# Appendix O2. Sewer Service Study

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# FANITA RANCH DEVELOPMENT SEWER SERVICE STUDY
**FOR THE**
# PADRE DAM MUNICIPAL WATER DISTRICT

PDMWD JN: 204020
Michael Baker International JN: 155036

## FINAL – February 4, 2020

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# Section 1 - Introduction

The purpose of this Sewer Service Study (SSS) is to confirm the proposed sewer system infrastructure that will be necessary to support the new Fanita Ranch Development (Project) in the City of Santee. The Project was originally designed as a Planned Development but is proposed to be designated as a Specific Plan according to the Fanita Ranch General Plan Amendment application dated June 2018 for the City of Santee. The proposed project area is located within the Padre Dam Municipal Water District (District) Western Service Area (WSA), serving potable, wastewater and recycled water to the City of Santee and parts of El Cajon and Lakeside.

The existing sanitary sewer system within the District's WSA currently delivers wastewater to the Ray Stoyer Water Recycling Facility (WRF) and the City of San Diego's Metropolitan Wastewater System Interceptor (METRO). The WRF, located north of Santee Lakes and immediately west of the Project in the City of Santee, is an advanced tertiary treatment facility that currently treats up to 2.0 million gallons of wastewater per day and provides recycled water for lake replenishment and irrigation within the service area. Wastewater that is not pumped to the WRF is transported to the METRO, ultimately sending wastewater to the Point Loma Waste Water Treatment Plant.

The sanitary flows that will be generated by the Project's proposed sewer system will ultimately be conveyed to the WRF for treatment. The District plans to expand the WRF to ultimately provide highly purified water to enhance the District's water supply portfolio as part of the Advanced Water Purification (AWP) program. This study evaluates quantitative wastewater production within the Project and verifies the required design of the sewer system.

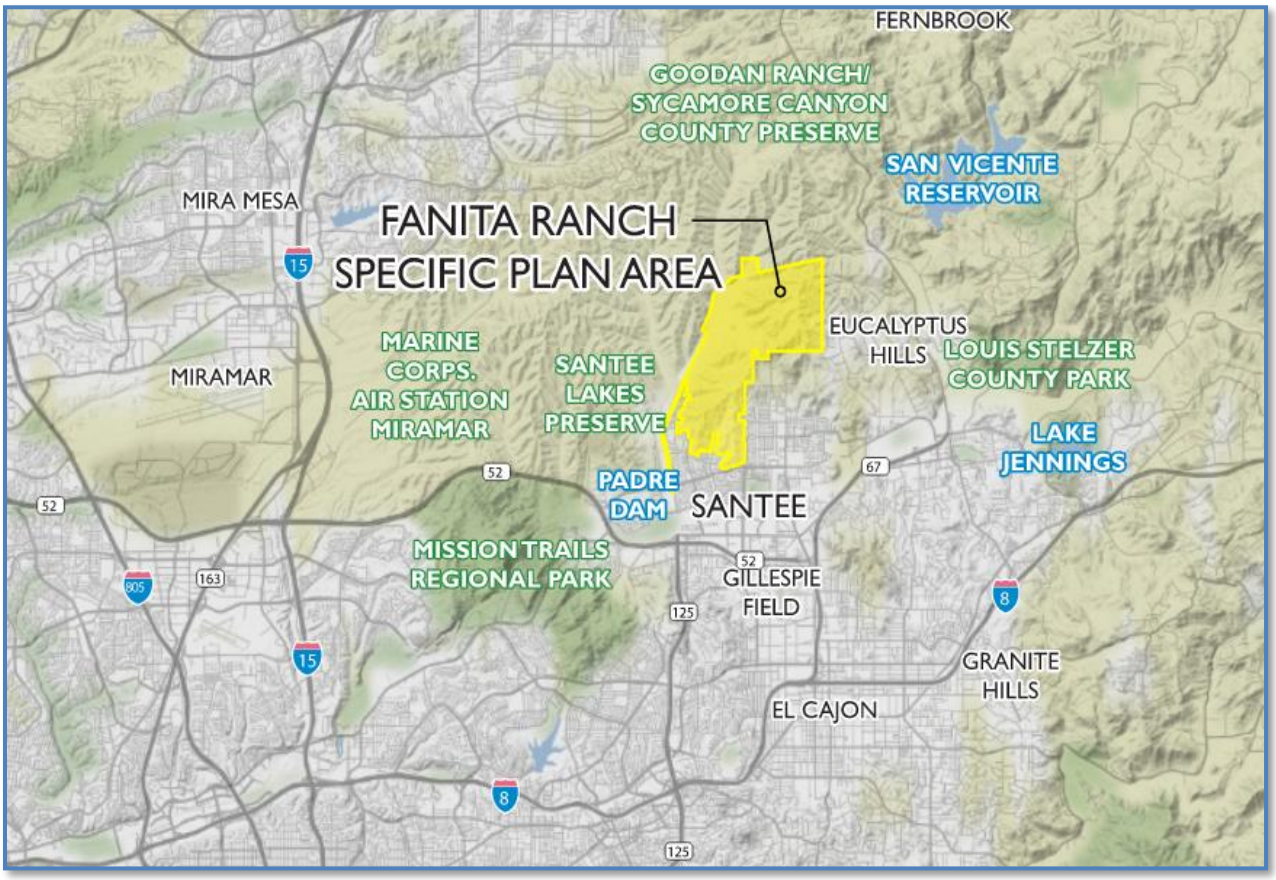
This report is organized to provide background data, hydraulic analysis, and a summary of the results from the Project's proposed sanitary sewer infrastructure. The analysis and evaluation reviewed onsite facilities under average and peak dry weather flow conditions and peak wet weather flow conditions.

# Section 2 - Project Description

## 2.1 Project Location

The Fanita Ranch project site consists of approximately 2,638 acres in the northern portion of the City of Santee (City) in eastern San Diego County. The City is located approximately 18 miles east of downtown San Diego and the Pacific Ocean. The project site is north of State Route (SR) 52 and west of SR-67 (see Figure 2-1 – Project Site Location Map). Access to the project site will be provided by the northerly extension of Fanita Parkway and Cuyamaca Street and the extension of Magnolia Avenue to Cuyamaca Street. The project site is bordered by Marine Corps Air Station Miramar and Padre Dam Municipal Water District (PDMWD) facilities and Santee Lakes Recreation Preserve to the west; open space/recreational areas, including Goodan Ranch Regional Park and Sycamore Canyon County Preserve, to the north and west; existing City residential neighborhoods to the south; and Eucalyptus Hills, an existing residential community, to the east.

**Figure 2-1**
**Project Site Location Map**




(Map courtesy of the Fanita Ranch Specific Plan, Public Review Draft, dated February 2020)

## 2.2 Project Description

Fanita Ranch is a master planned community consisting of up to 2,949 homes[1], up to 80,000 square feet of commercial uses, a school site, parks, open space and agricultural uses (see Figure 2-2 Proposed Site Layout and Land Use). The Fanita Ranch Specific Plan preserves more than 60 percent of the project site as a permanent Habitat Preserve (approximately 1,650.4 acres). Development is clustered within three villages: Fanita Commons, Orchard Village and Vineyard Village. Each village is defined by its unique design theme, location, physical characteristics and mix of housing types and land uses. In addition to the villages, the Specific Plan includes a 31.9-acre Special Use Area located in the southwest portion of the project site. The Specific Plan provides approximately 78.0 acres of public and private parks distributed throughout the three villages, including the 31.2-acre community park, 30.4 acres of neighborhood parks and approximately 16.4 acres of mini-parks and paseos. The farm is approximately 27.3 acres, with an additional 10.9 acres of open space with an agricultural overlay. Approximately 256.0 acres of open space, outside of the Habitat Preserve, includes manufactured open space slopes, fuel modification areas, trails, water quality/hydromodification basins, water pump stations and water storage tanks.

Each village/development area and key project components are summarized below.

**Fanita Commons**

Fanita Commons is in the northwest portion of the project site and is planned as the primary activity center for Fanita Ranch. Fanita Commons includes a mixed-use village center, an active-adult neighborhood, a K-8 school site, a community park, a working farm and two preserved natural drainages with an adjoining linear park. With the farm as its focal point, orchards, vineyards, fields and a barn for community events define this village. The mixed-use village center allows for up to 40,000 square feet of commercial uses and residential, recreation and civic uses, including a site for a new City fire station. A 15-acre school site could accommodate 700 students. If the Santee School District does not acquire the school site, the underlying Medium Density Residential (MDR) land use designation may be implemented. In that case, the maximum total number of units permitted in the Specific Plan would increase by 59 units for a total of 3,008 units. Fanita Commons includes a total of 768 residential units, including 445 Active Adult homes and 323 homes within the mixed-use village center.

**Orchard Village**

The Orchard Village is located south of Fanita Commons and consists of residential land uses, neighborhood and mini-parks and a centrally located mixed-use village center. The Orchard Village provides a total of 855 residential units, including 454 Low Density Residential (LDR) homes, 368 MDR homes and 33 homes within the mixed-use village center. Open space and a linear riparian area geographically and topographically separate the Orchard Village from Fanita Commons. Roadways, trails and a pedestrian bridge connect the Orchard Village to Fanita Commons. A neighborhood-serving village

[1] If the school site is not utilized for school purposes, the school site may be developed with residential uses and the total authorized units would be increased to 3,008 homes.

center includes up to 10,000 square-feet of retail, office and commercial uses. The Orchard Village also includes neighborhood parks and mini-parks.

**Vineyard Village**

The Vineyard Village is in the northeastern portion of the project site. The Vineyard Village is separated from the other two villages by an open space/wildlife corridor within the Habitat Preserve. Two local streets connect the Vineyard Village to Fanita Commons and the Orchard Village. The Vineyard Village provides a total of 1,326 residential units including, 749 LDR homes, 498 MDR homes and 79 homes within the mixed-use village center. The neighborhood-serving village center includes up to 10,000 square feet of retail and office uses. The Vineyard Village also features agricultural land planned for vineyards, as well as neighborhood parks and mini-parks.

**Habitat Preserve**

The Habitat Preserve is comprised of approximately 1,650.4 acres of permanently preserved open space. Open space within the Habitat Preserve will be dedicated to the Santee Multiple Species Conservation Program (MSCP) Subarea Plan Preserve. The Subarea Plan is currently being prepared by the City of Santee to ensure permanent preservation and management. A Habitat Management Plan will be adopted for the Habitat Preserve within Fanita Ranch to direct the long-term management of biological resources and meet the requirements of the MSCP Subarea Plan. A trail system through the Habitat Preserve will be designed to provide public access, consistent with the MSCP Subarea Plan.

**The Farm**

The Farm is the community focal point for Fanita Ranch. The approximately 27.3-acre Farm is located along the eastern edge of Fanita Commons and the Orchard Village, near the center of Fanita Ranch. An event barn featuring iconic agrarian architecture will set the theme for the community and provide a venue for special events and farming operations. The working Farm is planned to include terraced vegetable fields, pasture lands, limited housing for employees, raised gardens, limited animal keeping and up to 20,000 square feet of commercial uses. A Community Supported Agriculture program is planned for the Farm. Food grown on the Farm may be distributed to local schools, restaurants and other institutional facilities such as the congregate care and assisted living facilities. Agricultural uses have an underlying open space (OS) land use designation in the Specific Plan. The Specific Plan includes an "Agricultural Overlay" for 38.2 acres including the Farm which provides details regarding permitted agricultural uses.

**Special Use Area**

The Special Use area is comprised of approximately 31.9 acres in the south portion of the project site. Potential uses may include a solar farm, recreational vehicle and boat storage, above ground agriculture, such as greenhouses or similar uses. A Mini Park (MP-31) is planned west of Carlton Hills Boulevard which

would include a trail staging and parking area. Access to the Special Use Area is provided via Carlton Hills Boulevard.

**Parks, Trails and Recreational Facilities**

The Fanita Ranch project includes a coordinated system of parks and non-motorized use trails that connect to the three villages, regional trails and surrounding open space areas, including the Habitat Preserve. The trail system connects to existing off-site trails in Sycamore Canyon County Preserve, Goodan Ranch Regional Park, Mission Trails Regional Park and Santee Lakes Recreation Preserve. Approximately 78.0 acres of public and private parks are distributed throughout the three villages. The Community Park, located in Fanita Commons, provides for both active and passive recreation opportunities. Neighborhood parks are planned in key locations to provide recreational opportunities within walking distance of all homes. Mini-parks may feature trail heads, overlooks and passive and active recreational opportunities. A series of trails and paths ("AgMeander") connect the Farm to the Fanita Ranch villages

**Mobility (on-site)**

The Fanita Ranch Specific Plan establishes an on-site roadway network and street cross sections designed as a system of complete streets that support motorists, pedestrians, bicyclists and transit users. On-site streets are generally two lanes and include traffic calming measures such as gateways, roundabouts, narrowed travel lanes, on-street bike facilities and parking, a chicane, raised crosswalks and intersection pop-outs. On-site streets that cross open space areas are designed to minimize impacts to sensitive habitat and to accommodate wildlife crossings.

**Mobility Improvements**

Mobility improvements include the extension of three roadways identified in the Santee General Plan Mobility Element, including: 1) Fanita Parkway improvements from Mast Boulevard to the current northern limit; 2) Cuyamaca Street improvements from Mast Boulevard to the current northern limit; 3) the extension of Fanita Parkway from Ganley Road through the project site; 4) the extension of Cuyamaca Street from north of Chaparral Drive through the project site; and 5) the extension of Magnolia Avenue from its current northern limit to Cuyamaca Street.

**Development Phasing**

Fanita Ranch is anticipated to be developed in four phases over a 10 to 15-year period. Phases may overlap or vary depending on market conditions and may be broken down into smaller sub-phases. Construction is anticipated to begin in 2021. The Special Use Area is not tied to development phasing and may be developed anytime during project build-out.

## 2.3 Sewer Study

A hydraulic analysis was performed using Innovyze InfoSWMM™ hydraulic sewer and stormwater model to develop and evaluate the proposed gravity sewer infrastructure for the Project. InfoSWMM™ runs within the ESRI ArcMap GIS software program and has full access to the available geospatial analysis tools therein. The information used to prepare this Sewer System Study was obtained from the following sources:

- Fanita Ranch Specific Plan, Public Review Draft February 2020
- Fanita Ranch Project Description, KTGY Architects and Planners, October 2019
- Fanita Ranch Tentative Map/Preliminary Grading Plan, Hunsaker& Associates, September 17, 2019
- Santee Municipal Code
- District 2015 Comprehensive Facilities Master Plan, Carollo, October 2015 (2015 Master Plan)
- Water Agencies Standard (WAS) Design Guidelines (Rev. 07/28/2014)

The Project will include public sewer infrastructure that will be owned, operated and maintained by the District. The proposed sanitary sewer infrastructure will consist primarily of 8-inch Polyvinyl Chloride pipe (PVC) and will generally increase in size as the sanitary flow is conveyed westerly through the development. Ultimately, the wastewater will be conveyed by gravity west of Orchard Village through a 15-inch diameter pipe to both discharge locations recently identified by the District and shown in Figure 2-6:

> ***Discharge Location 1:*** Discharge Location 1 is the District's existing Ray Stoyer WRF. Connection to the WRF would be by gravity but will require the design and construction of a new Headworks Facility to provide screening and grit removal specifically for the Project's sanitary flow. Due to operation and odor control requirements for the new Headworks Facility, the District anticipates that this facility would be constructed at the north end of the existing WRF on District property. The cost to construct the facility would be borne by the Project. The Project will not require a lift station or force main since there is adequate vertical fall to convey the flow by gravity to the new headworks facility; however, a portion of the new westerly 15-inch gravity pipe would be continuously surcharged.
>
> ***Discharge Location 2:*** Discharge Location 2 involves connection of the Project's sanitary sewer system to an existing 18-inch and 24-inch sewer system that connects the Ray Stoyer WRF to the METRO system. The Project will not require a lift station or force main for this alternative since there is adequate vertical fall to convey the flow by gravity to the existing 18-inch and 24-inch sewer to METRO.

Pending ongoing planning for the District's proposed AWP and associated modifications to the existing Ray Stoyer WRF, the District anticipates that the Fanita Ranch sanitary system will connect to Location 1 and will thus require the construction of the new Headworks Facility to provide pretreatment for the

sanitary flow. Furthermore, for operational flexibility, the District will also require the Fanita Ranch sanitary system to connect to Location 2. Both discharge locations are deemed necessary for uninterrupted gravity flow from the Fanita Ranch sanitary system; therefore, a new Diversion structure will also be required to facilitate sanitary flow routing to Location 1 and/or Location 2.

Based upon the forgoing, coupled with review of the project information furnished to MBI for this project, the following items are incorporated into the scope of this study:

- Historic water use declines coupled with recent conservation efforts have led to steady declines in sewer generation rates. This study develops average dry weather, peak dry weather, and peak wet weather flows based on the Project's proposed land use coupled with the revised sewer generation factors from the District's 2015 Master Plan.

- The Project is planned to be constructed in four (4) phases. The phasing concept for sewer system implementation requires careful evaluation to confirm that the slope, size, and routing of sewer infrastructure to be constructed in earlier project phases will support the infrastructure for routing of flows in later phases.

- The Project site topography is highly variable with significant ground elevation change generally sloping from east to west. Therefore, slope analysis will be necessary to identify and mitigate excessive sewer slopes. Slopes that cannot be maintained at less than or equal to 10-percent will require mitigation for odor control, manhole lining, and other potential mitigative measures. Furthermore, the District requires that manholes not be deeper than 14-feet from rim to invert elevation.

- The District has identified two required discharge locations for the Project's sanitary system. The District will require that both discharge locations be incorporated into the Fanita Ranch sanitary sewer system design. It is anticipated that due to available elevation at the western portion of the Project site, sanitary connections to either discharge location can occur by gravity without need for a sanitary pump station. This study will confirm discharge by gravity flow.

## 2.4 Study Area and Land Use

The Project study area comprises approximately 2,638 acres of land with highly variable topography generally sloping from east to west. Proposed ground elevations within the study area will range from approximately 490 feet in the western portion of the development to 1,154 feet at the highest proposed lot in the northeast.

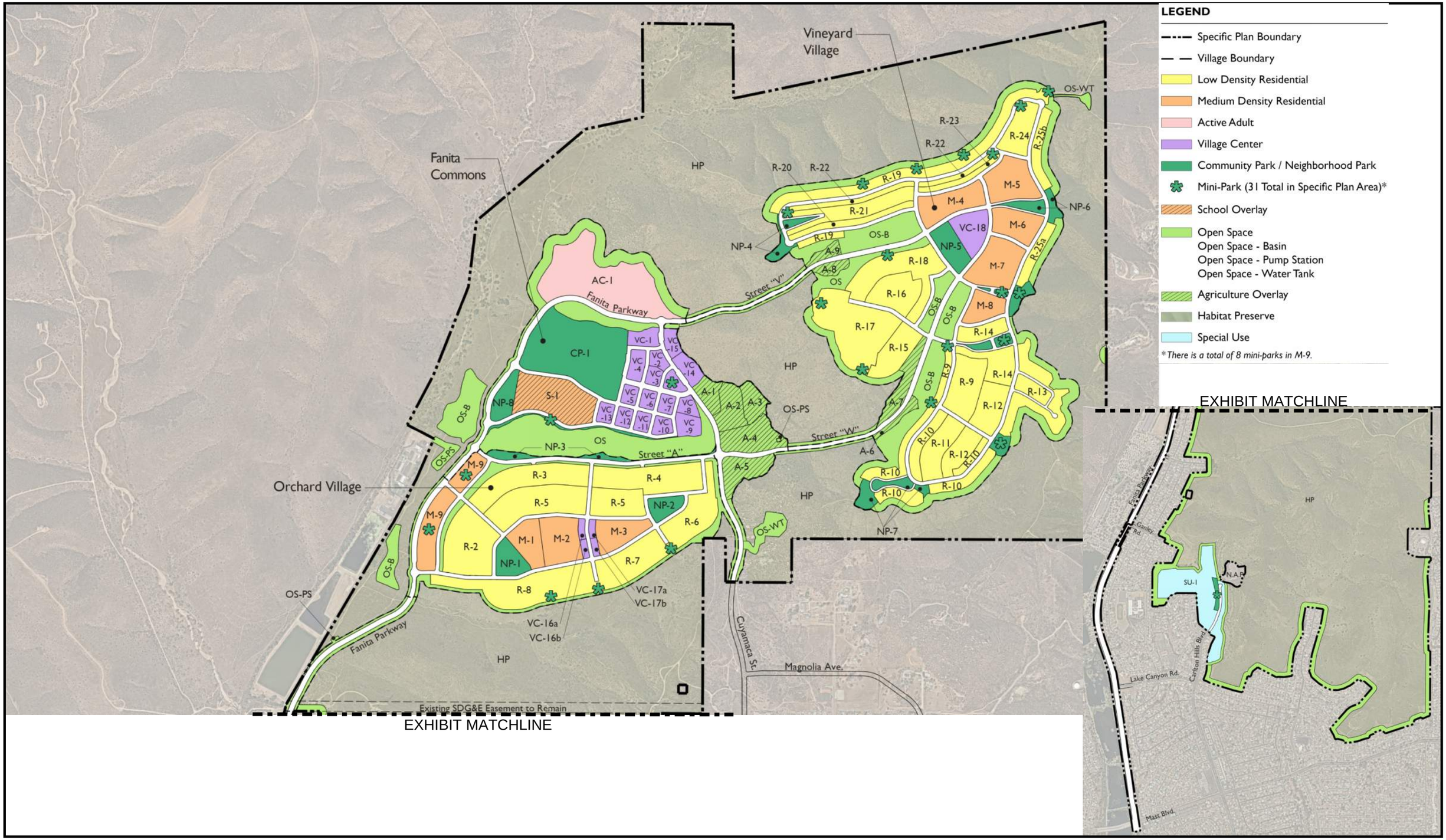
The Project is predominantly residential with 2,949 dwelling units[2], consisting of low-density single-family homes, medium-density multi-family homes, active adult and mixed-use village centers that are

[2] If the school site is not utilized for school purposes, the school site may be developed with residential uses and the total authorized units would be increased to 3,008 homes.

predominantly residential. The village centers serve multiple purposes such as housing, retail, office and service use. Approximately 80,000 square feet, or 1.8 acres, of commercial building area is allocated to the village center and agricultural areas. The Project will also include approximately 78 acres of new parks, 38.2 acres of farm and agricultural space and 15 acres allotted for school. The remaining 2,131.6 acres of land include areas designated for special use, open space, roadways and habitat preserve.

The Project will create a community consisting of three (3) clustered villages: Fanita Commons, Orchard Village, and Vineyard Village. Fanita Commons is in the northwest area of the Project and will serve as the main village. Land use types for Fanita Commons include an active-adult community, elementary school, community park, working farm, and a mixed-use Village Center comprised of a fire station, office uses, retail and residential units. The Orchard Village is located directly south of the Fanita Commons in the southwestern area of the development and is comprised of parks, smaller mixed-use village centers, multi-family and single-family residential units. The eastern half of the proposed Project is Vineyard Village. Developed on an elevated terrain, Vineyard Village will include similar land uses as Orchard Village, including additional open space areas dispersed throughout the village. The proposed site layout of the planned area land uses is shown on Figure 2-2.

The Project is conceptually planned in four (4) phases, as shown in Figure 2-3, to provide coordination support for the development of public facilities and services. Phase 1 includes the development of Fanita Commons and the eastern portion of Orchard village. This phase also includes off-site and on-site improvements to Fanita Parkway and Cuyamaca Street roadway extensions and new Headworks Facility at the Ray Stoyer WRF. Phase 2 is planned for the construction of the western portion of Orchard Village. The anticipated development for Vineyard Village will be planned in two phases. Phase 3 includes the construction of the southerly half of Vineyard Village. Phase 4 includes the construction of the north portion of Vineyard Village. Construction is expected to start during Summer 2021. Each phase is likely to obtain completion within two (2) to four (4) years and full build-out of the development is estimated for completion within ten (10) to fifteen (15) years from the start of construction. Phase development may vary, overlap or become divided into smaller sub-phases depending on conditions during construction and market related influences.




FANITA RANCH SEWER SERVICE STUDY

# PROPOSED SITE LAYOUT AND LAND USE

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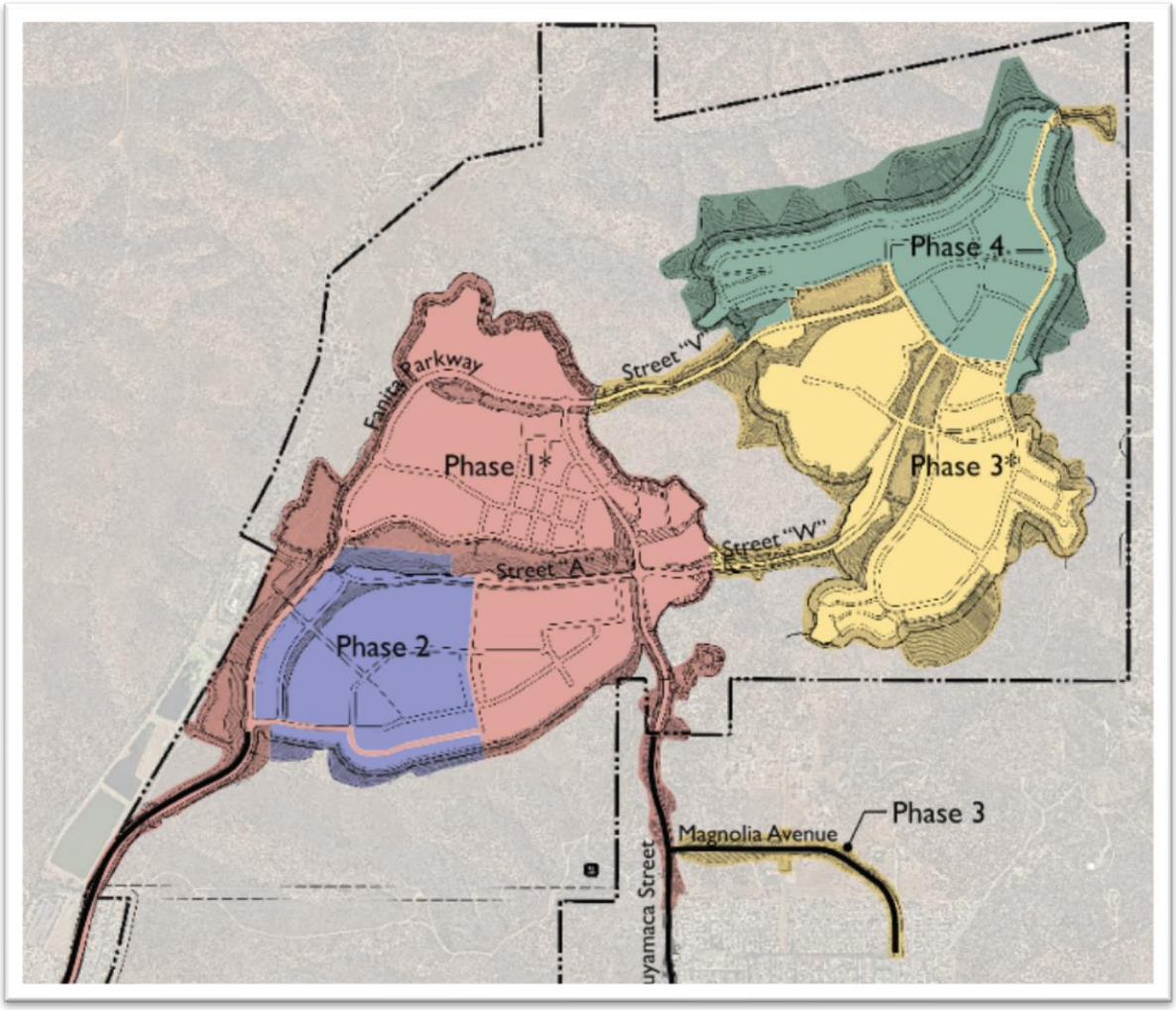
NOT TO SCALE

Figure 2-2

**Figure 2-3**
**Proposed Project Phasing**

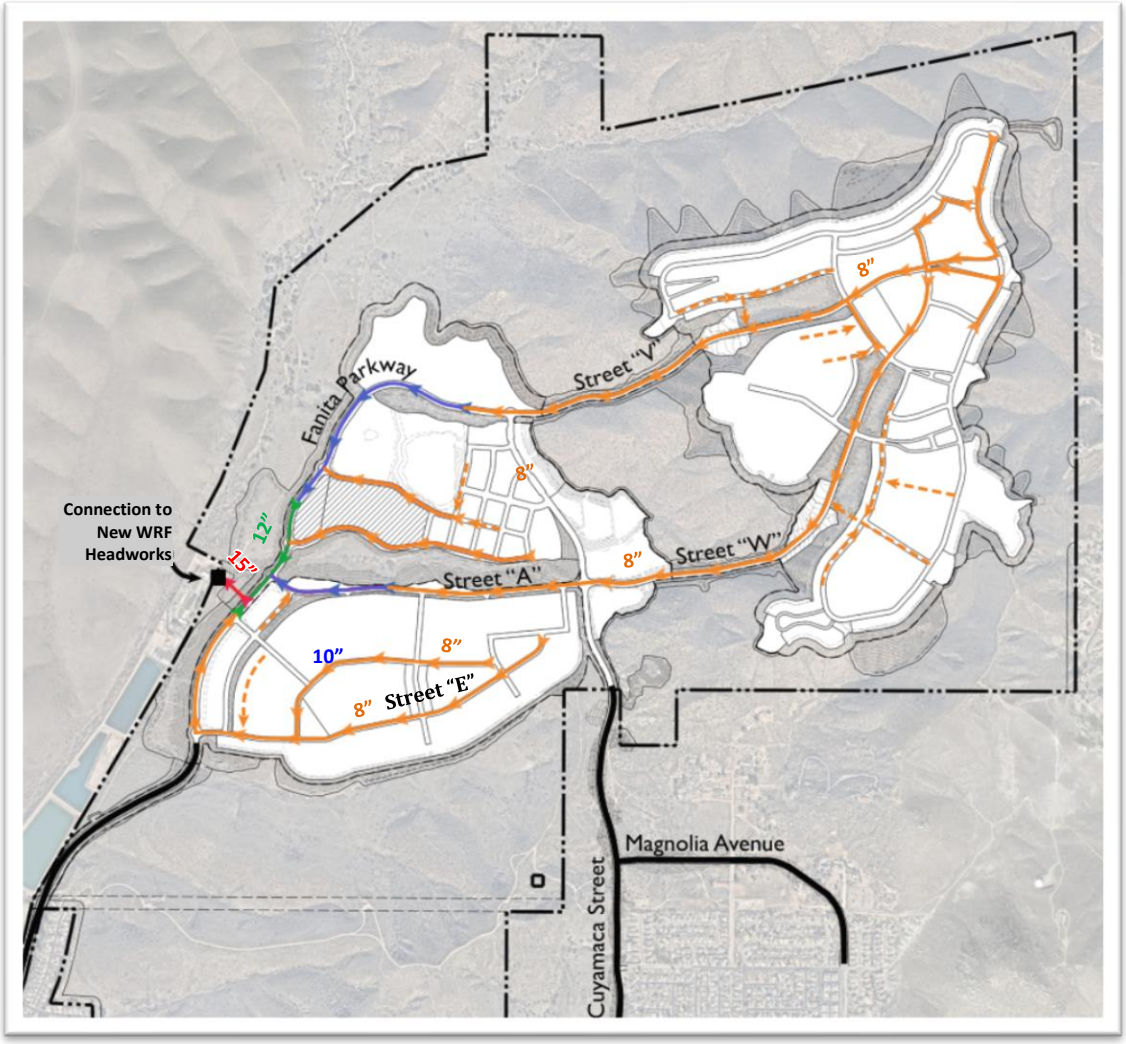



## 2.5 Preliminary Sewer Layout

A Conceptual Sanitary Sewer Plan showing the ultimate layout of the Project's sewer system was prepared as part of the Specific Plan and is shown in Figure 2-4. The Conceptual Sanitary Sewer Plan generally shows flow beginning at the highest elevated areas within the eastern portion of the site and flowing toward the west. Fanita Commons, Orchard Village and Vineyard Village sewer systems are comprised primarily of 8-inch pipe. Two roadways, Street 'V' and Street 'W', respectively connect Fanita Commons and Orchard Village to Vineyard Village. Sanitary flow produced in Vineyard Village will be conveyed to Fanita Commons via 8-inch pipe along Street 'V' and to Orchard Village via 8-inch pipe along Street 'W'. Sewer pipe sizes increase to 10-inch and 12-inch pipe further west in the area near the proposed intersection of Street 'W' and Fanita Parkway. South of the confluence of the sanitary sewers from Fanita

Commons and Orchard Village, a 15-inch sewer pipe conveys the combined flow by gravity to a new headworks at the WRF and possibly to a secondary connection to the METRO.

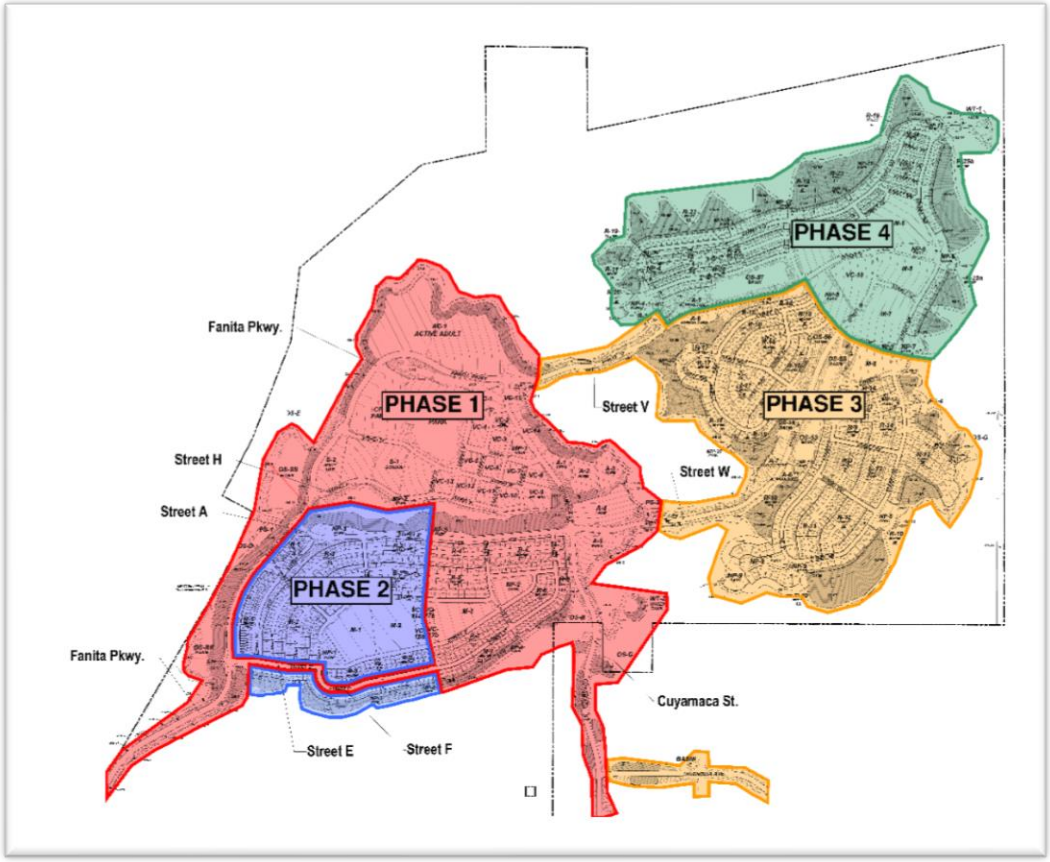
**Figure 2-4**
**Project Conceptual Sanitary Sewer Plan**




Proposed ground elevations within the developed area will range from 490 feet in the western portion of the development to 1,154 feet at the highest proposed lot in in the upper north east corner of Vineyard Village. This represents a change in elevation of approximately 664 feet across the 2-mile east-west direction of the site. Proposed roadways, Street 'V' and Street 'W', connecting Fanita Commons and Orchard Village to Vineyard Village, respectively, approach slopes up to 15-percent. Due to the conceptual project phasing and proposed site topography, development of this SSS required careful review, analysis and revision to the phased layout of the sewer system infrastructure.

The four phases of construction were analyzed during the development of the sewer hydraulic model to evaluate and confirm sewer flow direction, slopes, size, and connectivity based on proposed surface topography and lot pad elevations. Phase 1, which includes the development of the Fanita Commons and eastern half of the Orchard Village, sewer system requires that the southwest portion of the Orchard Village sewer system be constructed. Sewer installation along Street "E" during Phase 1 is imperative to appropriately convey flow from higher elevated residential units in Orchard Village toward the gravity discharge to the Ray Stoyer WRF. As a result, the conceptual sanitary sewer plan and limits for Phases 1 and 2 were modified accordingly. Sanitary sewer infrastructure in Phases 3 and 4 are not impacted by planned phase designation. A sanitary sewer phasing plan for the proposed development can be found below in Figure 2-5. The new sewer phasing plans demonstrating revisions to the conceptual sanitary infrastructure development for Phase 1 through Phase 4 are shown in Figure 2-6 through Figure 2-9, respectively.

**Figure 2-5**
**Sanitary Sewer Phasing Plan**




(Original map base courtesy of Hunsaker & Associates)

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

8/21/2018 JN H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**TYPE**

- Active
- Domain

**LoadParcels**

**Land_Use**

- A
- AC
- PARK
- M
- R
- R-1
- S
- VC

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0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER PHASING PLAN - PHASE 1

Figure 2-6

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**TYPE**

- Active
- Domain

**LoadParcels**

**Land_Use**

- A
- AC
- PARK
- M
- R
- R-1
- S
- VC

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Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER PHASING PLAN - PHASE 1 & 2

Figure 2-7

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**TYPE**

- Active
- Domain

**LoadParcels**

**Land_Use**

- A
- AC
- PARK
- M
- R
- R-1
- S
- VC

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Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER PHASING PLAN - PHASE 1, 2 & 3

Figure 2-8

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**TYPE**

- Active
- Domain

**LoadParcels**

**Land_Use**

- A
- AC
- PARK
- M
- R
- R-1
- S
- VC

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Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER PHASING PLAN - PHASE 1, 2, 3 & 4

Figure 2-9

# Section 3 - Sewer Demands

## 3.1 Average Dry Weather Flow Generation

Water conservation and water use efficiency continue to drive down sewer flow generation rates in the District's service area. New development requirements for the City of Santee include the use of drought tolerant landscaping and application of water conservation regulations in accordance with the California Model Water Efficient Landscape Ordinance (MWELO) and the Santee Municipal Code (SMC). As a new development, the Specific Plan proposes to follow the requirements of the California Green Building Standards Code, Part 11 of the Title 24 Building Standards Code (CalGreen), which requires use of water efficient appliances, irrigation systems, urinals, toilets, and other fixtures.

This SSS utilizes the sewer flow generation rates developed in the District's 2015 Master Plan instead of the WAS. Sewer demand assumptions in the 2015 Master Plan were based on historical records during the year 2012. During that year, the District sanitary collection system diverted about 2.0 million gallons per day (MGD) of the total flow to the Ray Stoyer Water Reclamation Facility (WRF) for treatment. Approximately 2.43 MGD of the total flow was diverted to METRO. The combined average dry weather flow (ADWF) within the District's sanitary sewer service area in 2012 was 4.43 MGD. The sanitary sewer service customers within the District at that time was approximately 67,658. Therefore, the per-capita wastewater generation rate was estimated at approximately 65.5 gallons per capita per day (gpcd).

Based on historical records dating back to 1998, sewer flow generated within the District decreased steadily from 1998 to 2012 by nearly 20-percent. Future sewer flow generation rates were adjusted in the 2015 Master Plan to account for water conservation efforts and increasing use of efficient appliances and fixtures in new developments. Based on that adjustment, the 2015 Master Plan established recommended sanitary flow generation rate of 60 gpcd for residential areas and 800 gpd/acre for non-residential (commercial) areas. The 800 gpd sanitary flow generation rate is based on a net developable acre basis instead of actual building footprint. Therefore, the non-residential wastewater flow generation rates were revised for this SSS to reflect similar flow factors as the residential wastewater flow generation rates.

According to the 2015 Master Plan, the per capita water use was established at a 100 gpcd generation rate. Comparing the water and wastewater generation rates indicate that approximately 60% of the water use per capita is returned to the sanitary system. The Commercial and Institutional land use category found in the WAS design guidelines define a water use generation of 5,000 gpd/acre which is used in the Project's Water Service Study. Applying the same 60% return figure to the commercial water use generation rate results in a sewer flow generation rate of 3,000 gpd/acre which is more appropriate for use with the actual commercial area included in the Specific Plan. This value is applied to the non-residential (commercial) flow projection calculations for this SSS.

Table 3-1 provides a summary of the reduction in per capita sewer flow generation rates between 1998, 2012 and future flow projections. Table 3-2 summarizes the sewer flow generation rates used throughout this SSS, including the 3,000 gpd/acre as previously discussed.

**Table 3-1**
**Sewer Flow Generation Rate Comparison**

| Per Capita Sewer Flow Generation Rates (gpcd) | | | | |
|---|---|---|---|---|
| **Generation Comparison** | **1998** | **2012** | **Future** | **Reduction** |
| 1998 vs 2012 | 81.2 | 65.5 | | 19.3% |
| 2015 vs Future Projected | | 65.5 | 60.0 | 8.4% |

**Table 3-2**
**Sewer Flow Generation Rates in Project Study**

| Category (Land Use) | Value | Unit |
|---|---|---|
| Residential (SFR/MFR/AA/VC) | 60 | gpcd |
| Commercial (VC/VG) | 3,000 | gpd/acre[1] |
| Institutional (School) | 15 | gpd/student |
| Farm Commercial Use Component | 3,000 | gpd/acre |

Notes
1. Commercial non-residential sewer generation rate modified from 800 gpd per net acre basis to 3,000 gpd per actual acre of identified building space.

The ADWF for the Project was estimated based on the proposed Project Land Use and Phasing Plans coupled with the revised sewer flow generation rates from the 2015 Master Plan. A summary of the ADWF for the residential, commercial, fire station and school zones within the Project is provided in Table 3-3. The detailed sewer flow generation tables for each Project phase are provided in Table 3-4 through Table 3-7 on the following pages. Table 3-4 includes the ADWF generation for a proposed K-8 school that would accommodate up to 1,000 persons (700 students and 300 staff). If the Santee School District does not acquire the school site, the underlying MDR land use designation may be implemented. In that case, the site would be developed with up to 59 MDR units. Michael Baker analyzed the ADWF generation for both the proposed school and the alternative residential use. Based on our analysis, the school site would produce an ADWF of 15,000 GPD while the alternative residential use would generate an ADWF of just under 11,000 GPD. Therefore, the proposed project with the school is used for this report because it would generate a higher ADWF and thus represents a worst-case scenario.

**Table 3-3**
**Project ADWF Summary**

| Phase | Phase | Total Area (Acres) | Total Units | Total ADWF (GPD) |
|---|---|---|---|---|
| 1 | Fanita Commons & Orchard Village | 119.71 | 1,050 | 218,610 |
| 2 | Orchard Village | 74.10 | 573 | 111,741 |
| 3 | Vineyard Village | 110.13 | 512 | 103,350 |
| 4 | Vineyard Village | 88.21 | 814 | 157,457 |
| **TOTAL** | | **392.15** | **2,949[3]** | **591,158** |

The AWDF was distributed to hydraulic model junction nodes (representing sewer manholes) using the geospatial tools available in ArcMap and InfoSWMM. A GIS layer was created to provide a simulated meter at each single-family residential, multi-family residential, active-adult/adult-care, commercial, agricultural, and institutional parcels where sanitary flow will be generated. The ADWF sewer flow generation rates were applied to each residential meter based on the capita per unit and number of units per parcel. For this study, each residential unit contains 3.4 capita per dwelling unit for low-density single-family homes and 3.1 capita per dwelling unit for medium-density multi-family homes[4]. We note that the capita per dwelling unit employed in this study are higher than the current U.S. Census average of 2.86 persons per household in Santee; however, the use of the higher capita results in a more conservative estimate in sanitary generation rates per dwelling unit. The capita per dwelling unit was used to calculate the sanitary flow per dwelling unit type. Per the 2015 Master Plan, the per capita sanitary flow is 60 gallons per capita per day (gpcd). Therefore, the sanitary flow per dwelling unit is 186 gallons per day and 204 gallons per day for the medium-density multi-family and low density single-family residential dwelling units respectively. The total ADWF was then calculated by multiplying the sanitary flow per dwelling unit times the number of dwelling units in each residential classification. The resulting ADWF for each project phase is provided in Tables 3-4 through 3-7. A second GIS layer was created containing polygons enclosing at least one junction node (manhole) and several adjacent parcels. Using specific tools within the InfoSWMM software, the flows generated by the parcel meters contained within each polygon were automatically assigned to one or more manholes located within the respective polygon. This feature greatly decreased the time required to generate flows at each model node.

[3] This assumes that the project will include a school. If the school site is not utilized for school purposes, the school site may be developed with residential uses and the total authorized units would be increased to 3,008 homes. However, this alternative would generate less AWDF.
[4] SMC Section 12.04.070 and Fanita Ranch Specific Plan Public Review Draft, dated February 2020, Section 7.2.

## Table 3-4
## Phase 1 – Fanita Commons & Orchard Village Sewer Flow Generation

| Planning Area | | Land Use | Area (Acres)[1] | No. Units | Total Area (SF) | Area Designated for Planning (Acres)[1,2] | Dwelling Units (DU) | Non-Res Unit ADWF (gpd/ac)[2] | Sewer Flow Per Dwelling Unit[4] | Total ADWF (GPD) |
|---|---|---|---|---|---|---|---|---|---|---|
| RESIDENTIAL | AC-1 | Active Adult | 31.00 | 1 | | 31.00 | 445 | | 186 | 82770 |
| | M-3 | MDR | 6.50 | 79 | | 6.50 | 79 | | 186 | 14694 |
| | R-4 | LDR 60' x 100' (56 units) | 11.30 | 56 | | 11.30 | 56 | | 204 | 11424 |
| | R-5 | LDR 70' x 100' (28 units) | 6.46 | 28 | | 6.46 | 28 | | 204 | 5712 |
| | R-6 | LDR 50' x 100' (53 units) | 9.07 | 53 | | 9.07 | 53 | | 204 | 10812 |
| | R-7 | LDR 55' x 100' (50 units) | 9.87 | 50 | | 9.87 | 50 | | 204 | 10200 |
| | VC-1 | Village Center | 2.62 | 39 | | 2.62 | 39 | | 186 | 7254 |
| | VC-3 | Village Center | 1.37 | 17 | | 1.37 | 17 | | 186 | 3162 |
| | VC-4 | Village Center | 2.41 | 37 | | 2.41 | 37 | | 186 | 6882 |
| | VC-5 | Village Center | 1.47 | 17 | | 1.47 | 17 | | 186 | 3162 |
| | VC-6 | Village Center | 1.45 | 17 | | 1.45 | 17 | | 186 | 3162 |
| | VC-7 | Village Center | 1.47 | 17 | | 1.47 | 17 | | 186 | 3162 |
| | VC-8 | Village Center | 1.70 | 17 | | 1.70 | 17 | | 186 | 3162 |
| | VC-9 | Village Center MF(MH) | 2.73 | 40 | | 2.73 | 40 | | 186 | 7440 |
| | VC-10 | Village Center | 1.69 | 24 | | 1.69 | 24 | | 186 | 4464 |
| | VC-11 | Village Center | 1.51 | 20 | | 1.51 | 20 | | 186 | 3720 |
| | VC-12 | Village Center | 1.53 | 20 | | 1.53 | 20 | | 186 | 3720 |
| | VC-13 | Village Center | 1.55 | 20 | | 1.55 | 20 | | 186 | 3720 |
| | VC-14 | Village Center | 2.83 | 20 | | 2.83 | 20 | | 186 | 3720 |
| | VC-15 | Village Center | 1.92 | 18 | | 1.92 | 18 | | 186 | 3348 |
| | VC-17a | Village Center | 0.64 | 8 | | 0.64 | 8 | | 186 | 1488 |
| | VC-17b | Village Center | 0.63 | 8 | | 0.63 | 8 | | 186 | 1488 |
| | **Subtotal** | | | | | **101.72** | **1,050** | | | **198,666** |
| OTHER | S-1[5] | Elementary School | 15.00 | 1 | | 15.00 | | | 15 | 15000 |
| | VC-2[6] | Village Center (Fire Station) | 1.50 | 1 | 2165.10 | 1.50 | | | 60 | 480 |
| | **Subtotal** | | | | | **16.50** | | | | **15,480** |
| COMMERCIAL[4] | A-1 | Ag-Farm | 3.39 | 1 | 2485 | 0.06 | | 3000 | | 171 |
| | A-2 | Ag-Farm | 5.68 | 1 | 4164 | 0.10 | | 3000 | | 287 |
| | A-3 | Ag-Farm | 3.77 | 1 | 2764 | 0.06 | | 3000 | | 190 |
| | A-4 | Ag-Farm | 8.18 | 1 | 5997 | 0.14 | | 3000 | | 413 |
| | A-5 | Ag-Farm | 6.25 | 1 | 4582 | 0.11 | | 3000 | | 316 |
| | VC-1 | Village Center | 2.59 | 1 | 3738.40 | 0.09 | | 3000 | | 257 |
| | VC-2[6] | Village Center (Fire Station) | 1.50 | 1 | 2165.10 | 0.05 | | 3000 | | 149 |
| | VC-3 | Village Center | 1.37 | 1 | 1977.45 | 0.05 | | 3000 | | 136 |
| | VC-4 | Village Center | 2.41 | 1 | 3478.59 | 0.08 | | 3000 | | 240 |
| | VC-5 | Village Center | 1.47 | 1 | 2121.79 | 0.05 | | 3000 | | 146 |
| | VC-6 | Village Center | 1.45 | 1 | 2092.93 | 0.05 | | 3000 | | 144 |
| | VC-7 | Village Center | 1.47 | 1 | 2121.79 | 0.05 | | 3000 | | 146 |
| | VC-8 | Village Center | 1.70 | 1 | 2453.78 | 0.06 | | 3000 | | 169 |
| | VC-9 | Village Center | 2.73 | 1 | 3940.47 | 0.09 | | 3000 | | 271 |
| | VC-10 | Village Center | 1.69 | 1 | 2439.34 | 0.06 | | 3000 | | 168 |
| | VC-11 | Village Center | 1.51 | 1 | 2179.53 | 0.05 | | 3000 | | 150 |
| | VC-12 | Village Center | 1.53 | 1 | 2208.40 | 0.05 | | 3000 | | 152 |
| | VC-13 | Village Center | 1.55 | 1 | 2237.27 | 0.05 | | 3000 | | 154 |
| | VC-14 | Village Center | 2.83 | 1 | 4084.81 | 0.09 | | 3000 | | 281 |
| | VC-15 | Village Center | 1.92 | 1 | 2771.32 | 0.06 | | 3000 | | 191 |
| | VC-17a | Village Center | 0.64 | 1 | 2424.24 | 0.06 | | 3000 | | 167 |
| | VC-17b | Village Center | 0.63 | 1 | 2386.36 | 0.05 | | 3000 | | 164 |
| | **Subtotal** | | | | | **1.49** | | | | **4,464** |
| | **TOTAL** | | | | | **119.71** | **1,050** | | | **218,610** |

Notes:

1 Area of zone determined with Tentative Map/Preliminary Grading Plan prepared by Hunsaker & Associates unless otherwise noted.

2 The village centers are mixed-use parcels containing both residential and commercial spaces. In Table 3.2 of the specific plan " Site utilization Plan statistical summary", a total of 60,000 commercial square footage was assigned to all three villages (40,000 SF - Fanita Commons, 10,000 SF - Orchard Village and 10,000 SF - Vineyard Village). Within each Village there are individual Village Centers. The estimated commercial floor area within each Village Center parcel was estimated by taking the ratio of each individual Village Center parcel area to the total of all Village Center areas and multiplying by the total commercial square footage per village. By employing this method, each Village Center parcel is assigned a prorated commercial square footage that can be utilized to calculate the commercial water demand. The same applies for the commercial areas in the Agriculture zone designation, which is an additional 20,000 SF of commercial area.

3 Wastewater flow factor for non-residential areas (2015 Comprehensive Facilities Master Plan, Section ES.5.3).

4 Wastewater use per Dwelling Unit (DU) is a factor calculated with population per dwelling unit (based on the WAS design guidelines) mutiplied with 60 gpcd (from the 2015 Comprehensive Facilities Master Plan, Section ES.5.3.)

5 School population obtained from the Fanita Ranch Specific Plan and is not included in total population count for Fanita Ranch. This value is incorporated in the household occupancy rate per the Specific Plan. Wastewater unit flow per Bureau of Enginering Manual - Part F.

6 VC-2 reserves a 1.5-acre fire station site per Table 3.2 in the Specific Plan and is assumed to maintain 8 persons at all times.

7 The Landuse area/dwelling units is/are split between two phases.

## Table 3-5
## Phase 2 – Orchard Village Sewer Flow Generation

| Planning Area | | Land Use | Area (Acres)[1] | No. Units | Total Area (SF) | Area Designated for Planning (Acres)[1,2] | Dwelling Units (DU) | Non-Res Unit ADWF (gpd/ac)[2] | Sewer Flow Per Dwelling Unit[4] | Total ADWF (GPD) |
|---|---|---|---|---|---|---|---|---|---|---|
| RESIDENTIAL | M-1 | MDR | 6.13 | 102 | | 6.13 | 102 | | 186 | 18972 |
| | M-2 | MDR | 8.91 | 111 | | 8.91 | 111 | | 186 | 20646 |
| | M-9 / R-1 | MDR 35' x 85' (76 units) | 5.64 | 76 | | 5.64 | 76 | | 186 | 14136 |
| | R-2 | LDR 50' x 100' (79 units) | 12.32 | 79 | | 12.32 | 79 | | 204 | 16116 |
| | R-3 | LDR 60' x 100' (53 units) | 10.73 | 53 | | 10.73 | 53 | | 204 | 10812 |
| | R-5 | LDR 70' x 100' (52 units) | 12.08 | 52 | | 12.08 | 52 | | 204 | 10608 |
| | R-8 | LDR 55' x 100' (83 units) | 16.80 | 83 | | 16.80 | 83 | | 204 | 16932 |
| | VC-16a | Village Center | 0.72 | 9 | | 0.72 | 9 | | 186 | 1674 |
| | VC-16b | Village Center | 0.65 | 8 | | 0.65 | 8 | | 186 | 1488 |
| | **Subtotal** | | | | | **73.98** | **573** | | | **111,384** |
| COMM-ERCIAL[2] | VC-16a | Village Center | 0.72 | 1 | 2727.27 | 0.06 | | 3000 | | 188 |
| | VC-16b | Village Center | 0.65 | 1 | 2462.12 | 0.06 | | 3000 | | 170 |
| | **Subtotal** | | | | | **0.12** | | | | **357** |
| | **TOTAL** | | | | | **74.10** | **573** | | | **111,741** |

Notes:

1 Area of zone determined with Tentative Map/Preliminary Grading Plan prepared by Hunsaker & Associates unless

2 The village centers are mixed-use parcels containing both residential and commercial spaces. In Table 3.2 of the specific plan " Site utilization Plan statistical summary", a total of 60,000 commercial square footage was assigned to all three villages (40,000 SF - Fanita Commons, 10,000 SF - Orchard Village and 10,000 SF - Vineyard Village). Within each Village there are individual Village Centers. The estimated commercial floor area within each Village Center parcel was estimated by taking the ratio of each individual Village Center parcel area to the total of all Village Center areas and multiplying by the total commercial square footage per village. By employing this method, each Village Center parcel is assigned a prorated commercial square footage that can be utilized to calculate the commercial water demand. The same applies for the commercial areas in the Agriculture zone designation, which is an additional 20,000 SF of

3 Wastewater flow factor for non-residential areas (2015 Comprehensive Facilities Master Plan, Section ES.5.3).

4 Wastewater use per Dwelling Unit (DU) is a factor calculated with population per dwelling unit based on the WAS design guidelines mutiplied with 60 gpcd from the 2015 Comprehensive Facilities Master Plan, Section ES.5.3.

5 R-1 / LDR Neighborhood designation was revised to M-9/MDR

6 The Landuse area/dwelling units is/are split between two phases.

## Table 3-6
## Phase 3 – Vineyard Village Sewer Flow Generation

| Planning Area | | Land Use | Area (Acres)[1] | No. Units | Area Designated for Planning (Acres)[1] | Dwelling Units (DU) | Non-Res Unit ADWF (gpd/ac)[2] | Sewer Flow Per Dwelling Unit[4] | Total ADWF (GPD) |
|---|---|---|---|---|---|---|---|---|---|
| RESIDENTIAL | M-8 | MDR | 4.86 | 61 | 4.86 | 61 | | 186 | 11346 |
| | R-9 | SF 55' x 100' (48 units) | 9.54 | 48 | 9.54 | 48 | | 204 | 9792 |
| | R-10 | SF 80' x 100' (58 units) | 17.72 | 59 | 17.72 | 59 | | 204 | 12036 |
| | R-11 | SF 55' x 100' (33 units) | 6.00 | 33 | 6.00 | 33 | | 204 | 6732 |
| | R-12 | SF 60' x 100' (52 units) | 9.97 | 52 | 9.97 | 52 | | 204 | 10608 |
| | R-13 | SF 70' x 100' (40 units) | 12.77 | 43 | 12.77 | 43 | | 204 | 8772 |
| | R-14 | SF 60' x 100' (41 units) | 8.66 | 41 | 8.66 | 41 | | 204 | 8364 |
| | R-15 | SF 60' x 100' (26 units) | 6.43 | 26 | 6.43 | 26 | | 204 | 5304 |
| | R-16 | SF 60' x 100' (30 units) | 6.40 | 30 | 6.40 | 30 | | 204 | 6120 |
| | R-17 | SF 80' x 100' (50 units) | 15.79 | 52 | 15.79 | 52 | | 204 | 10608 |
| | R-18 | SF 55' x 100' (67 units) | 11.99 | 67 | 11.99 | 67 | | 204 | 13668 |
| | **Subtotal** | | | | **110.13** | **512** | | | **103,350** |
| | **TOTAL** | | | | **110.13** | **512** | | | **103,350** |

Notes:

1 Area of zone determined with Tentative Map/Preliminary Grading Plan prepared by Hunsaker & Associates unless otherwise noted.
2 Wastewater flow factor for non-residential areas (2015 Comprehensive Facilities Master Plan, Section ES.5.3).
3 Wastewater use per Dwelling Unit (DU) is a factor calculated with population per dwelling unit based on the WAS design guidelines mutiplied with 60 gpcd from the 2015 Comprehensive Facilities Master Plan, Section ES.5.3.

## Table 3-7
## Phase 4 – Vineyard Village Sewer Flow Generation

| Planning Area | | Land Use | Area (Acres)[1] | No. Units | Total Area (SF) | Area Designated for Planning (Acres)[1,2] | Dwelling Units (DU) | Non-Res Unit ADWF (gpd/ac)[3] | Sewer Flow Per Dwelling Unit[4] | Total ADWF (GPD) |
|---|---|---|---|---|---|---|---|---|---|---|
| RESIDENTIAL | M-4 | MDR | 8.45 | 106 | | 8.45 | 106 | | 186 | 19716 |
| | M-5 | MDR | 9.38 | 117 | | 9.38 | 117 | | 186 | 21762 |
| | M-6 | MDR | 6.79 | 85 | | 6.79 | 85 | | 186 | 15810 |
| | M-7 | MDR | 10.31 | 129 | | 10.31 | 129 | | 186 | 23994 |
| | R-19 | SF 70' x 100' (67 units) | 16.21 | 67 | | 16.21 | 67 | | 204 | 13668 |
| | R-20 | SF 60' x 75' (28 units) | 3.81 | 28 | | 3.81 | 28 | | 204 | 5712 |
| | R-21 | SF 60' x 75' (70 units) | 6.81 | 70 | | 6.81 | 70 | | 204 | 14280 |
| | R-22 | SF 60' x 75' (28 units) | 3.10 | 28 | | 3.10 | 28 | | 204 | 5712 |
| | R-23 | SF 50' x 75' (20 units) | 2.41 | 20 | | 2.41 | 20 | | 204 | 4080 |
| | R-24 | SF 60' x 75' (57 units) | 6.89 | 57 | | 6.89 | 57 | | 204 | 11628 |
| | R-25a | SF 80' x 100' (12 units) | 3.51 | 13 | | 3.51 | 13 | | 204 | 2652 |
| | R-25b | SF 80' x 100' (15 units) | 4.21 | 15 | | 4.21 | 15 | | 204 | 3060 |
| | VC-18 | Village Center | 6.10 | 79 | | 6.10 | 79 | | 186 | 14694 |
| | **Subtotal** | | | | | **87.98** | **814** | | | **156,768** |
| COMMERCIAL[2] | VC-18 | Village Center | 6.10 | 1 | 10000 | 0.23 | | 3000 | | 689 |
| | **Subtotal** | | | | | **0.23** | | | | **689** |
| | **TOTAL** | | | | | **88.21** | **814** | | | **157,457** |

Notes:

1 Area of zone determined with Tentative Map/Preliminary Grading Plan prepared by Hunsaker & Associates unless otherwise noted.

2 The village centers are mixed-use parcels containing both residential and commercial spaces. In Table 3.2 of the specific plan " Site utilization Plan statistical summary", a total of 60,000 commercial square footage was assigned to all three villages (40,000 SF - Fanita Commons, 10,000 SF - Orchard Village and 10,000 SF - Vineyard Village). Within each Village there are individual Village Centers. The estimated commercial floor area within each Village Center parcel was estimated by taking the ratio of each individual Village Center parcel area to the total of all Village Center areas and multiplying by the total commercial square footage per village. By employing this method, each Village Center parcel is assigned a prorated commercial square footage that can be utilized to calculate the commercial water demand. The same applies for the commercial areas in the Agriculture zone designation, which is an additional 20,000 SF of commercial area.

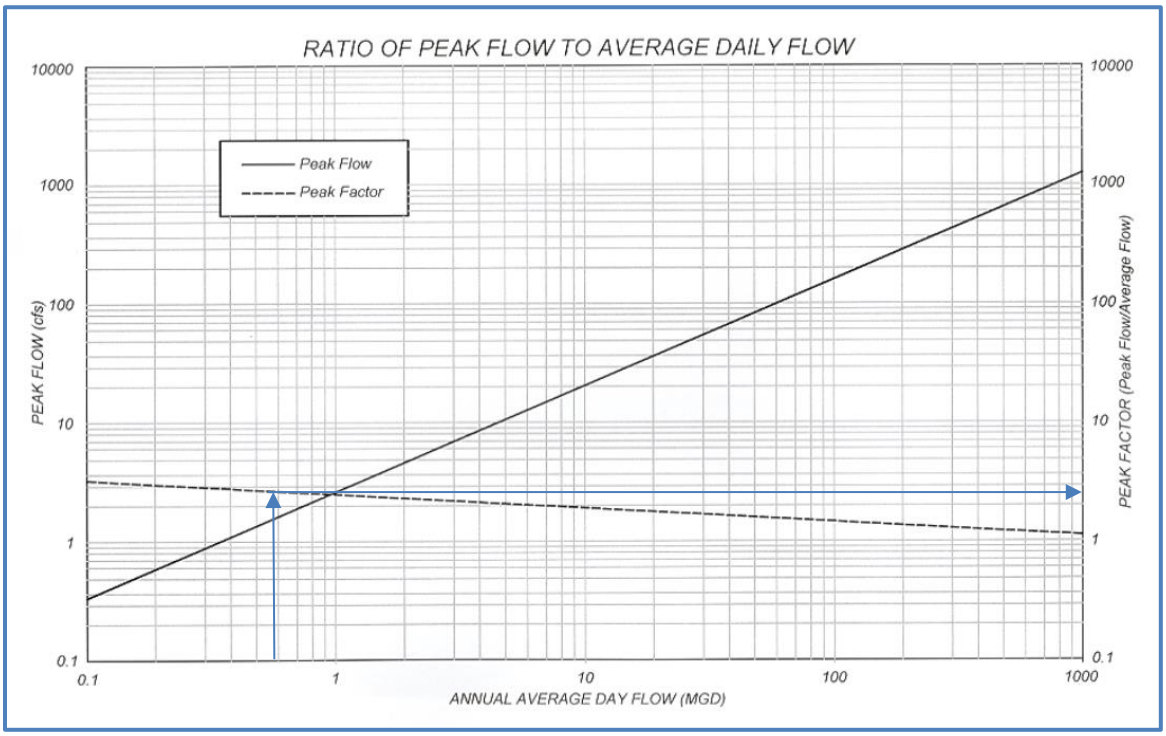
3 Wastewater flow factor for non-residential areas (2015 Comprehensive Facilities Master Plan, Section ES.5.3).

4 Wastewater use per Dwelling Unit (DU) is a factor calculated with population per dwelling unit based on the WAS design guidelines mutiplied with 60 gpcd from the 2015 Comprehensive Facilities Master Plan, Section ES.5.3.

## 3.2 Peak Dry Weather Flow Generation

Peak Dry Weather Flow (PDWF) represents the highest 1-hour flow that will occur during the daily ADWF diurnal. To develop the PDWF for the Project, the WAS Design Guidelines, Section 4.2 Sewer Planning, Figure 4-2-1 Ratio of Peak Flow to Average Daily Flow Curve (Peaking Factor Curve) was used. The Peaking Factor Curve is shown in Figure 3-1.

**Figure 3-1**
**Peak to Average Daily Flow Factor (WAS Design Guideline, Figure 4-2-1)**




From Figure 3-1, the Project ADWF of 591,158 gpd (0.59 mgd or 410.5 gpm) was indicated on the x-axis and shown to cross the MDD to ADD ratio of about 2.7 on the y-axis. However, based upon 2010 flow monitoring data provided in the 2015 Master Plan, peak flow to average daily flow ratios typically do not exceed 1.8 within the District service area regardless of the upstream tributary area. A copy of the 2010 flow monitoring data is provided in Table 3-8. Furthermore, the data shows that for metered flows having an ADWF of 0.5 MGD or less, the ratio ranged from 1.33 to 1.78.

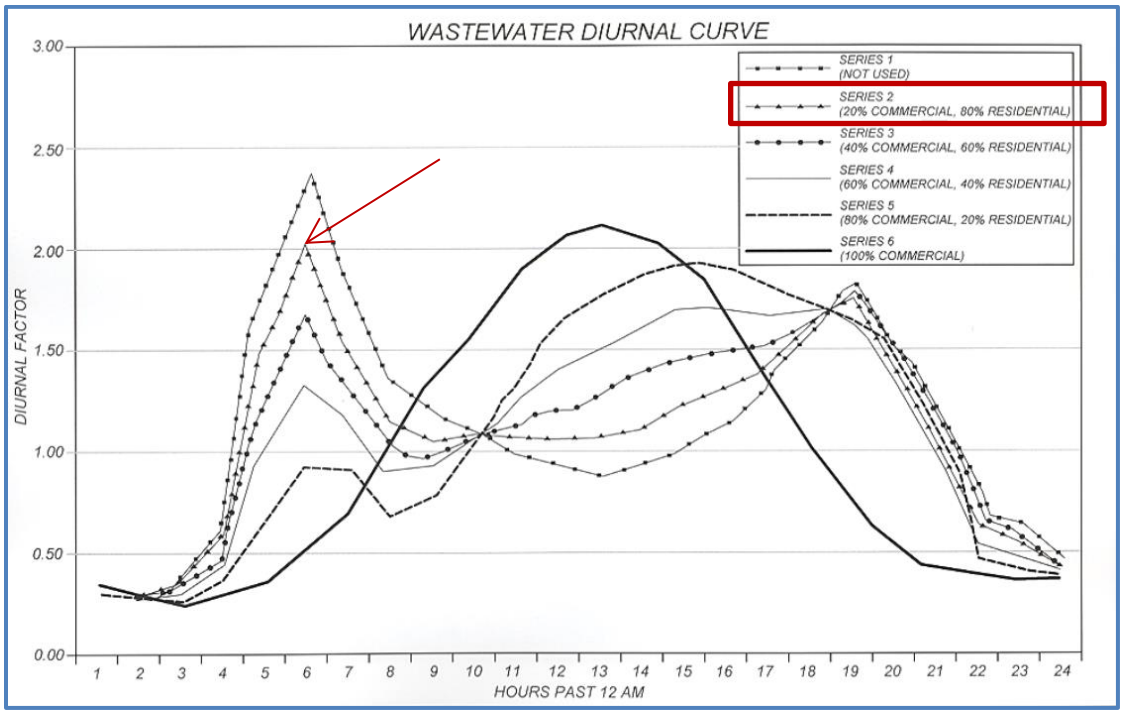
To provide a more representative peak factor, the WAS Design Guidelines, Section 4.2 Sewer Planning, Figure 4-2-2, Wastewater Diurnal Curve, Series 2 (20% Commercial, 80% Residential) was employed to estimate peak flow (refer to Figure 3-2). By inspection, the Series 2 Diurnal Curve provides a maximum peak factor of 2.0 at 6:00 AM. Based on a peak factor of 2.0, the PDWF was estimated as 821 gpm (1.83 cfs).

**Table 3-8**
**2010 District Flow Monitoring Data**

| Meter Number | Measured Data (2010) Avg. Flow (mgd) | Peak Flow (mgd) | |
|---|---|---|---|
| M1 | 0.244 | 0.355 | |
| M2 | 0.168 | 0.306 | |
| M3A | 0.149 | 0.228 | |
| M3B | 0.149 | 0.222 | |
| M4A | 0.747 | 0.974 | |
| M4C | 0.968 | 1.279 | PF=1.46 |
| M5 | 0.346 | 0.506 | |
| M7 | 1.533 | 2.191 | |
| M8A | 0.197 | 0.276 | |
| M8B | 0.102 | 0.138 | PF=1.33 |
| M10A | 0.501 | 0.666 | |
| M10B | 0.702 | 0.901 | PF=1.78 |
| M11 | 0.221 | 0.393 | |
| M13 | 0.131 | 0.200 | |
| M14 | 0.067 | 0.117 | |
| M15 | 0.074 | 0.112 | PF=1.40 |
| M16A | 0.567 | 0.796 | |
| M16B | 1.016 | 1.341 | |
| MSS | 1.594 | 2.833 | |
| PD1B | 5.308 | 7.328 | |
| PD2 | 0.421 | 0.593 | |

(Source: Table 4.2, 2015 Master Plan)

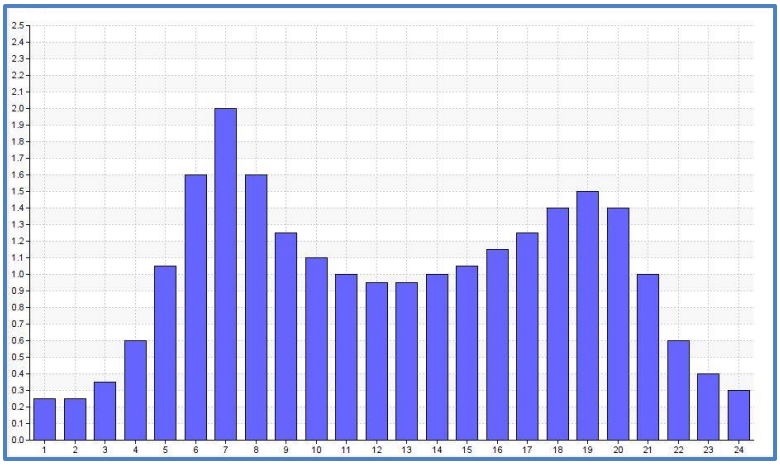
**Figure 3-2**
**Wastewater Diurnal Curve (WAS Design Guideline, Figure 4-2-2)**




**Extended Period Simulation**

The InfoSWMM model was setup to run a 24-hour extended period simulation (EPS) of the Dry Weather Flow. The EPS requires a 24-hour pattern containing peaking factors to multiply against the ADWF at each node at each 1-hour increment to simulate the diurnal curve. The diurnal pattern used in this model was based on the WAS Series 2 Wastewater Diurnal Curve discussed earlier. The pattern is provided in Figure 3-3.

**Figure 3-3**
**24-Hour Model Diurnal Pattern**



## 3.3 Wet Weather Flows

In addition to dry weather flows, sewer systems can be impacted by infiltration and inflow (I/I). Infiltration is caused by stormwater which percolates into the soil and then enters the sanitary sewer collection system via defects in the sewer pipe, manhole, and joints. Inflow is caused by direct stormwater entrance into a sanitary sewer system via an illicit connection such as an illegal roof downspout cross-connection or through leaky manhole covers. Newly installed sanitary sewer collection systems, when constructed properly using new material and premium gasketed pipe joints and waterproofed manholes, generally exhibit little to no I/I. However, improperly installed sewer systems, or damaged caused to sewers by roots, ground movement, or other phenomena, can exhibit I/I response to rainfall events. This type of I/I is often referred to as rainfall dependent infiltration and inflow (RDII).

The WAS Design Guidelines, Section 4, paragraph 4.2.7.D, indicates that I/I flow rates can range from 5% to 50% of the unpeaked average sewer flow. For the purpose of this SSS, an I/I rate of 10% was added to the ADWF to create an Average Wet Weather Flow (AWWF). Similar to the ADWF diurnal model, an EPS was also created using the diurnal pattern shown in Figure 3-3 to model the AWWF with an associated Peak Wet Weather Flow (PWWF) occurring at 6:00 to 7:00 AM. The PWWF also serves as the Peak Design Flow (PDF) as it represents the highest estimated flow to be conveyed by the proposed sanitary sewer collection system. Table 3-9 provide a summary of the ADWF, PDWF, AWWF and PWWF utilized in the InfoSWMM model.

**Table 3-9**
**Summary of Fanita Ranch Sewer Flow (Dry Weather & Wet Weather Flows)**

| Phase | Total Area (Acres) | Total Dwelling Units | Dry Weather Flow | | | Wet Weather Flow | | |
|---|---|---|---|---|---|---|---|---|
| | | | Total ADWF (gpd) | Total ADWF (cfs) | Total PDWF PF = 2.0 (cfs) | RDII @ 10% of ADWF (cfs) | Total AWWF (cfs) | Total PWWF PF = 2.0 (cfs) |
| **RESIDENTIAL** | | | | | | | | |
| Phase 1 | 101.72 | 1,050 | 198,666 | | | | | |
| Phase 2 | 73.98 | 573 | 111,384 | | | | | |
| Phase 3 | 110.13 | 512 | 103,350 | | | | | |
| Phase 4 | 87.98 | 814 | 156,768 | | | | | |
| | | | **570,168** | **0.882** | **1.764** | **0.088** | **0.970** | **1.941** |
| **OTHER** | | | | | | | | |
| Phase 1 | 16.50 | - | 15,480 | | | | | |
| Phase 2 | - | - | - | | | | | |
| Phase 3 | - | - | - | | | | | |
| Phase 4 | - | - | - | | | | | |
| | | | **15,480** | **0.024** | **0.048** | **0.002** | **0.026** | **0.053** |
| **COMMERCIAL** | | | | | | | | |
| Phase 1 | 1.49 | - | 4,464 | | | | | |
| Phase 2 | 0.12 | - | 357 | | | | | |
| Phase 3 | - | - | - | | | | | |
| Phase 4 | 0.23 | - | 689 | | | | | |
| | | **SUBTOTAL** | **5,510** | **0.009** | **0.017** | **0.001** | **0.009** | **0.019** |
| | | **TOTAL** | **591,158** | **0.915** | **1.829** | **0.091** | **1.006** | **2.012** |

# Section 4 - Hydraulic Analysis

The proposed on-site sanitary sewer collection system was evaluated using the InfoSWMM™ hydraulic computer model. Analyses consisted of assessing the proposed sewer collection system's ability to convey the ADWF, PDWF and PWWF while meeting the design requirements based on WAS design criteria as summarized in (Table 4-1).

**Table 4-1**
**WAS Section 4.2 – Sewer Criteria**

| Sewer Criteria | |
|---|---|
| **Sewer Generation Factors** | **From 2015 Master Plan** |
| Residential (AC/M/R/R-1//VC) | 60 gpcd |
| Institutional (S) | 15 gpcd (Elementary) |
| | **Based on WAS (converted by MBI)** |
| Commercial (VC) | 3,000 gpd/acre |
| Farm Commercial Use Component (A) | 3,000 gpd/acre |
| **Peak Flow and I/I** | |
| Peak Hour Factor | WAS Figure 4-2-1 and/or WAS Figure 4-2-2 (Curve 2 Utilized) |
| Infiltration/Inflow | 5% to 50% of ADWF (10% used for new system) |
| **Manning's and Hazen-Williams Coefficients** | |
| **Gravity Sewer (Manning's)** | |
| DIP (lined) | 0.013 |
| HDPE | 0.011 |
| PVC | 0.011 (Note: 0.013 used) |
| VCP | 0.013 |
| **Force Main (H-W)** | |
| DIP (Lined) | 120 |
| HDPE | 140 |
| PVC | 140 |
| **Depth to Diameter Ratio (d/D)** | |
| ≤ 12-inch Pipe | 0.50 |
| > 12-inch Pipe | 0.75 |
| **Manhole Min Depth (Rim to Invert)** | 6.0 ft |
| **Pipe** | |
| **Minimum Slope** | 1.0% for upper reach until 50 EDU attained; then as follows: |
| 8-inch | 0.40% |
| 10-inch | 0.28% |
| 12-inch | 0.21% |
| 15-inch | 0.18% |
| **Maximum Slope** | 10% (or District approved) |
| **Velocities (Gravity)** | |
| Minimum | 2.0 ft/s |
| Maximum | 10.0 ft/s |
| **Velocity Range (Force Main)** | 3.5 to 8.0 ft/s |
| **Pump Stations** | WAS Section 4.2.12 |

## 4.1 Hydraulic Sewer Model Assumptions

The hydraulic sewer model was run considering the sewer criteria discussed previously. Furthermore, the following extended period simulation (EPS) scenarios were run:

- Average Dry Weather flow with Diurnal based PDWF
- Average Wet Weather flow with Diurnal based PWWF

Use of the EPS allowed use of the Dynamic Wave Routing Model Engine in InfoSWMM to provide complete routing and profile development of the sanitary flow at each hourly interval. During the EPS, the ADWF and AWWF occur at time 11:00 AM, 2:00 PM and 9:00 PM (peaking factor equals 1.0). The PDWF and PWWF scenarios occur at time 7:00 AM (peaking factor equals 2.0).

Enlarged maps (4 sheets) of the hydraulic model network showing pipe and junction (MH) IDs and pipe diameters are shown in Figure 4-1. Additionally, a map showing manhole invert elevation contours is provided in Figure 4-2 to graphically show the general slope and direction of the sewer system. A map showing pipe slopes is provided in Figure 4-3.

## 4.2 Hydraulic Model Results

The hydraulic model results have been simplified through the use of colorized maps to show the results of the ADWF, PDWF, and PWWF flow scenarios via Pipe Flow, Pipe Velocity, and Depth versus Diameter (d/D) charts. The results are based upon the sewer slopes and invert elevations provided in the final hydraulic model. Brief result summaries are as follows:

**ADWF Results:**

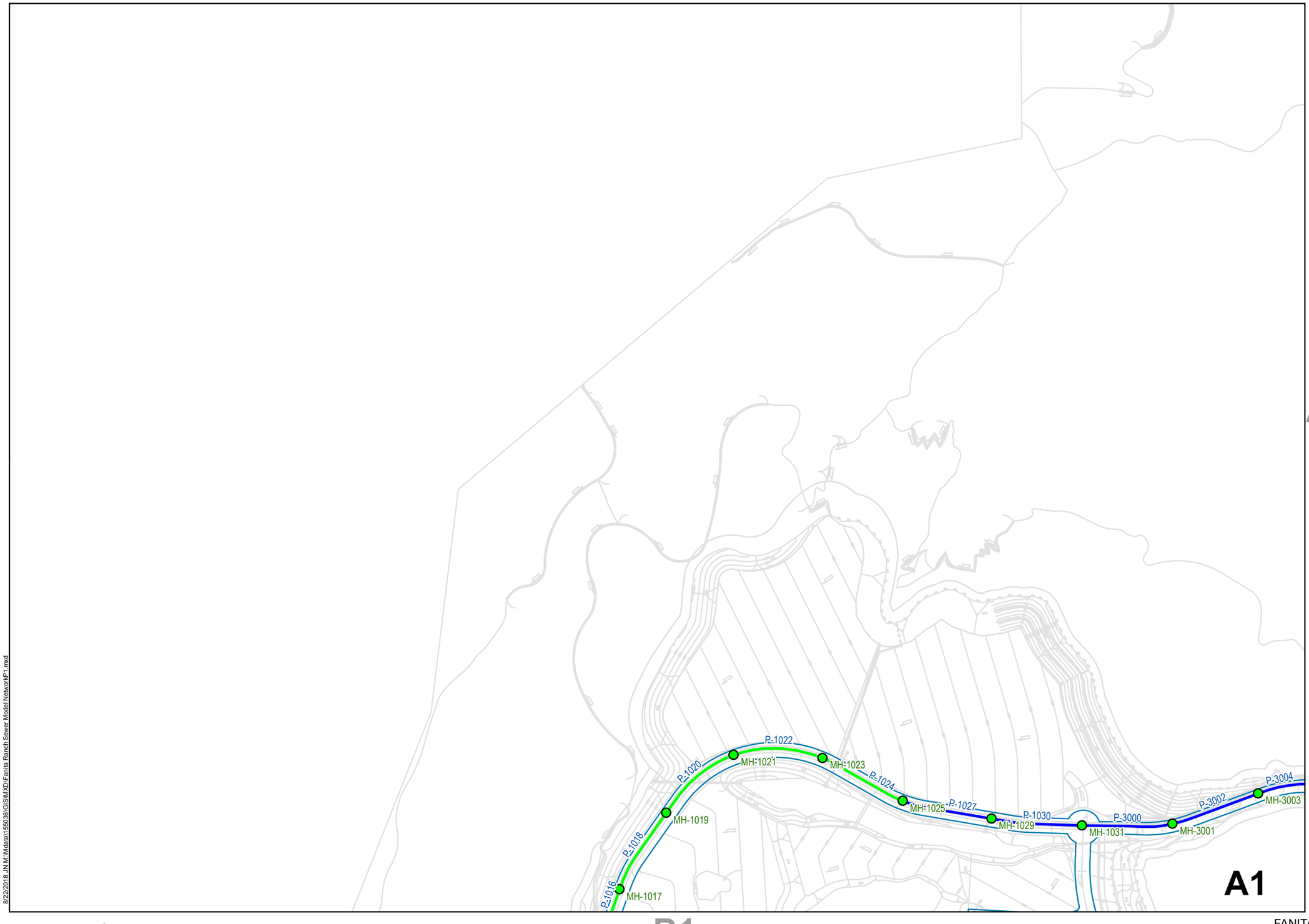
The ADWF Pipe Flow and Pipe Velocity Results are provided in Figure 4-4 and Figure 4-5. As expected, many 8-inch pipes have velocities less than the desired 2.0 ft/s minimum. These pipes are generally located in the upstream reaches of the collection system with light sewer loading. In accordance with WAS guidelines, upper sewer reaches must be laid at a minimum slope of 1.00% until 50 EDUs of upstream sanitary connections are achieved. Maximum pipe velocities range between 5.0 and 6.7 ft/s in the 8-inch sewer along the steep portions of Streets ‘V’ and ‘W’.

**PDWF Results:**

The PDWF Pipe Flow, Pipe Velocity and d/D Results are provided in Figure 4-6 through Figure 4-8. Many 8-inch pipes continue to experience minimum velocities less than 2.0 ft/s. In accordance with WAS guidelines, upper sewer reaches must be laid at a minimum slope of 1.00% until 50 EDUs of upstream sanitary connections are achieved. Maximum velocities range from 5.0 to 8.2 ft/s in the 8-inch sewer along Streets ‘V’ and ‘W’. All pipe d/D ratios are acceptable and do not exceed 0.50 under the PDWF scenario.

**PWWF Results:**

The PWWF Pipe Flow, Pipe Velocity and d/D Results are provided in Figure 4-9 through Figure 4-11. Results are generally similar to the PDWF scenario. Maximum velocities reach 8.4 ft/s along Streets 'V' and 'W'. Pipe d/D ratios are acceptable and do not exceed 0.50.




## Legend

**Junction**
- Active
- Domain

**Outfall**
- Active
- Domain

**Divider**
- Active
- Domain

**Pipe**
- 8 inch
- 10 inch
- 12 inch
- 15 inch
- 18 inch
- 24 inch

8/22/2018 J:\N:\M\data\t155036\GIS\MXD\Fanita Ranch Sewer Model NetworkP1.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

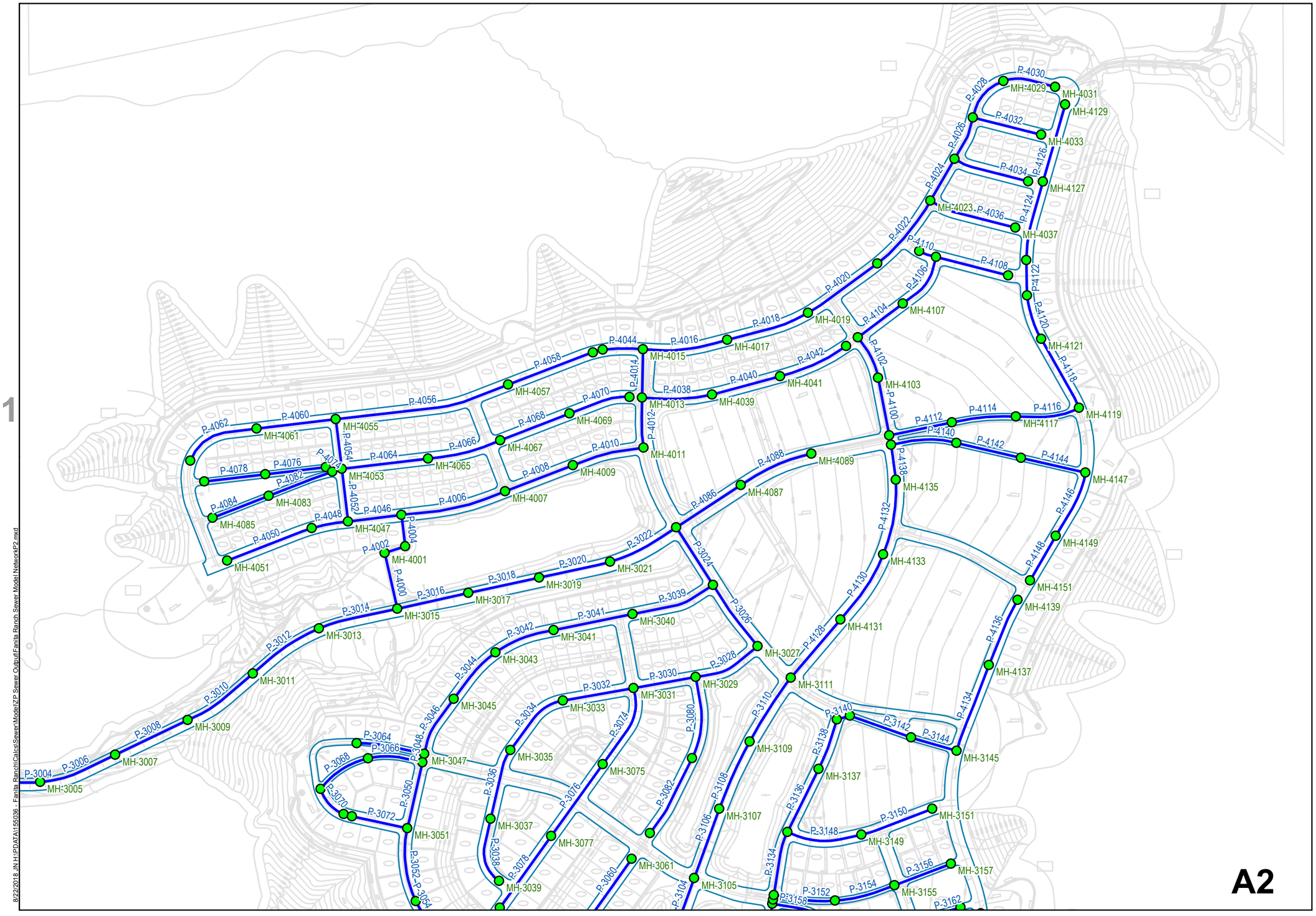
Source:

FANITA RANCH SEWER SERVICE STUDY

# Wastewater Collection System Hyrdaulic Model Maps

Figure 4-1

A1




A2

B2

8/22/2018 JN H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\ZP Sewer Output\Fanita Ranch Sewer Model NetworkP2.mxd

## Legend

**Junction**

- Active
- Domain

**Outfall**

- Active
- Domain

**Divider**

- Active
- Domain

**Pipe**

- 8 inch
- 10 inch
- 12 inch
- 15 inch
- 18 inch
- 24 inch

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# Wastewater Collection System Hyrdaulic Model Maps

Figure 4-1

A1

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

B2

B1

## Legend

**Junction**
- Active
- Domain

**Outfall**
- Active
- Domain

**Divider**
- Active
- Domain

**Pipe**
- 8 inch
- 10 inch
- 12 inch
- 15 inch
- 18 inch
- 24 inch

8/22/2018 JN M:\Mdata\155036\GIS\MXD\Fanita Ranch Sewer Model Network\P3.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

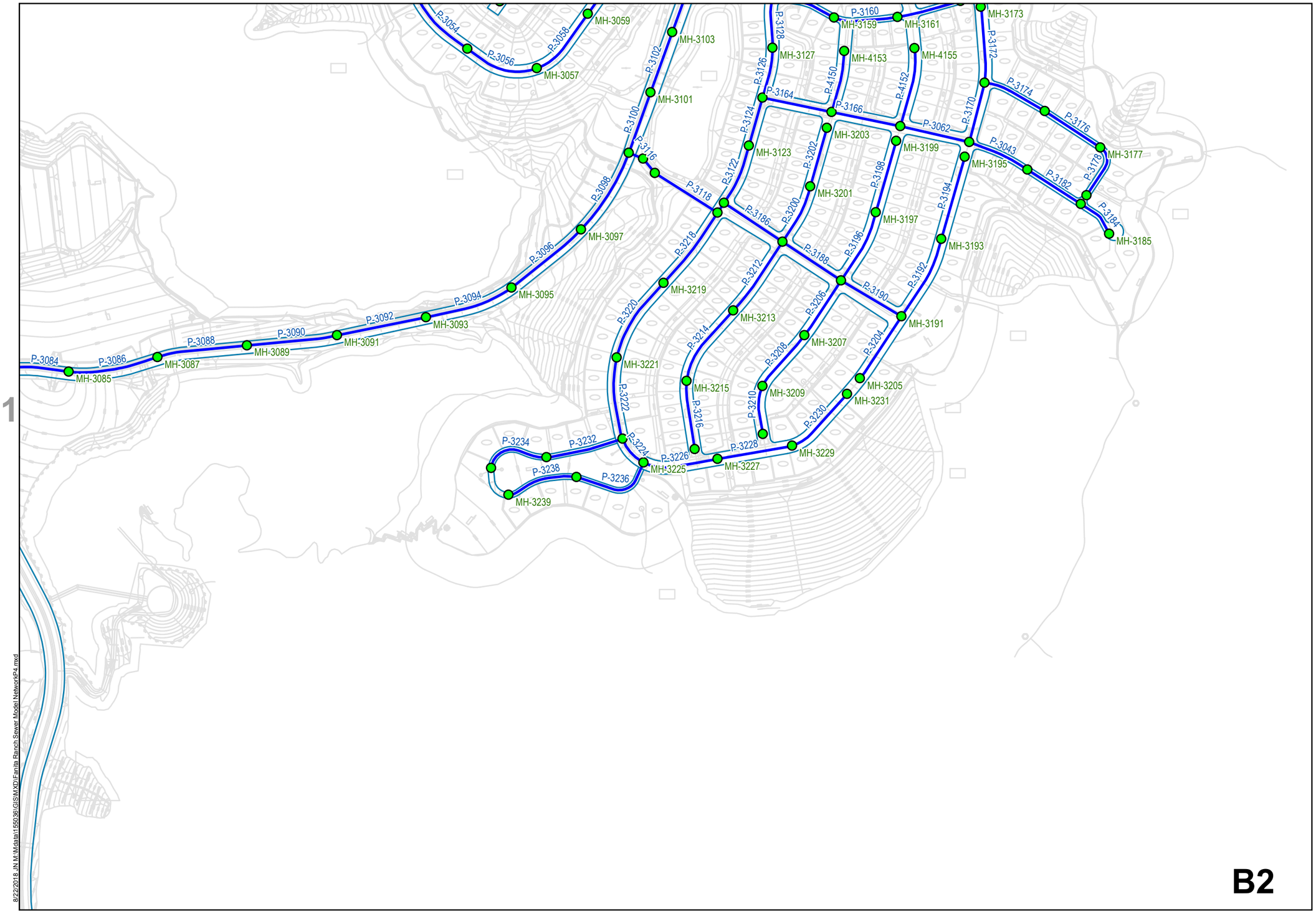
FANITA RANCH SEWER SERVICE STUDY

# Wastewater Collection System Hyrdaulic Model Maps

Figure 4-1

A2

B1




## Legend

**Junction**
- Active
- Domain

**Outfall**
- Active
- Domain

**Divider**
- Active
- Domain

**Pipe**
- 8 inch
- 10 inch
- 12 inch
- 15 inch
- 18 inch
- 24 inch

B2

8/22/2018 JN M:\data\11550\36\GIS\MXD\Fanita Ranch Sewer Model Network\P4.mxd

Michael Baker INTERNATIONAL

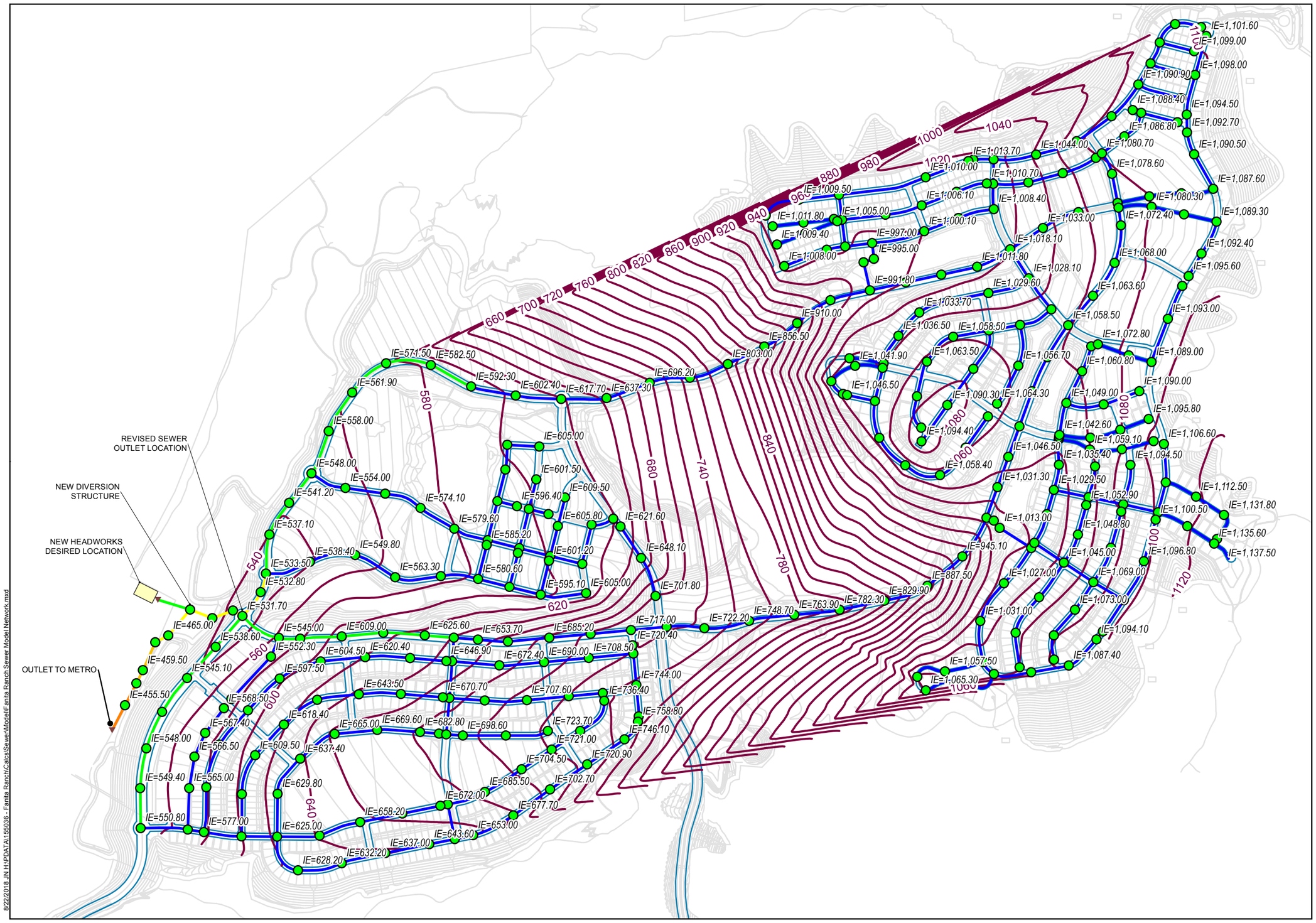
0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# Wastewater Collection System Hyrdaulic Model Maps

Figure 4-1




## Legend

**Junction**

**INV_ELEV**

- Manholes

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**GEOM1**

- 8 inch
- 10 inch
- 12 inch
- 15 inch
- 18 inch
- 24 inch

8/22/2018 JN H:\PDATA\155036 - Fanita Ranch\Cates\SewerModel\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM MH INVERT ELEVATION CONTOUR MAP

Figure 4-2

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**SLOPE**

- <0.40%
- 0.40%-9.00%
- >9.00%

8/21/2018 J:\N H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM PIPE SLOPES

Figure 4-3

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**FLOW**

- <0.10 cfs
- >0.10-0.25 cfs
- >0.25-0.50 cfs
- >0.50-0.75 cfs
- Greater than 0.75

8/21/2018 J:\N H:\PDATA\155036 - Fanita Ranch\Calcs\SewerModel\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM FLOWS AT ADWF

Figure 4-4

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**VELOCITY**

- <1.5 fps
- >1.5-2.0 fps
- >2.0-2.5 fps
- >2.5-5.0 fps
- >5.0 fps

8/21/2018 JN H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM VELOCITIES AT ADWF

Figure 4-5

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**FLOW**

- <0.10 cfs
- >0.10-0.25 cfs
- >0.25-0.50 cfs
- >0.50-0.75 cfs
- Greater than 0.75

8/21/2018 J:\N H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

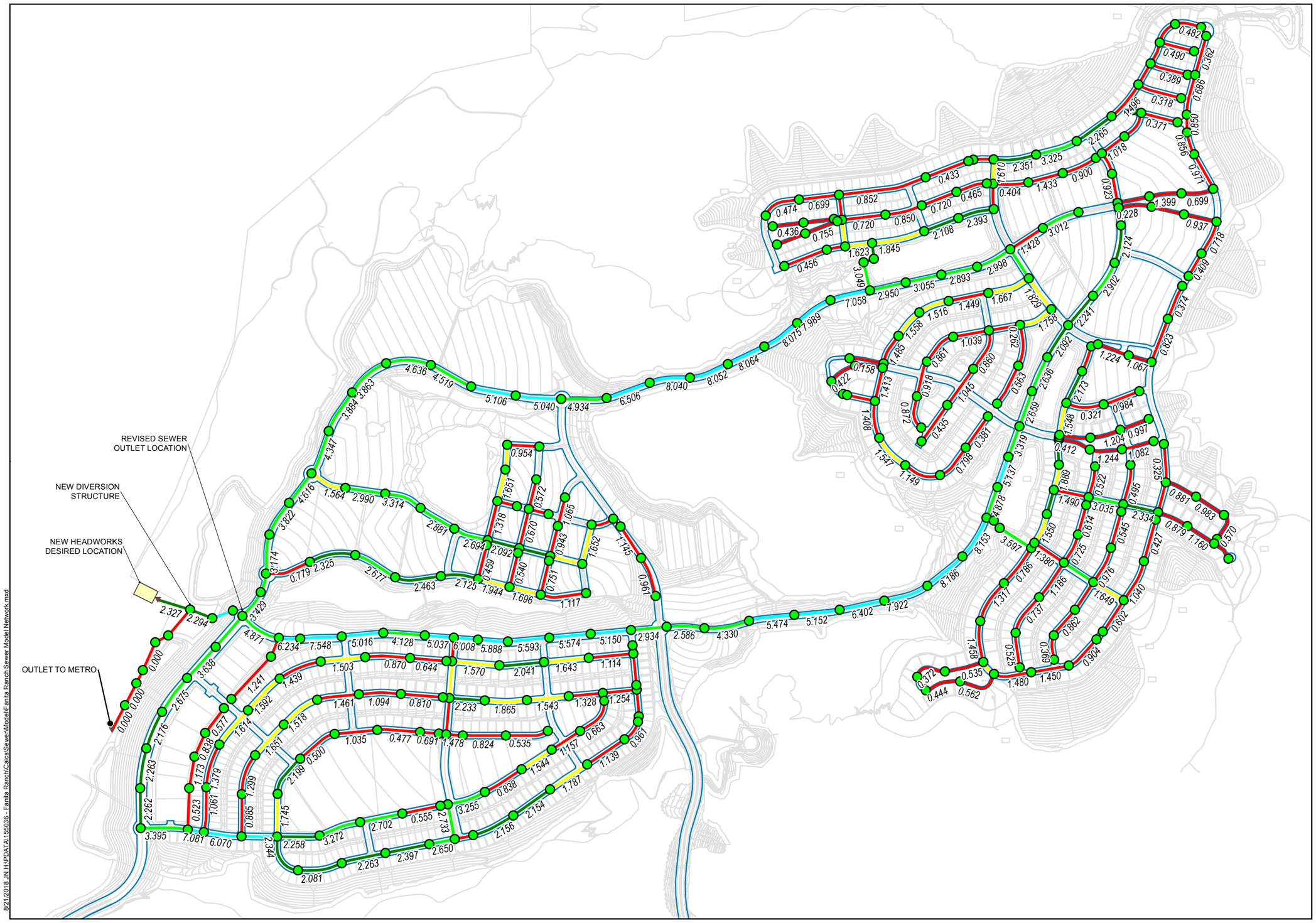
0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM FLOWS AT PDWF

Figure 4-6




## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**VELOCITY**

- <1.5 fps
- >1.5-2.0 fps
- >2.0-2.5 fps
- >2.5-5.0 fps
- >5.0 fps

8/21/2018 J:\N:\PDATA\155036 - Fanita Ranch\Cdes\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

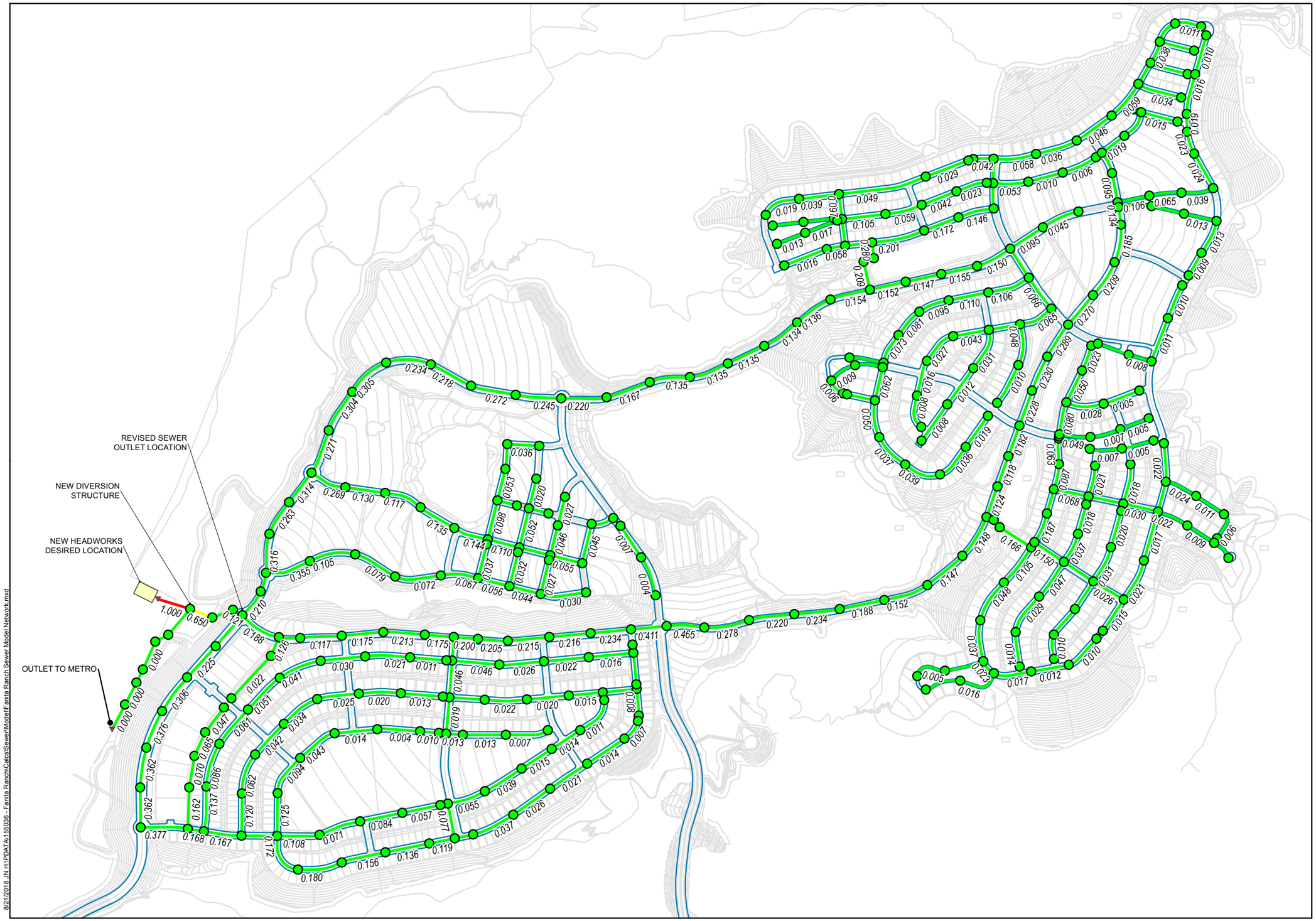
0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM VELOCITIES AT PDWF

Figure 4-7




## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**CAPACTY_DD**

- <0.5
- 0.5-0.75
- >0.75

8/21/2018 JN H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM d/D AT PDWF

Figure 4-8

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**FLOW**

- <0.10 cfs
- >0.10-0.25 cfs
- >0.25-0.50 cfs
- >0.50-0.75 cfs
- Greater than 0.75

8/21/2018 J:\N H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM FLOWS AT PWWF

Figure 4-9

REVISED SEWER OUTLET LOCATION

NEW DIVERSION STRUCTURE

NEW HEADWORKS DESIRED LOCATION

OUTLET TO METRO

8/21/2018 JN H:\PDATA\155036 - Fanita Ranch\Calcs\SewerModel\Fanita Ranch Sewer Model Network.mxd

## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**VELOCITY**

- <1.5 fps
- >1.5-2.0 fps
- >2.0-2.5 fps
- >2.5-5.0 fps
- >5.0 fps

Michael Baker INTERNATIONAL

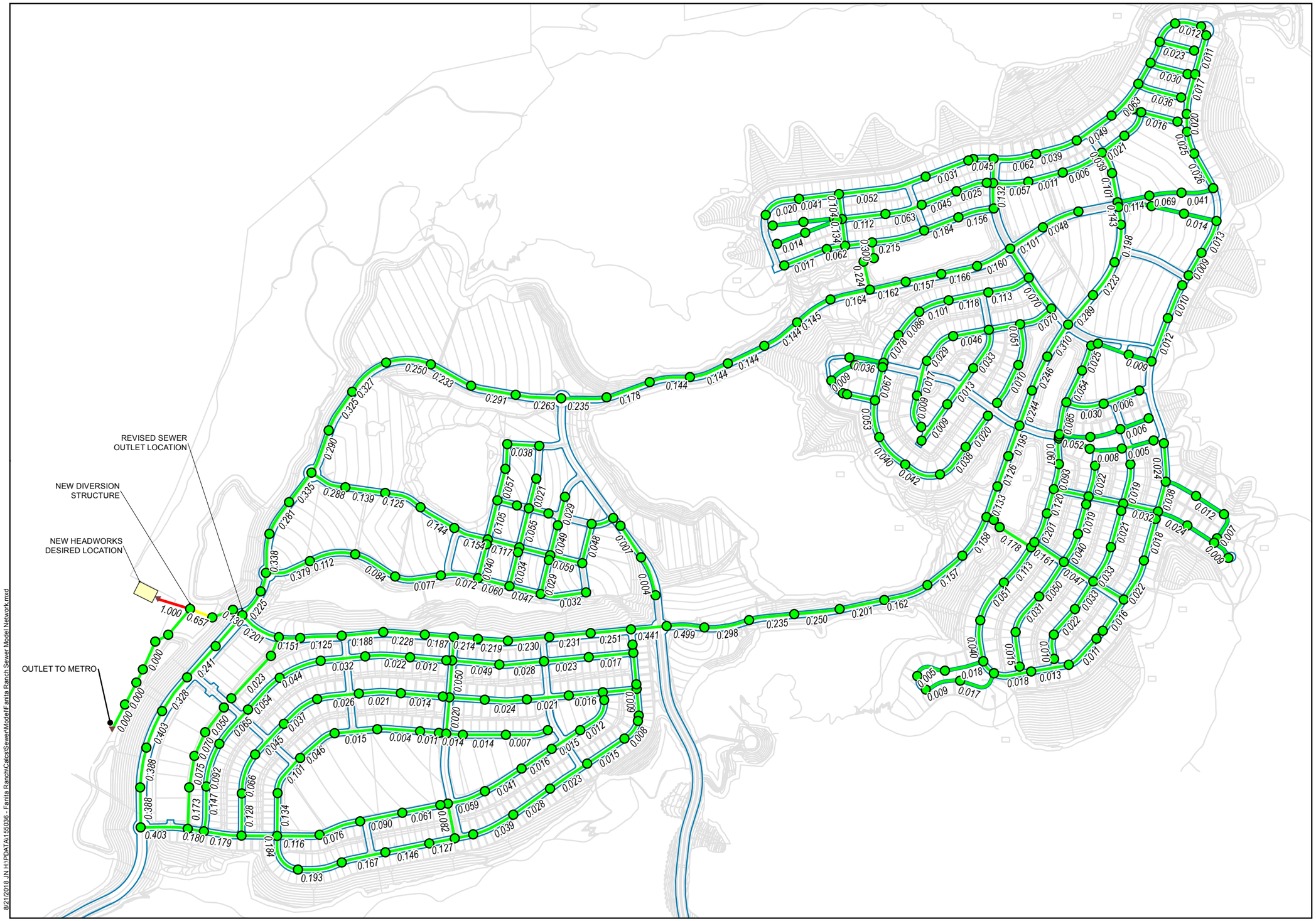
0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM VELOCITIES AT PWWF

Figure 4-10




## Legend

**Junction**

**TYPE**

- Active
- Domain

**Outfall**

**TYPE**

- Active
- Domain

**Pipe**

**CAPACTY_DD**

- <0.5
- 0.5-0.75
- >0.75

8/21/2018 JN H:\PDATA\155036 - Fanita Ranch\Calcs\Sewer\Model\Fanita Ranch Sewer Model Network.mxd

Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Source:

FANITA RANCH SEWER SERVICE STUDY

# SEWER COLLECTION SYSTEM d/D AT PWWF

Figure 4-11

# Section 5 - Conclusions

Based on the discussions provided in Sections 2 and 3, and the analysis results provided in Section 4, the following conclusions are provided:

1. ***Layout and Phasing*** – Slight modifications to pipe slope, flow direction, and connecting point were necessary to address requirements during Phase 1 construction in the Orchard Village to accommodate the Phase 2 construction requirements and ability of the Phase sewers to flow correctly. Specifically, the sewer in Street 'F' and the western portion of Street 'E', both originally contained in Phase 2, must be constructed in Phase 1 to convey flow from the south lots along Streets 'E' and 'F' in Phase 1. Additionally, modifications in flow direction and connecting points were necessary due to topography and proposed lot pad elevations in Phases 1, 3 and 4. Review the Sewer Phasing Maps provided in Figure 2-6 through Figure 2-9 and the Hydraulic Model Maps in Figure 4-1 to ascertain modifications.

2. ***Flows*** – The sewer sizing contained on the Conceptual Sewer Plan was generally followed in the development of the hydraulic model with minor exceptions. To address minor d/D concerns, pipes P-1004, P-1006 and P-1008 were upsized from 12-inch to 15-inch. Pipes P-1154, P-1156, P-1158, P-1160 and P-1195 were upsized from 8-inch to 10-inch. Based on this change, the collection system is capable of easily conveying the PWWF to the headworks or the Metro's pipeline. The PWWF at the outlet to the new Headworks Facility at the WRF is 2.012 cfs (903 gpm).

3. ***Pipeline Velocities*** – A significant number of pipes experience velocities less than the desired 2.0 ft/s. This is generally due to light sewer loading in upper sewer system reaches. Developer should adjust pipe slopes where possible during sewer design to maximize velocities by setting the upper reach sewers to a minimum slope of 1.00% until 50 equivalent dwelling units are connected upstream. The steep portions along Streets 'V' and 'W' necessitate sewer slopes approaching 15.0%. Please see item 5 "design considerations" (below) for any pipe slope exceeding 15%. The velocities along the steep reaches of sewer approach 8.4 ft/s during PWWF conditions.

4. ***Gravity Discharge Locations*** – As noted in Section 2, the District will require Fanita Ranch sanitary flow be conveyed by gravity to two discharge locations recently identified by the District:

    - ***Location 1***: Discharge Location 1 is the District's existing Ray Stoyer WRF. Connection to the WRF would be by gravity but will require the construction of a new Headworks Facility to provide screening and grit removal specifically for the Project's sanitary flow. Due to operational and odor control requirement for the new Headworks Facility, the District anticipates that this facility would be constructed at the north end of the existing WRF on District property. The cost to construct the facility would be borne by the Project. The elevations at the western portion of the Project provide adequate vertical fall to convey the flow by gravity to the new headworks facility; however, a portion of the new westerly 15-inch gravity pipe would be continuously surcharged. Therefore, this portion of pipeline may require special construction and material requirements.

- ***Location 2:*** Discharge Location 2 involves connection of the Project's sanitary sewer system to the District's existing 18-inch and 24-inch sewer system that conveys bypass flows from the Ray Stoyer WRF ultimately to the METRO system via the District's existing sanitary conveyance system. This discharge location also provides adequate vertical fall to convey the flow by gravity to the existing 18-inch and 24-inch sewer.

Pending ongoing planning for the District's proposed AWP and associated modifications to the existing Ray Stoyer WRF, the District anticipates that the Fanita Ranch sanitary system will connect to the Ray Stoyer WRF (Discharge Location 1) and will thus require construction of the new Headworks Facility to provide pretreatment for the sanitary flow. Furthermore, for operational flexibility, the District will also require the Fanita Ranch sanitary system to connect to the Districts' 18-inch and 24-inch sewer that diverts excess flow from the Ray Stoyer WRF ultimately to METRO (Discharge Location 2). To accommodate discharge to both discharge locations, a new Diversion Structure will be required to facilitate sanitary flow routing to Discharge Location 1 and/or Discharge Location 2. The PWWF flow to either location is 2.012 cfs (903 gpm).

5. **Design Considerations** – The following design considerations must be followed during project design development of the sanitary sewer system:

   - Due to project topography, several sewer segments will exceed 10% slope. The District will require special construction including lining of manholes, and installation of odor control devices via manhole inserts. Additionally, the upstream reach of steep sewers will require atmospheric venting with odor control provided on the vent stacks. Very steep sewer segments may require use of cut-off walls.

   - The District will not allow manhole depths greater than 14-feet from rim to invert. Sewer profiles will need to balance minimum and maximum sewer slopes and pipe diameters so that the maximum allowable sewer depth is not exceeded. The westerly Fanita Ranch sanitary system outlet was relocated from its proposed location to the intersection of Fanita Parkway and "A" Street. The relocation of the sewer outlet facilitated re-sloping of sewer in Fanita Road allowing manhole depths to meet the District requirements.

Based on the above conclusions, the Project sewer flows will be capable of being easily conveyed by the proposed sewer collection system with the noted sewer system design improvements.

# Section 6 - Appendices

A. Pipe Output Report - ADWF

B. Pipe Output Report - PDWF

C. Pipe Output Report – PWWF

D. Miscellaneous Documentation

# APPENDIX A – PIPE OUTPUT REPORT - ADWF

Pipe Output Report - ADWF

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BYPASS-01 | PDMWD-3010 | PDMWD-3012 | Circular Pipe | 3,199.193 | 0.013 | 0.000 | Free Surface | 0.006 | 0.000 | 0.000 | 0.000 |
| 2 | BYPASS-02 | PDMWD-3012 | PDMWD-3014 | Circular Pipe | 1,535.947 | 0.007 | 0.000 | Free Surface | 0.006 | 0.000 | 0.000 | 0.000 |
| 3 | BYPASS-03 | PDMWD-3014 | PDMWD-3015 | Circular Pipe | 2,605.561 | 0.014 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 4 | BYPASS-04 | PDMWD-3015 | METRO | Circular Pipe | 2,958.546 | 0.014 | 0.000 | Free Surface | 0.001 | 0.000 | 0.000 | 0.000 |
| 5 | P-1000A | MH-1001 | MH-1001B | Circular Pipe | 2,307.298 | 0.169 | 0.921 | Free Surface | 2.223 | 8.109 | 3.995 | 0.093 |
| 6 | P-1000C | MH-1001A | PDMWD-3010 | Circular Pipe | 1,543.081 | 0.016 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 7 | P-1001D | MH-1001C | WRF-HW | Circular Pipe | 3,530.122 | 0.024 | 0.921 | Backwater | 12.000 | 1.173 | 0.000 | 1.000 |
| 8 | P-1002 | MH-1005 | MH-1001 | Circular Pipe | 1,153.425 | 0.166 | 0.921 | Free Surface | 1.921 | 10.019 | 5.321 | 0.075 |
| 9 | P-1004 | MH-1005 | MH-1003 | Circular Pipe | 4,316.247 | 0.019 | -0.223 | Free Surface | 1.884 | 3.134 | 1.669 | 0.131 |
| 10 | P-1006 | MH-1007 | MH-1005 | Circular Pipe | 3,167.307 | 0.004 | 0.446 | Free Surface | 2.791 | 2.832 | 1.240 | 0.128 |
| 11 | P-1008 | MH-1009 | MH-1007 | Circular Pipe | 2,024.421 | 0.004 | 0.446 | Free Surface | 3.484 | 2.063 | 0.803 | 0.176 |
| 12 | P-1010 | MH-1011 | MH-1009 | Circular Pipe | 4,123.015 | 0.010 | 0.398 | Free Surface | 2.996 | 2.593 | 1.086 | 0.195 |
| 13 | P-1012 | MH-1013 | MH-1011 | Circular Pipe | 3,948.728 | 0.012 | 0.397 | Free Surface | 2.619 | 3.138 | 1.412 | 0.161 |
| 14 | P-1014 | MH-1015 | MH-1013 | Circular Pipe | 3,897.978 | 0.021 | 0.397 | Free Surface | 2.476 | 3.775 | 1.739 | 0.193 |
| 15 | P-1016 | MH-1017 | MH-1015 | Circular Pipe | 4,810.104 | 0.025 | 0.324 | Free Surface | 2.228 | 3.572 | 1.742 | 0.166 |
| 16 | P-1018 | MH-1019 | MH-1017 | Circular Pipe | 4,756.612 | 0.010 | 0.323 | Free Surface | 2.404 | 3.207 | 1.502 | 0.185 |
| 17 | P-1020 | MH-1021 | MH-1019 | Circular Pipe | 4,794.875 | 0.024 | 0.323 | Free Surface | 2.413 | 3.188 | 1.490 | 0.186 |
| 18 | P-1022 | MH-1023 | MH-1021 | Circular Pipe | 4,803.691 | 0.027 | 0.297 | Free Surface | 2.008 | 3.799 | 1.958 | 0.143 |
| 19 | P-1024 | MH-1025 | MH-1023 | Circular Pipe | 4,806.810 | 0.024 | 0.270 | Free Surface | 1.915 | 3.698 | 1.953 | 0.134 |
| 20 | P-1026 | MH-1001B | MH-1001C | Circular Pipe | 2,514.741 | 0.053 | 0.921 | Free Surface | 8.448 | 1.293 | 0.301 | 0.580 |
| 21 | P-1027 | MH-1029 | MH-1025 | Circular Pipe | 4,793.344 | 0.025 | 0.243 | Free Surface | 1.792 | 4.164 | 2.263 | 0.167 |
| 22 | P-1028 | MH-1001C | MH-1001A | Circular Pipe | 3,561.377 | 0.034 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 23 | P-1030 | MH-1031 | MH-1029 | Circular Pipe | 4,801.622 | 0.038 | 0.217 | Free Surface | 1.661 | 4.131 | 2.337 | 0.150 |
| 24 | P-1032 | MH-1033 | MH-1015 | Circular Pipe | 3,964.051 | 0.018 | 0.073 | Free Surface | 1.773 | 1.275 | 0.697 | 0.165 |
| 25 | P-1034 | MH-1035 | MH-1033 | Circular Pipe | 4,224.080 | 0.030 | 0.068 | Free Surface | 1.069 | 2.432 | 1.731 | 0.080 |
| 26 | P-1036 | MH-1037 | MH-1035 | Circular Pipe | 4,101.991 | 0.028 | 0.068 | Free Surface | 0.997 | 2.694 | 1.988 | 0.072 |
| 27 | P-1038 | MH-1039 | MH-1037 | Circular Pipe | 4,173.223 | 0.016 | 0.068 | Free Surface | 1.096 | 2.348 | 1.651 | 0.083 |
| 28 | P-1040 | MH-1041 | MH-1039 | Circular Pipe | 3,754.903 | 0.018 | 0.068 | Free Surface | 1.149 | 2.193 | 1.505 | 0.088 |
| 29 | P-1042 | MH-1043 | MH-1041 | Circular Pipe | 3,409.394 | 0.026 | 0.040 | Free Surface | 0.953 | 1.703 | 1.286 | 0.067 |
| 30 | P-1044 | MH-1045 | MH-1043 | Circular Pipe | 3,365.687 | 0.030 | 0.029 | Free Surface | 0.725 | 1.831 | 1.588 | 0.045 |
| 31 | P-1046 | MH-1047 | MH-1045 | Circular Pipe | 3,454.934 | 0.031 | 0.019 | Free Surface | 0.596 | 1.595 | 1.528 | 0.034 |
| 32 | P-1048 | MH-1049 | MH-1047 | Circular Pipe | 4,239.316 | 0.018 | 0.013 | Free Surface | 0.519 | 1.339 | 1.376 | 0.028 |
| 33 | P-1050 | MH-1051 | MH-1049 | Circular Pipe | 2,431.251 | 0.012 | 0.008 | Free Surface | 0.473 | 0.931 | 1.006 | 0.024 |
| 34 | P-1052 | MH-1053 | MH-1051 | Circular Pipe | 1,116.638 | 0.031 | 0.002 | Free Surface | 0.305 | 0.374 | 0.504 | 0.012 |
| 35 | P-1054 | MH-1055 | MH-1053 | Circular Pipe | 3,949.193 | 0.081 | 0.001 | Free Surface | 0.147 | 0.940 | 1.818 | 0.004 |
| 36 | P-1056 | MH-1057 | MH-1055 | Circular Pipe | 4,300.809 | 0.152 | 0.001 | Free Surface | 0.096 | 0.000 | 0.000 | 0.002 |
| 37 | P-1058 | MH-1059 | MH-1041 | Circular Pipe | 4,221.744 | 0.019 | 0.023 | Free Surface | 0.882 | 1.070 | 0.839 | 0.060 |
| 38 | P-1060 | MH-1061 | MH-1059 | Circular Pipe | 3,415.714 | 0.022 | 0.015 | Free Surface | 0.586 | 1.335 | 1.289 | 0.033 |
| 39 | P-1062 | MH-1063 | MH-1061 | Circular Pipe | 2,620.415 | 0.018 | 0.012 | Free Surface | 0.506 | 1.278 | 1.332 | 0.027 |
| 40 | P-1064 | MH-1065 | MH-1063 | Circular Pipe | 3,367.381 | 0.010 | 0.006 | Free Surface | 0.445 | 0.770 | 0.855 | 0.022 |
| 41 | P-1066 | MH-1067 | MH-1059 | Circular Pipe | 2,117.517 | 0.025 | 0.004 | Free Surface | 0.453 | 0.452 | 0.497 | 0.023 |
| 42 | P-1068 | MH-1069 | MH-1043 | Circular Pipe | 4,211.314 | 0.019 | 0.006 | Free Surface | 0.571 | 0.544 | 0.533 | 0.032 |
| 43 | P-1070 | MH-1071 | MH-1069 | Circular Pipe | 3,211.260 | 0.009 | 0.002 | Free Surface | 0.302 | 0.469 | 0.636 | 0.012 |
| 44 | P-1072 | MH-1073 | MH-1069 | Circular Pipe | 2,143.798 | 0.030 | 0.002 | Free Surface | 0.271 | 0.552 | 0.789 | 0.010 |
| 45 | P-1074 | MH-1075 | MH-1045 | Circular Pipe | 3,231.863 | 0.018 | 0.008 | Free Surface | 0.526 | 0.765 | 0.781 | 0.028 |
| 46 | P-1076 | MH-1077 | MH-1075 | Circular Pipe | 3,075.992 | 0.014 | 0.005 | Free Surface | 0.366 | 0.859 | 1.047 | 0.017 |
| 47 | P-1078 | MH-1079 | MH-1009 | Circular Pipe | 4,888.382 | 0.012 | 0.048 | Free Surface | 2.180 | 0.626 | 0.306 | 0.221 |
| 48 | P-1080 | MH-1081 | MH-1079 | Circular Pipe | 4,936.363 | 0.028 | 0.042 | Free Surface | 0.923 | 1.890 | 1.450 | 0.064 |
| 49 | P-1082 | MH-1083 | MH-1081 | Circular Pipe | 4,814.397 | 0.034 | 0.037 | Free Surface | 0.760 | 2.173 | 1.841 | 0.048 |
| 50 | P-1084 | MH-1085 | MH-1083 | Circular Pipe | 4,880.786 | 0.024 | 0.031 | Free Surface | 0.716 | 1.998 | 1.744 | 0.044 |
| 51 | P-1086 | MH-1087 | MH-1085 | Circular Pipe | 3,988.477 | 0.023 | 0.025 | Free Surface | 0.685 | 1.722 | 1.538 | 0.042 |
| 52 | P-1088 | MH-1089 | MH-1087 | Circular Pipe | 3,405.604 | 0.026 | 0.019 | Free Surface | 0.605 | 1.577 | 1.502 | 0.035 |
| 53 | P-1090 | MH-1091 | MH-1089 | Circular Pipe | 3,379.331 | 0.025 | 0.013 | Free Surface | 0.514 | 1.377 | 1.423 | 0.027 |
| 54 | P-1092 | MH-1093 | MH-1091 | Circular Pipe | 4,836.196 | 0.025 | 0.006 | Free Surface | 0.400 | 0.898 | 1.047 | 0.019 |
| 55 | P-1094 | MH-1095 | MH-1087 | Circular Pipe | 3,678.036 | 0.015 | 0.003 | Free Surface | 0.460 | 0.370 | 0.404 | 0.023 |
| 56 | P-1096 | MH-1097 | MH-1089 | Circular Pipe | 3,673.243 | 0.015 | 0.003 | Free Surface | 0.410 | 0.434 | 0.500 | 0.020 |
| 57 | P-1098 | MH-1099 | MH-1091 | Circular Pipe | 3,674.055 | 0.020 | 0.004 | Free Surface | 0.372 | 0.602 | 0.728 | 0.017 |
| 58 | P-1100 | MH-1101 | MH-1005 | Circular Pipe | 4,577.396 | 0.031 | 0.251 | Free Surface | 1.728 | 3.984 | 2.220 | 0.115 |
| 59 | P-1102 | MH-1103 | MH-1101 | Circular Pipe | 2,253.602 | 0.178 | 0.241 | Free Surface | 1.420 | 5.092 | 3.145 | 0.087 |
| 60 | P-1104 | MH-1105 | MH-1103 | Circular Pipe | 4,377.620 | 0.085 | 0.241 | Free Surface | 1.245 | 6.157 | 4.065 | 0.072 |
| 61 | P-1106 | MH-1107 | MH-1105 | Circular Pipe | 4,382.498 | 0.024 | 0.241 | Free Surface | 1.644 | 4.113 | 2.353 | 0.107 |
| 62 | P-1108 | MH-1109 | MH-1107 | Circular Pipe | 4,385.883 | 0.021 | 0.241 | Free Surface | 1.882 | 3.384 | 1.804 | 0.131 |
| 63 | P-1110 | MH-1111 | MH-1109 | Circular Pipe | 3,056.696 | 0.063 | 0.241 | Free Surface | 1.643 | 4.114 | 2.354 | 0.107 |
| 64 | P-1112 | MH-1113 | MH-1111 | Circular Pipe | 2,530.651 | 0.058 | 0.211 | Free Surface | 1.448 | 4.903 | 2.983 | 0.123 |
| 65 | P-1114 | MH-1115 | MH-1113 | Circular Pipe | 3,165.272 | 0.057 | 0.211 | Free Surface | 1.465 | 4.820 | 2.915 | 0.125 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66 | P-1116 | MH-1117 | MH-1115 | Circular Pipe | 4,371.695 | 0.045 | 0.211 | Free Surface | 1.517 | 4.579 | 2.717 | 0.132 |
| 67 | P-1118 | MH-1119 | MH-1117 | Circular Pipe | 4,365.331 | 0.056 | 0.211 | Free Surface | 1.521 | 4.562 | 2.704 | 0.132 |
| 68 | P-1120 | MH-1121 | MH-1119 | Circular Pipe | 4,275.693 | 0.032 | 0.211 | Free Surface | 1.605 | 4.225 | 2.436 | 0.143 |
| 69 | P-1122 | MH-1123 | MH-1121 | Circular Pipe | 3,753.480 | 0.005 | 0.211 | Free Surface | 2.360 | 2.451 | 1.148 | 0.247 |
| 70 | P-1124 | MH-1127 | MH-1125 | Circular Pipe | 4,980.228 | 0.061 | 0.013 | Free Surface | 0.526 | 1.277 | 1.303 | 0.028 |
| 71 | P-1126 | MH-1125 | MH-1111 | Circular Pipe | 2,484.867 | 0.028 | 0.030 | Free Surface | 1.053 | 1.096 | 0.786 | 0.078 |
| 72 | P-1128 | MH-1129 | MH-1127 | Circular Pipe | 4,718.688 | 0.045 | 0.009 | Free Surface | 0.363 | 1.648 | 2.019 | 0.016 |
| 73 | P-1130 | MH-1131 | MH-1129 | Circular Pipe | 4,724.661 | 0.047 | 0.006 | Free Surface | 0.320 | 1.340 | 1.765 | 0.013 |
| 74 | P-1132 | MH-1133 | MH-1131 | Circular Pipe | 4,714.063 | 0.030 | 0.003 | Free Surface | 0.261 | 0.907 | 1.320 | 0.010 |
| 75 | P-1134 | MH-1135 | MH-1133 | Circular Pipe | 878.481 | 0.004 | 0.001 | Free Surface | 0.204 | 0.262 | 0.431 | 0.007 |
| 76 | P-1136 | MH-1137 | MH-1125 | Circular Pipe | 3,870.776 | 0.075 | 0.015 | Free Surface | 0.531 | 1.478 | 1.501 | 0.029 |
| 77 | P-1138 | MH-1139 | MH-1137 | Circular Pipe | 3,735.832 | 0.067 | 0.010 | Free Surface | 0.358 | 1.797 | 2.219 | 0.016 |
| 78 | P-1140 | MH-1141 | MH-1139 | Circular Pipe | 4,435.425 | 0.042 | 0.007 | Free Surface | 0.324 | 1.514 | 1.980 | 0.014 |
| 79 | P-1142 | MH-1143 | MH-1141 | Circular Pipe | 4,432.325 | 0.037 | 0.005 | Free Surface | 0.300 | 1.255 | 1.706 | 0.012 |
| 80 | P-1144 | MH-1145 | MH-1143 | Circular Pipe | 3,597.118 | 0.053 | 0.003 | Free Surface | 0.248 | 1.076 | 1.605 | 0.009 |
| 81 | P-1146 | MH-1147 | MH-1145 | Circular Pipe | 3,584.673 | 0.033 | 0.003 | Free Surface | 0.208 | 1.014 | 1.650 | 0.007 |
| 82 | P-1148 | MH-1149 | MH-1147 | Circular Pipe | 2,805.771 | 0.056 | 0.001 | Free Surface | 0.167 | 0.711 | 1.303 | 0.005 |
| 83 | P-1150 | MH-1154 | MH-1133 | Circular Pipe | 3,302.693 | 0.087 | 0.001 | Free Surface | 0.166 | 0.540 | 0.994 | 0.005 |
| 84 | P-1152 | MH-1151 | MH-1003 | Circular Pipe | 4,423.252 | 0.015 | 0.223 | Free Surface | 1.953 | 2.976 | 1.556 | 0.138 |
| 85 | P-1154 | MH-1153 | MH-1151 | Circular Pipe | 4,422.281 | 0.004 | 0.223 | Free Surface | 2.412 | 2.203 | 1.030 | 0.186 |
| 86 | P-1156 | MH-1155 | MH-1153 | Circular Pipe | 4,198.987 | 0.004 | 0.223 | Free Surface | 2.793 | 1.793 | 0.774 | 0.228 |
| 87 | P-1158 | MH-1157 | MH-1155 | Circular Pipe | 4,212.055 | 0.004 | 0.223 | Free Surface | 2.716 | 1.864 | 0.817 | 0.220 |
| 88 | P-1160 | MH-1159 | MH-1157 | Circular Pipe | 4,203.406 | 0.004 | 0.223 | Free Surface | 2.716 | 1.863 | 0.816 | 0.220 |
| 89 | P-1162 | MH-1161 | MH-1159 | Circular Pipe | 4,959.011 | 0.029 | 0.223 | Free Surface | 2.249 | 2.776 | 1.335 | 0.230 |
| 90 | P-1164 | MH-1163 | MH-1161 | Circular Pipe | 1,723.666 | 0.097 | 0.208 | Free Surface | 1.279 | 5.778 | 3.750 | 0.103 |
| 91 | P-1166 | MH-1165 | MH-1163 | Circular Pipe | 3,976.682 | 0.073 | 0.177 | Free Surface | 1.274 | 4.950 | 3.219 | 0.103 |
| 92 | P-1168 | MH-1167 | MH-1165 | Circular Pipe | 3,762.583 | 0.077 | 0.154 | Free Surface | 1.219 | 4.594 | 3.056 | 0.096 |
| 93 | P-1170 | MH-1169 | MH-1167 | Circular Pipe | 4,475.759 | 0.045 | 0.043 | Free Surface | 0.944 | 1.840 | 1.396 | 0.066 |
| 94 | P-1172 | MH-1171 | MH-1169 | Circular Pipe | 4,508.279 | 0.044 | 0.041 | Free Surface | 0.712 | 2.655 | 2.323 | 0.044 |
| 95 | P-1174 | MH-1173 | MH-1171 | Circular Pipe | 4,523.765 | 0.019 | 0.040 | Free Surface | 0.799 | 2.196 | 1.817 | 0.052 |
| 96 | P-1176 | MH-2047 | MH-1173 | Circular Pipe | 4,094.557 | 0.020 | 0.006 | Free Surface | 0.613 | 0.453 | 0.429 | 0.035 |
| 97 | P-1178 | MH-1177 | MH-1175 | Circular Pipe | 4,130.243 | 0.038 | 0.031 | Free Surface | 0.594 | 2.640 | 2.534 | 0.034 |
| 98 | P-1180 | MH-1179 | MH-1177 | Circular Pipe | 4,521.591 | 0.050 | 0.006 | Free Surface | 0.471 | 0.680 | 0.736 | 0.024 |
| 99 | P-1182 | MH-1181 | MH-1179 | Circular Pipe | 3,781.710 | 0.052 | 0.004 | Free Surface | 0.250 | 1.253 | 1.861 | 0.009 |
| 100 | P-1184 | MH-1183 | MH-1181 | Circular Pipe | 3,593.420 | 0.020 | 0.003 | Free Surface | 0.238 | 0.936 | 1.426 | 0.009 |
| 101 | P-1186 | MH-1185 | MH-1183 | Circular Pipe | 4,335.787 | 0.026 | 0.001 | Free Surface | 0.202 | 0.534 | 0.884 | 0.007 |
| 102 | P-1189 | MH-1175 | MH-1187 | Circular Pipe | 3,720.688 | 0.078 | 0.037 | Free Surface | 0.748 | 2.220 | 1.895 | 0.047 |
| 103 | P-1190 | MH-1189 | MH-1187 | Circular Pipe | 1,987.398 | 0.028 | 0.017 | Free Surface | 0.750 | 1.042 | 0.889 | 0.047 |
| 104 | P-1191 | MH-1187 | MH-2046 | Circular Pipe | 2,738.010 | 0.021 | 0.055 | Free Surface | 1.010 | 2.154 | 1.578 | 0.073 |
| 105 | P-1192 | MH-1191 | MH-1189 | Circular Pipe | 4,719.513 | 0.063 | 0.014 | Free Surface | 0.455 | 1.743 | 1.915 | 0.023 |
| 106 | P-1193 | MH-2038 | MH-2037 | Circular Pipe | 1,999.926 | 0.079 | 0.001 | Free Surface | 0.194 | 0.566 | 0.956 | 0.006 |
| 107 | P-1194 | MH-1193 | MH-1191 | Circular Pipe | 4,720.235 | 0.064 | 0.010 | Free Surface | 0.359 | 1.733 | 2.136 | 0.016 |
| 108 | P-1196 | MH-1195 | MH-1193 | Circular Pipe | 4,710.696 | 0.046 | 0.007 | Free Surface | 0.313 | 1.455 | 1.937 | 0.013 |
| 109 | P-1198 | MH-1197 | MH-1195 | Circular Pipe | 4,730.283 | 0.064 | 0.003 | Free Surface | 0.241 | 0.918 | 1.388 | 0.009 |
| 110 | P-1200 | MH-1199 | MH-1197 | Circular Pipe | 2,400.518 | 0.064 | 0.001 | Free Surface | 0.156 | 0.794 | 1.505 | 0.005 |
| 111 | P-1202 | MH-1201 | MH-1137 | Circular Pipe | 3,832.353 | 0.074 | 0.003 | Free Surface | 0.291 | 0.851 | 1.175 | 0.012 |
| 112 | P-1204 | MH-1203 | MH-1201 | Circular Pipe | 1,745.974 | 0.025 | 0.003 | Free Surface | 0.232 | 1.190 | 1.837 | 0.008 |
| 113 | P-1206 | MH-1205 | MH-1203 | Circular Pipe | 4,517.188 | 0.026 | 0.002 | Free Surface | 0.228 | 0.664 | 1.032 | 0.008 |
| 114 | P-1208 | MH-1207 | MH-1205 | Circular Pipe | 4,522.365 | 0.041 | 0.001 | Free Surface | 0.144 | 0.444 | 0.865 | 0.004 |
| 115 | P-1300 | MH-1156 | MH-1158 | Circular Pipe | 6,091.366 | 0.030 | 0.005 | Free Surface | 0.321 | 1.012 | 1.330 | 0.013 |
| 116 | P-1302 | MH-1158 | MH-1101 | Circular Pipe | 2,141.936 | 0.041 | 0.010 | Free Surface | 1.045 | 0.354 | 0.255 | 0.077 |
| 117 | P-1304 | MH-1304 | MH-1306 | Circular Pipe | 3,256.304 | 0.004 | 0.005 | Free Surface | 0.539 | 0.467 | 0.471 | 0.029 |
| 118 | P-1306 | MH-1306 | MH-1308 | Circular Pipe | 2,722.479 | 0.004 | 0.010 | Free Surface | 0.670 | 0.679 | 0.614 | 0.040 |
| 119 | P-1308 | MH-1308 | MH-1310 | Circular Pipe | 3,342.780 | 0.005 | 0.014 | Free Surface | 0.701 | 0.951 | 0.839 | 0.043 |
| 120 | P-1310 | MH-1310 | MH-1161 | Circular Pipe | 4,357.176 | 0.006 | 0.015 | Free Surface | 1.236 | 0.430 | 0.284 | 0.098 |
| 121 | P-2000 | MH-2001 | MH-1163 | Circular Pipe | 4,724.962 | 0.005 | 0.025 | Free Surface | 1.112 | 0.865 | 0.604 | 0.084 |
| 122 | P-2002 | MH-2003 | MH-2001 | Circular Pipe | 4,712.651 | 0.014 | 0.021 | Free Surface | 0.809 | 1.120 | 0.920 | 0.053 |
| 123 | P-2004 | MH-2005 | MH-2003 | Circular Pipe | 4,709.030 | 0.015 | 0.017 | Free Surface | 0.642 | 1.316 | 1.219 | 0.038 |
| 124 | P-2006 | MH-2007 | MH-2005 | Circular Pipe | 4,716.805 | 0.019 | 0.014 | Free Surface | 0.566 | 1.287 | 1.264 | 0.031 |
| 125 | P-2008 | MH-2009 | MH-2007 | Circular Pipe | 4,723.521 | 0.018 | 0.010 | Free Surface | 0.491 | 1.171 | 1.241 | 0.025 |
| 126 | P-2010 | MH-2011 | MH-2009 | Circular Pipe | 4,708.143 | 0.041 | 0.008 | Free Surface | 0.395 | 1.212 | 1.422 | 0.019 |
| 127 | P-2012 | MH-2013 | MH-2011 | Circular Pipe | 4,720.373 | 0.012 | 0.003 | Free Surface | 0.308 | 0.709 | 0.952 | 0.013 |
| 128 | P-2014 | MH-2015 | MH-2013 | Circular Pipe | 3,828.405 | 0.068 | 0.001 | Free Surface | 0.204 | 0.523 | 0.860 | 0.007 |
| 129 | P-2016 | MH-2017 | MH-1165 | Circular Pipe | 4,433.614 | 0.007 | 0.019 | Free Surface | 1.012 | 0.721 | 0.528 | 0.074 |
| 130 | P-2018 | MH-2019 | MH-2017 | Circular Pipe | 4,403.928 | 0.016 | 0.014 | Free Surface | 0.648 | 1.060 | 0.976 | 0.038 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131 | P-2020 | MH-2021 | MH-2019 | Circular Pipe | 4,423.016 | 0.024 | 0.012 | Free Surface | 0.500 | 1.343 | 1.408 | 0.026 |
| 132 | P-2022 | MH-2023 | MH-2021 | Circular Pipe | 4,414.479 | 0.023 | 0.009 | Free Surface | 0.433 | 1.228 | 1.378 | 0.021 |
| 133 | P-2024 | MH-2025 | MH-2023 | Circular Pipe | 4,426.487 | 0.046 | 0.006 | Free Surface | 0.348 | 1.170 | 1.467 | 0.015 |
| 134 | P-2026 | MH-2027 | MH-2025 | Circular Pipe | 4,427.011 | 0.014 | 0.004 | Free Surface | 0.299 | 0.889 | 1.211 | 0.012 |
| 135 | P-2028 | MH-2029 | MH-2027 | Circular Pipe | 4,429.826 | 0.060 | 0.002 | Free Surface | 0.232 | 0.648 | 1.000 | 0.008 |
| 136 | P-2030 | MH-2031 | MH-1167 | Circular Pipe | 4,498.021 | 0.013 | 0.038 | Free Surface | 1.043 | 1.419 | 1.023 | 0.077 |
| 137 | P-2032 | MH-2033 | MH-2031 | Circular Pipe | 4,529.867 | 0.020 | 0.036 | Free Surface | 0.861 | 1.785 | 1.419 | 0.058 |
| 138 | P-2034 | MH-2035 | MH-2033 | Circular Pipe | 4,516.136 | 0.074 | 0.004 | Free Surface | 0.505 | 0.408 | 0.426 | 0.026 |
| 139 | P-2036 | MH-2037 | MH-2035 | Circular Pipe | 4,507.013 | 0.012 | 0.003 | Free Surface | 0.237 | 0.835 | 1.274 | 0.009 |
| 140 | P-2038 | MH-2039 | MH-2038 | Circular Pipe | 4,505.475 | 0.031 | 0.000 | Free Surface | 0.095 | 0.000 | 0.000 | 0.002 |
| 141 | P-2040 | MH-2041 | MH-1167 | Circular Pipe | 4,707.264 | 0.008 | 0.070 | Free Surface | 1.296 | 1.913 | 1.233 | 0.105 |
| 142 | P-2042 | MH-2043 | MH-2041 | Circular Pipe | 4,717.054 | 0.010 | 0.066 | Free Surface | 1.340 | 1.698 | 1.075 | 0.111 |
| 143 | P-2044 | MH-2045 | MH-2043 | Circular Pipe | 4,722.777 | 0.012 | 0.062 | Free Surface | 1.215 | 1.844 | 1.228 | 0.096 |
| 144 | P-2046 | MH-2046 | MH-2045 | Circular Pipe | 4,704.045 | 0.017 | 0.057 | Free Surface | 1.107 | 1.953 | 1.366 | 0.084 |
| 145 | P-3000 | MH-3001 | MH-1031 | Circular Pipe | 4,796.339 | 0.049 | 0.190 | Free Surface | 1.540 | 4.039 | 2.378 | 0.135 |
| 146 | P-3002 | MH-3003 | MH-3001 | Circular Pipe | 4,810.173 | 0.149 | 0.190 | Free Surface | 1.273 | 5.311 | 3.455 | 0.102 |
| 147 | P-3004 | MH-3005 | MH-3003 | Circular Pipe | 4,302.140 | 0.151 | 0.190 | Free Surface | 1.102 | 6.550 | 4.594 | 0.083 |
| 148 | P-3006 | MH-3007 | MH-3005 | Circular Pipe | 4,263.022 | 0.151 | 0.190 | Free Surface | 1.100 | 6.559 | 4.602 | 0.083 |
| 149 | P-3008 | MH-3009 | MH-3007 | Circular Pipe | 4,258.382 | 0.153 | 0.190 | Free Surface | 1.099 | 6.569 | 4.611 | 0.083 |
| 150 | P-3010 | MH-3011 | MH-3009 | Circular Pipe | 4,253.869 | 0.153 | 0.190 | Free Surface | 1.098 | 6.577 | 4.620 | 0.083 |
| 151 | P-3012 | MH-3013 | MH-3011 | Circular Pipe | 4,266.320 | 0.145 | 0.190 | Free Surface | 1.106 | 6.509 | 4.555 | 0.084 |
| 152 | P-3014 | MH-3015 | MH-3013 | Circular Pipe | 4,282.921 | 0.086 | 0.190 | Free Surface | 1.202 | 5.758 | 3.856 | 0.094 |
| 153 | P-3016 | MH-3017 | MH-3015 | Circular Pipe | 3,851.646 | 0.026 | 0.078 | Free Surface | 1.192 | 2.409 | 1.620 | 0.093 |
| 154 | P-3018 | MH-3019 | MH-3017 | Circular Pipe | 3,837.011 | 0.017 | 0.078 | Free Surface | 1.165 | 2.491 | 1.696 | 0.090 |
| 155 | P-3020 | MH-3021 | MH-3019 | Circular Pipe | 3,858.522 | 0.019 | 0.078 | Free Surface | 1.209 | 2.359 | 1.576 | 0.095 |
| 156 | P-3022 | MH-3023 | MH-3021 | Circular Pipe | 3,959.500 | 0.019 | 0.078 | Free Surface | 1.180 | 2.442 | 1.652 | 0.092 |
| 157 | P-3024 | MH-3025 | MH-3023 | Circular Pipe | 3,622.773 | 0.033 | 0.055 | Free Surface | 1.024 | 2.094 | 1.524 | 0.075 |
| 158 | P-3026 | MH-3027 | MH-3025 | Circular Pipe | 4,013.530 | 0.060 | 0.021 | Free Surface | 0.674 | 1.485 | 1.338 | 0.041 |
| 159 | P-3028 | MH-3029 | MH-3027 | Circular Pipe | 3,759.196 | 0.007 | 0.020 | Free Surface | 0.671 | 1.430 | 1.292 | 0.040 |
| 160 | P-3030 | MH-3031 | MH-3029 | Circular Pipe | 3,336.983 | 0.015 | 0.016 | Free Surface | 0.720 | 1.005 | 0.875 | 0.045 |
| 161 | P-3032 | MH-3033 | MH-3031 | Circular Pipe | 3,801.978 | 0.013 | 0.008 | Free Surface | 0.506 | 0.845 | 0.880 | 0.027 |
| 162 | P-3034 | MH-3035 | MH-3033 | Circular Pipe | 3,934.027 | 0.015 | 0.004 | Free Surface | 0.371 | 0.691 | 0.837 | 0.017 |
| 163 | P-3036 | MH-3037 | MH-3035 | Circular Pipe | 3,815.541 | 0.033 | 0.003 | Free Surface | 0.256 | 0.746 | 1.095 | 0.010 |
| 164 | P-3038 | MH-3039 | MH-3037 | Circular Pipe | 3,599.458 | 0.060 | 0.001 | Free Surface | 0.166 | 0.720 | 1.324 | 0.005 |
| 165 | P-3039 | MH-3040 | MH-3025 | Circular Pipe | 4,593.895 | 0.004 | 0.031 | Free Surface | 0.930 | 1.356 | 1.036 | 0.065 |
| 166 | P-3041 | MH-3041 | MH-3040 | Circular Pipe | 4,265.159 | 0.004 | 0.028 | Free Surface | 0.959 | 1.180 | 0.889 | 0.068 |
| 167 | P-3042 | MH-3043 | MH-3041 | Circular Pipe | 3,332.869 | 0.010 | 0.025 | Free Surface | 0.864 | 1.231 | 0.976 | 0.058 |
| 168 | P-3043 | MH-3181 | MH-3169 | Circular Pipe | 3,423.517 | 0.058 | 0.003 | Free Surface | 0.325 | 0.718 | 0.936 | 0.014 |
| 169 | P-3044 | MH-3045 | MH-3043 | Circular Pipe | 3,319.425 | 0.010 | 0.022 | Free Surface | 0.775 | 1.265 | 1.062 | 0.050 |
| 170 | P-3046 | MH-3047 | MH-3045 | Circular Pipe | 3,344.444 | 0.010 | 0.019 | Free Surface | 0.720 | 1.205 | 1.048 | 0.045 |
| 171 | P-3048 | MH-3049 | MH-3047 | Circular Pipe | 465.959 | 0.010 | 0.017 | Free Surface | 0.679 | 1.207 | 1.083 | 0.041 |
| 172 | P-3050 | MH-3051 | MH-3049 | Circular Pipe | 3,582.188 | 0.010 | 0.015 | Free Surface | 0.650 | 1.148 | 1.056 | 0.038 |
| 173 | P-3052 | MH-3053 | MH-3051 | Circular Pipe | 3,950.608 | 0.020 | 0.012 | Free Surface | 0.559 | 1.136 | 1.123 | 0.031 |
| 174 | P-3054 | MH-3055 | MH-3053 | Circular Pipe | 4,020.966 | 0.020 | 0.010 | Free Surface | 0.459 | 1.249 | 1.366 | 0.023 |
| 175 | P-3056 | MH-3057 | MH-3055 | Circular Pipe | 4,022.024 | 0.007 | 0.008 | Free Surface | 0.475 | 0.934 | 1.007 | 0.024 |
| 176 | P-3058 | MH-3059 | MH-3057 | Circular Pipe | 4,020.103 | 0.008 | 0.005 | Free Surface | 0.449 | 0.644 | 0.712 | 0.022 |
| 177 | P-3060 | MH-3061 | MH-3059 | Circular Pipe | 4,005.891 | 0.012 | 0.001 | Free Surface | 0.288 | 0.313 | 0.434 | 0.011 |
| 178 | P-3062 | MH-3169 | MH-3167 | Circular Pipe | 3,742.358 | 0.034 | 0.012 | Free Surface | 0.395 | 1.888 | 2.214 | 0.019 |
| 179 | P-3064 | MH-3065 | MH-3047 | Circular Pipe | 3,636.222 | 0.011 | 0.001 | Free Surface | 0.432 | 0.127 | 0.143 | 0.021 |
| 180 | P-3066 | MH-3067 | MH-3049 | Circular Pipe | 2,914.904 | 0.009 | 0.001 | Free Surface | 0.432 | 0.170 | 0.191 | 0.021 |
| 181 | P-3068 | MH-3069 | MH-3067 | Circular Pipe | 3,053.634 | 0.010 | 0.001 | Free Surface | 0.171 | 0.345 | 0.625 | 0.005 |
| 182 | P-3070 | MH-3071 | MH-3069 | Circular Pipe | 1,873.783 | 0.013 | 0.001 | Free Surface | 0.137 | 0.475 | 0.941 | 0.004 |
| 183 | P-3072 | MH-3073 | MH-3051 | Circular Pipe | 2,995.463 | 0.016 | 0.001 | Free Surface | 0.396 | 0.144 | 0.169 | 0.019 |
| 184 | P-3074 | MH-3075 | MH-3031 | Circular Pipe | 4,552.714 | 0.062 | 0.005 | Free Surface | 0.408 | 0.694 | 0.801 | 0.019 |
| 185 | P-3076 | MH-3077 | MH-3075 | Circular Pipe | 4,678.094 | 0.032 | 0.002 | Free Surface | 0.216 | 0.843 | 1.350 | 0.007 |
| 186 | P-3078 | MH-3079 | MH-3077 | Circular Pipe | 4,678.850 | 0.011 | 0.001 | Free Surface | 0.167 | 0.356 | 0.653 | 0.005 |
| 187 | P-3080 | MH-3081 | MH-3029 | Circular Pipe | 4,396.182 | 0.017 | 0.002 | Free Surface | 0.542 | 0.213 | 0.214 | 0.029 |
| 188 | P-3082 | MH-3083 | MH-3081 | Circular Pipe | 4,573.338 | 0.020 | 0.001 | Free Surface | 0.184 | 0.458 | 0.795 | 0.006 |
| 189 | P-3084 | MH-3085 | MH-1123 | Circular Pipe | 3,997.534 | 0.011 | 0.210 | Free Surface | 2.588 | 2.151 | 0.957 | 0.280 |
| 190 | P-3086 | MH-3087 | MH-3085 | Circular Pipe | 4,797.818 | 0.066 | 0.210 | Free Surface | 1.803 | 3.567 | 1.932 | 0.169 |
| 191 | P-3088 | MH-3089 | MH-3087 | Circular Pipe | 4,796.287 | 0.038 | 0.210 | Free Surface | 1.536 | 4.484 | 2.644 | 0.134 |
| 192 | P-3090 | MH-3091 | MH-3089 | Circular Pipe | 4,801.798 | 0.046 | 0.210 | Free Surface | 1.602 | 4.223 | 2.437 | 0.143 |
| 193 | P-3092 | MH-3093 | MH-3091 | Circular Pipe | 4,803.001 | 0.120 | 0.210 | Free Surface | 1.380 | 5.229 | 3.261 | 0.115 |
| 194 | P-3094 | MH-3095 | MH-3093 | Circular Pipe | 4,839.420 | 0.144 | 0.210 | Free Surface | 1.192 | 6.455 | 4.342 | 0.093 |
| 195 | P-3096 | MH-3097 | MH-3095 | Circular Pipe | 4,808.041 | 0.145 | 0.210 | Free Surface | 1.166 | 6.668 | 4.538 | 0.090 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 196 | P-3098 | MH-3099 | MH-3097 | Circular Pipe | 4,805.507 | 0.143 | 0.210 | Free Surface | 1.169 | 6.641 | 4.514 | 0.091 |
| 197 | P-3100 | MH-3101 | MH-3099 | Circular Pipe | 3,406.232 | 0.104 | 0.106 | Free Surface | 1.038 | 3.969 | 2.867 | 0.076 |
| 198 | P-3102 | MH-3103 | MH-3101 | Circular Pipe | 3,388.607 | 0.054 | 0.106 | Free Surface | 1.002 | 4.183 | 3.078 | 0.072 |
| 199 | P-3104 | MH-3105 | MH-3103 | Circular Pipe | 3,412.154 | 0.013 | 0.106 | Free Surface | 1.348 | 2.720 | 1.716 | 0.111 |
| 200 | P-3106 | MH-3107 | MH-3105 | Circular Pipe | 3,902.405 | 0.011 | 0.106 | Free Surface | 1.573 | 2.179 | 1.269 | 0.139 |
| 201 | P-3108 | MH-3109 | MH-3107 | Circular Pipe | 3,919.010 | 0.010 | 0.106 | Free Surface | 1.585 | 2.157 | 1.251 | 0.140 |
| 202 | P-3110 | MH-3111 | MH-3109 | Circular Pipe | 4,022.469 | 0.004 | 0.106 | Free Surface | 1.859 | 1.717 | 0.915 | 0.176 |
| 203 | P-3114 | MH-3115 | MH-3099 | Circular Pipe | 822.810 | 0.098 | 0.104 | Free Surface | 0.913 | 4.725 | 3.645 | 0.063 |
| 204 | P-3116 | MH-3117 | MH-3115 | Circular Pipe | 983.819 | 0.037 | 0.104 | Free Surface | 1.071 | 3.749 | 2.666 | 0.080 |
| 205 | P-3118 | MH-3119 | MH-3117 | Circular Pipe | 3,924.346 | 0.024 | 0.104 | Free Surface | 1.265 | 2.946 | 1.923 | 0.102 |
| 206 | P-3120 | MH-3121 | MH-3119 | Circular Pipe | 623.951 | 0.006 | 0.088 | Free Surface | 1.531 | 1.887 | 1.115 | 0.134 |
| 207 | P-3122 | MH-3123 | MH-3121 | Circular Pipe | 3,327.913 | 0.017 | 0.051 | Free Surface | 1.372 | 1.272 | 0.795 | 0.114 |
| 208 | P-3124 | MH-3125 | MH-3123 | Circular Pipe | 2,635.708 | 0.017 | 0.048 | Free Surface | 0.970 | 1.999 | 1.497 | 0.069 |
| 209 | P-3126 | MH-3127 | MH-3125 | Circular Pipe | 2,708.567 | 0.026 | 0.029 | Free Surface | 0.817 | 1.533 | 1.253 | 0.054 |
| 210 | P-3128 | MH-3129 | MH-3127 | Circular Pipe | 2,684.601 | 0.031 | 0.027 | Free Surface | 0.655 | 2.009 | 1.839 | 0.039 |
| 211 | P-3130 | MH-3131 | MH-3129 | Circular Pipe | 231.534 | 0.005 | 0.024 | Free Surface | 0.806 | 1.326 | 1.092 | 0.053 |
| 212 | P-3132 | MH-3133 | MH-3131 | Circular Pipe | 234.230 | 0.005 | 0.024 | Free Surface | 0.950 | 1.041 | 0.788 | 0.067 |
| 213 | P-3134 | MH-3135 | MH-3133 | Circular Pipe | 3,432.448 | 0.022 | 0.022 | Free Surface | 0.768 | 1.256 | 1.059 | 0.049 |
| 214 | P-3136 | MH-3137 | MH-3135 | Circular Pipe | 3,730.340 | 0.038 | 0.019 | Free Surface | 0.561 | 1.756 | 1.733 | 0.031 |
| 215 | P-3138 | MH-3139 | MH-3137 | Circular Pipe | 2,795.471 | 0.038 | 0.002 | Free Surface | 0.335 | 0.311 | 0.399 | 0.014 |
| 216 | P-3140 | MH-3141 | MH-3139 | Circular Pipe | 718.372 | 0.054 | 0.002 | Free Surface | 0.154 | 1.009 | 1.920 | 0.004 |
| 217 | P-3142 | MH-3143 | MH-3141 | Circular Pipe | 3,434.557 | 0.038 | 0.002 | Free Surface | 0.155 | 0.996 | 1.890 | 0.005 |
| 218 | P-3144 | MH-3145 | MH-3143 | Circular Pipe | 2,514.291 | 0.026 | 0.002 | Free Surface | 0.170 | 0.864 | 1.567 | 0.005 |
| 219 | P-3148 | MH-3149 | MH-3135 | Circular Pipe | 4,020.005 | 0.062 | 0.002 | Free Surface | 0.377 | 0.259 | 0.311 | 0.017 |
| 220 | P-3150 | MH-3151 | MH-3149 | Circular Pipe | 3,996.325 | 0.061 | 0.001 | Free Surface | 0.125 | 0.803 | 1.632 | 0.003 |
| 221 | P-3152 | MH-3153 | MH-3133 | Circular Pipe | 3,266.073 | 0.070 | 0.003 | Free Surface | 0.547 | 0.240 | 0.240 | 0.030 |
| 222 | P-3154 | MH-3155 | MH-3153 | Circular Pipe | 3,264.845 | 0.065 | 0.002 | Free Surface | 0.156 | 0.986 | 1.866 | 0.005 |
| 223 | P-3156 | MH-3157 | MH-3155 | Circular Pipe | 3,199.647 | 0.062 | 0.001 | Free Surface | 0.124 | 0.814 | 1.659 | 0.003 |
| 224 | P-3158 | MH-3159 | MH-3129 | Circular Pipe | 3,486.074 | 0.058 | 0.002 | Free Surface | 0.401 | 0.331 | 0.385 | 0.019 |
| 225 | P-3160 | MH-3161 | MH-3159 | Circular Pipe | 3,396.083 | 0.073 | 0.002 | Free Surface | 0.153 | 1.018 | 1.943 | 0.004 |
| 226 | P-3162 | MH-3163 | MH-3161 | Circular Pipe | 3,446.789 | 0.087 | 0.001 | Free Surface | 0.118 | 0.000 | 0.000 | 0.003 |
| 227 | P-3164 | MH-3165 | MH-3125 | Circular Pipe | 3,731.561 | 0.077 | 0.018 | Free Surface | 0.685 | 1.212 | 1.083 | 0.042 |
| 228 | P-3166 | MH-3167 | MH-3165 | Circular Pipe | 3,722.569 | 0.121 | 0.015 | Free Surface | 0.381 | 2.452 | 2.930 | 0.018 |
| 229 | P-3170 | MH-3171 | MH-3169 | Circular Pipe | 3,248.706 | 0.009 | 0.007 | Free Surface | 0.442 | 0.908 | 1.010 | 0.022 |
| 230 | P-3172 | MH-3173 | MH-3171 | Circular Pipe | 4,030.843 | 0.009 | 0.001 | Free Surface | 0.322 | 0.266 | 0.349 | 0.014 |
| 231 | P-3174 | MH-3175 | MH-3171 | Circular Pipe | 3,557.144 | 0.030 | 0.004 | Free Surface | 0.347 | 0.707 | 0.888 | 0.015 |
| 232 | P-3176 | MH-3177 | MH-3175 | Circular Pipe | 3,512.055 | 0.066 | 0.002 | Free Surface | 0.203 | 0.791 | 1.305 | 0.007 |
| 233 | P-3178 | MH-3179 | MH-3177 | Circular Pipe | 2,969.586 | 0.016 | 0.001 | Free Surface | 0.139 | 0.465 | 0.916 | 0.004 |
| 234 | P-3182 | MH-3183 | MH-3181 | Circular Pipe | 3,361.681 | 0.064 | 0.002 | Free Surface | 0.181 | 0.941 | 1.649 | 0.006 |
| 235 | P-3184 | MH-3185 | MH-3183 | Circular Pipe | 2,243.554 | 0.010 | 0.001 | Free Surface | 0.165 | 0.547 | 1.012 | 0.005 |
| 236 | P-3186 | MH-3187 | MH-3121 | Circular Pipe | 3,720.279 | 0.078 | 0.036 | Free Surface | 1.171 | 1.138 | 0.773 | 0.091 |
| 237 | P-3188 | MH-3189 | MH-3187 | Circular Pipe | 3,718.522 | 0.078 | 0.020 | Free Surface | 0.514 | 2.152 | 2.224 | 0.027 |
| 238 | P-3190 | MH-3191 | MH-3189 | Circular Pipe | 3,725.820 | 0.078 | 0.008 | Free Surface | 0.362 | 1.322 | 1.622 | 0.016 |
| 239 | P-3192 | MH-3193 | MH-3191 | Circular Pipe | 4,652.213 | 0.010 | 0.004 | Free Surface | 0.309 | 0.847 | 1.135 | 0.013 |
| 240 | P-3194 | MH-3195 | MH-3193 | Circular Pipe | 4,519.741 | 0.010 | 0.001 | Free Surface | 0.267 | 0.349 | 0.502 | 0.010 |
| 241 | P-3196 | MH-3197 | MH-3189 | Circular Pipe | 4,075.086 | 0.012 | 0.005 | Free Surface | 0.406 | 0.789 | 0.913 | 0.019 |
| 242 | P-3198 | MH-3199 | MH-3197 | Circular Pipe | 3,938.814 | 0.012 | 0.002 | Free Surface | 0.297 | 0.448 | 0.612 | 0.012 |
| 243 | P-3200 | MH-3201 | MH-3187 | Circular Pipe | 3,304.518 | 0.014 | 0.005 | Free Surface | 0.459 | 0.586 | 0.642 | 0.023 |
| 244 | P-3202 | MH-3203 | MH-3201 | Circular Pipe | 3,222.974 | 0.015 | 0.002 | Free Surface | 0.275 | 0.504 | 0.715 | 0.011 |
| 245 | P-3204 | MH-3205 | MH-3191 | Circular Pipe | 3,950.837 | 0.010 | 0.002 | Free Surface | 0.248 | 0.488 | 0.727 | 0.009 |
| 246 | P-3206 | MH-3207 | MH-3189 | Circular Pipe | 3,494.531 | 0.014 | 0.006 | Free Surface | 0.405 | 0.841 | 0.975 | 0.019 |
| 247 | P-3208 | MH-3209 | MH-3207 | Circular Pipe | 3,498.982 | 0.021 | 0.003 | Free Surface | 0.309 | 0.706 | 0.946 | 0.013 |
| 248 | P-3210 | MH-3211 | MH-3209 | Circular Pipe | 2,591.201 | 0.020 | 0.001 | Free Surface | 0.186 | 0.303 | 0.524 | 0.006 |
| 249 | P-3212 | MH-3213 | MH-3187 | Circular Pipe | 4,483.665 | 0.012 | 0.010 | Free Surface | 0.536 | 0.961 | 0.970 | 0.029 |
| 250 | P-3214 | MH-3215 | MH-3213 | Circular Pipe | 4,558.991 | 0.017 | 0.004 | Free Surface | 0.390 | 0.591 | 0.697 | 0.018 |
| 251 | P-3216 | MH-3217 | MH-3215 | Circular Pipe | 3,649.963 | 0.014 | 0.001 | Free Surface | 0.236 | 0.422 | 0.645 | 0.009 |
| 252 | P-3218 | MH-3219 | MH-3119 | Circular Pipe | 4,696.217 | 0.016 | 0.014 | Free Surface | 0.925 | 0.641 | 0.491 | 0.065 |
| 253 | P-3220 | MH-3221 | MH-3219 | Circular Pipe | 4,740.560 | 0.010 | 0.011 | Free Surface | 0.542 | 1.067 | 1.071 | 0.029 |
| 254 | P-3222 | MH-3223 | MH-3221 | Circular Pipe | 4,362.187 | 0.033 | 0.009 | Free Surface | 0.457 | 1.180 | 1.293 | 0.023 |
| 255 | P-3224 | MH-3225 | MH-3223 | Circular Pipe | 1,714.193 | 0.053 | 0.007 | Free Surface | 0.336 | 1.366 | 1.748 | 0.014 |
| 256 | P-3226 | MH-3227 | MH-3225 | Circular Pipe | 3,998.758 | 0.045 | 0.004 | Free Surface | 0.270 | 1.204 | 1.722 | 0.010 |
| 257 | P-3228 | MH-3229 | MH-3227 | Circular Pipe | 4,013.057 | 0.065 | 0.003 | Free Surface | 0.220 | 1.167 | 1.848 | 0.008 |
| 258 | P-3230 | MH-3231 | MH-3229 | Circular Pipe | 4,044.897 | 0.020 | 0.002 | Free Surface | 0.190 | 0.732 | 1.251 | 0.006 |
| 259 | P-3232 | MH-3233 | MH-3223 | Circular Pipe | 4,156.778 | 0.042 | 0.002 | Free Surface | 0.267 | 0.439 | 0.631 | 0.010 |
| 260 | P-3234 | MH-3235 | MH-3233 | Circular Pipe | 3,504.348 | 0.026 | 0.000 | Free Surface | 0.116 | 0.000 | 0.000 | 0.003 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 261 | P-3236 | MH-3237 | MH-3225 | Circular Pipe | 4,467.868 | 0.009 | 0.002 | Free Surface | 0.260 | 0.457 | 0.667 | 0.010 |
| 262 | P-3238 | MH-3239 | MH-3237 | Circular Pipe | 3,820.343 | 0.036 | 0.001 | Free Surface | 0.163 | 0.372 | 0.691 | 0.005 |
| 263 | P-4000 | MH-4001 | MH-3015 | Circular Pipe | 3,026.455 | 0.011 | 0.111 | Free Surface | 1.482 | 2.500 | 1.502 | 0.128 |
| 264 | P-4002 | MH-4003 | MH-4001 | Circular Pipe | 1,149.662 | 0.004 | 0.111 | Free Surface | 1.905 | 1.748 | 0.919 | 0.183 |
| 265 | P-4004 | MH-4005 | MH-4003 | Circular Pipe | 1,668.033 | 0.014 | 0.111 | Free Surface | 1.819 | 1.866 | 1.006 | 0.171 |
| 266 | P-4006 | MH-4007 | MH-4005 | Circular Pipe | 5,660.370 | 0.007 | 0.065 | Free Surface | 1.447 | 1.508 | 0.918 | 0.123 |
| 267 | P-4008 | MH-4009 | MH-4007 | Circular Pipe | 3,851.547 | 0.012 | 0.063 | Free Surface | 1.298 | 1.720 | 1.107 | 0.105 |
| 268 | P-4010 | MH-4011 | MH-4009 | Circular Pipe | 3,862.278 | 0.014 | 0.061 | Free Surface | 1.162 | 1.949 | 1.329 | 0.090 |
| 269 | P-4012 | MH-4013 | MH-4011 | Circular Pipe | 2,655.339 | 0.007 | 0.031 | Free Surface | 1.036 | 1.158 | 0.837 | 0.076 |
| 270 | P-4014 | MH-4015 | MH-4013 | Circular Pipe | 2,560.334 | 0.013 | 0.026 | Free Surface | 0.858 | 1.307 | 1.041 | 0.058 |
| 271 | P-4016 | MH-4017 | MH-4015 | Circular Pipe | 4,530.261 | 0.083 | 0.024 | Free Surface | 0.619 | 1.915 | 1.804 | 0.036 |
| 272 | P-4018 | MH-4019 | MH-4017 | Circular Pipe | 4,524.491 | 0.096 | 0.021 | Free Surface | 0.451 | 2.687 | 2.963 | 0.022 |
| 273 | P-4020 | MH-4021 | MH-4019 | Circular Pipe | 4,501.801 | 0.019 | 0.018 | Free Surface | 0.528 | 1.838 | 1.871 | 0.028 |
| 274 | P-4022 | MH-4023 | MH-4021 | Circular Pipe | 4,389.379 | 0.011 | 0.015 | Free Surface | 0.626 | 1.216 | 1.139 | 0.036 |
| 275 | P-4024 | MH-4025 | MH-4023 | Circular Pipe | 2,549.973 | 0.010 | 0.010 | Free Surface | 0.571 | 0.931 | 0.911 | 0.032 |
| 276 | P-4026 | MH-4027 | MH-4025 | Circular Pipe | 2,416.870 | 0.009 | 0.006 | Free Surface | 0.469 | 0.759 | 0.822 | 0.024 |
| 277 | P-4028 | MH-4029 | MH-4027 | Circular Pipe | 2,646.895 | 0.009 | 0.002 | Free Surface | 0.339 | 0.427 | 0.544 | 0.015 |
| 278 | P-4030 | MH-4031 | MH-4029 | Circular Pipe | 2,809.831 | 0.017 | 0.001 | Free Surface | 0.206 | 0.388 | 0.636 | 0.007 |
| 279 | P-4032 | MH-4033 | MH-4027 | Circular Pipe | 3,727.102 | 0.013 | 0.002 | Free Surface | 0.321 | 0.401 | 0.528 | 0.013 |
| 280 | P-4034 | MH-4035 | MH-4025 | Circular Pipe | 4,095.144 | 0.011 | 0.002 | Free Surface | 0.376 | 0.313 | 0.376 | 0.017 |
| 281 | P-4036 | MH-4037 | MH-4023 | Circular Pipe | 4,744.984 | 0.010 | 0.002 | Free Surface | 0.431 | 0.256 | 0.288 | 0.021 |
| 282 | P-4038 | MH-4039 | MH-4013 | Circular Pipe | 3,723.872 | 0.058 | 0.004 | Free Surface | 0.583 | 0.329 | 0.318 | 0.033 |
| 283 | P-4040 | MH-4041 | MH-4039 | Circular Pipe | 3,735.574 | 0.085 | 0.003 | Free Surface | 0.191 | 1.158 | 1.974 | 0.006 |
| 284 | P-4042 | MH-4043 | MH-4041 | Circular Pipe | 3,861.442 | 0.079 | 0.001 | Free Surface | 0.134 | 0.737 | 1.470 | 0.004 |
| 285 | P-4044 | MH-4045 | MH-4015 | Circular Pipe | 2,127.239 | 0.005 | 0.001 | Free Surface | 0.497 | 0.139 | 0.147 | 0.026 |
| 286 | P-4046 | MH-4047 | MH-4005 | Circular Pipe | 2,854.488 | 0.017 | 0.044 | Free Surface | 1.207 | 1.325 | 0.885 | 0.095 |
| 287 | P-4048 | MH-4049 | MH-4047 | Circular Pipe | 1,954.938 | 0.014 | 0.004 | Free Surface | 0.619 | 0.352 | 0.332 | 0.036 |
| 288 | P-4050 | MH-4051 | MH-4049 | Circular Pipe | 4,798.313 | 0.012 | 0.001 | Free Surface | 0.257 | 0.371 | 0.545 | 0.010 |
| 289 | P-4052 | MH-4053 | MH-4047 | Circular Pipe | 2,811.950 | 0.006 | 0.038 | Free Surface | 1.043 | 1.428 | 1.029 | 0.077 |
| 290 | P-4054 | MH-4055 | MH-4053 | Circular Pipe | 2,644.635 | 0.016 | 0.016 | Free Surface | 0.875 | 0.786 | 0.619 | 0.060 |
| 291 | P-4056 | MH-4057 | MH-4055 | Circular Pipe | 9,365.784 | 0.005 | 0.007 | Free Surface | 0.548 | 0.690 | 0.690 | 0.030 |
| 292 | P-4058 | MH-4059 | MH-4057 | Circular Pipe | 4,801.932 | 0.009 | 0.002 | Free Surface | 0.388 | 0.348 | 0.411 | 0.018 |
| 293 | P-4060 | MH-4061 | MH-4055 | Circular Pipe | 4,218.920 | 0.010 | 0.005 | Free Surface | 0.470 | 0.568 | 0.615 | 0.024 |
| 294 | P-4062 | MH-4063 | MH-4061 | Circular Pipe | 4,169.327 | 0.010 | 0.002 | Free Surface | 0.289 | 0.390 | 0.540 | 0.012 |
| 295 | P-4064 | MH-4065 | MH-4053 | Circular Pipe | 4,608.513 | 0.005 | 0.013 | Free Surface | 0.924 | 0.586 | 0.449 | 0.064 |
| 296 | P-4066 | MH-4067 | MH-4065 | Circular Pipe | 3,958.541 | 0.005 | 0.009 | Free Surface | 0.627 | 0.693 | 0.649 | 0.036 |
| 297 | P-4068 | MH-4069 | MH-4067 | Circular Pipe | 3,933.520 | 0.006 | 0.005 | Free Surface | 0.500 | 0.586 | 0.615 | 0.026 |
| 298 | P-4070 | MH-4071 | MH-4069 | Circular Pipe | 3,325.800 | 0.009 | 0.002 | Free Surface | 0.333 | 0.376 | 0.484 | 0.014 |
| 299 | P-4074 | MH-4075 | MH-4081 | Circular Pipe | 412.028 | 0.029 | 0.003 | Free Surface | 0.265 | 0.975 | 1.409 | 0.010 |
| 300 | P-4076 | MH-4077 | MH-4075 | Circular Pipe | 3,230.661 | 0.010 | 0.003 | Free Surface | 0.258 | 0.735 | 1.075 | 0.010 |
| 301 | P-4078 | MH-4079 | MH-4077 | Circular Pipe | 3,247.702 | 0.011 | 0.001 | Free Surface | 0.220 | 0.350 | 0.553 | 0.008 |
| 302 | P-4080 | MH-4081 | MH-4053 | Circular Pipe | 522.608 | 0.060 | 0.007 | Free Surface | 0.728 | 0.435 | 0.376 | 0.045 |
| 303 | P-4082 | MH-4083 | MH-4081 | Circular Pipe | 3,598.992 | 0.011 | 0.002 | Free Surface | 0.267 | 0.614 | 0.883 | 0.010 |
| 304 | P-4084 | MH-4085 | MH-4083 | Circular Pipe | 3,190.287 | 0.004 | 0.001 | Free Surface | 0.229 | 0.330 | 0.511 | 0.008 |
| 305 | P-4086 | MH-4087 | MH-3023 | Circular Pipe | 4,091.843 | 0.044 | 0.024 | Free Surface | 0.863 | 1.162 | 0.923 | 0.058 |
| 306 | P-4088 | MH-4089 | MH-4087 | Circular Pipe | 4,119.049 | 0.067 | 0.024 | Free Surface | 0.521 | 2.442 | 2.505 | 0.028 |
| 307 | P-4090 | MH-4091 | MH-4141 | Circular Pipe | 510.638 | 0.007 | 0.042 | Free Surface | 1.060 | 1.539 | 1.099 | 0.079 |
| 308 | P-4100 | MH-4103 | MH-4091 | Circular Pipe | 3,105.897 | 0.015 | 0.015 | Free Surface | 0.859 | 0.753 | 0.599 | 0.058 |
| 309 | P-4102 | MH-4105 | MH-4103 | Circular Pipe | 2,423.200 | 0.010 | 0.004 | Free Surface | 0.455 | 0.515 | 0.566 | 0.023 |
| 310 | P-4104 | MH-4107 | MH-4105 | Circular Pipe | 2,975.012 | 0.025 | 0.003 | Free Surface | 0.295 | 0.833 | 1.143 | 0.012 |
| 311 | P-4106 | MH-4109 | MH-4107 | Circular Pipe | 3,147.047 | 0.005 | 0.002 | Free Surface | 0.293 | 0.536 | 0.737 | 0.012 |
| 312 | P-4108 | MH-4111 | MH-4109 | Circular Pipe | 3,945.430 | 0.014 | 0.001 | Free Surface | 0.246 | 0.297 | 0.445 | 0.009 |
| 313 | P-4110 | MH-4113 | MH-4109 | Circular Pipe | 944.461 | 0.005 | 0.000 | Free Surface | 0.225 | 0.113 | 0.178 | 0.008 |
| 314 | P-4112 | MH-4115 | MH-4091 | Circular Pipe | 3,399.965 | 0.018 | 0.027 | Free Surface | 0.933 | 1.185 | 0.905 | 0.065 |
| 315 | P-4114 | MH-4117 | MH-4115 | Circular Pipe | 3,412.456 | 0.012 | 0.016 | Free Surface | 0.668 | 1.137 | 1.029 | 0.040 |
| 316 | P-4116 | MH-4119 | MH-4117 | Circular Pipe | 3,418.886 | 0.015 | 0.005 | Free Surface | 0.471 | 0.566 | 0.612 | 0.024 |
| 317 | P-4118 | MH-4121 | MH-4119 | Circular Pipe | 4,158.378 | 0.008 | 0.004 | Free Surface | 0.343 | 0.782 | 0.989 | 0.015 |
| 318 | P-4120 | MH-4123 | MH-4121 | Circular Pipe | 2,433.696 | 0.011 | 0.003 | Free Surface | 0.333 | 0.692 | 0.891 | 0.014 |
| 319 | P-4122 | MH-4125 | MH-4123 | Circular Pipe | 1,869.496 | 0.012 | 0.003 | Free Surface | 0.292 | 0.691 | 0.952 | 0.012 |
| 320 | P-4124 | MH-4127 | MH-4125 | Circular Pipe | 4,270.179 | 0.010 | 0.002 | Free Surface | 0.257 | 0.558 | 0.818 | 0.010 |
| 321 | P-4126 | MH-4129 | MH-4127 | Circular Pipe | 4,248.759 | 0.010 | 0.001 | Free Surface | 0.189 | 0.294 | 0.504 | 0.006 |
| 322 | P-4128 | MH-4131 | MH-3111 | Circular Pipe | 4,052.056 | 0.015 | 0.106 | Free Surface | 1.771 | 1.840 | 1.006 | 0.165 |
| 323 | P-4130 | MH-4133 | MH-4131 | Circular Pipe | 4,141.076 | 0.013 | 0.106 | Free Surface | 1.482 | 2.372 | 1.425 | 0.128 |
| 324 | P-4132 | MH-4135 | MH-4133 | Circular Pipe | 4,038.356 | 0.013 | 0.069 | Free Surface | 1.367 | 1.734 | 1.087 | 0.114 |
| 325 | P-4134 | MH-4137 | MH-3145 | Circular Pipe | 4,855.662 | 0.010 | 0.002 | Free Surface | 0.202 | 0.665 | 1.100 | 0.007 |

| | | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 326 | | P-4136 | MH-4139 | MH-4137 | Circular Pipe | 3,780.007 | 0.010 | 0.001 | Free Surface | 0.185 | 0.304 | 0.528 | 0.006 |
| 327 | | P-4138 | MH-4141 | MH-4135 | Circular Pipe | 1,867.686 | 0.013 | 0.044 | Free Surface | 1.095 | 1.547 | 1.088 | 0.082 |
| 328 | | P-4140 | MH-4143 | MH-4141 | Circular Pipe | 3,498.543 | 0.020 | 0.002 | Free Surface | 0.596 | 0.186 | 0.178 | 0.034 |
| 329 | | P-4142 | MH-4145 | MH-4143 | Circular Pipe | 3,508.277 | 0.014 | 0.002 | Free Surface | 0.227 | 0.778 | 1.212 | 0.008 |
| 330 | | P-4144 | MH-4147 | MH-4145 | Circular Pipe | 3,506.879 | 0.017 | 0.002 | Free Surface | 0.232 | 0.757 | 1.167 | 0.008 |
| 331 | | P-4146 | MH-4149 | MH-4147 | Circular Pipe | 3,727.496 | 0.010 | 0.002 | Free Surface | 0.221 | 0.580 | 0.916 | 0.008 |
| 332 | | P-4148 | MH-4151 | MH-4149 | Circular Pipe | 2,720.026 | 0.014 | 0.001 | Free Surface | 0.173 | 0.336 | 0.604 | 0.005 |
| 333 | | P-4150 | MH-4153 | MH-3165 | Circular Pipe | 3,307.709 | 0.021 | 0.002 | Free Surface | 0.307 | 0.428 | 0.576 | 0.013 |
| 334 | | P-4152 | MH-4155 | MH-3167 | Circular Pipe | 4,226.946 | 0.011 | 0.002 | Free Surface | 0.280 | 0.408 | 0.572 | 0.011 |

# APPENDIX B – PIPE OUTPUT REPORT - PDWF

Pipe Output Report - PDWF

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BYPASS-01 | PDMWD-3010 | PDMWD-3012 | Circular Pipe | 3,199.193 | 0.013 | 0.000 | Free Surface | 0.006 | 0.000 | 0.000 | 0.000 |
| 2 | BYPASS-02 | PDMWD-3012 | PDMWD-3014 | Circular Pipe | 1,535.947 | 0.007 | 0.000 | Free Surface | 0.006 | 0.000 | 0.000 | 0.000 |
| 3 | BYPASS-03 | PDMWD-3014 | PDMWD-3015 | Circular Pipe | 2,605.561 | 0.014 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 4 | BYPASS-04 | PDMWD-3015 | METRO | Circular Pipe | 2,958.546 | 0.014 | 0.000 | Free Surface | 0.001 | 0.000 | 0.000 | 0.000 |
| 5 | P-1000A | MH-1001 | MH-1001B | Circular Pipe | 2,307.298 | 0.169 | 1.829 | Free Surface | 3.113 | 9.927 | 4.103 | 0.150 |
| 6 | P-1000C | MH-1001A | PDMWD-3010 | Circular Pipe | 1,543.081 | 0.016 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 7 | P-1001D | MH-1001C | WRF-HW | Circular Pipe | 3,530.122 | 0.024 | 1.827 | Backwater | 12.000 | 2.327 | 0.000 | 1.000 |
| 8 | P-1002 | MH-1005 | MH-1001 | Circular Pipe | 1,153.425 | 0.166 | 1.829 | Free Surface | 2.682 | 12.297 | 5.499 | 0.121 |
| 9 | P-1004 | MH-1005 | MH-1003 | Circular Pipe | 4,316.247 | 0.019 | -0.447 | Free Surface | 2.645 | 3.868 | 1.720 | 0.212 |
| 10 | P-1006 | MH-1007 | MH-1005 | Circular Pipe | 3,167.307 | 0.004 | 0.884 | Free Surface | 3.947 | 3.429 | 1.248 | 0.210 |
| 11 | P-1008 | MH-1009 | MH-1007 | Circular Pipe | 2,024.421 | 0.004 | 0.885 | Free Surface | 4.947 | 2.507 | 0.806 | 0.288 |
| 12 | P-1010 | MH-1011 | MH-1009 | Circular Pipe | 4,123.015 | 0.010 | 0.789 | Free Surface | 4.244 | 3.174 | 1.097 | 0.316 |
| 13 | P-1012 | MH-1013 | MH-1011 | Circular Pipe | 3,948.728 | 0.012 | 0.789 | Free Surface | 3.708 | 3.822 | 1.425 | 0.263 |
| 14 | P-1014 | MH-1015 | MH-1013 | Circular Pipe | 3,897.978 | 0.021 | 0.790 | Free Surface | 3.513 | 4.616 | 1.754 | 0.314 |
| 15 | P-1016 | MH-1017 | MH-1015 | Circular Pipe | 4,810.104 | 0.025 | 0.643 | Free Surface | 3.160 | 4.347 | 1.753 | 0.271 |
| 16 | P-1018 | MH-1019 | MH-1017 | Circular Pipe | 4,756.612 | 0.010 | 0.643 | Free Surface | 3.431 | 3.884 | 1.496 | 0.304 |
| 17 | P-1020 | MH-1021 | MH-1019 | Circular Pipe | 4,794.875 | 0.024 | 0.644 | Free Surface | 3.446 | 3.863 | 1.484 | 0.305 |
| 18 | P-1022 | MH-1023 | MH-1021 | Circular Pipe | 4,803.691 | 0.027 | 0.591 | Free Surface | 2.838 | 4.636 | 1.984 | 0.234 |
| 19 | P-1024 | MH-1025 | MH-1023 | Circular Pipe | 4,806.810 | 0.024 | 0.538 | Free Surface | 2.702 | 4.519 | 1.986 | 0.218 |
| 20 | P-1026 | MH-1001B | MH-1001C | Circular Pipe | 2,514.741 | 0.053 | 1.829 | Free Surface | 9.280 | 2.294 | 0.499 | 0.650 |
| 21 | P-1027 | MH-1029 | MH-1025 | Circular Pipe | 4,793.344 | 0.025 | 0.485 | Free Surface | 2.533 | 5.106 | 2.300 | 0.272 |
| 22 | P-1028 | MH-1001C | MH-1001A | Circular Pipe | 3,561.377 | 0.034 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 23 | P-1030 | MH-1031 | MH-1029 | Circular Pipe | 4,801.622 | 0.038 | 0.432 | Free Surface | 2.352 | 5.040 | 2.365 | 0.245 |
| 24 | P-1032 | MH-1033 | MH-1015 | Circular Pipe | 3,964.051 | 0.018 | 0.147 | Free Surface | 2.512 | 1.564 | 0.708 | 0.269 |
| 25 | P-1034 | MH-1035 | MH-1033 | Circular Pipe | 4,224.080 | 0.030 | 0.135 | Free Surface | 1.498 | 2.990 | 1.786 | 0.130 |
| 26 | P-1036 | MH-1037 | MH-1035 | Circular Pipe | 4,101.991 | 0.028 | 0.135 | Free Surface | 1.394 | 3.314 | 2.055 | 0.117 |
| 27 | P-1038 | MH-1039 | MH-1037 | Circular Pipe | 4,173.223 | 0.016 | 0.135 | Free Surface | 1.537 | 2.881 | 1.698 | 0.135 |
| 28 | P-1040 | MH-1041 | MH-1039 | Circular Pipe | 3,754.903 | 0.018 | 0.135 | Free Surface | 1.612 | 2.694 | 1.549 | 0.144 |
| 29 | P-1042 | MH-1043 | MH-1041 | Circular Pipe | 3,409.394 | 0.026 | 0.080 | Free Surface | 1.333 | 2.092 | 1.328 | 0.110 |
| 30 | P-1044 | MH-1045 | MH-1043 | Circular Pipe | 3,365.687 | 0.030 | 0.058 | Free Surface | 1.009 | 2.260 | 1.657 | 0.073 |
| 31 | P-1046 | MH-1047 | MH-1045 | Circular Pipe | 3,454.934 | 0.031 | 0.038 | Free Surface | 0.828 | 1.968 | 1.597 | 0.055 |
| 32 | P-1048 | MH-1049 | MH-1047 | Circular Pipe | 4,239.316 | 0.018 | 0.026 | Free Surface | 0.720 | 1.652 | 1.437 | 0.045 |
| 33 | P-1050 | MH-1051 | MH-1049 | Circular Pipe | 2,431.251 | 0.012 | 0.016 | Free Surface | 0.656 | 1.147 | 1.049 | 0.039 |
| 34 | P-1052 | MH-1053 | MH-1051 | Circular Pipe | 1,116.638 | 0.031 | 0.003 | Free Surface | 0.423 | 0.456 | 0.518 | 0.020 |
| 35 | P-1054 | MH-1055 | MH-1053 | Circular Pipe | 3,949.193 | 0.081 | 0.003 | Free Surface | 0.204 | 1.145 | 1.885 | 0.007 |
| 36 | P-1056 | MH-1057 | MH-1055 | Circular Pipe | 4,300.809 | 0.152 | 0.001 | Free Surface | 0.137 | 0.961 | 1.900 | 0.004 |
| 37 | P-1058 | MH-1059 | MH-1041 | Circular Pipe | 4,221.744 | 0.019 | 0.045 | Free Surface | 1.232 | 1.318 | 0.871 | 0.098 |
| 38 | P-1060 | MH-1061 | MH-1059 | Circular Pipe | 3,415.714 | 0.022 | 0.031 | Free Surface | 0.814 | 1.651 | 1.352 | 0.053 |
| 39 | P-1062 | MH-1063 | MH-1061 | Circular Pipe | 2,620.415 | 0.018 | 0.024 | Free Surface | 0.701 | 1.576 | 1.390 | 0.043 |
| 40 | P-1064 | MH-1065 | MH-1063 | Circular Pipe | 3,367.381 | 0.010 | 0.012 | Free Surface | 0.617 | 0.954 | 0.900 | 0.036 |
| 41 | P-1066 | MH-1067 | MH-1059 | Circular Pipe | 2,117.517 | 0.025 | 0.007 | Free Surface | 0.627 | 0.561 | 0.525 | 0.036 |
| 42 | P-1068 | MH-1069 | MH-1043 | Circular Pipe | 4,211.314 | 0.019 | 0.012 | Free Surface | 0.795 | 0.670 | 0.556 | 0.052 |
| 43 | P-1070 | MH-1071 | MH-1069 | Circular Pipe | 3,211.260 | 0.009 | 0.004 | Free Surface | 0.418 | 0.572 | 0.653 | 0.020 |
| 44 | P-1072 | MH-1073 | MH-1069 | Circular Pipe | 2,143.798 | 0.030 | 0.004 | Free Surface | 0.375 | 0.672 | 0.809 | 0.017 |
| 45 | P-1074 | MH-1075 | MH-1045 | Circular Pipe | 3,231.863 | 0.018 | 0.015 | Free Surface | 0.731 | 0.943 | 0.814 | 0.046 |
| 46 | P-1076 | MH-1077 | MH-1075 | Circular Pipe | 3,075.992 | 0.014 | 0.010 | Free Surface | 0.509 | 1.065 | 1.106 | 0.027 |
| 47 | P-1078 | MH-1079 | MH-1009 | Circular Pipe | 4,888.382 | 0.012 | 0.096 | Free Surface | 3.079 | 0.779 | 0.314 | 0.355 |
| 48 | P-1080 | MH-1081 | MH-1079 | Circular Pipe | 4,936.363 | 0.028 | 0.085 | Free Surface | 1.291 | 2.325 | 1.502 | 0.105 |
| 49 | P-1082 | MH-1083 | MH-1081 | Circular Pipe | 4,814.397 | 0.034 | 0.073 | Free Surface | 1.059 | 2.677 | 1.914 | 0.079 |
| 50 | P-1084 | MH-1085 | MH-1083 | Circular Pipe | 4,880.786 | 0.024 | 0.062 | Free Surface | 0.997 | 2.463 | 1.817 | 0.072 |
| 51 | P-1086 | MH-1087 | MH-1085 | Circular Pipe | 3,988.477 | 0.023 | 0.050 | Free Surface | 0.953 | 2.125 | 1.606 | 0.067 |
| 52 | P-1088 | MH-1089 | MH-1087 | Circular Pipe | 3,405.604 | 0.026 | 0.038 | Free Surface | 0.840 | 1.944 | 1.565 | 0.056 |
| 53 | P-1090 | MH-1091 | MH-1089 | Circular Pipe | 3,379.331 | 0.025 | 0.026 | Free Surface | 0.713 | 1.696 | 1.483 | 0.044 |
| 54 | P-1092 | MH-1093 | MH-1091 | Circular Pipe | 4,836.196 | 0.025 | 0.012 | Free Surface | 0.554 | 1.117 | 1.110 | 0.030 |
| 55 | P-1094 | MH-1095 | MH-1087 | Circular Pipe | 3,678.036 | 0.015 | 0.006 | Free Surface | 0.637 | 0.459 | 0.426 | 0.037 |
| 56 | P-1096 | MH-1097 | MH-1089 | Circular Pipe | 3,673.243 | 0.015 | 0.006 | Free Surface | 0.568 | 0.540 | 0.529 | 0.032 |
| 57 | P-1098 | MH-1099 | MH-1091 | Circular Pipe | 3,674.055 | 0.020 | 0.007 | Free Surface | 0.514 | 0.751 | 0.776 | 0.027 |
| 58 | P-1100 | MH-1101 | MH-1005 | Circular Pipe | 4,577.396 | 0.031 | 0.499 | Free Surface | 2.428 | 4.871 | 2.268 | 0.188 |
| 59 | P-1102 | MH-1103 | MH-1101 | Circular Pipe | 2,253.602 | 0.178 | 0.480 | Free Surface | 1.988 | 6.234 | 3.229 | 0.141 |
| 60 | P-1104 | MH-1105 | MH-1103 | Circular Pipe | 4,377.620 | 0.085 | 0.480 | Free Surface | 1.739 | 7.548 | 4.192 | 0.117 |
| 61 | P-1106 | MH-1107 | MH-1105 | Circular Pipe | 4,382.498 | 0.024 | 0.480 | Free Surface | 2.315 | 5.016 | 2.396 | 0.175 |
| 62 | P-1108 | MH-1109 | MH-1107 | Circular Pipe | 4,385.883 | 0.021 | 0.480 | Free Surface | 2.658 | 4.128 | 1.831 | 0.213 |
| 63 | P-1110 | MH-1111 | MH-1109 | Circular Pipe | 3,056.696 | 0.063 | 0.480 | Free Surface | 2.309 | 5.037 | 2.409 | 0.175 |
| 64 | P-1112 | MH-1113 | MH-1111 | Circular Pipe | 2,530.651 | 0.058 | 0.420 | Free Surface | 2.035 | 6.008 | 3.050 | 0.200 |
| 65 | P-1114 | MH-1115 | MH-1113 | Circular Pipe | 3,165.272 | 0.057 | 0.421 | Free Surface | 2.065 | 5.888 | 2.966 | 0.205 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66 | P-1116 | MH-1117 | MH-1115 | Circular Pipe | 4,371.695 | 0.045 | 0.421 | Free Surface | 2.142 | 5.593 | 2.762 | 0.215 |
| 67 | P-1118 | MH-1119 | MH-1117 | Circular Pipe | 4,365.331 | 0.056 | 0.421 | Free Surface | 2.148 | 5.574 | 2.748 | 0.216 |
| 68 | P-1120 | MH-1121 | MH-1119 | Circular Pipe | 4,275.693 | 0.032 | 0.421 | Free Surface | 2.273 | 5.150 | 2.462 | 0.234 |
| 69 | P-1122 | MH-1123 | MH-1121 | Circular Pipe | 3,753.480 | 0.005 | 0.421 | Free Surface | 3.437 | 2.934 | 1.109 | 0.411 |
| 70 | P-1124 | MH-1127 | MH-1125 | Circular Pipe | 4,980.228 | 0.061 | 0.025 | Free Surface | 0.732 | 1.570 | 1.356 | 0.046 |
| 71 | P-1126 | MH-1125 | MH-1111 | Circular Pipe | 2,484.867 | 0.028 | 0.060 | Free Surface | 1.472 | 1.352 | 0.815 | 0.126 |
| 72 | P-1128 | MH-1129 | MH-1127 | Circular Pipe | 4,718.688 | 0.045 | 0.019 | Free Surface | 0.505 | 2.041 | 2.130 | 0.026 |
| 73 | P-1130 | MH-1131 | MH-1129 | Circular Pipe | 4,724.661 | 0.047 | 0.013 | Free Surface | 0.443 | 1.643 | 1.826 | 0.022 |
| 74 | P-1132 | MH-1133 | MH-1131 | Circular Pipe | 4,714.063 | 0.030 | 0.006 | Free Surface | 0.360 | 1.114 | 1.372 | 0.016 |
| 75 | P-1134 | MH-1135 | MH-1133 | Circular Pipe | 878.481 | 0.004 | 0.001 | Free Surface | 0.281 | 0.325 | 0.455 | 0.011 |
| 76 | P-1136 | MH-1137 | MH-1125 | Circular Pipe | 3,870.776 | 0.075 | 0.029 | Free Surface | 0.739 | 1.819 | 1.563 | 0.046 |
| 77 | P-1138 | MH-1139 | MH-1137 | Circular Pipe | 3,735.832 | 0.067 | 0.020 | Free Surface | 0.496 | 2.233 | 2.352 | 0.026 |
| 78 | P-1140 | MH-1141 | MH-1139 | Circular Pipe | 4,435.425 | 0.042 | 0.014 | Free Surface | 0.447 | 1.865 | 2.065 | 0.022 |
| 79 | P-1142 | MH-1143 | MH-1141 | Circular Pipe | 4,432.325 | 0.037 | 0.011 | Free Surface | 0.413 | 1.543 | 1.772 | 0.020 |
| 80 | P-1144 | MH-1145 | MH-1143 | Circular Pipe | 3,597.118 | 0.053 | 0.007 | Free Surface | 0.342 | 1.328 | 1.683 | 0.015 |
| 81 | P-1146 | MH-1147 | MH-1145 | Circular Pipe | 3,584.673 | 0.033 | 0.005 | Free Surface | 0.288 | 1.254 | 1.739 | 0.011 |
| 82 | P-1148 | MH-1149 | MH-1147 | Circular Pipe | 2,805.771 | 0.056 | 0.003 | Free Surface | 0.232 | 0.863 | 1.331 | 0.008 |
| 83 | P-1150 | MH-1154 | MH-1133 | Circular Pipe | 3,302.693 | 0.087 | 0.002 | Free Surface | 0.232 | 0.646 | 0.995 | 0.008 |
| 84 | P-1152 | MH-1151 | MH-1003 | Circular Pipe | 4,423.252 | 0.015 | 0.447 | Free Surface | 2.763 | 3.638 | 1.580 | 0.225 |
| 85 | P-1154 | MH-1153 | MH-1151 | Circular Pipe | 4,422.281 | 0.004 | 0.447 | Free Surface | 3.451 | 2.675 | 1.027 | 0.306 |
| 86 | P-1156 | MH-1155 | MH-1153 | Circular Pipe | 4,198.987 | 0.004 | 0.447 | Free Surface | 4.021 | 2.176 | 0.765 | 0.376 |
| 87 | P-1158 | MH-1157 | MH-1155 | Circular Pipe | 4,212.055 | 0.004 | 0.447 | Free Surface | 3.906 | 2.263 | 0.809 | 0.362 |
| 88 | P-1160 | MH-1159 | MH-1157 | Circular Pipe | 4,203.406 | 0.004 | 0.447 | Free Surface | 3.907 | 2.262 | 0.809 | 0.362 |
| 89 | P-1162 | MH-1161 | MH-1159 | Circular Pipe | 4,959.011 | 0.029 | 0.447 | Free Surface | 3.220 | 3.395 | 1.334 | 0.377 |
| 90 | P-1164 | MH-1163 | MH-1161 | Circular Pipe | 1,723.666 | 0.097 | 0.416 | Free Surface | 1.799 | 7.081 | 3.840 | 0.168 |
| 91 | P-1166 | MH-1165 | MH-1163 | Circular Pipe | 3,976.682 | 0.073 | 0.355 | Free Surface | 1.792 | 6.070 | 3.299 | 0.167 |
| 92 | P-1168 | MH-1167 | MH-1165 | Circular Pipe | 3,762.583 | 0.077 | 0.309 | Free Surface | 1.712 | 5.639 | 3.140 | 0.157 |
| 93 | P-1170 | MH-1169 | MH-1167 | Circular Pipe | 4,475.759 | 0.045 | 0.085 | Free Surface | 1.322 | 2.258 | 1.440 | 0.108 |
| 94 | P-1172 | MH-1171 | MH-1169 | Circular Pipe | 4,508.279 | 0.044 | 0.082 | Free Surface | 0.992 | 3.272 | 2.421 | 0.071 |
| 95 | P-1174 | MH-1173 | MH-1171 | Circular Pipe | 4,523.765 | 0.019 | 0.080 | Free Surface | 1.115 | 2.702 | 1.884 | 0.084 |
| 96 | P-1176 | MH-2047 | MH-1173 | Circular Pipe | 4,094.557 | 0.020 | 0.011 | Free Surface | 0.854 | 0.555 | 0.443 | 0.057 |
| 97 | P-1178 | MH-1177 | MH-1175 | Circular Pipe | 4,130.243 | 0.038 | 0.062 | Free Surface | 0.826 | 3.255 | 2.643 | 0.055 |
| 98 | P-1180 | MH-1179 | MH-1177 | Circular Pipe | 4,521.591 | 0.050 | 0.011 | Free Surface | 0.653 | 0.838 | 0.769 | 0.039 |
| 99 | P-1182 | MH-1181 | MH-1179 | Circular Pipe | 3,781.710 | 0.052 | 0.008 | Free Surface | 0.345 | 1.544 | 1.945 | 0.015 |
| 100 | P-1184 | MH-1183 | MH-1181 | Circular Pipe | 3,593.420 | 0.020 | 0.006 | Free Surface | 0.328 | 1.157 | 1.500 | 0.014 |
| 101 | P-1186 | MH-1185 | MH-1183 | Circular Pipe | 4,335.787 | 0.026 | 0.003 | Free Surface | 0.277 | 0.663 | 0.936 | 0.011 |
| 102 | P-1189 | MH-1175 | MH-1187 | Circular Pipe | 3,720.688 | 0.078 | 0.073 | Free Surface | 1.043 | 2.733 | 1.969 | 0.077 |
| 103 | P-1190 | MH-1189 | MH-1187 | Circular Pipe | 1,987.398 | 0.028 | 0.035 | Free Surface | 1.045 | 1.283 | 0.923 | 0.077 |
| 104 | P-1191 | MH-1187 | MH-2046 | Circular Pipe | 2,738.010 | 0.021 | 0.110 | Free Surface | 1.414 | 2.650 | 1.632 | 0.119 |
| 105 | P-1192 | MH-1191 | MH-1189 | Circular Pipe | 4,719.513 | 0.063 | 0.028 | Free Surface | 0.631 | 2.156 | 2.012 | 0.037 |
| 106 | P-1193 | MH-2038 | MH-2037 | Circular Pipe | 1,999.926 | 0.079 | 0.003 | Free Surface | 0.269 | 0.691 | 0.990 | 0.010 |
| 107 | P-1194 | MH-1193 | MH-1191 | Circular Pipe | 4,720.235 | 0.064 | 0.019 | Free Surface | 0.498 | 2.154 | 2.265 | 0.026 |
| 108 | P-1196 | MH-1195 | MH-1193 | Circular Pipe | 4,710.696 | 0.046 | 0.013 | Free Surface | 0.432 | 1.787 | 2.008 | 0.021 |
| 109 | P-1198 | MH-1197 | MH-1195 | Circular Pipe | 4,730.283 | 0.064 | 0.006 | Free Surface | 0.332 | 1.139 | 1.467 | 0.014 |
| 110 | P-1200 | MH-1199 | MH-1197 | Circular Pipe | 2,400.518 | 0.064 | 0.003 | Free Surface | 0.216 | 0.961 | 1.536 | 0.007 |
| 111 | P-1202 | MH-1201 | MH-1137 | Circular Pipe | 3,832.353 | 0.074 | 0.007 | Free Surface | 0.403 | 1.035 | 1.202 | 0.019 |
| 112 | P-1204 | MH-1203 | MH-1201 | Circular Pipe | 1,745.974 | 0.025 | 0.007 | Free Surface | 0.320 | 1.478 | 1.948 | 0.013 |
| 113 | P-1206 | MH-1205 | MH-1203 | Circular Pipe | 4,517.188 | 0.026 | 0.004 | Free Surface | 0.315 | 0.824 | 1.094 | 0.013 |
| 114 | P-1208 | MH-1207 | MH-1205 | Circular Pipe | 4,522.365 | 0.041 | 0.001 | Free Surface | 0.201 | 0.535 | 0.887 | 0.007 |
| 115 | P-1300 | MH-1156 | MH-1158 | Circular Pipe | 6,091.366 | 0.030 | 0.010 | Free Surface | 0.444 | 1.241 | 1.377 | 0.022 |
| 116 | P-1302 | MH-1158 | MH-1101 | Circular Pipe | 2,141.936 | 0.041 | 0.019 | Free Surface | 1.465 | 0.435 | 0.263 | 0.126 |
| 117 | P-1304 | MH-1304 | MH-1306 | Circular Pipe | 3,256.304 | 0.004 | 0.010 | Free Surface | 0.748 | 0.577 | 0.493 | 0.047 |
| 118 | P-1306 | MH-1306 | MH-1308 | Circular Pipe | 2,722.479 | 0.004 | 0.019 | Free Surface | 0.931 | 0.838 | 0.640 | 0.065 |
| 119 | P-1308 | MH-1308 | MH-1310 | Circular Pipe | 3,342.780 | 0.005 | 0.029 | Free Surface | 0.977 | 1.173 | 0.875 | 0.070 |
| 120 | P-1310 | MH-1310 | MH-1161 | Circular Pipe | 4,357.176 | 0.006 | 0.030 | Free Surface | 1.749 | 0.523 | 0.288 | 0.162 |
| 121 | P-2000 | MH-2001 | MH-1163 | Circular Pipe | 4,724.962 | 0.005 | 0.051 | Free Surface | 1.560 | 1.061 | 0.621 | 0.137 |
| 122 | P-2002 | MH-2003 | MH-2001 | Circular Pipe | 4,712.651 | 0.014 | 0.041 | Free Surface | 1.129 | 1.379 | 0.956 | 0.086 |
| 123 | P-2004 | MH-2005 | MH-2003 | Circular Pipe | 4,709.030 | 0.015 | 0.035 | Free Surface | 0.892 | 1.614 | 1.260 | 0.061 |
| 124 | P-2006 | MH-2007 | MH-2005 | Circular Pipe | 4,716.805 | 0.019 | 0.028 | Free Surface | 0.786 | 1.592 | 1.326 | 0.051 |
| 125 | P-2008 | MH-2009 | MH-2007 | Circular Pipe | 4,723.521 | 0.018 | 0.021 | Free Surface | 0.682 | 1.439 | 1.289 | 0.041 |
| 126 | P-2010 | MH-2011 | MH-2009 | Circular Pipe | 4,708.143 | 0.041 | 0.016 | Free Surface | 0.547 | 1.503 | 1.503 | 0.030 |
| 127 | P-2012 | MH-2013 | MH-2011 | Circular Pipe | 4,720.373 | 0.012 | 0.006 | Free Surface | 0.425 | 0.870 | 0.985 | 0.021 |
| 128 | P-2014 | MH-2015 | MH-2013 | Circular Pipe | 3,828.405 | 0.068 | 0.003 | Free Surface | 0.283 | 0.644 | 0.901 | 0.011 |
| 129 | P-2016 | MH-2017 | MH-1165 | Circular Pipe | 4,433.614 | 0.007 | 0.037 | Free Surface | 1.419 | 0.885 | 0.544 | 0.120 |
| 130 | P-2018 | MH-2019 | MH-2017 | Circular Pipe | 4,403.928 | 0.016 | 0.028 | Free Surface | 0.902 | 1.299 | 1.008 | 0.062 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131 | P-2020 | MH-2021 | MH-2019 | Circular Pipe | 4,423.016 | 0.024 | 0.024 | Free Surface | 0.695 | 1.651 | 1.463 | 0.042 |
| 132 | P-2022 | MH-2023 | MH-2021 | Circular Pipe | 4,414.479 | 0.023 | 0.018 | Free Surface | 0.602 | 1.518 | 1.448 | 0.034 |
| 133 | P-2024 | MH-2025 | MH-2023 | Circular Pipe | 4,426.487 | 0.046 | 0.013 | Free Surface | 0.482 | 1.461 | 1.564 | 0.025 |
| 134 | P-2026 | MH-2027 | MH-2025 | Circular Pipe | 4,427.011 | 0.014 | 0.008 | Free Surface | 0.412 | 1.094 | 1.258 | 0.020 |
| 135 | P-2028 | MH-2029 | MH-2027 | Circular Pipe | 4,429.826 | 0.060 | 0.004 | Free Surface | 0.319 | 0.810 | 1.068 | 0.013 |
| 136 | P-2030 | MH-2031 | MH-1167 | Circular Pipe | 4,498.021 | 0.013 | 0.076 | Free Surface | 1.462 | 1.745 | 1.056 | 0.125 |
| 137 | P-2032 | MH-2033 | MH-2031 | Circular Pipe | 4,529.867 | 0.020 | 0.072 | Free Surface | 1.202 | 2.199 | 1.473 | 0.094 |
| 138 | P-2034 | MH-2035 | MH-2033 | Circular Pipe | 4,516.136 | 0.074 | 0.008 | Free Surface | 0.702 | 0.500 | 0.441 | 0.043 |
| 139 | P-2036 | MH-2037 | MH-2035 | Circular Pipe | 4,507.013 | 0.012 | 0.005 | Free Surface | 0.327 | 1.035 | 1.344 | 0.014 |
| 140 | P-2038 | MH-2039 | MH-2038 | Circular Pipe | 4,505.475 | 0.031 | 0.001 | Free Surface | 0.137 | 0.477 | 0.944 | 0.004 |
| 141 | P-2040 | MH-2041 | MH-1167 | Circular Pipe | 4,707.264 | 0.008 | 0.140 | Free Surface | 1.824 | 2.344 | 1.262 | 0.172 |
| 142 | P-2042 | MH-2043 | MH-2041 | Circular Pipe | 4,717.054 | 0.010 | 0.131 | Free Surface | 1.889 | 2.081 | 1.100 | 0.180 |
| 143 | P-2044 | MH-2045 | MH-2043 | Circular Pipe | 4,722.777 | 0.012 | 0.123 | Free Surface | 1.708 | 2.263 | 1.262 | 0.156 |
| 144 | P-2046 | MH-2046 | MH-2045 | Circular Pipe | 4,704.045 | 0.017 | 0.114 | Free Surface | 1.552 | 2.397 | 1.405 | 0.136 |
| 145 | P-3000 | MH-3001 | MH-1031 | Circular Pipe | 4,796.339 | 0.049 | 0.379 | Free Surface | 2.174 | 4.934 | 2.417 | 0.220 |
| 146 | P-3002 | MH-3003 | MH-3001 | Circular Pipe | 4,810.173 | 0.149 | 0.379 | Free Surface | 1.787 | 6.506 | 3.541 | 0.167 |
| 147 | P-3004 | MH-3005 | MH-3003 | Circular Pipe | 4,302.140 | 0.151 | 0.379 | Free Surface | 1.541 | 8.040 | 4.733 | 0.135 |
| 148 | P-3006 | MH-3007 | MH-3005 | Circular Pipe | 4,263.022 | 0.151 | 0.379 | Free Surface | 1.540 | 8.052 | 4.742 | 0.135 |
| 149 | P-3008 | MH-3009 | MH-3007 | Circular Pipe | 4,258.382 | 0.153 | 0.379 | Free Surface | 1.538 | 8.064 | 4.751 | 0.135 |
| 150 | P-3010 | MH-3011 | MH-3009 | Circular Pipe | 4,253.869 | 0.153 | 0.379 | Free Surface | 1.537 | 8.075 | 4.760 | 0.134 |
| 151 | P-3012 | MH-3013 | MH-3011 | Circular Pipe | 4,266.320 | 0.145 | 0.379 | Free Surface | 1.548 | 7.989 | 4.691 | 0.136 |
| 152 | P-3014 | MH-3015 | MH-3013 | Circular Pipe | 4,282.921 | 0.086 | 0.379 | Free Surface | 1.688 | 7.058 | 3.959 | 0.154 |
| 153 | P-3016 | MH-3017 | MH-3015 | Circular Pipe | 3,851.646 | 0.026 | 0.156 | Free Surface | 1.673 | 2.950 | 1.663 | 0.152 |
| 154 | P-3018 | MH-3019 | MH-3017 | Circular Pipe | 3,837.011 | 0.017 | 0.156 | Free Surface | 1.634 | 3.055 | 1.744 | 0.147 |
| 155 | P-3020 | MH-3021 | MH-3019 | Circular Pipe | 3,858.522 | 0.019 | 0.156 | Free Surface | 1.697 | 2.893 | 1.618 | 0.155 |
| 156 | P-3022 | MH-3023 | MH-3021 | Circular Pipe | 3,959.500 | 0.019 | 0.156 | Free Surface | 1.656 | 2.998 | 1.699 | 0.150 |
| 157 | P-3024 | MH-3025 | MH-3023 | Circular Pipe | 3,622.773 | 0.033 | 0.109 | Free Surface | 1.433 | 2.574 | 1.575 | 0.122 |
| 158 | P-3026 | MH-3027 | MH-3025 | Circular Pipe | 4,013.530 | 0.060 | 0.042 | Free Surface | 0.939 | 1.829 | 1.392 | 0.066 |
| 159 | P-3028 | MH-3029 | MH-3027 | Circular Pipe | 3,759.196 | 0.007 | 0.040 | Free Surface | 0.934 | 1.758 | 1.341 | 0.065 |
| 160 | P-3030 | MH-3031 | MH-3029 | Circular Pipe | 3,336.983 | 0.015 | 0.031 | Free Surface | 1.004 | 1.237 | 0.910 | 0.073 |
| 161 | P-3032 | MH-3033 | MH-3031 | Circular Pipe | 3,801.978 | 0.013 | 0.016 | Free Surface | 0.704 | 1.039 | 0.914 | 0.043 |
| 162 | P-3034 | MH-3035 | MH-3033 | Circular Pipe | 3,934.027 | 0.015 | 0.008 | Free Surface | 0.513 | 0.861 | 0.889 | 0.027 |
| 163 | P-3036 | MH-3037 | MH-3035 | Circular Pipe | 3,815.541 | 0.033 | 0.005 | Free Surface | 0.353 | 0.918 | 1.142 | 0.016 |
| 164 | P-3038 | MH-3039 | MH-3037 | Circular Pipe | 3,599.458 | 0.060 | 0.003 | Free Surface | 0.230 | 0.872 | 1.349 | 0.008 |
| 165 | P-3039 | MH-3040 | MH-3025 | Circular Pipe | 4,593.895 | 0.004 | 0.061 | Free Surface | 1.300 | 1.667 | 1.073 | 0.106 |
| 166 | P-3041 | MH-3041 | MH-3040 | Circular Pipe | 4,265.159 | 0.004 | 0.056 | Free Surface | 1.340 | 1.449 | 0.917 | 0.110 |
| 167 | P-3042 | MH-3043 | MH-3041 | Circular Pipe | 3,332.869 | 0.010 | 0.050 | Free Surface | 1.206 | 1.516 | 1.014 | 0.095 |
| 168 | P-3043 | MH-3181 | MH-3169 | Circular Pipe | 3,423.517 | 0.058 | 0.007 | Free Surface | 0.452 | 0.879 | 0.969 | 0.022 |
| 169 | P-3044 | MH-3045 | MH-3043 | Circular Pipe | 3,319.425 | 0.010 | 0.044 | Free Surface | 1.080 | 1.558 | 1.103 | 0.081 |
| 170 | P-3046 | MH-3047 | MH-3045 | Circular Pipe | 3,344.444 | 0.010 | 0.038 | Free Surface | 1.003 | 1.485 | 1.092 | 0.073 |
| 171 | P-3048 | MH-3049 | MH-3047 | Circular Pipe | 465.959 | 0.010 | 0.035 | Free Surface | 0.945 | 1.488 | 1.129 | 0.066 |
| 172 | P-3050 | MH-3051 | MH-3049 | Circular Pipe | 3,582.188 | 0.010 | 0.031 | Free Surface | 0.903 | 1.413 | 1.096 | 0.062 |
| 173 | P-3052 | MH-3053 | MH-3051 | Circular Pipe | 3,950.608 | 0.020 | 0.024 | Free Surface | 0.775 | 1.408 | 1.181 | 0.050 |
| 174 | P-3054 | MH-3055 | MH-3053 | Circular Pipe | 4,020.966 | 0.020 | 0.020 | Free Surface | 0.637 | 1.547 | 1.437 | 0.037 |
| 175 | P-3056 | MH-3057 | MH-3055 | Circular Pipe | 4,022.024 | 0.007 | 0.016 | Free Surface | 0.659 | 1.149 | 1.049 | 0.039 |
| 176 | P-3058 | MH-3059 | MH-3057 | Circular Pipe | 4,020.103 | 0.008 | 0.010 | Free Surface | 0.624 | 0.798 | 0.749 | 0.036 |
| 177 | P-3060 | MH-3061 | MH-3059 | Circular Pipe | 4,005.891 | 0.012 | 0.003 | Free Surface | 0.400 | 0.381 | 0.444 | 0.019 |
| 178 | P-3062 | MH-3169 | MH-3167 | Circular Pipe | 3,742.358 | 0.034 | 0.024 | Free Surface | 0.549 | 2.334 | 2.329 | 0.030 |
| 179 | P-3064 | MH-3065 | MH-3047 | Circular Pipe | 3,636.222 | 0.011 | 0.002 | Free Surface | 0.600 | 0.158 | 0.151 | 0.034 |
| 180 | P-3066 | MH-3067 | MH-3049 | Circular Pipe | 2,914.904 | 0.009 | 0.003 | Free Surface | 0.599 | 0.211 | 0.202 | 0.034 |
| 181 | P-3068 | MH-3069 | MH-3067 | Circular Pipe | 3,053.634 | 0.010 | 0.001 | Free Surface | 0.236 | 0.422 | 0.645 | 0.009 |
| 182 | P-3070 | MH-3071 | MH-3069 | Circular Pipe | 1,873.783 | 0.013 | 0.001 | Free Surface | 0.190 | 0.584 | 0.997 | 0.006 |
| 183 | P-3072 | MH-3073 | MH-3051 | Circular Pipe | 2,995.463 | 0.016 | 0.002 | Free Surface | 0.549 | 0.180 | 0.179 | 0.030 |
| 184 | P-3074 | MH-3075 | MH-3031 | Circular Pipe | 4,552.714 | 0.062 | 0.009 | Free Surface | 0.566 | 0.860 | 0.845 | 0.031 |
| 185 | P-3076 | MH-3077 | MH-3075 | Circular Pipe | 4,678.094 | 0.032 | 0.004 | Free Surface | 0.298 | 1.045 | 1.426 | 0.012 |
| 186 | P-3078 | MH-3079 | MH-3077 | Circular Pipe | 4,678.850 | 0.011 | 0.001 | Free Surface | 0.231 | 0.435 | 0.672 | 0.008 |
| 187 | P-3080 | MH-3081 | MH-3029 | Circular Pipe | 4,396.182 | 0.017 | 0.004 | Free Surface | 0.756 | 0.262 | 0.223 | 0.048 |
| 188 | P-3082 | MH-3083 | MH-3081 | Circular Pipe | 4,573.338 | 0.020 | 0.002 | Free Surface | 0.255 | 0.563 | 0.829 | 0.010 |
| 189 | P-3084 | MH-3085 | MH-1123 | Circular Pipe | 3,997.534 | 0.011 | 0.420 | Free Surface | 3.780 | 2.586 | 0.923 | 0.465 |
| 190 | P-3086 | MH-3087 | MH-3085 | Circular Pipe | 4,797.818 | 0.066 | 0.420 | Free Surface | 2.573 | 4.330 | 1.934 | 0.278 |
| 191 | P-3088 | MH-3089 | MH-3087 | Circular Pipe | 4,796.287 | 0.038 | 0.420 | Free Surface | 2.173 | 5.474 | 2.682 | 0.220 |
| 192 | P-3090 | MH-3091 | MH-3089 | Circular Pipe | 4,801.798 | 0.046 | 0.420 | Free Surface | 2.270 | 5.152 | 2.465 | 0.234 |
| 193 | P-3092 | MH-3093 | MH-3091 | Circular Pipe | 4,803.001 | 0.120 | 0.420 | Free Surface | 1.945 | 6.402 | 3.331 | 0.188 |
| 194 | P-3094 | MH-3095 | MH-3093 | Circular Pipe | 4,839.420 | 0.144 | 0.420 | Free Surface | 1.674 | 7.922 | 4.464 | 0.152 |
| 195 | P-3096 | MH-3097 | MH-3095 | Circular Pipe | 4,808.041 | 0.145 | 0.420 | Free Surface | 1.636 | 8.186 | 4.670 | 0.147 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 196 | P-3098 | MH-3099 | MH-3097 | Circular Pipe | 4,805.507 | 0.143 | 0.420 | Free Surface | 1.641 | 8.153 | 4.644 | 0.148 |
| 197 | P-3100 | MH-3101 | MH-3099 | Circular Pipe | 3,406.232 | 0.104 | 0.211 | Free Surface | 1.454 | 4.878 | 2.962 | 0.124 |
| 198 | P-3102 | MH-3103 | MH-3101 | Circular Pipe | 3,388.607 | 0.054 | 0.211 | Free Surface | 1.402 | 5.137 | 3.177 | 0.118 |
| 199 | P-3104 | MH-3105 | MH-3103 | Circular Pipe | 3,412.154 | 0.013 | 0.211 | Free Surface | 1.904 | 3.319 | 1.747 | 0.182 |
| 200 | P-3106 | MH-3107 | MH-3105 | Circular Pipe | 3,902.405 | 0.011 | 0.211 | Free Surface | 2.229 | 2.659 | 1.285 | 0.228 |
| 201 | P-3108 | MH-3109 | MH-3107 | Circular Pipe | 3,919.010 | 0.010 | 0.211 | Free Surface | 2.243 | 2.636 | 1.269 | 0.230 |
| 202 | P-3110 | MH-3111 | MH-3109 | Circular Pipe | 4,022.469 | 0.004 | 0.211 | Free Surface | 2.650 | 2.092 | 0.919 | 0.289 |
| 203 | P-3114 | MH-3115 | MH-3099 | Circular Pipe | 822.810 | 0.098 | 0.209 | Free Surface | 1.276 | 5.817 | 3.780 | 0.103 |
| 204 | P-3116 | MH-3117 | MH-3115 | Circular Pipe | 983.819 | 0.037 | 0.209 | Free Surface | 1.507 | 4.575 | 2.725 | 0.131 |
| 205 | P-3118 | MH-3119 | MH-3117 | Circular Pipe | 3,924.346 | 0.024 | 0.209 | Free Surface | 1.783 | 3.597 | 1.960 | 0.166 |
| 206 | P-3120 | MH-3121 | MH-3119 | Circular Pipe | 623.951 | 0.006 | 0.176 | Free Surface | 2.169 | 2.302 | 1.129 | 0.219 |
| 207 | P-3122 | MH-3123 | MH-3121 | Circular Pipe | 3,327.913 | 0.017 | 0.101 | Free Surface | 1.942 | 1.550 | 0.807 | 0.187 |
| 208 | P-3124 | MH-3125 | MH-3123 | Circular Pipe | 2,635.708 | 0.017 | 0.096 | Free Surface | 1.356 | 2.459 | 1.547 | 0.112 |
| 209 | P-3126 | MH-3127 | MH-3125 | Circular Pipe | 2,708.567 | 0.026 | 0.058 | Free Surface | 1.139 | 1.889 | 1.302 | 0.087 |
| 210 | P-3128 | MH-3129 | MH-3127 | Circular Pipe | 2,684.601 | 0.031 | 0.054 | Free Surface | 0.910 | 2.471 | 1.910 | 0.063 |
| 211 | P-3130 | MH-3131 | MH-3129 | Circular Pipe | 231.534 | 0.005 | 0.049 | Free Surface | 1.125 | 1.630 | 1.131 | 0.086 |
| 212 | P-3132 | MH-3133 | MH-3131 | Circular Pipe | 234.230 | 0.005 | 0.049 | Free Surface | 1.330 | 1.277 | 0.811 | 0.109 |
| 213 | P-3134 | MH-3135 | MH-3133 | Circular Pipe | 3,432.448 | 0.022 | 0.043 | Free Surface | 1.070 | 1.548 | 1.102 | 0.080 |
| 214 | P-3136 | MH-3137 | MH-3135 | Circular Pipe | 3,730.340 | 0.038 | 0.038 | Free Surface | 0.779 | 2.173 | 1.819 | 0.050 |
| 215 | P-3138 | MH-3139 | MH-3137 | Circular Pipe | 2,795.471 | 0.038 | 0.003 | Free Surface | 0.464 | 0.386 | 0.420 | 0.023 |
| 216 | P-3140 | MH-3141 | MH-3139 | Circular Pipe | 718.372 | 0.054 | 0.003 | Free Surface | 0.211 | 1.241 | 2.005 | 0.007 |
| 217 | P-3142 | MH-3143 | MH-3141 | Circular Pipe | 3,434.557 | 0.038 | 0.003 | Free Surface | 0.213 | 1.224 | 1.969 | 0.007 |
| 218 | P-3144 | MH-3145 | MH-3143 | Circular Pipe | 2,514.291 | 0.026 | 0.003 | Free Surface | 0.234 | 1.067 | 1.639 | 0.008 |
| 219 | P-3148 | MH-3149 | MH-3135 | Circular Pipe | 4,020.005 | 0.062 | 0.003 | Free Surface | 0.524 | 0.321 | 0.329 | 0.028 |
| 220 | P-3150 | MH-3151 | MH-3149 | Circular Pipe | 3,996.325 | 0.061 | 0.002 | Free Surface | 0.176 | 0.984 | 1.750 | 0.005 |
| 221 | P-3152 | MH-3153 | MH-3133 | Circular Pipe | 3,266.073 | 0.070 | 0.005 | Free Surface | 0.763 | 0.295 | 0.250 | 0.049 |
| 222 | P-3154 | MH-3155 | MH-3153 | Circular Pipe | 3,264.845 | 0.065 | 0.003 | Free Surface | 0.216 | 1.204 | 1.926 | 0.007 |
| 223 | P-3156 | MH-3157 | MH-3155 | Circular Pipe | 3,199.647 | 0.062 | 0.002 | Free Surface | 0.175 | 0.997 | 1.783 | 0.005 |
| 224 | P-3158 | MH-3159 | MH-3129 | Circular Pipe | 3,486.074 | 0.058 | 0.004 | Free Surface | 0.555 | 0.412 | 0.409 | 0.031 |
| 225 | P-3160 | MH-3161 | MH-3159 | Circular Pipe | 3,396.083 | 0.073 | 0.003 | Free Surface | 0.211 | 1.244 | 2.013 | 0.007 |
| 226 | P-3162 | MH-3163 | MH-3161 | Circular Pipe | 3,446.789 | 0.087 | 0.002 | Free Surface | 0.166 | 1.082 | 1.990 | 0.005 |
| 227 | P-3164 | MH-3165 | MH-3125 | Circular Pipe | 3,731.561 | 0.077 | 0.035 | Free Surface | 0.956 | 1.490 | 1.125 | 0.068 |
| 228 | P-3166 | MH-3167 | MH-3165 | Circular Pipe | 3,722.569 | 0.121 | 0.030 | Free Surface | 0.529 | 3.035 | 3.087 | 0.028 |
| 229 | P-3170 | MH-3171 | MH-3169 | Circular Pipe | 3,248.706 | 0.009 | 0.014 | Free Surface | 0.614 | 1.121 | 1.060 | 0.035 |
| 230 | P-3172 | MH-3173 | MH-3171 | Circular Pipe | 4,030.843 | 0.009 | 0.003 | Free Surface | 0.446 | 0.325 | 0.360 | 0.022 |
| 231 | P-3174 | MH-3175 | MH-3171 | Circular Pipe | 3,557.144 | 0.030 | 0.008 | Free Surface | 0.481 | 0.881 | 0.945 | 0.024 |
| 232 | P-3176 | MH-3177 | MH-3175 | Circular Pipe | 3,512.055 | 0.066 | 0.004 | Free Surface | 0.280 | 0.983 | 1.382 | 0.011 |
| 233 | P-3178 | MH-3179 | MH-3177 | Circular Pipe | 2,969.586 | 0.016 | 0.001 | Free Surface | 0.193 | 0.570 | 0.966 | 0.006 |
| 234 | P-3182 | MH-3183 | MH-3181 | Circular Pipe | 3,361.681 | 0.064 | 0.004 | Free Surface | 0.250 | 1.160 | 1.725 | 0.009 |
| 235 | P-3184 | MH-3185 | MH-3183 | Circular Pipe | 2,243.554 | 0.010 | 0.002 | Free Surface | 0.226 | 0.673 | 1.052 | 0.008 |
| 236 | P-3186 | MH-3187 | MH-3121 | Circular Pipe | 3,720.279 | 0.078 | 0.072 | Free Surface | 1.658 | 1.380 | 0.781 | 0.150 |
| 237 | P-3188 | MH-3189 | MH-3187 | Circular Pipe | 3,718.522 | 0.078 | 0.041 | Free Surface | 0.714 | 2.646 | 2.313 | 0.044 |
| 238 | P-3190 | MH-3191 | MH-3189 | Circular Pipe | 3,725.820 | 0.078 | 0.015 | Free Surface | 0.501 | 1.649 | 1.727 | 0.026 |
| 239 | P-3192 | MH-3193 | MH-3191 | Circular Pipe | 4,652.213 | 0.010 | 0.008 | Free Surface | 0.426 | 1.040 | 1.176 | 0.021 |
| 240 | P-3194 | MH-3195 | MH-3193 | Circular Pipe | 4,519.741 | 0.010 | 0.003 | Free Surface | 0.370 | 0.427 | 0.519 | 0.017 |
| 241 | P-3196 | MH-3197 | MH-3189 | Circular Pipe | 4,075.086 | 0.012 | 0.011 | Free Surface | 0.565 | 0.976 | 0.960 | 0.031 |
| 242 | P-3198 | MH-3199 | MH-3197 | Circular Pipe | 3,938.814 | 0.012 | 0.004 | Free Surface | 0.413 | 0.545 | 0.626 | 0.020 |
| 243 | P-3200 | MH-3201 | MH-3187 | Circular Pipe | 3,304.518 | 0.014 | 0.009 | Free Surface | 0.637 | 0.725 | 0.674 | 0.037 |
| 244 | P-3202 | MH-3203 | MH-3201 | Circular Pipe | 3,222.974 | 0.015 | 0.004 | Free Surface | 0.380 | 0.614 | 0.734 | 0.018 |
| 245 | P-3204 | MH-3205 | MH-3191 | Circular Pipe | 3,950.837 | 0.010 | 0.003 | Free Surface | 0.342 | 0.602 | 0.762 | 0.015 |
| 246 | P-3206 | MH-3207 | MH-3189 | Circular Pipe | 3,494.531 | 0.014 | 0.011 | Free Surface | 0.562 | 1.040 | 1.025 | 0.031 |
| 247 | P-3208 | MH-3209 | MH-3207 | Circular Pipe | 3,498.982 | 0.021 | 0.006 | Free Surface | 0.428 | 0.862 | 0.973 | 0.021 |
| 248 | P-3210 | MH-3211 | MH-3209 | Circular Pipe | 2,591.201 | 0.020 | 0.001 | Free Surface | 0.258 | 0.369 | 0.540 | 0.010 |
| 249 | P-3212 | MH-3213 | MH-3187 | Circular Pipe | 4,483.665 | 0.012 | 0.019 | Free Surface | 0.745 | 1.186 | 1.015 | 0.047 |
| 250 | P-3214 | MH-3215 | MH-3213 | Circular Pipe | 4,558.991 | 0.017 | 0.008 | Free Surface | 0.539 | 0.737 | 0.742 | 0.029 |
| 251 | P-3216 | MH-3217 | MH-3215 | Circular Pipe | 3,649.963 | 0.014 | 0.003 | Free Surface | 0.324 | 0.525 | 0.687 | 0.014 |
| 252 | P-3218 | MH-3219 | MH-3119 | Circular Pipe | 4,696.217 | 0.016 | 0.029 | Free Surface | 1.296 | 0.786 | 0.507 | 0.105 |
| 253 | P-3220 | MH-3221 | MH-3219 | Circular Pipe | 4,740.560 | 0.010 | 0.022 | Free Surface | 0.753 | 1.317 | 1.120 | 0.048 |
| 254 | P-3222 | MH-3223 | MH-3221 | Circular Pipe | 4,362.187 | 0.033 | 0.019 | Free Surface | 0.635 | 1.458 | 1.357 | 0.037 |
| 255 | P-3224 | MH-3225 | MH-3223 | Circular Pipe | 1,714.193 | 0.053 | 0.014 | Free Surface | 0.464 | 1.692 | 1.842 | 0.023 |
| 256 | P-3226 | MH-3227 | MH-3225 | Circular Pipe | 3,998.758 | 0.045 | 0.009 | Free Surface | 0.372 | 1.480 | 1.789 | 0.017 |
| 257 | P-3228 | MH-3229 | MH-3227 | Circular Pipe | 4,013.057 | 0.065 | 0.006 | Free Surface | 0.304 | 1.450 | 1.959 | 0.012 |
| 258 | P-3230 | MH-3231 | MH-3229 | Circular Pipe | 4,044.897 | 0.020 | 0.003 | Free Surface | 0.261 | 0.904 | 1.314 | 0.010 |
| 259 | P-3232 | MH-3233 | MH-3223 | Circular Pipe | 4,156.778 | 0.042 | 0.003 | Free Surface | 0.369 | 0.535 | 0.649 | 0.017 |
| 260 | P-3234 | MH-3235 | MH-3233 | Circular Pipe | 3,504.348 | 0.026 | 0.001 | Free Surface | 0.163 | 0.372 | 0.693 | 0.005 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 261 | P-3236 | MH-3237 | MH-3225 | Circular Pipe | 4,467.868 | 0.009 | 0.003 | Free Surface | 0.358 | 0.562 | 0.693 | 0.016 |
| 262 | P-3238 | MH-3239 | MH-3237 | Circular Pipe | 3,820.343 | 0.036 | 0.001 | Free Surface | 0.228 | 0.444 | 0.690 | 0.008 |
| 263 | P-4000 | MH-4001 | MH-3015 | Circular Pipe | 3,026.455 | 0.011 | 0.223 | Free Surface | 2.097 | 3.049 | 1.523 | 0.209 |
| 264 | P-4002 | MH-4003 | MH-4001 | Circular Pipe | 1,149.662 | 0.004 | 0.223 | Free Surface | 2.716 | 2.130 | 0.923 | 0.299 |
| 265 | P-4004 | MH-4005 | MH-4003 | Circular Pipe | 1,668.033 | 0.014 | 0.223 | Free Surface | 2.587 | 2.277 | 1.014 | 0.280 |
| 266 | P-4006 | MH-4007 | MH-4005 | Circular Pipe | 5,660.370 | 0.007 | 0.130 | Free Surface | 2.042 | 1.845 | 0.935 | 0.201 |
| 267 | P-4008 | MH-4009 | MH-4007 | Circular Pipe | 3,851.547 | 0.012 | 0.127 | Free Surface | 1.827 | 2.108 | 1.134 | 0.172 |
| 268 | P-4010 | MH-4011 | MH-4009 | Circular Pipe | 3,862.278 | 0.014 | 0.122 | Free Surface | 1.630 | 2.393 | 1.368 | 0.146 |
| 269 | P-4012 | MH-4013 | MH-4011 | Circular Pipe | 2,655.339 | 0.007 | 0.061 | Free Surface | 1.450 | 1.426 | 0.867 | 0.124 |
| 270 | P-4014 | MH-4015 | MH-4013 | Circular Pipe | 2,560.334 | 0.013 | 0.053 | Free Surface | 1.197 | 1.610 | 1.081 | 0.094 |
| 271 | P-4016 | MH-4017 | MH-4015 | Circular Pipe | 4,530.261 | 0.083 | 0.048 | Free Surface | 0.861 | 2.351 | 1.868 | 0.058 |
| 272 | P-4018 | MH-4019 | MH-4017 | Circular Pipe | 4,524.491 | 0.096 | 0.042 | Free Surface | 0.626 | 3.325 | 3.116 | 0.036 |
| 273 | P-4020 | MH-4021 | MH-4019 | Circular Pipe | 4,501.801 | 0.019 | 0.036 | Free Surface | 0.734 | 2.265 | 1.952 | 0.046 |
| 274 | P-4022 | MH-4023 | MH-4021 | Circular Pipe | 4,389.379 | 0.011 | 0.031 | Free Surface | 0.869 | 1.496 | 1.183 | 0.059 |
| 275 | P-4024 | MH-4025 | MH-4023 | Circular Pipe | 2,549.973 | 0.010 | 0.021 | Free Surface | 0.793 | 1.153 | 0.957 | 0.051 |
| 276 | P-4026 | MH-4027 | MH-4025 | Circular Pipe | 2,416.870 | 0.009 | 0.013 | Free Surface | 0.652 | 0.935 | 0.858 | 0.038 |
| 277 | P-4028 | MH-4029 | MH-4027 | Circular Pipe | 2,646.895 | 0.009 | 0.004 | Free Surface | 0.470 | 0.530 | 0.575 | 0.024 |
| 278 | P-4030 | MH-4031 | MH-4029 | Circular Pipe | 2,809.831 | 0.017 | 0.002 | Free Surface | 0.283 | 0.482 | 0.674 | 0.011 |
| 279 | P-4032 | MH-4033 | MH-4027 | Circular Pipe | 3,727.102 | 0.013 | 0.004 | Free Surface | 0.445 | 0.490 | 0.543 | 0.022 |
| 280 | P-4034 | MH-4035 | MH-4025 | Circular Pipe | 4,095.144 | 0.011 | 0.004 | Free Surface | 0.521 | 0.389 | 0.398 | 0.028 |
| 281 | P-4036 | MH-4037 | MH-4023 | Circular Pipe | 4,744.984 | 0.010 | 0.004 | Free Surface | 0.597 | 0.318 | 0.305 | 0.034 |
| 282 | P-4038 | MH-4039 | MH-4013 | Circular Pipe | 3,723.872 | 0.058 | 0.008 | Free Surface | 0.813 | 0.404 | 0.331 | 0.053 |
| 283 | P-4040 | MH-4041 | MH-4039 | Circular Pipe | 3,735.574 | 0.085 | 0.005 | Free Surface | 0.263 | 1.433 | 2.076 | 0.010 |
| 284 | P-4042 | MH-4043 | MH-4041 | Circular Pipe | 3,861.442 | 0.079 | 0.002 | Free Surface | 0.187 | 0.900 | 1.552 | 0.006 |
| 285 | P-4044 | MH-4045 | MH-4015 | Circular Pipe | 2,127.239 | 0.005 | 0.003 | Free Surface | 0.691 | 0.171 | 0.152 | 0.042 |
| 286 | P-4046 | MH-4047 | MH-4005 | Circular Pipe | 2,854.488 | 0.017 | 0.088 | Free Surface | 1.698 | 1.623 | 0.908 | 0.155 |
| 287 | P-4048 | MH-4049 | MH-4047 | Circular Pipe | 1,954.938 | 0.014 | 0.009 | Free Surface | 0.862 | 0.432 | 0.343 | 0.058 |
| 288 | P-4050 | MH-4051 | MH-4049 | Circular Pipe | 4,798.313 | 0.012 | 0.003 | Free Surface | 0.354 | 0.456 | 0.567 | 0.016 |
| 289 | P-4052 | MH-4053 | MH-4047 | Circular Pipe | 2,811.950 | 0.006 | 0.077 | Free Surface | 1.461 | 1.755 | 1.063 | 0.125 |
| 290 | P-4054 | MH-4055 | MH-4053 | Circular Pipe | 2,644.635 | 0.016 | 0.033 | Free Surface | 1.224 | 0.964 | 0.640 | 0.097 |
| 291 | P-4056 | MH-4057 | MH-4055 | Circular Pipe | 9,365.784 | 0.005 | 0.014 | Free Surface | 0.761 | 0.852 | 0.721 | 0.049 |
| 292 | P-4058 | MH-4059 | MH-4057 | Circular Pipe | 4,801.932 | 0.009 | 0.004 | Free Surface | 0.537 | 0.433 | 0.437 | 0.029 |
| 293 | P-4060 | MH-4061 | MH-4055 | Circular Pipe | 4,218.920 | 0.010 | 0.009 | Free Surface | 0.653 | 0.699 | 0.641 | 0.039 |
| 294 | P-4062 | MH-4063 | MH-4061 | Circular Pipe | 4,169.327 | 0.010 | 0.003 | Free Surface | 0.401 | 0.474 | 0.552 | 0.019 |
| 295 | P-4064 | MH-4065 | MH-4053 | Circular Pipe | 4,608.513 | 0.005 | 0.026 | Free Surface | 1.294 | 0.720 | 0.464 | 0.105 |
| 296 | P-4066 | MH-4067 | MH-4065 | Circular Pipe | 3,958.541 | 0.005 | 0.018 | Free Surface | 0.872 | 0.850 | 0.672 | 0.059 |
| 297 | P-4068 | MH-4069 | MH-4067 | Circular Pipe | 3,933.520 | 0.006 | 0.011 | Free Surface | 0.695 | 0.720 | 0.638 | 0.042 |
| 298 | P-4070 | MH-4071 | MH-4069 | Circular Pipe | 3,325.800 | 0.009 | 0.004 | Free Surface | 0.462 | 0.465 | 0.507 | 0.023 |
| 299 | P-4074 | MH-4075 | MH-4081 | Circular Pipe | 412.028 | 0.029 | 0.007 | Free Surface | 0.365 | 1.199 | 1.466 | 0.016 |
| 300 | P-4076 | MH-4077 | MH-4075 | Circular Pipe | 3,230.661 | 0.010 | 0.005 | Free Surface | 0.356 | 0.905 | 1.121 | 0.016 |
| 301 | P-4078 | MH-4079 | MH-4077 | Circular Pipe | 3,247.702 | 0.011 | 0.002 | Free Surface | 0.303 | 0.436 | 0.590 | 0.012 |
| 302 | P-4080 | MH-4081 | MH-4053 | Circular Pipe | 522.608 | 0.060 | 0.014 | Free Surface | 1.018 | 0.533 | 0.389 | 0.074 |
| 303 | P-4082 | MH-4083 | MH-4081 | Circular Pipe | 3,598.992 | 0.011 | 0.004 | Free Surface | 0.367 | 0.755 | 0.919 | 0.017 |
| 304 | P-4084 | MH-4085 | MH-4083 | Circular Pipe | 3,190.287 | 0.004 | 0.002 | Free Surface | 0.316 | 0.409 | 0.542 | 0.013 |
| 305 | P-4086 | MH-4087 | MH-3023 | Circular Pipe | 4,091.843 | 0.044 | 0.047 | Free Surface | 1.207 | 1.428 | 0.955 | 0.095 |
| 306 | P-4088 | MH-4089 | MH-4087 | Circular Pipe | 4,119.049 | 0.067 | 0.047 | Free Surface | 0.723 | 3.012 | 2.616 | 0.045 |
| 307 | P-4090 | MH-4091 | MH-4141 | Circular Pipe | 510.638 | 0.007 | 0.085 | Free Surface | 1.487 | 1.889 | 1.133 | 0.128 |
| 308 | P-4100 | MH-4103 | MH-4091 | Circular Pipe | 3,105.897 | 0.015 | 0.030 | Free Surface | 1.204 | 0.923 | 0.618 | 0.095 |
| 309 | P-4102 | MH-4105 | MH-4103 | Circular Pipe | 2,423.200 | 0.010 | 0.008 | Free Surface | 0.631 | 0.637 | 0.594 | 0.037 |
| 310 | P-4104 | MH-4107 | MH-4105 | Circular Pipe | 2,975.012 | 0.025 | 0.007 | Free Surface | 0.407 | 1.018 | 1.177 | 0.019 |
| 311 | P-4106 | MH-4109 | MH-4107 | Circular Pipe | 3,147.047 | 0.005 | 0.004 | Free Surface | 0.401 | 0.662 | 0.770 | 0.019 |
| 312 | P-4108 | MH-4111 | MH-4109 | Circular Pipe | 3,945.430 | 0.014 | 0.002 | Free Surface | 0.336 | 0.371 | 0.475 | 0.015 |
| 313 | P-4110 | MH-4113 | MH-4109 | Circular Pipe | 944.461 | 0.005 | 0.001 | Free Surface | 0.310 | 0.141 | 0.188 | 0.013 |
| 314 | P-4112 | MH-4115 | MH-4091 | Circular Pipe | 3,399.965 | 0.018 | 0.054 | Free Surface | 1.307 | 1.454 | 0.933 | 0.106 |
| 315 | P-4114 | MH-4117 | MH-4115 | Circular Pipe | 3,412.456 | 0.012 | 0.032 | Free Surface | 0.929 | 1.399 | 1.070 | 0.065 |
| 316 | P-4116 | MH-4119 | MH-4117 | Circular Pipe | 3,418.886 | 0.015 | 0.009 | Free Surface | 0.653 | 0.699 | 0.641 | 0.039 |
| 317 | P-4118 | MH-4121 | MH-4119 | Circular Pipe | 4,158.378 | 0.008 | 0.008 | Free Surface | 0.475 | 0.971 | 1.047 | 0.024 |
| 318 | P-4120 | MH-4123 | MH-4121 | Circular Pipe | 2,433.696 | 0.011 | 0.007 | Free Surface | 0.461 | 0.856 | 0.935 | 0.023 |
| 319 | P-4122 | MH-4125 | MH-4123 | Circular Pipe | 1,869.496 | 0.012 | 0.006 | Free Surface | 0.402 | 0.850 | 0.989 | 0.019 |
| 320 | P-4124 | MH-4127 | MH-4125 | Circular Pipe | 4,270.179 | 0.010 | 0.004 | Free Surface | 0.354 | 0.686 | 0.853 | 0.016 |
| 321 | P-4126 | MH-4129 | MH-4127 | Circular Pipe | 4,248.759 | 0.010 | 0.001 | Free Surface | 0.261 | 0.362 | 0.526 | 0.010 |
| 322 | P-4128 | MH-4131 | MH-3111 | Circular Pipe | 4,052.056 | 0.015 | 0.211 | Free Surface | 2.521 | 2.241 | 1.012 | 0.270 |
| 323 | P-4130 | MH-4133 | MH-4131 | Circular Pipe | 4,141.076 | 0.013 | 0.211 | Free Surface | 2.094 | 2.902 | 1.451 | 0.209 |
| 324 | P-4132 | MH-4135 | MH-4133 | Circular Pipe | 4,038.356 | 0.013 | 0.138 | Free Surface | 1.927 | 2.124 | 1.111 | 0.185 |
| 325 | P-4134 | MH-4137 | MH-3145 | Circular Pipe | 4,855.662 | 0.010 | 0.003 | Free Surface | 0.279 | 0.823 | 1.159 | 0.011 |

| | | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 326 | | P-4136 | MH-4139 | MH-4137 | Circular Pipe | 3,780.007 | 0.010 | 0.001 | Free Surface | 0.256 | 0.374 | 0.549 | 0.010 |
| 327 | | P-4138 | MH-4141 | MH-4135 | Circular Pipe | 1,867.686 | 0.013 | 0.089 | Free Surface | 1.534 | 1.899 | 1.120 | 0.134 |
| 328 | | P-4140 | MH-4143 | MH-4141 | Circular Pipe | 3,498.543 | 0.020 | 0.004 | Free Surface | 0.832 | 0.228 | 0.184 | 0.055 |
| 329 | | P-4142 | MH-4145 | MH-4143 | Circular Pipe | 3,508.277 | 0.014 | 0.004 | Free Surface | 0.314 | 0.964 | 1.281 | 0.013 |
| 330 | | P-4144 | MH-4147 | MH-4145 | Circular Pipe | 3,506.879 | 0.017 | 0.004 | Free Surface | 0.320 | 0.937 | 1.233 | 0.013 |
| 331 | | P-4146 | MH-4149 | MH-4147 | Circular Pipe | 3,727.496 | 0.010 | 0.003 | Free Surface | 0.306 | 0.718 | 0.966 | 0.013 |
| 332 | | P-4148 | MH-4151 | MH-4149 | Circular Pipe | 2,720.026 | 0.014 | 0.001 | Free Surface | 0.241 | 0.409 | 0.619 | 0.009 |
| 333 | | P-4150 | MH-4153 | MH-3165 | Circular Pipe | 3,307.709 | 0.021 | 0.004 | Free Surface | 0.426 | 0.522 | 0.590 | 0.021 |
| 334 | | P-4152 | MH-4155 | MH-3167 | Circular Pipe | 4,226.946 | 0.011 | 0.003 | Free Surface | 0.389 | 0.495 | 0.585 | 0.018 |

# APPENDIX C – PIPE OUTPUT REPORT - PWWF

Pipe Output Report - PWWF

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BYPASS-01 | PDMWD-3010 | PDMWD-3012 | Circular Pipe | 3,199.193 | 0.013 | 0.000 | Free Surface | 0.005 | 0.000 | 0.000 | 0.000 |
| 2 | BYPASS-02 | PDMWD-3012 | PDMWD-3014 | Circular Pipe | 1,535.947 | 0.007 | 0.000 | Free Surface | 0.007 | 0.000 | 0.000 | 0.000 |
| 3 | BYPASS-03 | PDMWD-3014 | PDMWD-3015 | Circular Pipe | 2,605.561 | 0.014 | 0.000 | Free Surface | 0.003 | 0.000 | 0.000 | 0.000 |
| 4 | BYPASS-04 | PDMWD-3015 | METRO | Circular Pipe | 2,958.546 | 0.014 | 0.000 | Free Surface | 0.001 | 0.000 | 0.000 | 0.000 |
| 5 | P-1000A | MH-1001 | MH-1001B | Circular Pipe | 2,307.298 | 0.169 | 2.011 | Free Surface | 3.263 | 10.207 | 4.115 | 0.161 |
| 6 | P-1000C | MH-1001A | PDMWD-3010 | Circular Pipe | 1,543.081 | 0.016 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 7 | P-1001D | MH-1001C | WRF-HW | Circular Pipe | 3,530.122 | 0.024 | 2.009 | Backwater | 12.000 | 2.558 | 0.000 | 1.000 |
| 8 | P-1002 | MH-1005 | MH-1001 | Circular Pipe | 1,153.425 | 0.166 | 2.011 | Free Surface | 2.810 | 12.642 | 5.515 | 0.130 |
| 9 | P-1004 | MH-1005 | MH-1003 | Circular Pipe | 4,316.247 | 0.019 | -0.491 | Free Surface | 2.772 | 3.980 | 1.725 | 0.226 |
| 10 | P-1006 | MH-1007 | MH-1005 | Circular Pipe | 3,167.307 | 0.004 | 0.973 | Free Surface | 4.146 | 3.520 | 1.248 | 0.225 |
| 11 | P-1008 | MH-1009 | MH-1007 | Circular Pipe | 2,024.421 | 0.004 | 0.973 | Free Surface | 5.201 | 2.574 | 0.805 | 0.308 |
| 12 | P-1010 | MH-1011 | MH-1009 | Circular Pipe | 4,123.015 | 0.010 | 0.868 | Free Surface | 4.460 | 3.264 | 1.097 | 0.338 |
| 13 | P-1012 | MH-1013 | MH-1011 | Circular Pipe | 3,948.728 | 0.012 | 0.868 | Free Surface | 3.896 | 3.926 | 1.424 | 0.281 |
| 14 | P-1014 | MH-1015 | MH-1013 | Circular Pipe | 3,897.978 | 0.021 | 0.868 | Free Surface | 3.692 | 4.744 | 1.753 | 0.335 |
| 15 | P-1016 | MH-1017 | MH-1015 | Circular Pipe | 4,810.104 | 0.025 | 0.707 | Free Surface | 3.321 | 4.464 | 1.751 | 0.290 |
| 16 | P-1018 | MH-1019 | MH-1017 | Circular Pipe | 4,756.612 | 0.010 | 0.707 | Free Surface | 3.610 | 3.984 | 1.491 | 0.325 |
| 17 | P-1020 | MH-1021 | MH-1019 | Circular Pipe | 4,794.875 | 0.024 | 0.708 | Free Surface | 3.626 | 3.962 | 1.479 | 0.327 |
| 18 | P-1022 | MH-1023 | MH-1021 | Circular Pipe | 4,803.691 | 0.027 | 0.649 | Free Surface | 2.980 | 4.761 | 1.984 | 0.250 |
| 19 | P-1024 | MH-1025 | MH-1023 | Circular Pipe | 4,806.810 | 0.024 | 0.591 | Free Surface | 2.836 | 4.643 | 1.988 | 0.233 |
| 20 | P-1026 | MH-1001B | MH-1001C | Circular Pipe | 2,514.741 | 0.053 | 2.011 | Free Surface | 9.367 | 2.495 | 0.539 | 0.657 |
| 21 | P-1027 | MH-1029 | MH-1025 | Circular Pipe | 4,793.344 | 0.025 | 0.533 | Free Surface | 2.659 | 5.249 | 2.301 | 0.291 |
| 22 | P-1028 | MH-1001C | MH-1001A | Circular Pipe | 3,561.377 | 0.034 | 0.000 | Free Surface | 0.002 | 0.000 | 0.000 | 0.000 |
| 23 | P-1030 | MH-1031 | MH-1029 | Circular Pipe | 4,801.622 | 0.038 | 0.475 | Free Surface | 2.470 | 5.176 | 2.364 | 0.263 |
| 24 | P-1032 | MH-1033 | MH-1015 | Circular Pipe | 3,964.051 | 0.018 | 0.161 | Free Surface | 2.638 | 1.607 | 0.708 | 0.288 |
| 25 | P-1034 | MH-1035 | MH-1033 | Circular Pipe | 4,224.080 | 0.030 | 0.149 | Free Surface | 1.570 | 3.074 | 1.793 | 0.139 |
| 26 | P-1036 | MH-1037 | MH-1035 | Circular Pipe | 4,101.991 | 0.028 | 0.149 | Free Surface | 1.461 | 3.408 | 2.064 | 0.125 |
| 27 | P-1038 | MH-1039 | MH-1037 | Circular Pipe | 4,173.223 | 0.016 | 0.149 | Free Surface | 1.611 | 2.962 | 1.704 | 0.144 |
| 28 | P-1040 | MH-1041 | MH-1039 | Circular Pipe | 3,754.903 | 0.018 | 0.149 | Free Surface | 1.689 | 2.767 | 1.552 | 0.154 |
| 29 | P-1042 | MH-1043 | MH-1041 | Circular Pipe | 3,409.394 | 0.026 | 0.088 | Free Surface | 1.396 | 2.152 | 1.334 | 0.117 |
| 30 | P-1044 | MH-1045 | MH-1043 | Circular Pipe | 3,365.687 | 0.030 | 0.064 | Free Surface | 1.056 | 2.324 | 1.664 | 0.078 |
| 31 | P-1046 | MH-1047 | MH-1045 | Circular Pipe | 3,454.934 | 0.031 | 0.041 | Free Surface | 0.866 | 2.021 | 1.600 | 0.059 |
| 32 | P-1048 | MH-1049 | MH-1047 | Circular Pipe | 4,239.316 | 0.018 | 0.028 | Free Surface | 0.753 | 1.700 | 1.446 | 0.048 |
| 33 | P-1050 | MH-1051 | MH-1049 | Circular Pipe | 2,431.251 | 0.012 | 0.017 | Free Surface | 0.687 | 1.176 | 1.049 | 0.042 |
| 34 | P-1052 | MH-1053 | MH-1051 | Circular Pipe | 1,116.638 | 0.031 | 0.004 | Free Surface | 0.442 | 0.470 | 0.523 | 0.022 |
| 35 | P-1054 | MH-1055 | MH-1053 | Circular Pipe | 3,949.193 | 0.081 | 0.003 | Free Surface | 0.213 | 1.178 | 1.897 | 0.007 |
| 36 | P-1056 | MH-1057 | MH-1055 | Circular Pipe | 4,300.809 | 0.152 | 0.001 | Free Surface | 0.144 | 0.991 | 1.931 | 0.004 |
| 37 | P-1058 | MH-1059 | MH-1041 | Circular Pipe | 4,221.744 | 0.019 | 0.049 | Free Surface | 1.291 | 1.355 | 0.875 | 0.105 |
| 38 | P-1060 | MH-1061 | MH-1059 | Circular Pipe | 3,415.714 | 0.022 | 0.034 | Free Surface | 0.851 | 1.695 | 1.355 | 0.057 |
| 39 | P-1062 | MH-1063 | MH-1061 | Circular Pipe | 2,620.415 | 0.018 | 0.026 | Free Surface | 0.733 | 1.621 | 1.398 | 0.046 |
| 40 | P-1064 | MH-1065 | MH-1063 | Circular Pipe | 3,367.381 | 0.010 | 0.013 | Free Surface | 0.645 | 0.984 | 0.909 | 0.038 |
| 41 | P-1066 | MH-1067 | MH-1059 | Circular Pipe | 2,117.517 | 0.025 | 0.008 | Free Surface | 0.656 | 0.576 | 0.527 | 0.039 |
| 42 | P-1068 | MH-1069 | MH-1043 | Circular Pipe | 4,211.314 | 0.019 | 0.013 | Free Surface | 0.832 | 0.689 | 0.558 | 0.055 |
| 43 | P-1070 | MH-1071 | MH-1069 | Circular Pipe | 3,211.260 | 0.009 | 0.004 | Free Surface | 0.437 | 0.592 | 0.662 | 0.021 |
| 44 | P-1072 | MH-1073 | MH-1069 | Circular Pipe | 2,143.798 | 0.030 | 0.004 | Free Surface | 0.392 | 0.692 | 0.815 | 0.018 |
| 45 | P-1074 | MH-1075 | MH-1045 | Circular Pipe | 3,231.863 | 0.018 | 0.017 | Free Surface | 0.765 | 0.970 | 0.819 | 0.049 |
| 46 | P-1076 | MH-1077 | MH-1075 | Circular Pipe | 3,075.992 | 0.014 | 0.011 | Free Surface | 0.532 | 1.094 | 1.109 | 0.029 |
| 47 | P-1078 | MH-1079 | MH-1009 | Circular Pipe | 4,888.382 | 0.012 | 0.106 | Free Surface | 3.233 | 0.802 | 0.314 | 0.379 |
| 48 | P-1080 | MH-1081 | MH-1079 | Circular Pipe | 4,936.363 | 0.028 | 0.093 | Free Surface | 1.351 | 2.391 | 1.507 | 0.112 |
| 49 | P-1082 | MH-1083 | MH-1081 | Circular Pipe | 4,814.397 | 0.034 | 0.081 | Free Surface | 1.108 | 2.759 | 1.930 | 0.084 |
| 50 | P-1084 | MH-1085 | MH-1083 | Circular Pipe | 4,880.786 | 0.024 | 0.068 | Free Surface | 1.043 | 2.533 | 1.825 | 0.077 |
| 51 | P-1086 | MH-1087 | MH-1085 | Circular Pipe | 3,988.477 | 0.023 | 0.055 | Free Surface | 0.997 | 2.184 | 1.610 | 0.072 |
| 52 | P-1088 | MH-1089 | MH-1087 | Circular Pipe | 3,405.604 | 0.026 | 0.042 | Free Surface | 0.879 | 1.997 | 1.570 | 0.060 |
| 53 | P-1090 | MH-1091 | MH-1089 | Circular Pipe | 3,379.331 | 0.025 | 0.029 | Free Surface | 0.746 | 1.746 | 1.493 | 0.047 |
| 54 | P-1092 | MH-1093 | MH-1091 | Circular Pipe | 4,836.196 | 0.025 | 0.013 | Free Surface | 0.579 | 1.150 | 1.118 | 0.032 |
| 55 | P-1094 | MH-1095 | MH-1087 | Circular Pipe | 3,678.036 | 0.015 | 0.007 | Free Surface | 0.667 | 0.470 | 0.426 | 0.040 |
| 56 | P-1096 | MH-1097 | MH-1089 | Circular Pipe | 3,673.243 | 0.015 | 0.007 | Free Surface | 0.595 | 0.556 | 0.533 | 0.034 |
| 57 | P-1098 | MH-1099 | MH-1091 | Circular Pipe | 3,674.055 | 0.020 | 0.008 | Free Surface | 0.537 | 0.772 | 0.779 | 0.029 |
| 58 | P-1100 | MH-1101 | MH-1005 | Circular Pipe | 4,577.396 | 0.031 | 0.548 | Free Surface | 2.548 | 5.003 | 2.270 | 0.201 |
| 59 | P-1102 | MH-1103 | MH-1101 | Circular Pipe | 2,253.602 | 0.178 | 0.527 | Free Surface | 2.084 | 6.404 | 3.235 | 0.151 |
| 60 | P-1104 | MH-1105 | MH-1103 | Circular Pipe | 4,377.620 | 0.085 | 0.527 | Free Surface | 1.822 | 7.763 | 4.209 | 0.125 |
| 61 | P-1106 | MH-1107 | MH-1105 | Circular Pipe | 4,382.498 | 0.024 | 0.528 | Free Surface | 2.429 | 5.152 | 2.398 | 0.188 |
| 62 | P-1108 | MH-1109 | MH-1107 | Circular Pipe | 4,385.883 | 0.021 | 0.528 | Free Surface | 2.790 | 4.242 | 1.832 | 0.228 |
| 63 | P-1110 | MH-1111 | MH-1109 | Circular Pipe | 3,056.696 | 0.063 | 0.528 | Free Surface | 2.421 | 5.178 | 2.415 | 0.187 |
| 64 | P-1112 | MH-1113 | MH-1111 | Circular Pipe | 2,530.651 | 0.058 | 0.462 | Free Surface | 2.135 | 6.177 | 3.056 | 0.214 |
| 65 | P-1114 | MH-1115 | MH-1113 | Circular Pipe | 3,165.272 | 0.057 | 0.462 | Free Surface | 2.167 | 6.047 | 2.967 | 0.219 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66 | P-1116 | MH-1117 | MH-1115 | Circular Pipe | 4,371.695 | 0.045 | 0.462 | Free Surface | 2.248 | 5.748 | 2.765 | 0.230 |
| 67 | P-1118 | MH-1119 | MH-1117 | Circular Pipe | 4,365.331 | 0.056 | 0.462 | Free Surface | 2.254 | 5.728 | 2.751 | 0.231 |
| 68 | P-1120 | MH-1121 | MH-1119 | Circular Pipe | 4,275.693 | 0.032 | 0.462 | Free Surface | 2.387 | 5.288 | 2.461 | 0.251 |
| 69 | P-1122 | MH-1123 | MH-1121 | Circular Pipe | 3,753.480 | 0.005 | 0.462 | Free Surface | 3.632 | 3.001 | 1.098 | 0.441 |
| 70 | P-1124 | MH-1127 | MH-1125 | Circular Pipe | 4,980.228 | 0.061 | 0.028 | Free Surface | 0.765 | 1.617 | 1.365 | 0.049 |
| 71 | P-1126 | MH-1125 | MH-1111 | Circular Pipe | 2,484.867 | 0.028 | 0.066 | Free Surface | 1.541 | 1.391 | 0.818 | 0.135 |
| 72 | P-1128 | MH-1129 | MH-1127 | Circular Pipe | 4,718.688 | 0.045 | 0.021 | Free Surface | 0.527 | 2.098 | 2.139 | 0.028 |
| 73 | P-1130 | MH-1131 | MH-1129 | Circular Pipe | 4,724.661 | 0.047 | 0.014 | Free Surface | 0.463 | 1.699 | 1.852 | 0.023 |
| 74 | P-1132 | MH-1133 | MH-1131 | Circular Pipe | 4,714.063 | 0.030 | 0.007 | Free Surface | 0.376 | 1.146 | 1.379 | 0.017 |
| 75 | P-1134 | MH-1135 | MH-1133 | Circular Pipe | 878.481 | 0.004 | 0.001 | Free Surface | 0.294 | 0.335 | 0.460 | 0.012 |
| 76 | P-1136 | MH-1137 | MH-1125 | Circular Pipe | 3,870.776 | 0.075 | 0.032 | Free Surface | 0.773 | 1.874 | 1.575 | 0.050 |
| 77 | P-1138 | MH-1139 | MH-1137 | Circular Pipe | 3,735.832 | 0.067 | 0.022 | Free Surface | 0.519 | 2.288 | 2.351 | 0.028 |
| 78 | P-1140 | MH-1141 | MH-1139 | Circular Pipe | 4,435.425 | 0.042 | 0.016 | Free Surface | 0.468 | 1.923 | 2.086 | 0.024 |
| 79 | P-1142 | MH-1143 | MH-1141 | Circular Pipe | 4,432.325 | 0.037 | 0.012 | Free Surface | 0.432 | 1.590 | 1.787 | 0.021 |
| 80 | P-1144 | MH-1145 | MH-1143 | Circular Pipe | 3,597.118 | 0.053 | 0.008 | Free Surface | 0.357 | 1.361 | 1.682 | 0.016 |
| 81 | P-1146 | MH-1147 | MH-1145 | Circular Pipe | 3,584.673 | 0.033 | 0.006 | Free Surface | 0.301 | 1.291 | 1.752 | 0.012 |
| 82 | P-1148 | MH-1149 | MH-1147 | Circular Pipe | 2,805.771 | 0.056 | 0.003 | Free Surface | 0.242 | 0.889 | 1.341 | 0.009 |
| 83 | P-1150 | MH-1154 | MH-1133 | Circular Pipe | 3,302.693 | 0.087 | 0.002 | Free Surface | 0.243 | 0.666 | 1.004 | 0.009 |
| 84 | P-1152 | MH-1151 | MH-1003 | Circular Pipe | 4,423.252 | 0.015 | 0.491 | Free Surface | 2.901 | 3.736 | 1.580 | 0.241 |
| 85 | P-1154 | MH-1153 | MH-1151 | Circular Pipe | 4,422.281 | 0.004 | 0.491 | Free Surface | 3.630 | 2.744 | 1.024 | 0.328 |
| 86 | P-1156 | MH-1155 | MH-1153 | Circular Pipe | 4,198.987 | 0.004 | 0.491 | Free Surface | 4.235 | 2.232 | 0.761 | 0.403 |
| 87 | P-1158 | MH-1157 | MH-1155 | Circular Pipe | 4,212.055 | 0.004 | 0.491 | Free Surface | 4.112 | 2.321 | 0.805 | 0.388 |
| 88 | P-1160 | MH-1159 | MH-1157 | Circular Pipe | 4,203.406 | 0.004 | 0.491 | Free Surface | 4.113 | 2.320 | 0.805 | 0.388 |
| 89 | P-1162 | MH-1161 | MH-1159 | Circular Pipe | 4,959.011 | 0.029 | 0.491 | Free Surface | 3.388 | 3.488 | 1.330 | 0.403 |
| 90 | P-1164 | MH-1163 | MH-1161 | Circular Pipe | 1,723.666 | 0.097 | 0.457 | Free Surface | 1.887 | 7.277 | 3.848 | 0.180 |
| 91 | P-1166 | MH-1165 | MH-1163 | Circular Pipe | 3,976.682 | 0.073 | 0.390 | Free Surface | 1.878 | 6.240 | 3.307 | 0.179 |
| 92 | P-1168 | MH-1167 | MH-1165 | Circular Pipe | 3,762.583 | 0.077 | 0.339 | Free Surface | 1.794 | 5.798 | 3.149 | 0.168 |
| 93 | P-1170 | MH-1169 | MH-1167 | Circular Pipe | 4,475.759 | 0.045 | 0.094 | Free Surface | 1.384 | 2.322 | 1.445 | 0.116 |
| 94 | P-1172 | MH-1171 | MH-1169 | Circular Pipe | 4,508.279 | 0.044 | 0.090 | Free Surface | 1.038 | 3.366 | 2.432 | 0.076 |
| 95 | P-1174 | MH-1173 | MH-1171 | Circular Pipe | 4,523.765 | 0.019 | 0.088 | Free Surface | 1.166 | 2.776 | 1.889 | 0.090 |
| 96 | P-1176 | MH-2047 | MH-1173 | Circular Pipe | 4,094.557 | 0.020 | 0.012 | Free Surface | 0.894 | 0.570 | 0.444 | 0.061 |
| 97 | P-1178 | MH-1177 | MH-1175 | Circular Pipe | 4,130.243 | 0.038 | 0.068 | Free Surface | 0.865 | 3.345 | 2.652 | 0.059 |
| 98 | P-1180 | MH-1179 | MH-1177 | Circular Pipe | 4,521.591 | 0.050 | 0.012 | Free Surface | 0.683 | 0.860 | 0.769 | 0.041 |
| 99 | P-1182 | MH-1181 | MH-1179 | Circular Pipe | 3,781.710 | 0.052 | 0.009 | Free Surface | 0.360 | 1.587 | 1.952 | 0.016 |
| 100 | P-1184 | MH-1183 | MH-1181 | Circular Pipe | 3,593.420 | 0.020 | 0.006 | Free Surface | 0.343 | 1.189 | 1.504 | 0.015 |
| 101 | P-1186 | MH-1185 | MH-1183 | Circular Pipe | 4,335.787 | 0.026 | 0.003 | Free Surface | 0.289 | 0.683 | 0.945 | 0.012 |
| 102 | P-1189 | MH-1175 | MH-1187 | Circular Pipe | 3,720.688 | 0.078 | 0.081 | Free Surface | 1.092 | 2.812 | 1.980 | 0.082 |
| 103 | P-1190 | MH-1189 | MH-1187 | Circular Pipe | 1,987.398 | 0.028 | 0.038 | Free Surface | 1.095 | 1.320 | 0.928 | 0.082 |
| 104 | P-1191 | MH-1187 | MH-2046 | Circular Pipe | 2,738.010 | 0.021 | 0.121 | Free Surface | 1.481 | 2.725 | 1.638 | 0.127 |
| 105 | P-1192 | MH-1191 | MH-1189 | Circular Pipe | 4,719.513 | 0.063 | 0.030 | Free Surface | 0.660 | 2.214 | 2.018 | 0.039 |
| 106 | P-1193 | MH-2038 | MH-2037 | Circular Pipe | 1,999.926 | 0.079 | 0.003 | Free Surface | 0.281 | 0.714 | 1.001 | 0.011 |
| 107 | P-1194 | MH-1193 | MH-1191 | Circular Pipe | 4,720.235 | 0.064 | 0.021 | Free Surface | 0.521 | 2.207 | 2.264 | 0.028 |
| 108 | P-1196 | MH-1195 | MH-1193 | Circular Pipe | 4,710.696 | 0.046 | 0.014 | Free Surface | 0.452 | 1.841 | 2.027 | 0.023 |
| 109 | P-1198 | MH-1197 | MH-1195 | Circular Pipe | 4,730.283 | 0.064 | 0.006 | Free Surface | 0.347 | 1.165 | 1.463 | 0.015 |
| 110 | P-1200 | MH-1199 | MH-1197 | Circular Pipe | 2,400.518 | 0.064 | 0.003 | Free Surface | 0.226 | 0.989 | 1.547 | 0.008 |
| 111 | P-1202 | MH-1201 | MH-1137 | Circular Pipe | 3,832.353 | 0.074 | 0.008 | Free Surface | 0.421 | 1.067 | 1.213 | 0.020 |
| 112 | P-1204 | MH-1203 | MH-1201 | Circular Pipe | 1,745.974 | 0.025 | 0.008 | Free Surface | 0.334 | 1.514 | 1.945 | 0.014 |
| 113 | P-1206 | MH-1205 | MH-1203 | Circular Pipe | 4,517.188 | 0.026 | 0.004 | Free Surface | 0.329 | 0.846 | 1.097 | 0.014 |
| 114 | P-1208 | MH-1207 | MH-1205 | Circular Pipe | 4,522.365 | 0.041 | 0.001 | Free Surface | 0.211 | 0.549 | 0.889 | 0.007 |
| 115 | P-1300 | MH-1156 | MH-1158 | Circular Pipe | 6,091.366 | 0.030 | 0.010 | Free Surface | 0.464 | 1.283 | 1.397 | 0.023 |
| 116 | P-1302 | MH-1158 | MH-1101 | Circular Pipe | 2,141.936 | 0.041 | 0.021 | Free Surface | 1.536 | 0.447 | 0.263 | 0.134 |
| 117 | P-1304 | MH-1304 | MH-1306 | Circular Pipe | 3,256.304 | 0.004 | 0.010 | Free Surface | 0.782 | 0.594 | 0.496 | 0.050 |
| 118 | P-1306 | MH-1306 | MH-1308 | Circular Pipe | 2,722.479 | 0.004 | 0.021 | Free Surface | 0.974 | 0.862 | 0.644 | 0.070 |
| 119 | P-1308 | MH-1308 | MH-1310 | Circular Pipe | 3,342.780 | 0.005 | 0.031 | Free Surface | 1.021 | 1.207 | 0.879 | 0.075 |
| 120 | P-1310 | MH-1310 | MH-1161 | Circular Pipe | 4,357.176 | 0.006 | 0.032 | Free Surface | 1.835 | 0.537 | 0.288 | 0.173 |
| 121 | P-2000 | MH-2001 | MH-1163 | Circular Pipe | 4,724.962 | 0.005 | 0.056 | Free Surface | 1.634 | 1.091 | 0.623 | 0.147 |
| 122 | P-2002 | MH-2003 | MH-2001 | Circular Pipe | 4,712.651 | 0.014 | 0.046 | Free Surface | 1.181 | 1.417 | 0.957 | 0.092 |
| 123 | P-2004 | MH-2005 | MH-2003 | Circular Pipe | 4,709.030 | 0.015 | 0.038 | Free Surface | 0.933 | 1.663 | 1.269 | 0.065 |
| 124 | P-2006 | MH-2007 | MH-2005 | Circular Pipe | 4,716.805 | 0.019 | 0.031 | Free Surface | 0.823 | 1.636 | 1.332 | 0.054 |
| 125 | P-2008 | MH-2009 | MH-2007 | Circular Pipe | 4,723.521 | 0.018 | 0.023 | Free Surface | 0.713 | 1.479 | 1.294 | 0.044 |
| 126 | P-2010 | MH-2011 | MH-2009 | Circular Pipe | 4,708.143 | 0.041 | 0.017 | Free Surface | 0.572 | 1.547 | 1.512 | 0.032 |
| 127 | P-2012 | MH-2013 | MH-2011 | Circular Pipe | 4,720.373 | 0.012 | 0.007 | Free Surface | 0.445 | 0.897 | 0.994 | 0.022 |
| 128 | P-2014 | MH-2015 | MH-2013 | Circular Pipe | 3,828.405 | 0.068 | 0.003 | Free Surface | 0.296 | 0.663 | 0.908 | 0.012 |
| 129 | P-2016 | MH-2017 | MH-1165 | Circular Pipe | 4,433.614 | 0.007 | 0.041 | Free Surface | 1.487 | 0.910 | 0.546 | 0.128 |
| 130 | P-2018 | MH-2019 | MH-2017 | Circular Pipe | 4,403.928 | 0.016 | 0.031 | Free Surface | 0.945 | 1.337 | 1.015 | 0.066 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131 | P-2020 | MH-2021 | MH-2019 | Circular Pipe | 4,423.016 | 0.024 | 0.027 | Free Surface | 0.727 | 1.699 | 1.471 | 0.045 |
| 132 | P-2022 | MH-2023 | MH-2021 | Circular Pipe | 4,414.479 | 0.023 | 0.020 | Free Surface | 0.629 | 1.568 | 1.465 | 0.037 |
| 133 | P-2024 | MH-2025 | MH-2023 | Circular Pipe | 4,426.487 | 0.046 | 0.014 | Free Surface | 0.504 | 1.496 | 1.561 | 0.026 |
| 134 | P-2026 | MH-2027 | MH-2025 | Circular Pipe | 4,427.011 | 0.014 | 0.008 | Free Surface | 0.431 | 1.127 | 1.269 | 0.021 |
| 135 | P-2028 | MH-2029 | MH-2027 | Circular Pipe | 4,429.826 | 0.060 | 0.004 | Free Surface | 0.333 | 0.827 | 1.063 | 0.014 |
| 136 | P-2030 | MH-2031 | MH-1167 | Circular Pipe | 4,498.021 | 0.013 | 0.084 | Free Surface | 1.531 | 1.794 | 1.059 | 0.134 |
| 137 | P-2032 | MH-2033 | MH-2031 | Circular Pipe | 4,529.867 | 0.020 | 0.080 | Free Surface | 1.257 | 2.263 | 1.482 | 0.101 |
| 138 | P-2034 | MH-2035 | MH-2033 | Circular Pipe | 4,516.136 | 0.074 | 0.008 | Free Surface | 0.735 | 0.515 | 0.443 | 0.046 |
| 139 | P-2036 | MH-2037 | MH-2035 | Circular Pipe | 4,507.013 | 0.012 | 0.006 | Free Surface | 0.342 | 1.061 | 1.344 | 0.015 |
| 140 | P-2038 | MH-2039 | MH-2038 | Circular Pipe | 4,505.475 | 0.031 | 0.001 | Free Surface | 0.143 | 0.491 | 0.959 | 0.004 |
| 141 | P-2040 | MH-2041 | MH-1167 | Circular Pipe | 4,707.264 | 0.008 | 0.154 | Free Surface | 1.913 | 2.409 | 1.265 | 0.184 |
| 142 | P-2042 | MH-2043 | MH-2041 | Circular Pipe | 4,717.054 | 0.010 | 0.144 | Free Surface | 1.981 | 2.138 | 1.101 | 0.193 |
| 143 | P-2044 | MH-2045 | MH-2043 | Circular Pipe | 4,722.777 | 0.012 | 0.136 | Free Surface | 1.790 | 2.327 | 1.266 | 0.167 |
| 144 | P-2046 | MH-2046 | MH-2045 | Circular Pipe | 4,704.045 | 0.017 | 0.125 | Free Surface | 1.626 | 2.465 | 1.411 | 0.146 |
| 145 | P-3000 | MH-3001 | MH-1031 | Circular Pipe | 4,796.339 | 0.049 | 0.416 | Free Surface | 2.281 | 5.070 | 2.419 | 0.235 |
| 146 | P-3002 | MH-3003 | MH-3001 | Circular Pipe | 4,810.173 | 0.149 | 0.416 | Free Surface | 1.874 | 6.685 | 3.548 | 0.178 |
| 147 | P-3004 | MH-3005 | MH-3003 | Circular Pipe | 4,302.140 | 0.151 | 0.416 | Free Surface | 1.615 | 8.268 | 4.750 | 0.144 |
| 148 | P-3006 | MH-3007 | MH-3005 | Circular Pipe | 4,263.022 | 0.151 | 0.416 | Free Surface | 1.613 | 8.280 | 4.760 | 0.144 |
| 149 | P-3008 | MH-3009 | MH-3007 | Circular Pipe | 4,258.382 | 0.153 | 0.416 | Free Surface | 1.612 | 8.293 | 4.770 | 0.144 |
| 150 | P-3010 | MH-3011 | MH-3009 | Circular Pipe | 4,253.869 | 0.153 | 0.416 | Free Surface | 1.610 | 8.304 | 4.778 | 0.144 |
| 151 | P-3012 | MH-3013 | MH-3011 | Circular Pipe | 4,266.320 | 0.145 | 0.416 | Free Surface | 1.622 | 8.215 | 4.707 | 0.145 |
| 152 | P-3014 | MH-3015 | MH-3013 | Circular Pipe | 4,282.921 | 0.086 | 0.416 | Free Surface | 1.770 | 7.255 | 3.970 | 0.164 |
| 153 | P-3016 | MH-3017 | MH-3015 | Circular Pipe | 3,851.646 | 0.026 | 0.172 | Free Surface | 1.754 | 3.033 | 1.667 | 0.162 |
| 154 | P-3018 | MH-3019 | MH-3017 | Circular Pipe | 3,837.011 | 0.017 | 0.172 | Free Surface | 1.712 | 3.139 | 1.748 | 0.157 |
| 155 | P-3020 | MH-3021 | MH-3019 | Circular Pipe | 3,858.522 | 0.019 | 0.172 | Free Surface | 1.779 | 2.974 | 1.623 | 0.166 |
| 156 | P-3022 | MH-3023 | MH-3021 | Circular Pipe | 3,959.500 | 0.019 | 0.172 | Free Surface | 1.735 | 3.082 | 1.704 | 0.160 |
| 157 | P-3024 | MH-3025 | MH-3023 | Circular Pipe | 3,622.773 | 0.033 | 0.120 | Free Surface | 1.501 | 2.645 | 1.578 | 0.130 |
| 158 | P-3026 | MH-3027 | MH-3025 | Circular Pipe | 4,013.530 | 0.060 | 0.046 | Free Surface | 0.982 | 1.882 | 1.400 | 0.070 |
| 159 | P-3028 | MH-3029 | MH-3027 | Circular Pipe | 3,759.196 | 0.007 | 0.044 | Free Surface | 0.978 | 1.809 | 1.349 | 0.070 |
| 160 | P-3030 | MH-3031 | MH-3029 | Circular Pipe | 3,336.983 | 0.015 | 0.034 | Free Surface | 1.050 | 1.273 | 0.914 | 0.078 |
| 161 | P-3032 | MH-3033 | MH-3031 | Circular Pipe | 3,801.978 | 0.013 | 0.017 | Free Surface | 0.736 | 1.068 | 0.919 | 0.046 |
| 162 | P-3034 | MH-3035 | MH-3033 | Circular Pipe | 3,934.027 | 0.015 | 0.009 | Free Surface | 0.538 | 0.882 | 0.890 | 0.029 |
| 163 | P-3036 | MH-3037 | MH-3035 | Circular Pipe | 3,815.541 | 0.033 | 0.006 | Free Surface | 0.369 | 0.941 | 1.143 | 0.017 |
| 164 | P-3038 | MH-3039 | MH-3037 | Circular Pipe | 3,599.458 | 0.060 | 0.003 | Free Surface | 0.241 | 0.898 | 1.359 | 0.009 |
| 165 | P-3039 | MH-3040 | MH-3025 | Circular Pipe | 4,593.895 | 0.004 | 0.068 | Free Surface | 1.361 | 1.714 | 1.076 | 0.113 |
| 166 | P-3041 | MH-3041 | MH-3040 | Circular Pipe | 4,265.159 | 0.004 | 0.061 | Free Surface | 1.403 | 1.491 | 0.922 | 0.118 |
| 167 | P-3042 | MH-3043 | MH-3041 | Circular Pipe | 3,332.869 | 0.010 | 0.055 | Free Surface | 1.262 | 1.561 | 1.020 | 0.101 |
| 168 | P-3043 | MH-3181 | MH-3169 | Circular Pipe | 3,423.517 | 0.058 | 0.008 | Free Surface | 0.473 | 0.908 | 0.981 | 0.024 |
| 169 | P-3044 | MH-3045 | MH-3043 | Circular Pipe | 3,319.425 | 0.010 | 0.048 | Free Surface | 1.130 | 1.605 | 1.111 | 0.086 |
| 170 | P-3046 | MH-3047 | MH-3045 | Circular Pipe | 3,344.444 | 0.010 | 0.041 | Free Surface | 1.050 | 1.528 | 1.097 | 0.078 |
| 171 | P-3048 | MH-3049 | MH-3047 | Circular Pipe | 465.959 | 0.010 | 0.038 | Free Surface | 0.988 | 1.530 | 1.134 | 0.071 |
| 172 | P-3050 | MH-3051 | MH-3049 | Circular Pipe | 3,582.188 | 0.010 | 0.034 | Free Surface | 0.945 | 1.455 | 1.104 | 0.067 |
| 173 | P-3052 | MH-3053 | MH-3051 | Circular Pipe | 3,950.608 | 0.020 | 0.027 | Free Surface | 0.811 | 1.450 | 1.190 | 0.053 |
| 174 | P-3054 | MH-3055 | MH-3053 | Circular Pipe | 4,020.966 | 0.020 | 0.022 | Free Surface | 0.667 | 1.586 | 1.438 | 0.040 |
| 175 | P-3056 | MH-3057 | MH-3055 | Circular Pipe | 4,022.024 | 0.007 | 0.017 | Free Surface | 0.689 | 1.179 | 1.050 | 0.042 |
| 176 | P-3058 | MH-3059 | MH-3057 | Circular Pipe | 4,020.103 | 0.008 | 0.011 | Free Surface | 0.652 | 0.822 | 0.754 | 0.038 |
| 177 | P-3060 | MH-3061 | MH-3059 | Circular Pipe | 4,005.891 | 0.012 | 0.003 | Free Surface | 0.418 | 0.392 | 0.448 | 0.020 |
| 178 | P-3062 | MH-3169 | MH-3167 | Circular Pipe | 3,742.358 | 0.034 | 0.027 | Free Surface | 0.574 | 2.403 | 2.345 | 0.032 |
| 179 | P-3064 | MH-3065 | MH-3047 | Circular Pipe | 3,636.222 | 0.011 | 0.002 | Free Surface | 0.628 | 0.163 | 0.152 | 0.036 |
| 180 | P-3066 | MH-3067 | MH-3049 | Circular Pipe | 2,914.904 | 0.009 | 0.003 | Free Surface | 0.627 | 0.217 | 0.204 | 0.036 |
| 181 | P-3068 | MH-3069 | MH-3067 | Circular Pipe | 3,053.634 | 0.010 | 0.001 | Free Surface | 0.246 | 0.434 | 0.650 | 0.009 |
| 182 | P-3070 | MH-3071 | MH-3069 | Circular Pipe | 1,873.783 | 0.013 | 0.001 | Free Surface | 0.198 | 0.601 | 1.003 | 0.007 |
| 183 | P-3072 | MH-3073 | MH-3051 | Circular Pipe | 2,995.463 | 0.016 | 0.002 | Free Surface | 0.574 | 0.185 | 0.181 | 0.032 |
| 184 | P-3074 | MH-3075 | MH-3031 | Circular Pipe | 4,552.714 | 0.062 | 0.010 | Free Surface | 0.591 | 0.887 | 0.854 | 0.033 |
| 185 | P-3076 | MH-3077 | MH-3075 | Circular Pipe | 4,678.094 | 0.032 | 0.005 | Free Surface | 0.311 | 1.078 | 1.441 | 0.013 |
| 186 | P-3078 | MH-3079 | MH-3077 | Circular Pipe | 4,678.850 | 0.011 | 0.001 | Free Surface | 0.241 | 0.448 | 0.677 | 0.009 |
| 187 | P-3080 | MH-3081 | MH-3029 | Circular Pipe | 4,396.182 | 0.017 | 0.005 | Free Surface | 0.791 | 0.270 | 0.224 | 0.051 |
| 188 | P-3082 | MH-3083 | MH-3081 | Circular Pipe | 4,573.338 | 0.020 | 0.002 | Free Surface | 0.266 | 0.581 | 0.836 | 0.010 |
| 189 | P-3084 | MH-3085 | MH-1123 | Circular Pipe | 3,997.534 | 0.011 | 0.461 | Free Surface | 3.996 | 2.647 | 0.912 | 0.499 |
| 190 | P-3086 | MH-3087 | MH-3085 | Circular Pipe | 4,797.818 | 0.066 | 0.461 | Free Surface | 2.705 | 4.442 | 1.929 | 0.298 |
| 191 | P-3088 | MH-3089 | MH-3087 | Circular Pipe | 4,796.287 | 0.038 | 0.462 | Free Surface | 2.281 | 5.622 | 2.683 | 0.235 |
| 192 | P-3090 | MH-3091 | MH-3089 | Circular Pipe | 4,801.798 | 0.046 | 0.462 | Free Surface | 2.383 | 5.290 | 2.464 | 0.250 |
| 193 | P-3092 | MH-3093 | MH-3091 | Circular Pipe | 4,803.001 | 0.120 | 0.462 | Free Surface | 2.040 | 6.576 | 3.334 | 0.201 |
| 194 | P-3094 | MH-3095 | MH-3093 | Circular Pipe | 4,839.420 | 0.144 | 0.462 | Free Surface | 1.754 | 8.147 | 4.480 | 0.162 |
| 195 | P-3096 | MH-3097 | MH-3095 | Circular Pipe | 4,808.041 | 0.145 | 0.462 | Free Surface | 1.714 | 8.414 | 4.682 | 0.157 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 196 | P-3098 | MH-3099 | MH-3097 | Circular Pipe | 4,805.507 | 0.143 | 0.462 | Free Surface | 1.719 | 8.381 | 4.657 | 0.158 |
| 197 | P-3100 | MH-3101 | MH-3099 | Circular Pipe | 3,406.232 | 0.104 | 0.232 | Free Surface | 1.523 | 5.014 | 2.970 | 0.133 |
| 198 | P-3102 | MH-3103 | MH-3101 | Circular Pipe | 3,388.607 | 0.054 | 0.232 | Free Surface | 1.469 | 5.282 | 3.189 | 0.126 |
| 199 | P-3104 | MH-3105 | MH-3103 | Circular Pipe | 3,412.154 | 0.013 | 0.232 | Free Surface | 1.998 | 3.407 | 1.747 | 0.195 |
| 200 | P-3106 | MH-3107 | MH-3105 | Circular Pipe | 3,902.405 | 0.011 | 0.232 | Free Surface | 2.340 | 2.731 | 1.285 | 0.244 |
| 201 | P-3108 | MH-3109 | MH-3107 | Circular Pipe | 3,919.010 | 0.010 | 0.232 | Free Surface | 2.355 | 2.707 | 1.269 | 0.246 |
| 202 | P-3110 | MH-3111 | MH-3109 | Circular Pipe | 4,022.469 | 0.004 | 0.232 | Free Surface | 2.786 | 2.147 | 0.917 | 0.310 |
| 203 | P-3114 | MH-3115 | MH-3099 | Circular Pipe | 822.810 | 0.098 | 0.229 | Free Surface | 1.335 | 5.982 | 3.795 | 0.110 |
| 204 | P-3116 | MH-3117 | MH-3115 | Circular Pipe | 983.819 | 0.037 | 0.229 | Free Surface | 1.580 | 4.700 | 2.731 | 0.140 |
| 205 | P-3118 | MH-3119 | MH-3117 | Circular Pipe | 3,924.346 | 0.024 | 0.229 | Free Surface | 1.871 | 3.695 | 1.963 | 0.178 |
| 206 | P-3120 | MH-3121 | MH-3119 | Circular Pipe | 623.951 | 0.006 | 0.194 | Free Surface | 2.277 | 2.364 | 1.130 | 0.234 |
| 207 | P-3122 | MH-3123 | MH-3121 | Circular Pipe | 3,327.913 | 0.017 | 0.111 | Free Surface | 2.038 | 1.590 | 0.806 | 0.201 |
| 208 | P-3124 | MH-3125 | MH-3123 | Circular Pipe | 2,635.708 | 0.017 | 0.106 | Free Surface | 1.420 | 2.529 | 1.554 | 0.120 |
| 209 | P-3126 | MH-3127 | MH-3125 | Circular Pipe | 2,708.567 | 0.026 | 0.063 | Free Surface | 1.192 | 1.940 | 1.305 | 0.093 |
| 210 | P-3128 | MH-3129 | MH-3127 | Circular Pipe | 2,684.601 | 0.031 | 0.060 | Free Surface | 0.952 | 2.546 | 1.925 | 0.067 |
| 211 | P-3130 | MH-3131 | MH-3129 | Circular Pipe | 231.534 | 0.005 | 0.054 | Free Surface | 1.178 | 1.673 | 1.133 | 0.092 |
| 212 | P-3132 | MH-3133 | MH-3131 | Circular Pipe | 234.230 | 0.005 | 0.054 | Free Surface | 1.393 | 1.313 | 0.815 | 0.117 |
| 213 | P-3134 | MH-3135 | MH-3133 | Circular Pipe | 3,432.448 | 0.022 | 0.047 | Free Surface | 1.120 | 1.595 | 1.110 | 0.085 |
| 214 | P-3136 | MH-3137 | MH-3135 | Circular Pipe | 3,730.340 | 0.038 | 0.042 | Free Surface | 0.815 | 2.236 | 1.830 | 0.054 |
| 215 | P-3138 | MH-3139 | MH-3137 | Circular Pipe | 2,795.471 | 0.038 | 0.003 | Free Surface | 0.485 | 0.398 | 0.425 | 0.025 |
| 216 | P-3140 | MH-3141 | MH-3139 | Circular Pipe | 718.372 | 0.054 | 0.003 | Free Surface | 0.221 | 1.277 | 2.018 | 0.008 |
| 217 | P-3142 | MH-3143 | MH-3141 | Circular Pipe | 3,434.557 | 0.038 | 0.003 | Free Surface | 0.223 | 1.260 | 1.983 | 0.008 |
| 218 | P-3144 | MH-3145 | MH-3143 | Circular Pipe | 2,514.291 | 0.026 | 0.003 | Free Surface | 0.244 | 1.098 | 1.650 | 0.009 |
| 219 | P-3148 | MH-3149 | MH-3135 | Circular Pipe | 4,020.005 | 0.062 | 0.003 | Free Surface | 0.548 | 0.330 | 0.330 | 0.030 |
| 220 | P-3150 | MH-3151 | MH-3149 | Circular Pipe | 3,996.325 | 0.061 | 0.002 | Free Surface | 0.184 | 1.010 | 1.756 | 0.006 |
| 221 | P-3152 | MH-3153 | MH-3133 | Circular Pipe | 3,266.073 | 0.070 | 0.006 | Free Surface | 0.799 | 0.304 | 0.252 | 0.052 |
| 222 | P-3154 | MH-3155 | MH-3153 | Circular Pipe | 3,264.845 | 0.065 | 0.003 | Free Surface | 0.225 | 1.239 | 1.939 | 0.008 |
| 223 | P-3156 | MH-3157 | MH-3155 | Circular Pipe | 3,199.647 | 0.062 | 0.002 | Free Surface | 0.183 | 1.024 | 1.788 | 0.006 |
| 224 | P-3158 | MH-3159 | MH-3129 | Circular Pipe | 3,486.074 | 0.058 | 0.005 | Free Surface | 0.581 | 0.424 | 0.411 | 0.033 |
| 225 | P-3160 | MH-3161 | MH-3159 | Circular Pipe | 3,396.083 | 0.073 | 0.003 | Free Surface | 0.220 | 1.281 | 2.027 | 0.008 |
| 226 | P-3162 | MH-3163 | MH-3161 | Circular Pipe | 3,446.789 | 0.087 | 0.002 | Free Surface | 0.174 | 1.108 | 1.988 | 0.005 |
| 227 | P-3164 | MH-3165 | MH-3125 | Circular Pipe | 3,731.561 | 0.077 | 0.039 | Free Surface | 1.001 | 1.530 | 1.126 | 0.072 |
| 228 | P-3166 | MH-3167 | MH-3165 | Circular Pipe | 3,722.569 | 0.121 | 0.033 | Free Surface | 0.553 | 3.122 | 3.104 | 0.030 |
| 229 | P-3170 | MH-3171 | MH-3169 | Circular Pipe | 3,248.706 | 0.009 | 0.015 | Free Surface | 0.643 | 1.155 | 1.069 | 0.038 |
| 230 | P-3172 | MH-3173 | MH-3171 | Circular Pipe | 4,030.843 | 0.009 | 0.003 | Free Surface | 0.467 | 0.336 | 0.365 | 0.024 |
| 231 | P-3174 | MH-3175 | MH-3171 | Circular Pipe | 3,557.144 | 0.030 | 0.008 | Free Surface | 0.503 | 0.902 | 0.943 | 0.026 |
| 232 | P-3176 | MH-3177 | MH-3175 | Circular Pipe | 3,512.055 | 0.066 | 0.004 | Free Surface | 0.292 | 1.013 | 1.395 | 0.012 |
| 233 | P-3178 | MH-3179 | MH-3177 | Circular Pipe | 2,969.586 | 0.016 | 0.001 | Free Surface | 0.201 | 0.587 | 0.972 | 0.007 |
| 234 | P-3182 | MH-3183 | MH-3181 | Circular Pipe | 3,361.681 | 0.064 | 0.004 | Free Surface | 0.261 | 1.195 | 1.738 | 0.010 |
| 235 | P-3184 | MH-3185 | MH-3183 | Circular Pipe | 2,243.554 | 0.010 | 0.002 | Free Surface | 0.236 | 0.693 | 1.060 | 0.009 |
| 236 | P-3186 | MH-3187 | MH-3121 | Circular Pipe | 3,720.279 | 0.078 | 0.079 | Free Surface | 1.741 | 1.415 | 0.781 | 0.161 |
| 237 | P-3188 | MH-3189 | MH-3187 | Circular Pipe | 3,718.522 | 0.078 | 0.045 | Free Surface | 0.747 | 2.723 | 2.327 | 0.047 |
| 238 | P-3190 | MH-3191 | MH-3189 | Circular Pipe | 3,725.820 | 0.078 | 0.017 | Free Surface | 0.524 | 1.691 | 1.728 | 0.028 |
| 239 | P-3192 | MH-3193 | MH-3191 | Circular Pipe | 4,652.213 | 0.010 | 0.008 | Free Surface | 0.446 | 1.073 | 1.189 | 0.022 |
| 240 | P-3194 | MH-3195 | MH-3193 | Circular Pipe | 4,519.741 | 0.010 | 0.003 | Free Surface | 0.387 | 0.439 | 0.520 | 0.018 |
| 241 | P-3196 | MH-3197 | MH-3189 | Circular Pipe | 4,075.086 | 0.012 | 0.012 | Free Surface | 0.591 | 1.006 | 0.968 | 0.033 |
| 242 | P-3198 | MH-3199 | MH-3197 | Circular Pipe | 3,938.814 | 0.012 | 0.004 | Free Surface | 0.431 | 0.563 | 0.633 | 0.021 |
| 243 | P-3200 | MH-3201 | MH-3187 | Circular Pipe | 3,304.518 | 0.014 | 0.010 | Free Surface | 0.666 | 0.744 | 0.675 | 0.040 |
| 244 | P-3202 | MH-3203 | MH-3201 | Circular Pipe | 3,222.974 | 0.015 | 0.004 | Free Surface | 0.398 | 0.631 | 0.738 | 0.019 |
| 245 | P-3204 | MH-3205 | MH-3191 | Circular Pipe | 3,950.837 | 0.010 | 0.003 | Free Surface | 0.358 | 0.617 | 0.762 | 0.016 |
| 246 | P-3206 | MH-3207 | MH-3189 | Circular Pipe | 3,494.531 | 0.014 | 0.012 | Free Surface | 0.588 | 1.071 | 1.033 | 0.033 |
| 247 | P-3208 | MH-3209 | MH-3207 | Circular Pipe | 3,498.982 | 0.021 | 0.007 | Free Surface | 0.447 | 0.892 | 0.987 | 0.022 |
| 248 | P-3210 | MH-3211 | MH-3209 | Circular Pipe | 2,591.201 | 0.020 | 0.001 | Free Surface | 0.269 | 0.381 | 0.546 | 0.010 |
| 249 | P-3212 | MH-3213 | MH-3187 | Circular Pipe | 4,483.665 | 0.012 | 0.021 | Free Surface | 0.778 | 1.223 | 1.024 | 0.050 |
| 250 | P-3214 | MH-3215 | MH-3213 | Circular Pipe | 4,558.991 | 0.017 | 0.008 | Free Surface | 0.564 | 0.759 | 0.747 | 0.031 |
| 251 | P-3216 | MH-3217 | MH-3215 | Circular Pipe | 3,649.963 | 0.014 | 0.003 | Free Surface | 0.339 | 0.537 | 0.684 | 0.015 |
| 252 | P-3218 | MH-3219 | MH-3119 | Circular Pipe | 4,696.217 | 0.016 | 0.032 | Free Surface | 1.357 | 0.808 | 0.508 | 0.113 |
| 253 | P-3220 | MH-3221 | MH-3219 | Circular Pipe | 4,740.560 | 0.010 | 0.024 | Free Surface | 0.788 | 1.356 | 1.128 | 0.051 |
| 254 | P-3222 | MH-3223 | MH-3221 | Circular Pipe | 4,362.187 | 0.033 | 0.021 | Free Surface | 0.664 | 1.496 | 1.360 | 0.040 |
| 255 | P-3224 | MH-3225 | MH-3223 | Circular Pipe | 1,714.193 | 0.053 | 0.015 | Free Surface | 0.486 | 1.746 | 1.862 | 0.025 |
| 256 | P-3226 | MH-3227 | MH-3225 | Circular Pipe | 3,998.758 | 0.045 | 0.010 | Free Surface | 0.389 | 1.522 | 1.799 | 0.018 |
| 257 | P-3228 | MH-3229 | MH-3227 | Circular Pipe | 4,013.057 | 0.065 | 0.007 | Free Surface | 0.317 | 1.495 | 1.977 | 0.013 |
| 258 | P-3230 | MH-3231 | MH-3229 | Circular Pipe | 4,044.897 | 0.020 | 0.003 | Free Surface | 0.273 | 0.931 | 1.324 | 0.011 |
| 259 | P-3232 | MH-3233 | MH-3223 | Circular Pipe | 4,156.778 | 0.042 | 0.003 | Free Surface | 0.386 | 0.550 | 0.653 | 0.018 |
| 260 | P-3234 | MH-3235 | MH-3233 | Circular Pipe | 3,504.348 | 0.026 | 0.001 | Free Surface | 0.170 | 0.381 | 0.690 | 0.005 |

| | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 261 | P-3236 | MH-3237 | MH-3225 | Circular Pipe | 4,467.868 | 0.009 | 0.003 | Free Surface | 0.374 | 0.577 | 0.696 | 0.017 |
| 262 | P-3238 | MH-3239 | MH-3237 | Circular Pipe | 3,820.343 | 0.036 | 0.001 | Free Surface | 0.238 | 0.456 | 0.694 | 0.009 |
| 263 | P-4000 | MH-4001 | MH-3015 | Circular Pipe | 3,026.455 | 0.011 | 0.245 | Free Surface | 2.201 | 3.131 | 1.523 | 0.224 |
| 264 | P-4002 | MH-4003 | MH-4001 | Circular Pipe | 1,149.662 | 0.004 | 0.245 | Free Surface | 2.856 | 2.186 | 0.920 | 0.321 |
| 265 | P-4004 | MH-4005 | MH-4003 | Circular Pipe | 1,668.033 | 0.014 | 0.245 | Free Surface | 2.719 | 2.338 | 1.012 | 0.300 |
| 266 | P-4006 | MH-4007 | MH-4005 | Circular Pipe | 5,660.370 | 0.007 | 0.143 | Free Surface | 2.142 | 1.895 | 0.936 | 0.215 |
| 267 | P-4008 | MH-4009 | MH-4007 | Circular Pipe | 3,851.547 | 0.012 | 0.139 | Free Surface | 1.915 | 2.167 | 1.137 | 0.184 |
| 268 | P-4010 | MH-4011 | MH-4009 | Circular Pipe | 3,862.278 | 0.014 | 0.134 | Free Surface | 1.708 | 2.460 | 1.371 | 0.156 |
| 269 | P-4012 | MH-4013 | MH-4011 | Circular Pipe | 2,655.339 | 0.007 | 0.068 | Free Surface | 1.519 | 1.465 | 0.869 | 0.132 |
| 270 | P-4014 | MH-4015 | MH-4013 | Circular Pipe | 2,560.334 | 0.013 | 0.058 | Free Surface | 1.253 | 1.656 | 1.086 | 0.100 |
| 271 | P-4016 | MH-4017 | MH-4015 | Circular Pipe | 4,530.261 | 0.083 | 0.052 | Free Surface | 0.901 | 2.419 | 1.879 | 0.062 |
| 272 | P-4018 | MH-4019 | MH-4017 | Circular Pipe | 4,524.491 | 0.096 | 0.046 | Free Surface | 0.654 | 3.421 | 3.134 | 0.039 |
| 273 | P-4020 | MH-4021 | MH-4019 | Circular Pipe | 4,501.801 | 0.019 | 0.040 | Free Surface | 0.768 | 2.330 | 1.963 | 0.049 |
| 274 | P-4022 | MH-4023 | MH-4021 | Circular Pipe | 4,389.379 | 0.011 | 0.034 | Free Surface | 0.909 | 1.539 | 1.190 | 0.063 |
| 275 | P-4024 | MH-4025 | MH-4023 | Circular Pipe | 2,549.973 | 0.010 | 0.023 | Free Surface | 0.830 | 1.185 | 0.960 | 0.055 |
| 276 | P-4026 | MH-4027 | MH-4025 | Circular Pipe | 2,416.870 | 0.009 | 0.014 | Free Surface | 0.682 | 0.958 | 0.858 | 0.041 |
| 277 | P-4028 | MH-4029 | MH-4027 | Circular Pipe | 2,646.895 | 0.009 | 0.005 | Free Surface | 0.491 | 0.546 | 0.578 | 0.025 |
| 278 | P-4030 | MH-4031 | MH-4029 | Circular Pipe | 2,809.831 | 0.017 | 0.002 | Free Surface | 0.296 | 0.497 | 0.681 | 0.012 |
| 279 | P-4032 | MH-4033 | MH-4027 | Circular Pipe | 3,727.102 | 0.013 | 0.004 | Free Surface | 0.465 | 0.506 | 0.550 | 0.023 |
| 280 | P-4034 | MH-4035 | MH-4025 | Circular Pipe | 4,095.144 | 0.011 | 0.004 | Free Surface | 0.544 | 0.400 | 0.401 | 0.030 |
| 281 | P-4036 | MH-4037 | MH-4023 | Circular Pipe | 4,744.984 | 0.010 | 0.004 | Free Surface | 0.624 | 0.328 | 0.308 | 0.036 |
| 282 | P-4038 | MH-4039 | MH-4013 | Circular Pipe | 3,723.872 | 0.058 | 0.008 | Free Surface | 0.851 | 0.415 | 0.331 | 0.057 |
| 283 | P-4040 | MH-4041 | MH-4039 | Circular Pipe | 3,735.574 | 0.085 | 0.006 | Free Surface | 0.275 | 1.475 | 2.092 | 0.011 |
| 284 | P-4042 | MH-4043 | MH-4041 | Circular Pipe | 3,861.442 | 0.079 | 0.002 | Free Surface | 0.195 | 0.923 | 1.554 | 0.006 |
| 285 | P-4044 | MH-4045 | MH-4015 | Circular Pipe | 2,127.239 | 0.005 | 0.003 | Free Surface | 0.723 | 0.175 | 0.152 | 0.045 |
| 286 | P-4046 | MH-4047 | MH-4005 | Circular Pipe | 2,854.488 | 0.017 | 0.097 | Free Surface | 1.780 | 1.668 | 0.910 | 0.166 |
| 287 | P-4048 | MH-4049 | MH-4047 | Circular Pipe | 1,954.938 | 0.014 | 0.010 | Free Surface | 0.903 | 0.444 | 0.344 | 0.062 |
| 288 | P-4050 | MH-4051 | MH-4049 | Circular Pipe | 4,798.313 | 0.012 | 0.003 | Free Surface | 0.371 | 0.468 | 0.566 | 0.017 |
| 289 | P-4052 | MH-4053 | MH-4047 | Circular Pipe | 2,811.950 | 0.006 | 0.084 | Free Surface | 1.530 | 1.804 | 1.066 | 0.134 |
| 290 | P-4054 | MH-4055 | MH-4053 | Circular Pipe | 2,644.635 | 0.016 | 0.036 | Free Surface | 1.282 | 0.993 | 0.644 | 0.104 |
| 291 | P-4056 | MH-4057 | MH-4055 | Circular Pipe | 9,365.784 | 0.005 | 0.016 | Free Surface | 0.796 | 0.879 | 0.728 | 0.052 |
| 292 | P-4058 | MH-4059 | MH-4057 | Circular Pipe | 4,801.932 | 0.009 | 0.005 | Free Surface | 0.561 | 0.446 | 0.440 | 0.031 |
| 293 | P-4060 | MH-4061 | MH-4055 | Circular Pipe | 4,218.920 | 0.010 | 0.010 | Free Surface | 0.682 | 0.718 | 0.642 | 0.041 |
| 294 | P-4062 | MH-4063 | MH-4061 | Circular Pipe | 4,169.327 | 0.010 | 0.003 | Free Surface | 0.419 | 0.489 | 0.557 | 0.020 |
| 295 | P-4064 | MH-4065 | MH-4053 | Circular Pipe | 4,608.513 | 0.005 | 0.029 | Free Surface | 1.355 | 0.739 | 0.465 | 0.112 |
| 296 | P-4066 | MH-4067 | MH-4065 | Circular Pipe | 3,958.541 | 0.005 | 0.019 | Free Surface | 0.911 | 0.876 | 0.676 | 0.063 |
| 297 | P-4068 | MH-4069 | MH-4067 | Circular Pipe | 3,933.520 | 0.006 | 0.012 | Free Surface | 0.727 | 0.740 | 0.641 | 0.045 |
| 298 | P-4070 | MH-4071 | MH-4069 | Circular Pipe | 3,325.800 | 0.009 | 0.004 | Free Surface | 0.483 | 0.480 | 0.513 | 0.025 |
| 299 | P-4074 | MH-4075 | MH-4081 | Circular Pipe | 412.028 | 0.029 | 0.008 | Free Surface | 0.381 | 1.234 | 1.474 | 0.018 |
| 300 | P-4076 | MH-4077 | MH-4075 | Circular Pipe | 3,230.661 | 0.010 | 0.006 | Free Surface | 0.372 | 0.931 | 1.127 | 0.017 |
| 301 | P-4078 | MH-4079 | MH-4077 | Circular Pipe | 3,247.702 | 0.011 | 0.002 | Free Surface | 0.317 | 0.450 | 0.595 | 0.013 |
| 302 | P-4080 | MH-4081 | MH-4053 | Circular Pipe | 522.608 | 0.060 | 0.015 | Free Surface | 1.067 | 0.548 | 0.390 | 0.079 |
| 303 | P-4082 | MH-4083 | MH-4081 | Circular Pipe | 3,598.992 | 0.011 | 0.005 | Free Surface | 0.384 | 0.777 | 0.924 | 0.018 |
| 304 | P-4084 | MH-4085 | MH-4083 | Circular Pipe | 3,190.287 | 0.004 | 0.002 | Free Surface | 0.330 | 0.420 | 0.543 | 0.014 |
| 305 | P-4086 | MH-4087 | MH-3023 | Circular Pipe | 4,091.843 | 0.044 | 0.052 | Free Surface | 1.264 | 1.468 | 0.959 | 0.101 |
| 306 | P-4088 | MH-4089 | MH-4087 | Circular Pipe | 4,119.049 | 0.067 | 0.052 | Free Surface | 0.756 | 3.100 | 2.633 | 0.048 |
| 307 | P-4090 | MH-4091 | MH-4141 | Circular Pipe | 510.638 | 0.007 | 0.093 | Free Surface | 1.558 | 1.941 | 1.136 | 0.137 |
| 308 | P-4100 | MH-4103 | MH-4091 | Circular Pipe | 3,105.897 | 0.015 | 0.033 | Free Surface | 1.261 | 0.949 | 0.620 | 0.101 |
| 309 | P-4102 | MH-4105 | MH-4103 | Circular Pipe | 2,423.200 | 0.010 | 0.009 | Free Surface | 0.660 | 0.654 | 0.596 | 0.039 |
| 310 | P-4104 | MH-4107 | MH-4105 | Circular Pipe | 2,975.012 | 0.025 | 0.008 | Free Surface | 0.426 | 1.050 | 1.188 | 0.021 |
| 311 | P-4106 | MH-4109 | MH-4107 | Circular Pipe | 3,147.047 | 0.005 | 0.005 | Free Surface | 0.419 | 0.683 | 0.778 | 0.020 |
| 312 | P-4108 | MH-4111 | MH-4109 | Circular Pipe | 3,945.430 | 0.014 | 0.002 | Free Surface | 0.352 | 0.381 | 0.475 | 0.016 |
| 313 | P-4110 | MH-4113 | MH-4109 | Circular Pipe | 944.461 | 0.005 | 0.001 | Free Surface | 0.324 | 0.145 | 0.189 | 0.014 |
| 314 | P-4112 | MH-4115 | MH-4091 | Circular Pipe | 3,399.965 | 0.018 | 0.059 | Free Surface | 1.369 | 1.494 | 0.935 | 0.114 |
| 315 | P-4114 | MH-4117 | MH-4115 | Circular Pipe | 3,412.456 | 0.012 | 0.035 | Free Surface | 0.972 | 1.441 | 1.077 | 0.069 |
| 316 | P-4116 | MH-4119 | MH-4117 | Circular Pipe | 3,418.886 | 0.015 | 0.010 | Free Surface | 0.684 | 0.716 | 0.640 | 0.041 |
| 317 | P-4118 | MH-4121 | MH-4119 | Circular Pipe | 4,158.378 | 0.008 | 0.009 | Free Surface | 0.496 | 0.997 | 1.050 | 0.026 |
| 318 | P-4120 | MH-4123 | MH-4121 | Circular Pipe | 2,433.696 | 0.011 | 0.008 | Free Surface | 0.481 | 0.885 | 0.949 | 0.025 |
| 319 | P-4122 | MH-4125 | MH-4123 | Circular Pipe | 1,869.496 | 0.012 | 0.006 | Free Surface | 0.420 | 0.875 | 0.996 | 0.020 |
| 320 | P-4124 | MH-4127 | MH-4125 | Circular Pipe | 4,270.179 | 0.010 | 0.004 | Free Surface | 0.369 | 0.706 | 0.857 | 0.017 |
| 321 | P-4126 | MH-4129 | MH-4127 | Circular Pipe | 4,248.759 | 0.010 | 0.001 | Free Surface | 0.273 | 0.373 | 0.532 | 0.011 |
| 322 | P-4128 | MH-4131 | MH-3111 | Circular Pipe | 4,052.056 | 0.015 | 0.232 | Free Surface | 2.650 | 2.299 | 1.010 | 0.289 |
| 323 | P-4130 | MH-4133 | MH-4131 | Circular Pipe | 4,141.076 | 0.013 | 0.232 | Free Surface | 2.197 | 2.982 | 1.452 | 0.223 |
| 324 | P-4132 | MH-4135 | MH-4133 | Circular Pipe | 4,038.356 | 0.013 | 0.151 | Free Surface | 2.021 | 2.181 | 1.111 | 0.198 |
| 325 | P-4134 | MH-4137 | MH-3145 | Circular Pipe | 4,855.662 | 0.010 | 0.003 | Free Surface | 0.291 | 0.848 | 1.169 | 0.012 |

| | | ID | From ID | To ID | Type | Length (ft) | Slope | Flow (cfs) | Flow Class | Depth (in) | Velocity (ft/s) | Froude Number | Capacity d/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 326 | | P-4136 | MH-4139 | MH-4137 | Circular Pipe | 3,780.007 | 0.010 | 0.001 | Free Surface | 0.267 | 0.385 | 0.554 | 0.010 |
| 327 | | P-4138 | MH-4141 | MH-4135 | Circular Pipe | 1,867.686 | 0.013 | 0.098 | Free Surface | 1.608 | 1.953 | 1.125 | 0.143 |
| 328 | | P-4140 | MH-4143 | MH-4141 | Circular Pipe | 3,498.543 | 0.020 | 0.005 | Free Surface | 0.871 | 0.234 | 0.185 | 0.059 |
| 329 | | P-4142 | MH-4145 | MH-4143 | Circular Pipe | 3,508.277 | 0.014 | 0.005 | Free Surface | 0.328 | 0.991 | 1.285 | 0.014 |
| 330 | | P-4144 | MH-4147 | MH-4145 | Circular Pipe | 3,506.879 | 0.017 | 0.005 | Free Surface | 0.334 | 0.961 | 1.233 | 0.014 |
| 331 | | P-4146 | MH-4149 | MH-4147 | Circular Pipe | 3,727.496 | 0.010 | 0.003 | Free Surface | 0.319 | 0.740 | 0.975 | 0.013 |
| 332 | | P-4148 | MH-4151 | MH-4149 | Circular Pipe | 2,720.026 | 0.014 | 0.001 | Free Surface | 0.251 | 0.421 | 0.624 | 0.009 |
| 333 | | P-4150 | MH-4153 | MH-3165 | Circular Pipe | 3,307.709 | 0.021 | 0.004 | Free Surface | 0.445 | 0.538 | 0.596 | 0.022 |
| 334 | | P-4152 | MH-4155 | MH-3167 | Circular Pipe | 4,226.946 | 0.011 | 0.003 | Free Surface | 0.406 | 0.511 | 0.591 | 0.019 |

# APPENDIX D – MISCELLANEOUS DOCUMENTATION