residential dwelling with > 3 units
3) Residential Medium is defined as a residential dwelling with ≤ 3 units

As a conservative approach, the required fire flow (RFF) of 250 L/s for industrial sites was applied to all hydrants within the proposed 3054 Homestead Drive development.

# 3 HYDRAULIC MODEL

The proposed development will be located within Pressure District (PD) 6 of the City of Hamilton's water network. It will be supplied by the HD06A (Stone Church Road at Garth) and the HD06B (Stone Church Road at Tunbridge Crescent) pumping stations.

The development was added to an existing hydraulic model of the City of Hamilton received by WSP in March 2017 in the context of the Pressure District Characterization Study. Since the time of receipt, WSP has been updating the model with various developments (either approved or under review).

As part of the modeling completed in this study, WSP updated the total demands in the Pressure District (PD) 6 and 25 as to have them match the ongoing Master Plan Models provided by the City in June, 2023. Table 3-1 summarizes the sum of demands for PD6 and PD25 in WSP's model after the update.

Table 3-1: PD6 and PD25 Demand Update in WSP's Model

| | AVERAGE DAY (L/S) | MAXIMUM DAY (L/S) | PEAK HOUR DEMAND (L/S) |
|---|---|---|---|
| PD6+PD25 2021 Demand | 561.26 | 868.76 | 1,244.47 |
| PD6+PD25 2031 Demand | 630.29 | 975.62 | 1,397.54 |

Note: the 2031 demands update in PD6 and PD25 were calculated from the 2021 demands assuming a growth rate of 12.3% approved by the City. Once the final growth data from the ongoing City of Hamilton Master Plan Study is determined, the 2031 demands will need be updated.

## 3.1 BOUNDARY CONDITIONS

PD6 is a closed zone that is supplied by two (2) booster pumping stations: HD06A (Stone Church Road at Garth) and HD06B (Stone Church Road at Tunbridge Crescent). The HD06A pumping station is supplied by the HDR05 reservoir while the HD06B pumping station receives water through a 1,200 mm PD5 trunk main.

The analysis was carried out with the hydraulic grade line (HGL) in the HDR05 reservoir, set to 232.32m and 233.88m for all 2021 and 2031 scenarios of both planning horizons. These water levels represent a tank at approximately 50% and 70% full, respectively.

Additionally, the Lavender Drive and Upper Paradise Road PRVs in PD6 were open (active) in the model during these conditions and had HGL settings of 238.80 m and 252.49 m, respectively.

The modelled discharge pressure at HD06A pumping station was limited to 480kPa via recirculation through a PSV. This is consistent with the City of Hamilton's Water Outstation Process Narrative for HD06A. The status of each pump during all modelled scenarios of this analysis is outlined in Table 3-2.

Table 3-2: Pump Status at HD06A and HD06B PS under the simulated 2021 and 2031 planning horizons

| Pump Station | Pump | 2021 AVG | 2021 MDD | 2021 PHD | 2021 MDD+FF | 2031 AVG | 2031 MDD | 2031 PHD | 2031 MDD+FF |
|---|---|---|---|---|---|---|---|---|---|
| HDO6A[1] | HLP1 | ON | ON | ON | ON | ON | ON | ON | ON |
| | HLP3 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | HLP4 | ON | ON | ON | ON | ON | ON | ON | ON |
| | HLP5 | OFF | ON | ON | ON | OFF | ON | ON | ON |
| HDO6B | HLP1 | ON | ON | ON | ON | ON | ON | ON | ON |
| | HLP2 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | HLP4 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |

Note:
1. The discharge pressure at the pump station, HD06A, was kept just under 480kPa for all the scenarios based on the Water Outstation Process Control Narrative (section 5.4.2.2 in appendix at page 13 of 29).

## 3.2 3054 HOMESTEAD DRIVE DEVELOPMENT

The proposed watermains and water services were added to the PD6 pressure district and reflect the proposed servicing plan provided by the Client on December 16th, 2022. The servicing plan was added to Appendix A for ease of reference.

Elevation information within the development was taken as the finished grade elevation at the centerline of the road or applicable adjacent proposed grade point. Service elevations range from 229 m to 235.4 m within the proposed development.

The friction (C) factors for all new pipes added to the model were assigned according to the Ministry of the Environment, Conservation and Parks (MECP) watermain Design criteria as listed in Table 3-1. Internal diameters of the pipes were modelled to improve the accuracy of results.

Table 3–3: Hazen-Williams C-Factors

| DIAMETER (NOMINAL) | C-FACTOR |
|---|---|
| 150 mm (ID 152.5mm) | 100 |
| 200 mm (ID 204mm) | 110 |
| 300 mm (ID 290mm ) | 120 |

The proposed layout of the water distribution system is intended to satisfy the requirements of the City of Hamilton. All pipes and nodes added for the development are shown and identified in Appendix A.

## 3.3 VERIFICATION OF MODEL CALIBRATION

The hydraulic model calibration was verified using the results of hydrant flow tests conducted by WSP. These tests were completed by the City on October 22nd, 2022 at the following locations:

1. Hydrant GJ10H011 on 9079 Airport Road West, Mount Hope, ON.
2. Hydrant GJ10H006 on 3026 Homestead Drive, Mount Hope, ON.

Results of these hydrant flow tests are included in Appendix E. A comparison between the results of the hydrant flow tests and the modeled hydrant flow curves was done at the locations of the proposed development site. It was found that the modeled static pressures were within 5% of the hydrant flow test static pressures and that the modeled flows at 140 kPa (20 psi) were conservative in that the flow estimated by the model is lower than that calculated from the hydrant test. Appendix E provides detailed results of the hydrant test and model validation.

# 4 HYDRAULIC ANALYSIS

The suggested watermain layout was modelled for Average Day, Maximum Day, Maximum Day plus Fire Flow and Peak Hour scenarios under the present (2021) and ultimate buildout (2031) planning horizons using a WaterGEMS V8i model of the PD6 network as described in Section 3.

The piping layout within the development were sized to meet the greater requirement of Peak Hour Demands or Maximum Day Demand plus Fire Flow requirements. A detailed summary of demands is shown in Appendix A including the proposed pipe diameters for servicing the development.

## 4.1 SYSTEM PRESSURES

As outlined in the City of Hamilton WWWMP, the acceptable pressures under normal conditions range between 275 kPa (40 psi) and 690 kPa (100 psi). The modeling indicates that the expected service pressures range between approximately 284 kPa and 404 kPa for Phase 1 of the development and between 279 kPa and 455 kPa for ultimate buildout under all modeled scenarios. Modeled service pressures are summarized in Table 4-1 to Table 4–6. Detailed pipe and node result tables can be found in Appendix B.

Table 4–1: Simulated Pressures for Phase 1 with 50% TWL

| SCENARIO | AVERAGE DAY (kPa) | MAXIMUM DAY (kPa) | PEAK HOUR (kPa) |
|---|---|---|---|
| 2021 | 358 - 388 | 345 - 375 | 300 - 330 |
| 2031 | 351 - 380 | 333 - 363 | 284 - 314 |

Table 4–2: Simulated Pressures for Phase 1 with 70% TWL

| SCENARIO | AVERAGE DAY (kPa) | MAXIMUM DAY (kPa) | PEAK HOUR (kPa) |
|---|---|---|---|
| 2021 | 374 - 404 | 360 - 390 | 314 – 344 |
| 2031 | 365 - 395 | 347 - 377 | 298 - 328 |

Table 4–3: Simulated Pressures for Ultimate Buildout with 50% TWL

| SCENARIO | AVERAGE DAY (kPa) | MAXIMUM DAY (kPa) | PEAK HOUR (kPa) |
|---|---|---|---|
| 2021 | 356 - 419 | 343 - 406 | 298 – 360 |
| 2031 | 347 - 410 | 330 - 393 | 279 - 342 |

Table 4–4: Simulated Pressures for Ultimate Buildout with 70% TWL

| SCENARIO | AVERAGE DAY (kPa) | MAXIMUM DAY (kPa) | PEAK HOUR (kPa) |
|---|---|---|---|
| 2021 | 372 - 435 | 358 - 420 | 312 – 375 |
| 2031 | 361 - 419 | 345 - 407 | 293 – 356 |

Table 4–5: Simulated Pressures for Ultimate Buildout (Option 2) with 50% TWL

| SCENARIO | AVERAGE DAY (kPa) | MAXIMUM DAY (kPa) | PEAK HOUR (kPa) |
|---|---|---|---|
| 2021 | 357 - 439 | 344 - 426 | 296 – 380 |
| 2031 | 348 - 430 | 333 - 416 | 280 - 363 |

Table 4–6: Simulated Pressures for Ultimate Buildout (Option 2) with 70% TWL

| SCENARIO | AVERAGE DAY (kPa) | MAXIMUM DAY (kPa) | PEAK HOUR (kPa) |
|---|---|---|---|
| 2021 | 373 - 455 | 358 - 441 | 306 – 389 |
| 2031 | 362 - 445 | 347 - 430 | 294 – 378 |

The modelling results indicate that the expected service pressures within the development can meet the minimum pressure requirement of 275 kPa under all scenarios.

## 4.2 AVAILABLE FIRE FLOW

The minimum allowable pressure under Maximum Day Demand plus Fire Flow is 140 kPa (20 psi) at the location of the fire or anywhere else in the pressure district. The fire flow scenarios were simulated under Maximum Day Demand conditions for the 2021 and 2031 planning horizons.

Table 4–7 and Table 4–8 summarize the simulated available fire flows for Phase 1 and ultimate buildout of the proposed development under 2021 and 2031 planning horizons. A detailed analysis of fire flow availability at all nodes within the proposed development is included in Appendix C.

Table 4–7: Simulated Available Fire Flows at Hydrants Under Phase 1

| SCENARIO | 2021 MDD+FF AFF (L/S) | 2031 MDD+FF AFF (L/S) |
|---|---|---|
| 50% TWL | 150 - 258 | 143 - 245 |
| 70% TWL | 156 - 268 | 149 - 255 |
| 99% TWL | 164 - 281 | 158 - 269 |

Note: 99% water level was considered as a sensitivity run and is not considered as a typical operation level.

Table 4–8: Simulated Available Fire Flows at Hydrants Under Ultimate Buildout

| SCENARIO | 2021 MDD+FF AFF (L/S) | 2031 MDD+FF AFF (L/S) |
|---|---|---|
| 50% TWL | 190 - 256 | 183 - 243 |
| 70% TWL | 196 - 266 | 189 - 253 |
| 99% TWL | 205 - 279 | 198 - 267 |

Note: 99% water level was considered as a sensitivity run and is not considered as a typical operation level.

Table 4–9: Simulated Available Fire Flows at Hydrants Under Ultimate Buildout (Option 2)

| SCENARIO | 2021 MDD+FF AFF (L/S) | 2031 MDD+FF AFF (L/S) |
|---|---|---|
| 50% TWL | 192 - 267 | 183 – 235 |
| 70% TWL | 200 - 276 | 192 - 267 |
| 99% TWL | 211 - 287 | 203 - 278 |

Note: 99% water level was considered as a sensitivity run and is not considered as a typical operation level.

Steady State modelling results of the fire flows indicate that the simulated pressures at ground level at all nodes within Pressure District 6 (PD6) are above 140 kPa under 2021 and 2031 Maximum Day Demand plus Fire Flow conditions.

As shown in Table 4-7, Table 4–8, and Table 4–9, the Available Fire Flows (AFF) were simulated below the Required Fire Flow of 250 L/s for industrial site under both 2021 and 2031 planning horizon. WSP ran additional simulation by increasing the tank water level at HDR05 to 99%, and the simulated AFFs increased by roughly 5%; however, they were still below the minimum fire flow requirement. The proposed site was still not able to achieve the targeted fire flow of 250 L/s; however, all hydrants were simulated with AFF higher than 150 L/s which is the highest possible required fire flow calculated using the OBC method.

To examine the impact on the fire flow capacity on the existing network with the addition of the proposed site, WSP ran the baseline scenario (without the proposed development) under 2021 and 2031 MDD+FF with 70% TWL. The simulated fire flow on the existing hydrants along Homestead Dr. and Airport Rd. ranged between 223 L/s and 269 L/s under 2021 planning horizon and 214 L/s and 257 L/s under 2031 planning horizon. These additional fire flow runs demonstrated that the development will cause the existing fire flows to drop by approximately 10%, and with the addition of looping, the simulated fire flow on a few existing hydrants on Airport Rd. increased. These results indicate that the addition of the proposed site has little impact on the existing network capacity to maintain the existing level of service for fire flows. Table 4–10 summarizes and compares the simulated fire flow on the existing hydrants under Baseline and Ultimate Buildout condition with 70% TWL in both 2021 and 2031 planning horizons.

Table 4–10: Simulated Available Fire Flows on Existing Hydrants with 70% TWL

| SCENARIO | 2021 MDD+FF AFF (L/S) | 2031 MDD+FF AFF (L/S) |
|---|---|---|
| Baseline (without the development) | 223 - 269 | 214 - 257 |
| Ultimate Buildout | 196 - 266 | 189 - 253 |
| Ultimate Buildout – Option 2 | 200 - 276 | 192 - 267 |

### 4.2.1 MANUAL FIRE FLOW

WSP conducted manual fire flow runs to identify the limiting junctions within PD6. Table 4–11 summarizes the manual fire flow results and the number junctions below 140 kPa during 50% TWL.

Table 4–11: Manual Fire Flow Result Summary

| JUNCTION ID | FIRE FLOW ASSIGNED (L/S) | PD6 PRESSURE RANGE (KPA) | NO. OF JUNCTION BELOW 140 KPA |
|---|---|---|---|
| H-187 | 250 | -76 - 657 | 208 |
| H-188 | 250 | -105 - 657 | 208 |
| H-189 | 250 | -119 - 657 | 208 |
| H-190 | 250 | -105 - 657 | 208 |
| H-191 | 250 | -120 - 657 | 208 |
| H-192 | 250 | -146 - 657 | 209 |
| H-193 | 250 | -181 - 657 | 209 |
| H-195 | 250 | -55 - 657 | 215 |
| H-197 | 250 | -28 - 657 | 214 |

As shown in Table 4–11, the proposed hydrants cannot meet the required fire flow of 250 L/s under 50% TWL due to a number of junctions within PD6 fell below 140 kPa during the manual fire flow runs. These junctions can be found within the proposed development and the nearby Mount Hope development. The client confirms that the proposed development will be constructed with sprinkler systems to provide fire protection, which may reduce the required fire flow target used in this analysis. Detailed fire flow calculations need to be completed, and further analysis will be required to ensure the minimum HGL can be achieved for the sprinkler system once construction details become available.

## 4.3 TRANSIENT PRESSURES

According to the MECP Watermain Design Criteria, all watermains shall be designed so that pipes and joints are able to withstand the maximum operating pressure plus the surge pressure that would be created by stopping a water column moving at 0.6 m/s.

AWWA C900-compliant PVC pipe has a pressure rating of 235 psi (or greater) and this is consistent with the City of Hamilton's Specification for the Installation of Watermains (November 2018) that requires PVC pipe to be of Class 150 DR18. A PVC pipe with dimension ratio (DR) of 18 will experience a pressure surge of 240 kPa for a 0.6 m/s instantaneous flow velocity change (Joukowski).

The maximum operating pressure plus transient pressure is calculated as approximately 695 kPa (455 kPa + 240 kPa): well under 1620 kPa (235 psi) allowance. All pipe restraints and thrust blocks should be designed to a minimum 1030 kPa (150 psi) design pressure.

## 4.4 SYSTEM FLUSHING

A modeled flushing test was performed for the proposed water distribution network, under existing (2021) Average Day conditions for the Phase 1, full-buildout, and full-builtout (Option2) constructions to determine the achievable flushing velocities of the system. The MECP watermain design criterion requires a minimum flushing velocity of 0.8 m/s for pipes with diameter greater than or equal 150mm.

WaterGEMS software allows for testing of flushing by representing a modeled hydrant as a flow emitter with an emitter coefficient K equivalent to the components of the hydrant including the lateral, valve, bends and outlet. Hydrants were added to the model with a K value taken as 11.2 $L/s/m^{0.5}$ (150 $gpm/psi^{0.5}$) which is the minimum value prescribed by the American Water Works Association (AWWA) standard for flow calculations through a single 60 mm (2.5") outlet.

For the flushing simulation under Phase 1, a total of four (4) proposed hydrants were selected within the site with one-port open. Based on the simulation, all watermains can meet the required flushing velocity of 0.8 m/s. To achieve this, it is required all proposed hydrants be flushed with a single port within the development. The achievable flushing velocity within the Phase 1 of the development ranges from 0.92 to 0.96 m/s.

For the flushing simulation under full-buildout, a total of seven (7) proposed hydrants were selected within the site with two-port open. Based on the simulation, all watermains can meet the required flushing velocity of 0.8 m/s. A blow-off valve was required at the dead end to Building A to flush the dead-ended pipe. To achieve this, it is required that all proposed hydrants be flushed with two ports opened within the development. The achievable flushing velocity within the Phase 1 of the development ranges from 0.88 to 1.83 m/s.

For the flushing simulation under full-buildout (Option 2), a total of nine (9) proposed hydrants were selected within the site with two-port open. Based on the simulation, all watermains can meet the required flushing velocity of 0.8 m/s. Blow-off valves were required at the dead end to flush the dead-ended pipes. To achieve this, it is required that all proposed hydrants be flushed with two ports opened within the development. The achievable flushing velocity within the Phase 1 of the development ranges from 0.81 to 1.54 m/s.

A detailed flushing report is provided in Appendix D.

# 5 CONCLUSIONS

The proposed watermain system for the 3054 Homestead Drive Development site can achieve hydraulic requirements as prescribed by the Ministry of the Environment, Conservation and Parks (MECP), and the City of Hamilton watermain design criteria as summarized below:

1. The service pressures under existing conditions (2021) and ultimate build-out conditions (2031) are expected to range between 284 kPa and 404 kPa for Phase 1 of the development and between 279 kPa and 455 kPa for ultimate buildout. The simulated pressures under all scenarios presented herein are within standards established by the MECP and City of Hamilton Guidelines.
2. Based on the City of Hamilton's fire flow policy, the required fire flow (RFF) for industrial site targets 250 L/s. In the 2021 planning horizon, the simulated AFF ranged between 150 L/s and 281 L/s under Phase 1 and between 190 L/s to 281 L/s under full-buildout. In 2031 planning horizon, the simulated AFF ranged between 143 L/s and 269 L/s under Phase 1 and between 183 L/s to 278 L/s under full-buildout. Additional simulations were completed with 99% TWL at HDR05, and the RFF target of 250 L/s cannot be maintained.

   To examine the impact on the fire flow capacity on the existing network with the addition of the proposed site, WSP ran the baseline scenario under 2021 and 2031 MDD+FF with 70% TWL under both Phase 1 and full-buildout conditions. The results indicate that the addition of the proposed site has little impact on the existing network capacity to maintain the existing level of service for fire flows.
3. Under Maximum Day plus Fire Flow for existing (2021) and ultimate buildout (2031) conditions, the PD6 distribution system is able to maintain pressure above 140 kPa at ground level at all modeled nodes within the district;
4. When installing AWWA C900-compliant PVC pipe with a pressure rating of 235 psi (or greater), the watermains in the proposed development can withstand transient pressure created by stopping a water column moving at 0.6 m/s plus maximum operating pressure; and,
5. All proposed watermains can achieve a minimum flushing velocity of 0.8 m/s given the requirements outlined in Section 4.4.

These conclusions remain valid as long as the proposed water distribution system and the City's network configuration remain as described herein. If significant changes are contemplated, this analysis should be updated.

# APPENDIX

# A

## DEMANDS AND PROPOSED SYSTEM LAYOUT

APPENDIX A

WATER DEMANDS

## 3054 Homestead Drive Development

### Demands

| | | |
|---|---|---|
| Population (Single Family) | 3.39 | ppu |
| Population (Townhomes) | 2.45 | ppu |
| Population (Apartments) | 1.76 | ppu |
| Density (Townhouses) | 110.00 | pha |
| Industrial | 125 | pha |
| Average Day Residential Demand | 360 | L/cap/day |
| Average Day Commercial Demand | 260 | L/cap/day |

### Peaking Factors

| | |
|---|---|
| Maximum Hour | 3.00 |
| Maximum Day | 1.90 |

### Demand Rate Calculation

| Building | SINGLE FAMILY (No. of Units) | TOWNHOMES (No. of Units) | BUILDING AREA (Ha) | POPULATION | AVERAGE DAY (L/S) | MAX DAY (L/S) | PEAK HOUR (L/S) |
|---|---|---|---|---|---|---|---|
| Building C | | | 3.44 | 430 | 1.29 | 2.46 | 3.88 |
| Phase 1 Total | | | 3.44 | 430 | 1.29 | 2.46 | 3.88 |
| Building B | | | 3.43 | 429 | 1.29 | 2.45 | 3.87 |
| Building A | | | 2.64 | 330 | 0.99 | 1.89 | 2.98 |
| Building D | | | 3.81 | 476 | 1.43 | 2.72 | 4.30 |
| Total | 0 | 0 | 13.32 | 1665 | 5.01 | 9.52 | 15.03 |

SCALE 1:1300

HOMESTEAD DRIVE

REGIONAL ROAD No. 52

AIRPORT ROAD WEST

EAST CARGO ROAD

NEW SERVICE ROAD

NHS COMPENSATION
1.11 ha
2.74 acres

BUILDING 'A'
33,468.93 m2
360,257 sq ft

BUILDING 'B'
38,268.75 m2
411,921sq ft

BUILDING 'C'
26,562.68 m2
285,918 sq ft

BUILDING 'D'
31,250.96 m2
336,382 sq ft

STREET 'A'

INSTITUTIONAL ZONE

LANDS SUBJECT TO 4.0 m WIDE MAINTENANCE ACCESS EASEMENT, RETAINING WALL & CONVEYANCE SWALE

RETAINING WALL

63 TRUCK LEVEL DOORS

65 TRUCK LEVEL DOORS

50 TRUCK LEVEL DOORS

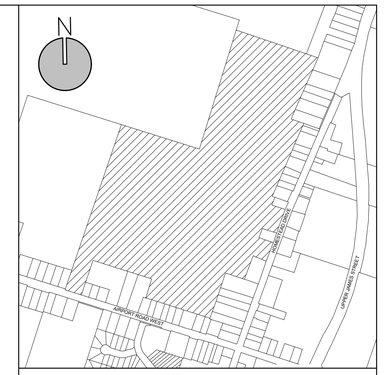
15 TRAILER PARKING SPACES

**DEVELOPMENT STATISTICS**
**Airside Industrial (M7) Zone**

| Item | Required | Proposed |
|---|---|---|
| Permitted Uses | Warehouse & Office | Warehouse & Office |
| Min. Lot Area | 4,000.00 $m^2$ | 313,822.42 $m^2$ |
| No. of Buildings | N/A | 4 Buildings |
| Min. Yard Abutting a Street | 3.0 m | New Service Road: 56.22 m (Building A)<br>East Cargo Road: 33.00 m (Building A)<br>Homestead Road: 94.84 m (Building C)<br>Street 'A': 3.00 m (Building Nos. A-C) |
| Max. Building Height | TBD | TBD |
| Landscaping | 10% | 11.87% (Excluding ROW & NHS Compensation) |
| Min. Landscaped Strip | 3.0 m | 3.0 m |
| Parking | | |
| Warehouse | 1 space/ 30$m^2$ of Office Use<br>= 3,485.90 $m^2$ /30<br>=116 spaces | 911 Typical Spaces<br>243 Truck Level Doors<br>30 Trailer Parking Spaces<br>Total: 1,184 spaces |
| Long Term Bicycle Parking | 5% of Required Spaces = 5.8 spaces | TBD |

**DEVELOPMENT STATISTICS: GFA**

| Item | Proposed |
|---|---|
| Building 'A' | 33,468.93 $m^2$ (360,257 ft2) |
| Building 'B' | 38,268.75 $m^2$ (411,921 ft2) |
| Building 'C' | 26,562.68 $m^2$ (285,918 ft2) |
| Building 'D' | 31,250.96 $m^2$ (336,382 ft2) |
| Total | *129,551.32 $m^2$ (1,394,478 ft2)* |




KEY MAP - N.T.S.

SCALE: 1:1300

0 50 100 150m

LEGEND:

- SUBJECT LANDS
- EXISTING PROPERTY LINES
- PROPOSED BUILDING
- MAN DOOR
- OVERHEAD DOOR

| | |
|---|---|
| DESIGN BY: S. McKAY | CHECKED BY: S. MANCHIA |
| DRAWN BY: L. DRENNAN | DATE: JULY 28, 2023 |

URBAN SOLUTIONS
PLANNING & LAND DEVELOPMENT
3 STUDEBAKER PLACE, UNIT 1
HAMILTON, ON L8L 0C8
905-546-1087 URBANSOLUTIONS.INFO

PROJECT:
3054 HOMESTEAD DRIVE, 9174 & 9166 AIRPORT ROAD WEST
City of Hamilton

CLIENT:
FENGATE HOMESTEAD HOLDINGS LP

TITLE:
CONCEPT PLAN

| U/S FILE NUMBER: | SHEET NUMBER: |
|---|---|
| 413-21 | 1 |

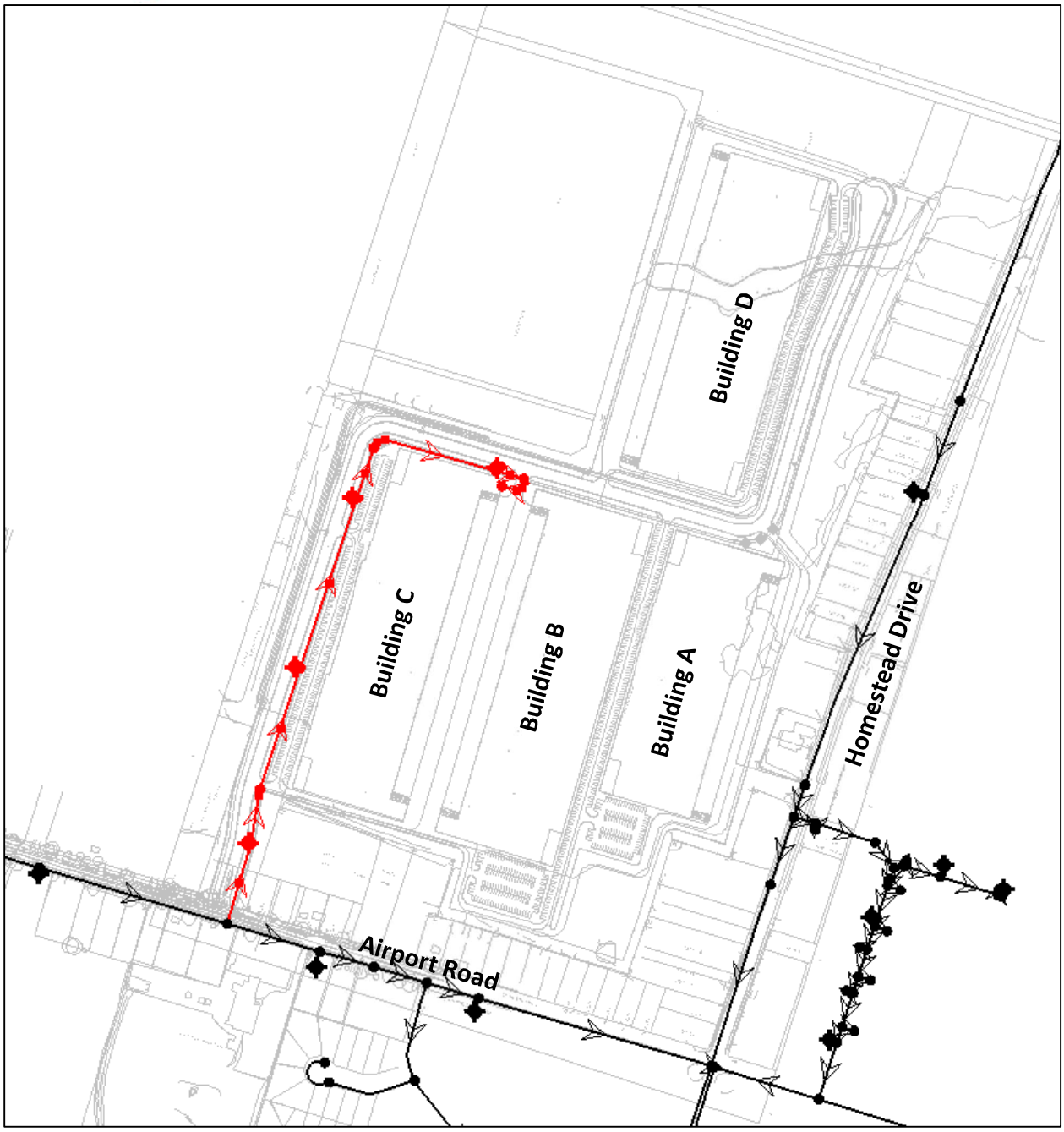



Figure A1 – Proposed Phase 1 3054 Homestead Drive Development System Layout Highlighted in Red

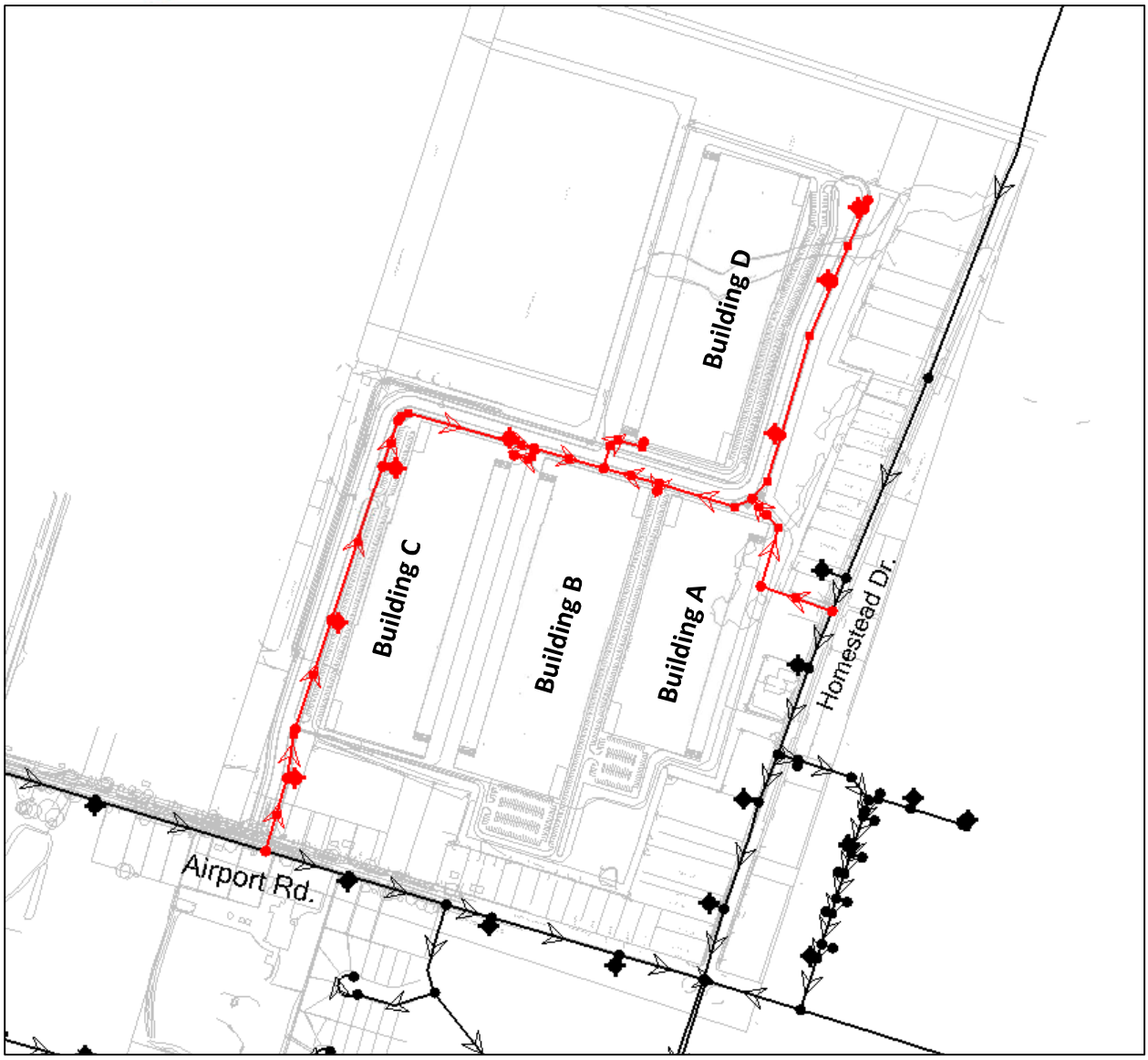



Figure A2 – Proposed 3054 Homestead Drive Development System Layout Highlighted in Red

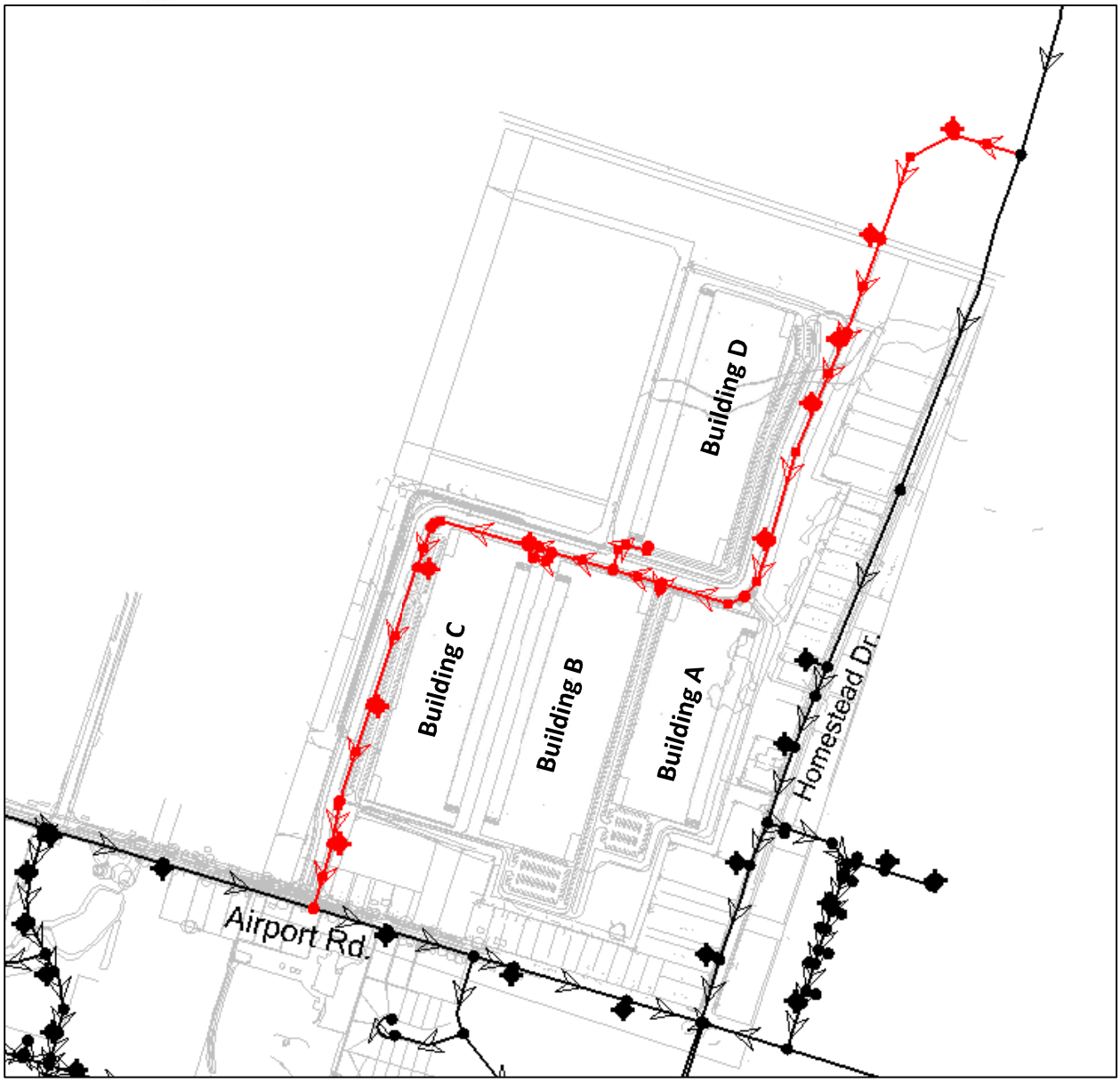



Figure A3 – Proposed 3054 Homestead Drive Development (Option 2) System Layout Highlighted in Red

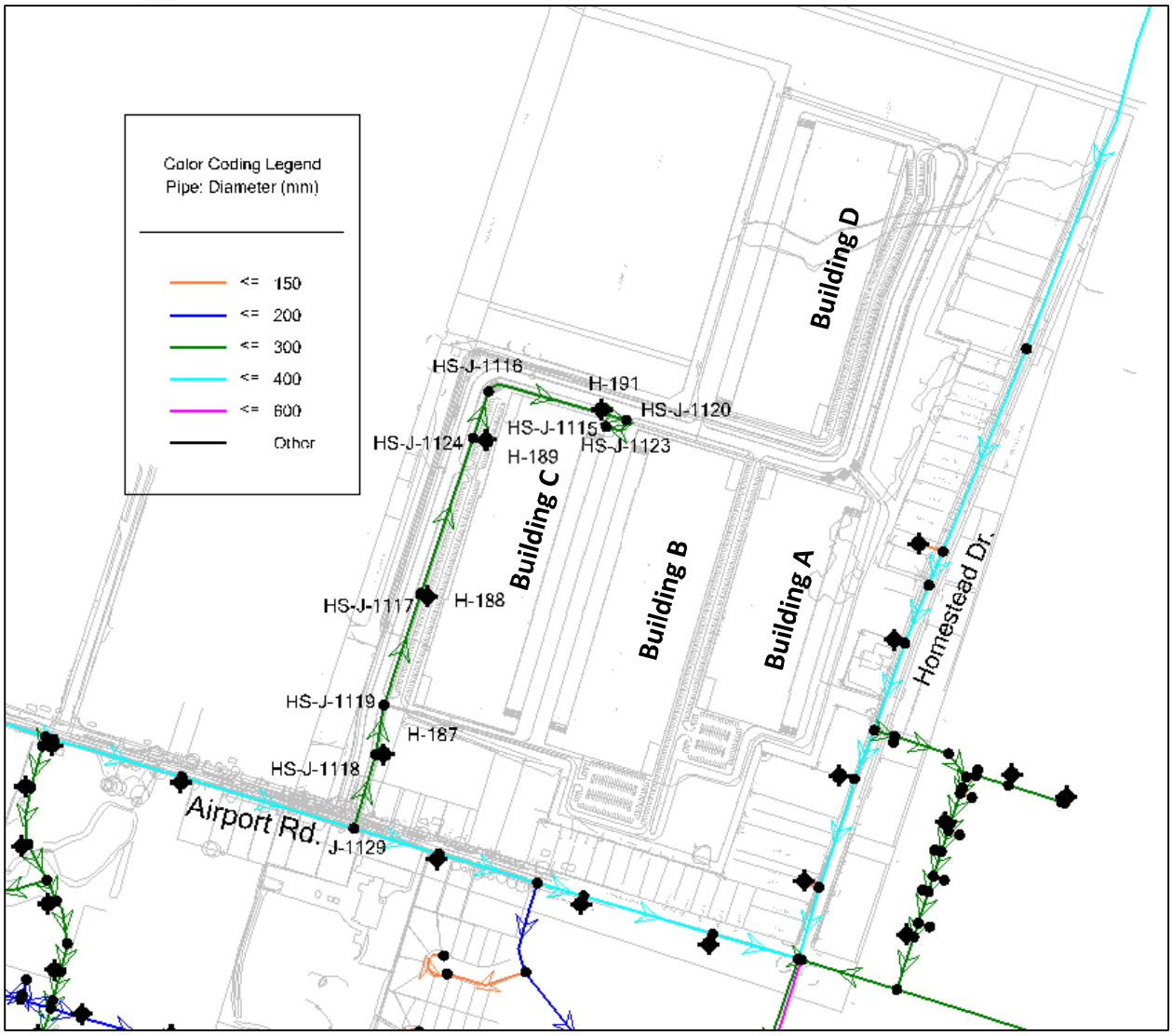



Figure A4 – Proposed Phase 1 3054 Homestead Drive Development System Layout with Junction and Hydrant IDs

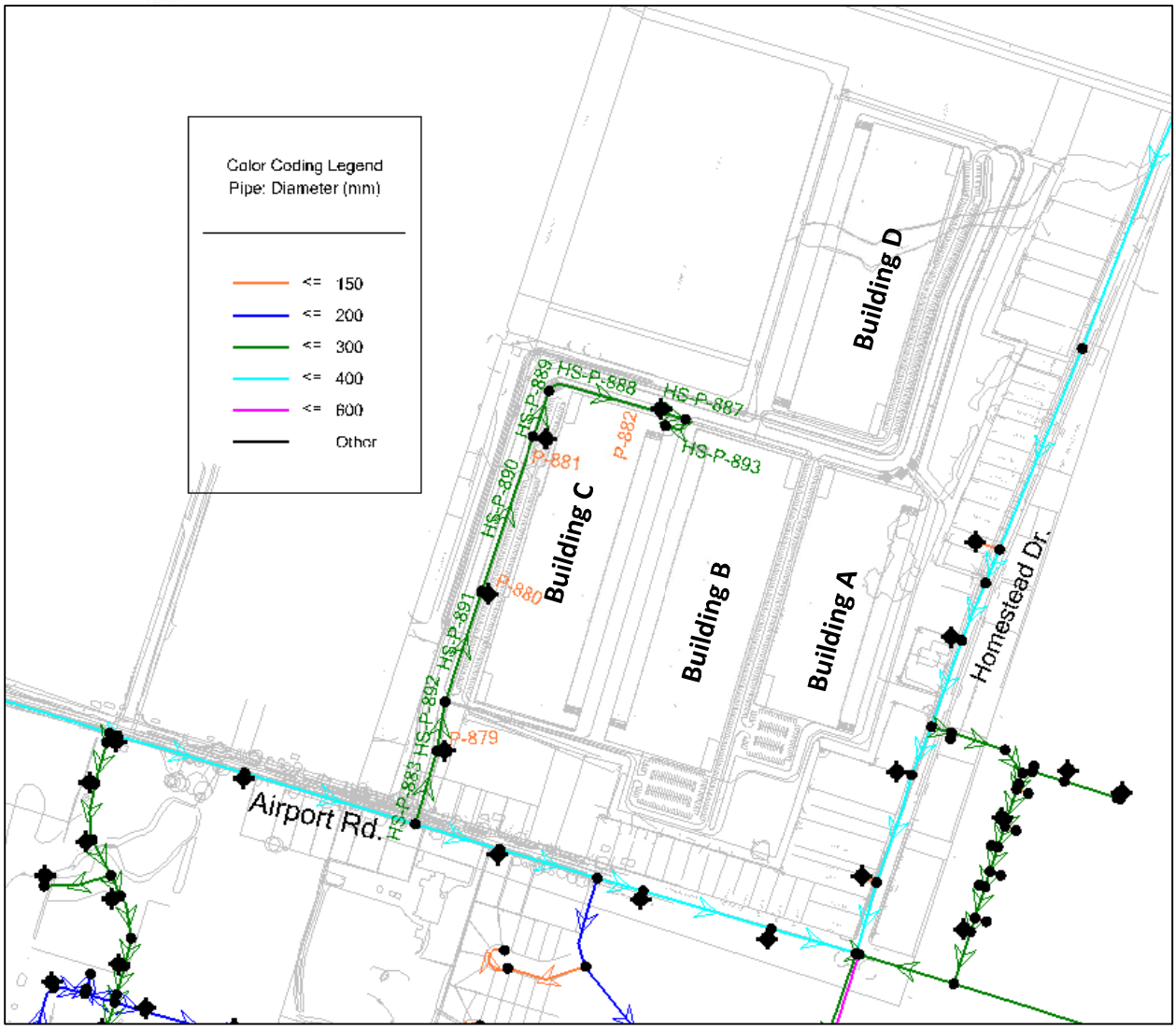



Figure A5 – Proposed Phase 1 3054 Homestead Drive Development System Layout with Pipe IDs

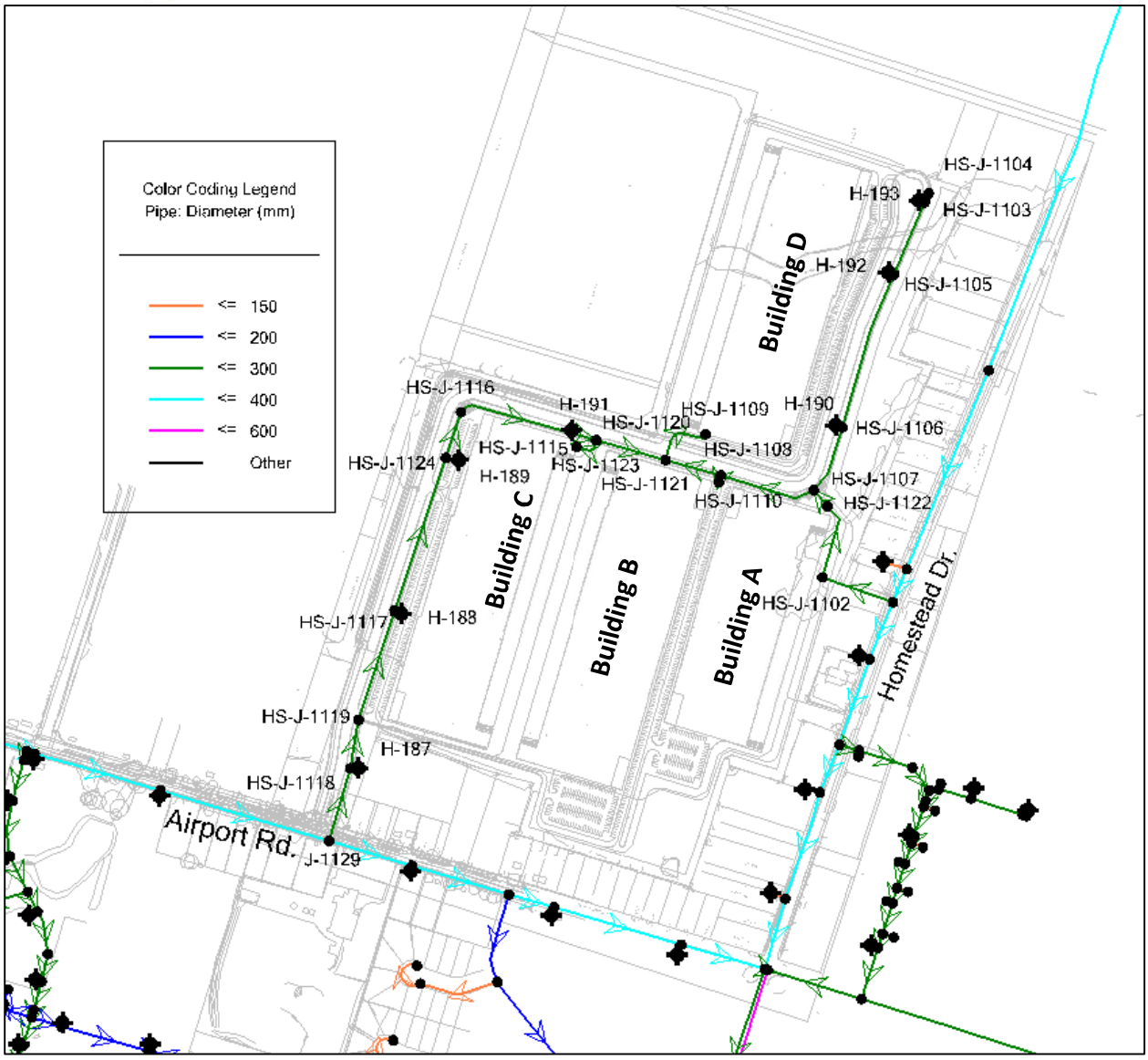



Figure A6 – Proposed 3054 Homestead Drive Development System Layout with Junction and Hydrant IDs

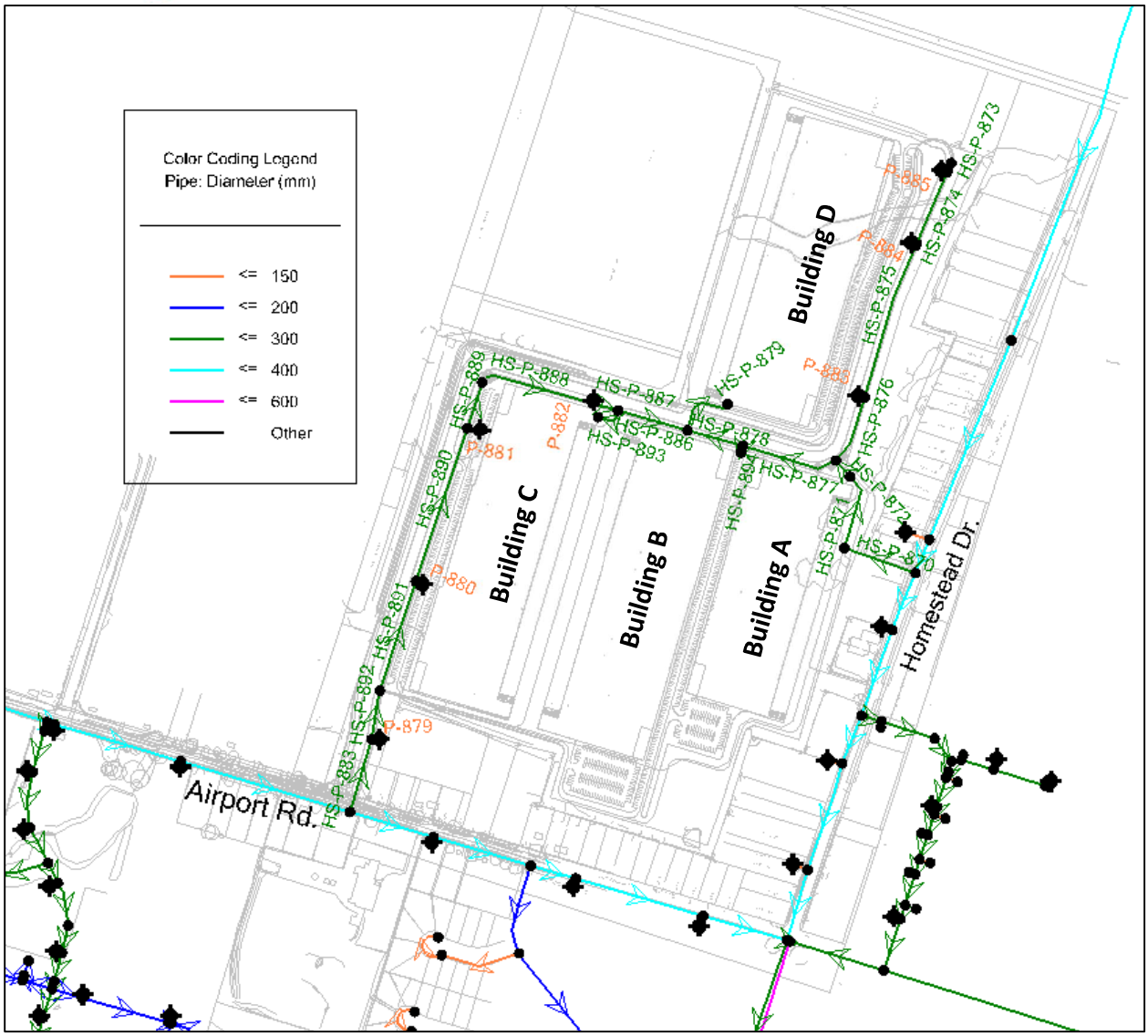



Figure A7 – Proposed 3054 Homestead Drive Development System Layout with Pipe IDs

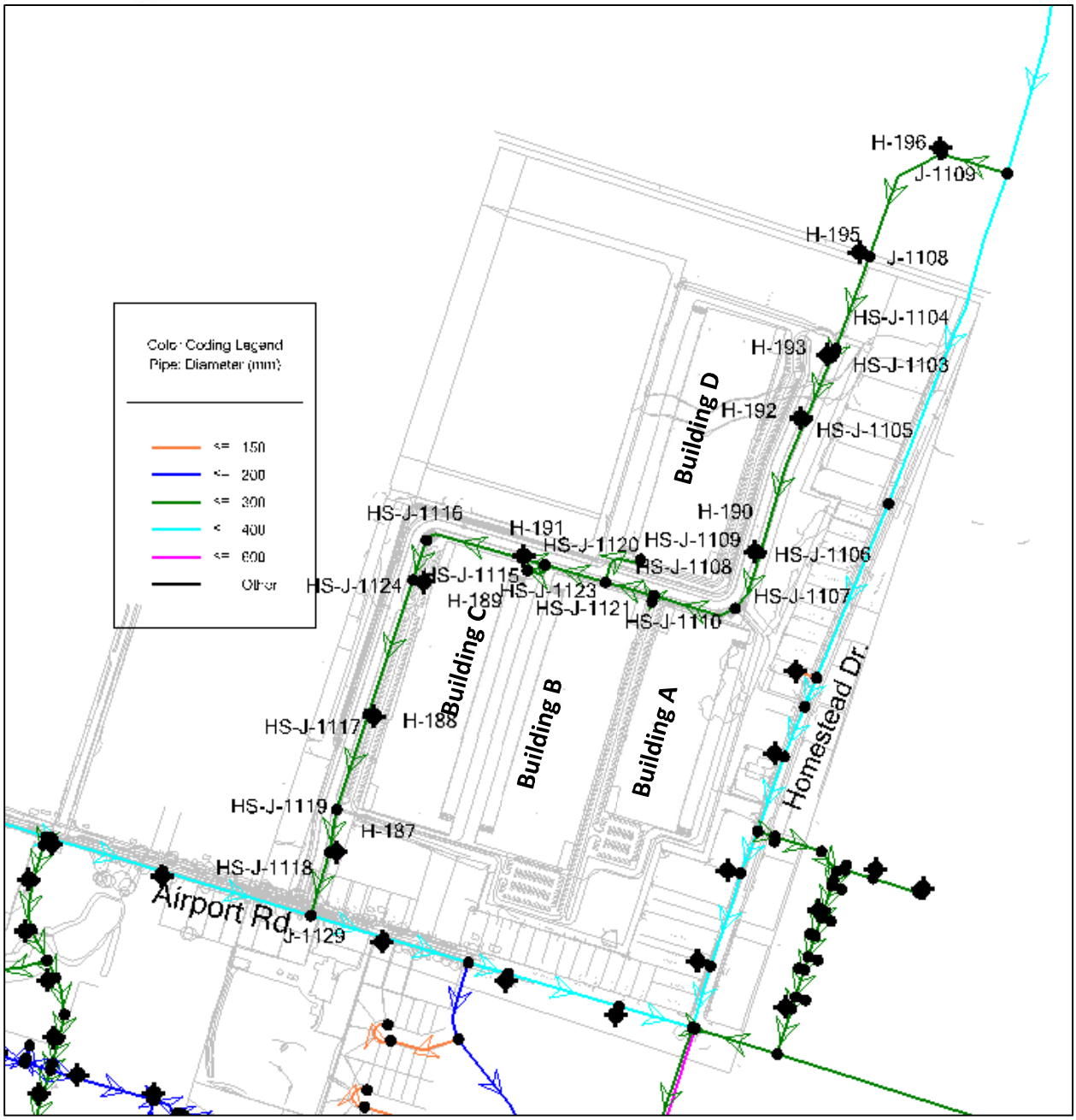



Figure A8 – Proposed 3054 Homestead Drive Development System (Option 2) Layout with Junction and Hydrant IDs

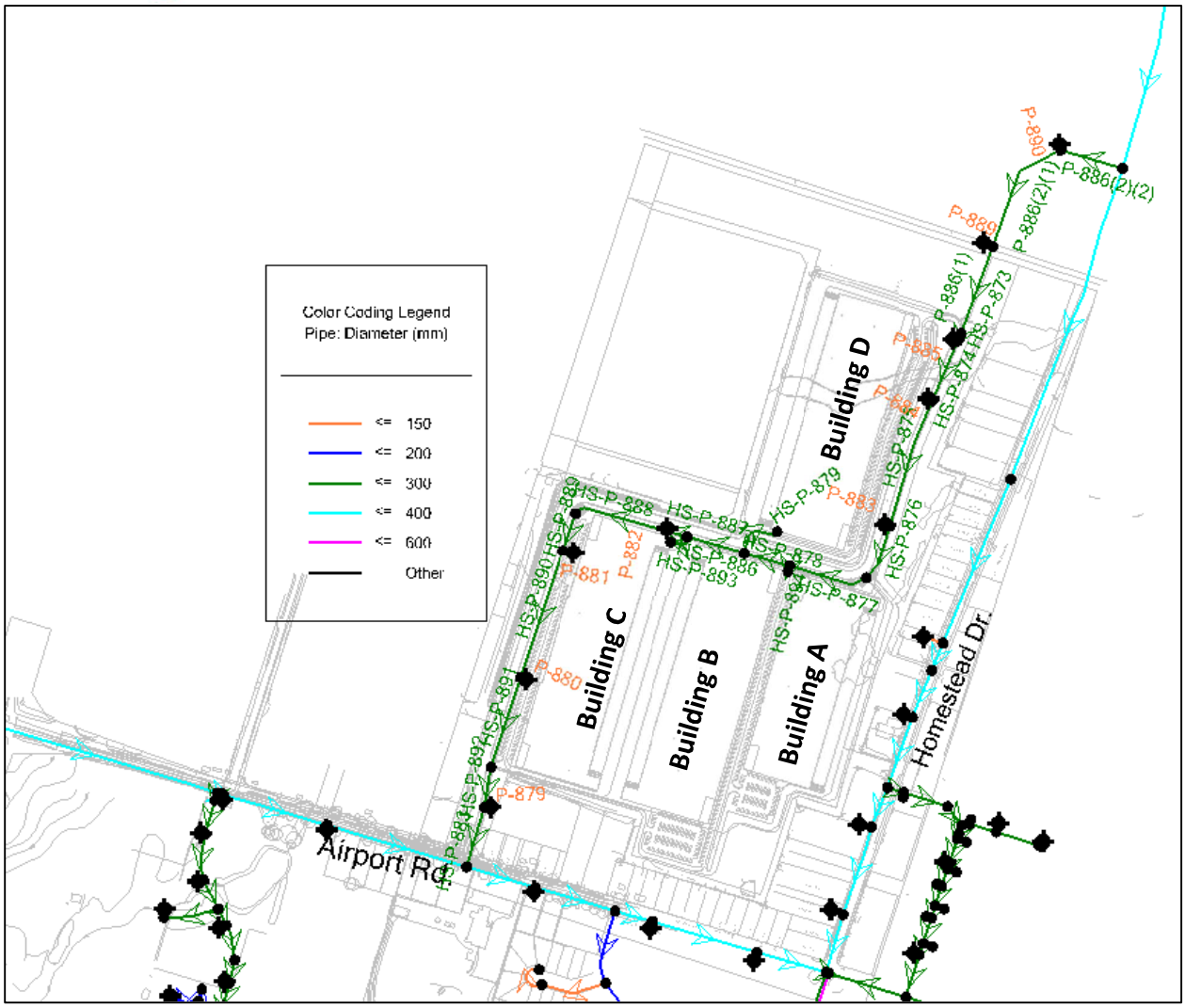



Figure A9 – Proposed 3054 Homestead Drive Development (Option 2) System Layout with Pipe IDs

# APPENDIX

# B

## PIPE AND JUNCTION TABLES

| 2021 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 271.99 | 358 |
| J-1103 | 235.24 | 0.00 | 271.98 | 360 |
| HS-J-1123 | 234.98 | 1.29 | 271.99 | 362 |
| HS-J-1115 | 234.91 | 0.00 | 271.99 | 363 |
| HS-J-1124 | 234.85 | 0.00 | 271.99 | 363 |
| HS-J-1117 | 234.54 | 0.00 | 271.99 | 367 |
| HS-J-1120 | 234.43 | 0.00 | 271.99 | 368 |
| HS-J-1119 | 232.92 | 0.00 | 271.99 | 382 |
| HS-J-1118 | 232.70 | 0.00 | 271.99 | 385 |
| J-1129 | 232.36 | 0.00 | 271.99 | 388 |
| | **Sum of Demand:** | **1.29** | **Min** | **358** |
| | | | **Max** | **388** |

| 2021 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.70 | 345 |
| J-1103 | 235.24 | 0.00 | 270.69 | 347 |
| HS-J-1123 | 234.98 | 2.46 | 270.70 | 350 |
| HS-J-1115 | 234.91 | 0.00 | 270.70 | 350 |
| HS-J-1124 | 234.85 | 0.00 | 270.70 | 351 |
| HS-J-1117 | 234.54 | 0.00 | 270.70 | 354 |
| HS-J-1120 | 234.43 | 0.00 | 270.70 | 355 |
| HS-J-1119 | 232.92 | 0.00 | 270.70 | 370 |
| HS-J-1118 | 232.70 | 0.00 | 270.70 | 372 |
| J-1129 | 232.36 | 0.00 | 270.71 | 375 |
| | **Sum of Demand:** | **2.46** | **Min** | **345** |
| | | | **Max** | **375** |

| 2021 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 266.04 | 300 |
| J-1103 | 235.24 | 0.00 | 266.07 | 302 |
| HS-J-1123 | 234.98 | 3.88 | 266.04 | 304 |
| HS-J-1115 | 234.91 | 0.00 | 266.04 | 305 |
| HS-J-1124 | 234.85 | 0.00 | 266.04 | 305 |
| HS-J-1117 | 234.54 | 0.00 | 266.04 | 308 |
| HS-J-1120 | 234.43 | 0.00 | 266.04 | 309 |
| HS-J-1119 | 232.92 | 0.00 | 266.05 | 324 |
| HS-J-1118 | 232.70 | 0.00 | 266.05 | 326 |
| J-1129 | 232.36 | 0.00 | 266.05 | 330 |
| | **Sum of Demand:** | **3.88** | **Min** | **300** |
| | | | **Max** | **330** |

| 2021 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.00 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.00 | 0.02 | 0.00 |

| 2021 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.46 | 0.03 | 0.01 |

| 2021 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |

# Junctions Tables
## Phase 1 - 50% TWL

| 2031 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 271.2 | 351 |
| J-1103 | 235.24 | 0.00 | 271.2 | 352 |
| HS-J-1123 | 234.98 | 1.29 | 271.2 | 355 |
| HS-J-1115 | 234.91 | 0.00 | 271.23 | 355 |
| HS-J-1124 | 234.85 | 0.00 | 271.23 | 356 |
| HS-J-1117 | 234.54 | 0.00 | 271.23 | 359 |
| HS-J-1120 | 234.43 | 0.00 | 271.23 | 360 |
| HS-J-1119 | 232.92 | 0.00 | 271.23 | 375 |
| HS-J-1118 | 232.70 | 0.00 | 271.23 | 377 |
| J-1129 | 232.36 | 0.00 | 271.23 | 380 |
| | **Sum of Demand:** | **1.29** | **Min** | **351** |
| | | | **Max** | **380** |

| 2031 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 269.42 | 333 |
| J-1103 | 235.24 | 0.00 | 269.41 | 334 |
| HS-J-1123 | 234.98 | 2.45 | 269.42 | 337 |
| HS-J-1115 | 234.91 | 0.00 | 269.42 | 338 |
| HS-J-1124 | 234.85 | 0.00 | 269.42 | 338 |
| HS-J-1117 | 234.54 | 0.00 | 269.43 | 341 |
| HS-J-1120 | 234.43 | 0.00 | 269.42 | 342 |
| HS-J-1119 | 232.92 | 0.00 | 269.43 | 357 |
| HS-J-1118 | 232.70 | 0.00 | 269.43 | 359 |
| J-1129 | 232.36 | 0.00 | 269.43 | 363 |
| | **Sum of Demand:** | **2.45** | **Min** | **333** |
| | | | **Max** | **363** |

| 2031 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 264.40 | 284 |
| J-1103 | 235.24 | 0.00 | 264.43 | 286 |
| HS-J-1123 | 234.98 | 3.88 | 264.39 | 288 |
| HS-J-1115 | 234.91 | 0.00 | 264.39 | 289 |
| HS-J-1124 | 234.85 | 0.00 | 264.40 | 289 |
| HS-J-1117 | 234.54 | 0.00 | 264.40 | 292 |
| HS-J-1120 | 234.43 | 0.00 | 264.39 | 293 |
| HS-J-1119 | 232.92 | 0.00 | 264.40 | 308 |
| HS-J-1118 | 232.70 | 0.00 | 264.40 | 310 |
| J-1129 | 232.36 | 0.00 | 264.40 | 314 |
| | **Sum of Demand:** | **3.88** | **Min** | **284** |
| | | | **Max** | **314** |

# Pipe Tables
## Phase 1 - 50% TWL

| 2031 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |

| 2031 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.45 | 0.03 | 0.01 |

| 2031 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |

| 2021 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 273.61 | 374 |
| J-1103 | 235.24 | 0.00 | 273.59 | 375 |
| HS-J-1123 | 234.98 | 1.29 | 273.60 | 378 |
| HS-J-1115 | 234.91 | 0.00 | 273.60 | 379 |
| HS-J-1124 | 234.85 | 0.00 | 273.61 | 379 |
| HS-J-1117 | 234.54 | 0.00 | 273.61 | 382 |
| HS-J-1120 | 234.43 | 0.00 | 273.60 | 383 |
| HS-J-1119 | 232.92 | 0.00 | 273.61 | 398 |
| HS-J-1118 | 232.70 | 0.00 | 273.61 | 400 |
| J-1129 | 232.36 | 0.00 | 273.61 | 404 |
| | **Sum of Demand:** | **1.29** | **Min** | **374** |
| | | | **Max** | **404** |

| 2021 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 272.19 | 360 |
| J-1103 | 235.24 | 0.00 | 272.17 | 361 |
| HS-J-1123 | 234.98 | 2.46 | 272.19 | 364 |
| HS-J-1115 | 234.91 | 0.00 | 272.19 | 365 |
| HS-J-1124 | 234.85 | 0.00 | 272.19 | 365 |
| HS-J-1117 | 234.54 | 0.00 | 272.19 | 368 |
| HS-J-1120 | 234.43 | 0.00 | 272.19 | 370 |
| HS-J-1119 | 232.92 | 0.00 | 272.19 | 384 |
| HS-J-1118 | 232.70 | 0.00 | 272.19 | 387 |
| J-1129 | 232.36 | 0.00 | 272.19 | 390 |
| | **Sum of Demand:** | **2.46** | **Min** | **360** |
| | | | **Max** | **390** |

| 2021 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 267.48 | 314 |
| J-1103 | 235.24 | 0.00 | 267.51 | 316 |
| HS-J-1123 | 234.98 | 3.88 | 267.48 | 318 |
| HS-J-1115 | 234.91 | 0.00 | 267.48 | 319 |
| HS-J-1124 | 234.85 | 0.00 | 267.49 | 319 |
| HS-J-1117 | 234.54 | 0.00 | 267.49 | 322 |
| HS-J-1120 | 234.43 | 0.00 | 267.48 | 323 |
| HS-J-1119 | 232.92 | 0.00 | 267.49 | 338 |
| HS-J-1118 | 232.70 | 0.00 | 267.49 | 341 |
| J-1129 | 232.36 | 0.00 | 267.49 | 344 |
| | **Sum of Demand:** | **3.88** | **Min** | **314** |
| | | | **Max** | **344** |

| 2021 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |

| 2021 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.46 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.46 | 0.03 | 0.01 |

| 2021 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |

# Junctions Tables
## Phase 1 - 70% TWL

| 2031 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 272.71 | 365 |
| J-1103 | 235.24 | 0.00 | 272.70 | 367 |
| HS-J-1123 | 234.98 | 1.29 | 272.71 | 369 |
| HS-J-1115 | 234.91 | 0.00 | 272.71 | 370 |
| HS-J-1124 | 234.85 | 0.00 | 272.71 | 370 |
| HS-J-1117 | 234.54 | 0.00 | 272.71 | 374 |
| HS-J-1120 | 234.43 | 0.00 | 272.71 | 375 |
| HS-J-1119 | 232.92 | 0.00 | 272.71 | 389 |
| HS-J-1118 | 232.70 | 0.00 | 272.71 | 392 |
| J-1129 | 232.36 | 0.00 | 272.71 | 395 |
| | **Sum of Demand:** | **1.29** | **Min** | **365** |
| | | | **Max** | **395** |

| 2031 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.90 | 347 |
| J-1103 | 235.24 | 0.00 | 270.88 | 349 |
| HS-J-1123 | 234.98 | 2.45 | 270.90 | 352 |
| HS-J-1115 | 234.91 | 0.00 | 270.90 | 352 |
| HS-J-1124 | 234.85 | 0.00 | 270.90 | 353 |
| HS-J-1117 | 234.54 | 0.00 | 270.90 | 356 |
| HS-J-1120 | 234.43 | 0.00 | 270.90 | 357 |
| HS-J-1119 | 232.92 | 0.00 | 270.90 | 372 |
| HS-J-1118 | 232.70 | 0.00 | 270.90 | 374 |
| J-1129 | 232.36 | 0.00 | 270.90 | 377 |
| | **Sum of Demand:** | **2.45** | **Min** | **347** |
| | | | **Max** | **377** |

| 2031 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 265.87 | 298 |
| J-1103 | 235.24 | 0.00 | 265.91 | 300 |
| HS-J-1123 | 234.98 | 3.88 | 265.87 | 302 |
| HS-J-1115 | 234.91 | 0.00 | 265.87 | 303 |
| HS-J-1124 | 234.85 | 0.00 | 265.87 | 304 |
| HS-J-1117 | 234.54 | 0.00 | 265.88 | 307 |
| HS-J-1120 | 234.43 | 0.00 | 265.87 | 308 |
| HS-J-1119 | 232.92 | 0.00 | 265.88 | 323 |
| HS-J-1118 | 232.70 | 0.00 | 265.88 | 325 |
| J-1129 | 232.36 | 0.00 | 265.88 | 328 |
| | **Sum of Demand:** | **3.88** | **Min** | **298** |
| | | | **Max** | **328** |

# Pipe Tables
## Phase 1 - 70% TWL

| 2031 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |

| 2031 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.45 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.45 | 0.03 | 0.01 |

| 2031 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -3.88 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |

# Junctions Tables
## Full Buildout - 50% TWL

| 2021 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 271.82 | 356 |
| J-1103 | 235.24 | 0.00 | 271.82 | 358 |
| HS-J-1123 | 234.98 | 1.29 | 271.81 | 360 |
| HS-J-1115 | 234.91 | 0.00 | 271.82 | 361 |
| HS-J-1124 | 234.85 | 0.00 | 271.82 | 362 |
| HS-J-1117 | 234.54 | 0.00 | 271.82 | 365 |
| HS-J-1120 | 234.43 | 0.00 | 271.82 | 366 |
| HS-J-1102 | 234.23 | 0.00 | 271.82 | 368 |
| HS-J-1121 | 234.00 | 1.43 | 271.81 | 370 |
| HS-J-1108 | 233.73 | 0.00 | 271.81 | 373 |
| HS-J-1110 | 233.44 | 0.99 | 271.81 | 376 |
| HS-J-1107 | 233.41 | 0.00 | 271.81 | 376 |
| HS-J-1109 | 232.98 | 1.29 | 271.81 | 380 |
| HS-J-1122 | 232.97 | 0.00 | 271.81 | 380 |
| HS-J-1119 | 232.92 | 0.00 | 271.82 | 381 |
| HS-J-1118 | 232.70 | 0.00 | 271.82 | 383 |
| J-1129 | 232.36 | 0.00 | 271.83 | 386 |
| HS-J-1106 | 232.22 | 0.00 | 271.81 | 388 |
| HS-J-1103 | 229.11 | 0.00 | 271.81 | 418 |
| HS-J-1104 | 229.04 | 0.00 | 271.81 | 419 |
| HS-J-1105 | 229.00 | 0.00 | 271.81 | 419 |
| | **Sum of Demand:** | **5.00** | **Min** | **356** |
| | | | **Max** | **419** |

# Junctions Tables
## Full Buildout - 50% TWL

| 2021 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.45 | 343 |
| J-1103 | 235.24 | 0.00 | 270.45 | 345 |
| HS-J-1123 | 234.98 | 2.45 | 270.44 | 347 |
| HS-J-1115 | 234.91 | 0.00 | 270.44 | 348 |
| HS-J-1124 | 234.85 | 0.00 | 270.45 | 348 |
| HS-J-1117 | 234.54 | 0.00 | 270.46 | 352 |
| HS-J-1120 | 234.43 | 0.00 | 270.44 | 352 |
| HS-J-1102 | 234.00 | 1.89 | 270.44 | 354 |
| HS-J-1121 | 233.73 | 0.00 | 270.44 | 357 |
| HS-J-1108 | 233.44 | 2.46 | 270.44 | 359 |
| HS-J-1110 | 233.41 | 0.00 | 270.44 | 362 |
| HS-J-1107 | 232.98 | 2.72 | 270.44 | 362 |
| HS-J-1109 | 232.92 | 0.00 | 270.44 | 367 |
| HS-J-1122 | 232.70 | 0.00 | 270.44 | 367 |
| HS-J-1119 | 232.36 | 0.00 | 270.46 | 367 |
| HS-J-1118 | 232.22 | 0.00 | 270.46 | 370 |
| J-1129 | 229.11 | 0.00 | 270.47 | 373 |
| HS-J-1106 | 229.04 | 0.00 | 270.44 | 374 |
| HS-J-1103 | 229.00 | 0.00 | 270.44 | 405 |
| HS-J-1104 | 228.18 | 0.00 | 270.44 | 405 |
| HS-J-1105 | 227.00 | 0.00 | 270.44 | 406 |
| | **Sum of Demand:** | **9.52** | **Min** | **343** |
| | | | **Max** | **406** |

# Junctions Tables
## Full Buildout - 50% TWL

| 2021 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1102 | 235.40 | 0.00 | 265.83 | 309 |
| HS-J-1122 | 235.24 | 0.00 | 265.82 | 321 |
| HS-J-1116 | 234.98 | 3.88 | 265.81 | 298 |
| J-1103 | 234.91 | 0.00 | 265.83 | 299 |
| HS-J-1123 | 234.85 | 0.00 | 265.81 | 302 |
| HS-J-1115 | 234.54 | 0.00 | 265.81 | 302 |
| HS-J-1124 | 234.43 | 0.00 | 265.82 | 303 |
| HS-J-1117 | 234.00 | 4.30 | 265.83 | 306 |
| HS-J-1120 | 233.73 | 0.00 | 265.81 | 307 |
| HS-J-1121 | 233.44 | 2.98 | 265.81 | 311 |
| HS-J-1108 | 233.41 | 0.00 | 265.81 | 314 |
| HS-J-1110 | 232.98 | 3.87 | 265.81 | 317 |
| HS-J-1107 | 232.92 | 0.00 | 265.82 | 317 |
| HS-J-1109 | 232.70 | 0.00 | 265.81 | 321 |
| HS-J-1119 | 232.36 | 0.00 | 265.83 | 322 |
| HS-J-1118 | 232.22 | 0.00 | 265.83 | 324 |
| J-1129 | 229.11 | 0.00 | 265.84 | 328 |
| HS-J-1106 | 229.04 | 0.00 | 265.82 | 329 |
| HS-J-1103 | 229.00 | 0.00 | 265.82 | 359 |
| HS-J-1104 | 228.18 | 0.00 | 265.82 | 360 |
| HS-J-1105 | 227.00 | 0.00 | 265.82 | 360 |
| | **Sum of Demand:** | **15.03** | **Min** | **298** |
| | | | **Max** | **360** |

# Pipe Tables
## Full Buildout - 50% TWL

| 2021 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 0.42 | 0.01 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.31 | 0.03 | 0.01 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 0.99 | 0.01 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |

# Pipe Tables
## Full Buildout - 50% TWL

| 2021 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 3.84 | 0.05 | 0.02 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 3.84 | 0.05 | 0.02 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 3.84 | 0.05 | 0.02 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 3.84 | 0.05 | 0.02 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 1.95 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 2.45 | 0.03 | 0.01 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -3.22 | 0.05 | 0.01 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -5.68 | 0.08 | 0.04 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 2.46 | 0.03 | 0.01 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 1.89 | 0.03 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |

# Pipe Tables
## Full Buildout - 50% TWL

| 2021 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 8.68 | 0.12 | 0.08 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 8.68 | 0.12 | 0.08 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 8.68 | 0.12 | 0.08 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 8.68 | 0.12 | 0.08 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 5.70 | 0.08 | 0.04 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 3.87 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -6.35 | 0.09 | 0.05 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.47 | 0.03 | 0.01 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -6.35 | 0.09 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -6.35 | 0.09 | 0.05 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -6.35 | 0.09 | 0.05 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -6.35 | 0.09 | 0.05 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -6.35 | 0.09 | 0.05 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -6.35 | 0.09 | 0.05 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 3.88 | 0.05 | 0.02 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 2.98 | 0.04 | 0.01 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |

# Junctions Tables
## Full Buildout - 50% TWL

| 2031 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.86 | 347 |
| J-1103 | 235.24 | 0.00 | 270.86 | 349 |
| HS-J-1123 | 234.98 | 1.29 | 270.86 | 351 |
| HS-J-1115 | 234.91 | 0.00 | 270.86 | 352 |
| HS-J-1124 | 234.85 | 0.00 | 270.86 | 352 |
| HS-J-1117 | 234.54 | 0.00 | 270.87 | 356 |
| HS-J-1120 | 234.43 | 0.00 | 270.86 | 357 |
| HS-J-1102 | 234.23 | 0.00 | 270.86 | 358 |
| HS-J-1121 | 234.00 | 1.43 | 270.86 | 361 |
| HS-J-1108 | 233.73 | 0.00 | 270.86 | 363 |
| HS-J-1110 | 233.44 | 0.99 | 270.86 | 366 |
| HS-J-1107 | 233.41 | 0.00 | 270.86 | 367 |
| HS-J-1109 | 232.98 | 1.29 | 270.86 | 371 |
| HS-J-1122 | 232.97 | 0.00 | 270.86 | 371 |
| HS-J-1119 | 232.92 | 0.00 | 270.87 | 371 |
| HS-J-1118 | 232.70 | 0.00 | 270.87 | 374 |
| J-1129 | 232.36 | 0.00 | 270.87 | 377 |
| HS-J-1106 | 232.22 | 0.00 | 270.86 | 378 |
| HS-J-1103 | 229.11 | 0.00 | 270.86 | 409 |
| HS-J-1104 | 229.04 | 0.00 | 270.86 | 409 |
| HS-J-1105 | 229.00 | 0.00 | 270.86 | 410 |
| | **Sum of Demand:** | **5.00** | **Min** | **347** |
| | | | **Max** | **410** |

# Junctions Tables
## Full Buildout - 50% TWL

| 2031 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 269.16 | 330 |
| J-1103 | 235.24 | 0.00 | 269.15 | 332 |
| HS-J-1123 | 234.98 | 2.45 | 269.15 | 334 |
| HS-J-1115 | 234.91 | 0.00 | 269.15 | 335 |
| HS-J-1124 | 234.85 | 0.00 | 269.16 | 336 |
| HS-J-1117 | 234.54 | 0.00 | 269.16 | 339 |
| HS-J-1120 | 234.43 | 0.00 | 269.15 | 340 |
| HS-J-1102 | 234.23 | 0.00 | 269.15 | 342 |
| HS-J-1121 | 234.00 | 1.89 | 269.15 | 344 |
| HS-J-1108 | 233.73 | 0.00 | 269.15 | 347 |
| HS-J-1110 | 233.44 | 2.46 | 269.15 | 349 |
| HS-J-1107 | 233.41 | 0.00 | 269.15 | 350 |
| HS-J-1109 | 232.98 | 2.72 | 269.15 | 354 |
| HS-J-1122 | 232.97 | 0.00 | 269.15 | 354 |
| HS-J-1119 | 232.92 | 0.00 | 269.17 | 355 |
| HS-J-1118 | 232.70 | 0.00 | 269.17 | 357 |
| J-1129 | 232.36 | 0.00 | 269.17 | 360 |
| HS-J-1106 | 232.22 | 0.00 | 269.15 | 361 |
| HS-J-1103 | 229.11 | 0.00 | 269.15 | 392 |
| HS-J-1104 | 229.04 | 0.00 | 269.15 | 393 |
| HS-J-1105 | 229.00 | 0.00 | 269.15 | 393 |
| | **Sum of Demand:** | **9.52** | **Min** | **330** |
| | | | **Max** | **393** |

# Junctions Tables
## Full Buildout - 50% TWL

| 2031 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 263.89 | 279 |
| J-1103 | 235.24 | 0.00 | 263.91 | 281 |
| HS-J-1123 | 234.98 | 3.88 | 263.88 | 283 |
| HS-J-1115 | 234.91 | 0.00 | 263.88 | 284 |
| HS-J-1124 | 234.85 | 0.00 | 263.89 | 284 |
| HS-J-1117 | 234.54 | 0.00 | 263.90 | 287 |
| HS-J-1120 | 234.43 | 0.00 | 263.88 | 288 |
| HS-J-1102 | 234.23 | 0.00 | 263.90 | 290 |
| HS-J-1121 | 234.00 | 4.30 | 263.88 | 292 |
| HS-J-1108 | 233.73 | 0.00 | 263.89 | 295 |
| HS-J-1110 | 233.44 | 2.98 | 263.89 | 298 |
| HS-J-1107 | 233.41 | 0.00 | 263.89 | 298 |
| HS-J-1109 | 232.98 | 3.87 | 263.88 | 302 |
| HS-J-1122 | 232.97 | 0.00 | 263.90 | 303 |
| HS-J-1119 | 232.92 | 0.00 | 263.91 | 303 |
| HS-J-1118 | 232.70 | 0.00 | 263.91 | 305 |
| J-1129 | 232.36 | 0.00 | 263.91 | 309 |
| HS-J-1106 | 232.22 | 0.00 | 263.89 | 310 |
| HS-J-1103 | 229.11 | 0.00 | 263.89 | 340 |
| HS-J-1104 | 229.04 | 0.00 | 263.89 | 341 |
| HS-J-1105 | 229.00 | 0.00 | 263.89 | 342 |
| | **Sum of Demand:** | **15.03** | **Min** | **279** |
| | | | **Max** | **342** |

# Pipe Tables
## Full Buildout - 50% TWL

| 2031 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 0.42 | 0.01 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 0.99 | 0.01 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.31 | 0.03 | 0.01 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |

# Pipe Tables
## Full Buildout - 50% TWL

| 2031 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 1.39 | 0.02 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 2.46 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 2.45 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 2.72 | 0.04 | 0.01 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -3.22 | 0.05 | 0.01 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 3.85 | 0.05 | 0.02 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 3.85 | 0.05 | 0.02 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 3.85 | 0.05 | 0.02 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 3.85 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -5.67 | 0.08 | 0.04 |

# Pipe Tables
## Full Buildout - 50% TWL

| 2031 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 2.98 | 0.04 | 0.01 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 5.77 | 0.08 | 0.04 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 3.88 | 0.05 | 0.02 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 3.87 | 0.05 | 0.02 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 8.75 | 0.12 | 0.08 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 8.75 | 0.12 | 0.08 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 8.75 | 0.12 | 0.08 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 8.75 | 0.12 | 0.08 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.40 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -6.28 | 0.09 | 0.04 |

# Junctions Tables
## Full Buildout - 70% TWL

| 2021 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 273.43 | 372 |
| J-1103 | 235.24 | 0.00 | 273.43 | 374 |
| HS-J-1123 | 234.98 | 1.29 | 273.43 | 376 |
| HS-J-1115 | 234.91 | 0.00 | 273.43 | 377 |
| HS-J-1124 | 234.85 | 0.00 | 273.43 | 378 |
| HS-J-1117 | 234.54 | 0.00 | 273.43 | 381 |
| HS-J-1120 | 234.43 | 0.00 | 273.43 | 382 |
| HS-J-1102 | 234.23 | 0.00 | 273.43 | 384 |
| HS-J-1121 | 234.00 | 1.43 | 273.43 | 386 |
| HS-J-1108 | 233.73 | 0.00 | 273.43 | 388 |
| HS-J-1110 | 233.44 | 0.99 | 273.43 | 391 |
| HS-J-1107 | 233.41 | 0.00 | 273.43 | 392 |
| HS-J-1109 | 232.98 | 1.29 | 273.43 | 396 |
| HS-J-1122 | 232.97 | 0.00 | 273.43 | 396 |
| HS-J-1119 | 232.92 | 0.00 | 273.44 | 397 |
| HS-J-1118 | 232.70 | 0.00 | 273.44 | 399 |
| J-1129 | 232.36 | 0.00 | 273.44 | 402 |
| HS-J-1106 | 232.22 | 0.00 | 273.43 | 403 |
| HS-J-1103 | 229.11 | 0.00 | 273.43 | 434 |
| HS-J-1104 | 229.04 | 0.00 | 273.43 | 434 |
| HS-J-1105 | 229.00 | 0.00 | 273.43 | 435 |
| | **Sum of Demand:** | **5.01** | **Min** | **372** |
| | | | **Max** | **435** |

# Junctions Tables
## Full Buildout - 70% TWL

| 2021 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 271.93 | 358 |
| J-1103 | 235.24 | 0.00 | 271.93 | 359 |
| HS-J-1123 | 234.98 | 2.46 | 271.93 | 362 |
| HS-J-1115 | 234.91 | 0.00 | 271.93 | 362 |
| HS-J-1124 | 234.85 | 0.00 | 271.94 | 363 |
| HS-J-1117 | 234.54 | 0.00 | 271.94 | 366 |
| HS-J-1120 | 234.43 | 0.00 | 271.93 | 367 |
| HS-J-1102 | 234.23 | 0.00 | 271.93 | 369 |
| HS-J-1121 | 234.00 | 2.72 | 271.93 | 371 |
| HS-J-1108 | 233.73 | 0.00 | 271.93 | 374 |
| HS-J-1110 | 233.44 | 1.89 | 271.93 | 377 |
| HS-J-1107 | 233.41 | 0.00 | 271.93 | 377 |
| HS-J-1109 | 232.98 | 2.45 | 271.93 | 381 |
| HS-J-1122 | 232.97 | 0.00 | 271.93 | 381 |
| HS-J-1119 | 232.92 | 0.00 | 271.95 | 382 |
| HS-J-1118 | 232.70 | 0.00 | 271.95 | 384 |
| J-1129 | 232.36 | 0.00 | 271.95 | 387 |
| HS-J-1106 | 232.22 | 0.00 | 271.93 | 389 |
| HS-J-1103 | 229.11 | 0.00 | 271.93 | 419 |
| HS-J-1104 | 229.04 | 0.00 | 271.93 | 420 |
| HS-J-1105 | 229.00 | 0.00 | 271.93 | 420 |
| | **Sum of Demand:** | **9.52** | **Min** | **358** |
| | | | **Max** | **420** |

# Junctions Tables
## Full Buildout - 70% TWL

| 2021 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 267.27 | 312 |
| J-1103 | 235.24 | 0.00 | 267.29 | 314 |
| HS-J-1123 | 234.98 | 3.88 | 267.26 | 316 |
| HS-J-1115 | 234.91 | 0.00 | 267.26 | 317 |
| HS-J-1124 | 234.85 | 0.00 | 267.27 | 317 |
| HS-J-1117 | 234.54 | 0.00 | 267.28 | 320 |
| HS-J-1120 | 234.43 | 0.00 | 267.26 | 321 |
| HS-J-1102 | 234.23 | 0.00 | 267.28 | 323 |
| HS-J-1121 | 234.00 | 4.30 | 267.26 | 326 |
| HS-J-1108 | 233.73 | 0.00 | 267.26 | 328 |
| HS-J-1110 | 233.44 | 2.98 | 267.26 | 331 |
| HS-J-1107 | 233.41 | 0.00 | 267.27 | 331 |
| HS-J-1109 | 232.98 | 3.87 | 267.26 | 335 |
| HS-J-1122 | 232.97 | 0.00 | 267.27 | 336 |
| HS-J-1119 | 232.92 | 0.00 | 267.29 | 336 |
| HS-J-1118 | 232.70 | 0.00 | 267.29 | 339 |
| J-1129 | 232.36 | 0.00 | 267.29 | 342 |
| HS-J-1106 | 232.22 | 0.00 | 267.27 | 343 |
| HS-J-1103 | 229.11 | 0.00 | 267.27 | 373 |
| HS-J-1104 | 229.04 | 0.00 | 267.27 | 374 |
| HS-J-1105 | 229.00 | 0.00 | 267.27 | 375 |
| | **Sum of Demand:** | **15.03** | **Min** | **312** |
| | | | **Max** | **375** |

# Pipe Tables
## Full Buildout - 50% TWL

| 2021 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 0.99 | 0.01 | 0.00 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 0.42 | 0.01 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 1.41 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.31 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -3.60 | 0.05 | 0.02 |

# Pipe Tables
## Full Buildout - 50% TWL

| 2021 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 1.89 | 0.03 | 0.00 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 1.88 | 0.03 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 2.46 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 2.45 | 0.03 | 0.01 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 3.77 | 0.05 | 0.02 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 3.77 | 0.05 | 0.02 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 3.77 | 0.05 | 0.02 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 3.77 | 0.05 | 0.02 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -3.29 | 0.05 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -5.75 | 0.08 | 0.04 |

# Pipe Tables
## Full Buildout - 50% TWL

| 2021 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 2.98 | 0.04 | 0.01 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 5.64 | 0.08 | 0.04 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 3.88 | 0.05 | 0.02 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 3.87 | 0.05 | 0.02 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 8.62 | 0.12 | 0.08 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 8.62 | 0.12 | 0.08 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 8.62 | 0.12 | 0.08 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 8.62 | 0.12 | 0.08 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.53 | 0.04 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -6.41 | 0.09 | 0.05 |

# Junctions Tables
## Full Buildout - 70% TWL

| 2031 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 272.33 | 361 |
| J-1103 | 235.24 | 0.00 | 272.33 | 363 |
| HS-J-1123 | 234.98 | 1.29 | 272.33 | 366 |
| HS-J-1115 | 234.91 | 0.00 | 272.33 | 366 |
| HS-J-1124 | 234.85 | 0.00 | 272.33 | 367 |
| HS-J-1117 | 234.54 | 0.00 | 272.34 | 370 |
| HS-J-1120 | 234.43 | 0.00 | 272.33 | 371 |
| HS-J-1102 | 234.23 | 0.00 | 272.33 | 373 |
| HS-J-1121 | 234.00 | 1.43 | 272.33 | 375 |
| HS-J-1108 | 233.73 | 0.00 | 272.33 | 378 |
| HS-J-1110 | 233.44 | 0.99 | 272.33 | 381 |
| HS-J-1107 | 233.41 | 0.00 | 272.33 | 381 |
| HS-J-1109 | 232.98 | 1.29 | 272.33 | 385 |
| HS-J-1122 | 232.97 | 0.00 | 272.33 | 385 |
| HS-J-1119 | 232.92 | 0.00 | 272.34 | 386 |
| HS-J-1118 | 232.70 | 0.00 | 272.34 | 388 |
| J-1129 | 232.36 | 0.00 | 272.34 | 391 |
| HS-J-1106 | 232.22 | 0.00 | 272.33 | 393 |
| HS-J-1103 | 229.11 | 0.00 | 272.33 | 423 |
| HS-J-1104 | 229.04 | 0.00 | 272.33 | 424 |
| HS-J-1105 | 229.00 | 0.00 | 272.33 | 424 |
| | **Sum of Demand:** | **5.01** | **Min** | **361** |
| | | | **Max** | **424** |

# Junctions Tables
## Full Buildout - 70% TWL

| 2031 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.63 | 345 |
| J-1103 | 235.24 | 0.00 | 270.63 | 346 |
| HS-J-1123 | 234.98 | 2.45 | 270.62 | 349 |
| HS-J-1115 | 234.91 | 0.00 | 270.63 | 350 |
| HS-J-1124 | 234.85 | 0.00 | 270.63 | 350 |
| HS-J-1117 | 234.54 | 0.00 | 270.64 | 353 |
| HS-J-1120 | 234.43 | 0.00 | 270.62 | 354 |
| HS-J-1102 | 234.23 | 0.00 | 270.63 | 356 |
| HS-J-1121 | 234.00 | 1.89 | 270.62 | 358 |
| HS-J-1108 | 233.73 | 0.00 | 270.62 | 361 |
| HS-J-1110 | 233.44 | 2.46 | 270.62 | 364 |
| HS-J-1107 | 233.41 | 0.00 | 270.63 | 364 |
| HS-J-1109 | 232.98 | 2.72 | 270.62 | 368 |
| HS-J-1122 | 232.97 | 0.00 | 270.63 | 369 |
| HS-J-1119 | 232.92 | 0.00 | 270.64 | 369 |
| HS-J-1118 | 232.70 | 0.00 | 270.65 | 371 |
| J-1129 | 232.36 | 0.00 | 270.65 | 375 |
| HS-J-1106 | 232.22 | 0.00 | 270.63 | 376 |
| HS-J-1103 | 229.11 | 0.00 | 270.63 | 406 |
| HS-J-1104 | 229.04 | 0.00 | 270.63 | 407 |
| HS-J-1105 | 229.00 | 0.00 | 270.63 | 407 |
| | **Sum of Demand:** | **9.52** | **Min** | **345** |
| | | | **Max** | **407** |

# Junctions Tables
## Full Buildout - 70% TWL

| 2031 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 265.37 | 293 |
| J-1103 | 235.24 | 0.00 | 265.39 | 295 |
| HS-J-1123 | 234.98 | 4.00 | 265.36 | 297 |
| HS-J-1115 | 234.91 | 0.00 | 265.36 | 298 |
| HS-J-1124 | 234.85 | 0.00 | 265.37 | 299 |
| HS-J-1117 | 234.54 | 0.00 | 265.38 | 302 |
| HS-J-1120 | 234.43 | 0.00 | 265.36 | 303 |
| HS-J-1102 | 234.23 | 0.00 | 265.38 | 305 |
| HS-J-1121 | 234.00 | 4.00 | 265.36 | 307 |
| HS-J-1108 | 233.73 | 0.00 | 265.36 | 310 |
| HS-J-1110 | 233.44 | 3.00 | 265.36 | 312 |
| HS-J-1107 | 233.41 | 0.00 | 265.37 | 313 |
| HS-J-1109 | 232.98 | 4.00 | 265.36 | 317 |
| HS-J-1122 | 232.97 | 0.00 | 265.37 | 317 |
| HS-J-1119 | 232.92 | 0.00 | 265.38 | 318 |
| HS-J-1118 | 232.70 | 0.00 | 265.38 | 320 |
| J-1129 | 232.36 | 0.00 | 265.39 | 323 |
| HS-J-1106 | 232.22 | 0.00 | 265.37 | 324 |
| HS-J-1103 | 229.11 | 0.00 | 265.37 | 355 |
| HS-J-1104 | 229.04 | 0.00 | 265.37 | 356 |
| HS-J-1105 | 229.00 | 0.00 | 265.37 | 356 |
| | **Sum of Demand:** | **15.00** | **Min** | **293** |
| | | | **Max** | **356** |

# Pipe Tables
## Full Buildout - 70% TWL

| 2031 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 0.99 | 0.01 | 0.00 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 0.33 | 0.00 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 1.29 | 0.02 | 0.00 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 1.32 | 0.02 | 0.00 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 1.32 | 0.02 | 0.00 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 1.32 | 0.02 | 0.00 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 1.32 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.40 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -3.69 | 0.05 | 0.02 |

Pipe Tables
Full Buildout - 70% TWL

| 2031 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 2.46 | 0.03 | 0.01 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 1.32 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 2.45 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 2.72 | 0.04 | 0.01 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 3.78 | 0.05 | 0.02 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 3.78 | 0.05 | 0.02 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 3.78 | 0.05 | 0.02 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 3.78 | 0.05 | 0.02 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -3.29 | 0.05 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -5.74 | 0.08 | 0.04 |

# Pipe Tables
## Full Buildout - 70% TWL

| 2031 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300.00 | 120.00 | 2.98 | 0.04 | 0.01 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300.00 | 120.00 | 0.00 | 0.00 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300.00 | 120.00 | 5.72 | 0.08 | 0.04 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300.00 | 120.00 | 3.88 | 0.05 | 0.02 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300.00 | 120.00 | 3.87 | 0.05 | 0.02 |
| HS-P-872 | HS-J-1122 | HS-J-1107 | 23.77 | 300.00 | 120.00 | 8.70 | 0.12 | 0.08 |
| HS-P-871 | HS-J-1102 | HS-J-1122 | 86.87 | 300.00 | 120.00 | 8.70 | 0.12 | 0.08 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300.00 | 120.00 | 8.70 | 0.12 | 0.08 |
| HS-P-870 | J-1103 | HS-J-1102 | 83.52 | 300.00 | 120.00 | 8.70 | 0.12 | 0.08 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300.00 | 120.00 | -2.45 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300.00 | 120.00 | -6.33 | 0.09 | 0.04 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300.00 | 120.00 | -6.33 | 0.09 | 0.04 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300.00 | 120.00 | -6.33 | 0.09 | 0.04 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300.00 | 120.00 | -6.33 | 0.09 | 0.04 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300.00 | 120.00 | -6.33 | 0.09 | 0.05 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300.00 | 120.00 | -6.33 | 0.09 | 0.05 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300.00 | 120.00 | -6.33 | 0.09 | 0.04 |

# Junctions Tables
## Full Buildout (Option 2) - 50% TWL

| 2021 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 273.47 | 357 |
| J-1103 | 235.24 | 0.00 | 273.43 | 358 |
| HS-J-1123 | 234.98 | 1.29 | 273.47 | 361 |
| HS-J-1115 | 234.91 | 0.00 | 273.47 | 362 |
| HS-J-1124 | 234.85 | 0.00 | 273.47 | 362 |
| HS-J-1117 | 234.54 | 0.00 | 273.47 | 365 |
| HS-J-1120 | 234.43 | 0.00 | 273.47 | 366 |
| HS-J-1121 | 234.00 | 1.43 | 273.47 | 371 |
| HS-J-1108 | 233.73 | 0.00 | 273.47 | 373 |
| HS-J-1110 | 233.44 | 0.99 | 273.47 | 376 |
| HS-J-1107 | 233.41 | 0.00 | 273.48 | 376 |
| HS-J-1109 | 232.98 | 1.29 | 273.47 | 381 |
| HS-J-1119 | 232.92 | 0.00 | 273.47 | 381 |
| HS-J-1118 | 232.70 | 0.00 | 273.47 | 383 |
| J-1129 | 232.36 | 0.00 | 273.47 | 387 |
| HS-J-1106 | 232.22 | 0.00 | 273.48 | 388 |
| HS-J-1103 | 229.11 | 0.00 | 273.49 | 419 |
| HS-J-1104 | 229.04 | 0.00 | 273.49 | 419 |
| HS-J-1105 | 229.00 | 0.00 | 273.49 | 420 |
| J-1108 | 228.18 | 0.00 | 273.50 | 428 |
| J-1109 | 227.00 | 0.00 | 273.51 | 439 |
| | **Sum of Demand:** | **5.01** | **Min** | **357** |
| | | | **Max** | **439** |

# Junctions Tables
## Full Buildout (Option 2) - 50% TWL

| 2021 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.50 | 344 |
| J-1103 | 235.24 | 0.00 | 270.46 | 345 |
| HS-J-1123 | 234.98 | 2.46 | 270.50 | 348 |
| HS-J-1115 | 234.91 | 0.00 | 270.50 | 348 |
| HS-J-1124 | 234.85 | 0.00 | 270.50 | 349 |
| HS-J-1117 | 234.54 | 0.00 | 270.50 | 352 |
| HS-J-1120 | 234.43 | 0.00 | 270.50 | 353 |
| HS-J-1121 | 234.00 | 2.72 | 270.50 | 357 |
| HS-J-1108 | 233.73 | 0.00 | 270.50 | 360 |
| HS-J-1110 | 233.44 | 1.89 | 270.50 | 363 |
| HS-J-1107 | 233.41 | 0.00 | 270.51 | 363 |
| HS-J-1109 | 232.98 | 2.45 | 270.50 | 367 |
| HS-J-1119 | 232.92 | 0.00 | 270.50 | 368 |
| HS-J-1118 | 232.70 | 0.00 | 270.50 | 370 |
| J-1129 | 232.36 | 0.00 | 270.50 | 373 |
| HS-J-1106 | 232.22 | 0.00 | 270.51 | 375 |
| HS-J-1103 | 229.11 | 0.00 | 270.53 | 405 |
| HS-J-1104 | 229.04 | 0.00 | 270.53 | 406 |
| HS-J-1105 | 229.00 | 0.00 | 270.52 | 406 |
| J-1108 | 228.18 | 0.00 | 270.54 | 415 |
| J-1109 | 227.00 | 0.00 | 270.55 | 426 |
| | **Sum of Demand:** | **9.52** | **Min** | **344** |
| | | | **Max** | **426** |

# Junctions Tables
## Full Buildout (Option 2) - 50% TWL

| 2021 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 265.67 | 296 |
| J-1103 | 235.24 | 0.00 | 265.65 | 298 |
| HS-J-1123 | 234.98 | 3.88 | 265.67 | 300 |
| HS-J-1115 | 234.91 | 0.00 | 265.67 | 301 |
| HS-J-1124 | 234.85 | 0.00 | 265.67 | 302 |
| HS-J-1117 | 234.54 | 0.00 | 265.68 | 305 |
| HS-J-1120 | 234.43 | 0.00 | 265.67 | 306 |
| HS-J-1121 | 234.00 | 4.30 | 265.67 | 310 |
| HS-J-1108 | 233.73 | 0.00 | 265.68 | 313 |
| HS-J-1110 | 233.44 | 2.98 | 265.68 | 316 |
| HS-J-1107 | 233.41 | 0.00 | 265.70 | 316 |
| HS-J-1109 | 232.98 | 3.87 | 265.67 | 320 |
| HS-J-1119 | 232.92 | 0.00 | 265.68 | 321 |
| HS-J-1118 | 232.70 | 0.00 | 265.68 | 323 |
| J-1129 | 232.36 | 0.00 | 265.68 | 326 |
| HS-J-1106 | 232.22 | 0.00 | 265.71 | 328 |
| HS-J-1103 | 229.11 | 0.00 | 265.75 | 359 |
| HS-J-1104 | 229.04 | 0.00 | 265.75 | 359 |
| HS-J-1105 | 229.00 | 0.00 | 265.74 | 360 |
| J-1108 | 228.18 | 0.00 | 265.77 | 368 |
| J-1109 | 227.00 | 0.00 | 265.80 | 380 |
| | **Sum of Demand:** | **15.03** | **Min** | **296** |
| | | | **Max** | **380** |

# Pipe Tables
## Full Buildout (Option 2) - 50% TWL

| 2021 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 0.99 | 0.01 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 2.45 | 0.03 | 0.01 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.17 | 0.07 | 0.03 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -6.17 | 0.09 | 0.04 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -6.17 | 0.09 | 0.04 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -6.17 | 0.09 | 0.04 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -6.17 | 0.09 | 0.04 |

# Pipe Tables
## Full Buildout (Option 2) - 50% TWL

| 2021 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 1.89 | 0.03 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.16 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 2.45 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.46 | 0.03 | 0.01 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 0.30 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.48 | 0.08 | 0.03 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -7.37 | 0.10 | 0.06 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -7.37 | 0.10 | 0.06 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 7.37 | 0.10 | 0.06 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 7.37 | 0.10 | 0.06 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 7.37 | 0.10 | 0.06 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -7.37 | 0.10 | 0.06 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 7.37 | 0.10 | 0.06 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -7.37 | 0.10 | 0.06 |

# Pipe Tables
## Full Buildout (Option 2) - 50% TWL

| 2021 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 2.98 | 0.04 | 0.01 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.48 | 0.04 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 3.87 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 1.40 | 0.02 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 9.57 | 0.14 | 0.10 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -12.55 | 0.18 | 0.16 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -12.55 | 0.18 | 0.16 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 12.55 | 0.18 | 0.16 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 12.55 | 0.18 | 0.16 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 12.55 | 0.18 | 0.16 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -12.55 | 0.18 | 0.16 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 12.55 | 0.18 | 0.16 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -12.55 | 0.18 | 0.16 |

# Junctions Tables
## Full Buildout (Option 2) - 50% TWL

| 2031 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.91 | 348 |
| J-1103 | 235.24 | 0.00 | 270.87 | 349 |
| HS-J-1123 | 234.98 | 1.29 | 270.91 | 352 |
| HS-J-1115 | 234.91 | 0.00 | 270.91 | 352 |
| HS-J-1124 | 234.85 | 0.00 | 270.91 | 353 |
| HS-J-1117 | 234.54 | 0.00 | 270.91 | 356 |
| HS-J-1120 | 234.43 | 0.00 | 270.91 | 357 |
| HS-J-1121 | 234.00 | 1.43 | 270.91 | 361 |
| HS-J-1108 | 233.73 | 0.00 | 270.92 | 364 |
| HS-J-1110 | 233.44 | 0.99 | 270.92 | 367 |
| HS-J-1107 | 233.41 | 0.00 | 270.92 | 367 |
| HS-J-1109 | 232.98 | 1.29 | 270.91 | 371 |
| HS-J-1119 | 232.92 | 0.00 | 270.91 | 372 |
| HS-J-1118 | 232.70 | 0.00 | 270.91 | 374 |
| J-1129 | 232.36 | 0.00 | 270.91 | 377 |
| HS-J-1106 | 232.22 | 0.00 | 270.93 | 379 |
| HS-J-1103 | 229.11 | 0.00 | 270.94 | 409 |
| HS-J-1104 | 229.04 | 0.00 | 270.94 | 410 |
| HS-J-1105 | 229.00 | 0.00 | 270.93 | 410 |
| J-1108 | 228.18 | 0.00 | 270.95 | 419 |
| J-1109 | 227.00 | 0.00 | 270.95 | 430 |
| | **Sum of Demand:** | **5.01** | **Min** | **348** |
| | | | **Max** | **430** |

# Junctions Tables
## Full Buildout (Option 2) - 50% TWL

| 2031 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 269.40 | 333 |
| J-1103 | 235.24 | 0.00 | 269.36 | 334 |
| HS-J-1123 | 234.98 | 2.45 | 269.40 | 337 |
| HS-J-1115 | 234.91 | 0.00 | 269.40 | 338 |
| HS-J-1124 | 234.85 | 0.00 | 269.40 | 338 |
| HS-J-1117 | 234.54 | 0.00 | 269.40 | 341 |
| HS-J-1120 | 234.43 | 0.00 | 269.40 | 342 |
| HS-J-1121 | 234.00 | 1.89 | 269.40 | 346 |
| HS-J-1108 | 233.73 | 0.00 | 269.41 | 349 |
| HS-J-1110 | 233.44 | 2.46 | 269.41 | 352 |
| HS-J-1107 | 233.41 | 0.00 | 269.41 | 352 |
| HS-J-1109 | 232.98 | 2.72 | 269.40 | 356 |
| HS-J-1119 | 232.92 | 0.00 | 269.40 | 357 |
| HS-J-1118 | 232.70 | 0.00 | 269.40 | 359 |
| J-1129 | 232.36 | 0.00 | 269.40 | 363 |
| HS-J-1106 | 232.22 | 0.00 | 269.42 | 364 |
| HS-J-1103 | 229.11 | 0.00 | 269.44 | 395 |
| HS-J-1104 | 229.04 | 0.00 | 269.44 | 395 |
| HS-J-1105 | 229.00 | 0.00 | 269.43 | 396 |
| J-1108 | 228.18 | 0.00 | 269.45 | 404 |
| J-1109 | 227.00 | 0.00 | 269.46 | 416 |
| | **Sum of Demand:** | **9.52** | **Min** | **333** |
| | | | **Max** | **416** |

# Junctions Tables
## Full Buildout (Option 2) - 50% TWL

| 2031 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 264.00 | 280 |
| J-1103 | 235.24 | 0.00 | 263.96 | 281 |
| HS-J-1123 | 234.98 | 3.88 | 263.99 | 284 |
| HS-J-1115 | 234.91 | 0.00 | 263.99 | 285 |
| HS-J-1124 | 234.85 | 0.00 | 264.00 | 285 |
| HS-J-1117 | 234.54 | 0.00 | 264.00 | 288 |
| HS-J-1120 | 234.43 | 0.00 | 263.99 | 289 |
| HS-J-1121 | 234.00 | 4.30 | 264.00 | 294 |
| HS-J-1108 | 233.73 | 0.00 | 264.00 | 296 |
| HS-J-1110 | 233.44 | 2.98 | 264.00 | 299 |
| HS-J-1107 | 233.41 | 0.00 | 264.02 | 300 |
| HS-J-1109 | 232.98 | 3.87 | 263.99 | 304 |
| HS-J-1119 | 232.92 | 0.00 | 264.00 | 304 |
| HS-J-1118 | 232.70 | 0.00 | 264.00 | 306 |
| J-1129 | 232.36 | 0.00 | 264.00 | 310 |
| HS-J-1106 | 232.22 | 0.00 | 264.04 | 311 |
| HS-J-1103 | 229.11 | 0.00 | 264.09 | 342 |
| HS-J-1104 | 229.04 | 0.00 | 264.09 | 343 |
| HS-J-1105 | 229.00 | 0.00 | 264.07 | 343 |
| J-1108 | 228.18 | 0.00 | 264.11 | 352 |
| J-1109 | 227.00 | 0.00 | 264.14 | 363 |
| | **Sum of Demand:** | **15.03** | **Min** | **280** |
| | | | **Max** | **363** |

# Pipe Tables
## Full Buildout (Option 2) - 50% TWL

| 2031 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 0.99 | 0.01 | 0.00 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | 1.67 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 2.97 | 0.04 | 0.01 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.69 | 0.08 | 0.04 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -6.68 | 0.09 | 0.05 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -6.68 | 0.09 | 0.05 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 6.68 | 0.09 | 0.05 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 6.68 | 0.09 | 0.05 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 6.68 | 0.09 | 0.05 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -6.68 | 0.09 | 0.05 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 6.68 | 0.09 | 0.05 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -6.68 | 0.09 | 0.05 |

# Pipe Tables
## Full Buildout (Option 2) - 50% TWL

| 2031 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 2.459 | 0.0 | 0.0 |
| P-879 | HS-J-1118 | H-187 | 6.1 | 150 | 100 | 0 | 0.0 | 0.0 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.29 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 2.72 | 0.04 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.45 | 0.03 | 0.01 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.77 | 0.08 | 0.04 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -8.23 | 0.12 | 0.07 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -8.23 | 0.12 | 0.07 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 8.23 | 0.12 | 0.07 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 8.23 | 0.12 | 0.07 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 8.23 | 0.12 | 0.07 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -8.23 | 0.12 | 0.07 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 8.23 | 0.12 | 0.07 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -8.23 | 0.12 | 0.07 |

# Pipe Tables
## Full Buildout (Option 2) - 50% TWL

| 2031 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 2.98 | 0.04 | 0.01 |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.55 | 0.02 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 3.87 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 2.34 | 0.03 | 0.01 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 10.51 | 0.15 | 0.11 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -13.48 | 0.19 | 0.18 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -13.48 | 0.19 | 0.18 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 13.48 | 0.19 | 0.18 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 13.48 | 0.19 | 0.18 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 13.48 | 0.19 | 0.18 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -13.48 | 0.19 | 0.18 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 13.48 | 0.19 | 0.18 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -13.48 | 0.19 | 0.18 |

# Junctions Tables
## Full Buildout (Option 2) - 70% TWL

| 2021 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 273.47 | 373 |
| J-1103 | 235.24 | 0.00 | 273.43 | 374 |
| HS-J-1123 | 234.98 | 1.29 | 273.47 | 377 |
| HS-J-1115 | 234.91 | 0.00 | 273.47 | 377 |
| HS-J-1124 | 234.85 | 0.00 | 273.47 | 378 |
| HS-J-1117 | 234.54 | 0.00 | 273.47 | 381 |
| HS-J-1120 | 234.43 | 0.00 | 273.47 | 382 |
| HS-J-1121 | 234.00 | 1.43 | 273.47 | 386 |
| HS-J-1108 | 233.73 | 0.00 | 273.47 | 389 |
| HS-J-1110 | 233.44 | 0.99 | 273.47 | 392 |
| HS-J-1107 | 233.41 | 0.00 | 273.48 | 392 |
| HS-J-1109 | 232.98 | 1.29 | 273.47 | 396 |
| HS-J-1119 | 232.92 | 0.00 | 273.47 | 397 |
| HS-J-1118 | 232.70 | 0.00 | 273.47 | 399 |
| J-1129 | 232.36 | 0.00 | 273.47 | 402 |
| HS-J-1106 | 232.22 | 0.00 | 273.48 | 404 |
| HS-J-1103 | 229.11 | 0.00 | 273.49 | 434 |
| HS-J-1104 | 229.04 | 0.00 | 273.49 | 435 |
| HS-J-1105 | 229.00 | 0.00 | 273.49 | 435 |
| J-1108 | 228.18 | 0.00 | 273.50 | 444 |
| J-1109 | 227.00 | 0.00 | 273.51 | 455 |
| | **Sum of Demand:** | **5.01** | **Min** | **373** |
| | | | **Max** | **455** |

# Junctions Tables
## Full Buildout (Option 2) - 70% TWL

| 2021 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 271.99 | 358 |
| J-1103 | 235.24 | 0.00 | 271.95 | 359 |
| HS-J-1123 | 234.98 | 2.46 | 271.99 | 362 |
| HS-J-1115 | 234.91 | 0.00 | 271.99 | 363 |
| HS-J-1124 | 234.85 | 0.00 | 271.99 | 363 |
| HS-J-1117 | 234.54 | 0.00 | 271.99 | 366 |
| HS-J-1120 | 234.43 | 0.00 | 271.99 | 368 |
| HS-J-1121 | 234.00 | 2.72 | 271.99 | 372 |
| HS-J-1108 | 233.73 | 0.00 | 271.99 | 374 |
| HS-J-1110 | 233.44 | 1.89 | 271.99 | 377 |
| HS-J-1107 | 233.41 | 0.00 | 271.99 | 378 |
| HS-J-1109 | 232.98 | 2.45 | 271.98 | 382 |
| HS-J-1119 | 232.92 | 0.00 | 271.99 | 382 |
| HS-J-1118 | 232.70 | 0.00 | 271.99 | 385 |
| J-1129 | 232.36 | 0.00 | 271.99 | 388 |
| HS-J-1106 | 232.22 | 0.00 | 272.00 | 389 |
| HS-J-1103 | 229.11 | 0.00 | 272.01 | 420 |
| HS-J-1104 | 229.04 | 0.00 | 272.01 | 421 |
| HS-J-1105 | 229.00 | 0.00 | 272.01 | 421 |
| J-1108 | 228.18 | 0.00 | 272.02 | 429 |
| J-1109 | 227.00 | 0.00 | 272.03 | 441 |
| | **Sum of Demand:** | **9.52** | **Min** | **358** |
| | | | **Max** | **441** |

# Junctions Tables
## Full Buildout (Option 2) - 70% TWL

| 2021 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 266.65 | 306 |
| J-1103 | 235.24 | 0.00 | 266.62 | 307 |
| HS-J-1123 | 234.98 | 3.88 | 266.65 | 310 |
| HS-J-1115 | 234.91 | 0.00 | 266.65 | 311 |
| HS-J-1124 | 234.85 | 0.00 | 266.65 | 311 |
| HS-J-1117 | 234.54 | 0.00 | 266.65 | 314 |
| HS-J-1120 | 234.43 | 0.00 | 266.65 | 315 |
| HS-J-1121 | 234.00 | 4.30 | 266.65 | 320 |
| HS-J-1108 | 233.73 | 0.00 | 266.66 | 322 |
| HS-J-1110 | 233.44 | 2.98 | 266.66 | 325 |
| HS-J-1107 | 233.41 | 0.00 | 266.67 | 326 |
| HS-J-1109 | 232.98 | 3.87 | 266.65 | 330 |
| HS-J-1119 | 232.92 | 0.00 | 266.66 | 330 |
| HS-J-1118 | 232.70 | 0.00 | 266.66 | 332 |
| J-1129 | 232.36 | 0.00 | 266.66 | 336 |
| HS-J-1106 | 232.22 | 0.00 | 266.68 | 337 |
| HS-J-1103 | 229.11 | 0.00 | 266.73 | 368 |
| HS-J-1104 | 229.04 | 0.00 | 266.73 | 369 |
| HS-J-1105 | 229.00 | 0.00 | 266.71 | 369 |
| J-1108 | 228.18 | 0.00 | 266.75 | 377 |
| J-1109 | 227.00 | 0.00 | 266.77 | 389 |
| | **Sum of Demand:** | **15.03** | **Min** | **306** |
| | | | **Max** | **389** |

# Pipe Tables
## Full Buildout (Option 2) - 70% TWL

| 2021 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | 1.16 | 0.02 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 0.99 | 0.01 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 2.45 | 0.03 | 0.01 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.17 | 0.07 | 0.03 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -6.17 | 0.09 | 0.04 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -6.17 | 0.09 | 0.04 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 6.17 | 0.09 | 0.04 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -6.17 | 0.09 | 0.04 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -6.17 | 0.09 | 0.04 |

# Pipe Tables
## Full Buildout (Option 2) - 70% TWL

| 2021 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -2.24 | 0.03 | 0.01 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 1.89 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 2.45 | 0.03 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.46 | 0.03 | 0.01 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 0.22 | 0.00 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.39 | 0.08 | 0.03 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 7.28 | 0.10 | 0.06 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -7.28 | 0.10 | 0.06 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 7.28 | 0.10 | 0.06 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -7.28 | 0.10 | 0.06 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 7.28 | 0.10 | 0.06 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 7.28 | 0.10 | 0.06 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -7.28 | 0.10 | 0.06 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -7.28 | 0.10 | 0.06 |

# Pipe Tables
## Full Buildout (Option 2) - 70% TWL

| 2021 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-895 | J-1106 | H-182 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-898 | J-1125 | H-185 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-894 | J-1105 | H-181 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-873 | J-1103 | J-1104 | 11.28 | 300 | 120 | 0.00 | 0.00 | 0.00 |
| P-874 | J-1103 | J-1105 | 88.09 | 300 | 120 | 0.00 | 0.00 | 0.00 |
| P-876 | J-1106 | J-1107 | 78.33 | 300 | 120 | 0.00 | 0.00 | 0.00 |
| P-875 | J-1105 | J-1106 | 178.92 | 300 | 120 | 0.00 | 0.00 | 0.00 |
| P-893 | J-1103 | H-180 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-901 | J-1136 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-896 | J-1122 | H-183 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-897 | J-1124 | H-184 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-878 | J-1108 | J-1133 | 151.79 | 300 | 120 | 0.03 | 0.00 | 0.00 |
| P-877 | J-1107 | J-1108 | 20.12 | 300 | 120 | 0.03 | 0.00 | 0.00 |
| P-872 | J-1134 | J-1107 | 23.77 | 300 | 120 | 0.03 | 0.00 | 0.00 |
| P-900 | J-1134 | J-1110 | 10.36 | 300 | 120 | 2.98 | 0.04 | 0.01 |
| P-870 | J-1130 | J-1102 | 72.54 | 300 | 120 | 3.01 | 0.04 | 0.01 |
| P-871 | J-1102 | J-1134 | 224.64 | 300 | 120 | 3.01 | 0.04 | 0.01 |
| P-879 | J-1133 | J-1109 | 70.41 | 300 | 120 | 3.87 | 0.05 | 0.02 |
| P-899 | J-1132 | J-1135 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |
| P-886 | J-1133 | J-1132 | 80.47 | 300 | 120 | -8.14 | 0.12 | 0.07 |
| P-887 | J-1132 | J-1122 | 28.96 | 300 | 120 | -12.03 | 0.17 | 0.15 |
| P-888 | J-1122 | J-1123 | 130.15 | 300 | 120 | -12.03 | 0.17 | 0.15 |
| P-889 | J-1123 | J-1136 | 53.34 | 300 | 120 | -12.03 | 0.17 | 0.15 |
| P-890 | J-1136 | J-1124 | 179.22 | 300 | 120 | -12.03 | 0.17 | 0.15 |
| P-883 | J-1125 | J-1129 | 84.12 | 300 | 120 | -12.03 | 0.17 | 0.15 |
| P-891 | J-1124 | J-1131 | 128.32 | 300 | 120 | -12.03 | 0.17 | 0.15 |
| P-892 | J-1131 | J-1125 | 54.86 | 300 | 120 | -12.03 | 0.17 | 0.15 |

# Junctions Tables
## Full Buildout (Option 2) - 70% TWL

| 2031 ADD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 272.38 | 362 |
| J-1103 | 235.24 | 0.00 | 272.34 | 363 |
| HS-J-1123 | 234.98 | 1.29 | 272.38 | 366 |
| HS-J-1115 | 234.91 | 0.00 | 272.38 | 367 |
| HS-J-1124 | 234.85 | 0.00 | 272.38 | 367 |
| HS-J-1117 | 234.54 | 0.00 | 272.38 | 370 |
| HS-J-1120 | 234.43 | 0.00 | 272.38 | 371 |
| HS-J-1121 | 234.00 | 1.43 | 272.38 | 376 |
| HS-J-1108 | 233.73 | 0.00 | 272.39 | 378 |
| HS-J-1110 | 233.44 | 0.99 | 272.39 | 381 |
| HS-J-1107 | 233.41 | 0.00 | 272.39 | 382 |
| HS-J-1109 | 232.98 | 1.29 | 272.38 | 386 |
| HS-J-1119 | 232.92 | 0.00 | 272.38 | 386 |
| HS-J-1118 | 232.70 | 0.00 | 272.38 | 388 |
| J-1129 | 232.36 | 0.00 | 272.38 | 392 |
| HS-J-1106 | 232.22 | 0.00 | 272.40 | 393 |
| HS-J-1103 | 229.11 | 0.00 | 272.41 | 424 |
| HS-J-1104 | 229.04 | 0.00 | 272.41 | 424 |
| HS-J-1105 | 229.00 | 0.00 | 272.40 | 425 |
| J-1108 | 228.18 | 0.00 | 272.42 | 433 |
| J-1109 | 227.00 | 0.00 | 272.42 | 445 |
| | **Sum of Demand:** | **5.01** | **Min** | **362** |
| | | | **Max** | **445** |

# Junctions Tables
## Full Buildout (Option 2) - 70% TWL

| 2031 MDD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 270.89 | 347 |
| J-1103 | 235.24 | 0.00 | 270.85 | 348 |
| HS-J-1123 | 234.98 | 2.45 | 270.89 | 351 |
| HS-J-1115 | 234.91 | 0.00 | 270.89 | 352 |
| HS-J-1124 | 234.85 | 0.00 | 270.89 | 353 |
| HS-J-1117 | 234.54 | 0.00 | 270.89 | 356 |
| HS-J-1120 | 234.43 | 0.00 | 270.89 | 357 |
| HS-J-1121 | 234.00 | 1.89 | 270.89 | 361 |
| HS-J-1108 | 233.73 | 0.00 | 270.89 | 364 |
| HS-J-1110 | 233.44 | 2.46 | 270.89 | 367 |
| HS-J-1107 | 233.41 | 0.00 | 270.90 | 367 |
| HS-J-1109 | 232.98 | 2.72 | 270.89 | 371 |
| HS-J-1119 | 232.92 | 0.00 | 270.89 | 372 |
| HS-J-1118 | 232.70 | 0.00 | 270.89 | 374 |
| J-1129 | 232.36 | 0.00 | 270.89 | 377 |
| HS-J-1106 | 232.22 | 0.00 | 270.90 | 379 |
| HS-J-1103 | 229.11 | 0.00 | 270.92 | 409 |
| HS-J-1104 | 229.04 | 0.00 | 270.92 | 410 |
| HS-J-1105 | 229.00 | 0.00 | 270.92 | 410 |
| J-1108 | 228.18 | 0.00 | 270.93 | 418 |
| J-1109 | 227.00 | 0.00 | 270.94 | 430 |
| | **Sum of Demand:** | **9.52** | **Min** | **347** |
| | | | **Max** | **430** |

# Junctions Tables
## Full Buildout (Option 2) - 70% TWL

| 2031 PHD Junction Results | | | | |
|---|---|---|---|---|
| Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
| HS-J-1116 | 235.40 | 0.00 | 265.47 | 294 |
| J-1103 | 235.24 | 0.00 | 265.44 | 296 |
| HS-J-1123 | 234.98 | 3.88 | 265.47 | 298 |
| HS-J-1115 | 234.91 | 0.00 | 265.47 | 299 |
| HS-J-1124 | 234.85 | 0.00 | 265.47 | 300 |
| HS-J-1117 | 234.54 | 0.00 | 265.47 | 303 |
| HS-J-1120 | 234.43 | 0.00 | 265.47 | 304 |
| HS-J-1121 | 234.00 | 4.30 | 265.47 | 308 |
| HS-J-1108 | 233.73 | 0.00 | 265.48 | 311 |
| HS-J-1110 | 233.44 | 2.98 | 265.48 | 314 |
| HS-J-1107 | 233.41 | 0.00 | 265.50 | 314 |
| HS-J-1109 | 232.98 | 3.87 | 265.47 | 318 |
| HS-J-1119 | 232.92 | 0.00 | 265.47 | 319 |
| HS-J-1118 | 232.70 | 0.00 | 265.47 | 321 |
| J-1129 | 232.36 | 0.00 | 265.47 | 324 |
| HS-J-1106 | 232.22 | 0.00 | 265.51 | 326 |
| HS-J-1103 | 229.11 | 0.00 | 265.56 | 357 |
| HS-J-1104 | 229.04 | 0.00 | 265.56 | 357 |
| HS-J-1105 | 229.00 | 0.00 | 265.54 | 358 |
| J-1108 | 228.18 | 0.00 | 265.58 | 366 |
| J-1109 | 227.00 | 0.00 | 265.62 | 378 |
| | **Sum of Demand:** | **15.03** | **Min** | **294** |
| | | | **Max** | **378** |

# Pipe Tables
## Full Buildout (Option 2) - 70% TWL

| 2031 ADD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.1 | 150 | 100 | 0 | 0.0 | 0.0 |
| P-880 | HS-J-1117 | H-188 | 6.1 | 150 | 100 | 0 | 0.0 | 0.0 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | 1.58 | 0.02 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 0.99 | 0.01 | 0.00 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 1.29 | 0.02 | 0.00 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 2.87 | 0.04 | 0.01 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.59 | 0.08 | 0.04 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 6.59 | 0.09 | 0.05 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -6.59 | 0.09 | 0.05 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 6.59 | 0.09 | 0.05 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -6.59 | 0.09 | 0.05 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 6.59 | 0.09 | 0.05 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 6.59 | 0.09 | 0.05 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -6.59 | 0.09 | 0.05 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -6.59 | 0.09 | 0.05 |

# Pipe Tables
## Full Buildout (Option 2) - 70% TWL

| 2031 MDD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-880 | HS-J-1117 | H-188 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.38 | 0.02 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 2.46 | 0.03 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 2.72 | 0.04 | 0.01 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 2.45 | 0.03 | 0.01 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 1.07 | 0.02 | 0.00 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 5.68 | 0.08 | 0.04 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 8.14 | 0.12 | 0.07 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -8.14 | 0.12 | 0.07 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 8.14 | 0.12 | 0.07 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -8.14 | 0.12 | 0.07 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 8.14 | 0.12 | 0.07 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 8.14 | 0.12 | 0.07 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -8.14 | 0.12 | 0.07 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -8.14 | 0.12 | 0.07 |

# Pipe Tables
## Full Buildout (Option 2) - 70% TWL

| 2031 PHD Pipe Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Label | Start Node | Stop Node | Length (m) | Diameter (mm) | Hazen-Williams C | Flow (L/s) | Velocity (m/s) | Headloss Gradient (m/km) |
| P-879 | HS-J-1118 | H-187 | 6.1 | 150 | 100 | 0.00 | 0.0 | 0.0 |
| P-880 | HS-J-1117 | H-188 | 6.1 | 150 | 100 | 0.00 | 0.0 | 0.0 |
| P-881 | HS-J-1124 | H-189 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-882 | HS-J-1115 | H-191 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-883 | HS-J-1106 | H-190 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-884 | HS-J-1105 | H-192 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-885 | HS-J-1103 | H-193 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-889 | J-1108 | H-195 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| P-890 | J-1109 | H-196 | 6.10 | 150 | 100 | 0.00 | 0.00 | 0.00 |
| HS-P-889 | HS-J-1116 | HS-J-1124 | 53.34 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-891 | HS-J-1117 | HS-J-1119 | 128.32 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-887 | HS-J-1120 | HS-J-1115 | 28.96 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-890 | HS-J-1124 | HS-J-1117 | 179.22 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-883 | HS-J-1118 | J-1129 | 84.12 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-888 | HS-J-1115 | HS-J-1116 | 130.15 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-892 | HS-J-1119 | HS-J-1118 | 54.86 | 300 | 120 | -1.61 | 0.02 | 0.00 |
| HS-P-894 | HS-J-1108 | HS-J-1110 | 7.92 | 300 | 120 | 2.98 | 0.04 | 0.01 |
| HS-P-879 | HS-J-1121 | HS-J-1109 | 70.41 | 300 | 120 | 3.87 | 0.05 | 0.02 |
| HS-P-893 | HS-J-1120 | HS-J-1123 | 30.18 | 300 | 120 | 3.88 | 0.05 | 0.02 |
| HS-P-886 | HS-J-1121 | HS-J-1120 | 80.47 | 300 | 120 | 2.27 | 0.03 | 0.01 |
| HS-P-878 | HS-J-1108 | HS-J-1121 | 63.70 | 300 | 120 | 10.44 | 0.15 | 0.11 |
| HS-P-874 | HS-J-1103 | HS-J-1105 | 88.09 | 300 | 120 | 13.42 | 0.19 | 0.18 |
| P-886(2)(2) | J-1109 | J-1105 | 87.48 | 300 | 120 | -13.42 | 0.19 | 0.18 |
| HS-P-876 | HS-J-1106 | HS-J-1107 | 78.33 | 300 | 120 | 13.42 | 0.19 | 0.18 |
| P-886(1) | HS-J-1104 | J-1108 | 124.66 | 300 | 120 | -13.42 | 0.19 | 0.18 |
| HS-P-875 | HS-J-1105 | HS-J-1106 | 178.92 | 300 | 120 | 13.42 | 0.19 | 0.18 |
| HS-P-877 | HS-J-1107 | HS-J-1108 | 109.42 | 300 | 120 | 13.42 | 0.19 | 0.18 |
| P-886(2)(1) | J-1108 | J-1109 | 170.99 | 300 | 120 | -13.42 | 0.19 | 0.18 |
| HS-P-873 | HS-J-1103 | HS-J-1104 | 11.28 | 300 | 120 | -13.42 | 0.19 | 0.18 |

# APPENDIX

# C

## FIRE FLOW REPORT

| 2021 MDD + FF - 50% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 231 | N/A | 271 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 229 | N/A | 271 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 235 | N/A | 271 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 240 | N/A | 271 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 243 | N/A | 271 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 214 | N/A | 271 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 224 | N/A | 271 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 258 | N/A | 271 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 224 | FALSE | 271 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 185 | FALSE | 271 | 140 | 140 | 140 | 184 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 165 | FALSE | 271 | 140 | 140 | 140 | 180 | HS-J-1116 | SE06V108 |
| H-191 | 234.91 | 250 | 150 | FALSE | 271 | 140 | 140 | 140 | 178 | HS-J-1123 | SE06V108 |
| | | **Minimum** | **150** | | | | | | | | |
| | | **Maximum** | **258** | | | | | | | | |

| 2021 MDD + FF - 70% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 241 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 239 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 245 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 249 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 253 | N/A | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 222 | N/A | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 233 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 268 | N/A | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 233 | FALSE | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 193 | FALSE | 272 | 140 | 140 | 140 | 193 | HS-J-1116 | SE06V108 |
| H-189 | 234.85 | 250 | 171 | FALSE | 272 | 140 | 140 | 140 | 184 | HS-J-1116 | SE06V108 |
| H-191 | 234.91 | 250 | 156 | FALSE | 272 | 140 | 140 | 140 | 181 | HS-J-1123 | SE06V108 |
| | | **Minimum** | **156** | | | | | | | | |
| | | **Maximum** | **268** | | | | | | | | |

| 2021 MDD + FF - 99% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 254 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 252 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 257 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 262 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 265 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 233 | N/A | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 245 | N/A | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 281 | N/A | 274 | 140 | 140 | 140 | 212 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 244 | FALSE | 274 | 140 | 140 | 140 | 209 | HS-J-1116 | SE06V108 |
| H-188 | 234.54 | 250 | 203 | FALSE | 274 | 140 | 140 | 140 | 199 | HS-J-1116 | SE06V108 |
| H-189 | 234.85 | 250 | 180 | FALSE | 274 | 140 | 140 | 140 | 189 | HS-J-1116 | SE06V108 |
| H-191 | 234.91 | 250 | 164 | FALSE | 274 | 140 | 140 | 140 | 185 | HS-J-1123 | SE06V108 |

| | |
|---|---|
| **Minimum** | **164** |
| **Maximum** | **281** |

| 2031 MDD + FF - 50% | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 220 | N/A | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 217 | N/A | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 224 | N/A | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 228 | N/A | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 232 | N/A | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 204 | N/A | 269 | 140 | 140 | 140 | 175 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 214 | N/A | 269 | 140 | 140 | 140 | 175 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 245 | N/A | 269 | 140 | 140 | 140 | 173 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 214 | FALSE | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 176 | FALSE | 269 | 140 | 140 | 140 | 176 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 157 | FALSE | 269 | 140 | 140 | 140 | 177 | HS-J-1116 | SE06V108 |
| H-191 | 234.91 | 250 | 143 | FALSE | 269 | 140 | 140 | 140 | 175 | HS-J-1123 | SE06V108 |

| | |
|---|---|
| **Minimum** | **143** |
| **Maximum** | **245** |

| 2031 MDD + FF - 70% | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 229 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 227 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 233 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 238 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 241 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 213 | N/A | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 223 | N/A | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 255 | N/A | 271 | 140 | 140 | 140 | 186 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 223 | FALSE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 184 | FALSE | 271 | 140 | 140 | 140 | 188 | HS-J-1116 | SE06V108 |
| H-189 | 234.85 | 250 | 164 | FALSE | 271 | 140 | 140 | 140 | 180 | HS-J-1116 | SE06V108 |
| H-191 | 234.91 | 250 | 149 | FALSE | 271 | 140 | 140 | 140 | 178 | HS-J-1123 | SE06V108 |

| | |
|---|---|
| **Minimum** | **149** |
| **Maximum** | **255** |

| 2031 MDD + FF - 99% | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 242 | N/A | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 240 | N/A | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 246 | N/A | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 250 | N/A | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 254 | N/A | 273 | 140 | 140 | 140 | 204 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 223 | N/A | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 235 | N/A | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 269 | N/A | 273 | 140 | 140 | 140 | 204 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 234 | FALSE | 273 | 140 | 140 | 140 | 202 | HS-J-1116 | SE06V108 |
| H-188 | 234.54 | 250 | 194 | FALSE | 273 | 140 | 140 | 140 | 194 | HS-J-1116 | SE06V108 |
| H-189 | 234.85 | 250 | 173 | FALSE | 273 | 140 | 140 | 140 | 185 | HS-J-1116 | SE06V108 |
| H-191 | 234.91 | 250 | 158 | FALSE | 273 | 140 | 140 | 140 | 182 | HS-J-1123 | SE06V108 |

| | |
|---|---|
| **Minimum** | **158** |
| **Maximum** | **269** |

| 2021 MDD + FF - 50% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 230 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 227 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 232 | N/A | 270 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 236 | N/A | 270 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 240 | N/A | 270 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 212 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 222 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 256 | N/A | 271 | 140 | 140 | 140 | 180 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 230 | FALSE | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 206 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 199 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 209 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 198 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 201 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 190 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| | | **Minimum** | **190** | | | | | | | | |
| | | **Maximum** | **256** | | | | | | | | |

| 2021 MDD + FF - 70% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 239 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 236 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 242 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 246 | N/A | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 249 | N/A | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 220 | N/A | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 231 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 266 | N/A | 272 | 140 | 140 | 140 | 193 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 239 | FALSE | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 215 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 208 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 217 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 207 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 207 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 196 | FALSE | 272 | 140 | 140 | 140 | 197 | HD38T004 | SE06V108 |
| | | **Minimum** | **196** | | | | | | | | |
| | | **Maximum** | **266** | | | | | | | | |

# Fire Flow Tables
## Full Buildout

| 2021 MDD + FF - 99% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 252 | TRUE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 249 | FALSE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 254 | TRUE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 258 | TRUE | 274 | 140 | 140 | 140 | 212 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 262 | TRUE | 274 | 140 | 140 | 140 | 212 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 230 | FALSE | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 243 | FALSE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 279 | TRUE | 274 | 140 | 140 | 140 | 211 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 251 | TRUE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 227 | FALSE | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 219 | FALSE | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 228 | FALSE | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 218 | FALSE | 274 | 140 | 140 | 140 | 215 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 216 | FALSE | 274 | 140 | 140 | 140 | 215 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 205 | FALSE | 274 | 140 | 140 | 140 | 209 | HS-J-1103 | SE06V108 |
| | | **Minimum** | **205** | | | | | | | | |
| | | **Maximum** | **279** | | | | | | | | |

| 2031 MDD + FF - 50% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 217 | N/A | 269 | 140 | 140 | 140 | 173 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 214 | N/A | 269 | 140 | 140 | 140 | 173 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 220 | N/A | 269 | 140 | 140 | 140 | 173 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 224 | N/A | 269 | 140 | 140 | 140 | 172 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 228 | N/A | 269 | 140 | 140 | 140 | 172 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 201 | N/A | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 211 | N/A | 269 | 140 | 140 | 140 | 173 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 243 | N/A | 269 | 140 | 140 | 140 | 172 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 219 | FALSE | 269 | 140 | 140 | 140 | 173 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 196 | FALSE | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 189 | FALSE | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 200 | FALSE | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 188 | FALSE | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 193 | FALSE | 269 | 140 | 140 | 140 | 174 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 183 | FALSE | 269 | 140 | 140 | 140 | 175 | HD38T004 | SE06V108 |
| | | **Minimum** | **183** | | | | | | | | |
| | | **Maximum** | **243** | | | | | | | | |

# Fire Flow Tables
## Full Buildout

| 2031 MDD + FF - 70% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 228 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 225 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 230 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 234 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 238 | N/A | 271 | 140 | 140 | 140 | 186 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 210 | N/A | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 220 | N/A | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 253 | N/A | 271 | 140 | 140 | 140 | 186 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 228 | FALSE | 271 | 140 | 140 | 140 | 187 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 205 | FALSE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 198 | FALSE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 208 | FALSE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 197 | FALSE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 200 | FALSE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 189 | FALSE | 271 | 140 | 140 | 140 | 189 | HD38T004 | SE06V108 |
| | | **Minimum** | **189** | | | | | | | | |
| | | **Maximum** | **253** | | | | | | | | |

| 2031 MDD + FF - 99% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 241 | FALSE | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 238 | FALSE | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 243 | FALSE | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 247 | FALSE | 273 | 140 | 140 | 140 | 204 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 250 | TRUE | 273 | 140 | 140 | 140 | 204 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 221 | FALSE | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 233 | FALSE | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 267 | TRUE | 273 | 140 | 140 | 140 | 203 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 240 | FALSE | 273 | 140 | 140 | 140 | 205 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 217 | FALSE | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 210 | FALSE | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 219 | FALSE | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 208 | FALSE | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 208 | FALSE | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 198 | FALSE | 273 | 140 | 140 | 140 | 204 | HS-J-1103 | SE06V108 |
| | | **Minimum** | **198** | | | | | | | | |
| | | **Maximum** | **267** | | | | | | | | |

Fire Flow Tables
Full Buildout - Option 2

| 2021 MDD + FF - 50% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 228 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 226 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 233 | N/A | 270 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 238 | N/A | 270 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 242 | N/A | 270 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 214 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 225 | N/A | 270 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 259 | N/A | 271 | 140 | 140 | 140 | 180 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 233 | FALSE | 271 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 207 | FALSE | 271 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 197 | FALSE | 271 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 206 | FALSE | 271 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 192 | FALSE | 270 | 140 | 140 | 140 | 183 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 228 | FALSE | 271 | 140 | 140 | 140 | 182 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 231 | FALSE | 271 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| H-195 | 228.18 | 250 | 244 | FALSE | 271 | 140 | 140 | 140 | 181 | HD38T004 | SE06V108 |
| H-196 | 227.00 | 250 | 267 | TRUE | 271 | 140 | 140 | 140 | 180 | HD38T004 | SE06V108 |

| | |
|---|---|
| **Minimum** | **192** |
| **Maximum** | **267** |

| 2021 MDD + FF - 70% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 238 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 236 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 243 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 247 | N/A | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 252 | N/A | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 222 | N/A | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 234 | N/A | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 269 | N/A | 272 | 140 | 140 | 140 | 193 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 242 | FALSE | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 215 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 205 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 214 | FALSE | 272 | 140 | 140 | 140 | 196 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 200 | FALSE | 272 | 140 | 140 | 140 | 197 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 235 | FALSE | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 238 | FALSE | 272 | 140 | 140 | 140 | 195 | HD38T004 | SE06V108 |
| H-195 | 228.18 | 250 | 252 | TRUE | 272 | 140 | 140 | 140 | 194 | HD38T004 | SE06V108 |
| H-196 | 227.00 | 250 | 276 | TRUE | 272 | 140 | 140 | 140 | 193 | HD38T004 | SE06V108 |

| | |
|---|---|
| **Minimum** | **200** |
| **Maximum** | **276** |

# Fire Flow Tables
## Full Buildout - Option 2

| 2021 MDD + FF - 99% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 251 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 249 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 255 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 260 | N/A | 274 | 140 | 140 | 140 | 212 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 264 | N/A | 274 | 140 | 140 | 140 | 212 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 233 | N/A | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 246 | N/A | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 283 | N/A | 274 | 140 | 140 | 140 | 211 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 254 | TRUE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 227 | FALSE | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 216 | FALSE | 274 | 140 | 140 | 140 | 213 | HS-J-1116 | SE06V108 |
| H-190 | 232.22 | 250 | 224 | FALSE | 274 | 140 | 140 | 140 | 214 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 211 | FALSE | 274 | 140 | 140 | 140 | 213 | HS-J-1115 | SE06V108 |
| H-192 | 229.00 | 250 | 245 | FALSE | 274 | 140 | 140 | 140 | 209 | HS-J-1107 | SE06V108 |
| H-193 | 229.11 | 250 | 249 | FALSE | 274 | 140 | 140 | 140 | 213 | HD38T004 | SE06V108 |
| H-195 | 228.18 | 250 | 262 | TRUE | 274 | 140 | 140 | 140 | 212 | HD38T004 | SE06V108 |
| H-196 | 227.00 | 250 | 287 | TRUE | 274 | 140 | 140 | 140 | 211 | HD38T004 | SE06V108 |

| | |
|---|---|
| **Minimum** | **211** |
| **Maximum** | **287** |

# Fire Flow Tables
## Full Buildout - Option 2

| 2031 MDD + FF - 50% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 218 | N/A | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 215 | N/A | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 223 | N/A | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 227 | N/A | 269 | 140 | 140 | 140 | 176 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 232 | N/A | 269 | 140 | 140 | 140 | 176 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 205 | N/A | 269 | 140 | 140 | 140 | 178 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 215 | N/A | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 235 | N/A | 269 | 140 | 140 | 158 | 176 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 223 | FALSE | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 198 | FALSE | 269 | 140 | 140 | 140 | 178 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 188 | FALSE | 269 | 140 | 140 | 140 | 178 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 198 | FALSE | 269 | 140 | 140 | 140 | 178 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 183 | FALSE | 269 | 140 | 140 | 140 | 179 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 220 | FALSE | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 223 | FALSE | 269 | 140 | 140 | 140 | 177 | HD38T004 | SE06V108 |
| H-195 | 228.18 | 250 | 233 | FALSE | 269 | 140 | 140 | 144 | 176 | HD38T004 | SE06V108 |
| H-196 | 227.00 | 250 | 233 | FALSE | 269 | 140 | 140 | 183 | 176 | HD38T004 | SE06V108 |

| | |
|---|---|
| **Minimum** | **183** |
| **Maximum** | **235** |

| 2031 MDD + FF - 70% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 228 | N/A | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 225 | N/A | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 232 | N/A | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 237 | N/A | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 241 | N/A | 271 | 140 | 140 | 140 | 189 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 213 | N/A | 271 | 140 | 140 | 140 | 191 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 224 | N/A | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 258 | N/A | 271 | 140 | 140 | 140 | 189 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 232 | FALSE | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 206 | FALSE | 271 | 140 | 140 | 140 | 191 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 197 | FALSE | 271 | 140 | 140 | 140 | 192 | HD38T004 | SE06V108 |
| H-190 | 232.22 | 250 | 206 | FALSE | 271 | 140 | 140 | 140 | 191 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 192 | FALSE | 271 | 140 | 140 | 140 | 192 | HD38T004 | SE06V108 |
| H-192 | 229.00 | 250 | 227 | FALSE | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| H-193 | 229.11 | 250 | 230 | FALSE | 271 | 140 | 140 | 140 | 190 | HD38T004 | SE06V108 |
| H-195 | 228.18 | 250 | 243 | FALSE | 271 | 140 | 140 | 140 | 189 | HD38T004 | SE06V108 |
| H-196 | 227.00 | 250 | 267 | TRUE | 271 | 140 | 140 | 140 | 188 | HD38T004 | SE06V108 |

| | |
|---|---|
| **Minimum** | **192** |
| **Maximum** | **267** |

# Fire Flow Tables
## Full Buildout - Option 2

| 2031 MDD + FF - 99% TWL | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Label | Elevation (m) | Fire Flow (Needed) (L/s) | Fire Flow (Available) (L/s) | Satisfies Fire Flow Constraints? | Hydraulic Grade (m) | Pressure (Residual Lower Limit) (kPa) | Pressure (Zone Lower Limit) (kPa) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated Zone Lower Limit) (kPa) | Junction w/ Minimum Pressure (System) | Junction w/ Minimum Pressure (Zone) |
| GJ10H006 | 234.42 | 250 | 241 | N/A | 273 | 140 | 140 | 140 | 208 | HD38T004 | SE06V108 |
| GJ10H007 | 234.73 | 250 | 239 | N/A | 273 | 140 | 140 | 140 | 208 | HD38T004 | SE06V108 |
| GJ10H008 | 233.63 | 250 | 245 | N/A | 273 | 140 | 140 | 140 | 208 | HD38T004 | SE06V108 |
| GJ10H009 | 232.91 | 250 | 250 | N/A | 273 | 140 | 140 | 140 | 208 | HD38T004 | SE06V108 |
| GJ10H010 | 232.43 | 250 | 254 | N/A | 273 | 140 | 140 | 140 | 207 | HD38T004 | SE06V108 |
| GJ10H011 | 232.63 | 250 | 224 | N/A | 273 | 140 | 140 | 140 | 209 | HD38T004 | SE06V108 |
| GJ10H012 | 233.64 | 250 | 237 | N/A | 273 | 140 | 140 | 140 | 208 | HD38T004 | SE06V108 |
| GJ10H014 | 232.48 | 250 | 272 | N/A | 273 | 140 | 140 | 140 | 206 | HD38T004 | SE06V108 |
| H-187 | 232.70 | 250 | 245 | FALSE | 273 | 140 | 140 | 140 | 208 | HD38T004 | SE06V108 |
| H-188 | 234.54 | 250 | 218 | FALSE | 273 | 140 | 140 | 140 | 209 | HD38T004 | SE06V108 |
| H-189 | 234.85 | 250 | 208 | FALSE | 273 | 140 | 140 | 140 | 208 | HS-J-1116 | SE06V108 |
| H-190 | 232.22 | 250 | 217 | FALSE | 273 | 140 | 140 | 140 | 209 | HD38T004 | SE06V108 |
| H-191 | 234.91 | 250 | 203 | FALSE | 273 | 140 | 140 | 140 | 208 | HS-J-1115 | SE06V108 |
| H-192 | 229.00 | 250 | 237 | FALSE | 273 | 140 | 140 | 140 | 202 | HS-J-1107 | SE06V108 |
| H-193 | 229.11 | 250 | 241 | FALSE | 273 | 140 | 140 | 140 | 206 | HS-J-1123 | SE06V108 |
| H-195 | 228.18 | 250 | 254 | TRUE | 273 | 140 | 140 | 140 | 205 | HS-J-1123 | SE06V108 |
| H-196 | 227.00 | 250 | 278 | TRUE | 273 | 140 | 140 | 140 | 203 | HS-J-1123 | SE06V108 |

| | |
|---|---|
| **Minimum** | **203** |
| **Maximum** | **278** |

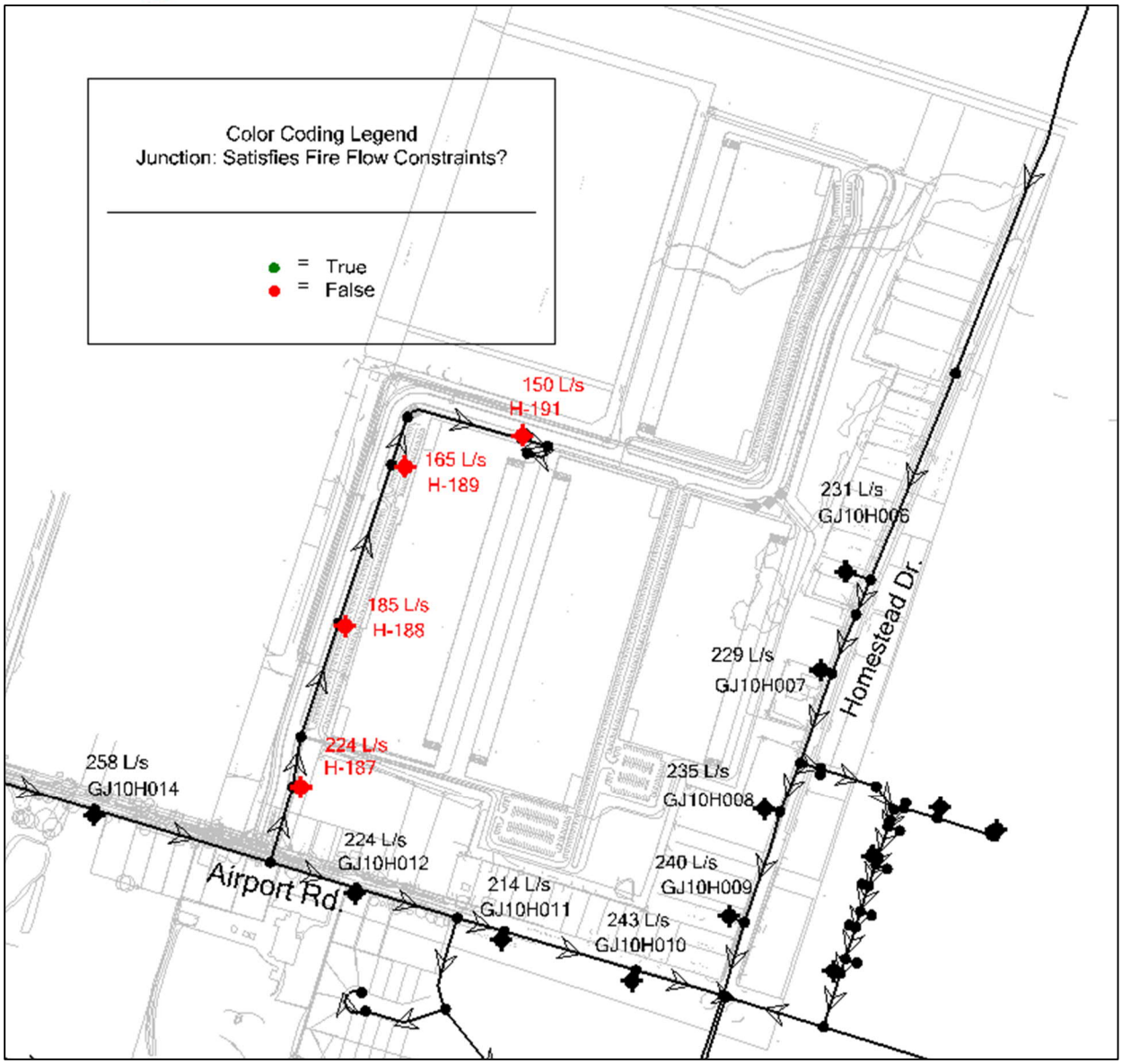



Figure C1 – Simulated AFF under 2021 MDD+FF with 50% TWL (Phase 1)

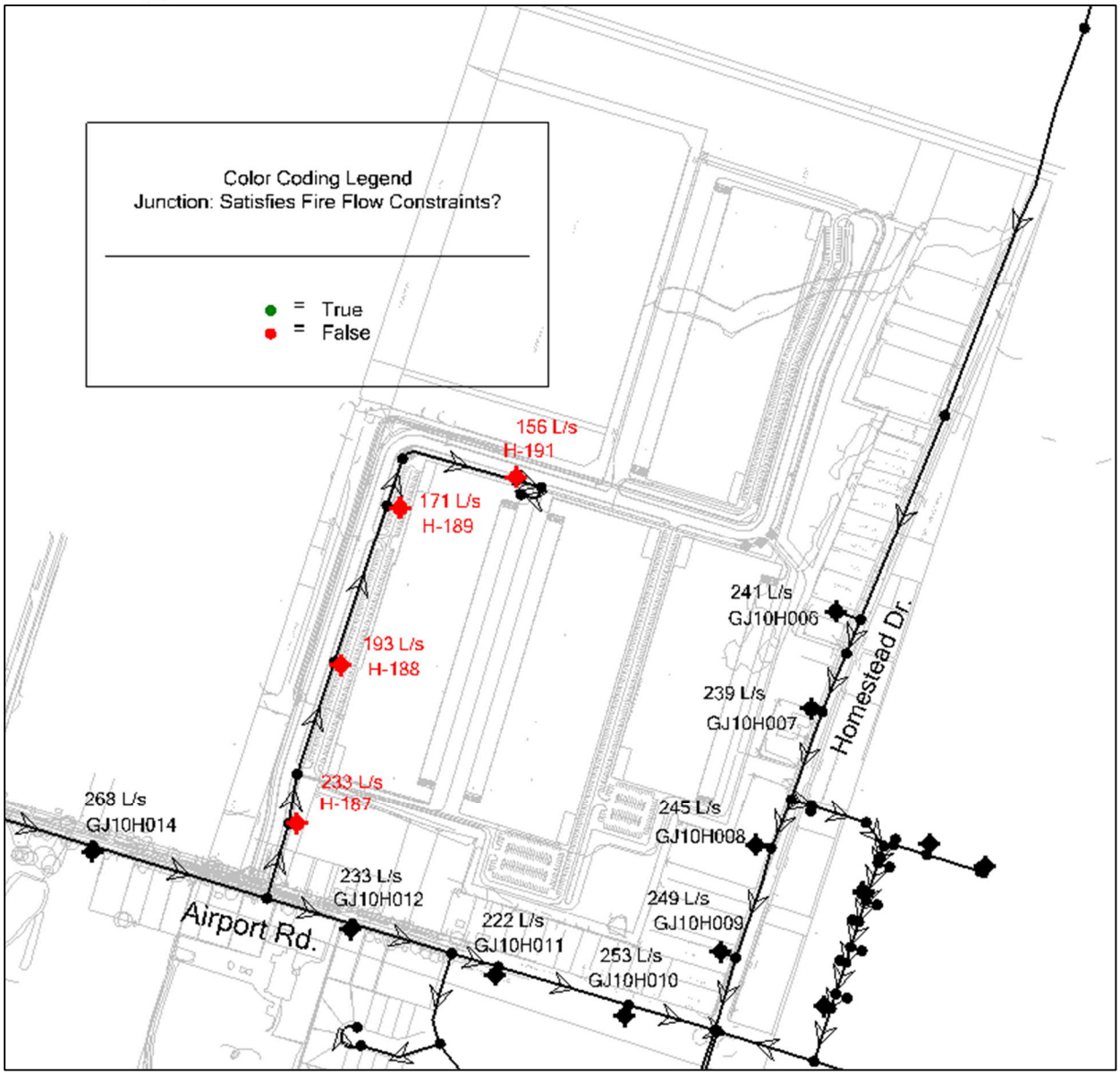



Figure C2 – Simulated AFF under 2021 MDD+FF with 70% TWL (Phase 1)

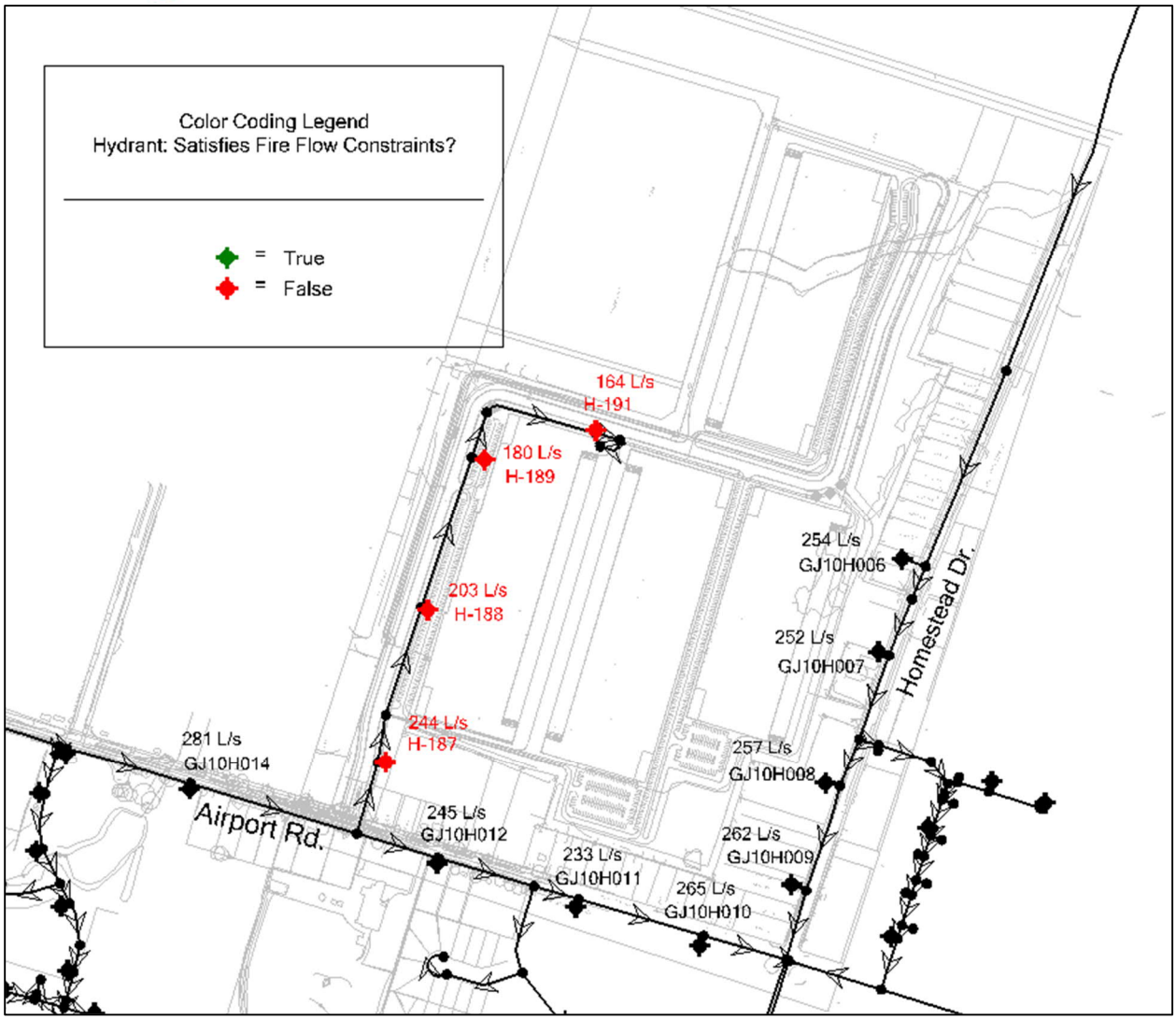



Figure C3 – Simulated AFF under 2021 MDD+FF with 99% TWL (Phase 1)

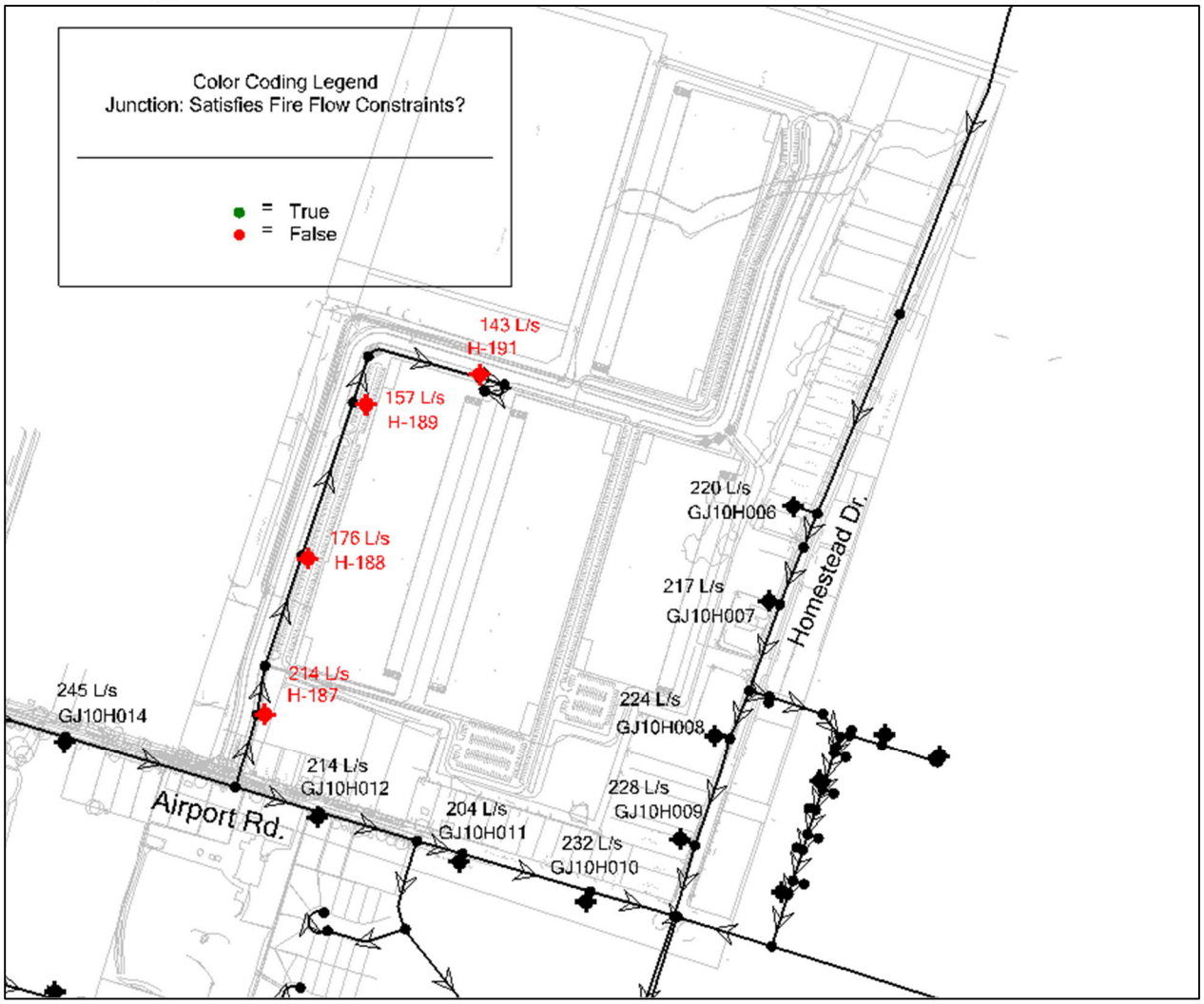



Figure C4 – Simulated AFF under 2031 MDD+FF with 50% TWL (Phase 1)

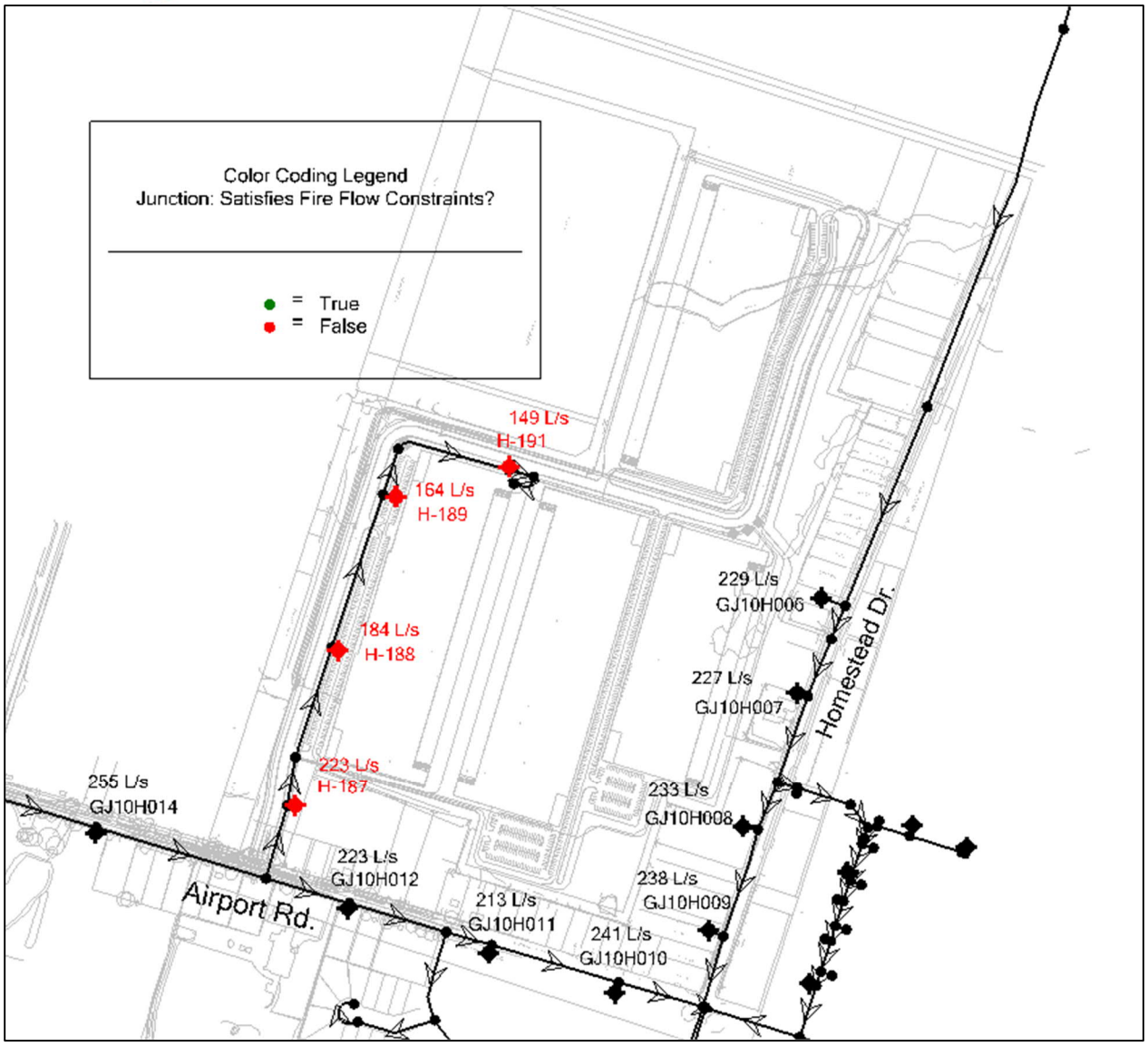



Figure C5 – Simulated AFF under 2031 MDD+FF with 70% TWL (Phase 1)

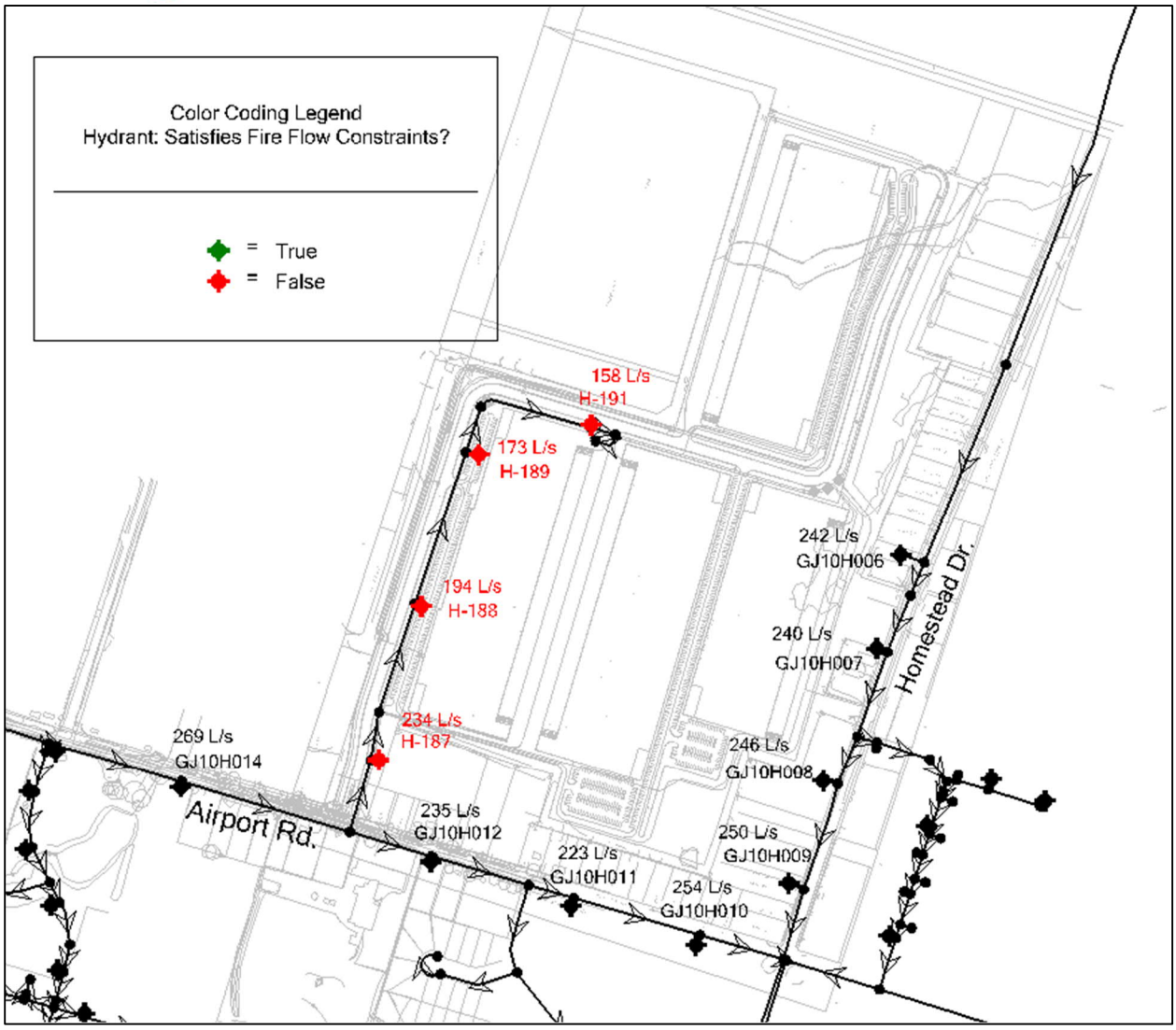



Figure C6 – Simulated AFF under 2031 MDD+FF with 99% TWL (Phase 1)

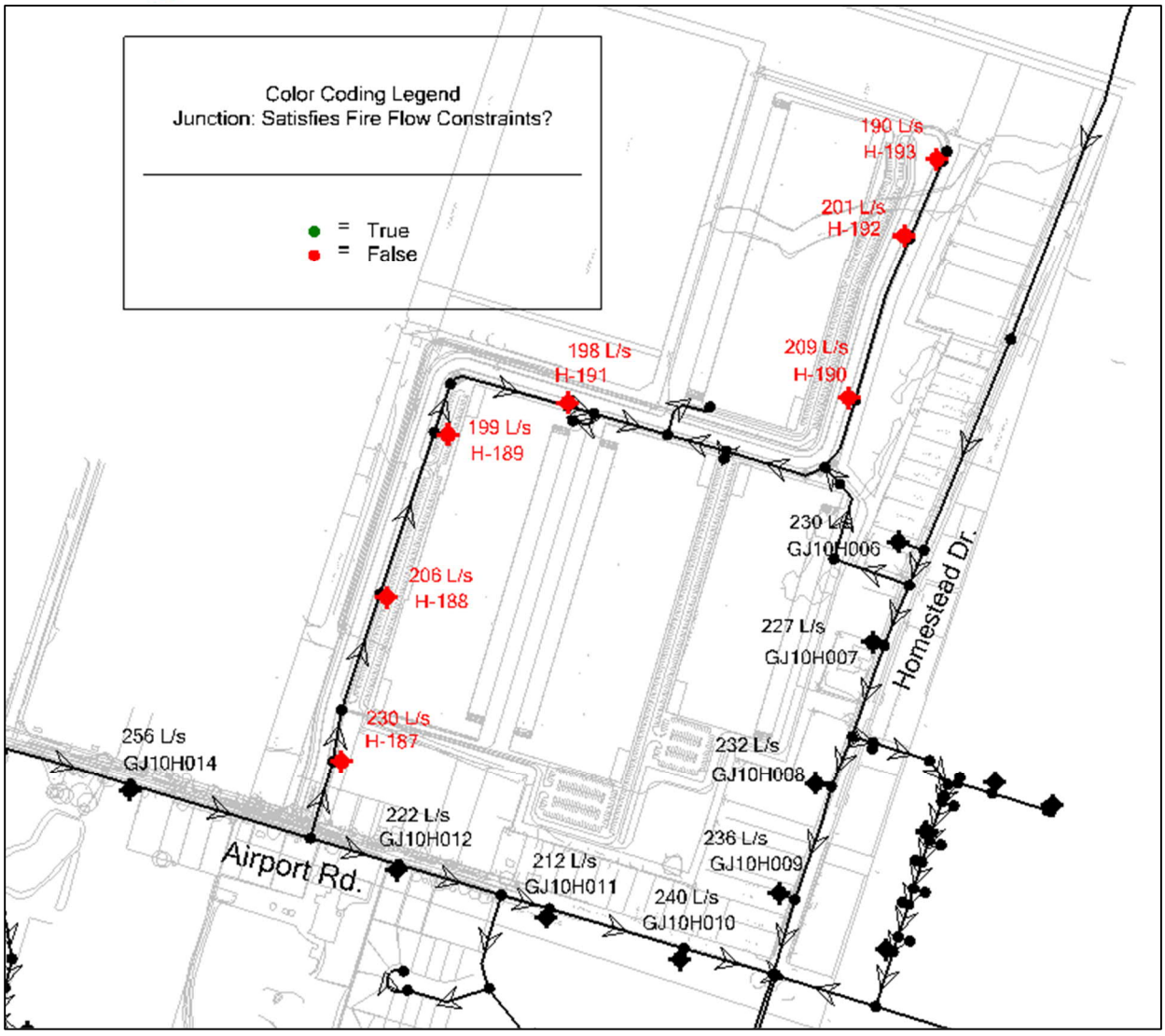



Figure C7 – Simulated AFF under 2021 MDD+FF with 50% TWL (Ultimate Buildout)

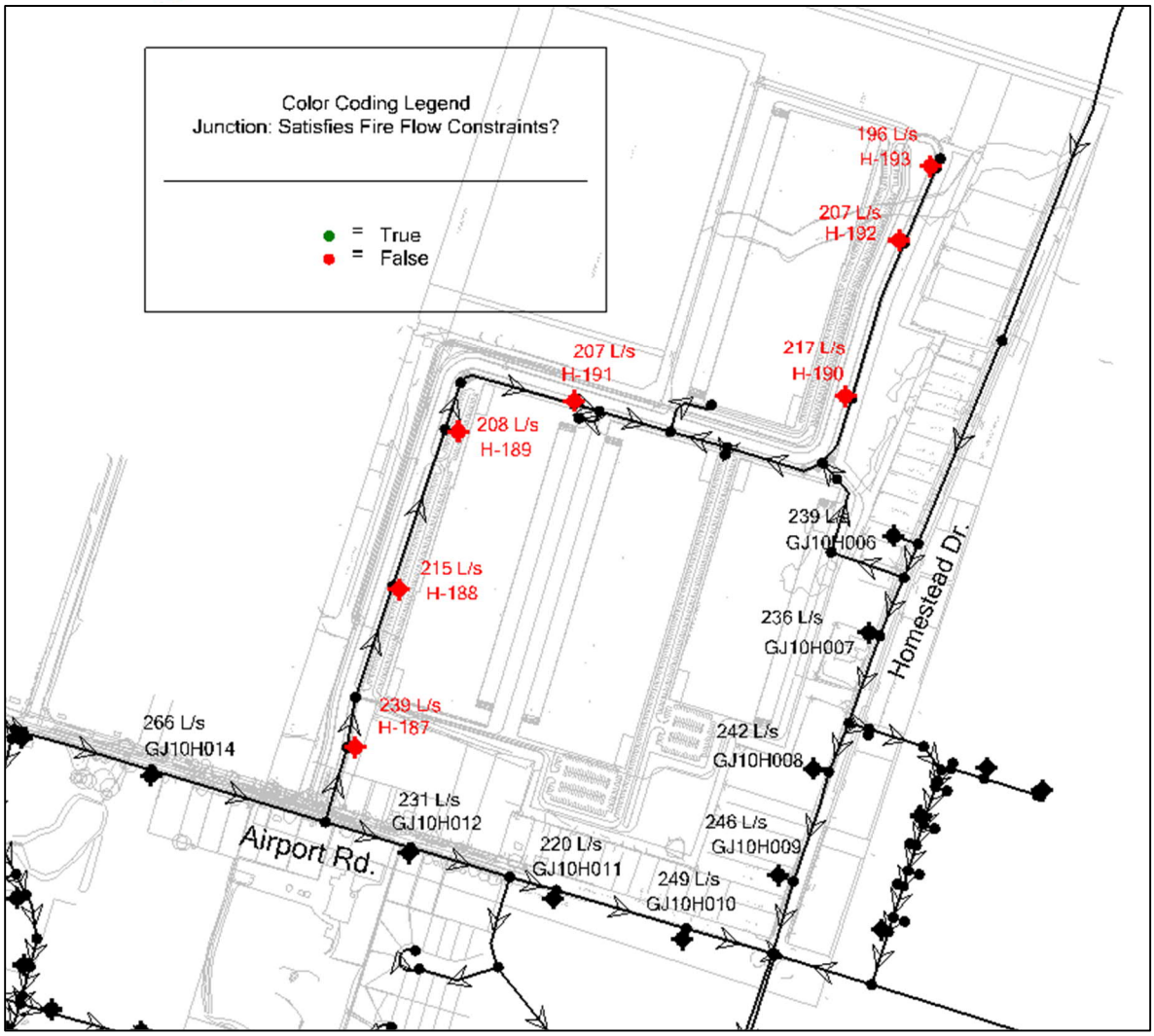



Figure C8 – Simulated AFF under 2021 MDD+FF with 70% TWL (Ultimate Buildout)

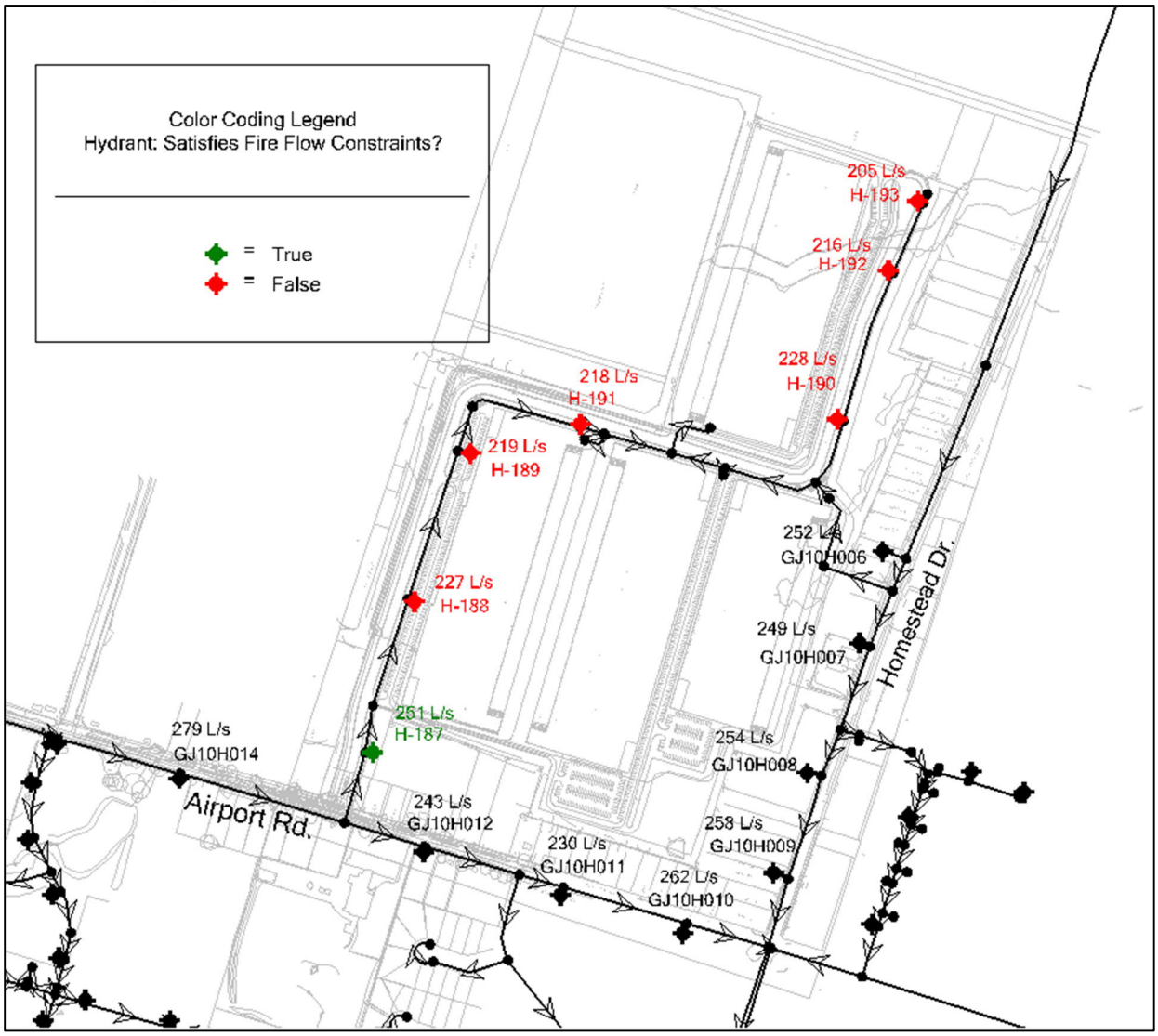



Figure C9 – Simulated AFF under 2021 MDD+FF with 99% TWL (Ultimate Buildout)

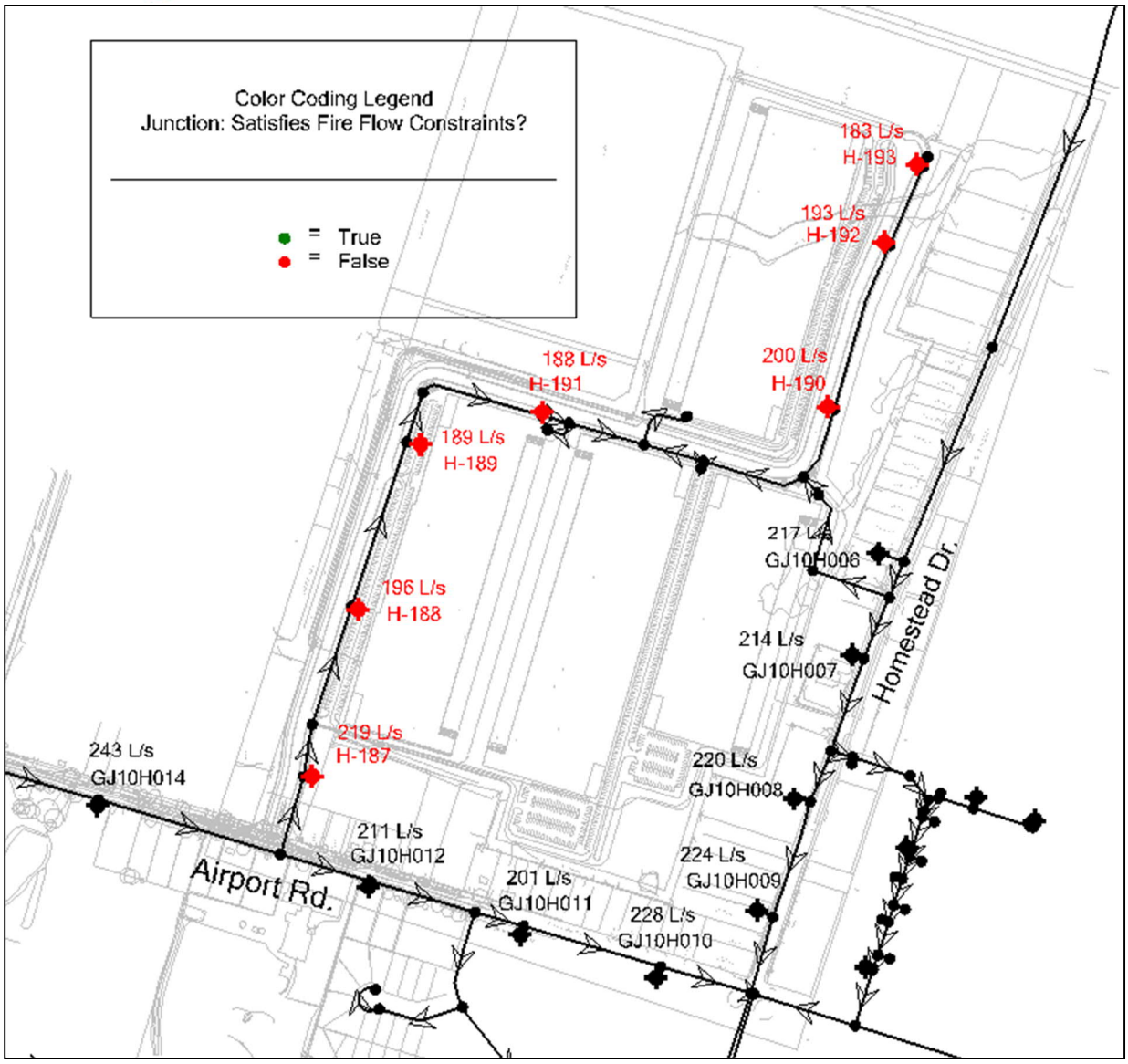



Figure C10 – Simulated AFF under 2031 MDD+FF with 50% TWL (Ultimate Buildout)

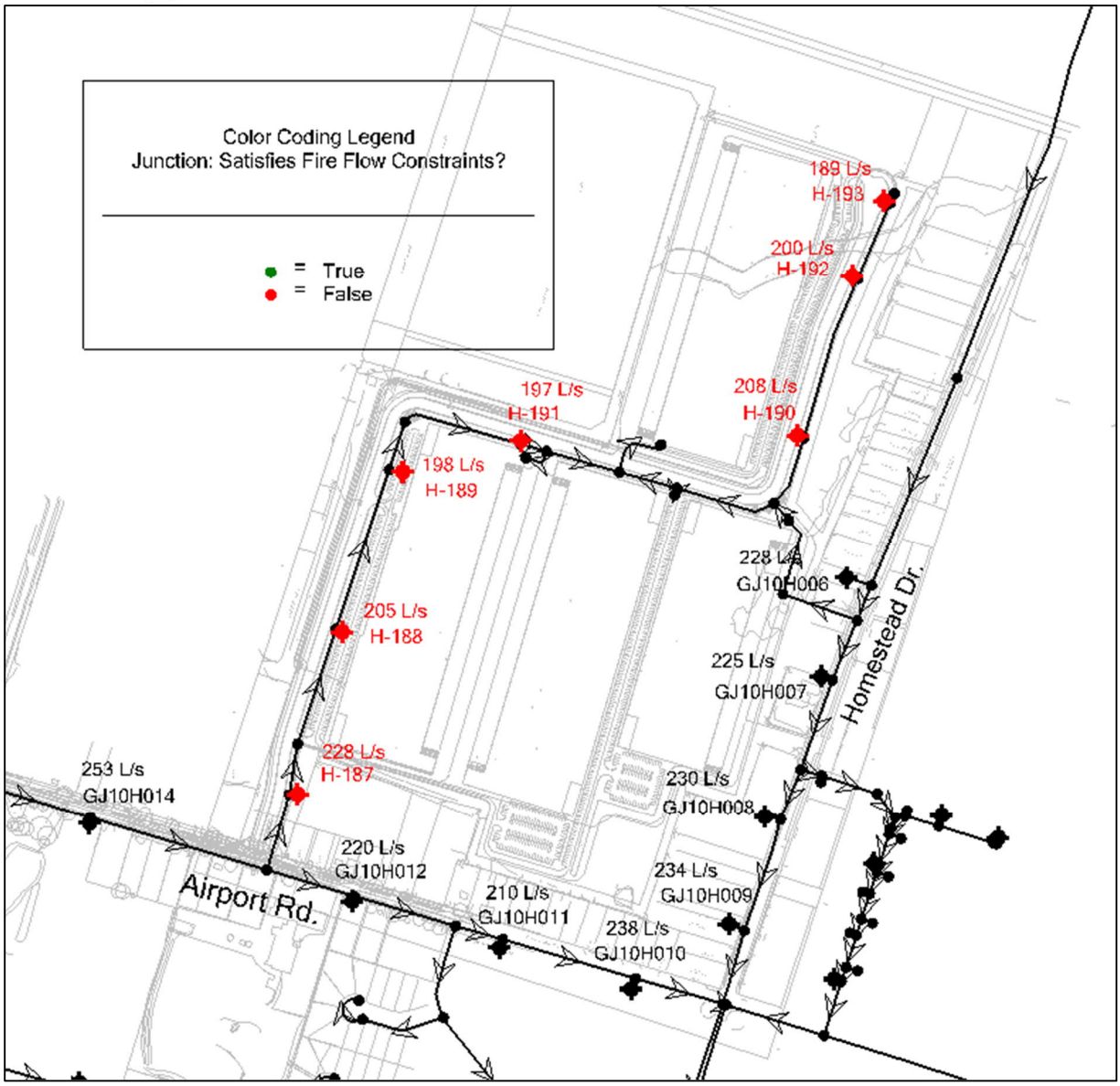



Figure C11 – Simulated AFF under 2031 MDD+FF with 70% TWL (Ultimate Buildout)

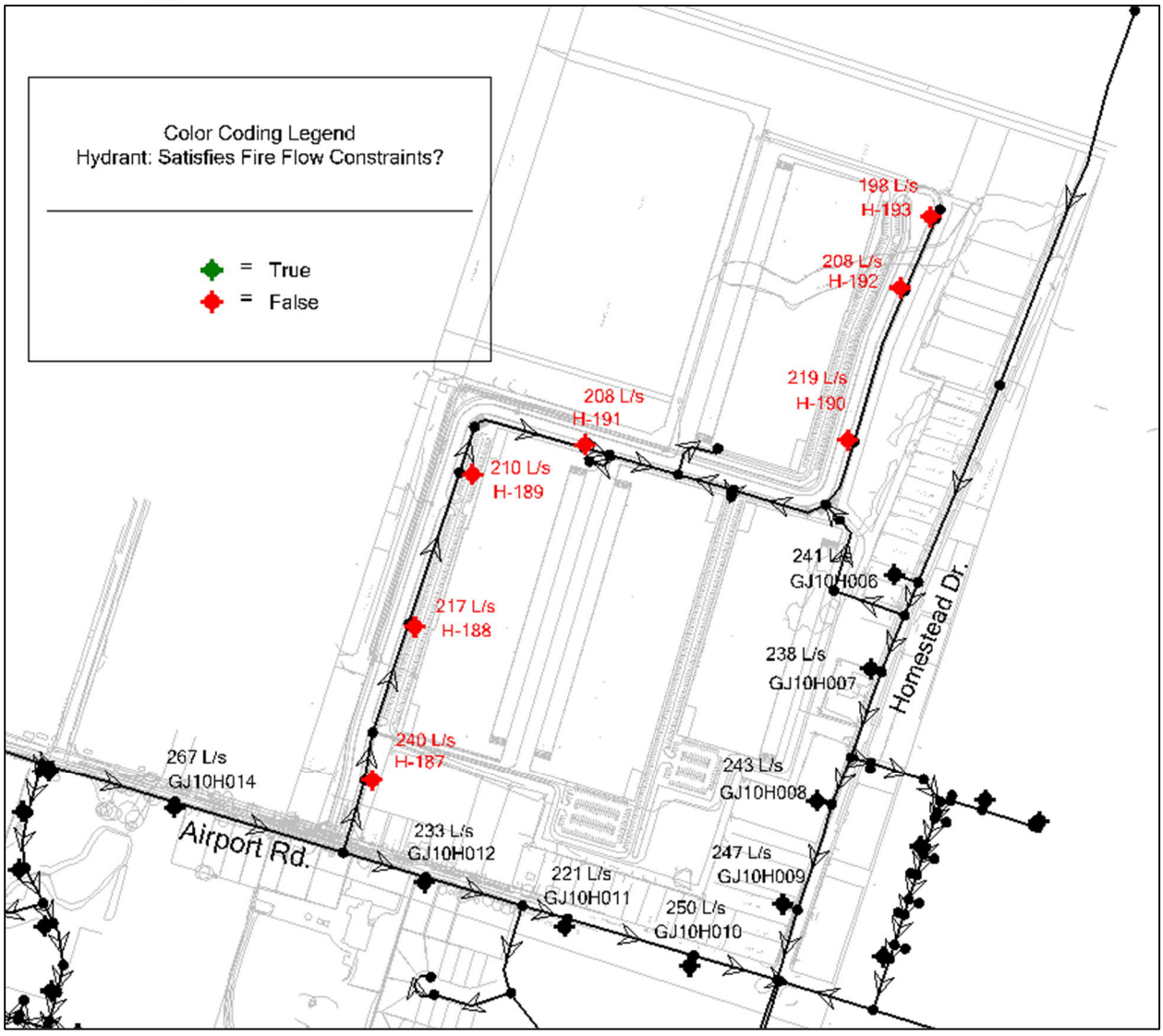



Figure C12 – Simulated AFF under 2031 MDD+FF with 99% TWL (Ultimate Buildout)

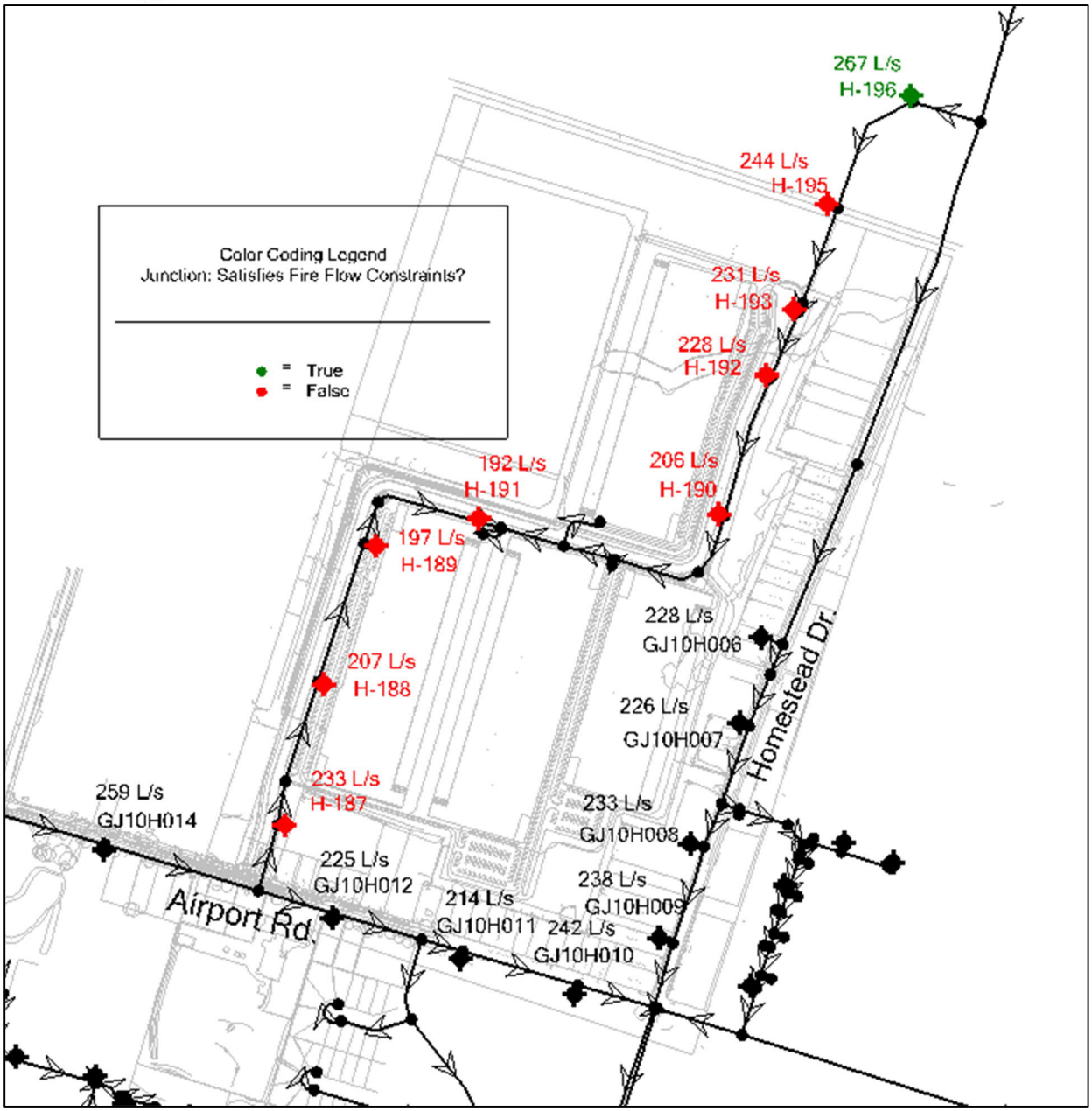



Figure C13 – Simulated AFF under 2021 MDD+FF with 50% TWL (Ultimate Buildout – Option 2)

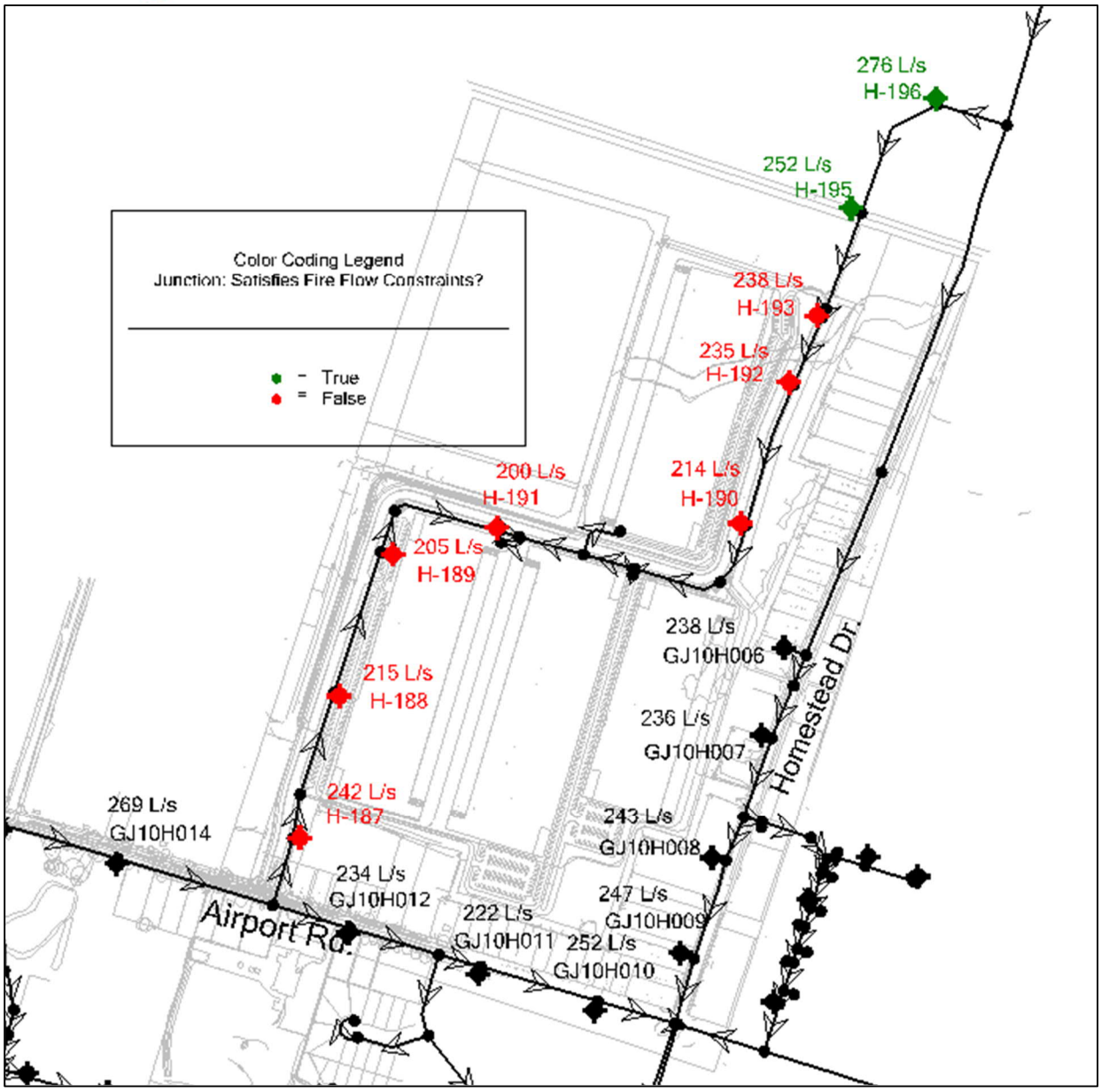



Figure C14 – Simulated AFF under 2021 MDD+FF with 70% TWL (Ultimate Buildout – Option 2)

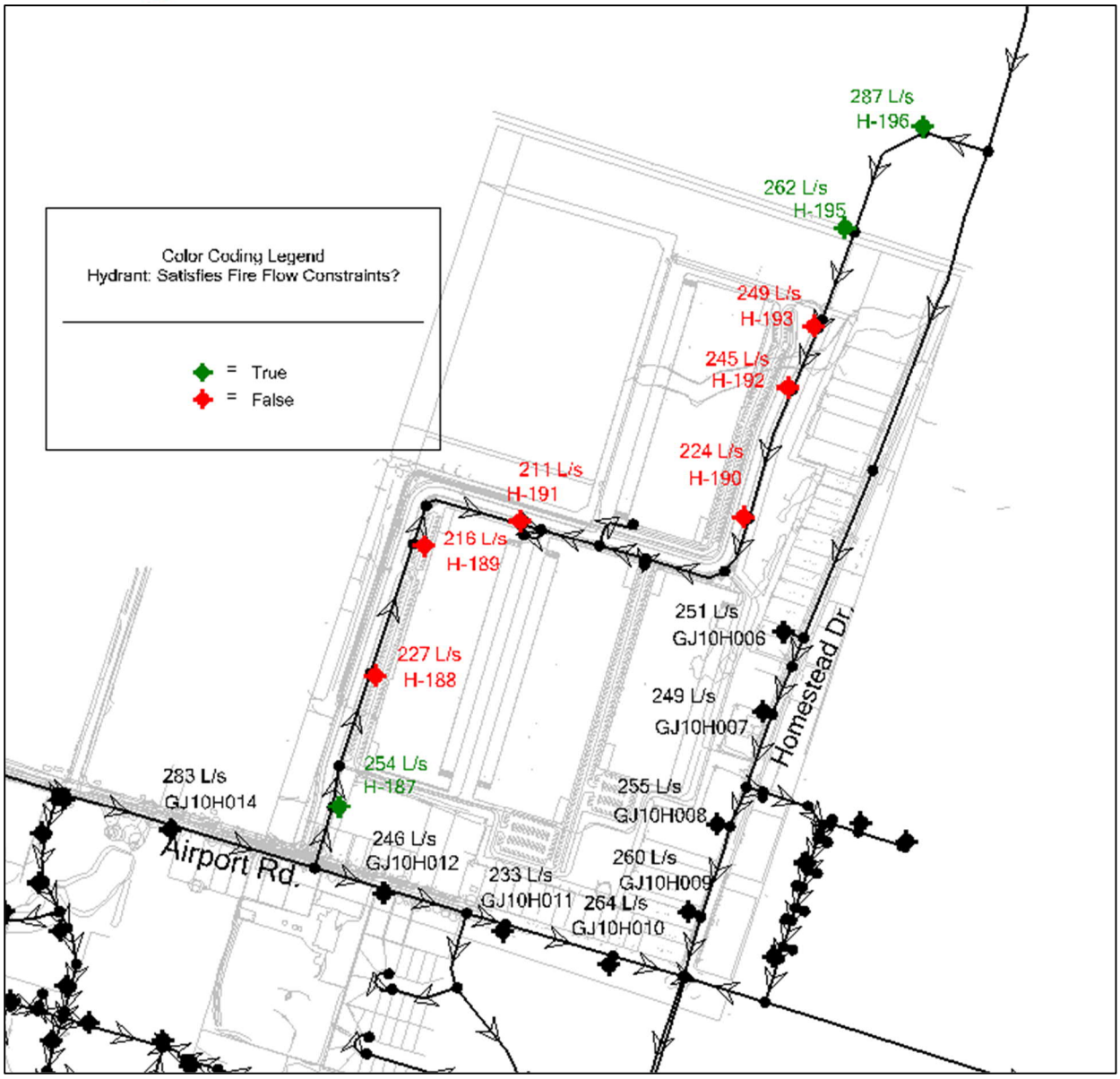



Figure C15 – Simulated AFF under 2021 MDD+FF with 99% TWL (Ultimate Buildout – Option 2)

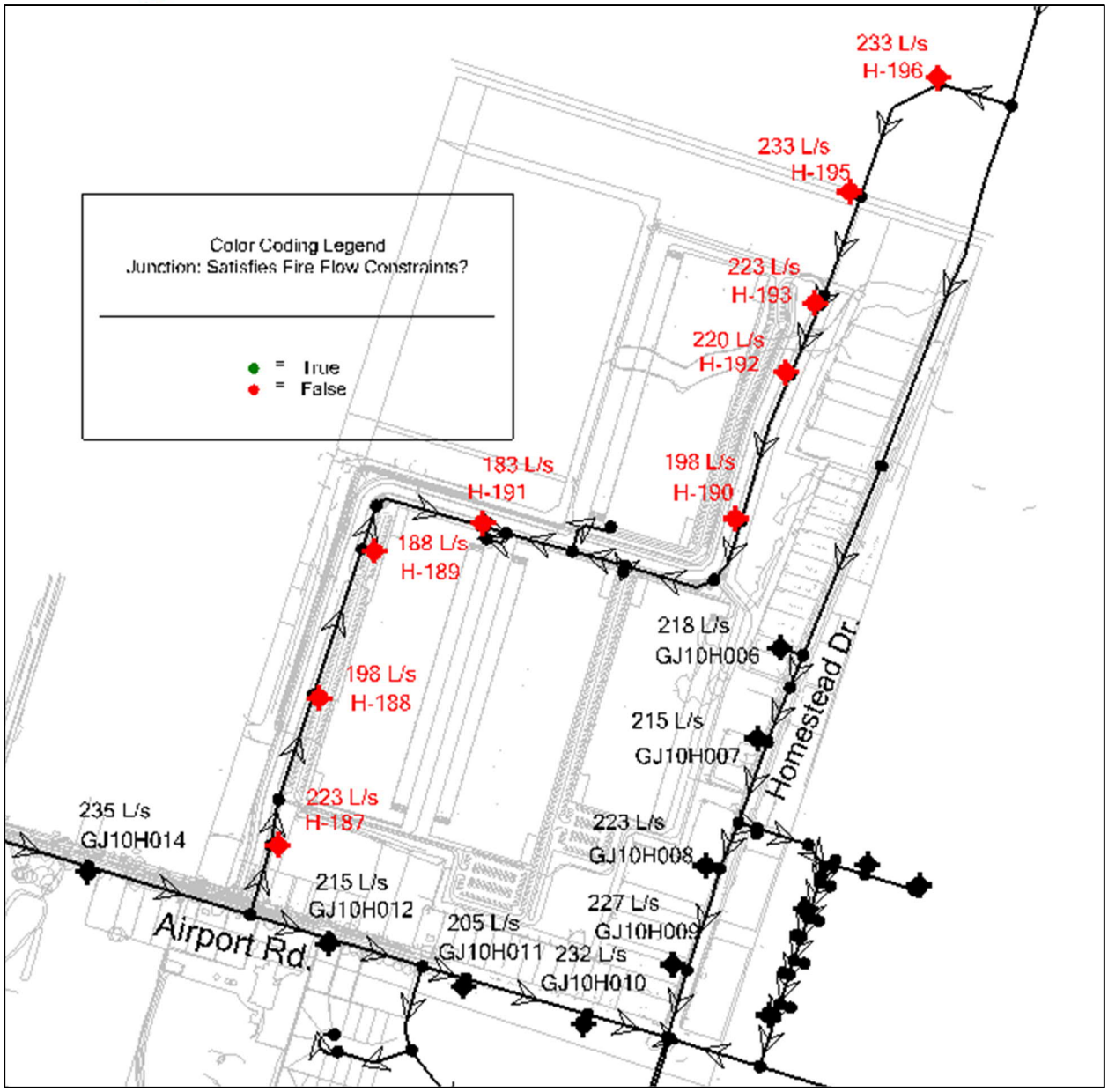



Figure C16 – Simulated AFF under 2031 MDD+FF with 50% TWL (Ultimate Buildout – Option 2)

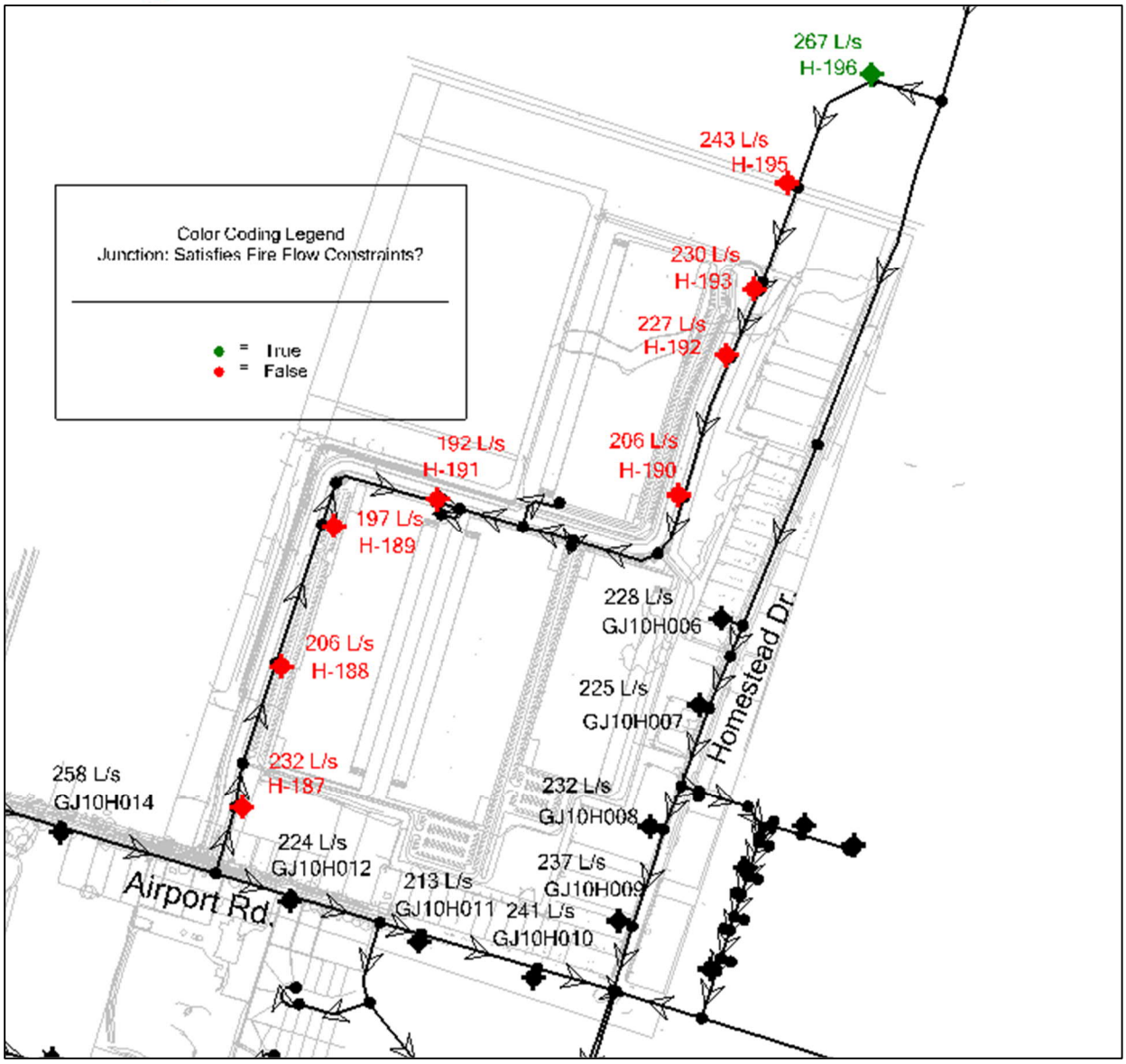



Figure C17 – Simulated AFF under 2031 MDD+FF with 70% TWL (Ultimate Buildout – Option 2)

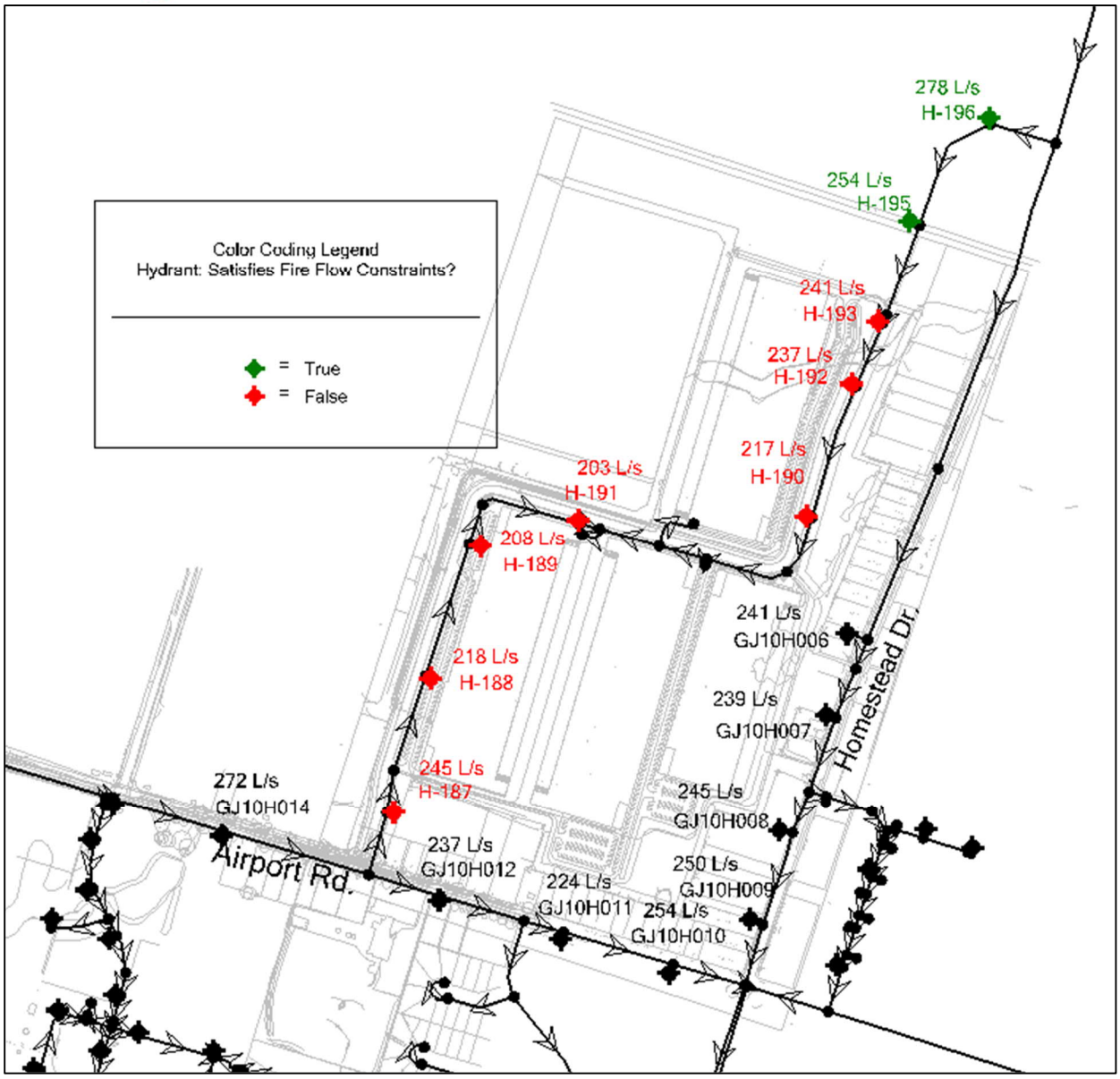



Figure C18 – Simulated AFF under 2031 MDD+FF with 99% TWL (Ultimate Buildout – Option 2)

# APPENDIX

# D

## FLUSHING REPORT

# Flushing Reports
## Phase 1

| Label | Length (m) | Diameter (mm) | Flushing Event | Velocity (Maximum Flushing) (m/s) | Satisfies Flushing Target Velocity? | Flow (Absolute) (L/s) | No. of Port |
|---|---|---|---|---|---|---|---|
| HS-P-893 | 30.18 | 300.00 | Event [HS-J-1123] | 0.92 | TRUE | 1.29 | 1 |
| HS-P-887 | 28.96 | 300.00 | Event [HS-J-1123] | 0.92 | TRUE | 1.29 | 1 |
| HS-P-889 | 53.34 | 300.00 | Event [HS-J-1123] | 0.92 | TRUE | 1.29 | 1 |
| HS-P-888 | 130.15 | 300.00 | Event [HS-J-1123] | 0.92 | TRUE | 1.29 | 1 |
| HS-P-890 | 179.22 | 300.00 | Event [H-189] | 0.92 | TRUE | 1.29 | 1 |
| HS-P-892 | 54.86 | 300.00 | Event [H-188] | 0.93 | TRUE | 1.29 | 1 |
| HS-P-891 | 128.32 | 300.00 | Event [H-188] | 0.93 | TRUE | 1.29 | 1 |
| HS-P-883 | 84.12 | 300.00 | Event [H-187] | 0.96 | TRUE | 1.29 | 1 |

| | |
|---|---|
| **Minimum** | 0.92 |
| **Maximum** | 0.96 |

| Label | Length (m) | Diameter (mm) | Flushing Event | Velocity (Maximum Flushing) (m/s) | Satisfies Flushing Target Velocity? | Flow (Absolute) (L/s) | No. of Port |
|---|---|---|---|---|---|---|---|
| P-887 | 28.96 | 300.00 | Event [J-1135] | 0.88 | TRUE | 3.83 | 2 |
| P-888 | 130.15 | 300.00 | Event [J-1135] | 0.88 | TRUE | 3.83 | 2 |
| P-889 | 53.34 | 300.00 | Event [J-1135] | 0.88 | TRUE | 3.83 | 2 |
| P-886 | 80.47 | 300.00 | Event [J-1135] | 0.90 | TRUE | 2.44 | 2 |
| P-877 | 20.12 | 300.00 | Event [J-1135] | 0.95 | TRUE | 0.50 | 2 |
| P-878 | 151.79 | 300.00 | Event [J-1135] | 0.95 | TRUE | 0.50 | 2 |
| P-890 | 179.22 | 300.00 | Event [H-188] | 1.01 | TRUE | 3.83 | 2 |
| P-872 | 23.77 | 300.00 | Event [J-1104] | 1.17 | TRUE | 0.50 | 2 |
| P-891 | 128.32 | 300.00 | Event [H-184] | 1.18 | TRUE | 3.83 | 2 |
| P-892 | 54.86 | 300.00 | Event [H-184] | 1.18 | TRUE | 3.83 | 2 |
| P-870 | 72.54 | 300.00 | Event [J-1104] | 1.19 | TRUE | 1.57 | 2 |
| P-871 | 224.64 | 300.00 | Event [J-1104] | 1.19 | TRUE | 1.57 | 2 |
| P-883 | 84.12 | 300.00 | Event [H-185] | 1.45 | TRUE | 3.83 | 2 |
| P-873 | 11.28 | 300.00 | Event [J-1104] | 1.83 | TRUE | 0.00 | 2 |
| P-874 | 88.09 | 300.00 | Event [J-1104] | 1.83 | TRUE | 0.00 | 2 |
| P-875 | 178.92 | 300.00 | Event [J-1104] | 1.83 | TRUE | 0.00 | 2 |
| P-876 | 78.33 | 300.00 | Event [J-1104] | 1.83 | TRUE | 0.00 | 2 |

| | |
|---|---|
| **Minimum** | 0.88 |
| **Maximum** | 1.83 |

# Flushing Reports
## Full Buildout - Option 2

| Label | Length (m) | Diameter (mm) | Flushing Event | Velocity (Maximum Flushing) (m/s) | Satisfies Flushing Target Velocity? | Flow (Absolute) (L/s) | No. of Port |
|---|---|---|---|---|---|---|---|
| HS-P-878 | 63.7 | 300 | Event [H-191] | 0.97 | TRUE | 5.17 | 2 |
| HS-P-877 | 109.42 | 300 | Event [H-191] | 0.98 | TRUE | 6.17 | 2 |
| HS-P-876 | 78.33 | 300 | Event [H-191] | 0.98 | TRUE | 6.17 | 2 |
| HS-P-886 | 80.47 | 300 | Event [H-190] | 0.93 | TRUE | 2.45 | 2 |
| HS-P-887 | 28.96 | 300 | Event [H-190] | 0.81 | TRUE | 1.16 | 2 |
| HS-P-889 | 53.34 | 300 | Event [H-191] | 0.96 | TRUE | 1.16 | 2 |
| HS-P-888 | 130.15 | 300 | Event [H-191] | 0.96 | TRUE | 1.16 | 2 |
| HS-P-875 | 178.92 | 300 | Event [H-190] | 0.99 | TRUE | 6.17 | 2 |
| HS-P-890 | 179.22 | 300 | Event [H-189] | 1.06 | TRUE | 1.16 | 2 |
| HS-P-874 | 88.09 | 300 | Event [H-192] | 1.14 | TRUE | 6.17 | 2 |
| HS-P-892 | 54.86 | 300 | Event [H-188] | 1.18 | TRUE | 1.16 | 2 |
| HS-P-891 | 128.32 | 300 | Event [H-188] | 1.18 | TRUE | 1.16 | 2 |
| P-886(1) | 124.66 | 300 | Event [H-193] | 1.2 | TRUE | 6.17 | 2 |
| P-886(2)(1) | 170.99 | 300 | Event [H-195] | 1.32 | TRUE | 6.17 | 2 |
| HS-P-883 | 84.12 | 300 | Event [H-187] | 1.38 | TRUE | 1.16 | 2 |
| P-886(2)(2) | 87.48 | 300 | Event [H-196] | 1.54 | TRUE | 6.17 | 2 |

| | |
|---|---|
| **Minimum** | 0.81 |
| **Maximum** | 1.54 |

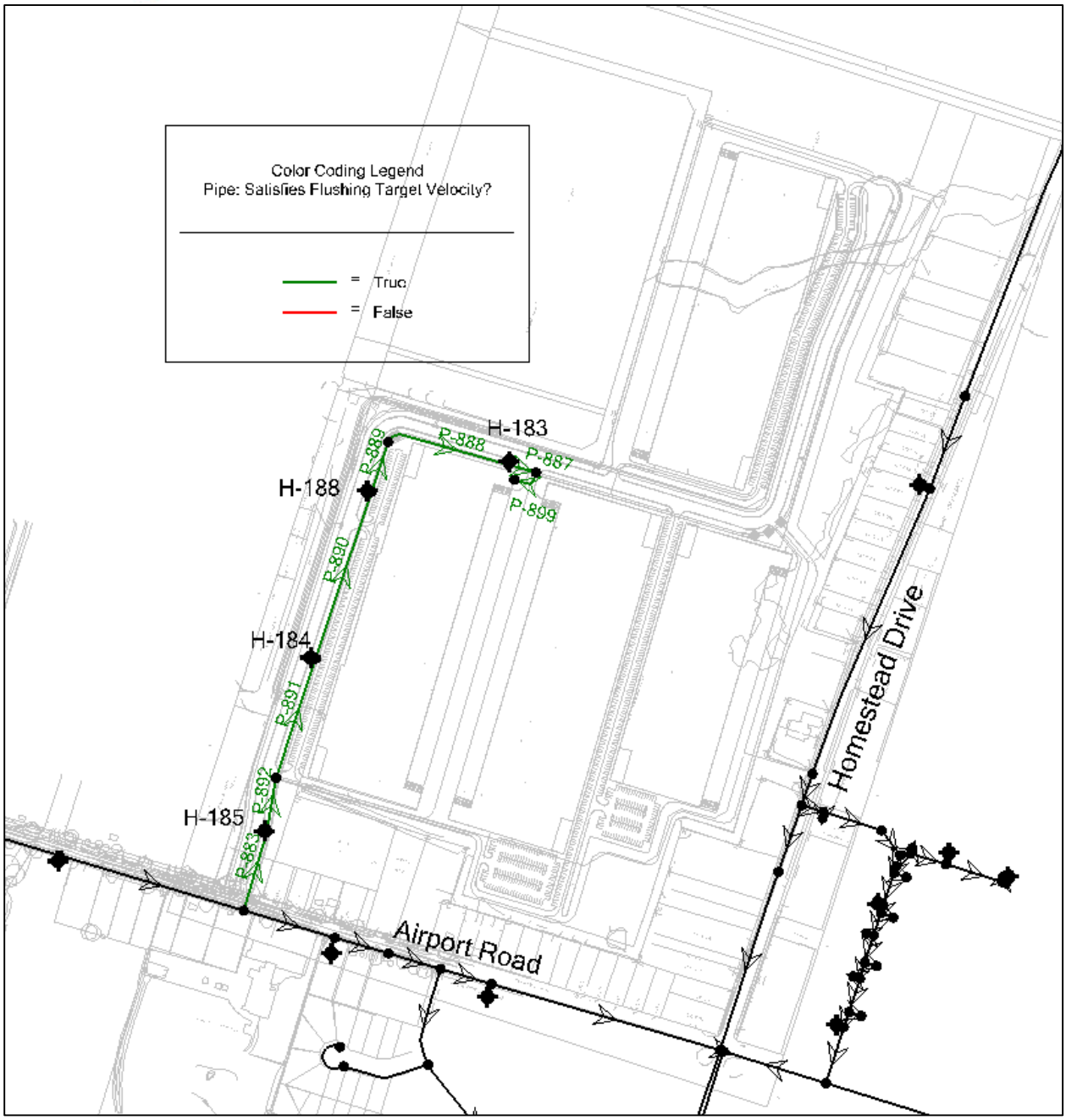



Figure D1 – Flushing Results for the Proposed 3054 Homestead Drive Development (Phase 1)


Figure D2 – Flushing Results for the Proposed 3054 Homestead Drive Development (Ultimate Buildout)

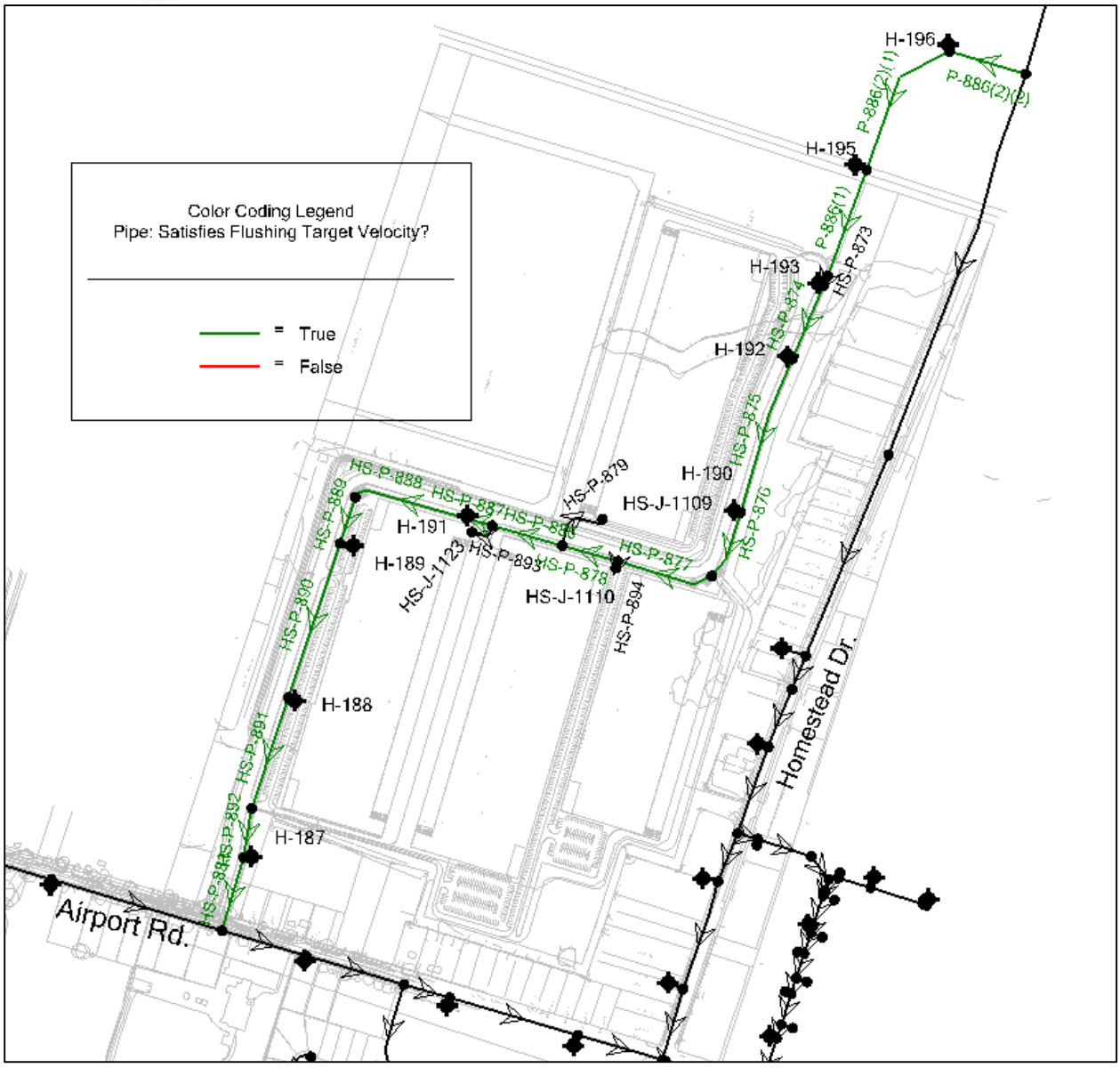


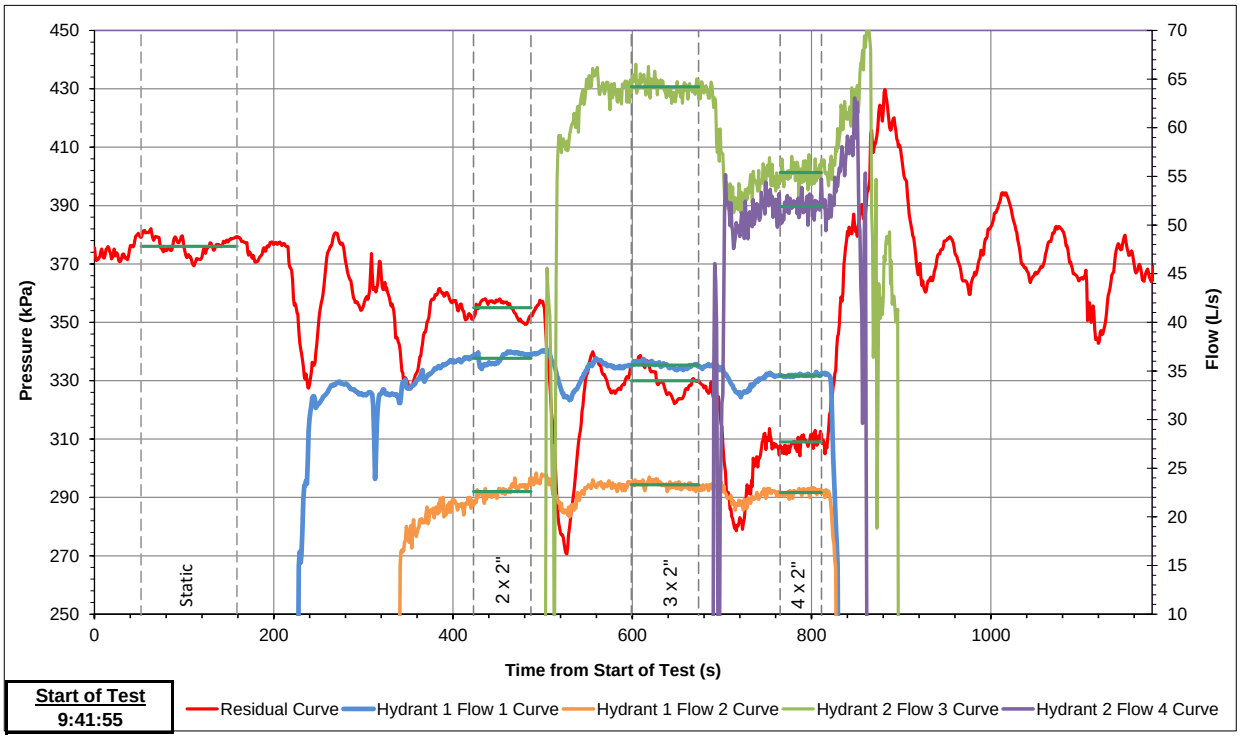

Figure D3 – Flushing Results for the Proposed 3054 Homestead Drive Development (Ultimate Buildout – Option 2)

# APPENDIX

# E

## HYDRANT FLOW TEST RESULTS

# 9079 Airport Rd (GJ10H011)




**Subject Watermain Details**

| | | | |
|---|---|---|---|
| **Diameter:** | 400 mm | **Material:** | DI |
| **Area:** | 0.126 m2 | | |

**Subject Hydrant & Valve Details**

| | |
|---|---|
| **Residual Hydrant:** | GJ10H011 |
| **Flow Hydrant 1:** | GJ10H012 |
| **Flow Hydrant 2:** | GJ10H010 |

**TABLE A: TESTED PRESSURES AND FLOWS**

| Point | Time | | Residual (GJ10H011) | | Flow Hydrant 1 (GJ10H012) | | | | Flow Hydrant 2 (GJ10H010) | | | | Total Flow | | Velocity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Residual (S1) | | Flow 1 (S2) | | Flow 2 (S3) | | Flow 3 (S4) | | Flow 4 (S5) | | | | |
| | Start | Finish | (kPa) | (psi) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (m/s) |
| **Static** | 52 | 159 | 376 | 54.5 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **1 x 2"** | | | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2 x 2"** | 423 | 487 | 355 | 51.5 | 36.3 | 575 | 22.6 | 358 | 0.0 | 0 | 0.0 | 0 | 58.9 | 934 | 0.5 |
| **3 x 2"** | 599 | 674 | 330 | 47.9 | 35.6 | 564 | 23.3 | 369 | 64.2 | 1018 | 0.0 | 0 | 123.1 | 1951 | 1.0 |
| **4 x 2"** | 765 | 811 | 309 | 44.8 | 34.5 | 547 | 22.5 | 357 | 55.4 | 878 | 51.9 | 823 | 164.3 | 2604 | 1.3 |

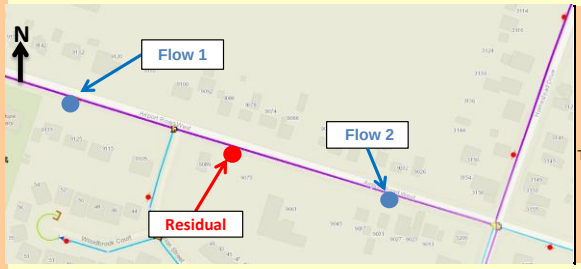
# 9079 Airport Rd (GJ10H011)

## HYDRANT FLOW TEST RESULTS

Date: 13-Oct-22 Time: 9:41 (hh/mm) Municipality: City of Hamilton

Operator:

Tested By: Sen, Issac Test No: **1**




Conditions before Test (STATIC)

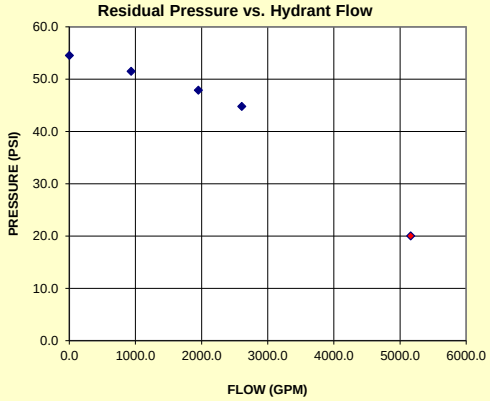
| | | |
|---|---|---|
| Residual Hydrant: | 54.5 psi | 376 kPa |
| Hydrant that will Flow: | 54.5 psi | 376 kPa |
| Δ pressure: | 0.0 psi | 0 kPa |
| Elevation Difference: (Flow El. - Residual El.) | 0.0 ft | 0.0 m |

Test Notes:

| TEST | | TEST FLOW | | RESIDUAL PRESSURE (psi) | | Minimum Residual $P_r$ (psi) | Fire Flow at Minimum Residual, $Q_r$ (USGPM) | Fire Flow at Minimum Residual, $Q_r$ (L/s) | 10% Pressure Drop Achieved? |
|---|---|---|---|---|---|---|---|---|---|
| Port Size (in) | Nozzle Pressure (psi) | (USGPM) | (L/s) | Monitoring Hydrant | Flow Hydrant (Corrected) * | | | | |
| STATIC | n/a | 0 | 0 | 54.5 | 54.5 | | | | |
| Single Hydrant Test | | | | | | | | | |
| 1 x 2" | 0.0 | 0.0 | 0.0 | | | 20 | | | |
| 2 x 2" | 8.9 | 933.0 | 58.9 | 51.5 | 51.5 | 20 | 3469 | 219 | NO |
| 3 x 2" | | | | | | | | | |
| Hydrant 1 | 8.9 | 933.0 | 58.9 | 47.9 | 47.9 | 20 | 4755 | 300 | YES |
| Hydrant 2 | 37.0 | 1018.0 | 64.2 | | | | | | |
| 4 x 2" | | | | | | | | | |
| Hydrant 1 | 8.4 | 904.0 | 57.0 | 44.8 | 44.8 | 20 | 5162 | 326 | YES |
| Hydrant 2 | 25.8 | 1701.0 | 107.3 | | | | | | |

* Pressure correction is equal to the elevation difference. Column 2 (and Table A) show the nozzle pressure while flowing.

**Residual Pressure vs. Hydrant Flow**




| Results | | | |
|---|---|---|---|
| Static Pressure | | Flow at 20 psi (140kPa)* | |
| (psi) | (kPa) | (gpm) | (L/s) |
| 54.5 | 376 | 5200 | 328 |

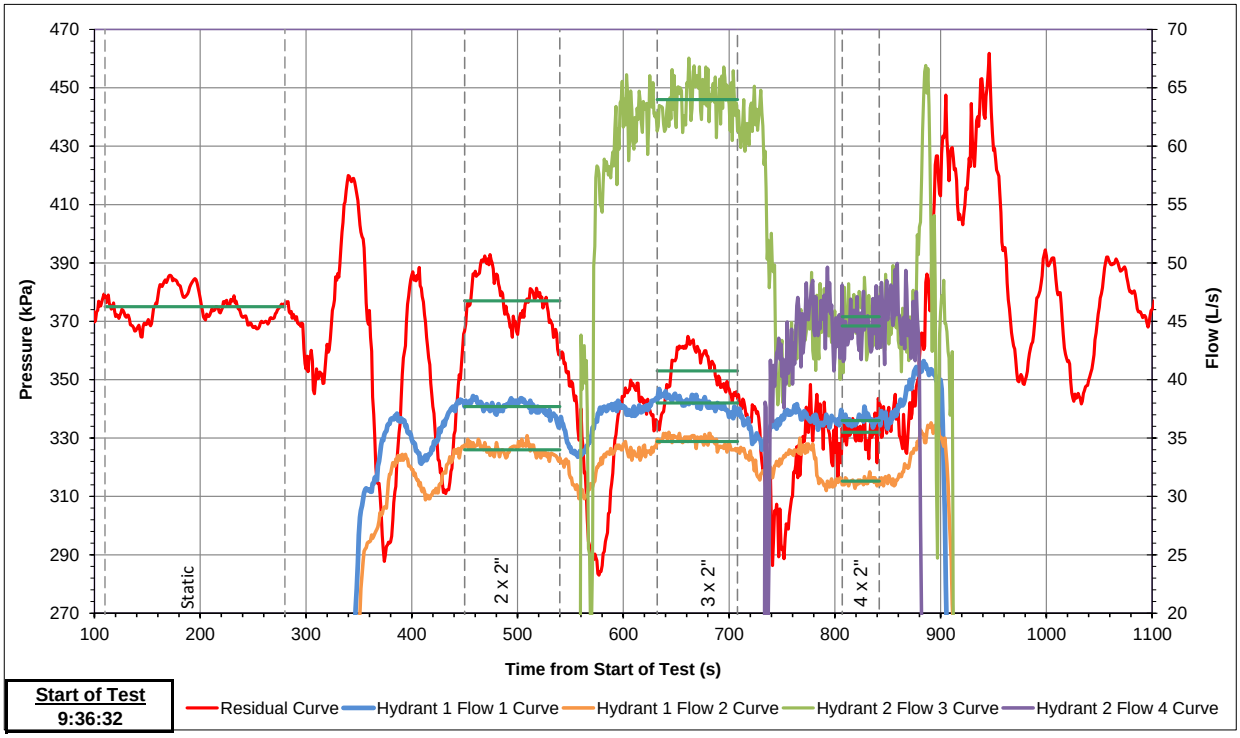
* Results carried to nearest 50 gpm or 100 gpm if over 1000 gpm

| Hydrant Classification as per NFPA 291 | | | |
|---|---|---|---|
| Class | AA | Color | BLUE |

| Water Discharged During Test: | 43500 L |
|---|---|

Rounded up to closest 100L

# 3026 Homestead Dr (GJ10H006)




**Subject Watermain Details**

| | | | |
|---|---|---|---|
| **Diameter:** | 400 mm | **Material:** | DI |
| **Area:** | 0.126 m2 | | |

**Subject Hydrant & Valve Details**

| | |
|---|---|
| **Residual Hydrant:** | GJ10H006 |
| **Flow Hydrant 1:** | GJ10H008 |
| **Flow Hydrant 2:** | GJ10H007 |

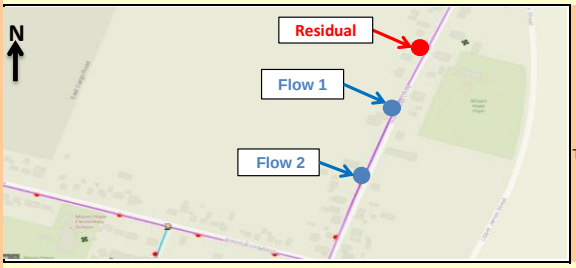
**TABLE A: TESTED PRESSURES AND FLOWS**

| Point | Time | | Residual (GJ10H006) | | Flow Hydrant 1 (GJ10H008) | | | | Flow Hydrant 2 (GJ10H007) | | | | Total Flow | | Velocity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Residual (S1) | | Flow 1 (S2) | | Flow 2 (S3) | | Flow 3 (S4) | | Flow 4 (S5) | | | | |
| | Start | Finish | (kPa) | (psi) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (m/s) |
| **Static** | 110 | 280 | 375 | 54.4 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **1 x 2"** | | | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2 x 2"** | 450 | 540 | 377 | 54.7 | 37.7 | 598 | 34.0 | 539 | 0.0 | 0 | 0.0 | 0 | 71.7 | 1136 | 0.6 |
| **3 x 2"** | 632 | 708 | 353 | 51.2 | 38.0 | 602 | 34.7 | 550 | 64.0 | 1014 | 0.0 | 0 | 136.7 | 2167 | 1.1 |
| **4 x 2"** | 807 | 842 | 332 | 48.2 | 36.5 | 579 | 31.3 | 496 | 45.4 | 720 | 44.6 | 707 | 157.8 | 2501 | 1.3 |

# 3026 Homestead Dr (GJ10H006)

## HYDRANT FLOW TEST RESULTS

| | | | | | |
|---|---|---|---|---|---|
| Date: | 19-Oct-22 | Time: | 9:36 (hh/mm) | Municipality: | City of Hamilton |
| | | | | Operator: | |
| Tested By: | Sen, Issac | | | Test No: | 2 |



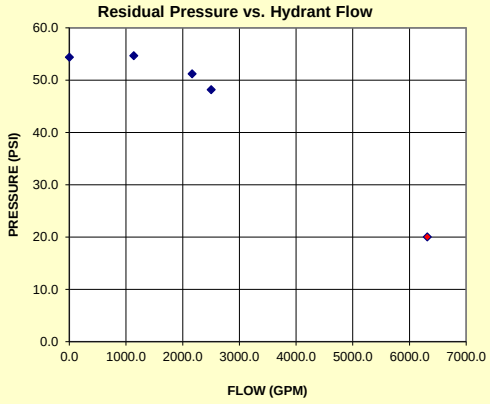

Conditions before Test (STATIC)

| | | |
|---|---|---|
| Residual Hydrant: | 54.4 psi | 375 kPa |
| Hydrant that will Flow: | 54.4 psi | 375 kPa |
| Δ pressure: | 0.0 psi | 0 kPa |
| Elevation Difference: (Flow El. - Residual El.) | 0.0 ft | 0.0 m |

Test Notes: A pump may have started during test

| TEST | | TEST FLOW | | RESIDUAL PRESSURE (psi) | | Minimum Residual $P_r$ (psi) | Fire Flow at Minimum Residual, $Q_r$ (USGPM) | Fire Flow at Minimum Residual, $Q_r$ (L/s) | 10% Pressure Drop Achieved? |
|---|---|---|---|---|---|---|---|---|---|
| Port Size (in) | Nozzle Pressure (psi) | (USGPM) | (L/s) | Monitoring Hydrant | Flow Hydrant (Corrected) * | | | | |
| STATIC | n/a | 0 | 0 | 54.4 | 54.4 | | | | |
| Single Hydrant Test | | | | | | | | | |
| 1 x 2" | 0.0 | 0.0 | 0.0 | | | 20 | | | |
| 2 x 2" | 13.3 | 1137.0 | 71.7 | 54.7 | 54.7 | 20 | N.A. | N.A. | NO |
| 3 x 2" | | | | | | | | | |
| Hydrant 1 | 13.6 | 1152.0 | 72.7 | 51.2 | 51.2 | 20 | 7822 | 494 | NO |
| Hydrant 2 | 36.7 | 1014.0 | 64.0 | | | | | | |
| 4 x 2" | | | | | | | | | |
| Hydrant 1 | 11.9 | 1075.0 | 67.8 | 48.2 | 48.2 | 20 | 6316 | 399 | YES |
| Hydrant 2 | 18.2 | 1427.0 | 90.0 | | | | | | |

* Pressure correction is equal to the elevation difference. Column 2 (and Table A) show the nozzle pressure while flowing.




| Results | | | |
|---|---|---|---|
| Static Pressure | | Flow at 20 psi (140kPa)* | |
| (psi) | (kPa) | (gpm) | (L/s) |
| 54.4 | 375 | 6300 | 397 |

* Results carried to nearest 50 gpm or 100 gpm if over 1000 gpm

| Hydrant Classification as per NFPA 291 | | | |
|---|---|---|---|
| Class | AA | Color | BLUE |

| Water Discharged During Test: | 39300 L |
|---|---|

Rounded up to closest 100L

DISCLAIMER FOR FIRE FLOW TESTS

While WSP makes every effort to ensure that the information contained herein is accurate and up to date, WSP is not responsible for unintended or incorrect use of the data and information described and/or contained herein. The user must make his/her own determination as to its accuracy and suitability. The information is representative for a dynamic water system that may change over time.

Table E1: Hydrant Flow Test vs. Simulated Flow Test Results @ Hydrant GJ10H011

| GJ10H011 | | | | |
|---|---|---|---|---|
| Source | Static Pressure (kPa) | Residual Pressure (kPa) | Test Flow (L/s) | Theoretical Flow Available at 20 psi Residual (L/s) |
| Hydrant Test | 376 | 309 | 164 | 328 |
| Model Curve | 364 | 243 | 164 | 240 |

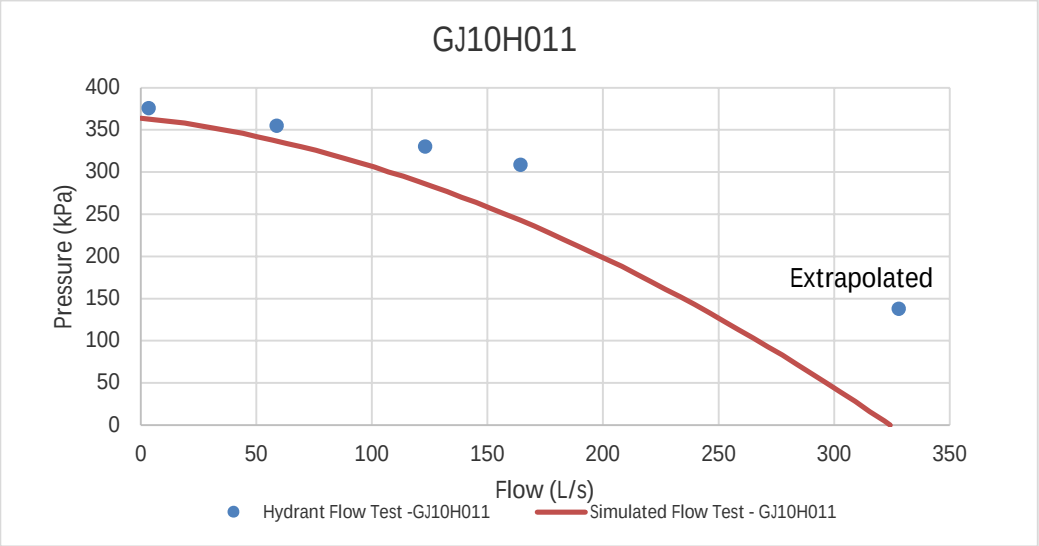



Figure E1: Hydrant Flow Test vs. Simulated Flow Test Results @ Hydrant GJ10H011

Table E2: Hydrant Flow Test vs. Simulated Flow Test Results @ Hydrant GJ10H006

| GJ10H006 | | | | |
|---|---|---|---|---|
| Source | Static Pressure (kPa) | Residual Pressure (kPa) | Test Flow (L/s) | Theoretical Flow Available at 20 psi Residual (L/s) |
| Hydrant Test | 377 | 332 | 158 | 398 |
| Model Curve | 373 | 260 | 158 | 246 |

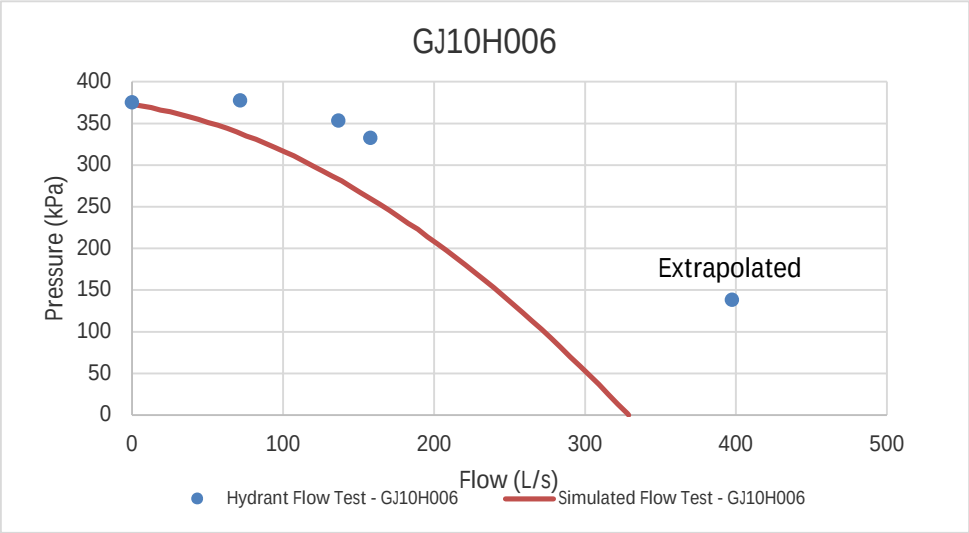



Figure E2: Hydrant Flow Test vs. Simulated Flow Test Results @ Hydrant GJ10H006