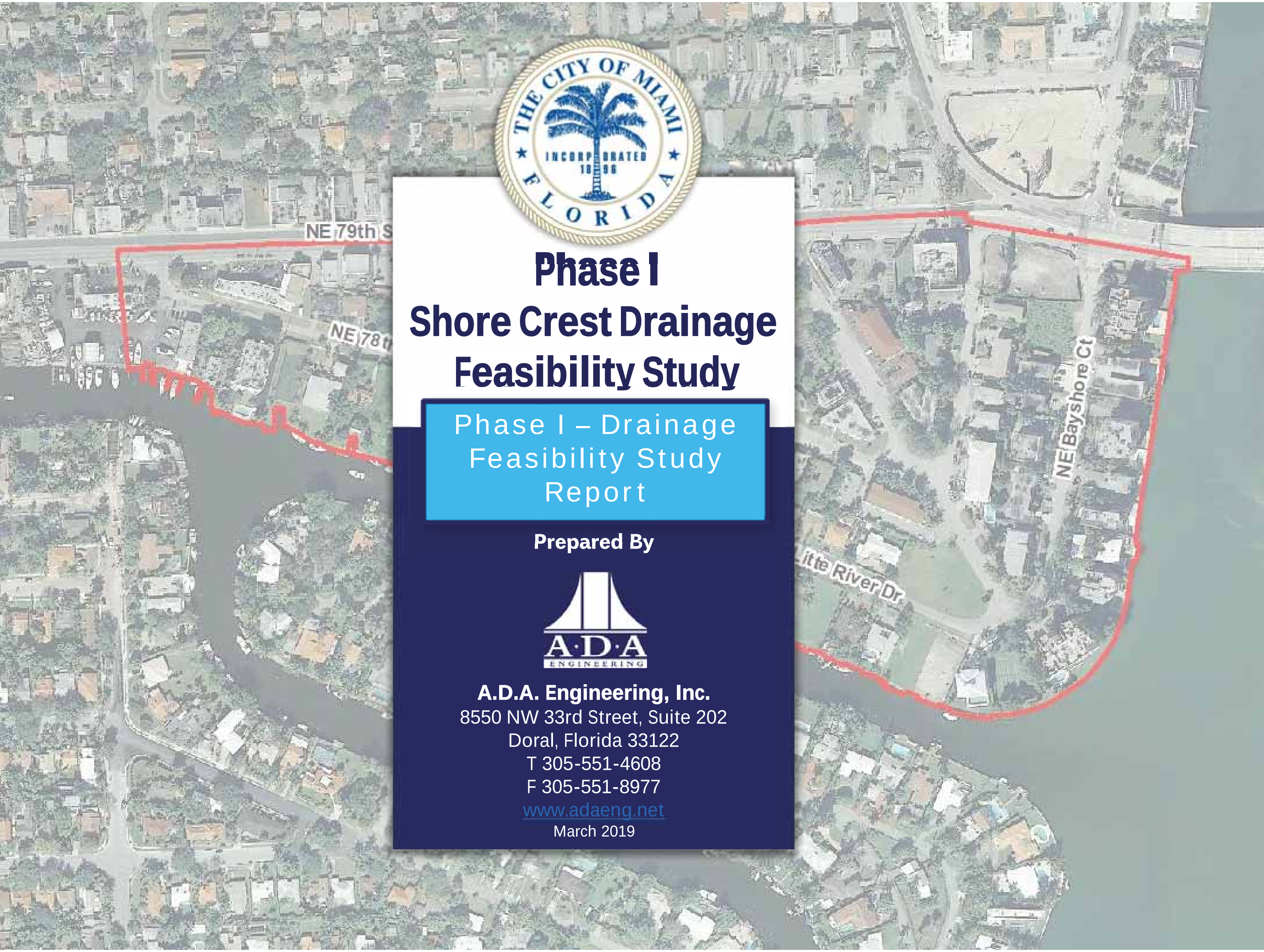

Phase I

Shore Crest Drainage Feasibility Study

Phase I – Drainage Feasibility Study Report

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March 2019

City of Miami
Phase I – Shore Crest
Drainage Feasibility Study Report

Prepared by:

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City of Miami
Phase I – Shore Crest Drainage Feasibility Study Report

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1.0 EXECUTIVE SUMMARY

The Shore Crest area is located at the northeast end of the City of Miami (City) and is generally bound by NE 87th Street to the north, Biscayne Boulevard to the west, the South Florida Water Management District (SFWMD) C-7 Canal (Little River Canal) to the south and Biscayne Bay to the east. During the last five to 10 years, King Tides have progressively increased to the point that during normal King Tide conditions, most of the low-lying areas within Shore Crest experience significant tidal flooding, even without any rainfall events.

The purpose of this project is to perform a pilot drainage feasibility study within one of the most critically impacted area of Shore Crest. This area is located at the southeast end of Shore Crest (approximately 40 acres) and is bound by NE 79th Street to the north, NE 8th CT to the west, Little River Canal to the south, and Biscayne Bay to the east. **Figure 1.1.1** depicts the limits of the study area.

Figure 1.1.1 – Shore Crest Pilot Study Area Limits

As part of this drainage feasibility study, the existing condition impacts due to King Tide events with and without rainfall events were evaluated, and planning-level short-term and mid-range solutions were identified and evaluated to determine the most cost-effective solutions to be considered by the City.

A.D.A. Engineering, Inc. (ADA) was contracted by the City to complete the Shore Crest Phase I Drainage Feasibility Study in accordance with WO#1 (Project Number: B-17365), which is part of the City's Professional Services Agreement for Miscellaneous Civil

Environmental Engineering Services RFQ 16-17-063, City Code Section 18-87 between the City and ADA.

WO#1 was subdivided into seven (7) project activities (tasks) with the final task consisting of preparing the Phase I – Shore Crest Drainage Feasibility Study Report. Task 1 includes the required project coordination and progress meetings. The results and findings of the remaining tasks were summarized in three (3) task-specific Technical Memorandums (TM). The Technical Memorandums that were prepared as part of this projects are as follows:

- Technical Memorandum No. 1 – Data Collection and Evaluation
- Technical Memorandum No. 2 – Existing Conditions Assessment
- Technical Memorandum No. 3 – Short-term and Mid-Range Conceptual Stormwater Improvement Projects

During the Progress Meeting on February 28, 2019 it was agreed to postpone the Long-range Conceptual Stormwater Improvement Projects and Resiliency Assessment task from the study, due to the high uncertainty of the projected sea level rise for periods beyond 50 years.

TM No. 1 through 3 were combined to develop the Phase I – Shore Crest Drainage Feasibility Study Report. Comments and revisions from the City on each technical memorandum were incorporated into this Report.

1.1 Data Collection and Evaluation

Readily available data was collected and evaluated from the City, County, and State agencies for the Shore Crest pilot study area. That data collected as part of this project are cataloged in **Appendix 3A** and **Appendix 3B**. These data were used to develop an existing conditions integrated one dimensional/two dimension (1D/2D) hydrologic/hydraulic model using the ICPR4 model. The data was also used to assess the current seawall elevations relative to the current design high water (DHW) elevation, October 2017 recorded King Tide and recorders high tide elevations during Hurricane Irma. **Appendix 4A** includes the current seawall elevations relative to these tidal elevations.

Based on the available data provided by the City and obtained from various other agencies during this task, it was determined that there is sufficient data to complete the Phase 1 – Shore Crest Drainage Feasibility Study and develop the existing conditions hydrologic/hydraulic model to evaluate short-term and mid-range stormwater improvement projects.

The City should continue to monitor all flooding that occurs within the study area whether driven by rain or tidal events, documenting findings with photos and flood delineation maps. While the plugs installed by the City are a temporary solution to the King tide flooding, they should continue to be used until such time that a more permanent solution is available to be installed.

1.2 Existing Conditions Assessment

Using the available data collected as part of this project, an existing condition integrated one dimensional (1D)/two dimensional (2D) hydrologic/hydraulic model was developed using the ICPR4 model. The existing conditions ICPR4 model node/link schematic and input reports are included in **Appendix 4E** and **Appendix 4F**, respectively.

Data including topography, land use, soils, existing stormwater drainage infrastructure, rainfall, and current tidal stages were incorporated into the ICPR4 model. Both the hydrologic and hydraulic data was entered and the 2D mesh was generated.

Following the model setup and to ensure the accuracy of the model, a validation run was created to simulate the flooding experienced during the October 2017 King tide event. Concurrence was obtained from the City verifying the model accuracy. The inundation flood map for the validation simulation is included in **Appendix 4B**.

Following the model validation, the model was simulated under the following conditions:

1. Highest King Tide conditions with a 5-year, 1-day design storm event
2. Highest King Tide conditions with a 100-year, 3-day design storm event.

Inundation flood maps were created for each of these conditions to verify the model and represent the aerial extent and depth of flooding within the study area. These inundation flood maps are included in **Appendix 4C**. This information was then translated into establishing the current flood protection level of service (LOS) provided by the existing drainage systems.

The results showed significant roadway flooding with both design storm events and the flooding of four properties with the 100-year, 3-day event. A Flood Protection Severity Score (FPSS) was computed for the study area using the procedures implemented in the 2012 Stormwater Master Plan update. The computed existing conditions FPSS is 17.10. The LOS map and FPSS calculations are included in **Appendix 4D**. This value provides a basis for comparison with existing conditions for future Sea Level Rise (SLR) conditions and also for the implementation of Short-Term and Mid-Range capital improvement projects.

1.3 Short-Term and Mid-Range Conceptual Stormwater Improvement Projects

The existing condition validated, integrated one-dimensional (1D)/two-dimensional (2D) hydrologic/hydraulic model was used to identify Short-Term and Mid-Range Stormwater Improvements. The Capital improvements for the Mid-Range (2050) Planning Horizon include increased stormwater pipe sizes, expanded stormwater pipe infrastructure interconnectivity, a stormwater pump station, raised road elevations to a minimum 3.5 feet relative to the North American Datum of 1988 (ft-NAVD), added backflow preventers for private existing outfalls to remain, grouted select existing City gravity outfalls to remain, and a raised the seawall to a minimum 3.78 ft-NAVD (the predicted King tide of 2050).

Iterations of the capital improvements within the ICPR4 model were performed by increasing pump capacity, increasing pipe sizes, and expanding and interconnecting the pipe network, in order to accommodate the projected 2050 sea level and groundwater rise. These iterations of increasing the stormwater infrastructure capacity were performed until the roads were no longer flooded for the 5-year, 1-day storm event, and structural flooding was eliminated (as much as feasible) for the 100-year, 3-day storm event.

After the ICPR4 iteration analysis was completed, the Mid-Range Stormwater Improvements require an 80,000 gallons per minute (GPM) pump station. This pump station will be located within the Little River Pocket Mini Park parcel that is owned by the City. **Appendix 5A** shows a schematic of the Mid-Range stormwater pump station, and **Appendix 5D** shows a conceptual layout of the pump station within the Little River Pocket Mini Park. **Appendix 5B** shows typical section and map of the proposed roadway raising. **Figure 5.3.3** below shows the elements of the proposed capital improvements for the Mid-Range (2050) planning horizon.

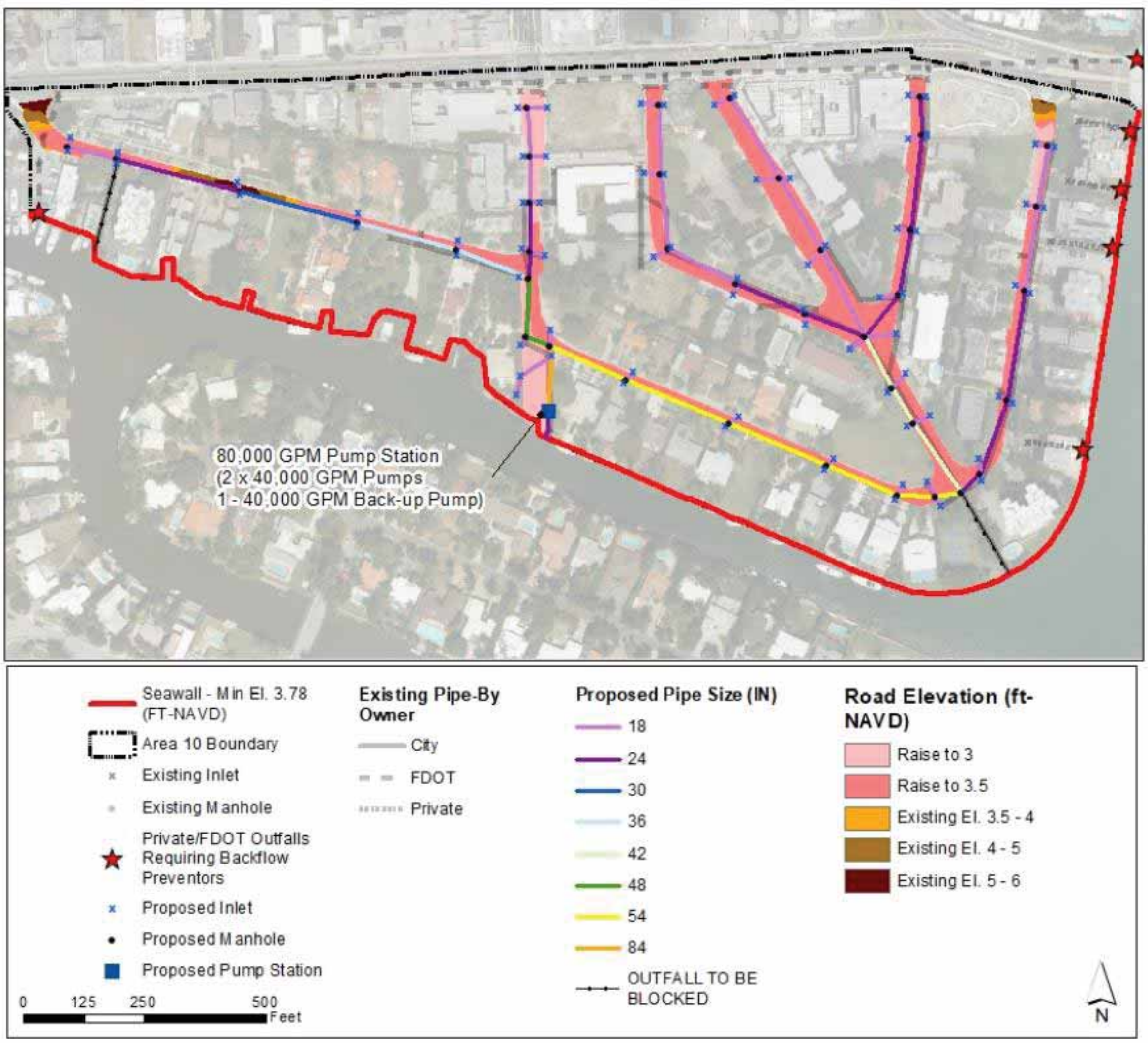

Figure 1.3.1 – Mid-Range Planning Horizon (2050) Capital Improvements

The Mid-Range (2050) stormwater improvement project was simulated under the following conditions:

- Sea level rise dictated by the *Unified Sea Level Rise Projection for Southeast Florida (2015)* NOAA High Curve for the year 2050 in conjunction with a 5-year, 1-day design storm event
- Sea level rise dictated by the *Unified Sea Level Rise Projection for Southeast Florida (2015)* NOAA High Curve for the year 2050 in conjunction with a 100-*year, 3-day design storm event.*
- Increase rainfall intensity for both the 5- and 100-year design storm events.

Appendix 5G shows the inundation flood maps for these simulated conditions.

For the Mid-Range planning horizon, the infrastructure improvements within the study area are not predicted to lower the Flood Protection Severity Score (FPSS). The FPSS for the existing conditions is 17.1 due to 0.4 miles of roadway and four buildings being flooded; for the Mid-Range planning horizon, the FPSS is increased to 28.0. This increase is primarily due to six structures having estimated finished floor elevations lower than the 2050 DHW elevation of 2.44 ft-NAVD. Due to the extent of flooding within the properties, the FPSS increases even though the roadway flooding has been eliminated. Since pumping groundwater is not possible, these low-lying structures will have to be abandoned or have their finished floor elevation raised in the future.

For the short-term stormwater improvement project, elements of the mid-range conceptual project that could be separated out were examined. Viability was based on future available funding and the ability to be constructed within the next two fiscal years with available funding.

Several of the Mid-Range (2050) planning horizon capital improvements are able to be implemented in the short-term. They are as follows:

- Raising of the roads
- Expanded, interconnecting and upsized pipe network
- Backflow preventers on City, private, and FDOT outfalls

The improvements were then implemented into an ICPR4 model with the existing tidal boundary conditions and existing DHW elevation in order to illustrate how constructing the short-term improvements will improve the flood protection LOS. The pump station and raising of the seawall were not included for this scenario. **Figure 5.3.7** below shows the details of the proposed capital improvements for the short-term planning horizon. The upsized outfall that will lead to the pump station in the Mid-range conditions will need to be optimized to a smaller diameter during the detailed design phase.

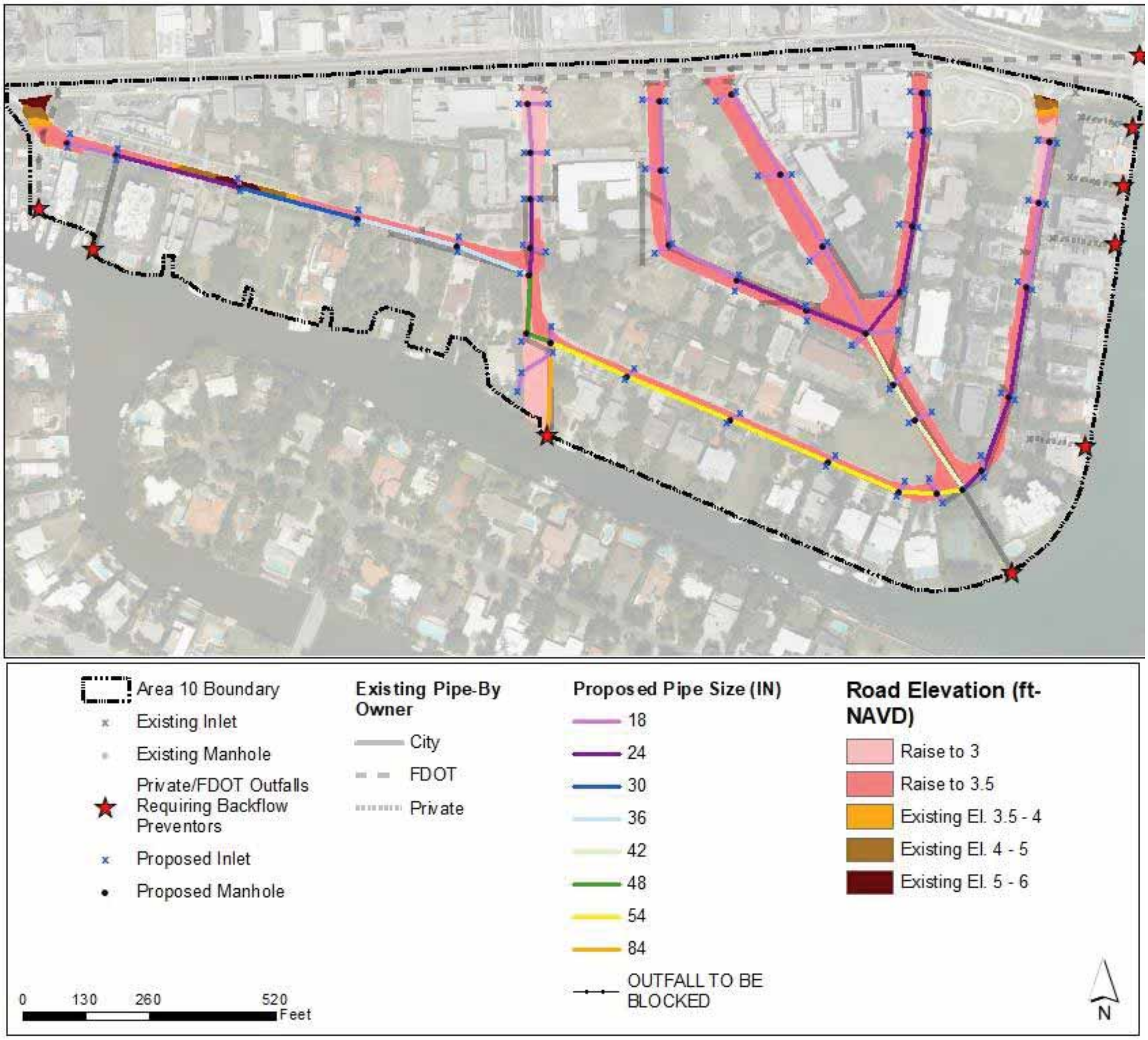

Figure 1.3.2 – Short-Term Planning Horizon Capital Improvements

The Short-Term Scenario was simulated under the following conditions:

- Highest King Tide conditions (identical to existing conditions from *Technical Memorandum No. 2)* in conjunction with a 5-year, 1-day design storm event
- Highest King Tide conditions (identical to existing conditions from *Technical Memorandum No. 2)* in conjunction with a 100-year, 3-day design storm event.

Appendix 5I shows the inundation flood maps for these simulated conditions.

The street flooding was eliminated by the proposed short-term stormwater improvement projects, but four buildings within the study area will still experience some level of flooding. The houses flooded during the 100-year event sit below 2.44 ft-NAVD and flooding cannot be eliminated even with the use of a pump station. The FPSS for the Short-Term Capital

Improvements Modeling was calculated to be 16.0, while the Existing Conditions Modeling had an FPSS of 17.1. However, if we compare the existing finish floor elevation with the current DHW of 0.47 ft-NAVD, the FPSS or the short-term improvement project will be 0, and the FPSS will remain 0 until the DHW reaches 2.44 ft-NAVD.

Planning-level cost estimates were developed for the Mid-range and Short-term stormwater improvement projects were based on the Florida Department of Transportation (FDOT) cost databases, costs from recent projects constructed within the City and ADA's own construction cost databases. The preliminary cost estimates for both the Short-Term and Mid-Range Capital Improvement Projects are provided in **Table 5.4.1**. **Appendix 5J** contains the detailed cost breakdown for both the Short-Term and Mid-Range Cost Estimates.

Table 1.3.1 – Mid-Range and Short-Term Improvement Project Opinion of Probable Construction Cost

Capital Improvement Projects	Opinion of Probable Construction Cost*
Mid-Range Capital Improvement Projects	$12,788,425.56
Short-Term Capital Improvement Projects	$4,421,658.06

1.4 Conclusions and Recommendations

Utilizing the existing conditions 1D/2D model created, Short-Term and Mid-Range capital improvement projects were analyzed for viability and cost effectiveness for both the 5-year, 1-day, and 100-year, 3-day events occurring in conjunction with the existing King tide and 2050 King tide events. The rainfall depths for the 2050 design storms were increased by 25 percent over existing condition to account for potential rising trend of rainfall depth.

Required capital improvements for the Mid-Range (2050) Planning Horizon include increased stormwater pipe sizes, expanded stormwater pipe infrastructure reach, added a stormwater pump station, raised road elevations to a minimum 3.5 ft-NAVD, added backflow preventers for select existing outfalls, grouted select existing outfalls and a raised the seawall to a minimum 3.78 ft-NAVD (the predicted King tide of 2050) at an estimated cost of $12,788,425.56. Since the vast majority of the seawall is privately owned, the City will need to pass wfordinances that require the raising of the seawall and adding backflow preventers within the private properties. For the 2050 planning horizon, the FPSS is increased to 28.0, even with the implementation of the capital improvement projects due to several properties lying below the 2050 DHW of 2.44 ft-NAVD. These properties will have to be abandoned or raised by 2050 as they will not be able to be protected from the groundwater rise. If the subject properties are abandoned or raised, the FPSS can be reduced to 0.0.

Several of the Mid-Range (2050) planning horizon capital improvements are able to be implemented in the short-term including raising of the roads; expanding, upsizing, and interconnecting the stormwater pipe network; and installing backflow preventers on private and FDOT outfalls, at an estimate cost of $4,421,658.06. With the implementation of the short-term capital improvements, the FPSS with the DHW of 2.44 ft-NAVD is lowered to 16.0. At less than about a third of the cost of the Mid-Range Capital

Improvement Project, the Short-Term Improvement Projects provide an immediate solution to the flooding within the Shore Crest study area and provides the City time to implement the Mid-Range Capital Improvement Projects. Geotechnical investigations and utility locates will need to be done prior to finalizing any design, but with the topographic survey has already being complete. Therefore, the design lead time for the short-term stormwater improvement project will be greatly reduced and will aid in addressing the current flooding conditions.

2.0 INTRODUCTION

2.1 Background

The Shore Crest area is located at the northeast end of the City of Miami (City) and is generally bound by NE 87th Street to the north, Biscayne Boulevard to the west, the South Florida Water Management District (SFWMD) C-7 Canal (Little River Canal) to the south and Biscayne Bay to the east. During the last five to 10 years, King Tides have progressively increased to the point that during normal King Tide conditions, most of the low-lying areas within Shore Crest experience significant tidal flooding, even without any rainfall events.

The purpose of this project is to perform a pilot drainage feasibility study within one of the most critically impacted area of Shore Crest. This area is located at the southeast end of Shore Crest (approximately 40 acres) and is bound by NE 79th Street to the north, NE 8th CT to the west, Little River Canal to the south, and Biscayne Bay to the east. **Figure 2.1.1** depicts the limits of the study area.

Figure 2.1.1 – Shore Crest Pilot Study Area Limits

As part of this drainage feasibility study, the existing condition impacts due to King Tide events with and without rainfall events were evaluated, and planning-level short-term and mid-range solutions were identified and evaluated to determine the most cost-effective solutions to be considered by the City.

2.2 Feasibility Study Purpose and scope

A.D.A. Engineering, Inc. (ADA) was contracted by the City to complete the Shore Crest Phase I Drainage Feasibility Study in accordance with WO#1 (Project Number: B-17365), which is part of the City's Professional Services Agreement for Miscellaneous Civil Environmental Engineering Services RFQ 16-17-063, City Code Section 18-87 between the City and ADA.

WO#1 was subdivided into seven (7) project activities (tasks) with the final task consisting of preparing the Phase I – Shore Crest Drainage Feasibility Study Report. Task 1 includes the required project coordination and progress meetings. The results and findings of the remaining tasks were summarized in three (3) task-specific Technical Memorandums (TM). The Technical Memorandums that were prepared as part of this projects are as follows:

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TM No. 1 through 3 were combined to develop the Phase I – Shore Crest Drainage Feasibility Study Report. Comments and revisions from the City on each technical memorandum were incorporated into this Report.

3.0 DATA COLLECTION AND EVALUATION

3.1 Data Collection

Data was collected from the City of Miami, the South Florida Water Management District (SFWMD), the Florida Department of Transportation (FDOT), the National Oceanographic and Atmospheric Administration (NOAA), the Florida Department of Environmental Protection (FDEP), the Southeast Florida Regional Climate Change Compact, and the Miami-Dade Water and Sewer Department. The data collected from these various sources is described in the following sections and summarized in **Appendix 3A** and **Appendix 3B**

3.1.1 City of Miami

ADA collected data associated with stormwater infrastructure, construction projects, and studies from the City of Miami. The City provided files which include the City's current catch basins and outfalls, drainage structures, drainage complaints, and overall basin areas for the study area within Shore Crest. Additional data collected from the City also includes the following:

- King tide observations from October 5, 2017 (photos and a flood delineation map)
- Tidal Flood Prevention Action plan
- Percolation test data or geotechnical reports in or near the Shore Crest study area
- Limits of City-owned seawall with the Shore Crest Area

The data catalog presented in **Attachment 3A** provides a listing of the City project data collected for incorporation into the hydrologic/hydraulic models. The data catalog also includes a section of pertinent GIS data collected from the City. The following subsection provide a summary of the most pertinent data collected.

3.1.1.1 Project Data

The City of Miami provided design plans for the original construction of the stormwater infrastructure from July 1958. Since then, the only drainage improvement completed within the study area was the installation of temporary plugs in September 2018 to mitigate the tidal flooding.

3.1.1.2 GIS Data

The City currently maintains stormwater infrastructure data in GIS shapefile format showing the layout the systems but very limited information about the systems themselves. Detailed structure information or pipe sizes and lengths are not available from the City GIS shapefiles. The City is currently in the process of using collected field data to update the current GIS database with pipe sized, material and inverts.

3.1.1.3 ALERT5 Data

ALERT5, who provides unmanned aerial systems (drone) assisted surveying and mapping, was retained by the City to survey the Shore Crest study area. Working in conjunction with the surveying and mapping firm, Stoner and Associates, Inc., ALERT5 created a detailed survey of elevations in point cloud formatting for the project area from the top of sea wall to the finished floor elevations of buildings of accessible buildings. The study also captured the inlet/manhole rim elevations and the roadway elevations. **Figure 3.1.1** shows an excerpt of the post-processed point cloud survey of the Shore Crest study area.

Figure 3.1.1 – ALERT5 Point Cloud Data

3.1.2 Other Data Sources

In addition to the main data contributions from the City of Miami, other sources of information were accessed to help support the development of the existing conditions 1D/2D hydraulic/hydrologic model for use in TMs 2 and 3. The following subsections provide a description of the entity and applicable data collected to support development of the Phase 1 – Shore Crest Drainage Feasibility Study. **Attachment 3B** provides a full list of data collected for this project from agencies other than the City.

3.1.2.1 South Florida Water Management District (SFWMD)

The SFWMD maintains an extensive water resources database, titled DBHYDRO, which includes hydrologic, meteorological, hydrogeologic and water quality data. The data contained within DBHYDRO includes historical and current data for the 16 counties governed by the SFWMD. In order to facilitate the access of this data, the SFWMD has developed a browser accessible via the web, at the following location:

- Main DBHYDRO portal:
    - http://www.sfwmd.gov/portal/page/portal/xweb%20environmental%20monitoring/dbhydro%20application
- DBHYDRO Browser Menu for accessing all SFWMD data:
    - http://my.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu

A screen capture of both the main DBHYDRO portal and the DBHYDRO Browser Menu website are shown in **Figure 3.1.2** and **Figure 3.1.3**.

Figure 3.1.2 – Main DBHYDRO Portal

A listing of the active stations within and near the study area is shown in **Table 3.1.1**. A figure showing the location of the stations listing in **Table 3.1.1** is shown in **Figure 3.1.4**.

Figure 3.1.3 – DBHYDRO Browser Menu

Table 3.1.1 – Active DBHYDRO Stations near the Shore Crest Study Area

Station	Agency	Class	Status	Start Date	End Date
S27_R	SFWMD	Rainfall	Active	01/08/1991	11/01/2018
S27_H	SFWMD	Stage	Active	01/01/1978	10/31/2018
S27_S	SFWMD	Flow	Active	01/01/1978	10/31/2018
S27_T	SFWMD	Stage	Active	05/31/1985	10/31/2018

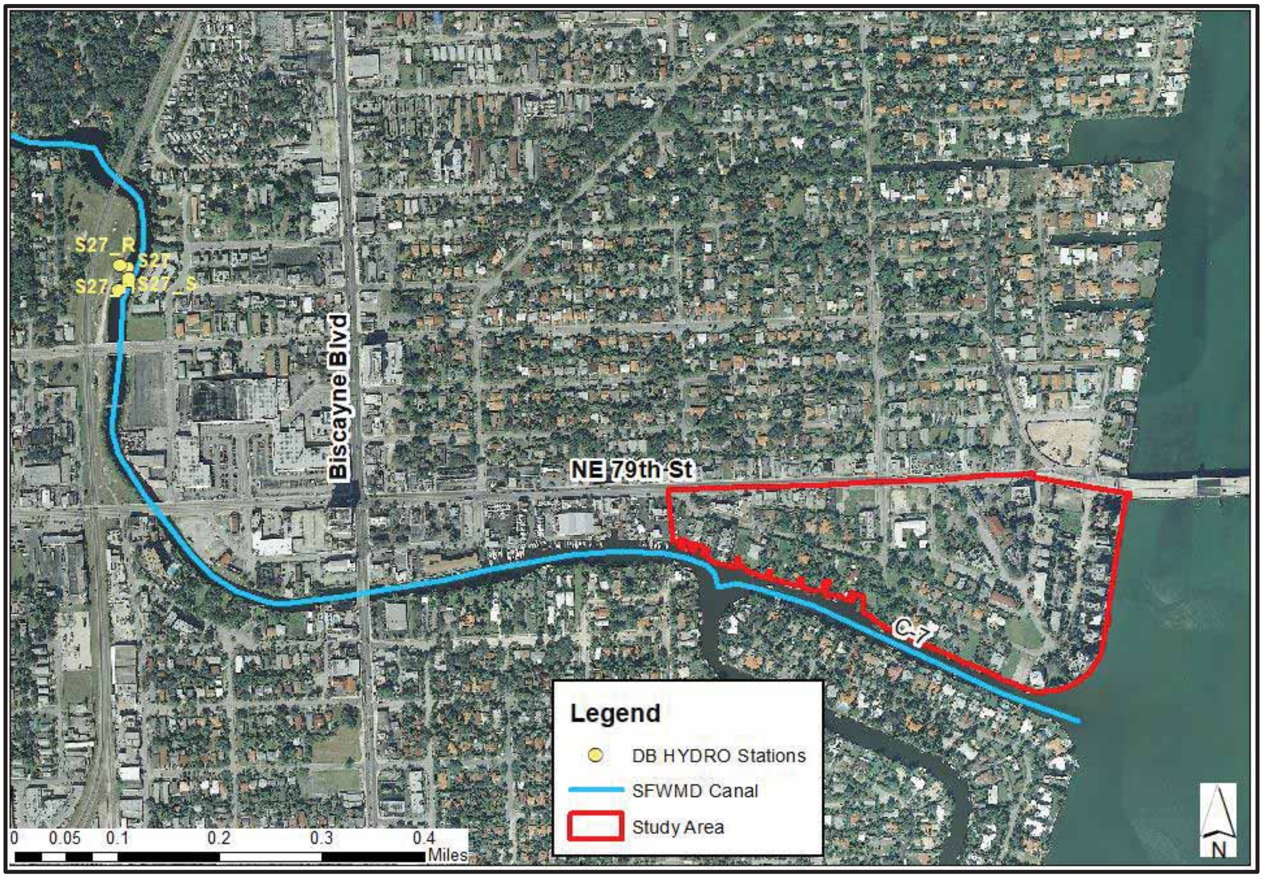


Figure 3.1.4 – Map of Active DBHYDRO Stations near Shore Crest Study Area

The SFWMD also maintains a GIS data repository for all GIS data for the SFWMD - see **Figure 3.1.5**. This GIS data catalog contains a shapefile with the location of all the DBHYDRO stations where observations, samplings, or monitoring are collected. This shapefile is available via the web, at the following locations:

- GIS Data distribution site:
  - http://my.sfwmd.gov/gisapps/sfwmdxwebdc/
- DBHYDRO monitoring station shapefile:
  - http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?query=unq_id=1588

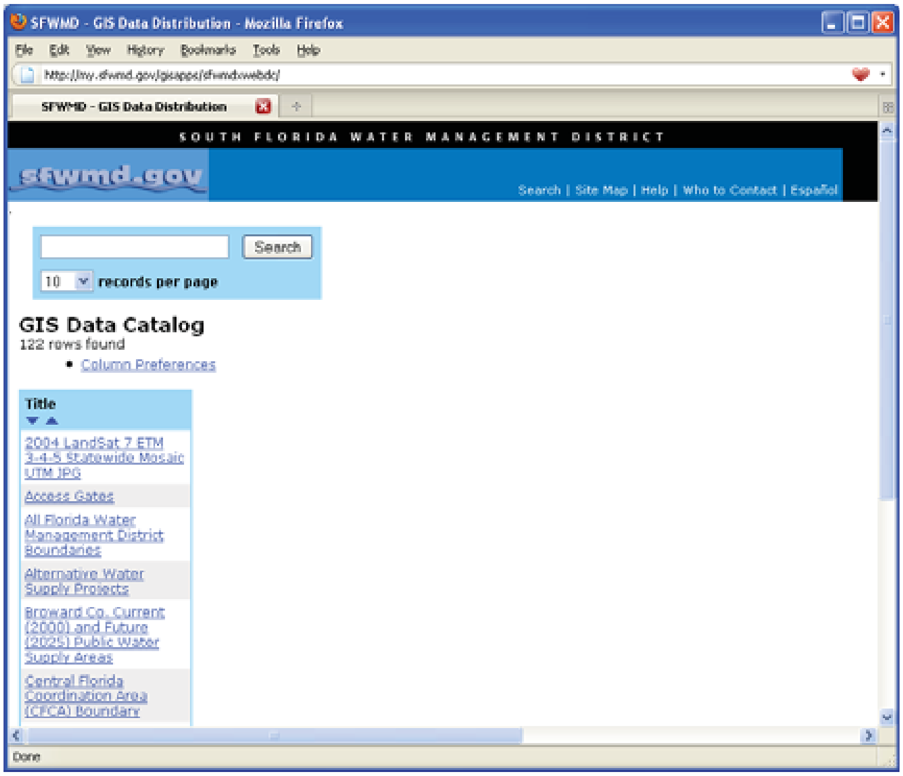


Figure 3.1.5 – SFWMD GIS Data Distribution Site

Existing stormwater and environmental permitting information is also available via the SFWMD ePermitting website. This website contains supporting documentation for Environmental Resources Permits (ERP) and applications submitted to and approved by the SFWMD. These websites are as follows:

- Main SFWMD permitting portal:
  - http://www.sfwmd.gov/portal/page/portal/levelthree/permits
- SFWMD ePermitting portal:
  - http://my.sfwmd.gov/ePermitting/MainPage.do

However, after a search of the ePermitting Web App, there appear to be no existing or historical ERPs within the study area. **Figure 3.1.6** is a screen shot from the Web App showing no permits within the study area.

Figure 3.1.6 – SFWMD ePermitting Web App

In conjunction with the SFWMD permitting website, a GIS shapefile containing the location and extent of the SFWMD ERP permit can be found at the SFWMD GIS data repository mentioned previously.

Additionally, the SFWMD data repository is a valuable source for additional data that is often directly available from other sources such as land use, soils, aerial imagery, etc. Although this data may not be maintained regularly, this data may be used if alternate sources are not accessible.

3.1.2.2 Florida Department of Transportation (FDOT)

Data requests were also extended to the FDOT. As-built plans of improvements along NE 79th Street from 2015, Bridge Repair/Rehabilitation As-Builts for the NE 79th Street Bridge from 2000, and the Outfall Assessment TWO #14 Report were obtained from FDOT. GIS mapping of the existing FDOT drainage structures around the project area were obtained utilizing the FDOT District 6 GIS Viewer. As shown in **Figure 3.1.7,** based on the GIS Viewer, all FDOT drainage structures are located along NE 79th Street, which is the only FDOT road found bordering the Shore Crest study area.

Figure 3.1.7 – FDOT Drainage Structures & Major Roads

3.1.2.3 National Oceanic and Atmospheric Administration (NOAA)

Tide data is available from the NOAA. NOAA monitors, assess, and distributes tide, current water level, and other coastal oceanographic data via their Center for Operational Oceanographic Products and Services (CO-OPS). NOAA's data is accessible via the web, at the following location:

- Main NOAA CO-OPS portal:
  - o http://tidesandcurrents.noaa.gov/
- NOAA's Observational Data Interactive Navigation (ODIN) site for station data:
  - o http://tidesandcurrents.noaa.gov/gmap3/

GIS data is also available from NOAA. GIS data for the NOAA stations can be obtained from the following location:

- NOAA GIS portal:
  - o http://www.nws.noaa.gov/gis/

For this drainage feasibility study, the main information we will gather from the NOAA tide stations is the historical King tide elevations over the last five years. Virginia Key, Station ID 8723214, is the closest tidal station to the study area. **Figure 3.1.8** shows the location of the Virginia Key station in reference to the Shore Crest study area while, **Figure 3.1.9** shows a screen capture of NOAA's Virginia Key station data information. Unless otherwise stated, all elevations for the Virginia Key Station are in reference to mean lower low water (MLLW). The information gathered will be converted to the North American Vertical Datum of 1988 (NAVD): 0.0 ft MLLW = 2.01 ft NAVD.

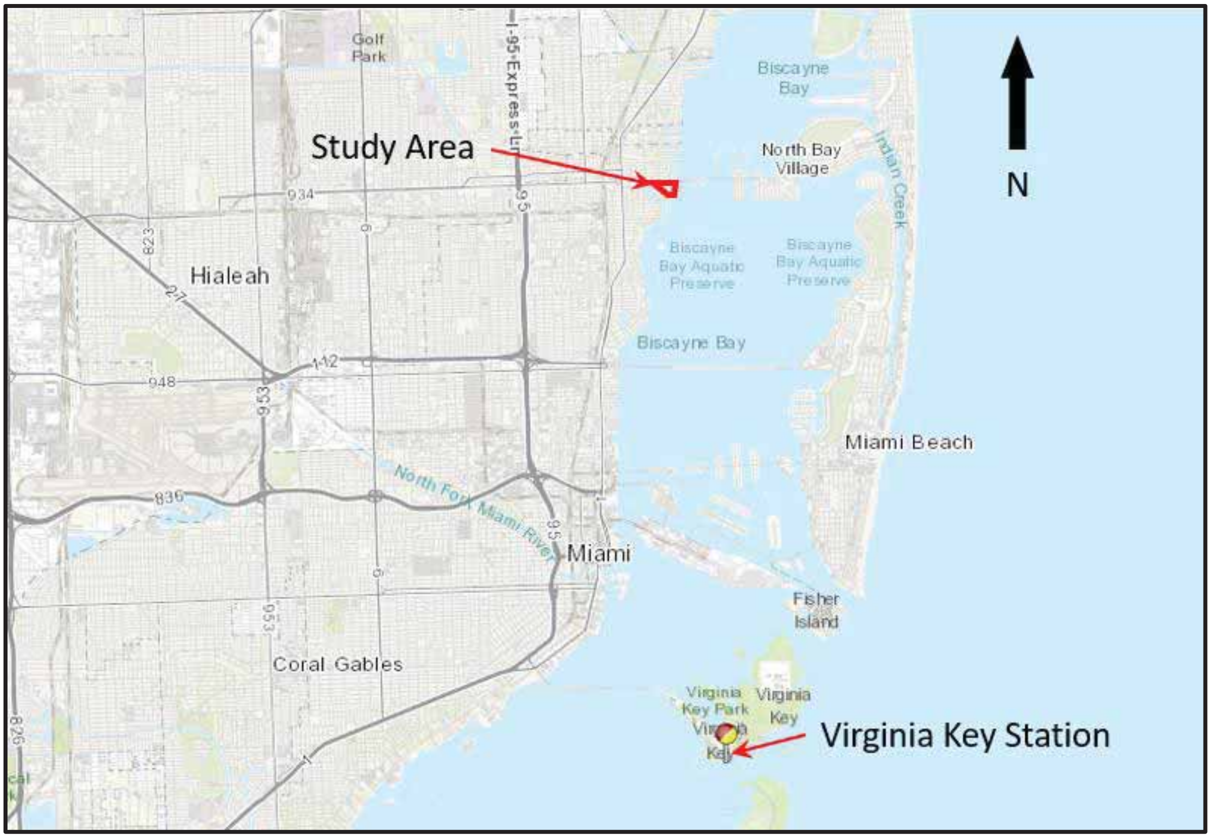


Figure 3.1.8 – NOAA CO-OPS ODIN Station Location

Figure 3.1.9 – NOAA CO-OPS ODIN Station Data Page

3.1.2.4 Florida Department of Environmental Protection (FDEP)

Existing Class V Injection Well information is available from the FDEP Geodatabase. Class V wells are part of the FDEP Underground Injection Control (UIC) department. Class V wells include a wide range of uses. **Figure 3.1.10** shows the study area with all the FDEP Permitted Class V Wells, five of which are stormwater injection wells but are all privately owned and operated. The City does not own or operate any stormwater injection wells within the study area. FDEP UIC's data is accessible via the web, at the following location:

- Main FDEP Geospatial Open Data portal:
    - o http://geodata.dep.state.fl.us/

Figure 3.1.10 – FDEP Class V Underground Injection Wells

3.1.2.5 Southeast Florida Regional Climate Change Compact

A number of sea level rise studies are available through the internet with often diverging opinions as to the existence, cause, and extent of the expected rise in average sea level in addition to impacts associated with storm surges from hurricanes combined with sea level rise. In July 2014, Miami-Dade County published the findings of a Sea Level Task Force initiated by the County to review available sea level studies and to provide recommendations with regards to addressing sea level rise at the County Level. This document titled *Miami-Dade Sea Level Rise Task Force Report and Recommendations* is available through the County's Sea Level Rise Task Force webpage:

- http://www.miamidade.gov/planning/boards-sea-level-rise.asp

In October 2015, the Southeast Florida Regional Climate Change Compact published the *Unified Sea Level Rise Projection* Study for Southeast Florida (**Figure 3.1.11**). It outlines the SLR projections from various agencies for the year 2030, 2060, and 2100.

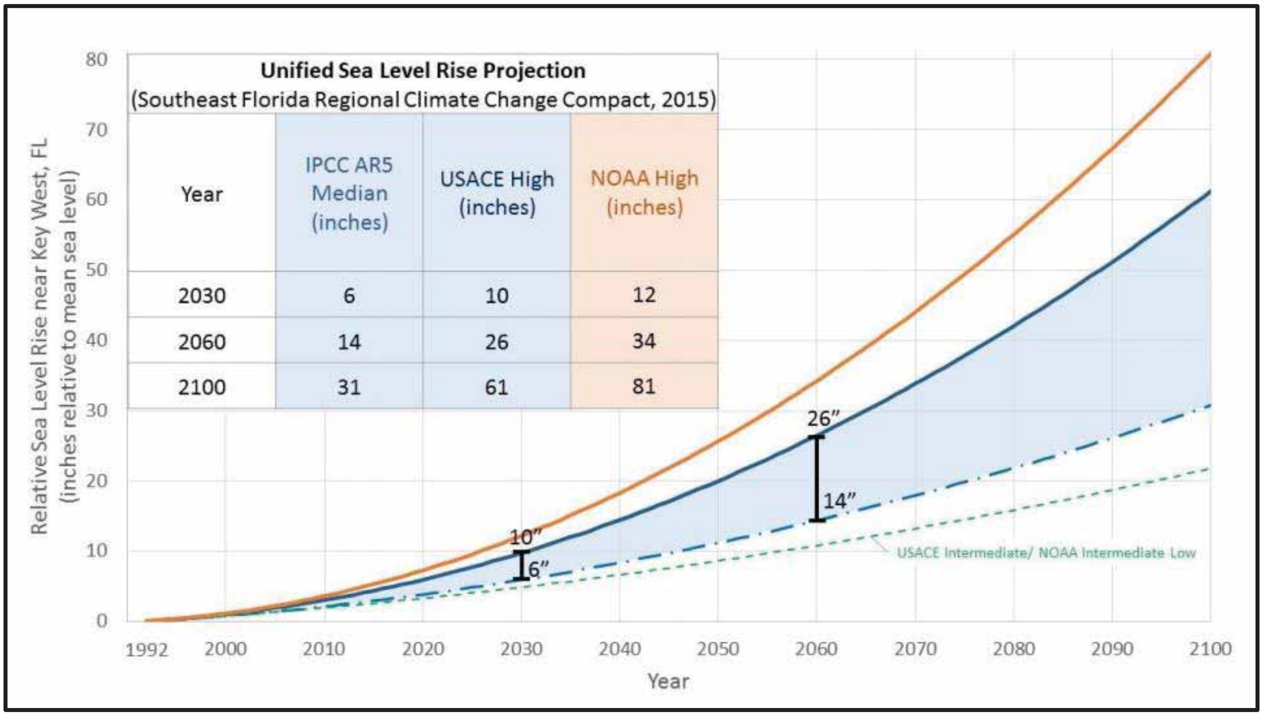


Figure 3.1.11 – Southeast Florida Regional Climate Change Compact's Sea Level Rise Projections

The study is available through the Compact's webpage:

- http://www.southeastfloridaclimatecompact.org/

Additionally, Florida Atlantic University, with funding from FDOT, has also done research on sea level rise and climate change as it relates to South Florida. Their research is available through their Climate Change in South Florida webpage:

- http://www.ces.fau.edu/climate_change/

3.1.2.6 Miami-Dade Water and Sewer Department

The isohyetal maps from SFWMD historically used in determining rainfall depths for storm events were developed in 1990. In May 2015, CH2M developed updated rainfall criteria for the Miami-Dade Water and Sewer Department (WASD) utilizing nine climate stations throughout Miami-Dade County in the report *Final Rainfall Intensity, Duration, and Frequency Projections Based on Climate Change for Miami-Dade County*. The current rainfall depths shown in the report show an increase of 25 to 30 percent over the existing isohyetal maps.

3.2 Data Evaluation

The data collected from the City of Miami, Miami-Dade County and other sources were evaluated to define the completeness and viability of the data as well as to identify the pertinent items that would be applicable to the Drainage Feasibility Study and the short-term, mid-range, and long-range goals. The following subsections detail the pertinent components of the data collected and their potential role in the development of the feasibility study.

3.2.1 City of Miami Data

With regards to the City of Miami Data, the as-built plans, basin delineations, and the data provided by ALERT5 are the most valuable items for the development of a representative existing conditions hydrologic/hydraulic models and the potential solution analyses.

The ALERT5 data provided a 3-dimensional survey of the existing surface, including buildings and vegetation along with the existing drainage infrastructure. This information was used to establish the existing conditions 1D/2D hydraulic/hydrologic model, which was used in the development of Technical Memorandum #2 (**Section 4.0**). In addition, this data was also be used in the evaluation of short-term and mid-range solutions documented in Technical Memorandum #3 (**Section 5.0**).

The ALERT5 survey of the top of the existing seawall elevations had to be established based on ground elevation averaging, for areas with heavy vegetation over the seawall. For future drone surveying efforts, drone side flights should be included to obtain actual elevations below the canopy along the areas with seawalls.

The City of Miami GIS information was very limited. While it provided the overall layout and relative structure location, no additional information such as pipe size, pipe material, inlet type, pipe inverts, etcetera was available.

Information regarding the King tide and the flooding response with the temporary plugs in place, installed as part of the Tidal Flood Prevention Action Plan, will help to pinpoint the areas of greatest risk from tidal flooding.

3.2.2 Data from other Sources

The data collection effort associated with this task was primarily focused on collecting the necessary data from agencies other than the City of Miami to ensure the accuracy of the feasibility study and the viability of potential solutions. The most important data was collected from various agencies with the key items being:

- Defined sea level rise criteria (Southeast Florida Regional Climate Change Compact)
- Revised rainfall depths for the design storm events (WASD)
- Established recent King tide elevations (NOAA)

Though DBHYDRO information is available from SFWMD, no active monitoring stations are available within the study limits. The only active stations nearby are upstream in the C-7 Canal at the S27 Control Structure; however, rainfall depth will be utilized from this station for help in establishing the current level of service of the drainage system.

The outfall assessment report provided by FDOT picked up the public outfalls along the project boundaries. The private outfalls were not included in the study. The outfall information will be used in conjunction with the as-builts in defining the existing conditions for the ICPR4 Model. But the information was also used to assess the viability of the existing outfalls for use in future solutions.

3.3 Conclusion & Recommendations

Based on the available data provided by the City and obtained from various other agencies, there was sufficient data to complete the Phase 1 – Shore Crest Drainage Feasibility Study and develop the existing conditions hydrologic/hydraulic model.

The City should continue to monitor all flooding that occurs within the study area whether driven by rain or tidal events, documenting findings with photos and flood delineation maps. While the plugs installed by the City are a temporary solution to the King tide flooding, they should continue to be used until such time that a more permanent solution is implemented based on available funding.

4.0 EXISTING CONDITIONS ASSESSMENT

4.1 Summary of Available Data used in Developing the Existing Conditions Hydrologic/Hydraulic Model

4.1.1 Topography

ALERT5 Mapping provided a digital elevation model (DEM) based on the North America Vertical Datum (NAVD) of 1988, Release Version 1 obtained from drone LiDAR. This is a DEM of bare earth that covers the entire study area at a resolution of 1.4 centimeters. The DEM data for the study area is displayed in **Figure 4.1.1**.

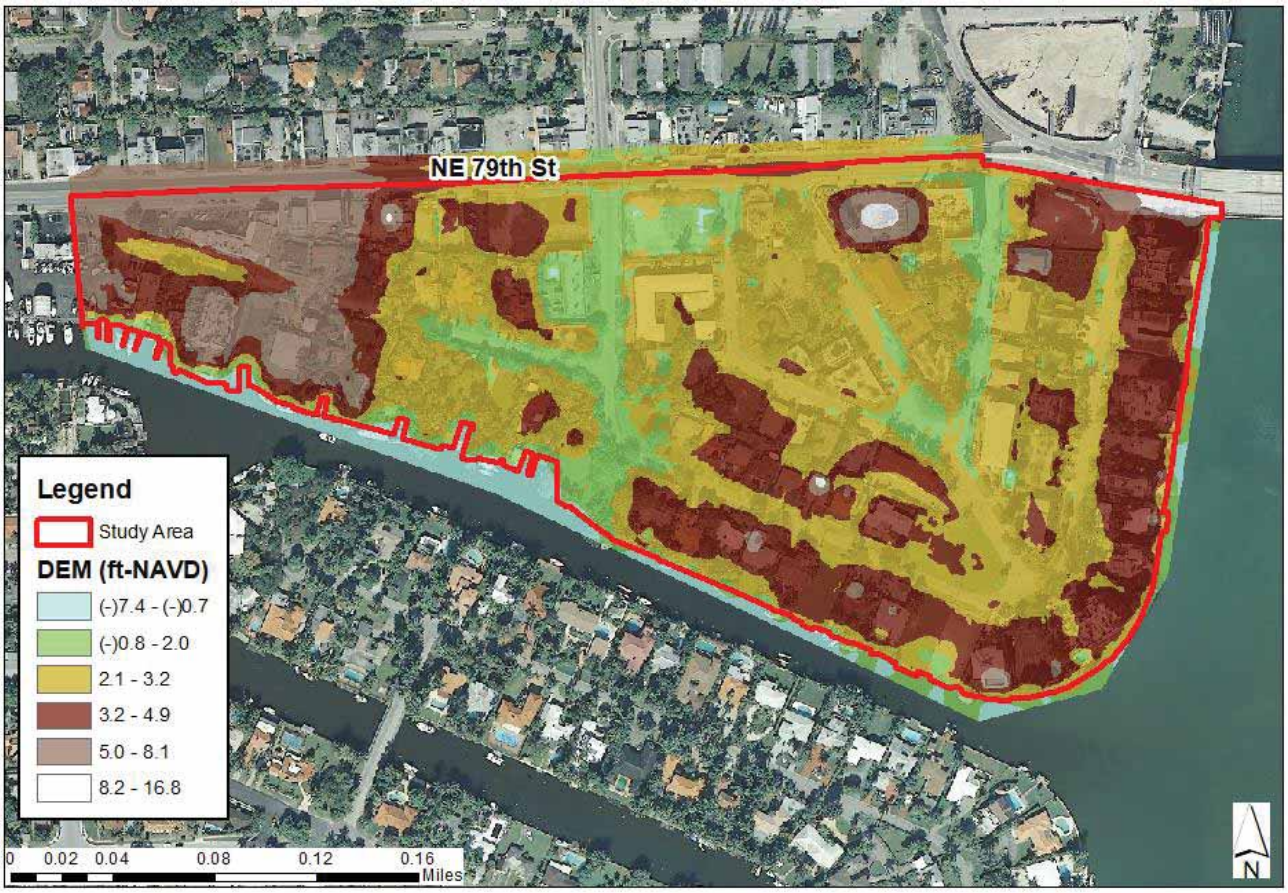


Figure 4.1.1 – Topographic Map of the Shore Crest Study Area

4.1.2 Land Use

A land use coverage was obtained from the City of Miami Zoning Department. The land use classifications are shown in **Figure 4.1.2**.

Figure 4.1.2 – City of Miami Land Use Map – Shore Crest Study Area

4.1.3 Soils

Soil zones were defined according to the soil depth to seasonal high groundwater elevation versus water storage capacity relationship specified in the SFWMD Environmental Resource Permit (ERP) Applicant's Handbook Volume II for coastal compacted soils, based on Soil Conservation Service estimates. Three soil zones (**Figure 4.1.3**) were defined for the study area based on the average pervious area elevations:

1. Elevations below 2 ft-NAVD
2. Elevations equal to or between 2 and 5 ft-NAVD
3. Elevations above 5 ft-NAVD.

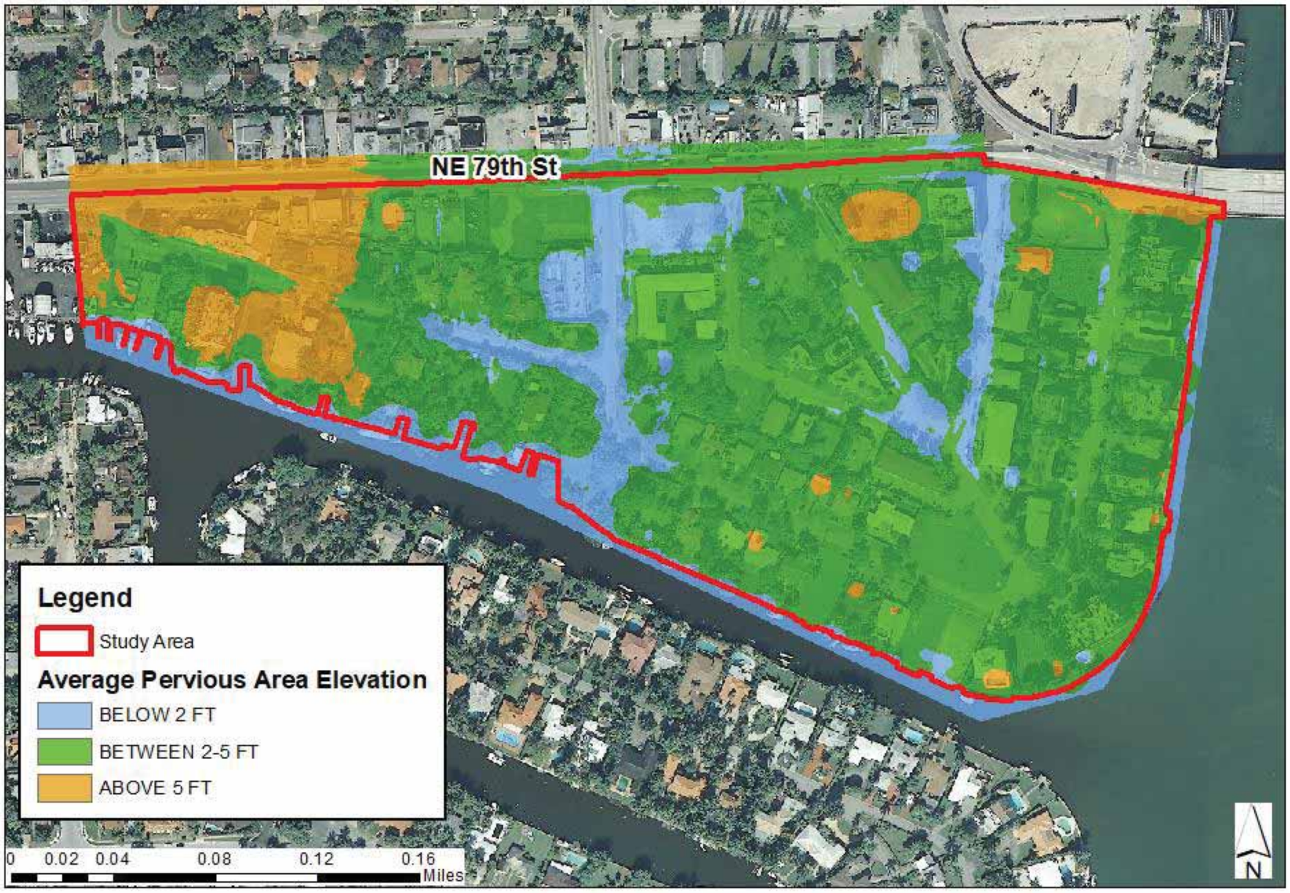


Figure 4.1.3 – Soil Zone Map for the Shore Crest Study Area

4.1.4 Stormwater Drainage System

Data for the stormwater drainage system was obtained from the City's stormwater infrastructure GIS database. The SFWMD permits database was also reviewed to obtain information, but unfortunately no SFWMD permits, current or historical, exist within the limits of the study area. FDOT does not have any infrastructure within the study area however, NE 79th Street abuts the north limits of the project. As-built plans along with the FDOT GIS database were used to obtain available information regarding stormwater infrastructure.

4.1.4.1 Inlets and Storm Drains

Inlets, manholes, and storm drains from both the City's GIS database and the FDOT database were included in the model to simulate the field conditions as accurately as possible. **Figure 4.1.4** shows the stormwater infrastructure used in the 1D/2D model.

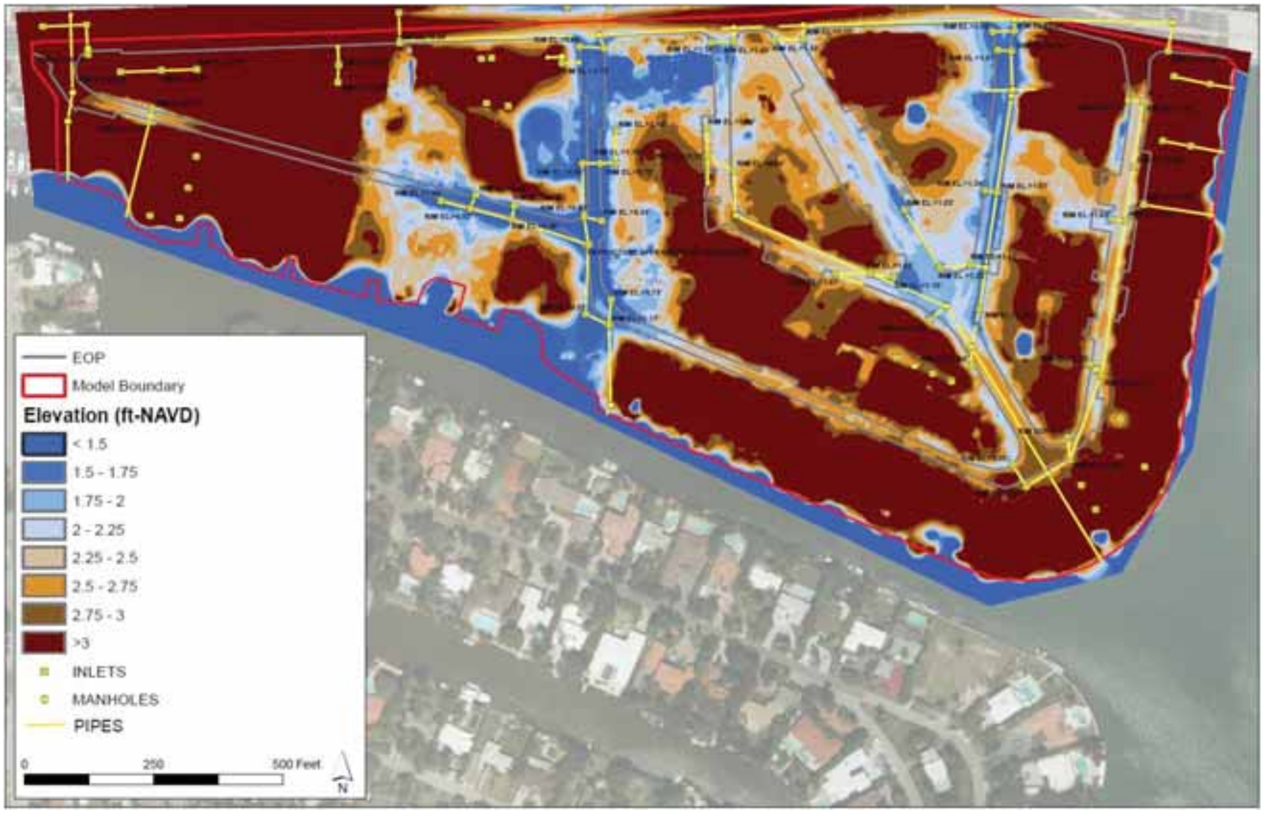


Figure 4.1.4 – Ground Survey with Stormwater Infrastructure from GIS Databases Rainfall

Gauge rainfall data is available at the SFWMD DBHYDRO Station S27_R along Canal C-7 located to the northwest of the study area, however this rainfall is not associated with specific return frequencies. In order to analyze the design storm events, the rainfall depths were specified according to SFWMD design rainfall contours (isohyetal maps) for each of the storm frequencies. The rainfall depths are outlined in **Section 4.3.2.5**.

Two design storm events were simulated to establish the existing conditions LOS in the Shore Crest study area:

1. 5-year, 24-hour
2. 100-year, 72-hour

The SCSII-24 and SFWMD72 non-dimensional rainfall distributions were used for the 24-hour and 72-hour design storms, respectively.

4.1.5 Current Tide Stages

Measured tidal stages related to the King tides over the last 5 years, starting with 2014, were obtained from the closest NOAA station to the study area which is located at Virginia Key, Florida. **Table 4.1.1** shows the low and high tides associated with the King Tides at Virginia Key for the 5-year period. The King tide in 2017 was the highest on record

Table 4.1.1 – Virginia Key Tide Station King Tide Elevation (NOAA)

Year	Designation	Date	Elevation (FT-NAVD)
2018	High	10/8/2018	1.59
	Low	10/8/2018	-1.28
2017	**High**	**10/5/2017**	**2.28**
	Low	**10/5/2017**	**-0.41**
2016	High	10/14/2016	2.04
	Low	10/14/2016	-0.70
2015	High	9/27/2015	2.05
	Low	9/27/2015	-1.06
2014	High	10/7/2014	1.53
	Low	10/7/2014	-1.40

4.2 Assessment of Existing Seawall Elevations

4.2.1 Existing Seawall Topography

The elevations of the existing seawall along the C-7 Canal and Biscayne Bay were provided as part of the LiDAR obtained by ALERT5 within the study area. However, the top of wall elevations were skewed in some locations due to heavy canopy cover. These elevations were isolated and removed from the file. The top of seawall was then averaged in these locations to create a continuous wall that best represents the actual field conditions. For future drone LiDAR, it is recommended that flights are done and elevations shot at an angle to mitigate the canopy interference present in this study.

The existing top of seawall ranges in elevation from 0.11 ft-NAVD to 5.38 ft-NAVD. The seawall profile in comparison to the location can be seen in **Appendix 4A** along with the plotted DHW, the October 2017 King tide stage, and the maximum sea level observed during Hurricane Irma. The lowest portions of the seawall lie along the C-7 Canal with the vast majority being privately owned. Only the seawall along Little River Pocket Park at the end of NE 10th Court (approximately Station 1550 to 1620) is owned by the City.

While less than 10 LF of seawall lie below the DHW of 0.47 ft-NAVD, approximately fourteen percent or 525 LF lie below the October 2017 King tide event with a peak high tide of 2.28 ft-NAVD. This leaves the study area very susceptible to tidal flooding regardless of how efficient the stormwater collection system may be. This also shows that the blocking of outfalls or installation of backflow preventers are not viable long-term solutions.

4.3 Existing Conditions Hydrologic/Hydraulic Model Setup

4.3.1 Overview of the ICPR 4 Expert Model

The ICPR computer model is a hydrodynamic model developed by Streamline Technologies, Inc. that simulates hydrologic and hydraulic conditions by generating runoff hydrographs and dynamically routing these hydrographs through dendritic, diverging, looped, and/or bifurcated stormwater management systems.

ICPR 4 Expert Model (ICPR4) includes 2-dimensional (2D) overland flow and groundwater components that are used instead as either a substitute or a complement to the traditional basin runoff method. These components generate a flexible triangular mesh based on a specified resolution and several types of landscape features. Honeycombs (or control volumes) are formed around the vertices of the triangles and produce different hydrological responses based on specified parameters the mapping of various landscape characteristics. Mass balance is accounted in each control volume to determine excess rainfall. The Manning's equation is used to calculate runoff velocities using the slopes from the interpolated topography along the sides of the mesh triangles. Analogous to the 1D node-link computational schematic, the vertices of the triangles are treated as nodes and the sides of triangles are the overland flow links.

The layers that can be used to define the parameters which generate the overland flow hydrological unit response in each honeycomb are:

1. Ground elevations
2. Soil parameters
3. Land cover (% imperviousness)
4. Manning's roughness coefficients
5. Rainfall zones
6. Evapotranspiration parameters

4.3.2 Hydrologic Model Setup

For the models developed for this study, only the 2D overland flow component, as opposed to the traditional manual basin approach was used to generate runoff. The rainfall-runoff parameters specified in the models are described below.

The soil zone, land cover zone, and rainfall zone parameters are intersected to characterize the infiltration capabilities and precipitation amount for each 2D honeycomb basin. **Figure 4.3.1** illustrates the honeycomb basins (green), land use coverage (blue outline), and soil zone coverage (orange outline in a portion of the validation model. A mass balance for each honeycomb basin is performed which calculates the total precipitation minus the total infiltration for each honeycomb basin based on the soil zone, land cover zone, and rainfall zone.

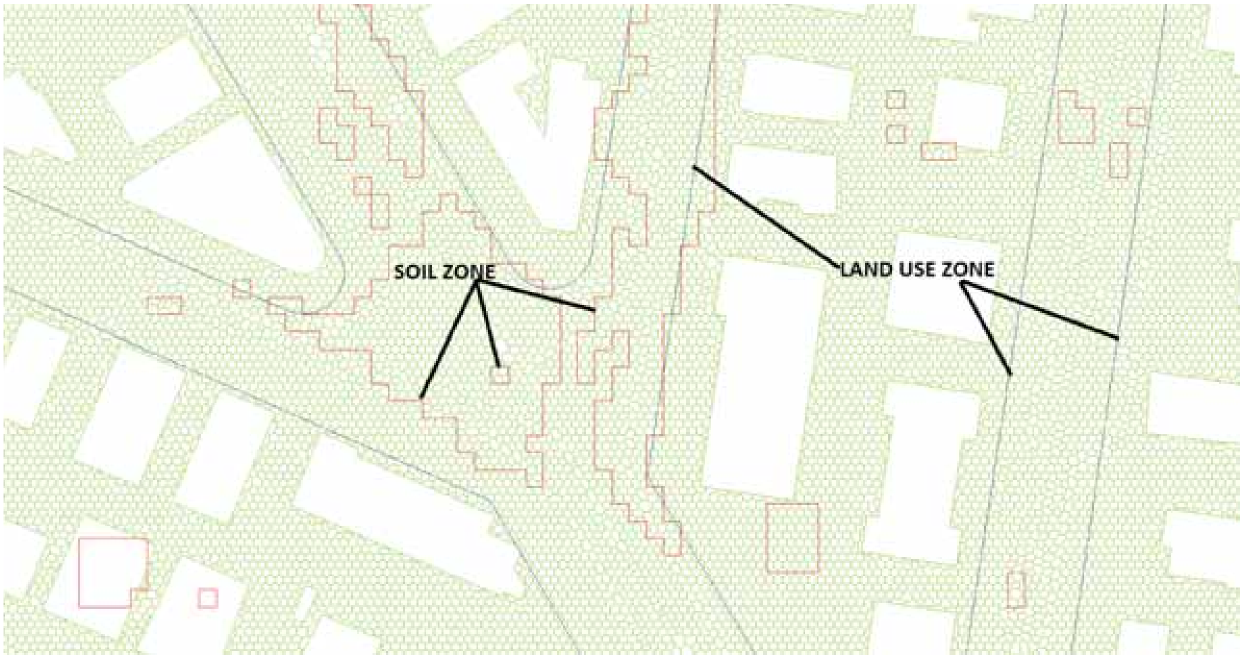


Figure 4.3.1 – 2D Honeycomb Basin Characterization

4.3.2.2 Model Domains

Due to hydraulic and hydrologic connectivity of the site, the entire limits of the study area were combined into a single model domain.

4.3.2.3 Average Wet Season/Design High Water (DHW)

In order to set the initial condition parameters for the 2D mesh and 1D nodes, a DHW assumption was made. Since the entire site is located in the coastal area, it was assumed that the DHW was tidally influenced. More specifically, the DHW was calculated using the average of the King tides over the last five years. **Equation 4-1** describes the calculation of the Coastal DHW assumption value.

Equation 4-1 – Coastal DHW Assumption

$$DHW = \frac{(Avg.\ of\ King\ tides\ for\ past\ 5\ years) + (Avg.\ of\ low\ tides\ corresponding\ to\ King\ tides)}{2}$$

The five highest tidal events associated with King tides from the past five years (2014-2018) at the NOAA Tidal Gage at Virginia Key were examined. The mean elevation of the five King tides was averaged with the mean elevation of the corresponding low tide for those five tidal events. The resulting DHW assumption value was 0.47 ft-NAVD. For the validation model and establishing the current level of service, no sea level rise (SLR) was considered.

4.3.2.4 Curve Number

Curve number was calculated for each soil zone / land use combination. **Table 4.3.1** shows each calculated number.

Table 4.3.1 – Curve Number for Land Cover Zone / Soil Zone Combinations

Land Cover Zone Abbr.	Land Cover Zone	Soil Zone	Curve Number
T	Transportation, Communication, and Utilities	1	98
CII	Commercial and Service, Industrial, Institutional	1	98
U	Parks and Recreational Open Space, Undeveloped	1	97
R	Residential	1	98
W	Coastal Water Bays and Ocean Inland Water	1	98
T	Transportation, Communication, and Utilities	2	94
CII	Commercial and Service, Industrial, Institutional	2	93
U	Parks and Recreational Open Space, Undeveloped	2	76
R	Residential	2	92
W	Coastal Water Bays and Ocean Inland Water	2	98
T	Transportation, Communication, and Utilities	3	91
CII	Commercial and Service, Industrial, Institutional	3	88
U	Parks and Recreational Open Space, Undeveloped	3	56
R	Residential	3	85
W	Coastal Water Bays and Ocean Inland Water	3	98

As described in **Section 4.1.3**, soil zone was based on the soil depth to water table versus water storage capacity relationship specified in the SFWMD Environmental Resource Permit Applicant's Handbook Volume II for compacted soils, based on Soil Conservation Service estimates. Land use was determined from the Proposed Land Use GIS coverage provided by the City of Miami (**Section 4.1.2**). ICPR4 uses the spatial coverages of the land cover zones and the soil zones during the 2D overland flow runoff calculations.

4.3.2.5 Design Rainfall Depths

Rainfall depths for the Design Storms were estimated by the SFWMD isohyetal design rainfall contours and are as described in **Table 4.3.2**. Due to the small size of the study area, rainfall depths did not vary across the model limits.

Table 4.3.2 – Model Domain Rainfall Depths

Model Domain	5Y-1D	100Y-3D
Entire Study Area	6.4 in	16.0 in

4.3.3 1D Hydraulic Model Setup

In ICPR, a stormwater management system is modeled into a network of nodes or junctions and links. A node is a discrete location in the drainage system where runoff enters the system and conservation of mass or continuity is maintained. The nodes model the hydrologic conditions within the drainage system. Links represent connections between nodes and are used to transfer or convey stormwater runoff through the system. The links are used to model the hydraulic response of the management system for a defined hydrologic condition. A node-link schematic was developed to show the relationship between the nodes and links in the model setup that represent the existing and proposed designs. Node/link schematics for the 1D model setup for the existing conditions model are in **Appendix 4E**.

The stormwater pipe, manhole, and inlet spatial datasets obtained from the City of Miami Atlas and the ALERT5 survey were used to define the 1D features of the hydraulic model. The inlet and manhole locations along with the pipe lengths and locations were taken from the ALERT5 survey while the pipe dimensions were pulled from the City Atlas. This information was then used to define the 1D nodes and 1D links in the model to define the 1D interface features. The 1D node interface features tie the 1D and 2D models together such that surface water flow will discharge into the 1D hydraulic network where it will be conveyed to the stormwater pipes and discharged out of the basins.

The type of node used for the manholes in the basin is referred to as the Stage/Area node. Nodes at the basin's outfalls are referred to as time/stage nodes set to an oscillating tidal schedule.

Details about other 1D hydraulic model setup parameters such as link and node parameters, curve number lookup tables, impervious and roughness lookup tables, and boundary stage tables for design storm and validation events are included in **Appendix 4F**.

4.3.4 2D Hydrologic Mesh Development

The entire study area was modeled as a single Overland Flow Region in the 2D component of ICPR4. Overland Flow Regions are characterized by their land use classifications, soil zone classifications, elevation raster values, and rainfall zone values.

The 2D triangular mesh defines the computational resolution of the model, i.e., how accurately the model can read and use the information from the input DEM and the other model layers. Several 2D features can be used to define the mesh. For example, breaklines and breakpoints were the most common 2D features used in the models developed. Breaklines were incorporated into the 2D model to represent the roadways and ensure that the triangular mesh edges run along the correct paths to simulate flow. Extrusion areas were incorporated into the 2D model to represent the buildings and ensure that overland flow did not fictitiously run through buildings. Extrusion areas allow rainfall within the building area but the runoff is routed through 2D links on the edges of the buildings.

A road centerline shapefile provided by the City was imported into ICPR4 to delineate the breaklines. This shapefile was edited to include the edge of pavement from the available aerial maps, and the edge of pavement as also included as breaklines. Breakpoints were placed evenly throughout the model domains 5 feet apart, which guarantees that there will be triangle vertices (2D nodes) every 5 feet. **Figure 4.3.2** shows an example of how the triangular mesh (blue) was set-up along one of the breaklines (green) and extrusions (orange).

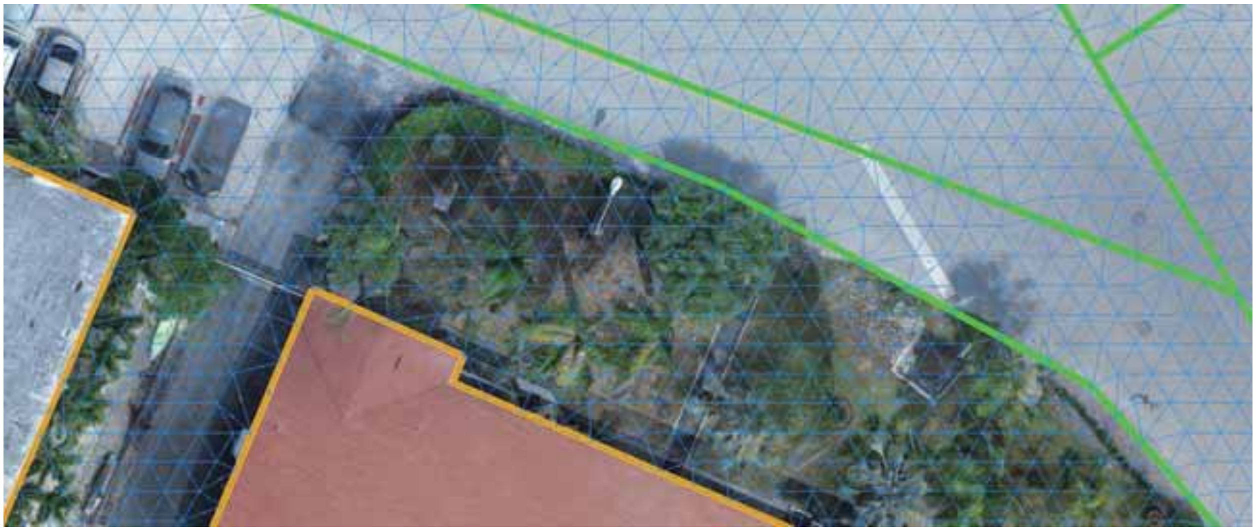


Figure 4.3.2 – Triangular Mesh Formulation with Breaklines

Once the geometry of the mesh was defined, the links of the triangular mesh and the cells of the diamond and honeycomb meshes were given characteristics based on the DEM, soil zone map, land zone map, and roughness zone map. The soil zone, land cover zone, and roughness zone map layers each have a corresponding lookup table to further describe the hydrologic characteristics of the features in the map layers. **Figure 4.3.3** shows the triangular (blue), diamond (pink), and honeycomb (green) meshes that characterize the 2D hydraulic model.

A single boundary stage line along the edge of the model domain that borders the C-7 Canal or Biscayne Bay was used. The overland flow links coincide with the boundary stage lines are disabled, and the stage elevations along the boundary stage lines are forced as the tidal boundary stage elevation. This permits overland flow runoff into the Intracoastal Waterway eliminates the “wall” effect of the basin boundary edges that causes water buildup in some basin boundary locations and also allows for seawall overflows in the cases where tidal events are higher than waterfront lot elevations.

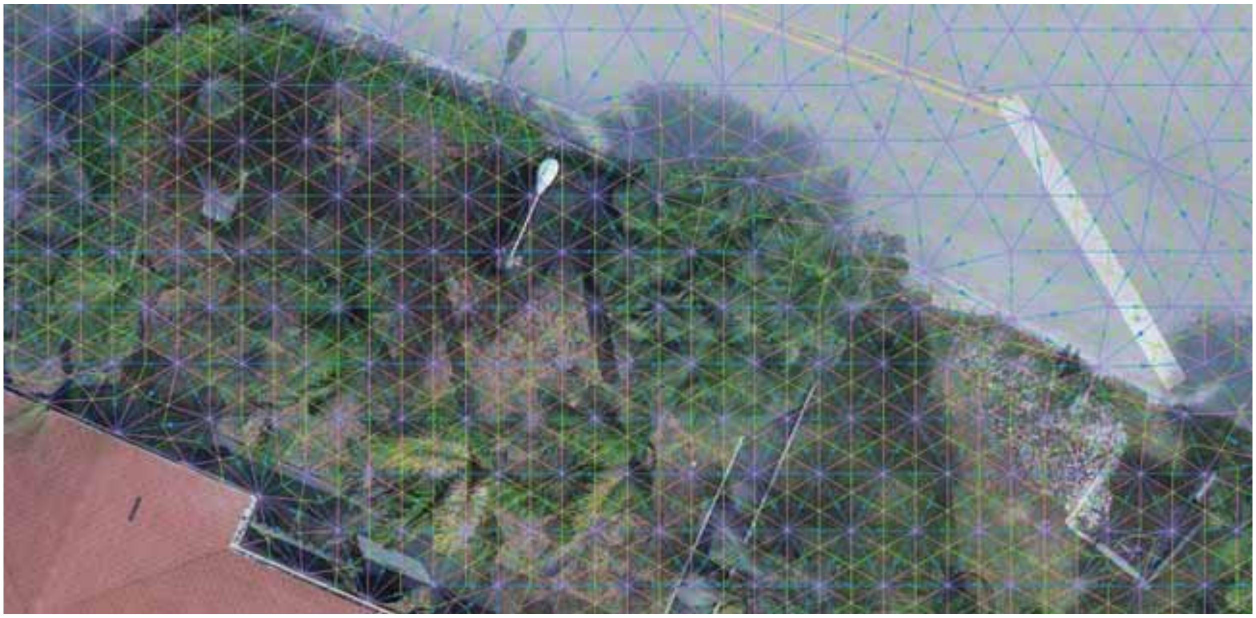


Figure 4.3.3 – Diamond and Honeycomb Characteristic Meshes

The curve number rainfall excess method was used to model soil water storage and the corresponding runoff volume. The curve number for each of the honeycomb catchment areas is defined by the soils map layer and land cover map layer as described in **Section 4.3.2.4** and **Table 4.3.1**. Roughness zones characterize the diamond mesh and define the manning's n values for the overland flow links within the diamond-shaped cells. Roughness zones are spatially defined by the roughness zones map layer which, in the case of this model, is identical to the land cover map layer. Roughness values for each land use type are described for each model in **Appendix 4F**.

4.3.5 Boundary Conditions

For the Validation Model, the high and low stages measured at the NOAA tidal gage at Virginia Key for the 2017 King tide event were specified as the downstream boundary elevations. The tailwater stages at the S27 structure were not considered as it did not appear to register the Kind Tide events.

For the design storm event boundary conditions, conservative high tidal conditions were used. The same King tide condition from the validation was used to simulate the effects of the max King tide conditions in conjunction with the design storm events. The corresponding low tide for the 2017 King tide was also used. A 6-hour, oscillating tide cycle was assumed for the 1-day and 3-day design events. The tidal elevations used were 2.28 ft-NAVD and (–)0.41ft-NAVD for high and low tides, respectively. **Appendix 4F** shows this boundary stage set for each design storm event. The north (along NE 79th Street) and west boundaries of the study area were treated as true hydrologic boundaries; no water entered or left the study area through this boundary. Existing Conditions Hydrologic/Hydraulic Model Validation

4.3.6 Validation Storm Event Identification and Selection

A model validation period was selected based on a single event where widespread flooding occurred and was well documented in the study area. Communications with City staff indicated that flooding typically occurred yearly during King tide events but the October 2017 event was the most extreme. Thus, this event was chosen for the validation model. **Figure 4.3.4** shows the recorded tides for the for the time period surrounding the 2017 King tide event on October 5, 2017.

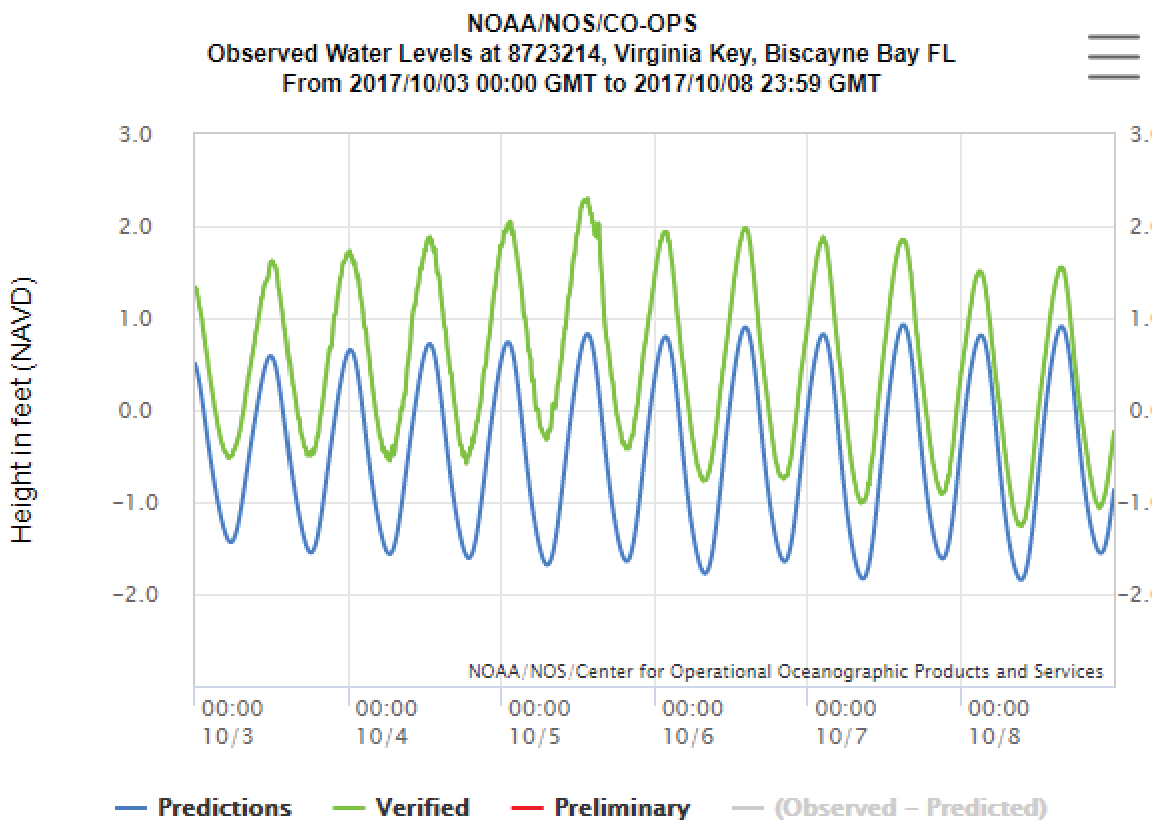


Figure 4.3.4 – NOAA Tide Gauge Data for Period Surrounding Validation Event

4.3.7 Hydrologic and 2-D Model Setup for Validation Storm Event

The validation simulation period was set to run for 24 hours cycling through the low and high tides associated with the King tide event on October 5, 2017. The assumptions made to specify the initial and boundary conditions are described in **Sections 4.3.2.3** and **4.3.5**, respectively. The validation model does not account for any rainfall, as was the condition when the King tide and associated flooding occurred.

4.3.8 Validation Storm Event Results and Inundation Flood Maps

ICPR4 has the capability of exporting raster files of 2D model results at any time during the simulation period. Maximum elevation and ground elevation raster files were exported from ICPR4. The ground elevation raster was then subtracted from the maximum elevation raster to create a depth of flooding raster. The depth of flooding raster for the study area is included in **Appendix 4B**.

Validation flood maps were delivered to the City via email on December 10, 2018 for the City to compare the flood depths and extent of flooding predicted by the model to the observed flooding and know flooding complains. Based on the City's review and comparison, the validation model's inundation flood maps for the October 2017 King tide event generates flooding very consistent with the drone aerial footage, flooding complaints, and observed flooding on the ground. No discrepancies of note were observed between the flooding predicted by the model with known areas of flooding.

There is consensus that the model represents very well the observed flooding during the 2017 King tide event. Therefore, it is assumed that this model is a valid representation and was carried forward to assess the flood protection level of service for the Shore Crest study area and to evaluate the required stormwater management improvements needed to address flooding and to address future predicted sea level and ground water rise.

4.4 Existing Conditions Design Storm Event Simulations and Results

4.4.1 Summary of Design Storm Event Results

The validated ICPR4 model documented in **Section 0** was then used to simulate the level of flooding for the Shore Crest study area during the 5-year, 24-hour and 100-year, 72-hour rainfall events and boundary conditions documented in **Section 4.3**. **Table 4.4.1** summarizes the design storm events' results with the range of flooding depth for each street within the study area where the worst flooding occurs. **Appendix 4C** has inundation maps for each of the design storm events.

Table 4.4.1 – Summary of Design Storm Events' Results

Maximum Depth of Flooding (FT)		**Locations of Significant Flooding**
5Y-1D	**100Y-3D**	
1.5	1.7	NE 78th Street
1.5	1.6	NE 10th Avenue
0.7	0.8	NE North Little River Drive
1.2	1.4	NE Bayshore Court
1.4	1.6	N Bayshore Drive
0.8	1.0	Dunham Boulevard at NE 78th Road
1.2	1.4	Little River Pocket Park

4.4.2 Flood Protection Level of Service

4.4.2.6 Flood Problem Area Ranking Procedure

The ranking of flooding problem areas within the study area will be related to the defined stormwater infrastructure flood protection level of service (FPLOS) as follows:

1. Building finished floor elevations shall be at or above the 100-year, 3-day design storm peak flood elevations (SFWMD ERP Applicant's Handbook, Volume II).

Both tidal flooding and the 100-year, 3-day storm event shall be considered in determining the peak elevations.

2. City owned residential roads shall be at or above the 5-year, 1-day design storm peak flood elevations (SFWMD ERP Applicant's Handbook, Volume II). Both tidal flooding and the 5-year, 1-day storm event shall be considered in determining the peak elevations.

The severity of flooding within each problem area will be determined through the calculation of a flooding problem severity score (FPSS), which is a function of two "severity indicators" that are directly related to the FPLOS criteria described previously. These severity indicators are defined and summarized below. Each of these indicators also has an assigned "weighting factor" (WF), which is related to the relative importance of the flooding severity indicator.

1. **NS:** Number of structures anticipated to flood by a 100-year, 3-day design storm event, which can include commercial, residential, and public buildings. All structures and/or buildings are considered equivalent, regardless of their size or value. **(WF = 4)**
2. **MCLRS:** Miles of residential streets anticipated to be impassable during 5-year, 1-day design storm event. All collector and local residential streets are considered impassable if the depth of flooding exceeds the crown of the road during the 5-year, 1-day design storm event. **(WF = 2)**

The severity indicators are rated by an exceedance (E) value pursuant to the following severity score listed in the table below.

Depth of Flooding Above the FPLOS	E
Less than or equal to 6 inches	1
Greater than 6 inches and less than or equal to 12 inches	2
Greater than 12 inches	3

Given the definitions for the flooding severity indicators (NS and MCLRS), WF, and E, the FPSS for each problem area is calculated using the following formula, where $E_{(i)}$ relates to the degree of exceedance for each of the five severity indicators.

$$\textbf{FPSS} = \sum 4E_i * NS + \sum 2E_i * MCLRS$$

4.4.2.7 Flood Problem Area LOS Determination

Numerous GIS files were collected from the City of Miami and data provided by ALERT5 to represent the roads, properties, and topography within the study limits. The various flood severity indicators of the FPSS equation outlined in **Section 4.4.2.6** were quantified using standard GIS tools to facilitate the analysis of the resulting model data versus the DEM provided by ALERT5.

As presented in **Section 4.3.8**, the modeled flood depths for the design storms were calculated by subtracting the modeled maximum elevation raster output, from ICPR4, from the modeled ground surface elevation raster output used by ICPR4. The resulting flood depth raster has cell dimensions of 5-ft by 5-ft.

A 5-ft by 5-ft raster file was also created from the road centerlines. All road centerline cells were given a value of 1 and all other cells were given a value of 0. This road centerline raster was multiplied by the 5-year, 1-day flood depth raster to produce a grid along the road centerline with 5-year, 1-day flood depth values. The road centerline raster was also multiplied by the 100-year, 3-day storm maximum elevation raster to produce a coverage along the road centerline with 100-year, 3-day flood elevation values to be used in the analysis of flooded structures.

The 5-ft by 5-ft rasterized road centerline flood depth raster was reclassified using ArcMap tools. The reclassify tool was used to change any raster cell with a value less than 0.25 to zero, any raster cell with a value between 0.25 and 0.5 to a reclassified value of 1, any raster cell with a value between 0.5 and 1 to a reclassified value of 2, and any raster cell with a value above 1 to a reclassified value of 3. This created an Exceedance value for each 5-ft section of City roadway. **Appendix 4D** includes the MCLRS flooded and the exceedance values for the road raster in existing conditions. The number of cells with each exceedance value was summed to give a count of 5-ft roadway sections for each flooding exceedance value. **Appendix 4D** shows the MCLRS count for the study area.

Next, the number of structures flooded, or NS, was calculated using the CAD survey files provided by ALERT5 and then further verified with aerial coverage.

Per the data collected in TM1 – *Data Collection and Evaluation* (**Section 3.0**), the finished floor elevations were obtained from the ALERT5 survey along with as-builts from the City's Building Department. The structures were delineated with a point shapefile in GIS, and finished floor elevations were assigned for each structure. Then the 5-ft by 5-ft road centerline 100-year, 3-day maximum elevation raster was further processed by converting it into a point shapefile. A spatial join was performed with the target raster set as the structures point shapefile and the join raster set as the road max flood elevation point shapefile. The structure location point shapefile attribute table was then populated with the closest road flood elevation.

Attribute table calculations were then performed for the depth of flooding of the structures. The finished floor elevation for each structure was subtracted from the maximum flood elevation for the nearest road. Negative values from this calculation were converted to 0 because this indicated that the road flood elevation was lower than the finished floor elevation. The flood depths were then assigned an exceedance value. As described earlier, any structure flooded less than 0.5-ft was assigned an exceedance value of 1. Any structure flooded between 0.5-ft and 1-ft was assigned an exceedance value of 2. Any structure flooded above 1-ft was assigned an exceedance value of 3. **Appendix 4D** shows the structure flooding and exceedance values for each problem area.

The number of flooded structures with each exceedance value was summed to give a count of structures for each flooding exceedance value for the study area. **Appendix 4D** shows the number of structures flooded (NS) count for each problem area.

4.4.2.8 Existing LOS

The values quantified by the two "severity indicators" outlined above determined the severity of flooding and were used to establish the FPSS value for the study area in the existing condition. The FPSS for the existing conditions is 17.10.

Appendix 4D contains the Flood Protection Level of Service map for the entire study area.

- 5-year, 24-hour event:
  - 0.4 miles of road flooded
- 100-year, 72-hour event:
  - 4 buildings inundated

In the conceptual stormwater improvement project analysis (**Section 5.0**), the FPSS will be established for the SLR conditions, and then again with the implementation of short-term and mid-range solutions as a means to compare effectiveness.

4.5 Conclusion

Utilizing the information obtained in the Data Collection and Evaluation task described in **Section 3.0**, a 1D/2D ICPR4 model was created to analyze the current flood conditions. To ensure the accuracy of the model, a validation run was created to simulate the flooding experienced during the October 2017 King tide event. Concurrence was obtained from the City verifying the model accuracy. This model was then used the simulate the effects of the 5-year, 1-day, and 100-year, 3-day events occurring in conjunction with the King tide events. The results showed significant roadway flooding with both design storm events and the flooding of four properties with the 100-year, 3-day event. The FPSS score for the study area in the existing condition is 17.10. This value provides a basis for comparison with existing conditions for future Sea Level Rise (SLR) conditions and also for the implementation of Short-Term and Mid-Range capital improvement projects (**Section 5.0**).

5.0 SHORT TERM AND MID-RANGE CONCEPTUAL STORMWATER IMPROVEMENT PROJECTS

5.1 Mid-Range (2050) Planning Horizon Model Setup

5.1.1 General

Model parameters requiring adjustment for the sea level planning horizon modeling task include the tidal boundary conditions, soil storage values, rainfall depths, and groundwater initial conditions. For the 2050 planning horizon tidal boundary conditions were raised, soil storage was decreased, rainfall depths increased, and groundwater initial conditions increased.

5.1.2 Mid-Range (2050) Planning Horizon Tidal and Groundwater Parameters

The *Unified Sea Level Rise Projection for Southeast Florida* (2015) contains three global curves adapted for regional application as shown in **Figure 5.1.1**. The NOAA High curve from this study was applied per the City's request and because its intended use is for medium-term projections. The value of sea level rise applied in this study for the 2050 projections is 18 inches. Adding 18 inches to the high and low tide conditions used in the Existing Conditions Model of *Technical Memorandum No. 2 – Existing Conditions Assessment* (TM2) (**Section 4.0**) brings the high and low tides for the Mid-Range Planning Horizon to 3.78 feet relative to the National Geodetic Vertical Datum of 1988 (ft-NAVD) and 1.09 ft-NAVD, respectively. **Figure 5.1.2** graphically displays the current and 2050 projected tidal conditions.

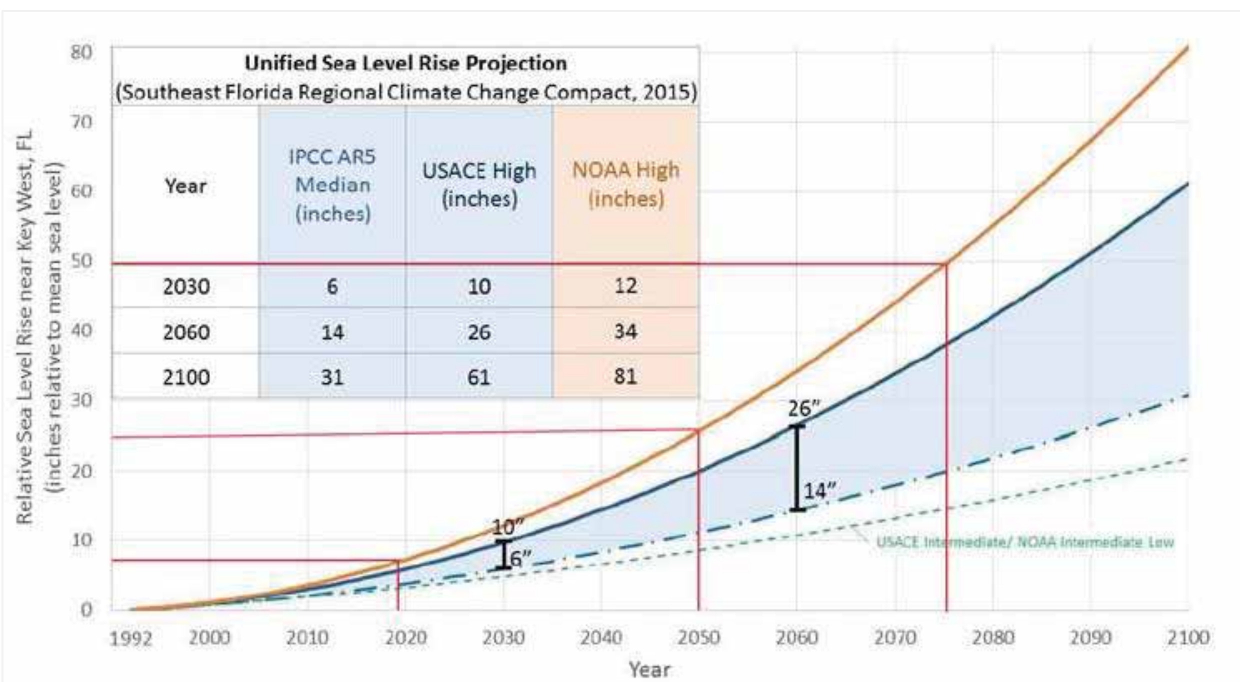


Figure 5.1.1 – Unified Sea Level Rise Projections for Southeast Florida (2015)

According to the 2016 study performed by Miami-Dade Water and Sewer, in conjunction with the USGS (*Hydrologic Conditions in Urban Miami-Dade County, Florida, and the Effect of Groundwater Pumpage and Increased Sea Level on Canal Leakage and Regional Groundwater Flow*) for every unit of sea level rise, groundwater conditions rise by one unit as well for locations near the coastline. Therefore, it was assumed that groundwater conditions were the average of the high and low tide elevation for the 2050 sea level rise scenario due to the tide levels being greatly unknown.

The initial groundwater elevation in the existing condition (TM No. 2, **Section 4.0**) is the average of the past five years of recorded King Tide high and low tide elevations. The initial stage elevation was raised from 0.47 ft-NAVD in the Existing Conditions model to 2.44 ft-NAVD in the Mid-Range 2050 Planning Horizon model. **Table 5.1.1** and **Figure 5.1.2** summarize the current-2019, 2050- and 2075 projected high tide, low tide design high water (DHW or groundwater) conditions.

Table 5.1.1 – Projected Tide and Groundwater Elevations with SLR

	High	Low	DHW	NOAA Estimated SLR from 1992 (in)	Net SLR from Measured Current King Tide (in)
Current (2019)	2.28	-0.41	0.47	8	0
2050	3.78	1.09	2.44	26	18
2075	5.78	3.09	4.44	50	42

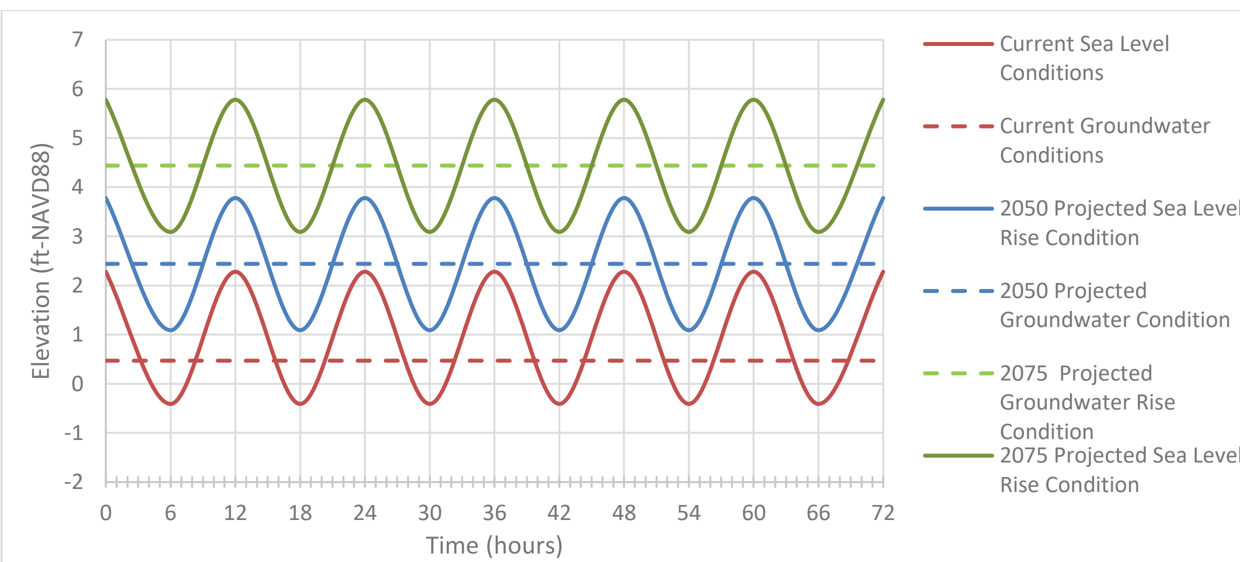


Figure 5.1.2 – Projected Sea Level and Groundwater Conditions for Current, 2050 and 2075

5.1.3 Mid-Range (2050) Rainfall Parameters

In May 2015, a report was produced for the Miami-Dade Water and Sewer Department titled *Final Rainfall Intensity, Duration, and Frequency Projections Based on Climate Change for Miami-Dade County* that outlines the increased rainfall depths experienced in recent years when compared to the South Florida Water Management District (SFWMD) isohyetal maps based on observations at nine daily stations throughout Miami-Dade County. For this analysis, the rainfall depths for the 2050 design storms were incrementally increased by 25 percent each to account for this rising trend in rainfall depth. **Table 5.1.2** describes rainfall depths for each design storm event for the existing conditions model, as well as for the Mid-Range 2050 Planning Horizon model and Long-range 2075 Planning Horizon.

Table 5.1.2 – Existing and Projected Rainfall Depths for 2050 and 2075

	5-Year 1-Day Storm Depth (inches)	100-Year 3-Day Storm Depth (inches)
Existing Conditions	6.4	16
Mid-Range (2050)	8	20
Long-Range (2075)	10	25

5.1.4 Mid-Range (2050) Soil Storage Parameters

Due to increased DHW (groundwater levels), the soil storage is lower in the sea level rise scenarios. As in TM2 (**Section 4.0**), soil zones were defined according to the depth to seasonal high groundwater elevation from existing ground versus water storage capacity relationship specified in the South Florida Water Management District (SFWMD) Environmental Resource Permit (ERP) Applicant's Handbook Volume II for coastal compacted soils, based on Soil Conservation Service estimates. Three soil zones (**Figure 5.1.3**) were defined for the study area based on the average pervious area elevations:

4. Elevations below 3.44 ft-NAVD (less than 1 ft to water table)
5. Elevations equal to or between 3.44 and 6.44 ft-NAVD (between 1 ft and 4 ft to water table)
6. Elevations above 6.44 ft-NAVD (greater than 4 ft to water table).

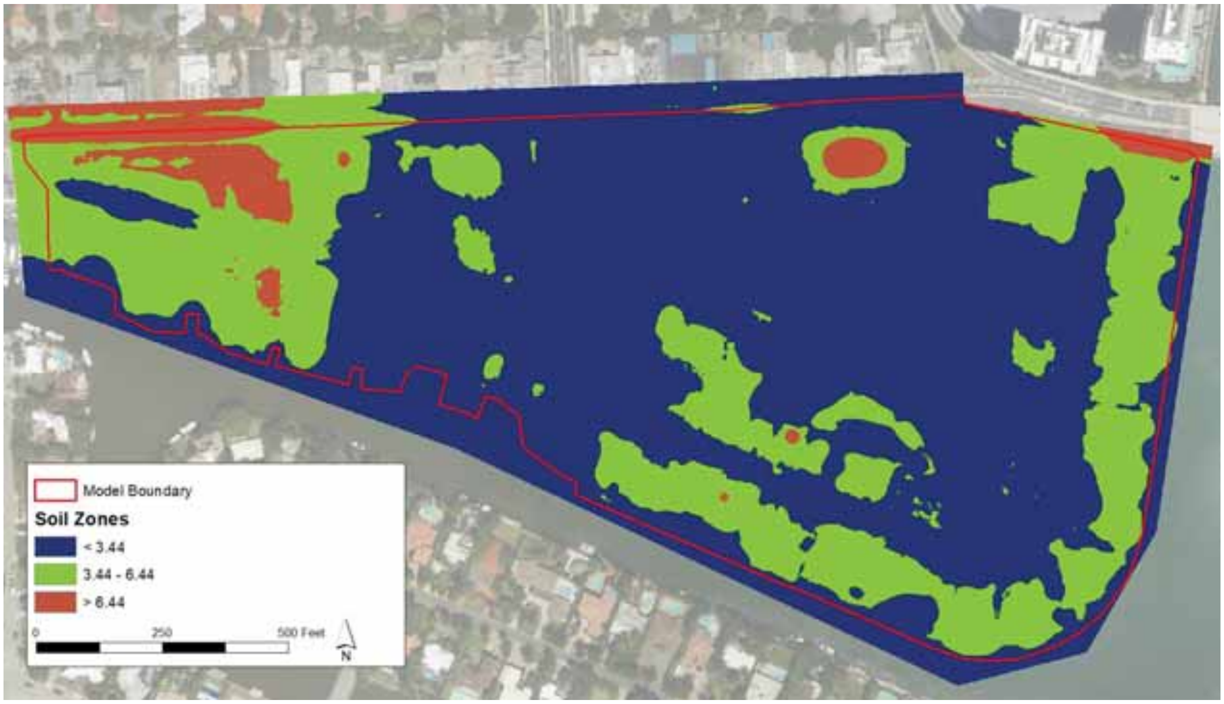


Figure 5.1.3 – Soil Zones for Raised 2050 Groundwater Conditions

Curve numbers were re-calculated for each soil zone/land use combination. **Table 5.1.3** shows each re-calculated curve number for the Mid-Range 2050 sea level rise planning horizon.

Table 5.1.3 – Mid-Range (2050) Sea Level Rise Recalculated Curve Numbers

Land Cover Zone Abbr.	Land Cover Zone	Soil Zone		
		1	2	3
T	Transportation, Communication, and Utilities	98	94	91
CII	Commercial and Service, Industrial, Institutional	98	93	88
U	Parks and Recreational Open Space, Undeveloped	97	76	56
R	Residential	98	92	85
W	Coastal Water Bays and Ocean Inland Water	98	98	98

5.2 Stormwater Management Systems

5.2.1 General

In June 2016, the City of Miami Department of Public Works released Bulletin No. 51 titled "Additional Design Requirements for Right-of-Way and Drainage Improvements in Low Lying Areas." It outlines the minimum design parameters for right-of-way and drainage improvements as follows:

1. Roadways shall be raised so that the lowest inlet elevation is 5.00 feet relative to the National Geodetic Vertical Datum of 1929 (ft-NGVD) or 3.50 ft-NAVD, or higher
2. Where existing conditions do not permit the rising of the existing roadway to elevation 5.00 ft-NGVD (3.50 ft-NAVD) or higher, the engineer of record must make a reasonable effort to raise the existing road to the highest possible elevation.
3. Where applicable, drainage systems for roads that are to remain below elevation 4.5 ft-NGVD (3.0 ft-NAVD) shall be constructed to be watertight.
4. Drainage systems within existing roadways that are below elevation 4.00 ft-NGVD shall include a backflow valve to prevent tidal and groundwater intrusion.

Where possible, the proposed capital improvement projects for the Shore Crest Study area will comply with the Bulletin No. 51 criteria. In addition, to better address the level of flooding within the Shore Crest Study Area, the capital improvement projects shall also be comprised of one or more of the following flood protection best management practices:

1. Raising existing sea walls or implementing new seawalls to a minimum top elevation of 3.78 ft-NAVD (2050 High Tide).
2. Constructing a new stormwater pump station with emergency generator
3. Implementing a pollution control device upstream of the pump station prior to discharging to Biscayne Bay
4. Adding backflow preventers to positive outfalls to remain (predominantly private outfalls). All drainage systems that connect to the pump station, the existing gravity outfalls associated with these systems must be plugged to prevent recirculation of seawater if backflow preventor leak.
5. Raising the crown of road elevation to elevation 3.5 ft-NAVD where feasible, and 3 ft-NAVD in others.
6. Expanding, interconnecting and upsizing the stormwater infrastructure.

The majority of the seawalls within the study area are privately owned. These seawalls will need to be raised by the property owners either via incentives or adoption of ordinances to require raising of the privately-owned walls. The only seawall owned by the City is at Little River Pocket Mini Park. For the Mid-Range analysis, it was be assumed that the all the seawalls within the study area will be raised to a minimum 3.78 ft-NAVD. The City may want to consider raising the seawall an additional six to 12 inches to allow for freeboard above the high tide since Biscayne Bay is subject to wave action.

For privately owned outfalls, the City will also need to adopt ordinances to ensure that backflow prevention devices and pipe replacement or lining, if required, are implemented in the privately-owned systems.

5.2.2 Stormwater Pump Stations

Pump stations are used for expediting flows to a receiving water body or retention area or for when the required head is not possible to provide gravity outfalls. Although stormwater pump stations are expensive to install, operate, and maintain, their use is often required in areas where space is limited and no other practical gravity alternative is available. **Appendix 5A** shows typical details of a stormwater pump station and associated components. The main components of the stormwater pump station unit are:

- Off-line pollution control structure
- Trash rack
- Pump station and wet well
- Valve box
- Energy dissipator
- Electrical control panel
- Generator and Fuel Tank

By separating each of the components out, rather than placing them all within a centralized box, it allows for easier maintenance on a structure-specific basis. Numerous factors play a role in determining the size of the pump station and associated components. This includes limits on rate/volume of receiving water body, conveyance capacity of contributing systems, and size constraints for the pump station wet well. A pump station discharging to Biscayne Bay is recommended for the City to mitigate the projected impacts of the anticipated Mid-Range 2050 sea level and groundwater rise.

Although the primary elements of the stormwater pump station will be located underground, the electrical panel, generator, and fuel tank will need to be located above ground, with a minimum elevation of 6.5 ft-NAVD. This can create aesthetic challenges that will need to be addressed during the detailed design of these systems. Typically, landscaping is a viable option to partially shield the above ground components.

5.2.3 Backflow Preventer

Backflow preventers, also known as check valves, are devices that prevent the flow of water from one point backwards (negative) into a conveyance system, while still allowing for flow to continue in the positive direction. These devices are typically applied in conjunction with outfalls that discharge to water bodies and canal systems with high surface water profiles and/or high tide conditions. During positive flow discharge, these devices do increase the amount of head loss due to the pressure required to open the valve and reduced pipe diameter.

The recommended check valves are in-line backflow preventers. They minimize head losses and the possibility of being blocked or maintained opened by debris and marine growth. Several companies such as Red Valve, Inc.; WAPRO, Inc.; and others that manufacture these type of backflow preventers. **Figure 5.2.1** and **Figure 5.2.2** show typical in-line backflow preventer devices and how they operate.

Figure 5.2.1 – Typical in-line back-flow preventer installation

Typical in-line back-flow preventer installation

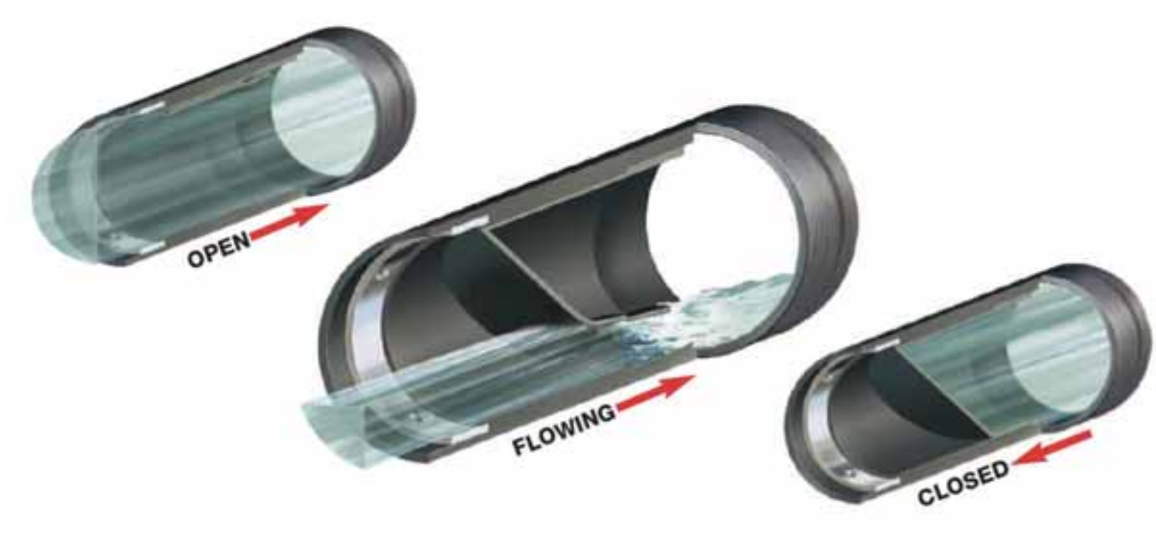


Figure 5.2.2 – Typical in-line back-flow preventer installation

5.2.4 Pollution Control Structures

Pollution control structures, such as CDS or Vortech units, are used to treat stormwater runoff in urban areas with limited right-of-way and/or poor soil infiltration rates. The units remove floatables, oil/grease, and reduce the total suspended solids (TSS) of the runoff prior to discharging to a waterbody or stormwater pump station wet well. The units do not reduce the total volume of water discharged to the outfall. Pollution control structures can be designed as in-line or offline structures. Offline control structures allow for the bypass of the system during large flow events while still providing the required treatment volume. Units are designed to handle peak flow events. The pollution control structures suggested for this project are comprised of an inlet, diversion weir, offline pollution control structure, baffle, and outlet. The purpose of this pollution control structure is to remove floatable pollution and reduce Total Suspended Solids (TSS) before dispersing the water to the pump station before exiting into a nearby water body or, in this case, Biscayne Bay. This reduces the required maintenance needs of the pump station and improves the quality of stormwater discharges into the receiving waterbody.

Further analysis of these structures will be made during the design phase. **Figure 5.2.3** shows a schematic of the components of a vortex structure.

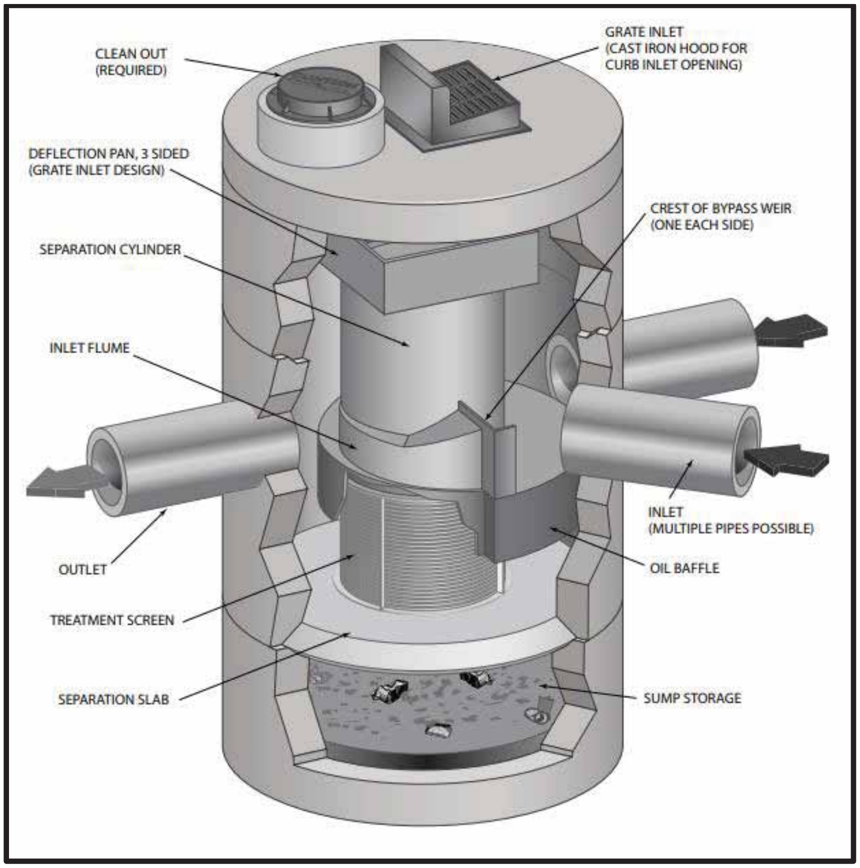


Figure 5.2.3 – Vortex Pollution Control Structure Schematic

5.2.5 Raised Crown of Road

The current roadway system in the Shore Crest area has sections where the crown of road is well below current high tide conditions, and in some cases well below the projected 2050 DHW elevation. These low elevations cause areas to experience extreme flooding during high tide events without any rainfall, otherwise known as "sunny day flooding." To reduce large amounts of flooding it is important to route the water from areas at high elevations to areas of low elevations where inlet drainage structures can be found. By increasing the road crown and placing inlets on either side of the road, flooding can be routed from the road to newly created low-lying inlets to a main trunk line where it will eventually be pumped out into Biscayne Bay through the proposed stormwater pump station explained above.

Standard City grates and inlets will be located on both sides of the road to divert the water into an 18" pipe that is connected to a central trunk line of various dimensions depending on the current level of flooding or contributing runoff in the area. A manhole connecting the structures allows for easier maintenance access. Further detailed pipe analyses will need to be done during the design phase. Roads will be raised through a process of milling the asphalt and filling to the desired elevation with black base (FDOT B-12.5) to protect against the high groundwater table and overlaying with one inch of FDOT Type S-III asphalt. In areas that require a rise of more than nine inches, a combination of limerock, black base, and asphalt will be used to reach the desired elevation. **Figure 5.2.4** shows a profile of a typical raised crown of road and the added drainage. **Appendix 5B** also shows this detail.

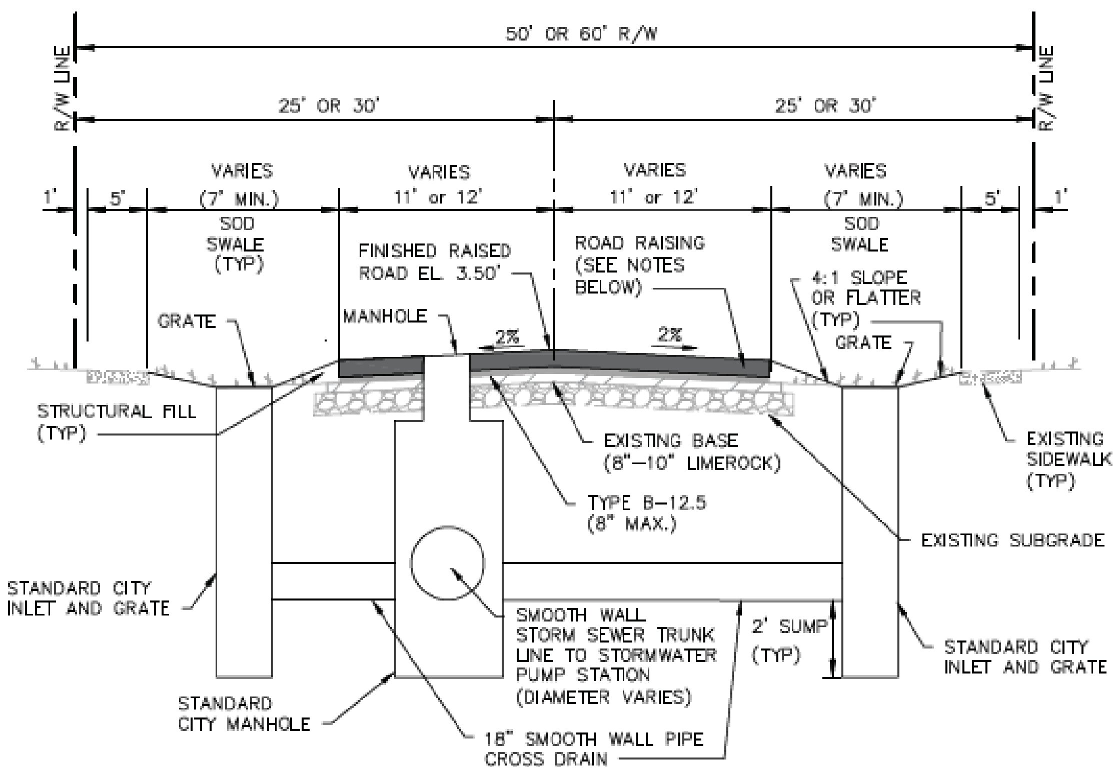


Figure 5.2.4 – Raised Crown of Road and Added Drainage Profile

5.3 Capital Improvement Projects

5.3.1 General

Prior to analyzing additional/proposed stormwater infrastructure and other capital improvements, the region's topography was examined. Since the DHW elevation estimation for 2050 is above the road elevation in many areas, an analysis of raising the roads to elevation 3.5 ft-NAVD was conducted. It was determined that it is not unrealistic for many areas to have roads raised to elevation 3.5 ft-NAVD, however more detailed analysis will need to be carried-out during the design phase, especially to look at harmonization possibilities. **Figure 5.3.1** shows the existing topographic elevations within the project area. **Appendix 5B** contains maps outlining the areas within the roadways that will need to be raised.

Next, the best location for the installation of the pump station was determined to be Little River Pocket Mini Park due to City-ownership, proximity to the water, and low-elevation of the surrounding stormwater system and roads. **Figure 5.3.1** also shows the existing elevations and location of the Little River Pocket Mini Park.

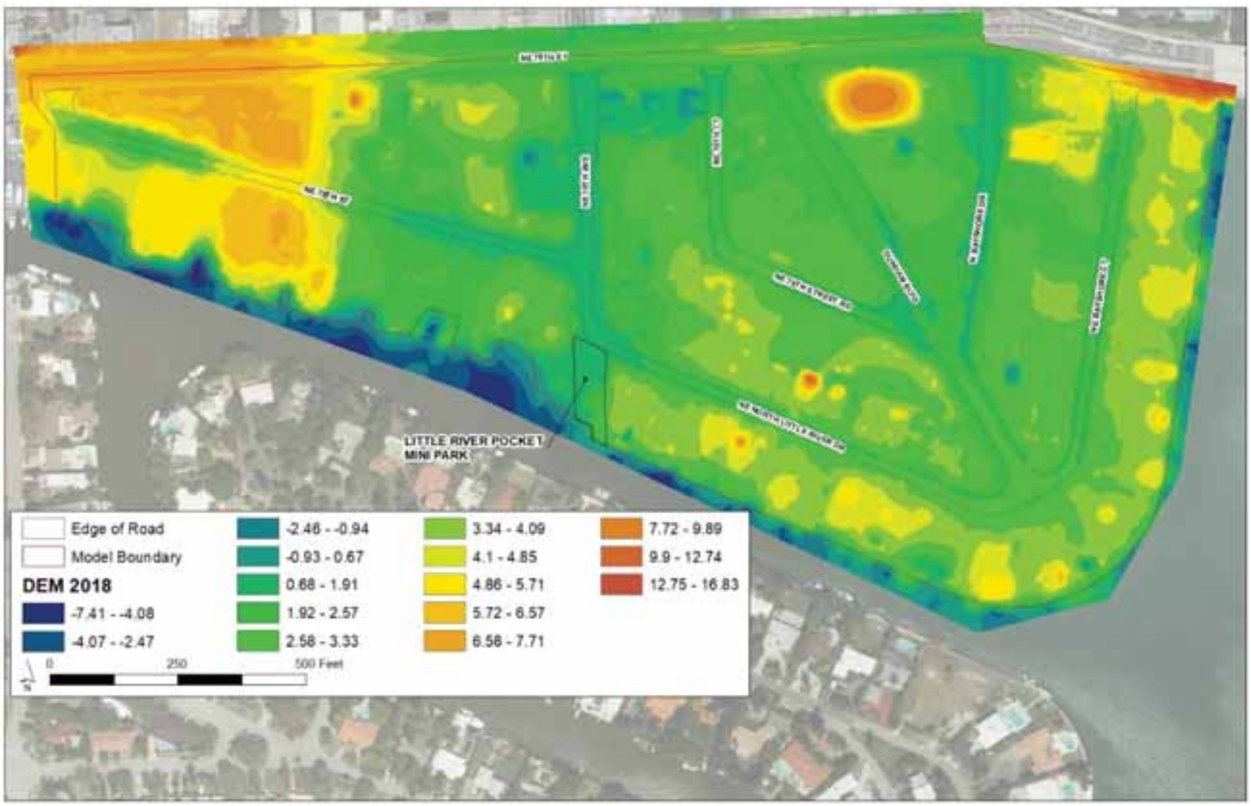


Figure 5.3.1 – Existing Condition DEM

5.3.2 Mid-Range (2050) Planning Horizon Capital Improvements

Capital improvements for the Mid-Range (2050) Planning Horizon include increased stormwater pipe sizes, expanded stormwater pipe infrastructure reach, a stormwater pump station with pollution control structure, raised road elevations, grouting of select existing outfalls, raised seawall, and backflow preventers on existing private gravity outfalls.

Roads were raised in the model by burning a new elevation of 3.5 ft-NAVD onto the existing condition digital elevation model (DEM). Seawalls were also "burned" into the existing condition DEM so that stages from the Biscayne Bay boundary stage line in the model do not overtop into the Shore Crest Study region. **Figure 5.3.2** shows the altered DEM for the Mid-Range Planning Horizon modeling efforts.

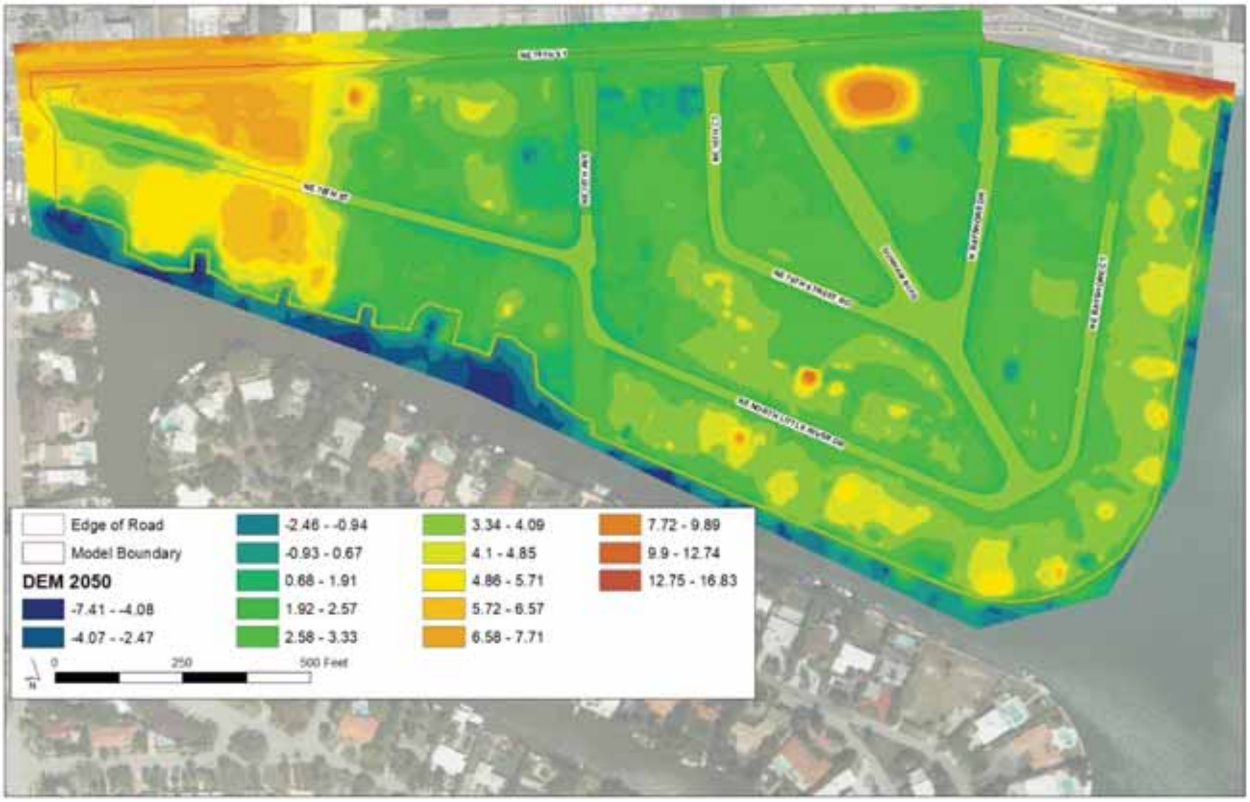


Figure 5.3.2 – Edited DEM with Raised Roads and Seawalls for Mid-Range 2050 Scenario Model

Iterations of the capital improvements within the ICPR4 model were performed by increasing pump capacity, increasing pipe sizes, and expanding and interconnecting the pipe network, in order to accommodate the projected 2050 sea level and groundwater rise. These iterations of increasing the stormwater infrastructure capacity were performed until the roads were no longer flooded for the 5-year, 1-day storm event, and structural flooding was eliminated (as much as feasible) for the 100-year, 3-day storm event. The ICPR4 final infrastructure node-link schematic is depicted in **Appendix 5C**.

The finished floor elevation for several structures is lower than the predicted 2050 DHW elevation (2.44 ft-NAVD). Since pumping groundwater due to sea level rise is not possible, several homes will still show as flooded and the *Level of Service Flood Protection Severity Score* (LOS FPSS) will not be able to be reduced to zero.

5.3.2.1 Mid-Range (2050) Planning Horizon Stormwater Management Elements and Conceptual Design

The conceptual design drains all of the roads within the model boundary to a proposed 80,000 gallons per minute (GPM) pump station. This pump station will be located within the Little River Pocket Mini Park parcel that is owned by the City. A conceptual schematic of the pump station within the park is depicted in **Appendix 5D**. Inlets on each side of the road and raised road elevations work to mitigate street flooding. Two existing City outfalls will be blocked to maintain discharge through the pump station forcemain and prevent recirculation of water. Backflow preventers were added to each of the private and FDOT outfalls to prevent ocean water from flowing onto the roads during high tide events. A raised seawall with an elevation equivalent to the 2050 high tide elevation of 3.78 ft-NAVD protects the study area from seawall overtopping.

Pump station operating criteria was determined from the Design High Water (DHW) elevation, as well as the lowest invert of the system. The pump-on elevation was set slightly higher the 2050 DHW elevation at 2.45 ft-NAVD. The pump-off elevation was set 1-ft below the lowest pipe invert of the system at -6 ft-NAVD in order to dry-out the system before turning-off. In addition, the pump station will be designed to incorporate a rain sensor so that when the first sign of a rainfall event is detected, the pumps will turn on to empty the drainage system of any water in the system. The pump station design and headlosses throughout the system and on/off elevations should will be more closely examined during the detailed design phase. **Appendix 5E** shows the node and link maximum conditions for the ICPR4 model with the Mid-Range solutions in place.

A pump station discharging to injection wells was examined and determined to provide no net benefit up stream of the pump station, while incurring a higher construction cost. The FDEP limits the amount of allowable head on injection wells at elevation 6.5 ft-NAVD. This severely limits the capacity of wells. To compound this matter, when pumping freshwater into a well east of the salinity line, the pressure needs to overcome the freshwater/saltwater barrier caused by the density difference. This accounts for a 1.5 ft headloss, thus further reducing the achievable head on the wells. The elevation at which water starts to flow into the wells is 3.94 ft-NAVD versus the DHW of 2.44 ft-NAVD.

Figure 5.3.3 below shows the elements of the proposed capital improvements for the Mid-Range (2050) planning horizon.

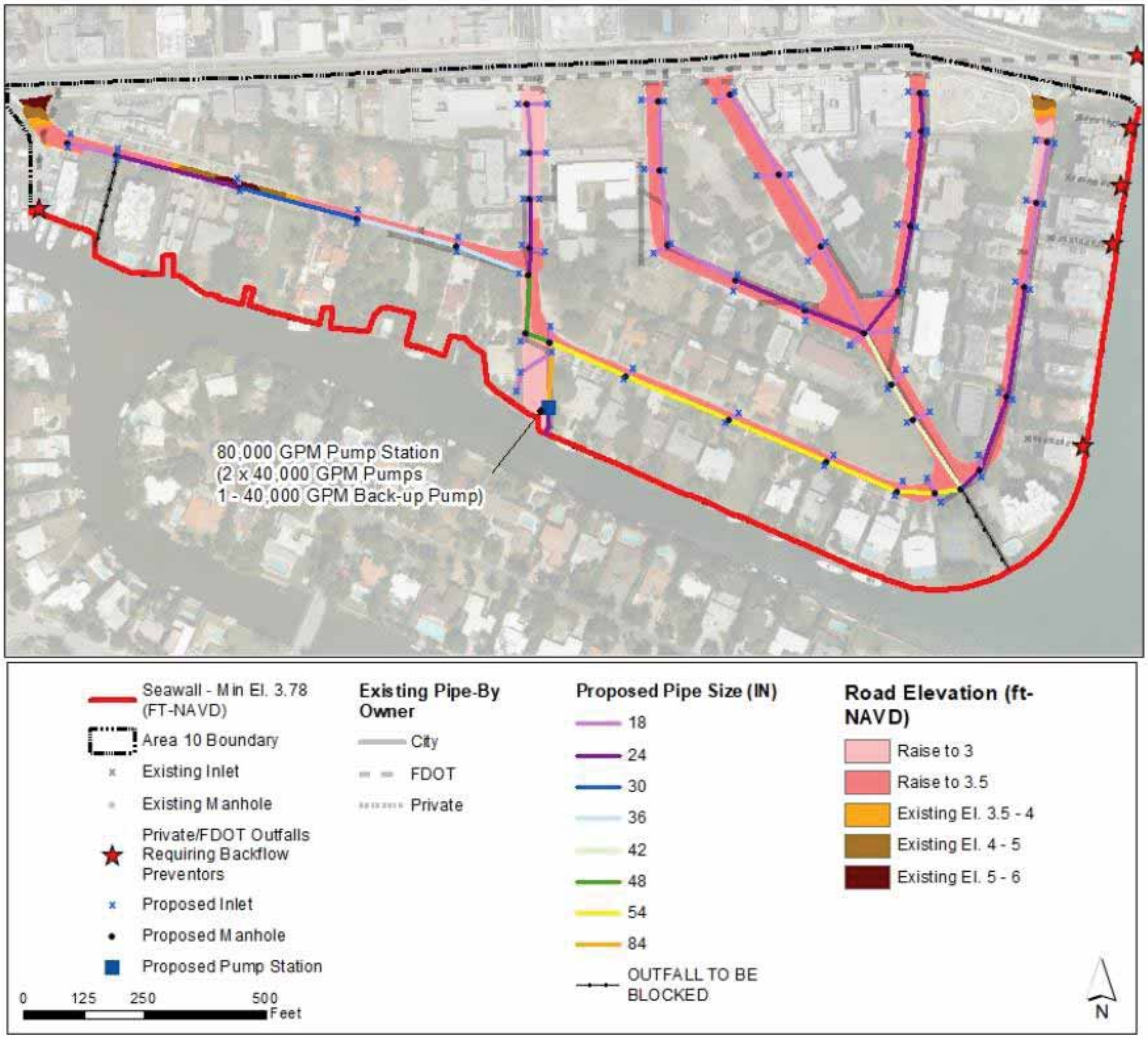


Figure 5.3.3 – Mid-Range Planning Horizon (2050) Capital Improvements

5.3.2.2 Flood Reduction Benefits

Both the 5-year, 1-day and the 100-year, 3-day design storm events were modeled with the mid-range planning horizon capital improvements. The inundation maps in **Figure 5.3.4** show the results of the modeling of both scenarios.

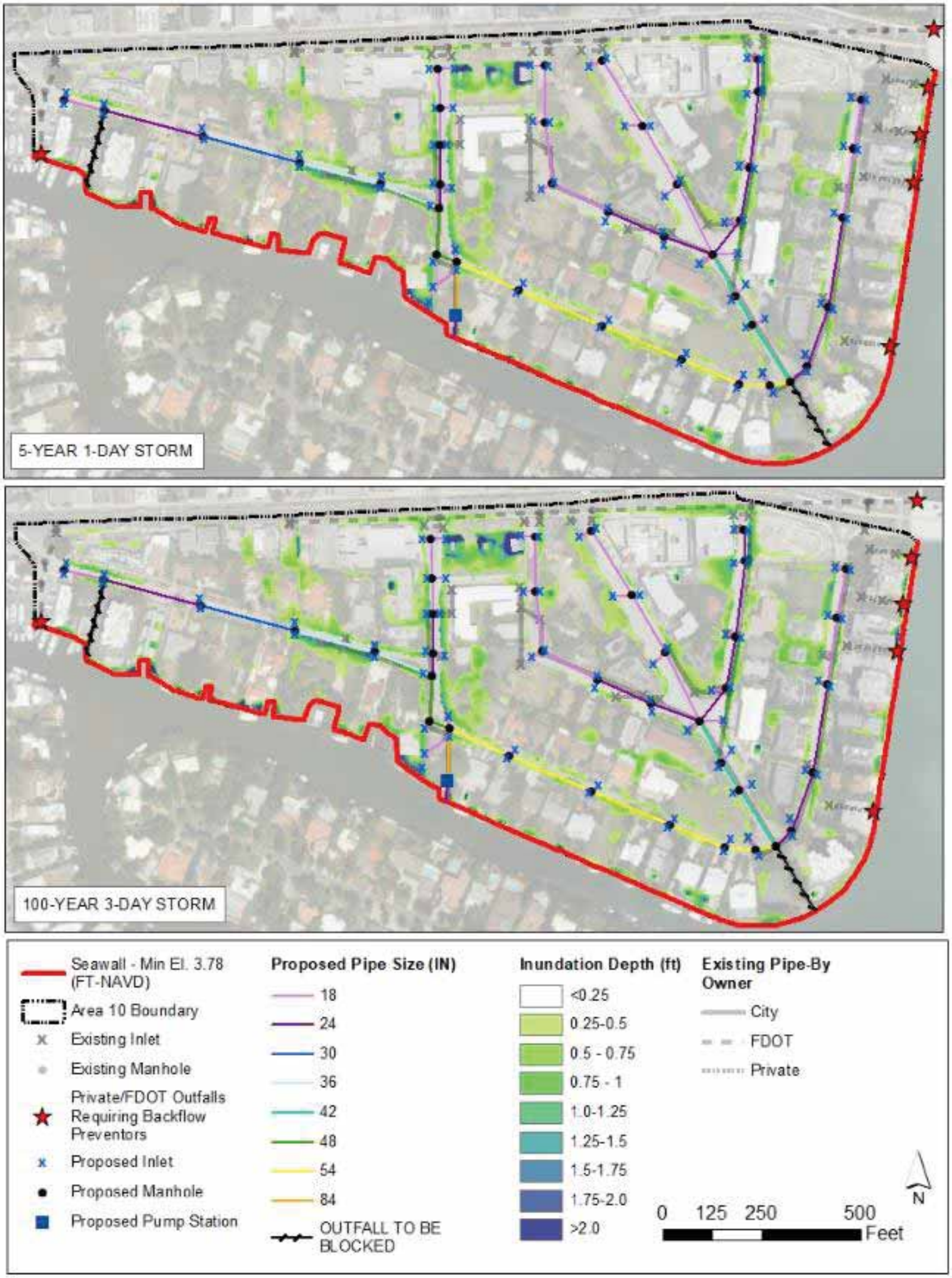


Figure 5.3.4 – Inundation Maps for Mid-Range Capital Improvements Modeling

For the Mid-Range planning horizon, the infrastructure improvements within the study area are not predicted to lower the Flood Protection Severity Score (FPSS). As outlined in TM 2 (**Section 4.0**), the FPSS for the existing conditions is 17.1 due to 0.4 miles of roadway and four buildings being flooded; for the Mid-Range planning horizon, the FPSS is increased to 28.0. This increase is primarily due to six structures having estimated finished floor elevations lower than the 2050 DHW elevation of 2.44 ft-NAVD. Due to the extent of flooding within the properties, the FPSS increases even though the roadway flooding has been eliminated. Since pumping groundwater is not possible, these low-lying structures will have to be abandoned or have their finished floor elevation raised in the future. **Appendix 5F** shows the detailed calculation of the Mid-Range planning horizon FPSS.

As shown in the FPSS calculations, the street flooding was essentially eliminated by the proposed stormwater improvement projects except a very small segment of N. Bayshore Drive at its intersection with NE 79th Street shows a negligible amount of flooding. **Figure 5.3.5** shows the buildings that are flooded, along with the flooding exceedance during the 100-year, 3-day storm event with predicted 2050 conditions.

Figure 5.3.5 – Predicted 2050 Level of Service with Proposed Capital Improvements

Appendix 5G contains inundation maps for the 5-year, 1-day and 100-year, 3-day design storms for the study area showing the 2050 tide and rainfall conditions with the mid-range planning horizon infrastructure in place.

5.3.3 Short-Term (Existing Conditions) Planning Horizon Capital Improvements

For the short-term solutions, elements of the mid-range conceptual project that could be separated out were examined. Viability was based on future available funding and the ability to be constructed within the next two fiscal years with available funding.

Figure 5.3.6 shows the altered DEM for the Mid-Range Planning Horizon modeling efforts.

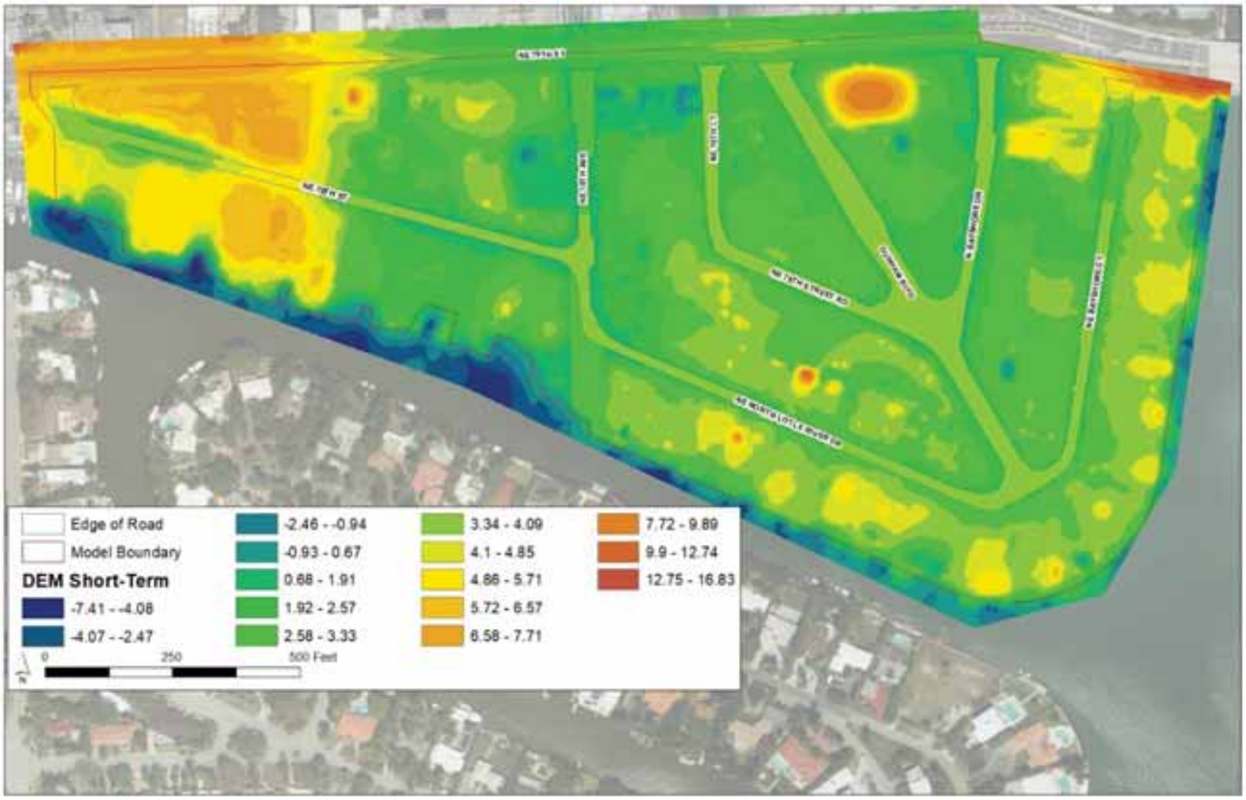


Figure 5.3.6 – Edited DEM with Raised Roads for Short-Term Scenario Model

5.3.3.3 Short-Term (Existing Conditions) Planning Horizon Stormwater Management Elements and Conceptual Design

Several of the Mid-Range (2050) planning horizon capital improvements are able to be implemented in the short-term. They are as follows:

- Raising of the roads
- Expanded, interconnecting and upsized pipe network
- Backflow preventers on City, private, and FDOT outfalls

The improvements were then implemented into an ICPR4 model with the existing boundary conditions and existing DHW elevation in order to illustrate how constructing the short-term improvements will improve the flood protection LOS. The pump station and raising of the seawall were not included for this scenario. The ICPR4 node-link schematic for the Short-term scenario is depicted in **Appendix 5C** and the Node and Link maximum conditions are shown outlined in **Appendix 5H**. **Figure 5.3.7** below shows the details of the proposed capital improvements for the short-term planning horizon. The upsized outfall that will lead to the pump station in the Mid-range conditions will need to be optimized to a smaller diameter during the detailed design phase.

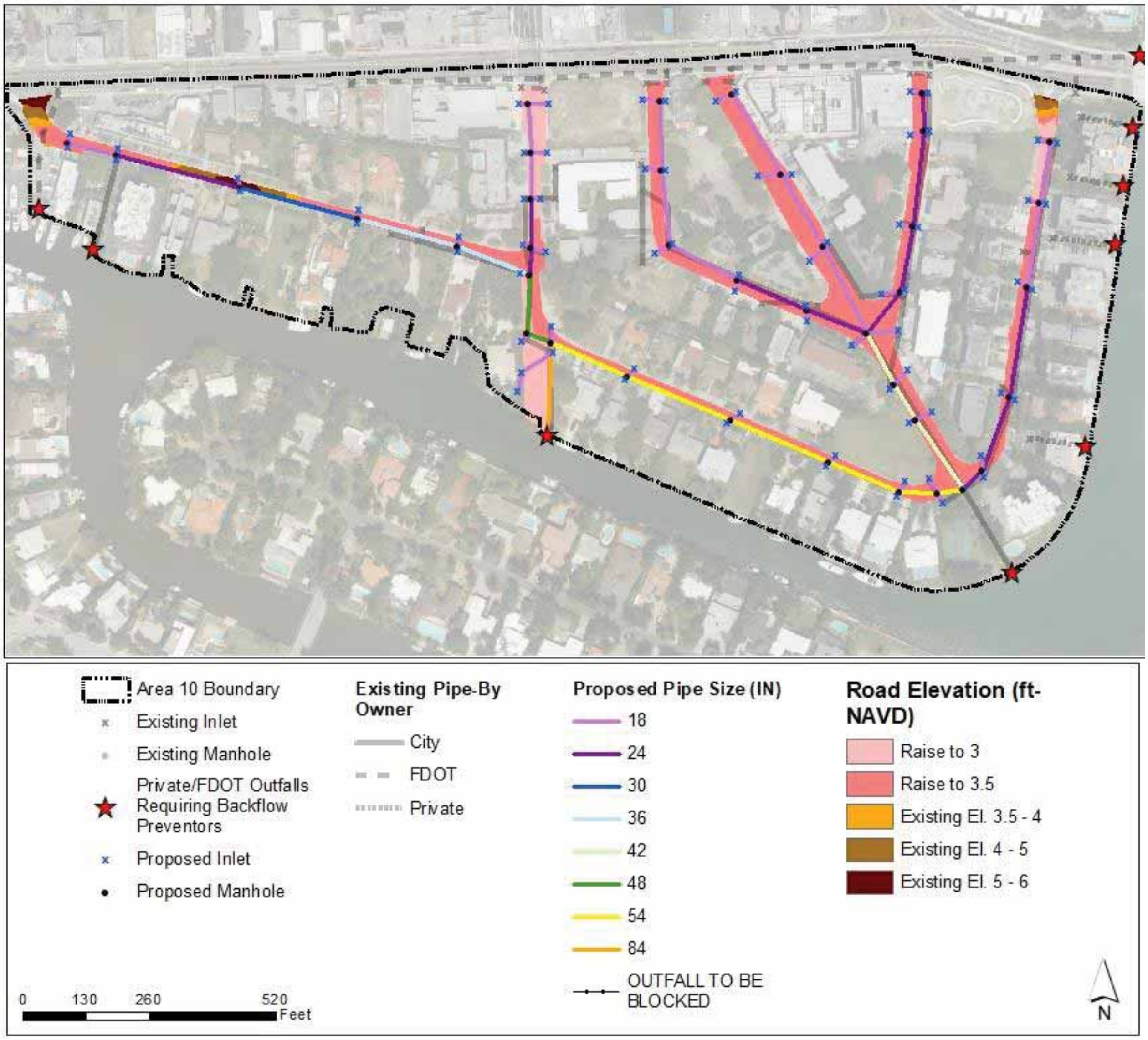


Figure 5.3.7 – Short-Term Planning Horizon Capital Improvements

5.3.3.4 Flood Reduction Benefits

Appendix 5I contains inundation maps for the 5-year, 1-day and 100-year, 3-day design storms for the study area showing current tide and rainfall conditions with the short-term planning horizon infrastructure in place. **Figure 5.3.8** shows the results of modeling both storm scenarios.

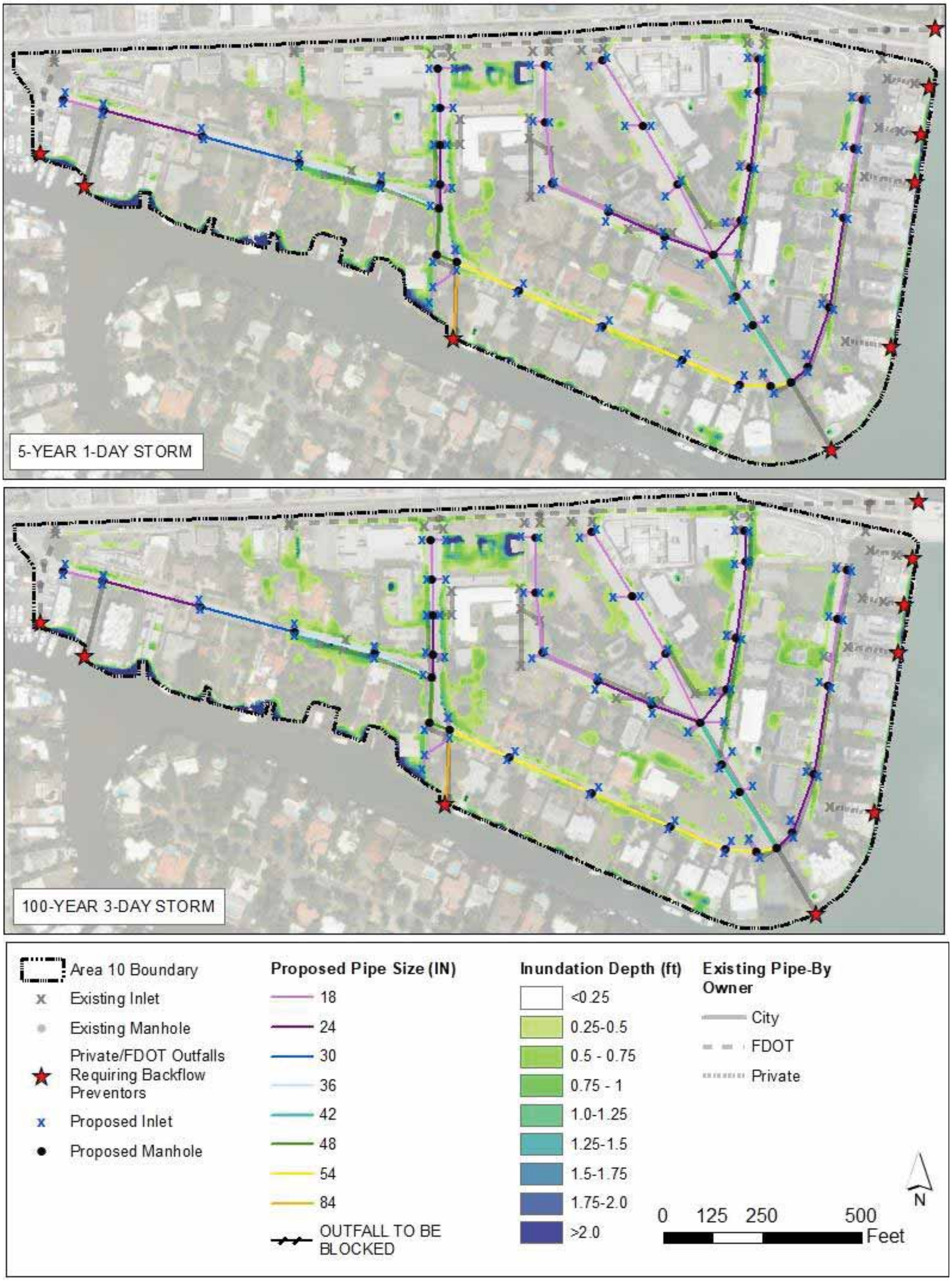


Figure 5.3.8 - Inundation Maps for Short-Term Capital Improvements Modeling

The street flooding was eliminated by the proposed short-term stormwater improvement projects but four buildings within the study area will still experience some level of flooding. **Figure 5.3.9** shows the buildings that are flooded during the 100-year, 3-day storm event with current tide and rainfall conditions.

Figure 5.3.9 - Predicted Short-Term Level of Service with Proposed Capital Improvements

The houses flooded during the 100-year event sit below 2.44 ft-NAVD and flooding cannot be eliminated even with the use of a pump station. The FPSS for the Short-Term Capital Improvements Modeling was calculated to be 16.0, while the Existing Conditions Modeling had an FPSS of 17.1. However, if we compare the existing finish floor elevation with the current DHW of 0.47 ft-NAVD, the FPSS or the short-term improvement project will be 0, and the FPSS will remain 0 until the DHW reaches 2.44 ft-NAVD.

Appendix 5F shows the detailed calculation of the FPSS.

5.4 Opinion of Probable Construction Costs

As outlined in **Section 5.3**, the proposed projects consist of typically implemented stormwater infrastructure components described in **Section 5.2**. Each project was assessed for its ability to mitigate the projected flooding associated with the estimated 2050 tide and groundwater rise conditions. The 5-year, 1-day storm event was used to model flooding within the roadways, while the 100-year, 3-day storm was used to model flooding of homes and buildings.

Planning-level cost estimates were developed for each project based on the Florida Department of Transportation (FDOT) cost databases, costs from recent projects constructed within the City and ADA's own construction cost databases. The estimated cost for raising the crown of road is based on FDOT cost data assuming an average width of road of 23 feet. This cost considers the use of black base due to the high groundwater table as well as depth of Superpave SP-12.5 asphalt.

The preliminary cost estimates for both the Short-Term and Mid-Range Capital Improvement Projects are provided in **Table 5.4.1**. **Table 5.4.2** outlines the incidental expenditures used in determining the price shown in the Opinion of Probable Construction Cost including the costs for maintenance of traffic, mobilization, clearing, permitting, and the preliminary contingency. **Appendix 5J** contains the detailed cost breakdown for both the Short-Term and Mid-Range Cost Estimates.

Table 5.4.1 – Opinion of Probable Construction Cost

Capital Improvement Projects	Opinion of Probable Construction Cost*
Mid-Range Capital Improvement Projects	$12,788,425.56
Short-Term Capital Improvement Projects	$4,421,658.06

Table 5.4.2 – Capital Improvement Cost Factors

Capital Cost Factors as Percentage of Total Material Cost				
Maintenance of Traffic	Mobilization	Clearing	Permitting	Contingency
5%	7%	2%	5%	30%

While the short-term improvements are expensive, almost half the capital cost is to raise the roads, while the other half is to upsize and interconnect the stormwater system. It is not practical to install one without the other. In order to install the modified stormwater collection system, the road would need to be demolished and reconstructed. Raising of the road creates low points on either side of the road; new inlets need to be installed to eliminate the chance of flooding the adjacent properties due to the higher road elevations and reduction of on-road storage.

It should be noted that the planning-level cost estimate developed for this Shore Crest Drainage Feasibility Study is intended for use as a planning tool to help guide the City in handling the effect of sea level rise by showing a cost to benefit ratio associated with both the Short-Term and Mid-Range solutions. These costs should be further refined during the final design and permitting phases of the capital improvement plan implementation process.

5.5 Conclusions and Recommendations

Utilizing the existing conditions 1D/2D model created, Short-Term and Mid-Range capital improvement projects were analyzed for viability and cost effectiveness for both the 5-year, 1-day, and 100-year, 3-day events occurring in conjunction with the existing King tide and 2050 King tide events. The rainfall depths for the 2050 design storms were increased by 25 percent over existing condition to account for potential rising trend of rainfall depth.

Required capital improvements for the Mid-Range (2050) Planning Horizon include increased stormwater pipe sizes, expanded stormwater pipe infrastructure reach, added a stormwater pump station, raised road elevations to a minimum 3.5 ft-NAVD, added backflow preventers for select existing outfalls, grouted select existing outfalls and a raised the seawall to a minimum 3.78 ft-NAVD (the predicted King tide of 2050) at an estimated cost of $12,788,425.56. Since the vast majority of the seawall is privately owned, the City will need to pass ordinances that require the raising of the seawall and adding backflow preventers within the private properties. For the 2050 planning horizon, the FPSS is increased to 28.0, even with the implementation of the capital improvement projects due to several properties lying below the 2050 DHW of 2.44 ft-NAVD. These properties will have to be abandoned or raised by 2050 as they will not be able to be protected from the groundwater rise. If the subject properties are abandoned or raised, the FPSS can be reduced to 0.0.

Several of the Mid-Range (2050) planning horizon capital improvements are able to be implemented in the short-term including raising of the roads; expanding, upsizing, and interconnecting the stormwater pipe network; and installing backflow preventers on private and FDOT outfalls, at an estimate cost of $4,421,658.06. With the implementation of the short-term capital improvements, the FPSS with the DHW of 2.44 ft-NAVD is lowered to 16.0. At less than about a third of the cost of the Mid-Range Capital Improvement Project, the Short-Term Improvement Projects provide an immediate solution to the flooding within the Shore Crest study area and provides the City time to implement the Mid-Range Capital Improvement Projects. Geotechnical investigations and utility locates will need to be done prior to finalizing any design, but with the topographic survey has already being complete. Therefore, the design lead time for the short-term stormwater improvement project will be greatly reduced and will aid in addressing the current flooding conditions.

APPENDIX 3A

DATA COLLECTED FROM CITY OF MIAMI

Data Acquisition Log

Title	Date	Data Type	Collected By	Source	Author	Comments
Current and Future Flood Protection Project Conceptual or Design Plans within Shorecrest Area	10/22/2018	pdf	City of Miami	City of Miami	City of Miami	
Percolation Tests of nearby Geotechnical Investigations	10/22/2018	pdf	City of Miami	City of Miami	City of Miami	Information for 3 nearby borings were provided
Photos/Aerials and video of Flooding During King Tide on October 5, 2017	10/5/2017	pdf, mp4, point cloud	City of Miami	ALERT5	ALERT5	
Flood Delineation during King Tide	10/5/2017	pdf	City of Miami	City of Miami	City of Miami	
Tidal Flood Prevention Action Plan Reports	unknown	pdf	City of Miami	City of Miami	City of Miami	
Repetative Loss Property Data	unknown	pdf	City of Miami	City of Miami	City of Miami	Received preliminary map but still awainging GIS Data
Drainage Complaints	unknown	pdf	City of Miami	City of Miami	City of Miami	Received preliminary flood map but are still awaiting actual flooding complaints
As-Builts of Drainage in Study Area	July 1958	pdf	City of Miami	City of Miami	City of Miami	
City of Miami Storm Atlas Map	2/3/1988	pdf	City of Miami	City of Miami	City of Miami	
Shore Crest Pilot Area "Stormwater Basin Maps"	10/1/2018	pdf	City of Miami	City of Miami	CDM Smith	
GIS - Stormwater Infrastructure	8/13/2014	pdf	City of Miami	City of Miami	City of Miami	
Construction unit cost data for recently constructed projects	11/8/2018	Excel Spreadsheet	City of Miami	City of Miami	City of Miami	Project No. B-30628 Bid Tabulation Project No. B-78508 Bid Tabulation Project No. B-30524 Bid Tabulation
Repetitive Loss GIS Coverage	11/8/2018	shp	City of Miami	City of Miami	City of Miami	HistoricClaims.shp

APPENDIX 3B

DATA COLLECTED FROM OTHER AGENCIES

Data Acquisition Log

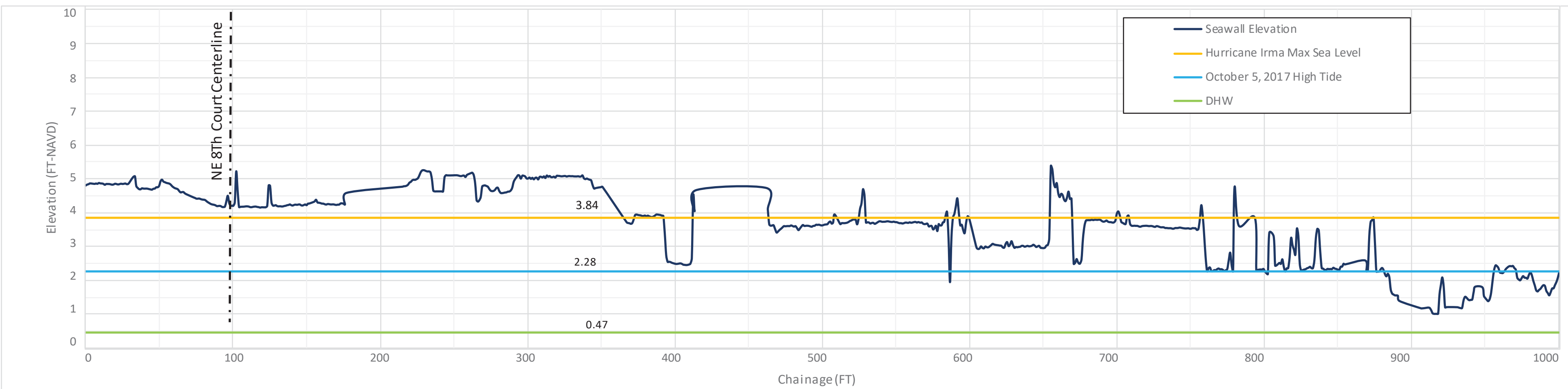
Title	Date	Data Type	Collected By	Source	Author	Comments
DBHYDRO Data	11/2/2018	pdf	ADA	SFWMD	SFWMD	http://my.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu
As-built Plans for Projects Adjacent to Study Area						
1. Bridge Repair and Rehabilitation for Bridge 870082 & 870554 Over Intracoastal Waterway	10/5/1999	pdf	ADA	FDOT	FDOT	
2. Bridges 870550 & 870084 Over Biscayne Bay	1/23/2015	pdf	ADA	FDOT	FDOT	
3. NE 79th From East of N. Bayshore Drive to Bay Dr. West	1/22/2015	pdf	ADA	FDOT	FDOT	
Outfall Assessment TWO #14 Report	Feb. 18	pdf	ADA	FDOT	APCTE	Only provides information on public outfalls
Key Biscayne Tide Station Information (Station ID: 8723214)	11/7/2018		ADA	NOAA	NOAA	http://tidesandcurrents.noaa.gov/gmap3/
UIC Class V Well Data for Wells in Study Area	Nov. 2018	GIS Viewer	ADA	FDEP	FDEP	http://geodata.dep.state.fl.us/
Miami-Dad Sea Level Rise Task Force Report and Recommendations (July 2014)	July 2014	pdf	ADA	*	*	*Southeastern Florida Regional Climate Change Compact
Final Rainfall Intensity, Duration, and Fequency Projections Based on Climate Change for Miami-Dade County (CH2M)	May 2015	pdf	ADA	WASD	CH2M	

APPENDIX 4A

SHORE CREST SEAWALL PROFILE FIGURES

A·D·A ENGINEERING	SHORE CREST SEAWALL KEY SHEET	PAGE 1 OF 5

Plan View

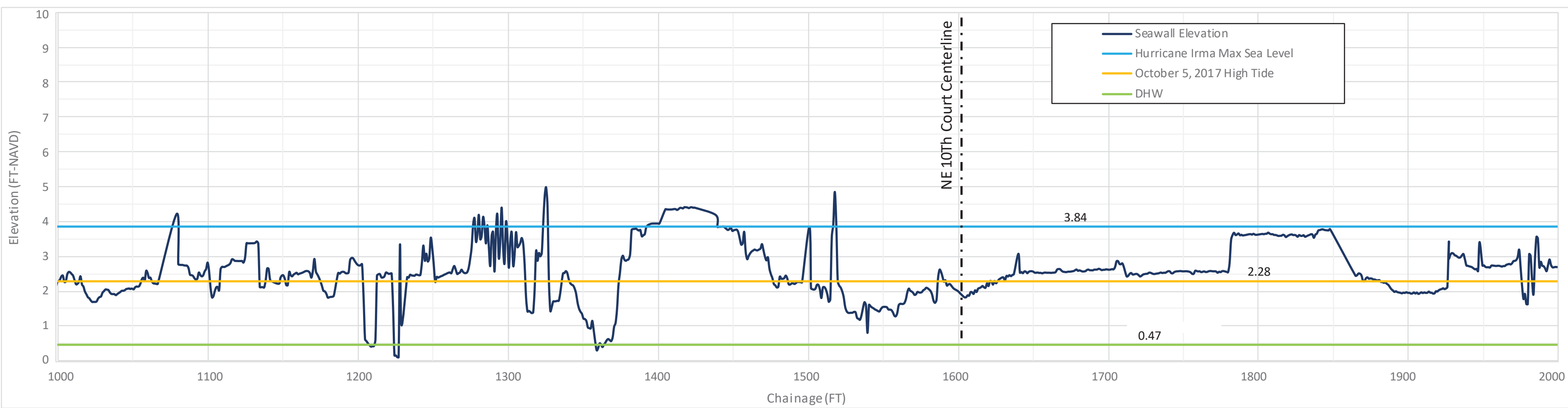


Profile View

Scale: 1" = 70' Horizontal, 1" = 3' Vertical

SHORE CREST SEAWALL PLAN/PROFILE 1	PAGE 2 OF 5

Plan View

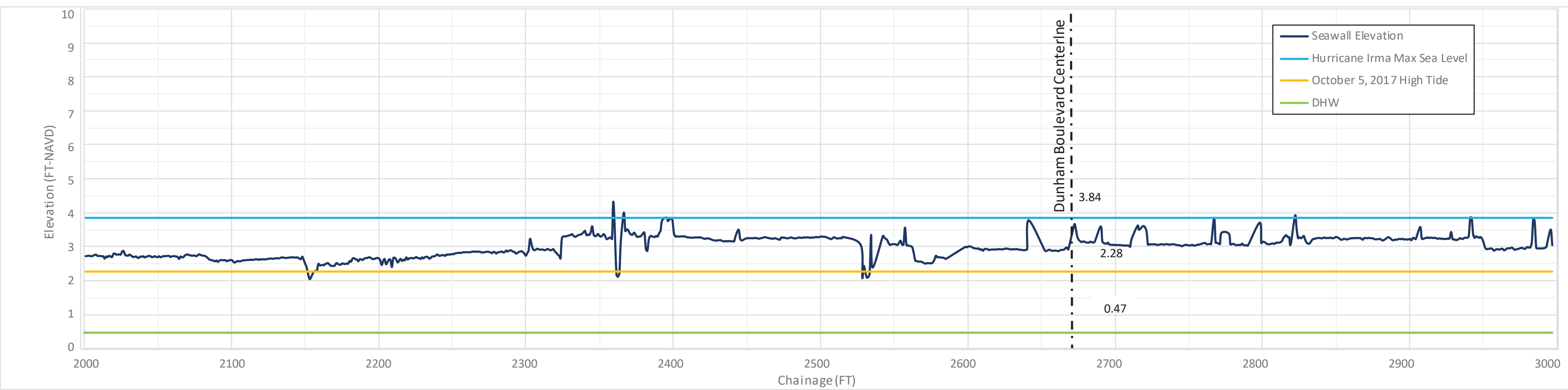


Profile View

Scale: 1" = 70' Horizontal, 1" = 3' Vertical

	SHORE CREST SEAWALL **PLAN/PROFILE 2**	**PAGE** **3 OF 5**

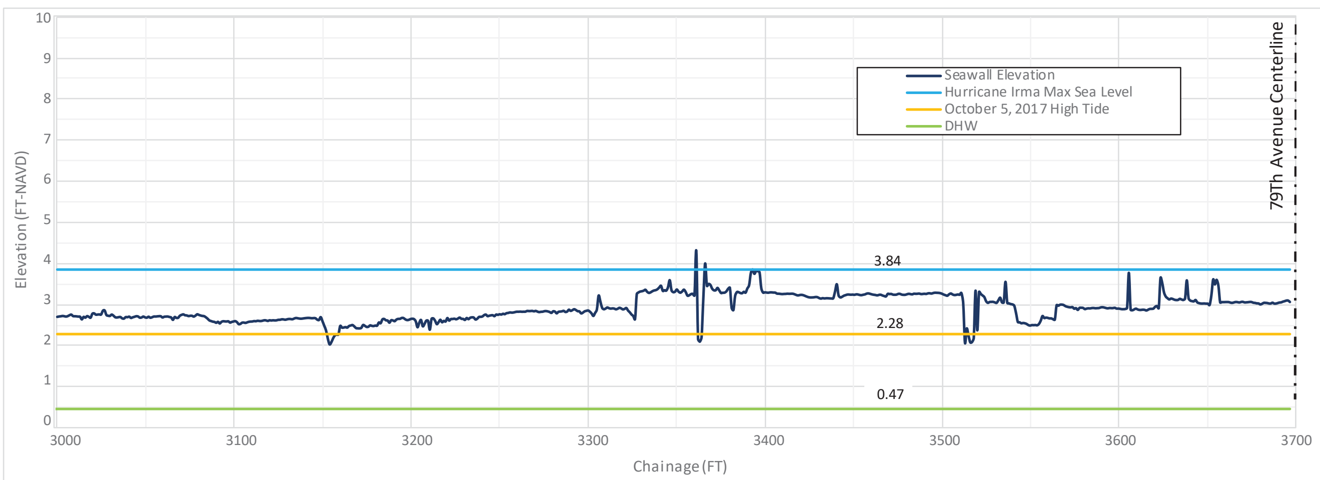
Plan View



Profile View

Scale: 1” = 70’ Horizontal, 1” = 3’ Vertical

Plan View



Profile View

Scale: 1" = 70' Horizontal, 1" = 3' Vertical

SHORE CREST SEAWALL PLAN/PROFILE 4	PAGE 5 OF 5

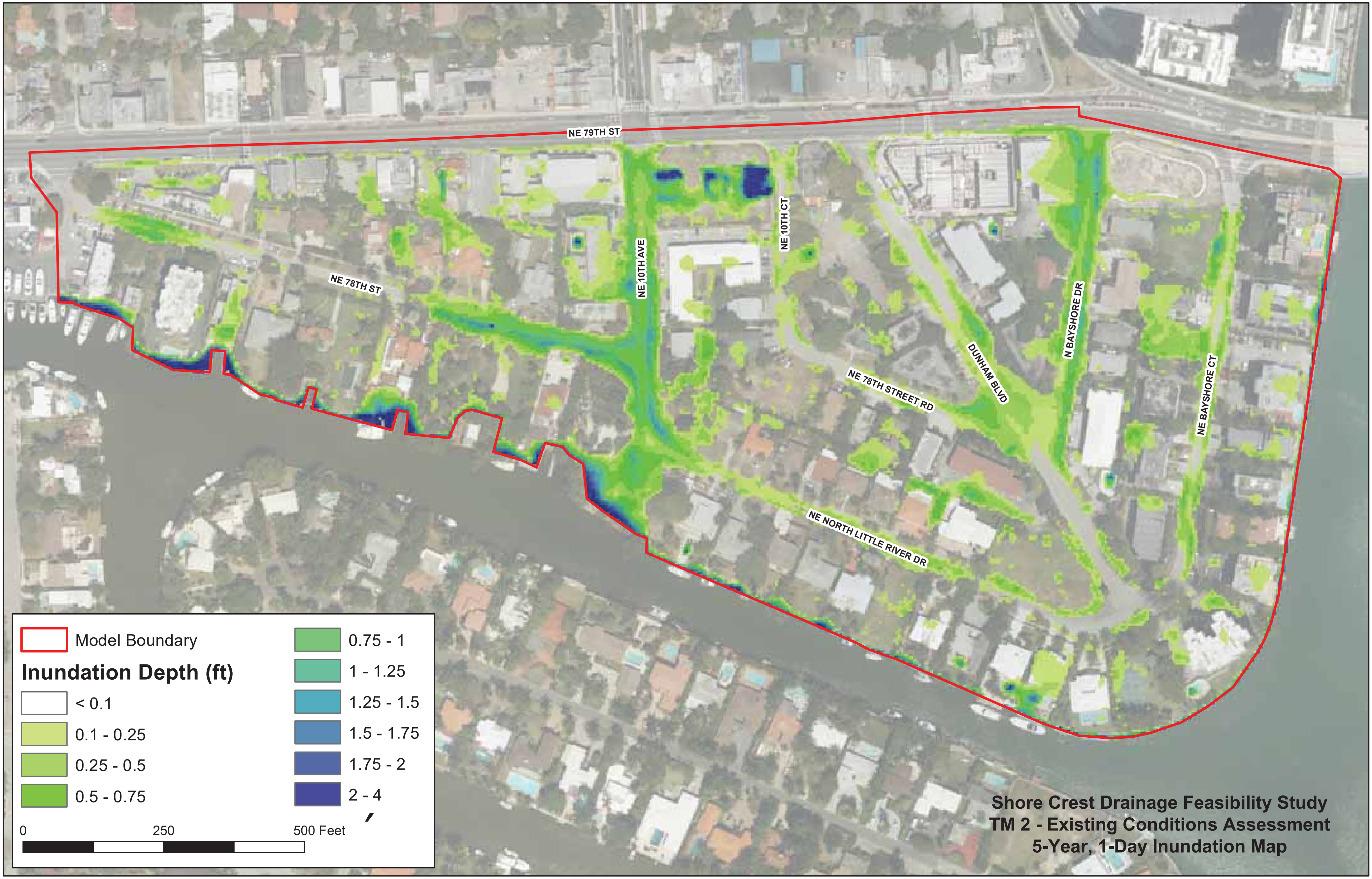
APPENDIX 4B

VALIDATION MODEL INUNDATION MAPS


NE 79TH ST
NE 78TH ST
NE 10TH AVE
NE 10TH CT
NE 78TH STREET RD
DUNHAM BLVD
N BAYSHORE DR
NE BAYSHORE CT
NE NORTH LITTLE RIVER DR
Model Boundary
Inundation Depth (ft)
<0.005
0.005 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
1.5 - 1.75
1.75 - 2
2 - 4
0
250
500 Feet
Shore Crest Drainage Feasibility Study
TM 2 - Existing Conditions Assessment
Validation Inundation Map
October 5, 2017

APPENDIX 4C

DESIGN STORM MODEL INUNDATION MAPS

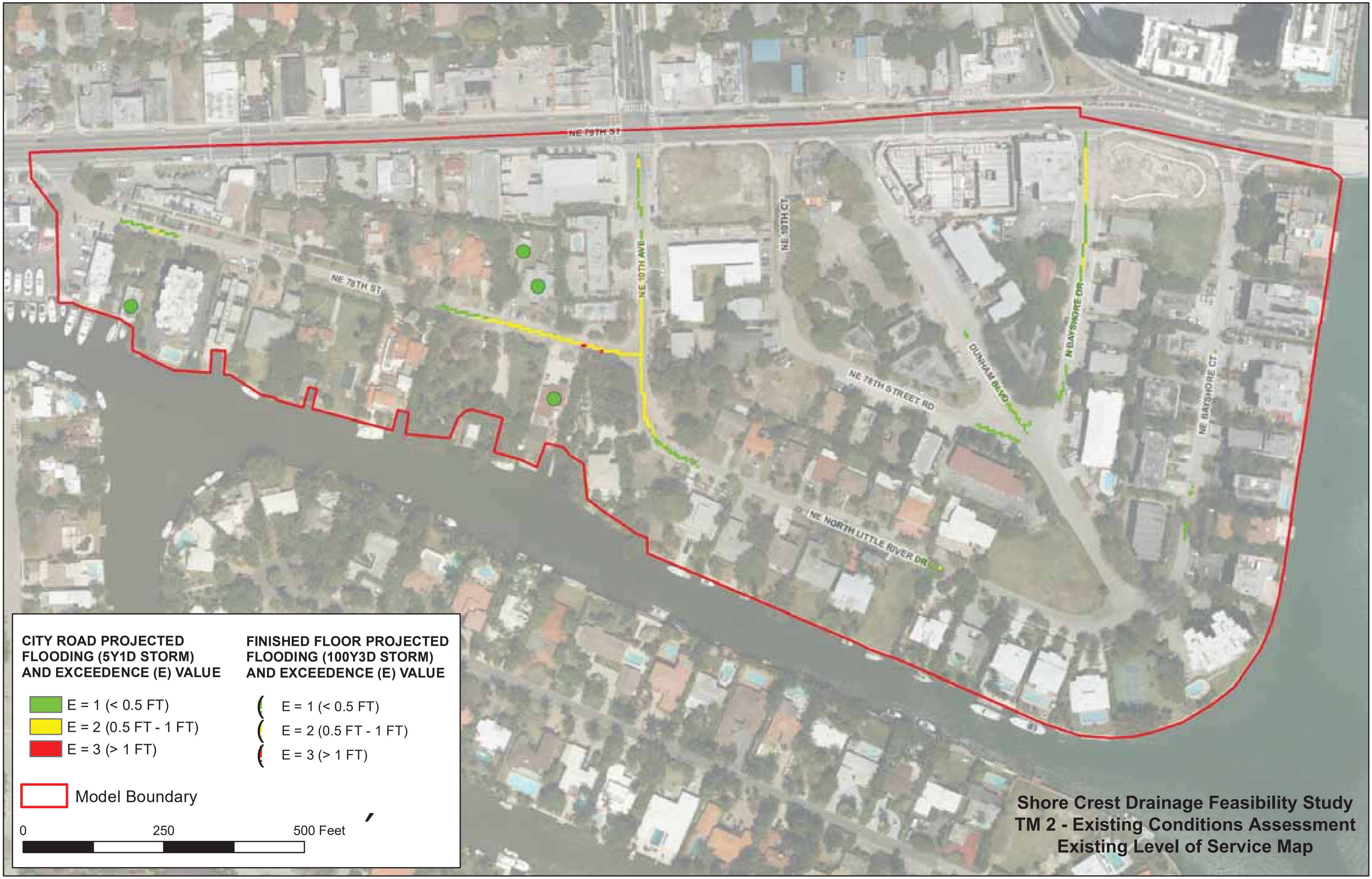


Shore Crest Drainage Feasibility Study
TM 2 - Existing Conditions Assessment
5-Year, 1-Day Inundation Map

Shore Crest Drainage Feasibility Study
TM 2 - Existing Conditions Assessment
100-Year, 3-Day Inundation Map

APPENDIX 4D

FLOOD PROTECTION LEVEL OF SERVICE MAP AND CALCULATIONS



Shore Crest Drainage Feasibility Study
TM 2 - Existing Conditions Assessment
Existing Level of Service Map

Shore Crest Drainage Feasibility Study
TM 2 - Existing Conditions Assessment
Flood Protection Level of Service Calcuations

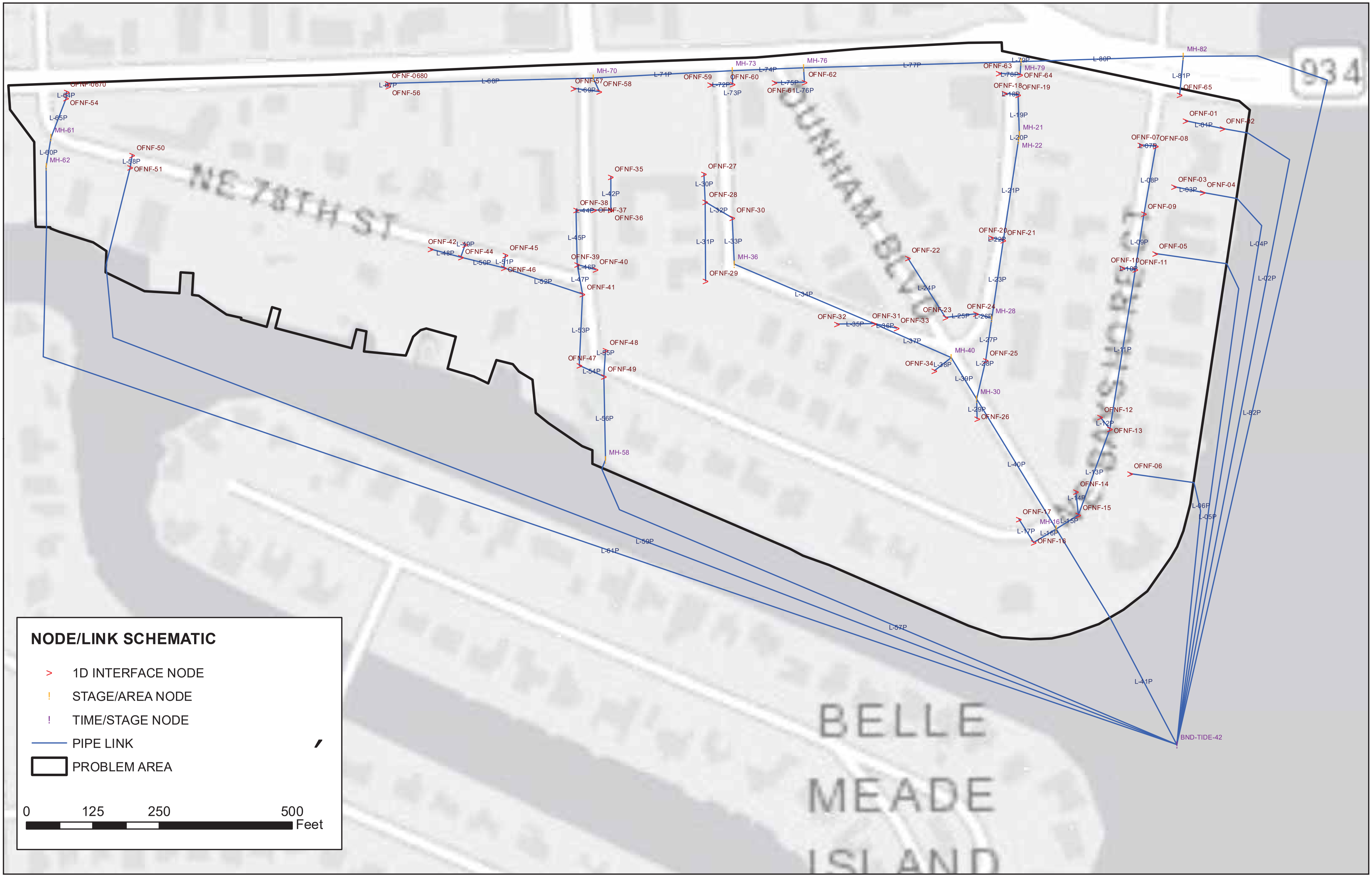
12/18/2018

Performed by: DV

Shore Crest Study Area (Acres)	NS	MCLRS	Composite Scores	NS						MCLRS									
	4 Weighing Factor	2 Weighing Factor																	
	Score	**Score**	**FPSS**	COUNT EXC 0	COUNT EXC 1	COUNT EXC 2	COUNT EXC 3	Total Structures	**$\sum E_i$*NS**	MCLRS 0	COUNT EXC 0	MCLRS 1	COUNT EXC 1	MCLRS 2	COUNT EXC 2	MCLRS 3	COUNT EXC 3	Total Miles	**∑Ei*MCLRS**
37.40	16	1.10	17.10	989	4	0	0	993	**4**	1.16	1227.00	0.24	255.00	0.16	168.00	0.00	3.00	1.57	**0.57**

APPENDIX 4E

EXISTING CONDITIONS MODEL NODE/LINK SCHEMATIC


NODE/LINK SCHEMATIC
1D INTERFACE NODE
STAGE/AREA NODE
TIME/STAGE NODE
PIPE LINK
PROBLEM AREA
0
125
250
500
Feet
NE 78TH ST
DUNHAM BLVD
BELLE
MEADE
ISLAND
934
BND-TIDE-42

APPENDIX 4F

EXISTING CONDITIONS MODEL INPUT REPORTS

Pipe Link: L-01P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.50 ft	Invert:	-0.50 ft
From Node:	OFNF-01	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-02	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	70.91 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: No data. Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-02P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.50 ft	Invert:	-0.50 ft
From Node:	OFNF-02	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	48.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: No data, downstream outfall no access. Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-03P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.50 ft	Invert:	-0.50 ft
From Node:	OFNF-03	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-04	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	54.96 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: No data. Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-04P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.50 ft	Invert:	-0.50 ft
From Node:	OFNF-04	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	65.50 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: No data, downstream outfall no access. Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-05P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.18 ft	Invert:	-1.18 ft
From Node:	OFNF-05	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	137.50 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" RCP, -1.18 Inv. El. upstream, downstream Inv. El. outfall no access (Survey)

Pipe Link: L-06P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.00 ft	Invert:	-1.00 ft
From Node:	OFNF-06	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	121.50 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: No data, downstream outfall no access. Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-07P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.72 ft	Invert:	-3.08 ft
From Node:	OFNF-07	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-08	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	28.41 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-08P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.95 ft	Invert:	-3.17 ft
From Node:	OFNF-08	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-09	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	128.77 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-09P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.17 ft	Invert:	-3.16 ft
From Node:	OFNF-09	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-11	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	105.87 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	

		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-10P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.28 ft	Invert:	-2.01 ft
From Node:	OFNF-10	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-11	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	25.38 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-11P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.14 ft	Invert:	-3.31 ft
From Node:	OFNF-11	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-13	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Max Width:	1.83 ft	Max Width:	1.83 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	303.38 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 22"x13" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-12P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.48 ft	Invert:	-1.72 ft
From Node:	OFNF-12	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-13	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	30.07 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	

Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-13P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.32 ft	Invert:	-4.33 ft
From Node:	OFNF-13	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-15	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.33 ft	Max Depth:	1.33 ft
Flow Direction:	Both	Max Width:	2.08 ft	Max Width:	2.08 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	172.72 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 25"x16" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-14P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.04 ft	Invert:	-4.33 ft
From Node:	OFNF-14	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-15	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	44.34 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-15P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.34 ft	Invert:	-4.42 ft
From Node:	OFNF-15	Manning's N:	0.0240	Manning's N:	0.0240

To Node:	MH-16	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.33 ft	Max Depth:	1.33 ft
Flow Direction:	Both	Max Width:	2.08 ft	Max Width:	2.08 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	49.56 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 25"x16" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-16P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.55 ft	Invert:	-3.99 ft
From Node:	OFNF-16	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-16	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	49.71 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-17P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.74 ft	Invert:	-3.63 ft
From Node:	OFNF-17	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-18	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	51.84 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-18P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.05 ft	Invert:	-4.05 ft
From Node:	OFNF-18	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-19	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	26.09 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. assumed the same Inv. El. as node MH-21. 18"x11" Arch Pipe, Inv. El. (As-built: Haynsworth Village Storm Sewer Improvement DR-5066, July/1958)

Pipe Link: L-19P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.05 ft	Invert:	-4.05 ft
From Node:	OFNF-19	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-21	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	74.99 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Downstream Inv. El. Upstream Inv. El. assumed the same as downstream (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-20P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.84 ft	Invert:	-3.63 ft
From Node:	MH-21	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-22	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	10.90 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft

Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-21P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.62 ft	Invert:	-3.92 ft
From Node:	MH-22	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-21	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	189.98 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-22P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.41 ft	Invert:	-2.87 ft
From Node:	OFNF-20	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-21	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	23.13 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-23P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.96 ft	Invert:	-4.37 ft
From Node:	OFNF-21	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-28	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Max Width:	1.83 ft	Max Width:	1.83 ft
Damping:	0.0000 ft	Bottom Clip			

Length:	148.09 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 22"x13" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-24P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.22 ft	Invert:	-2.53 ft
From Node:	OFNF-22	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-23	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	133.06 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-25P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.47 ft	Invert:	-2.59 ft
From Node:	OFNF-23	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-24	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	59.47 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-26P		Upstream		Downstream	

Scenario:	Existing Conditions	Invert:	-2.69 ft	Invert:	-3.08 ft
From Node:	OFNF-24	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-28	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	30.84 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-27P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.44 ft	Invert:	-4.40 ft
From Node:	MH-28	Manning's N:	0.0130	Manning's N:	0.0130
To Node:	OFNF-25	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.33 ft	Max Depth:	1.33 ft
Flow Direction:	Both	Max Width:	2.08 ft	Max Width:	2.08 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	80.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 25"x16" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-28P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.39 ft	Invert:	-4.48 ft
From Node:	OFNF-25	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-30	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.33 ft	Max Depth:	1.33 ft
Flow Direction:	Both	Max Width:	2.08 ft	Max Width:	2.08 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	74.45 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 25"x16" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-29P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.36 ft	Invert:	-4.72 ft
From Node:	OFNF-26	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-30	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	36.72 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.46	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" CMP, Inv. El. (Survey)

Pipe Link: L-30P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	0.21 ft	Invert:	-0.25 ft
From Node:	OFNF-27	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	OFNF-28	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	52.90 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.40	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" RCP, Inv. El. (Survey)

Pipe Link: L-31P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.05 ft	Invert:	-0.05 ft
From Node:	OFNF-29	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	OFNF-28	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	145.12 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.46	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft

Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" RCP, downstream Inv. El., upstream assumed the same as downstream (Survey)

Pipe Link: L-32P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.25 ft	Invert:	-3.17 ft
From Node:	OFNF-28	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-30	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	59.49 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Downstream Inv. El., Upstream Inv. El. assumed the same as Inv. North on node CB-33 (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-33P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.16 ft	Invert:	-3.16 ft
From Node:	OFNF-30	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-36	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	87.59 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Upstream Inv. El., Downstream Inv. El. assumed the same as upstream, structure downstream appears to be paved over (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-34P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.16 ft	Invert:	-3.85 ft
From Node:	MH-36	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-31	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft

Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	283.40 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Upstream Inv. El. assumed the same as previous link pipe, upstream structure appears to be paved over. Downstream Inv. El. assumed the lowest Inv. El at node CB-37 (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-35P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.82 ft	Invert:	-3.66 ft
From Node:	OFNF-32	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-31	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	67.14 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-36P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.41 ft	Invert:	-3.85 ft
From Node:	OFNF-33	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-31	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	45.83 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-37P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.85 ft	Invert:	-4.16 ft
From Node:	OFNF-31	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-40	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Max Width:	1.83 ft	Max Width:	1.83 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	160.52 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Upstream Inv. El. assumed to be the lowest Inv. El. at node CB-37 (Survey) & 22"x13" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-38P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.97 ft	Invert:	-3.12 ft
From Node:	OFNF-34	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-40	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	39.96 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-39P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.10 ft	Invert:	-4.48 ft
From Node:	MH-40	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-30	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Max Width:	1.83 ft	Max Width:	1.83 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	91.66 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	

		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 22"x13" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-40P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-5.04 ft	Invert:	-5.14 ft
From Node:	MH-30	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-16	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.83 ft	Max Depth:	1.83 ft
Flow Direction:	Both	Max Width:	3.00 ft	Max Width:	3.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	285.69 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 36"x22" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-41P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.89 ft	Invert:	-4.89 ft
From Node:	MH-16	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	BND-TIDE-42	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.83 ft	Max Depth:	1.83 ft
Flow Direction:	Both	Max Width:	3.00 ft	Max Width:	3.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	197.40 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El., downstream Inv. El. outfall no access (Survey) & 36"x22" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-42P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.01 ft	Invert:	-0.25 ft
From Node:	OFNF-35	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	OFNF-36	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft

Length:	62.76 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.46	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" RCP, Inv. El. (Survey)

Pipe Link: L-43P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.31 ft	Invert:	-2.72 ft
From Node:	OFNF-36	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	OFNF-37	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	30.66 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.10	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" RCP, Inv. El. upstream. (Survey) Assumed that upstream and downstream Inv. El. are the same

Pipe Link: L-44P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.72 ft	Invert:	-3.23 ft
From Node:	OFNF-37	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-38	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	34.69 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-45P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.88 ft	Invert:	-2.84 ft
From Node:	OFNF-38	Manning's N:	0.0240	Manning's N:	0.0240

To Node:	OFNF-39	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	103.84 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-46P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.80 ft	Invert:	-3.05 ft
From Node:	OFNF-40	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-39	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	34.61 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-47P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.76 ft	Invert:	-2.76 ft
From Node:	OFNF-39	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-41	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	55.08 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Upstream Inv. El., downstream Inv. El assumed the same as upstream, downstream structure appears to be paved over (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-48P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.26 ft	Invert:	-2.28 ft
From Node:	OFNF-42	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-44	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	59.22 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-49P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.73 ft	Invert:	-2.40 ft
From Node:	OFNF-43	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-44	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	27.84 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-50P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.25 ft	Invert:	-2.73 ft
From Node:	OFNF-44	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-46	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	82.83 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	

		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-51P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.64 ft	Invert:	-2.97 ft
From Node:	OFNF-45	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-46	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	27.16 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-52P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.62 ft	Invert:	-3.62 ft
From Node:	OFNF-46	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-41	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	156.65 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Upstream Inv. El., downstream Inv. El assumed the same as upstream, downstream structure appears to be paved over (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-53P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.20 ft	Invert:	-3.20 ft
From Node:	OFNF-41	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-47	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	133.98 ft	Default:	0.00 ft	Default:	0.00 ft

FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Downstream Inv. El., upstream Inv. El assumed the same as downstream, upstream structure appears to be paved over (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-54P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.61 ft	Invert:	-3.21 ft
From Node:	OFNF-47	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-49	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	50.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.46	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-55P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.68 ft	Invert:	-2.43 ft
From Node:	OFNF-48	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	OFNF-49	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	0.92 ft	Max Depth:	0.92 ft
Flow Direction:	Both	Max Width:	1.50 ft	Max Width:	1.50 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	49.84 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.10	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 18"x11" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-56P		Upstream		Downstream	

Scenario:	Existing Conditions	Invert:	-3.65 ft	Invert:	-3.87 ft
From Node:	OFNF-49	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	MH-58	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.33 ft	Max Depth:	1.33 ft
Flow Direction:	Both	Max Width:	2.08 ft	Max Width:	2.08 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	156.31 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	0.40	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 25"x16" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-57P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.43 ft	Invert:	-5.93 ft
From Node:	MH-58	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	BND-TIDE-42	Geometry: Arch Structural Plate		Geometry: Arch Structural Plate	
Link Count:	1	Max Depth:	1.33 ft	Max Depth:	1.33 ft
Flow Direction:	Both	Max Width:	2.08 ft	Max Width:	2.08 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	18.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.50	Ref Node:		Ref Node:	
Exit Loss Coef:	1.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 ft	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Inv. El. (Survey) & 25"x16" corrugated metal pipe-arches (As-built: Haynsworth Village DR-5066, July/1958)

Pipe Link: L-58P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.20 ft	Invert:	-1.15 ft
From Node:	OFNF-50	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	OFNF-51	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.00 ft	Max Depth:	1.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	25.36 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.10	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 12" RCP, Inv. El. (Survey)

Pipe Link: L-59P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.18 ft	Invert:	-1.18 ft
From Node:	OFNF-51	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	190.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 15" RCP, upstream Inv. El., downstream Inv. El. outfall no access (Survey)

Pipe Link: L-60P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.56 ft	Invert:	-4.82 ft
From Node:	MH-61	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	MH-62	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	55.72 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.40	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 36" RCP, Inv. El. (Survey)

Pipe Link: L-61P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.70 ft	Invert:	-5.69 ft
From Node:	MH-62	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	115.60 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: 36" RCP, Inv. El. (Survey). Biscayne Blvd. Outfall BIS_33. Inv. El. -3.88, discrepancy with Survey (Outfall Assessment TWO#14 Report)

Pipe Link: L-64P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.00 ft	Invert:	1.00 ft
From Node:	OFNF-0670	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	OFNF-54	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	12.02 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-65P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.59 ft	Invert:	-4.59 ft
From Node:	OFNF-54	Manning's N:	0.0110	Manning's N:	0.0110
To Node:	MH-61	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	79.25 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.40	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size & connection to 36" outfall (BIS_33)

Pipe Link: L-67P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-0.70 ft	Invert:	-0.36 ft
From Node:	OFNF-56	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	OFNF-0680	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.50 ft	Max Depth:	1.50 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	5.67 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	1.46	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size.

Pipe Link: L-68P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.59 ft	Invert:	-1.59 ft
From Node:	OFNF-0680	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-70	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	386.28 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: L-69P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.99 ft	Invert:	-2.99 ft
From Node:	OFNF-57	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	OFNF-58	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	47.49 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: L-70P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.99 ft	Invert:	-2.99 ft
From Node:	OFNF-58	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-70	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	26.80 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed invert from surrounding pipes

Pipe Link: L-71P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.99 ft	Invert:	-2.99 ft
From Node:	MH-70	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-73	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	261.68 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-72P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.27 ft	Invert:	-2.27 ft
From Node:	OFNF-59	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	OFNF-60	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	43.03 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size

Pipe Link: L-73P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.31 ft	Invert:	-2.31 ft
From Node:	OFNF-60	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-73	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	25.91 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size

Pipe Link: L-74P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.00 ft	Invert:	-2.00 ft
From Node:	MH-73	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-76	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	134.11 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-75P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.25 ft	Invert:	-2.25 ft
From Node:	OFNF-61	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	OFNF-62	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	55.39 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-76P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.25 ft	Invert:	-2.25 ft
From Node:	OFNF-62	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-76	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	25.86 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-77P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.50 ft	Invert:	-2.50 ft
From Node:	MH-76	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-79	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	408.44 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size

Pipe Link: L-78P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.40 ft	Invert:	-2.30 ft
From Node:	OFNF-63	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	OFNF-64	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	42.16 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: L-79P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.46 ft	Invert:	-2.46 ft
From Node:	OFNF-64	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-79	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	1.25 ft	Max Depth:	1.25 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	22.22 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: L-80P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.00 ft	Invert:	-3.00 ft
From Node:	MH-79	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-82	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	307.40 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-81P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	3.50 ft	Invert:	3.50 ft
From Node:	OFNF-65	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	MH-82	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	57.07 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Assumed pipe size. Assumed Invert = Ground El - 3 FT Cover - Pipe Diameter

Pipe Link: L-82P		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.66 ft	Invert:	-3.66 ft
From Node:	MH-82	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	BND-TIDE-42	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	140.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: Biscayne Blvd. Outfall BIS_34 (Outfall Assessment TWO#14 Report)

Node: BND-TIDE-42

Scenario: Existing Conditions
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 0.00 ft
Boundary Stage: IC

Comment:

Node: MH-16

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.78 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-21

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 1.23 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-22

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 1.45 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-28

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft

Warning Stage: 1.44 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-30

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.54 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-36

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.78 ft

Comment: Warning Stage=Rim Elev. from Point Cloud

Node: MH-40

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 1.94 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-58

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.97 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-61

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 3.23 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-62

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 4.94 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-70

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.18 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-73

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.83 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-76

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 0.47 ft
Warning Stage: 2.87 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-79

Scenario:	Existing Conditions
Type:	Stage/Area
Base Flow:	0.00 cfs
Initial Stage:	0.47 ft
Warning Stage:	2.31 ft

Comment: Warning Stage=Rim Elev. from Survey

Node: MH-82

Scenario:	Existing Conditions
Type:	Stage/Area
Base Flow:	0.00 cfs
Initial Stage:	0.47 ft
Warning Stage:	8.96 ft

Comment: Warning Stage=Rim Elev. from Outfall Assessment TWO#14 Report (Appendix A - Outfall No. BIS-34)

Curve Number: Existing [Set]

Land Cover Zone	Soil Zone	Curve Number [dec]
CII	1	98.0
CII	2	93.0
CII	3	88.0
R	1	98.0
R	2	92.0
R	3	85.0
T	1	98.0
T	2	94.0
T	3	91.0
U	1	97.0
U	2	76.0
U	3	56.0
W	1	98.0
W	2	98.0
W	3	98.0

Impervious: Existing [Set]

Land Cover Zone	% Impervious	% DCIA	% Direct	Ia Impervious [in]	Ia Pervious [in]
CII	0.00	0.00	0.00	0.000	0.000
R	0.00	0.00	0.00	0.000	0.000
T	0.00	0.00	0.00	0.000	0.000
U	0.00	0.00	0.00	0.000	0.000
W	0.00	0.00	0.00	0.000	0.000

Roughness: Existing [Set]

Roughness Zone	Shallow Manning's N [dec]	Deep Manning's N [dec]	Depth Range [ft]	Damping Threshold [ft]	Area Reduction Factor [dec]
CII	0.0137	0.0070	3.00	0.0000	1.00
R	0.0137	0.0070	3.00	0.0000	1.00
T	0.0137	0.0070	3.00	0.0000	1.00
U	0.4500	0.4000	3.00	0.0000	1.00
W	0.0137	0.0070	3.00	0.0000	1.00

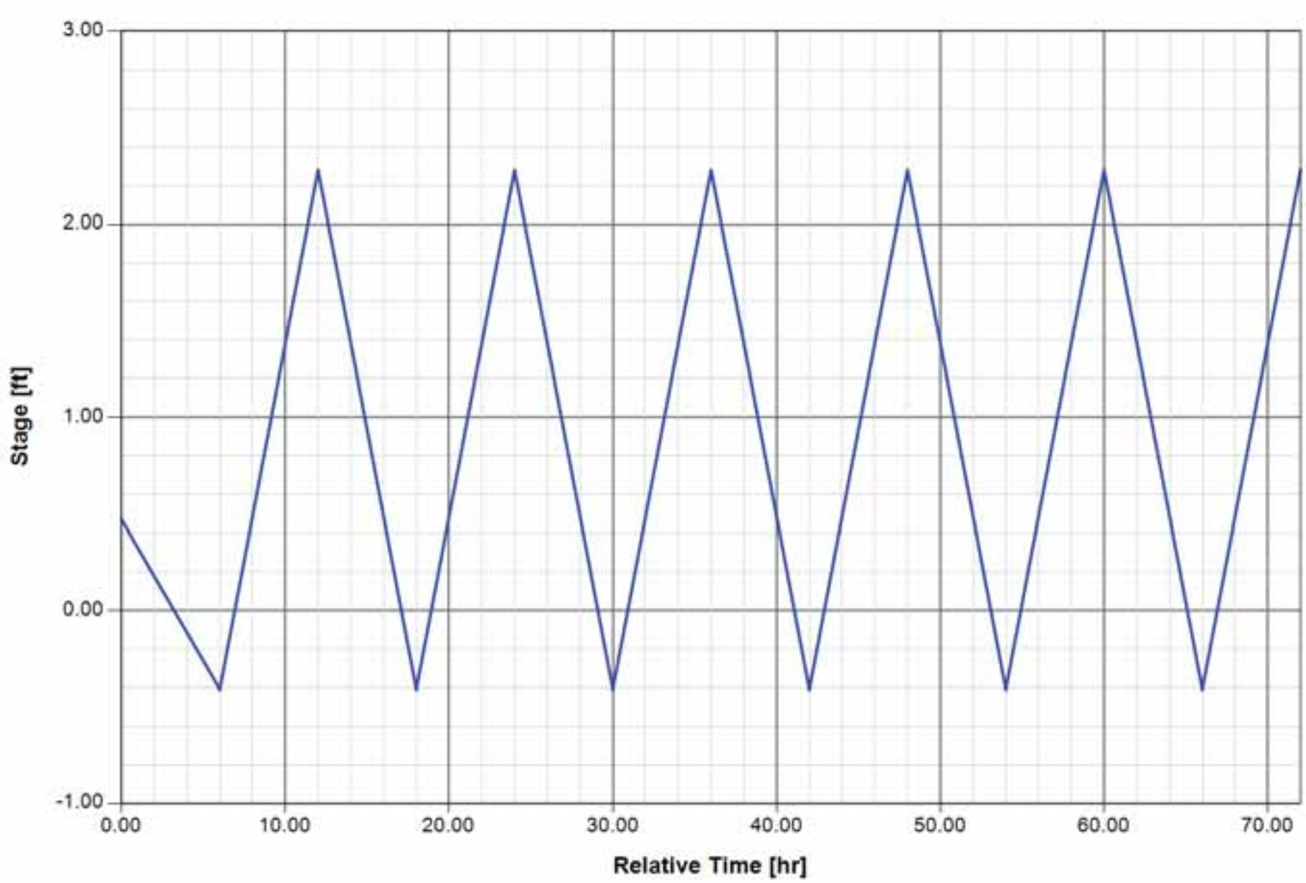
Boundary Stage: IC

Boundary Stage Set: Validation

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	0.47
0	0	0	6.0000	-0.41
0	0	0	12.0000	2.28
0	0	0	18.0000	-0.41
0	0	0	24.0000	2.28
0	0	0	30.0000	-0.41
0	0	0	36.0000	2.28
0	0	0	42.0000	-0.41
0	0	0	48.0000	2.28
0	0	0	54.0000	-0.41
0	0	0	60.0000	2.28
0	0	0	66.0000	-0.41
0	0	0	72.0000	2.28

Comment:

Boundary Stage: IC   Boundary Stage Set: Validation



Simulation: Validation

Scenario: Existing Conditions
Run Date/Time: 12/7/2018 3:35:12 PM
Program Version: ICPR4 4.04.00

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	24.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.0500	900.0000
Max Calculation Time:		5.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	8.0000	5.0000
0	0	0	10.0000	1.0000
0	0	0	14.0000	5.0000
0	0	0	16.0000	15.0000
0	0	0	24.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	8.0000	5.0000
0	0	0	10.0000	1.0000
0	0	0	14.0000	5.0000
0	0	0	16.0000	15.0000
0	0	0	24.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: Validation
Extern Hydrograph Set:
Curve Number Set: Existing
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: Existing
Roughness Set: Existing

		Crop Coef Set:	
		Fillable Porosity Set:	
		Conductivity Set:	
		Leakage Set:	

Tolerances & Options

Time Marching:	FIREBALL	IA Recovery Time:	24.0000 hr
		ET for Manual Basins:	False
dZ Tolerance:	0.0005 ft	Manual Basin Rain Opt:	No Rainfall
Max dZ:	1.0000 ft	OF Region Rain Opt:	No Rainfall
Link Optimizer Tol:	0.0000 ft		
Edge Length Option:	Automatic		
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Momentum	Energy Switch (1D):	Energy

Comment:

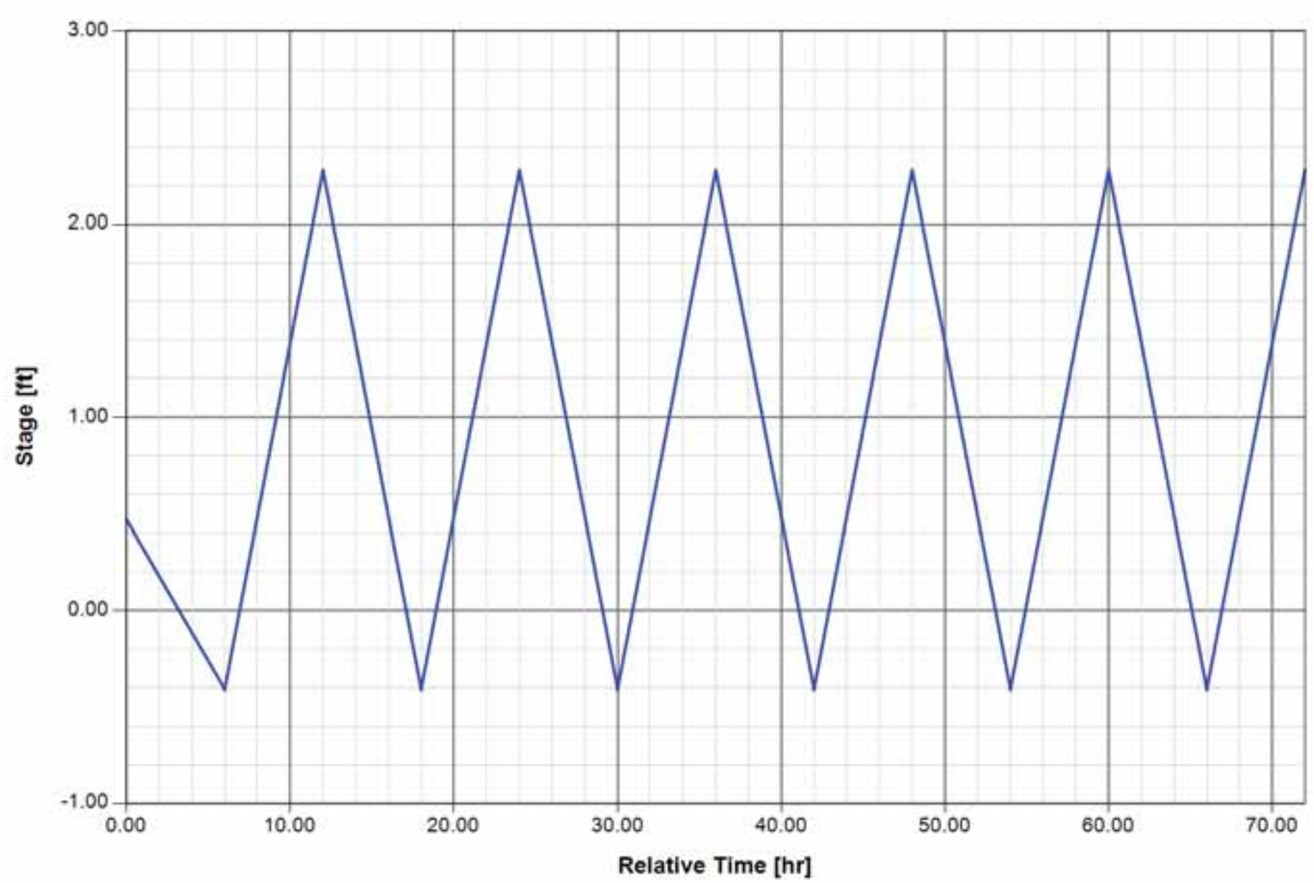
Boundary Stage: IC

Boundary Stage Set: DesignStorm

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	0.47
0	0	0	6.0000	-0.41
0	0	0	12.0000	2.28
0	0	0	18.0000	-0.41
0	0	0	24.0000	2.28
0	0	0	30.0000	-0.41
0	0	0	36.0000	2.28
0	0	0	42.0000	-0.41
0	0	0	48.0000	2.28
0	0	0	54.0000	-0.41
0	0	0	60.0000	2.28
0	0	0	66.0000	-0.41
0	0	0	72.0000	2.28

Comment:

Boundary Stage: IC   Boundary Stage Set: DesignStorm



Simulation: 100y3D

Scenario: Existing Conditions
Run Date/Time: 12/12/2018 2:17:23 PM
Program Version: ICPR4 4.04.00

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	72.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.0500	900.0000
Max Calculation Time:		5.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	48.0000	5.0000
0	0	0	56.0000	1.0000
0	0	0	64.0000	5.0000
0	0	0	72.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	48.0000	5.0000
0	0	0	56.0000	1.0000
0	0	0	64.0000	5.0000
0	0	0	72.0000	5.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder: 100yr
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: DesignStorm
Extern Hydrograph Set:
Curve Number Set: Existing
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: Existing
Roughness Set: Existing
Crop Coef Set:
Fillable Porosity Set:

Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	FIREBALL	IA Recovery Time:	24.0000 hr
		ET for Manual Basins:	False
dZ Tolerance:	0.0005 ft	Manual Basin Rain Opt:	No Rainfall
Max dZ:	1.0000 ft	OF Region Rain Opt:	Region Specification
Link Optimizer Tol:	0.0000 ft		
Edge Length Option:	Automatic		
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Momentum	Energy Switch (1D):	Energy

Comment:

Simulation: 5y1D

Scenario: Existing Conditions
Run Date/Time: 12/12/2018 10:07:55 AM
Program Version: ICPR4 4.04.00

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	24.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.0500	900.0000
Max Calculation Time:		5.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	8.0000	5.0000
0	0	0	10.0000	1.0000
0	0	0	14.0000	5.0000
0	0	0	16.0000	15.0000
0	0	0	24.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	8.0000	5.0000
0	0	0	10.0000	1.0000

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	14.0000	5.0000
0	0	0	16.0000	15.0000
0	0	0	24.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	360.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder: 5yr
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: DesignStorm
Extern Hydrograph Set:
Curve Number Set: Existing
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: Existing
Roughness Set: Existing
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching: FIREBALL

dZ Tolerance: 0.0005 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0000 ft

Edge Length Option: Automatic

Dflt Damping (2D): 0.0050 ft
Min Node Srf Area (2D): 100 ft2
Energy Switch (2D): Momentum

IA Recovery Time: 24.0000 hr
ET for Manual Basins: False

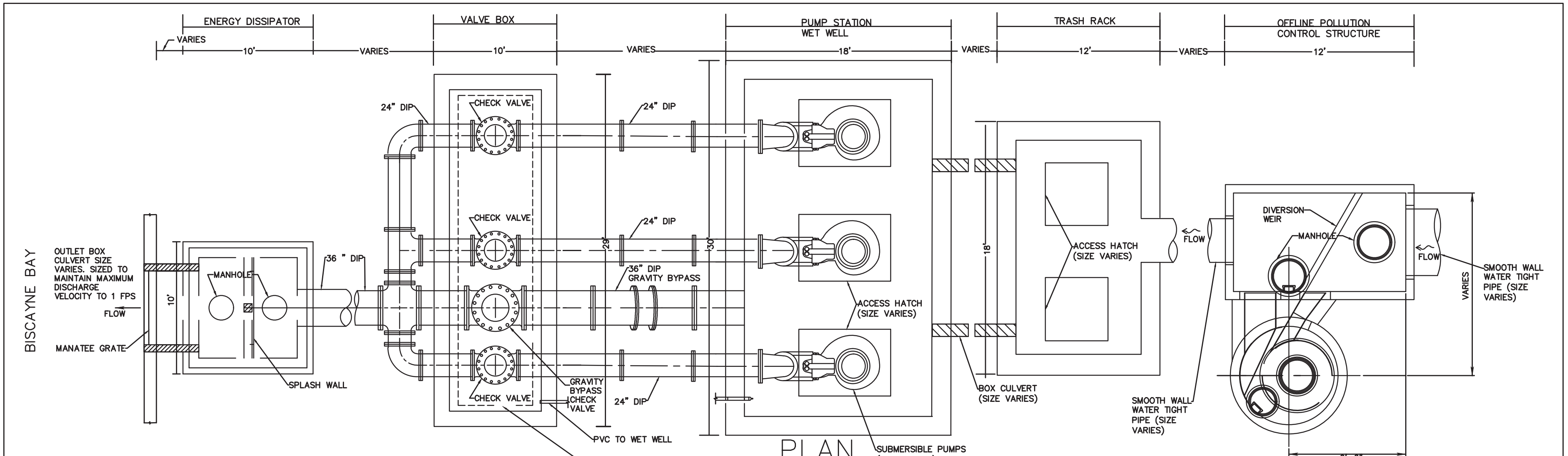
Manual Basin Rain Opt: No Rainfall
OF Region Rain Opt: Region Specification

Dflt Damping (1D): 0.0050 ft
Min Node Srf Area (1D): 100 ft2
Energy Switch (1D): Energy

Comment:

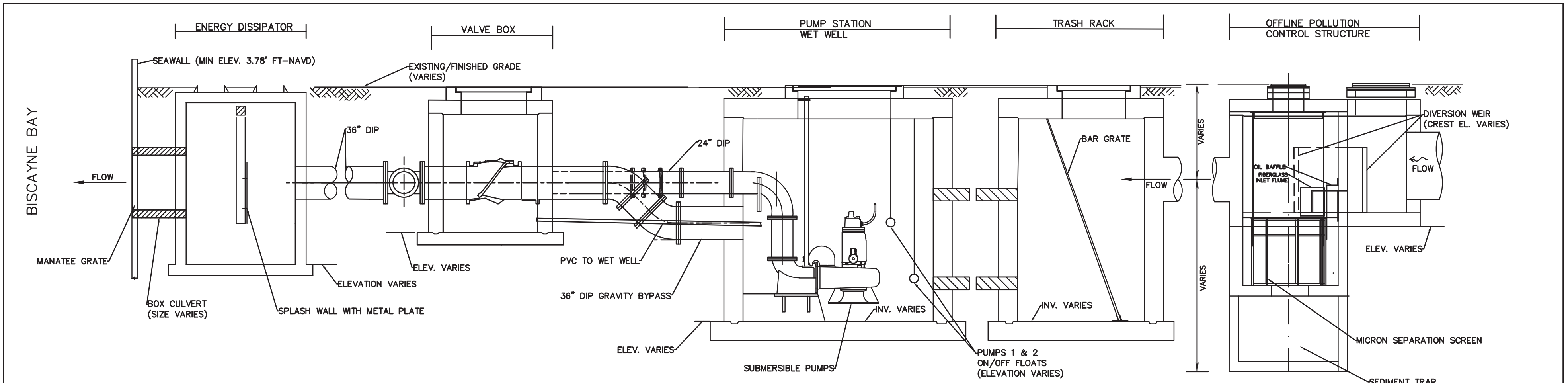
APPENDIX 5A

MID-RANGE SOLUTION PUMP STATION SCHEMATIC



PLAN

N.T.S.



PROFILE

N.T.S.

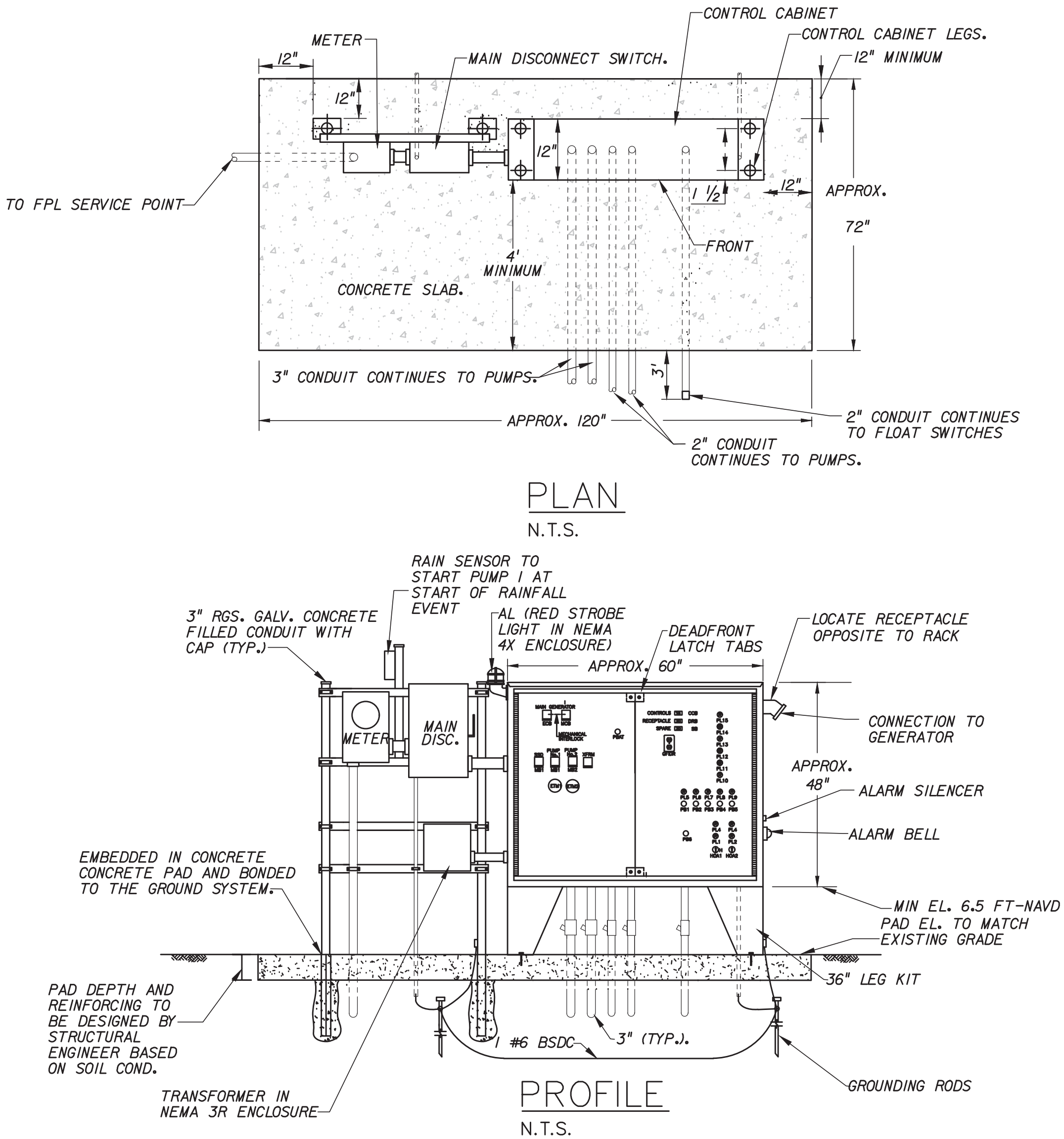
A.D.A ENGINEERING INC.

8550 NW 33 STREET, Suite 202
Doral, Florida 33122

STORMWATER PUMP STATION
TYPICAL DETAIL

APPENDIX

A



NOTES:

- PANEL SIZE WILL VARY DEPENDING ON CAPACITY OF PUMP STATION
- CONTROL PANEL TO BE LOCATED AS CLOSE AS POSSIBLE TO PUMP STATION
- CONTROL PANEL SIGHTING CONSIDERATIONS:
  - LOCATED WITHIN CITY RIGHT OF WAY
  - AVOID IMPACT TO RESIDENTIAL PROPERTY LINE OF SIGHT
  - PROVIDE LANDSCAPING TO MINIMIZE IMPACT TO AESTHETICS

A.D.A. ENGINEERING, INC.

8550 NW 33 STREET, Suite 202
Doral, Florida 33122

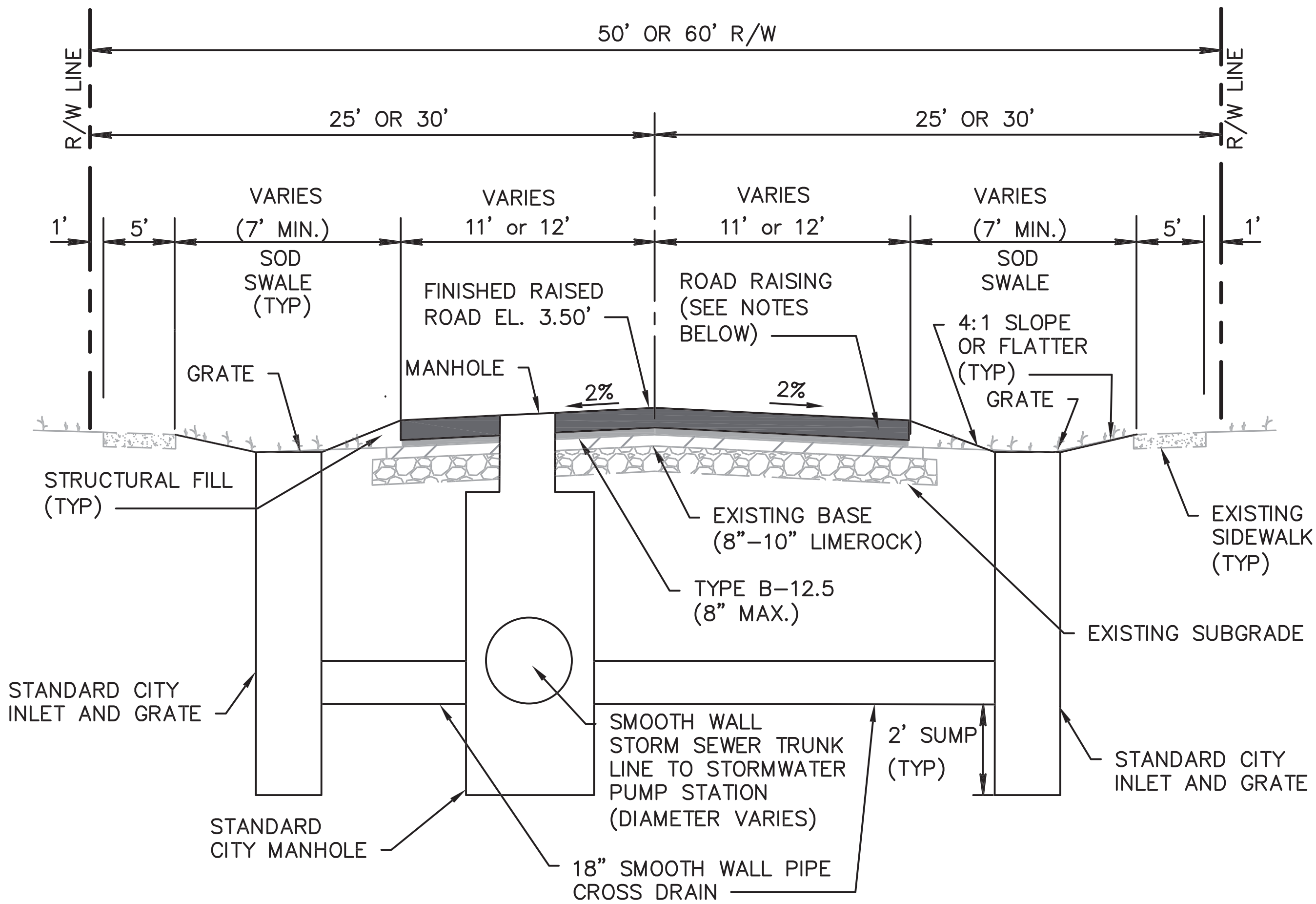
STORMWATER PUMP STATION CONTROL PANEL
TYPICAL DETAIL

APPENDIX

A

APPENDIX 5B

ROADWAY RAISING TYPICAL SECTION AND MAPS



ROADWAY RAISING NOTES:

1. FOR ROADWAY RAISING BETWEEN 0" AND 9":
   - MILL EXISITING ASPHALT TO TOP OF LIMEROCK BASE.
   - ABOVE EXISTING LIMEROCK, PLACE AND COMPACT TYPE B–12.5 (8" MAX.).
   - TOP LAYER: 1" FDOT TYPE S–III ASPHALT.

2. FOR ROADWAY RAISING GREATER THAN 9":
   - MILL EXISTING ASPHALT TO TOP OF LIMEROCK BASE.
   - PLACE AND COMPACT LIMEROCK ABOVE EXISTING TOP OF LIMEROCK BASE.
   - ABOVE EXISTING LIMEROCK, PLACE AND COMPACT TYPE B–12.5 (8" MAX.).
   - TOP LAYER: 1" FDOT TYPE S–III ASPHALT.

A.D.A ENGINEERING INC. 8550 NW 33rd Street, Suite 202 Doral, Florida 33122	TYPICAL RAISED ROAD SECTION	APPENDIX B

A-D-A ENGINEERING

SHORT-TERM PROJECTS

ROAD RAISE

Area 10 Boundary

Road Elevation (ft-NAVD)

Raise to 3

Raise to 3.5

Existing El. 3.5 - 4

Existing El. 4 - 5

Existing El. 5 - 6

0 50 100 200
Feet

MID-RANGE PROJECTS
ROAD RAISE

Area 10 Boundary

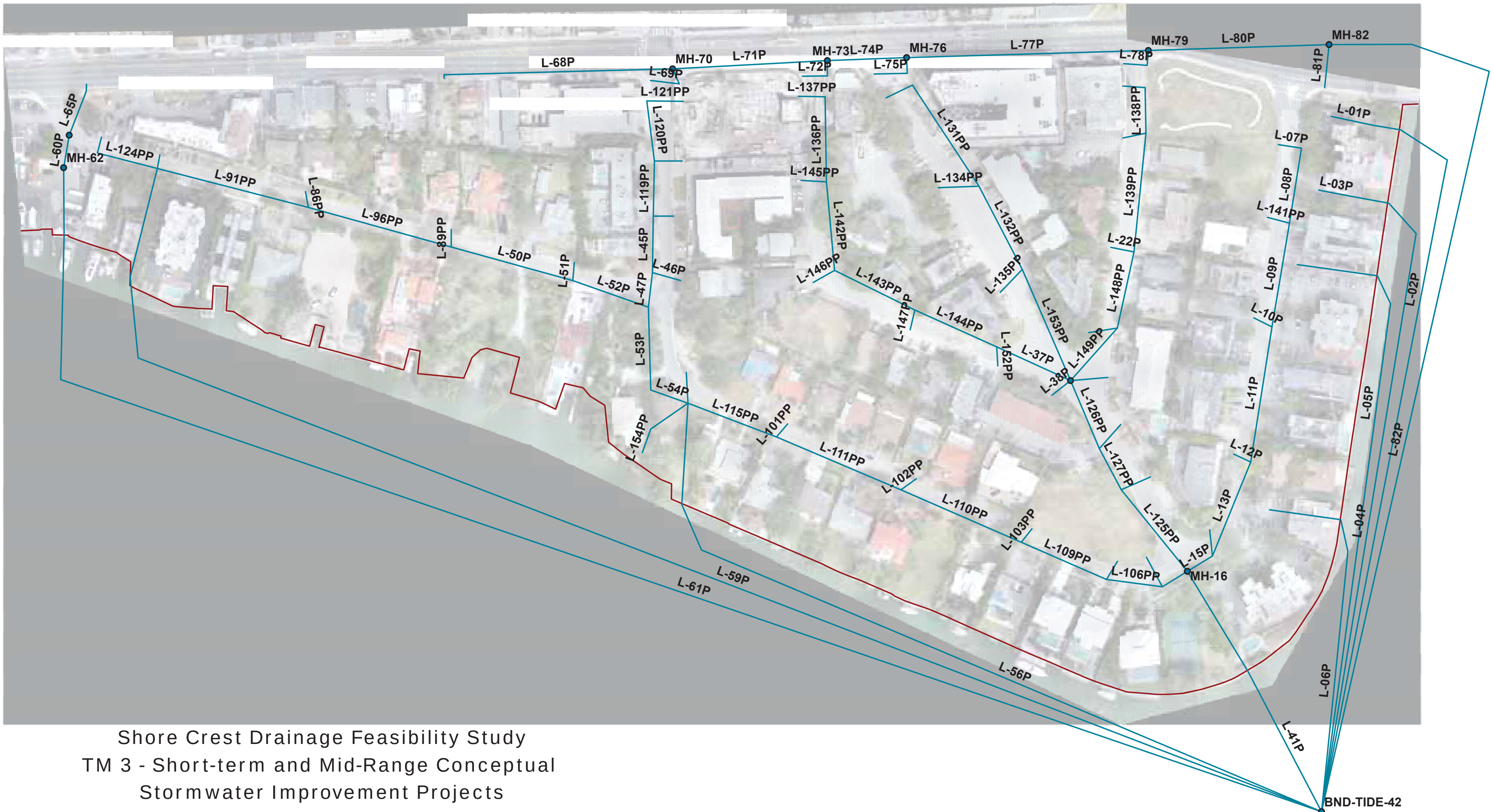
Road Elevation (ft-NAVD)

- Raise to 3
- Raise to 3.5
- Existing El. 3.5 - 4
- Existing El. 4 - 5
- Existing El. 5 - 6

0 50 100 200
Feet

APPENDIX 5C

SHORT-TERM AND MID-RANGE NODE/LINK SCHEMATICS



Shore Crest Drainage Feasibility Study

TM 3 - Short-term and Mid-Range Conceptual

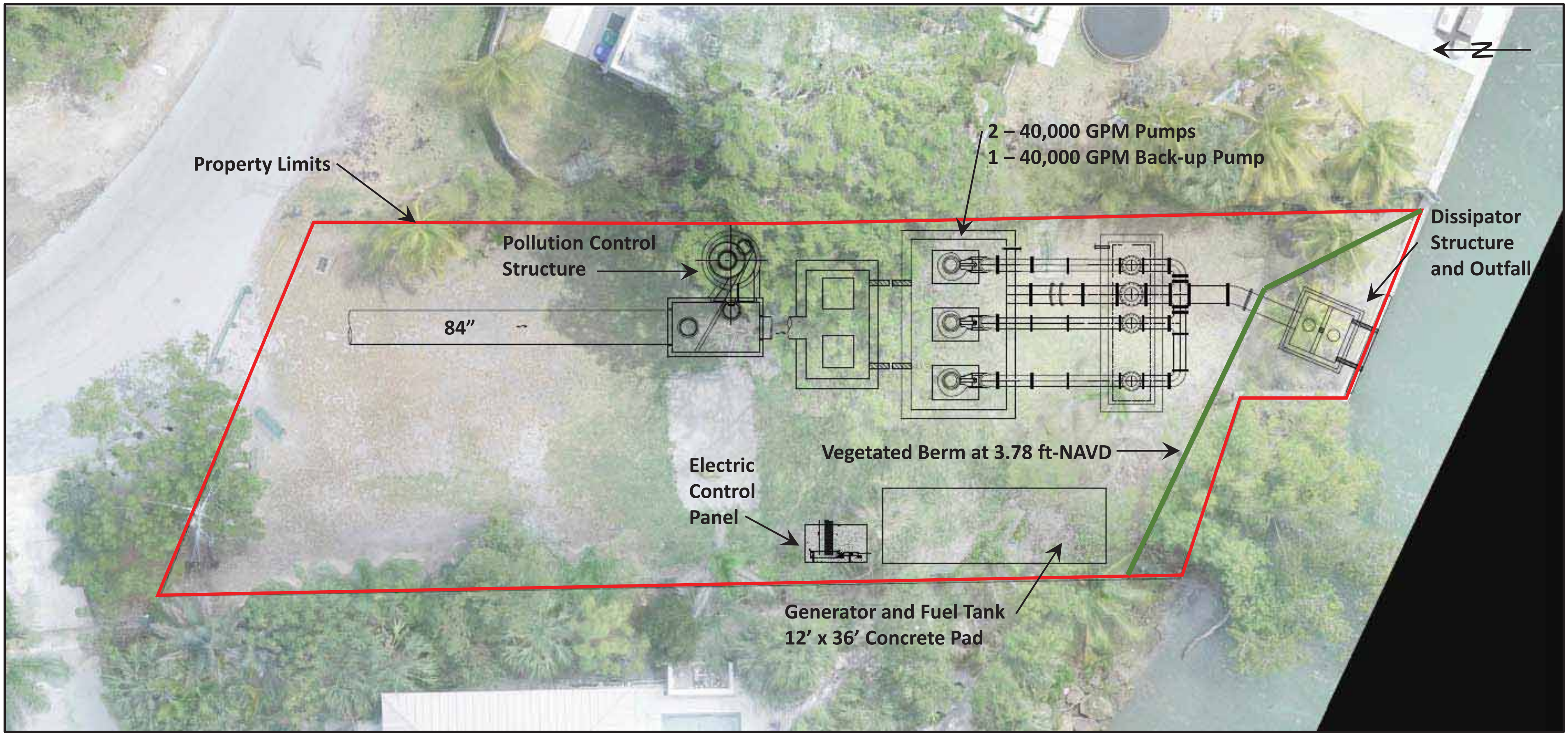
Stormwater Improvement Projects

Short-Term Node/Link Schematic

Shore Crest Drainage Feasibility Study
TM 3 - Short-term and Mid-Range Conceptual
Stormwater Improvement Projects
Mid-Range Node/Link Schematic

APPENDIX 5D

CONCEPTUAL LAYOUT AT LITTLE RIVER POCKET MINI PARK



Little River Pocket Mini Park (City of Miami)
Pump Station Conceptual Layout

APPENDIX 5E

MID-RANGE ICPR NODE AND LINK MAX

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
BND-TIDE-42	100y3D	0.00	3.78	0.0004	181.17	41.90	0	0.0000	8.4231	59.8169	0.0020
BND-TIDE-42	5y1D	0.00	3.78	0.0004	5.06	41.90	0	0.0000	0.2542	16.5136	0.0020

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
CB-PS-DS	100y3D	0.00	116.23	0.3372	178.25	176.87	100	60.0396	60.8711	59.6798	60.0396
CB-PS-DS	5y1D	0.00	3.78	0.3325	41.90	0.01	100	24.0009	0.0009	0.0020	2.0320

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
CB-PS-US	100y3D	0.00	2.45	0.6919	308.41	314.93	667	59.9013	24.4800	20.3511	24.4800
CB-PS-US	5y1D	0.00	2.40	0.3921	267.40	336.97	667	12.1786	10.6773	10.8987	10.7982

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-16	100y3D	2.78	2.55	0.4536	106.56	108.63	456	60.1537	26.8578	17.2773	22.8249
MH-16	5y1D	2.78	2.50	0.1349	77.29	80.77	456	12.0675	10.5840	10.8756	10.5840

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-40	100y3D	1.94	2.52	0.1849	66.67	65.23	695	60.1608	27.5467	27.5467	17.1076
MH-40	5y1D	1.94	2.47	0.0808	49.91	43.63	695	12.1316	11.6782	10.6587	10.6000

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-61	100y3D	3.23	3.79	0.0296	22.83	19.81	202	60.0018	60.9804	60.5885	60.5591
MH-61	5y1D	3.23	3.71	0.0270	17.37	18.25	202	12.1858	12.4587	12.4587	13.2320

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-62	100y3D	4.94	3.79	0.0129	9.81	12.15	150	60.0019	60.5493	60.7849	60.9805
MH-62	5y1D	4.94	3.70	0.0128	7.87	11.31	143	12.1858	12.5911	12.4658	12.5911

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-70	100y3D	2.18	2.52	0.0387	20.12	18.35	485	60.0506	59.4160	58.8880	63.9733
MH-70	5y1D	2.18	2.32	0.0365	19.63	17.01	556	12.9102	14.2551	13.8018	13.4942

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage	Max Total Inflow	Max Total Outflow	Max Surface Area	Time to Max Stage	Time to Min/Max Delta	Time to Max Total	Time to Max Total

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-73	100y3D	2.83	2.51	0.0124	6.98	7.80	402	60.0499	52.4044	63.9280	63.9280
MH-73	5y1D	2.83	2.31	0.0105	7.04	6.92	444	12.8836	21.5120	14.4311	14.4311

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-76	100y3D	2.87	2.52	0.0100	5.07	5.24	544	60.0498	42.5911	40.8124	59.3236
MH-76	5y1D	2.87	2.32	0.0093	4.19	5.31	547	12.8836	16.1564	17.4800	14.4311

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-79	100y3D	2.31	2.52	0.0075	7.56	7.78	881	60.0427	42.7387	42.7387	42.7387
MH-79	5y1D	2.31	2.33	0.0060	6.35	7.06	881	12.8829	12.9083	13.1510	17.7080

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-82	100y3D	8.96	2.52	0.0095	6.15	12.63	541	60.0428	42.7387	52.3058	42.7387
MH-82	5y1D	8.96	2.33	0.0070	5.90	10.19	512	12.8831	17.7079	17.7080	16.5136

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-01P	100y3D	0.63	-0.30	-0.17	0.80	0.80	59.5806	60.0098	60.0044	59.5806	59.5806
L-01P	5y1D	0.39	0.00	-0.17	0.49	0.49	11.8745	23.2827	12.0290	11.8745	11.8745

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-02P	100y3D	1.12	0.00	0.04	1.43	1.43	60.5704	0.0000	60.5588	60.5704	60.5704
L-02P	5y1D	0.98	0.00	0.05	1.24	1.24	12.4763	0.0000	12.4567	12.4763	12.4763

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-03P	100y3D	0.21	-0.45	-0.01	-0.57	-0.57	60.4099	60.0047	60.1884	60.0047	60.0047
L-03P	5y1D	0.17	-0.39	-0.01	-0.50	-0.50	12.3388	12.0050	12.1485	12.0050	12.0050

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-04P	100y3D	0.55	0.00	0.00	0.69	0.69	59.6365	0.0000	60.1859	59.6365	59.6365
L-04P	5y1D	0.23	0.00	0.00	0.30	0.30	12.3336	0.0000	18.0000	12.3336	12.3336

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow	Time to Min Flow	Time to Min/Max Delta	Time to Max Us Velocity	Time to Max Ds Velocity

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-05P	100y3D	0.06	0.00	0.00	0.08	0.08	61.7015	0.0000	61.7052	61.7015	61.7015
L-05P	5y1D	0.02	0.00	0.00	0.02	0.02	13.7066	0.0000	18.0000	13.7066	13.7066

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-06P	100y3D	0.74	0.00	0.24	0.95	0.95	61.9822	0.0000	26.2684	61.9822	61.9822
L-06P	5y1D	0.63	0.00	0.12	0.81	0.81	14.2888	0.0000	13.9588	14.2888	14.2888

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-07P	100y3D	3.12	-5.87	-5.85	-3.32	-3.32	60.1691	60.3742	60.3742	60.3742	60.3742
L-07P	5y1D	2.16	-4.00	-3.99	-2.26	-2.26	12.1513	12.1378	12.1378	12.1378	12.1378

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-08P	100y3D	1.95	-1.00	-0.82	1.10	1.10	60.0424	61.6365	61.6364	60.0424	60.0424
L-08P	5y1D	1.38	-0.85	-0.86	0.78	0.78	11.8503	12.7184	12.6258	11.8503	11.8503

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-09P	100y3D	4.02	-1.59	-1.23	2.27	2.27	60.9594	59.6278	60.3742	60.9594	60.9594
L-09P	5y1D	1.82	-2.22	0.91	-1.25	1.59	13.1331	11.9341	12.2355	11.9341	8.5713

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-101PP	100y3D	12.08	-12.30	-12.30	-6.96	-6.96	27.6533	27.6240	27.6240	27.6240	27.6240
L-101PP	5y1D	9.21	-10.61	-10.61	-6.01	6.16	10.8844	10.7396	10.7396	10.7396	10.8844

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-102PP	100y3D	10.16	-10.95	-10.95	-6.19	6.27	26.4471	23.3991	23.3991	23.3991	25.3822
L-102PP	5y1D	7.80	-11.48	-11.48	-6.50	-6.50	11.7325	10.7751	10.7751	10.7751	10.7751

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-103PP	100y3D	11.35	-12.44	-12.44	-7.04	-7.04	27.3662	31.9449	31.9449	31.9449	31.9449
L-103PP	5y1D	10.82	-11.08	-11.08	-6.27	-6.27	12.7689	13.5111	13.5111	13.5111	13.5111

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-105PP	100y3D	11.80	-11.68	11.79	6.68	6.68	30.7147	17.8773	30.7147	30.7147	30.7147
L-105PP	5y1D	9.65	-10.22	-10.21	-5.78	-5.78	13.0409	10.7209	10.7209	10.7209	10.7209

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-106PP	100y3D	134.38	-117.53	134.38	8.45	8.45	28.7307	29.5556	28.7307	28.7307	28.7307
L-106PP	5y1D	109.77	-117.48	-117.48	-7.39	-7.44	10.7636	10.7209	10.7209	10.7209	10.7209

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-109PP	100y3D	125.06	-134.69	-134.69	-8.47	-8.47	27.2756	31.9449	31.9449	31.9449	31.9449
L-109PP	5y1D	113.30	-111.63	113.30	7.12	7.19	10.7209	13.5111	10.7209	10.7209	10.7209

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-10P	100y3D	3.61	-4.00	-3.71	-2.26	-2.26	60.9590	60.4439	60.5422	60.4439	60.4439
L-10P	5y1D	2.19	-3.04	-2.87	-1.72	-1.72	12.5510	12.2262	12.5511	12.2262	12.2262

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-110PP	100y3D	139.21	-124.43	139.21	8.75	8.75	31.9449	22.7573	31.9449	31.9449	31.9449
L-110PP	5y1D	111.73	-119.20	-119.20	-7.49	-7.53	13.5111	10.7751	10.7751	10.7751	10.7751

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-111PP	100y3D	123.59	-120.37	123.59	7.77	7.89	27.3662	27.6240	27.3662	27.3662	25.1547
L-111PP	5y1D	110.45	-91.83	110.45	6.94	7.13	10.8845	10.7396	10.8845	10.8845	10.8845

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-115PP	100y3D	144.99	-168.22	-168.22	-10.58	-10.58	27.6240	30.2596	30.2596	30.2596	30.2596
L-115PP	5y1D	111.71	-136.62	-136.61	-8.59	-8.81	10.6142	10.8845	10.8845	10.8845	10.8845

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-116RCP	100y3D	178.24	0.00	178.24	0.00	0.00	59.6798	0.0000	59.6798	0.0000	0.0000
L-116RCP	5y1D	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow	Min Flow	Min/Max Delta	Max Us Velocity	Max Ds Velocity	Time to Max	Time to Min	Time to Min/Max	Time to Max Us	Time to Max Ds

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-118PP	100y3D	15.87	-12.13	11.43	8.98	9.18	60.9100	30.2596	27.1813	60.9100	60.9107
L-118PP	5y1D	7.93	-7.96	-7.96	-4.51	4.90	10.5724	10.8987	10.8987	10.8987	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-119PP	100y3D	2.97	-6.81	-6.81	-3.85	-3.85	66.2857	24.2285	24.2285	24.2285	24.2285
L-119PP	5y1D	1.78	-4.83	-3.14	-2.73	-2.73	20.4453	11.7943	11.1440	11.7943	11.7943

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-11P	100y3D	8.87	-1.67	1.74	2.82	2.82	60.9577	28.2605	18.1849	60.9577	60.9577
L-11P	5y1D	3.17	-1.40	-1.40	1.01	1.01	12.6258	10.8569	10.8569	12.6258	12.6258

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-120PP	100y3D	4.26	-2.55	2.82	2.41	2.41	60.5364	29.4977	28.8116	60.5364	60.5364
L-120PP	5y1D	2.32	-2.97	2.32	-1.68	-1.68	18.2536	11.7545	18.2536	11.7545	11.7545

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-121PP	100y3D	3.16	-1.63	-1.33	1.79	1.79	61.0673	27.4453	26.6356	61.0673	61.0673
L-121PP	5y1D	1.09	-3.69	-0.80	-2.09	-2.09	13.9646	12.0875	23.5003	12.0875	12.0875

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-122PP	100y3D	4.04	-3.55	4.04	2.29	2.29	29.4843	46.0602	29.4843	29.4843	29.4843
L-122PP	5y1D	2.78	-3.08	-3.08	-1.75	-1.75	11.5058	18.3705	18.3705	18.3705	18.3705

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-123PP	100y3D	5.27	-1.47	1.49	2.98	2.98	59.6248	29.3645	20.2596	59.6248	59.6248
L-123PP	5y1D	5.88	-0.86	1.12	3.33	3.33	11.8982	10.8498	10.7467	11.8982	11.8982

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-124PP	100y3D	5.45	-1.20	1.48	3.09	3.09	59.6262	30.6133	26.3058	59.6262	59.6262
L-124PP	5y1D	6.16	-1.00	-0.97	3.49	3.49	11.9002	21.1580	10.7467	11.9002	11.9002

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-125PP	100y3D	44.50	-33.85	44.40	4.63	4.63	26.8578	17.8693	26.8578	26.8578	26.8578
L-125PP	5y1D	24.19	-27.87	-27.87	-2.90	-2.94	10.7085	10.5840	10.5840	10.5840	10.5840

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-126PP	100y3D	38.25	-38.95	-38.95	-4.05	4.06	17.1076	27.5467	27.5467	27.5467	17.1076
L-126PP	5y1D	28.26	-32.71	-32.71	-3.40	-3.41	10.6000	10.6587	10.6587	10.6587	10.6587

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-127PP	100y3D	43.41	-39.46	43.40	4.51	4.53	19.9369	23.6987	19.9369	19.9369	19.9369
L-127PP	5y1D	38.02	-34.39	38.02	3.95	3.97	10.6587	10.6000	10.6587	10.6587	10.6587

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-128PP	100y3D	5.90	-5.20	5.23	3.34	3.34	60.9024	19.9369	26.9929	60.9024	60.9024
L-128PP	5y1D	4.08	-4.72	-4.72	-2.67	-2.67	10.6000	10.6587	10.6587	10.6587	10.6587

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-129PP	100y3D	6.35	-5.61	6.34	3.60	3.60	28.4604	22.9618	28.4604	28.4604	28.4604
L-129PP	5y1D	3.92	-3.18	3.84	2.22	2.22	10.7484	10.7565	10.7484	10.7484	10.7484

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-12P	100y3D	3.31	-1.18	2.19	1.87	1.87	60.5241	18.7440	60.6391	60.5241	60.5241
L-12P	5y1D	2.85	-0.98	2.08	1.61	1.61	12.2603	10.6756	12.2016	12.2603	12.2603

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-131PP	100y3D	1.79	-1.97	-1.68	-1.11	-1.11	60.0212	60.2006	60.3883	60.2006	60.2006
L-131PP	5y1D	1.68	-1.93	-1.48	-1.09	-1.09	11.6856	12.8604	12.3848	12.8604	12.8604

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-132PP	100y3D	2.54	-5.85	-4.76	-3.31	-3.31	60.9581	61.3120	56.6140	61.3120	61.3120
L-132PP	5y1D	3.28	-5.79	-4.45	-3.27	-3.27	11.6797	12.7145	13.7929	12.7145	12.7145

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-133PP	100y3D	3.32	-3.21	2.93	1.88	1.88	60.7138	60.0212	60.3754	60.7138	60.7138
L-133PP	5y1D	3.16	-2.39	3.16	1.79	1.79	13.0106	12.0039	13.0106	13.0106	13.0106

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-134PP	100y3D	3.51	-2.17	2.35	1.99	1.99	60.6498	59.6796	62.8871	60.6498	60.6498
L-134PP	5y1D	3.03	-1.88	2.41	1.71	1.71	13.1351	14.0658	13.3262	13.1351	13.1351

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-135PP	100y3D	2.76	-8.91	-7.34	-5.04	-5.04	60.0218	61.3120	56.6140	61.3120	61.3120
L-135PP	5y1D	2.73	-8.86	-6.33	-5.01	-5.01	15.3716	12.7145	12.8600	12.7145	12.7145

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-136PP	100y3D	3.04	-2.85	2.26	1.72	1.72	60.9084	59.7499	61.3666	60.9084	60.9084
L-136PP	5y1D	1.11	-4.51	1.18	-2.55	-2.55	17.0532	11.8898	14.9008	11.8898	11.8898

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-137PP	100y3D	9.26	-10.80	-9.40	-6.11	-6.11	16.1849	61.8938	53.1723	61.8938	61.8938
L-137PP	5y1D	8.81	-9.46	-9.18	-5.35	-5.35	17.0531	19.3382	21.1582	19.3382	19.3382

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-138PP	100y3D	10.49	-12.17	-10.27	-3.87	-3.87	31.9092	34.9519	31.3520	34.9519	34.9519
L-138PP	5y1D	9.16	-9.89	7.55	-3.15	-3.15	19.2337	18.3724	18.7493	18.3724	18.3724

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-139PP	100y3D	9.02	-6.46	-8.09	2.87	2.87	34.9519	32.5538	47.2524	34.9519	34.9519
L-139PP	5y1D	7.84	-4.83	5.75	2.49	2.49	18.3724	11.9612	17.8859	18.3724	18.3724

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-13P	100y3D	12.09	-3.92	-3.91	3.85	3.85	60.5229	22.7636	22.7636	60.5229	60.5229
L-13P	5y1D	5.49	-2.45	-2.45	1.75	1.75	12.2605	10.8178	10.8178	12.2605	12.2605

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-140PP	100y3D	6.69	-6.26	-6.25	3.79	3.79	33.0070	43.6079	31.3520	33.0070	33.0070
L-140PP	5y1D	5.59	-5.54	4.96	3.16	3.16	13.3838	19.3839	18.3724	13.3838	13.3838

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-141PP	100y3D	2.21	-4.20	-3.07	-2.38	-2.38	60.9605	59.6901	60.6771	59.6901	59.6901
L-141PP	5y1D	1.85	-4.87	-2.91	-2.76	-2.76	12.7796	11.9304	12.3129	11.9304	11.9304

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-142PP	100y3D	1.86	-3.35	-0.88	-1.90	-1.90	60.9677	59.7038	60.4932	59.7038	59.7038
L-142PP	5y1D	0.05	-3.42	-0.16	-1.93	-1.93	17.0534	11.9881	12.0237	11.9881	11.9881

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-143PP	100y3D	2.59	-2.38	0.87	1.47	1.47	60.9619	22.7190	59.8031	60.9619	60.9619
L-143PP	5y1D	0.73	-2.14	0.88	-1.21	-1.21	11.9885	10.8533	12.0977	10.8533	10.8533

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-144PP	100y3D	6.10	-3.89	3.89	1.94	1.94	60.0941	63.7039	63.7040	60.0941	60.0941
L-144PP	5y1D	5.70	-3.42	3.78	1.82	1.82	12.0986	14.3396	12.2086	12.0986	12.0986

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-145PP	100y3D	1.54	-2.25	-1.44	-1.28	-1.28	59.9005	60.1971	60.5447	60.1971	60.1971
L-145PP	5y1D	1.59	-0.98	-0.98	0.90	0.90	11.9373	16.2121	16.2121	11.9373	11.9373

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-146PP	100y3D	2.36	-0.50	-1.27	1.34	1.34	60.0425	31.6532	59.9226	60.0425	60.0425
L-146PP	5y1D	2.12	-0.37	-1.34	1.20	1.20	11.9852	22.2764	12.0977	11.9852	11.9852

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-147PP	100y3D	4.47	-1.73	2.01	2.53	2.53	60.0664	17.0053	58.8658	60.0664	60.0664
L-147PP	5y1D	3.93	-1.04	1.61	2.22	2.22	11.9502	22.0344	15.2489	11.9502	11.9502

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-148PP	100y3D	8.69	-5.72	8.27	2.77	2.77	51.6369	70.1813	41.9927	51.6369	51.6369
L-148PP	5y1D	7.43	-6.43	6.87	2.37	2.37	20.6612	12.0333	15.4709	20.6612	20.6612

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-149PP	100y3D	11.42	-8.44	7.94	3.63	3.63	60.9545	51.6369	27.5467	60.9545	60.9545
L-149PP	5y1D	6.14	-7.01	-6.47	-2.23	-2.23	16.2247	20.6612	15.4709	20.6612	20.6612

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-14P	100y3D	4.40	-2.31	2.51	2.49	2.49	60.2639	60.9640	60.7245	60.2639	60.2639
L-14P	5y1D	3.79	-1.17	1.99	2.15	2.15	12.1067	10.8178	12.5600	12.1067	12.1067

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-150PP	100y3D	5.21	-3.28	5.21	2.95	2.95	38.0925	49.1876	38.0925	38.0925	38.0925
L-150PP	5y1D	4.30	-3.29	4.30	2.43	2.43	15.5813	12.9961	15.5813	15.5813	15.5813

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-151PP	100y3D	4.70	-7.43	-7.43	-4.20	-4.20	17.1076	47.8373	47.8373	47.8373	47.8373
L-151PP	5y1D	2.84	-6.76	-5.84	-3.83	-3.83	10.7547	23.2328	16.0584	23.2328	23.2328

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-152PP	100y3D	3.46	-3.88	-3.27	-2.20	-2.20	60.0941	60.2931	60.0942	60.2931	60.2931
L-152PP	5y1D	3.45	-3.35	-3.45	1.95	1.95	12.0305	12.0831	12.0306	12.0305	12.0305

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-153PP	100y3D	5.98	-3.01	3.57	3.38	3.38	61.3120	17.1076	46.0418	61.3120	61.3120
L-153PP	5y1D	5.97	-1.51	2.47	3.38	3.38	12.7145	10.6000	22.2640	12.7145	12.7145

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-154PP	100y3D	7.00	-12.81	-3.97	-7.25	-7.25	0.0009	60.9161	31.3565	60.9161	60.9161
L-154PP	5y1D	7.00	-3.26	4.15	4.07	5.44	0.0009	10.7484	10.8898	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-15P	100y3D	15.99	-7.51	10.59	5.09	5.09	60.2642	24.0764	26.8578	60.2642	60.2642
L-15P	5y1D	8.19	-5.77	-5.77	2.61	2.61	12.0711	10.5840	10.5840	12.0711	12.0711

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-16P	100y3D	65.76	-59.43	65.42	4.13	4.13	23.2640	23.7325	23.2640	23.2640	23.2640
L-16P	5y1D	48.77	-52.28	-52.28	-3.29	-3.35	10.7085	10.7751	10.7751	10.7751	10.7751

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-17P	100y3D	8.96	-6.21	-6.21	5.07	5.07	60.9033	23.2640	23.2640	60.9033	60.9033
L-17P	5y1D	4.63	-4.49	4.63	2.62	2.89	10.7751	10.7636	10.7751	10.7751	10.7751

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-18P	100y3D	4.38	-2.51	2.52	2.48	2.48	60.2001	48.0767	60.1827	60.2001	60.2001
L-18P	5y1D	4.03	-2.75	1.94	2.28	2.28	12.9876	22.4535	12.7713	12.9876	12.9876

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-22P	100y3D	3.51	-3.27	-3.27	1.98	1.98	36.8391	61.6337	61.6337	36.8391	36.8391
L-22P	5y1D	3.34	-2.78	3.34	1.89	1.89	14.7945	12.7199	14.7945	14.7945	14.7945

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-37P	100y3D	10.00	-6.61	6.47	3.18	3.18	60.2567	17.1076	27.5467	60.2567	60.2567
L-37P	5y1D	5.76	-3.98	-3.98	1.83	1.83	11.9631	10.7547	10.7547	11.9631	11.9631

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-38P	100y3D	5.39	-3.49	3.96	3.05	3.05	60.9562	17.1076	34.2418	60.9562	60.9562
L-38P	5y1D	3.30	-2.30	3.00	1.87	1.87	12.8157	14.5998	14.1573	12.8157	12.8157

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-41P	100y3D	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000
L-41P	5y1D	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-44P	100y3D	1.93	-6.07	-6.07	-3.44	-3.44	62.9800	24.2285	24.2285	24.2285	24.2285
L-44P	5y1D	1.84	-3.91	-3.13	-2.21	-2.21	13.9538	11.7943	11.0018	11.7943	11.7943

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-45P	100y3D	12.73	-5.54	12.73	4.05	4.05	24.2284	59.6476	24.2284	24.2284	24.2284
L-45P	5y1D	7.87	-6.35	6.50	2.50	2.50	21.5464	12.0362	11.0018	21.5464	21.5464

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-46P	100y3D	2.91	-2.76	-2.06	1.65	1.65	60.9534	60.3467	19.3147	60.9534	60.9534
L-46P	5y1D	1.82	-2.57	1.89	-1.45	-1.45	17.3979	12.0361	22.5300	12.0361	12.0361

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-47P	100y3D	15.77	-11.28	11.89	5.02	5.02	60.9559	59.8995	23.4649	60.9559	60.9559
L-47P	5y1D	7.51	-11.56	7.51	-3.68	-3.68	10.5360	12.0840	10.5360	12.0840	12.0840

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-50P	100y3D	26.57	-22.58	24.17	3.76	3.76	60.9407	28.4951	66.3204	60.9407	60.9407
L-50P	5y1D	18.94	-17.31	-17.31	2.68	2.68	18.9277	10.8676	10.8676	18.9277	18.9277

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-51P	100y3D	2.59	-3.87	-3.79	-2.19	-2.19	20.6942	71.3539	31.0231	71.3539	71.3539
L-51P	5y1D	1.87	-3.73	-3.03	-2.11	-2.11	10.6773	12.1665	17.7592	12.1665	12.1665

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-52P	100y3D	29.39	-13.10	16.89	4.16	4.16	59.9657	18.0569	22.9644	59.9657	59.9657
L-52P	5y1D	11.32	-11.43	-11.43	-1.62	1.84	10.8676	10.8898	10.8898	10.8898	6.9120

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-53P	100y3D	53.09	-35.12	35.78	4.22	4.22	60.2033	21.5885	20.8453	60.2033	60.2033
L-53P	5y1D	27.37	-29.77	-29.77	-2.37	-2.37	10.7431	10.8356	10.8356	10.8356	10.8356

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-54P	100y3D	66.40	-75.19	-75.19	-5.98	7.38	27.1813	30.2596	30.2596	30.2596	60.2294
L-54P	5y1D	52.11	-53.81	-53.81	-4.28	-4.28	10.8356	10.8987	10.8987	10.8987	10.8987

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-55P	100y3D	13.91	-13.43	13.55	7.87	8.17	60.8779	30.2596	31.1298	60.8779	60.8796
L-55P	5y1D	9.28	-8.70	-8.70	5.25	5.25	23.8747	10.8987	10.8987	23.8747	23.8747

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-56P	100y3D	315.56	-320.40	-320.40	-8.33	9.07	30.2596	24.4800	24.4800	24.4800	59.7890
L-56P	5y1D	255.22	-220.62	255.22	6.63	6.65	10.8987	10.5653	10.8987	10.8987	10.8987

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-57P	100y3D	176.87	-41.90	4.98	56.30	56.30	60.0396	0.0020	60.8710	60.0396	60.0396
L-57P	5y1D	0.01	-41.90	0.19	-13.34	-13.56	2.3556	0.0020	0.0020	0.0020	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-58P	100y3D	6.96	-2.52	-2.41	3.94	3.94	60.0292	60.8533	60.2233	60.0292	60.0292
L-58P	5y1D	3.34	-1.51	-1.51	1.89	1.89	12.0295	12.4836	12.1127	12.0295	12.0295

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-59P	100y3D	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000
L-59P	5y1D	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-60P	100y3D	9.03	-9.15	-9.15	-1.29	-1.29	60.6373	60.9805	60.9805	60.9805	60.9805
L-60P	5y1D	8.09	-8.69	-8.69	-1.23	-1.23	13.2320	12.4587	12.4587	12.4587	12.4587

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-61P	100y3D	4.00	0.00	3.60	0.57	0.57	60.6372	0.0000	60.7849	60.6372	60.6372
L-61P	5y1D	3.27	0.00	-3.27	0.46	0.46	12.5911	0.0000	12.5911	12.5911	12.5911

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-64P	100y3D	18.75	-20.46	-20.45	-6.51	-6.51	60.7618	60.5885	60.5885	60.5885	60.5885
L-64P	5y1D	18.75	-13.43	18.75	5.97	5.97	13.2320	12.4836	13.2320	13.2320	13.2320

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-65P	100y3D	15.11	-9.54	15.11	2.14	2.14	60.5885	60.6045	60.5885	60.5885	60.5885
L-65P	5y1D	9.92	-10.61	-10.61	-1.50	-1.50	12.4587	13.2320	13.2320	13.2320	13.2320

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-67P	100y3D	4.38	-0.93	1.11	2.48	2.48	59.9297	45.2587	45.0667	59.9297	59.9297
L-67P	5y1D	3.68	-1.04	1.07	2.08	4.29	12.0151	14.1778	14.6827	12.0151	12.0151

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-68P	100y3D	4.40	-2.68	-2.68	1.40	1.40	59.9300	58.7565	58.7565	59.9300	59.9300
L-68P	5y1D	3.38	-2.35	-2.35	1.79	3.78	11.9936	14.3565	14.3565	11.9668	11.9360

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-69P	100y3D	7.80	-11.46	-11.46	-3.65	-3.65	46.6285	58.8880	58.8880	58.8880	58.8880
L-69P	5y1D	7.73	-10.61	-10.61	-3.38	-3.38	21.5565	13.5911	13.5911	13.5911	13.5911

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-70P	100y3D	16.37	-11.39	16.37	5.21	5.21	58.8880	62.3556	58.8880	58.8880	58.8880
L-70P	5y1D	14.68	-10.72	14.67	4.67	4.67	13.8018	21.5565	13.8018	13.8018	13.8018

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-71P	100y3D	3.23	-2.80	3.08	1.03	1.03	63.9218	58.8569	59.4160	63.9218	63.9218
L-71P	5y1D	3.63	-2.83	-2.79	1.15	1.15	11.9689	13.8018	15.4605	11.9689	11.9689

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-72P	100y3D	1.09	-1.08	1.08	0.89	0.89	41.6596	63.6498	41.6596	41.6596	41.6596
L-72P	5y1D	1.02	-1.01	1.02	0.83	0.83	12.5627	14.2125	12.5627	12.5627	12.5627

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-73P	100y3D	1.73	-1.94	-1.94	-1.58	-1.58	42.4285	52.4045	52.4045	52.4045	52.4045
L-73P	5y1D	1.77	-1.54	1.76	1.44	1.44	14.2125	14.3013	14.2125	14.2125	14.2125

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-74P	100y3D	2.96	-3.09	-3.09	-0.98	1.11	41.6596	63.2747	63.2747	63.2747	21.1604
L-74P	5y1D	3.23	-3.06	-3.06	2.00	3.02	11.9623	14.4311	14.4311	11.9305	11.8268

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-75P	100y3D	0.69	-0.64	0.63	0.56	0.56	53.4364	54.3813	59.4898	53.4364	53.4364
L-75P	5y1D	0.68	-0.64	-0.63	0.56	0.56	17.9547	23.7867	23.7867	17.9547	17.9547

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-76P	100y3D	1.37	-1.24	1.37	1.12	1.12	40.6587	63.1280	40.6587	40.6587	40.6587
L-76P	5y1D	1.28	-1.19	1.28	1.04	1.04	16.1565	16.1422	16.1565	16.1565	16.1565

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-77P	100y3D	1.67	-1.68	1.29	-0.54	1.03	59.9191	60.4353	53.4365	60.4353	16.3921
L-77P	5y1D	2.03	-2.01	-1.19	0.86	1.77	11.9614	12.3121	13.8951	11.9375	10.8477

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-78P	100y3D	2.91	-1.26	2.20	2.37	2.37	59.9870	59.9193	60.4133	59.9870	59.9870
L-78P	5y1D	2.13	-0.57	1.72	1.73	1.73	12.7671	12.7668	12.9403	12.7671	12.7671

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-79P	100y3D	2.09	-3.84	-3.77	-3.13	-3.13	60.3836	59.9185	59.9870	59.9185	59.9185
L-79P	5y1D	2.17	-2.53	-2.52	-2.07	-2.07	12.3117	13.9493	12.7671	13.9493	13.9493

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-80P	100y3D	5.55	-2.93	5.54	0.78	0.78	42.7387	61.4808	42.7387	42.7387	42.7387
L-80P	5y1D	4.34	-2.75	4.34	0.61	1.43	19.2693	13.6222	19.2693	19.2693	10.0980

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-81P	100y3D	0.06	0.00	0.00	0.55	0.00	59.9197	0.0000	53.1667	59.9197	0.0000
L-81P	5y1D	0.05	0.00	0.00	0.53	0.00	12.0010	0.0000	10.3768	12.0010	0.0000

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-82P	100y3D	5.30	0.00	-4.75	0.75	0.75	63.8192	0.0000	63.7191	63.8192	63.8192
L-82P	5y1D	4.76	0.00	-4.76	0.67	0.67	16.5135	0.0000	16.5136	16.5135	16.5135

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-86PP	100y3D	4.04	-3.74	4.04	2.29	2.30	18.7787	29.1653	18.7787	18.7787	18.7787
L-86PP	5y1D	2.55	-3.11	2.55	-1.76	-1.76	10.6756	21.1579	10.6756	21.1579	21.1579

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-89PP	100y3D	6.58	-7.55	-7.55	-4.27	-4.27	60.5223	47.0622	47.0622	47.0622	47.0622
L-89PP	5y1D	3.89	-5.53	-5.12	-3.13	-3.13	10.7485	18.9277	21.1578	18.9277	18.9277

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-91PP	100y3D	17.26	-5.22	5.66	5.49	5.49	59.9482	29.1653	18.7787	59.9482	59.9482
L-91PP	5y1D	12.45	-4.03	3.74	3.96	3.96	12.0519	21.1579	10.6756	12.0519	12.0519

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-96PP	100y3D	16.97	-16.86	-16.85	3.46	3.46	59.9532	47.0622	47.0622	59.9532	59.9532
L-96PP	5y1D	12.75	-12.37	-11.21	2.60	2.60	12.0221	21.1578	14.6416	12.0221	12.0221

APPENDIX 5F

FLOOD PROTECTION SEVERITY SCORE CALCULATIONS

Flood Protection Severity Score Calculations

	Number of Structures Flooded (NS) During the 100 Year – 3 Day Storm					Miles of Collector and Local Residential Streets Flooded (MCLRS) During the 5-Year – 3 Day Storm					Flood Protection Severity Score
	NS Count Exceedance= 1	NS Count Exceedance= 2	NS Count Exceedance= 3	**∑Ei*NS**	**NS Score (4 Weighting Factor)**	MCLRS Exceedance= 1	MCLRS Exceedance= 2	MCLRS Exceedance= 3	**∑Ei*MCLRS**	**MCLRS Score (2 Weighting Factor)**	
Short-Term Improvements, Current Tidal and Rainfall Conditions	4	0	0	**4**	16	0.0	0.0	0.0	**0.0**	0.0	16.00
Mid-Range Improvements, Predicted 2050 Tidal and Rainfall Conditions	5	1	0	**7**	28	0.0	0.0	0.0	**0.0**	0.0	28.00

APPENDIX 5G

MID-RANGE INNUDATION MAPS

5-YEAR 1-DAY STORM INUNDATION MAP MID-TERM PROJECTS 2050 SEA LEVEL ESTIMATE

Seawall - Min El. 3.78 (FT-NAVD)

Area 10 Boundary

Existing Inlet

Existing Manhole

Private/FDOT Outfalls Requiring Backflow Preventors

Proposed Inlet

Proposed Manhole

Proposed Pump Station

Existing Pipe-By Owner

City

FDOT

Private

Proposed Pipe Size (IN)

18

24

30

36

42

48

54

84

OUTFALL TO BE BLOCKED

Inundation Depth (ft)

<0.25

0.25-0.5

0.5 - 0.75

0.75 - 1

1.0-1.25

1.25-1.5

1.5-1.75

1.75-2.0

>2.0

0 50 100 200

Feet

A-D-A ENGINEERING

100-YEAR 3-DAY STORM INUNDATION MAP MID-TERM PROJECTS 2050 SEA LEVEL ESTIMATE

- Seawall - Min El. 3.78 (FT-NAVD)
- Area 10 Boundary
- Existing Inlet
- Existing Manhole
- Private/FDOT Outfalls Requiring Backflow Preventors
- Proposed Inlet
- Proposed Manhole
- Proposed Pump Station

Existing Pipe-By Owner

- City
- FDOT
- Private

Proposed Pipe Size (IN)

- 18
- 24
- 30
- 36
- 42
- 48
- 54
- 84
- OUTFALL TO BE BLOCKED

Inundation Depth (ft)

- <0.25
- 0.25-0.5
- 0.5 - 0.75
- 0.75 - 1
- 1.0-1.25
- 1.25-1.5
- 1.5-1.75
- 1.75-2.0
- >2.0

0 50 100 200 Feet

APPENDIX 5H

SHORT-TERM ICPR NODE AND LINK MAX

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
BND-TIDE-42	100y3D	0.00	2.28	0.0004	150.47	0.00	0	72.0001	67.1058	62.7973	0.0000
BND-TIDE-42	5y1D	0.00	2.28	0.0004	153.80	0.00	0	12.0000	8.0329	14.8365	0.0000

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-16	100y3D	2.78	2.48	0.7698	96.23	94.95	477	60.0285	0.0009	0.0009	47.7938
MH-16	5y1D	2.78	2.39	0.7698	96.23	96.17	477	12.0133	0.0009	0.0009	10.6978

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-40	100y3D	1.94	2.48	0.5064	65.86	56.50	715	60.0230	0.0009	69.3973	70.8418
MH-40	5y1D	1.94	2.36	0.5064	63.30	55.04	715	12.0897	0.0009	0.0009	23.0996

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-61	100y3D	3.23	2.29	0.5795	72.44	28.25	202	60.0006	0.0009	0.0009	32.0804
MH-61	5y1D	3.23	2.23	0.5795	72.44	15.90	202	12.1162	0.0009	0.0009	0.0030

Node Max Conditions w/ Times

Node	Sim	Warning	Max	Min/Max	Max	Max	Max	Time to	Time to	Time to	Time to

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-62	100y3D	4.94	2.28	0.0570	15.90	14.11	180	59.9991	32.0449	0.0030	32.0818
MH-62	5y1D	4.94	2.23	0.0146	15.90	11.83	180	12.1145	19.6711	0.0030	12.4489

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-70	100y3D	2.18	2.35	0.5205	65.07	14.04	627	60.0222	0.0009	0.0009	62.3414
MH-70	5y1D	2.18	2.10	0.5205	65.07	13.88	627	12.4089	0.0009	0.0009	14.1014

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-73	100y3D	2.83	2.33	0.1376	19.01	7.25	364	60.0174	0.0009	0.0024	64.0702
MH-73	5y1D	2.83	2.10	0.1376	19.01	7.20	364	12.3985	0.0009	0.0024	14.2463

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-76	100y3D	2.87	2.32	0.1351	16.88	6.45	596	60.0038	0.0009	0.0009	63.4222
MH-76	5y1D	2.87	2.10	0.1351	16.88	5.51	596	12.3987	0.0009	0.0009	17.3778

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage	Time to Max Total Inflow	Time to Max Total Outflow

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-79	100y3D	2.31	2.30	0.1541	19.26	14.76	1128	60.0001	0.0009	0.0009	65.4640
MH-79	5y1D	2.31	2.11	0.1541	19.26	13.33	1128	12.3932	0.0009	0.0009	17.2356

Node Max Conditions w/ Times

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]	Time to Max Stage [hr]	Time to Min/Max Delta Stage [hr]	Time to Max Total Inflow [hr]	Time to Max Total Outflow [hr]
MH-82	100y3D	8.96	2.29	0.0473	11.16	18.17	674	60.0001	65.4640	65.4640	52.5822
MH-82	5y1D	8.96	2.11	0.0409	10.30	18.04	674	12.3917	17.2356	17.2356	16.4702

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-01P	100y3D	0.87	0.00	0.01	1.11	1.11	59.9433	35.0421	61.5260	59.9433	59.9433
L-01P	5y1D	0.77	0.00	0.01	0.98	0.98	12.0162	20.5448	12.5447	12.0162	12.0162

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-02P	100y3D	1.97	0.00	0.00	2.50	2.50	60.0099	0.0000	62.6321	60.0099	60.0099
L-02P	5y1D	1.66	0.00	0.00	2.11	2.11	12.0130	0.0000	11.5103	12.0130	12.0130

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-03P	100y3D	0.34	0.00	0.00	0.43	0.43	60.0138	55.1280	16.1200	60.0138	60.0138
L-03P	5y1D	0.31	0.00	0.00	0.40	0.40	12.0136	11.7724	11.8120	12.0136	12.0136

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-04P	100y3D	0.70	0.00	0.00	0.89	0.89	60.0106	0.0000	16.1218	60.0106	60.0106
L-04P	5y1D	0.61	0.00	0.00	0.77	0.77	12.0110	0.0000	11.8113	12.0110	12.0110

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow	Time to Min Flow	Time to Min/Max Delta	Time to Max Us Velocity	Time to Max Ds Velocity

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-05P	100y3D	0.28	0.00	0.01	0.36	0.36	60.0049	0.0000	59.6140	60.0049	60.0049
L-05P	5y1D	0.26	0.00	0.01	0.34	0.34	12.0049	0.0000	11.9394	12.0049	12.0049

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-06P	100y3D	1.39	0.00	0.03	1.77	1.77	60.1028	0.0000	59.9124	60.1028	60.1028
L-06P	5y1D	1.16	0.00	0.02	1.48	1.48	12.0418	0.0000	12.0414	12.0418	12.0418

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-07P	100y3D	2.58	-3.80	-3.80	-2.15	-2.15	60.2381	60.2293	60.2293	60.2293	60.2293
L-07P	5y1D	1.87	-3.16	-2.92	-1.79	-1.79	12.1158	12.1511	12.2320	12.1511	12.1511

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-08P	100y3D	1.70	-0.71	1.22	0.96	0.96	61.3764	61.0116	60.2089	61.3764	61.3764
L-08P	5y1D	1.41	-0.86	0.71	0.80	0.80	11.9086	12.1513	23.3520	11.9086	11.9086

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-09P	100y3D	3.20	-1.98	-1.09	1.81	1.81	61.1486	59.7252	60.2310	61.1486	61.1486
L-09P	5y1D	2.49	-2.16	-0.94	1.41	1.41	12.5724	11.9921	23.3520	12.5724	12.5724

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-101PP	100y3D	10.49	-10.36	10.49	5.94	-6.17	70.0756	62.9751	70.0756	70.0756	15.3547
L-101PP	5y1D	10.56	-10.72	-10.72	-6.07	6.13	22.1929	14.6756	14.6756	14.6756	22.1929

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-102PP	100y3D	11.01	-11.20	-11.20	-6.34	-6.34	35.6951	70.2836	70.2836	70.2836	70.2836
L-102PP	5y1D	10.48	-11.35	-11.35	-6.42	-6.42	10.8933	10.8107	10.8107	10.8107	10.8107

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-103PP	100y3D	11.23	-11.77	-11.77	-6.66	-6.66	36.2871	47.8649	47.8649	47.8649	47.8649
L-103PP	5y1D	10.87	-10.30	10.87	6.15	6.18	23.3138	14.3520	23.3138	23.3138	10.9289

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-105PP	100y3D	11.12	-10.80	11.10	6.29	6.79	46.4676	46.7227	46.4676	46.4676	46.4676
L-105PP	5y1D	11.17	-10.65	11.17	6.32	6.36	22.7431	10.6978	22.7431	22.7431	22.7431

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-106PP	100y3D	119.32	-121.28	-121.28	-7.63	-7.63	24.8898	46.8027	46.8027	46.8027	46.8027
L-106PP	5y1D	115.48	-119.52	-119.51	-7.51	-7.66	22.0249	14.8471	14.8471	14.8471	14.8471

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-109PP	100y3D	126.82	-123.49	126.82	7.97	7.97	47.3867	48.3271	47.3867	47.3867	47.3867
L-109PP	5y1D	119.29	-113.30	119.29	7.50	7.50	10.6978	11.4773	10.6978	10.6978	10.6978

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-10P	100y3D	2.51	-2.65	-2.65	-1.50	-1.50	60.1865	60.4151	60.4151	60.4151	60.4151
L-10P	5y1D	1.50	-2.91	-2.88	-1.65	1.78	12.0596	11.9839	12.1804	11.9839	18.0791

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-110PP	100y3D	126.43	-118.36	126.43	7.95	7.95	70.2747	33.8756	70.2747	70.2747	70.2747
L-110PP	5y1D	117.36	-114.17	117.35	7.38	7.38	22.7591	10.8107	22.7591	22.7591	22.7591

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-111PP	100y3D	112.69	-110.69	112.69	7.09	7.10	46.5005	12.9991	46.5005	46.5005	14.9387
L-111PP	5y1D	116.19	-111.66	116.19	7.31	7.63	10.8107	10.8933	10.8107	10.8107	14.7093

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-115PP	100y3D	137.01	-110.49	137.01	8.61	9.11	69.9645	70.0756	69.9645	69.9645	69.9645
L-115PP	5y1D	130.46	-109.16	130.46	8.20	9.24	14.6098	22.1929	14.6098	14.6098	14.6098

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-118PP	100y3D	9.86	-5.37	9.86	5.58	5.58	69.9645	69.7280	69.9645	69.9645	69.9645
L-118PP	5y1D	10.46	-5.44	10.46	5.92	5.92	14.7938	14.6080	14.7938	14.7938	14.7938

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-119PP	100y3D	4.57	-6.59	-5.62	-3.73	-3.73	62.8140	71.1111	46.3467	71.1111	71.1111
L-119PP	5y1D	3.68	-6.05	-6.05	-3.43	-3.43	14.4849	22.6053	22.6053	22.6053	22.6053

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-11P	100y3D	5.05	-1.76	-1.76	1.61	1.61	60.9819	14.9387	14.9387	60.9819	60.9819
L-11P	5y1D	3.63	-1.47	1.59	1.15	1.15	12.4969	22.8827	23.2782	12.4969	12.4969

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-120PP	100y3D	4.22	-3.27	2.88	2.39	2.39	62.7787	59.1187	35.6205	62.7787	62.7787
L-120PP	5y1D	3.24	-2.77	2.88	1.83	1.83	14.5193	23.9048	23.7582	14.5193	14.5193

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-121PP	100y3D	3.76	-2.28	-1.56	2.13	2.13	62.9359	59.7975	48.1271	62.9359	62.9359
L-121PP	5y1D	2.96	-3.28	1.34	-1.86	-1.86	14.5374	12.1435	11.0080	12.1435	12.1435

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-122PP	100y3D	4.13	-3.44	4.13	2.34	2.34	35.6205	24.8933	35.6205	35.6205	35.6205
L-122PP	5y1D	4.13	-3.33	4.13	2.34	2.34	23.7582	23.9048	23.7582	23.7582	23.7582

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-123PP	100y3D	6.10	-1.36	1.46	3.45	3.45	59.7331	34.6321	45.9947	59.7331	59.7331
L-123PP	5y1D	5.94	-1.06	1.48	3.36	3.36	12.0098	11.3191	22.8196	12.0098	12.0098

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-124PP	100y3D	6.46	-1.12	1.20	3.65	3.65	59.7244	25.1218	35.0329	59.7244	59.7244
L-124PP	5y1D	6.29	-0.92	1.23	3.56	3.56	12.0113	23.3449	14.3005	12.0113	12.0113

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-125PP	100y3D	39.58	-36.19	-36.19	4.61	7.15	0.0009	14.7645	14.7645	0.0009	0.0009
L-125PP	5y1D	39.58	-35.63	-35.63	4.61	7.15	0.0009	10.6978	10.6978	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-126PP	100y3D	33.49	-41.57	-38.21	-4.87	-7.28	70.8418	0.0009	69.3973	0.0009	0.0009
L-126PP	5y1D	32.43	-41.57	-32.95	-4.87	-7.28	10.9618	0.0009	10.6978	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-127PP	100y3D	42.21	-41.06	42.21	4.39	4.46	14.7645	47.7938	14.7645	14.7645	14.7645
L-127PP	5y1D	40.34	-38.58	40.33	4.19	4.26	21.2125	23.3538	21.2125	21.2125	21.2125

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-128PP	100y3D	4.84	-5.15	-5.15	-2.91	3.76	12.7742	35.7413	35.7413	35.7413	0.0021
L-128PP	5y1D	4.92	-5.04	4.92	-2.85	3.76	22.9040	10.6978	22.9040	10.6978	0.0021

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-129PP	100y3D	5.62	-5.43	5.61	3.18	3.77	14.7644	47.7938	14.7644	14.7644	0.0021
L-129PP	5y1D	5.11	-5.26	-5.25	-2.97	3.77	21.2124	20.7769	20.7769	20.7769	0.0021

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-12P	100y3D	3.14	-1.21	3.01	1.78	1.78	60.1067	13.2018	60.1100	60.1067	60.1067
L-12P	5y1D	1.51	-1.10	1.19	0.86	0.86	12.0889	23.2391	12.1227	12.0889	12.0889

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-131PP	100y3D	1.91	-1.83	-1.92	1.08	1.08	59.6506	60.2913	59.6507	59.6506	59.6506
L-131PP	5y1D	1.62	-2.16	-1.73	-1.22	-1.22	11.8184	11.9430	11.9429	11.9430	11.9430

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-132PP	100y3D	3.50	-5.82	-3.69	-3.30	-3.30	62.1815	60.9005	61.3402	60.9005	60.9005
L-132PP	5y1D	2.99	-5.59	-3.14	-3.16	-3.16	12.8641	12.4400	12.8160	12.4400	12.4400

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-133PP	100y3D	3.30	-2.59	3.09	1.87	1.87	60.2913	59.6506	61.0264	60.2913	60.2913
L-133PP	5y1D	2.77	-2.00	2.76	1.56	1.56	12.3990	12.7689	12.3990	12.3990	12.3990

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-134PP	100y3D	3.52	-1.72	2.09	1.99	1.99	61.3482	59.7742	60.0557	61.3482	61.3482
L-134PP	5y1D	2.82	-1.44	2.73	1.59	1.59	12.1546	12.0210	12.4960	12.1546	12.1546

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-135PP	100y3D	2.38	-9.27	-6.34	-5.24	-5.24	59.9419	60.9005	60.8333	60.9005	60.9005
L-135PP	5y1D	1.81	-8.79	-5.48	-4.97	-4.97	12.4625	12.4400	12.5316	12.4400	12.4400

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-136PP	100y3D	3.27	-4.11	1.64	-2.32	-2.32	63.9640	59.6659	60.9360	59.6659	59.6659
L-136PP	5y1D	3.13	-4.25	0.91	-2.40	-2.40	15.1016	11.9637	21.6973	11.9637	11.9637

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-137PP	100y3D	7.76	-9.77	-7.72	-5.53	-5.53	61.9044	60.2550	60.6960	60.2550	60.2550
L-137PP	5y1D	7.82	-9.03	6.94	-5.11	-5.11	13.2684	12.1981	14.9407	12.1981	12.1981

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-138PP	100y3D	10.30	-9.57	10.30	3.28	3.28	36.0773	25.1128	36.0773	36.0773	36.0773
L-138PP	5y1D	6.87	-7.64	-7.64	-2.43	-2.43	13.2361	11.7188	11.7188	11.7188	11.7188

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-139PP	100y3D	9.70	-7.23	-7.72	3.09	3.09	63.3776	12.7714	48.1404	63.3776	63.3776
L-139PP	5y1D	8.17	-5.69	-4.84	2.60	2.60	14.2525	23.5768	22.9778	14.2525	14.2525

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-13P	100y3D	6.47	-2.85	-2.85	2.06	2.06	60.3716	13.1858	13.1858	60.3716	60.3716
L-13P	5y1D	5.13	-2.78	-2.78	1.63	1.63	12.2247	10.7565	10.7565	12.2247	12.2247

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-140PP	100y3D	8.25	-6.64	6.64	4.67	4.67	49.1396	48.1403	48.1404	49.1396	49.1396
L-140PP	5y1D	5.16	-4.21	-4.21	2.92	2.92	13.2361	23.7778	23.7778	13.2361	13.2361

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-141PP	100y3D	2.14	-4.67	-4.00	-2.64	-2.64	61.0349	60.1458	60.2160	60.1458	60.1458
L-141PP	5y1D	1.55	-4.20	-2.59	-2.38	-2.38	12.5596	11.9795	12.1680	11.9795	11.9795

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-142PP	100y3D	3.38	-3.23	0.61	1.91	1.97	63.9676	59.9490	69.8818	63.9676	63.9676
L-142PP	5y1D	2.94	-2.89	0.42	1.67	1.67	15.1040	12.0118	22.4870	15.1040	15.1040

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-143PP	100y3D	3.58	-2.56	1.02	2.07	3.02	63.8847	11.4984	35.6373	63.9724	65.6703
L-143PP	5y1D	3.03	-2.43	0.66	1.72	2.82	15.1091	10.7636	22.4196	15.1091	17.7736

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-144PP	100y3D	5.33	-2.89	4.45	1.70	1.70	59.7838	71.5013	60.2060	59.7838	59.7838
L-144PP	5y1D	4.40	-3.00	3.97	1.40	1.40	12.0054	10.6898	12.0772	12.0054	12.0054

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-145PP	100y3D	1.47	-1.25	-1.25	0.83	0.83	60.0904	45.5776	45.5776	60.0904	60.0904
L-145PP	5y1D	1.22	-1.24	-1.24	-0.70	-0.70	11.9927	21.6922	21.6922	21.6922	21.6922

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-146PP	100y3D	2.09	-0.99	-1.67	1.18	1.18	59.8077	57.3094	59.9490	59.8077	59.8077
L-146PP	5y1D	1.66	-0.41	-0.24	0.94	0.94	12.0128	22.8973	21.6925	12.0128	12.0128

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-147PP	100y3D	3.91	-1.84	-1.83	2.21	2.21	59.9756	24.4942	24.4942	59.9756	59.9756
L-147PP	5y1D	3.56	-1.73	-1.73	2.01	2.01	12.0039	21.6382	21.6382	12.0039	12.0039

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-148PP	100y3D	9.68	-7.01	6.19	3.08	3.08	63.5294	59.9376	59.0504	63.5294	63.5294
L-148PP	5y1D	8.06	-6.21	5.42	2.57	2.57	14.7330	11.9901	12.3754	14.7330	14.7330

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-149PP	100y3D	10.06	-7.71	-7.71	3.20	4.86	63.2974	47.7938	47.7938	63.2974	0.0009
L-149PP	5y1D	8.42	-8.01	-7.87	2.91	4.86	14.6114	23.0996	23.0996	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-14P	100y3D	3.51	-1.58	2.36	1.98	1.98	60.2009	24.8791	60.0226	60.2009	60.2009
L-14P	5y1D	2.29	-1.57	-1.57	1.29	1.29	12.0249	10.7565	10.7565	12.0249	12.0249

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-150PP	100y3D	4.55	-2.82	4.55	2.57	2.57	35.7556	46.4125	35.7556	35.7556	35.7556
L-150PP	5y1D	3.93	-2.76	3.93	2.22	2.22	12.3118	22.4818	12.3118	12.3118	12.3118

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-151PP	100y3D	4.18	-5.40	-5.00	-3.06	-3.93	70.8418	60.3712	59.7840	60.3712	0.0009
L-151PP	5y1D	4.73	-4.93	4.73	-2.79	-3.93	23.0996	12.4738	23.0996	12.4738	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-152PP	100y3D	3.59	-4.23	-3.67	-2.39	-2.39	59.8311	59.9426	59.8213	59.9426	59.9426
L-152PP	5y1D	2.54	-3.11	-3.11	-1.76	-1.76	12.0479	12.0771	12.0771	12.0771	12.0771

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-153PP	100y3D	6.64	-2.49	2.87	3.76	3.76	60.9005	70.8418	69.3973	60.9005	60.9005
L-153PP	5y1D	6.24	-2.98	-2.98	3.53	3.64	12.4400	23.0996	23.0996	12.4400	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-154PP	100y3D	2.19	-7.34	-3.04	-4.15	-4.15	33.4285	10.9536	63.1271	10.9536	10.9536
L-154PP	5y1D	2.04	-5.89	-3.17	-3.33	-3.33	21.7813	23.9987	14.8596	23.9987	23.9987

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-15P	100y3D	8.75	-6.77	-6.77	2.79	4.24	60.0576	47.4222	47.4222	60.0576	0.0009
L-15P	5y1D	7.16	-7.97	-7.97	-2.54	4.24	12.0416	10.6978	10.6978	10.6978	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-16P	100y3D	58.01	-58.51	-58.51	3.69	7.03	24.8000	70.4302	70.4302	0.0038	0.0009
L-16P	5y1D	54.81	-53.58	54.81	3.69	7.03	23.2347	23.3138	23.2347	0.0038	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-17P	100y3D	5.59	-5.53	-5.53	3.16	3.16	70.3778	47.8649	47.8649	70.3778	70.3778
L-17P	5y1D	4.96	-5.20	4.96	-2.94	-2.94	23.3138	23.2347	23.3138	23.2347	23.2347

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-18P	100y3D	3.79	-2.45	2.09	2.14	2.14	60.2956	59.5478	60.4870	60.2956	60.2956
L-18P	5y1D	2.45	-1.59	1.71	1.39	1.39	13.0551	12.5893	12.5177	13.0551	13.0551

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-22P	100y3D	3.17	-2.91	2.79	1.80	1.80	60.0514	59.5845	60.7391	60.0514	60.0514
L-22P	5y1D	2.97	-2.91	-2.38	1.68	1.68	12.5090	12.1360	12.1729	12.5090	12.5090

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-37P	100y3D	6.88	-5.56	6.40	2.37	4.56	59.9338	70.8418	69.3973	0.0009	0.0009
L-37P	5y1D	6.25	-6.64	-5.75	2.37	4.56	12.0771	23.0996	23.0996	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-38P	100y3D	3.73	-3.02	3.67	2.11	3.41	69.3973	69.8996	69.3973	69.3973	0.0009
L-38P	5y1D	3.51	-3.57	-3.57	-2.02	3.41	12.0609	23.0996	23.0996	23.0996	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-41P	100y3D	5.93	0.00	4.05	1.37	1.37	60.9716	0.0000	69.3307	60.9716	60.9716
L-41P	5y1D	4.52	0.00	-3.81	1.05	1.05	13.4915	0.0000	14.2880	13.4915	13.4915

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-44P	100y3D	1.97	-5.66	-5.21	-3.20	-3.20	12.3262	14.0196	71.1111	14.0196	14.0196
L-44P	5y1D	1.99	-5.04	-4.38	-2.85	-2.85	22.6057	22.6053	22.6053	22.6053	22.6053

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-45P	100y3D	12.46	-5.43	11.25	3.97	3.97	14.0196	59.9847	71.1111	14.0196	14.0196
L-45P	5y1D	11.60	-5.76	9.15	3.69	3.69	22.6053	12.0466	22.6053	22.6053	22.6053

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-46P	100y3D	2.15	-2.39	-2.08	-1.35	1.45	60.5499	59.1636	24.1038	59.1636	66.0067
L-46P	5y1D	1.85	-2.45	-2.06	-1.38	-1.38	12.9418	11.9313	21.7262	11.9313	11.9313

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-47P	100y3D	9.10	-9.60	8.66	-3.06	-3.06	62.1181	60.0112	24.6844	60.0112	60.0112
L-47P	5y1D	8.95	-10.56	8.95	-3.36	-3.36	21.4853	12.0221	21.4853	12.0221	12.0221

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-50P	100y3D	22.48	-23.15	-23.15	-3.28	-3.28	70.9182	36.4474	36.4474	36.4474	36.4474
L-50P	5y1D	20.79	-18.54	-18.54	2.94	2.94	12.6225	23.5111	23.5111	12.6225	12.6225

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-51P	100y3D	2.34	-3.93	-3.93	-2.22	-2.22	33.9156	36.6080	36.6080	36.6080	36.6080
L-51P	5y1D	2.44	-3.49	-3.49	-1.98	-1.98	14.8596	23.5111	23.5111	23.5111	23.5111

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-52P	100y3D	16.53	-11.01	13.42	2.34	2.34	13.3226	46.0658	13.3224	13.3226	13.3226
L-52P	5y1D	13.41	-10.39	13.10	1.90	1.91	21.4853	14.7040	21.4853	21.4853	21.4853

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-53P	100y3D	33.29	-29.39	33.28	2.65	2.69	69.0809	44.9022	69.0809	69.0809	69.0809
L-53P	5y1D	30.24	-28.44	30.23	2.41	2.43	14.6951	21.4853	14.6951	14.6951	14.8676

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-54P	100y3D	59.55	-37.69	59.55	4.74	5.06	69.9645	34.3138	69.9645	69.9645	69.9645
L-54P	5y1D	57.65	-42.57	57.65	4.59	5.34	14.6098	10.8107	14.6098	14.6098	14.7938

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-55P	100y3D	9.53	-6.21	8.87	5.39	5.92	36.7298	34.1929	46.2747	36.7298	69.9645
L-55P	5y1D	7.74	-7.03	7.73	4.38	5.48	21.8320	10.8107	21.8320	21.8320	14.6098

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-56P	100y3D	145.60	0.00	145.60	3.78	3.78	62.7973	0.0000	62.7973	62.7973	62.7973
L-56P	5y1D	149.93	0.00	149.93	3.90	3.90	14.8364	0.0000	14.8364	14.8364	14.8364

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-58P	100y3D	4.00	-1.93	-1.93	2.27	2.27	60.0148	34.2774	34.2774	60.0148	60.0148
L-58P	5y1D	1.75	-1.52	1.70	0.99	0.99	11.9527	23.2427	22.2996	11.9527	11.9527

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-59P	100y3D	3.24	0.00	-0.54	2.64	2.64	60.0145	0.0000	13.3787	60.0145	60.0145
L-59P	5y1D	2.01	0.00	0.24	1.64	1.64	12.0417	0.0000	11.8920	12.0417	12.0417

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-60P	100y3D	15.90	-15.65	-15.65	5.47	6.53	0.0030	32.0818	32.0818	0.0018	0.0018
L-60P	5y1D	15.90	-7.69	8.04	5.47	6.53	0.0030	19.2729	19.4889	0.0018	0.0018

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-61P	100y3D	3.46	0.00	3.22	0.49	0.49	59.6769	0.0000	59.6771	59.6769	59.6769
L-61P	5y1D	3.96	0.00	-3.96	0.56	0.56	12.4488	0.0000	12.4489	12.4488	12.4488

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-64P	100y3D	5.62	-5.34	5.62	3.05	3.14	60.3547	59.6773	60.3547	60.3547	60.3547
L-64P	5y1D	6.09	-5.61	6.09	3.17	3.26	12.2596	12.3449	12.2596	12.2596	12.2596

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-65P	100y3D	62.10	-9.98	19.05	8.79	9.74	0.0009	20.2267	32.0818	0.0009	0.0009
L-65P	5y1D	62.10	-7.49	-10.34	8.79	9.74	0.0009	12.3022	0.0009	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-67P	100y3D	3.45	-0.74	0.84	1.95	2.61	59.8818	61.4062	62.4071	59.8818	0.0085
L-67P	5y1D	2.69	-0.76	0.92	1.52	3.88	12.0060	14.6285	14.1742	12.0060	12.0060

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-68P	100y3D	8.43	-1.91	2.14	2.68	5.14	0.0009	63.9814	64.2391	0.0009	0.0009
L-68P	5y1D	8.43	-1.76	1.85	2.68	5.14	0.0009	14.7076	14.2463	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-69P	100y3D	23.93	-5.87	23.93	7.62	7.62	0.0009	64.2951	0.0009	0.0009	0.0009
L-69P	5y1D	23.93	-6.19	23.93	7.62	7.62	0.0009	15.2187	0.0009	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-70P	100y3D	47.79	-10.64	-10.64	15.21	15.59	0.0009	62.3413	62.3413	0.0009	0.0009
L-70P	5y1D	47.79	-10.76	-10.76	15.21	15.59	0.0009	14.1013	14.1013	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-71P	100y3D	7.43	-2.70	-2.70	2.72	4.85	0.0047	64.0702	64.0702	0.0046	0.0040
L-71P	5y1D	7.43	-2.43	-2.43	2.72	4.85	0.0047	14.2267	14.2267	0.0046	0.0040

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-72P	100y3D	6.29	-0.95	3.96	5.13	5.13	0.0028	53.3183	0.0009	0.0028	0.0028
L-72P	5y1D	6.29	-0.88	3.96	5.13	5.13	0.0028	17.2925	0.0009	0.0028	0.0028

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-73P	100y3D	16.44	-1.97	-1.97	13.40	13.73	0.0009	62.1671	62.1671	0.0009	0.0009
L-73P	5y1D	16.44	-1.94	-1.94	13.40	13.73	0.0009	13.7502	13.7502	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-74P	100y3D	3.02	-2.94	3.02	1.82	3.37	62.0765	63.4222	62.0765	0.0299	0.0299
L-74P	5y1D	2.85	-2.44	2.85	1.82	3.37	17.4276	17.3778	17.4276	0.0299	0.0299

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-75P	100y3D	5.87	-0.50	3.46	4.78	4.78	0.0031	62.5529	0.0009	0.0031	0.0031
L-75P	5y1D	5.87	-0.36	3.46	4.78	4.78	0.0031	17.2143	0.0009	0.0031	0.0031

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-76P	100y3D	16.13	-1.67	-1.67	13.14	13.47	0.0009	63.4222	63.4222	0.0009	0.0009
L-76P	5y1D	16.13	-1.57	-1.57	13.14	13.47	0.0009	17.1431	17.1431	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-77P	100y3D	2.54	-1.59	2.16	1.49	3.42	64.1644	53.4533	64.1644	0.0208	0.0208
L-77P	5y1D	2.18	-1.39	1.76	1.49	3.42	0.0208	17.2356	16.1991	0.0208	0.0208

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-78P	100y3D	6.89	-1.15	4.23	5.62	5.62	0.0029	52.5858	0.0009	0.0029	0.0029
L-78P	5y1D	6.89	-0.97	4.23	5.62	5.62	0.0029	17.2054	0.0009	0.0029	0.0029

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-79P	100y3D	18.40	-2.01	2.93	14.99	15.37	0.0009	65.2800	64.1644	0.0009	0.0009
L-79P	5y1D	18.40	-1.79	2.18	14.99	15.37	0.0009	17.2142	17.2231	0.0009	0.0009

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-80P	100y3D	10.96	-8.03	10.95	1.58	3.26	65.4640	64.1645	65.4640	65.4640	0.0470
L-80P	5y1D	10.21	-7.79	10.21	1.50	3.26	17.2356	16.1991	17.2356	0.0468	0.0470

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-81P	100y3D	0.05	0.00	0.00	0.51	0.00	59.9133	0.0000	54.2456	59.9133	0.0000
L-81P	5y1D	0.04	0.00	0.00	0.48	0.00	12.0016	0.0000	10.7304	12.0016	0.0000

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-82P	100y3D	10.66	0.00	10.36	1.51	1.51	52.5822	0.0000	52.5822	52.5822	52.5822
L-82P	5y1D	10.60	0.00	10.34	1.50	1.50	16.4702	0.0000	16.4702	16.4702	16.4702

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-86PP	100y3D	3.50	-3.30	3.50	1.98	1.98	34.2018	24.8347	34.2018	34.2018	34.2018
L-86PP	5y1D	3.54	-3.35	3.54	2.00	2.00	21.7929	22.2996	21.7929	21.7929	21.7929

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-89PP	100y3D	5.61	-6.35	-6.35	-3.59	-3.59	60.3166	24.6356	24.6356	24.6356	24.6356
L-89PP	5y1D	3.77	-5.70	-4.49	-3.23	-3.23	21.7280	12.6224	14.5653	12.6224	12.6224

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-91PP	100y3D	11.72	-4.49	4.67	3.73	3.73	60.0145	24.8347	34.2018	60.0145	60.0145
L-91PP	5y1D	8.57	-4.02	4.95	2.73	2.73	11.9523	22.2996	21.7929	11.9523	11.9523

Link Min/Max Conditions with Times

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Time to Max Flow [hrs]	Time to Min Flow [hrs]	Time to Min/Max Delta Flow [hrs]	Time to Max Us Velocity [hrs]	Time to Max Ds Velocity [hrs]
L-96PP	100y3D	12.15	-14.53	-14.53	-2.96	-2.96	60.0193	70.9182	70.9182	70.9182	70.9182
L-96PP	5y1D	9.45	-13.52	-10.17	-2.75	-2.75	21.7280	12.6224	23.3636	12.6224	12.6224

APPENDIX 5I

SHORT-TERM INUNDATION MAPS

A·D·A
5-YEAR 1-DAY STORM
INUNDATION MAP
SHORT-TERM PROJECTS
CURRENT SEA LEVEL
CONDITIONS
Area 10 Boundary
Existing Inlet
Existing Manhole
Private/FDOT Outfalls Requiring Backflow Preventors
Proposed Inlet
Proposed Manhole
Existing Pipe-By Owner
City
FDOT
Private
Proposed Pipe Size (IN)
18
24
30
36
42
48
54
84
OUTFALL TO BE BLOCKED
Inundation Depth (ft)
<0.25
0.25-0.5
0.5 - 0.75
0.75 - 1
1.0-1.25
1.25-1.5
1.5-1.75
1.75-2.0
>2.0
0 50 100 200
Feet

100-YEAR 3-DAY STORM INUNDATION MAP SHORT-TERM PROJECTS

CURRENT SEA LEVEL CONDITIONS

Area 10 Boundary
Existing Inlet
Existing Manhole
Private/FDOT Outfalls Requiring Backflow Preventors
Proposed Inlet
Proposed Manhole

Existing Pipe-By Owner

City
FDOT
Private

Proposed Pipe Size (IN)

18
24
30
36
42
48
54
84

OUTFALL TO BE BLOCKED

Inundation Depth (ft)

<0.25
0.25-0.5
0.5 - 0.75
0.75 - 1
1.0-1.25
1.25-1.5
1.5-1.75
1.75-2.0
>2.0

0 50 100 200
Feet

APPENDIX 5J

OPINION OF PROBABLE CONSTRUCTION COST

Opinion of Probable Cost
City of Miami
Shore Crest - Short Term
Drainage Feasibility Study

8550 NW 33rd Street, Suite 202
Doral, FL 33122
Phone: (305)-551-4608
Fax: (305)-551-8977
www.adaeng.net

DATE: March 18, 2019

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	ROADWAY				
101-1	MOBILIZATION	LS	1	$197,175.39	$197,175.39
102-1	MAINTENANCE OF TRAFFIC	LS	1	$140,839.56	$140,839.56
110-1-1	CLEARING AND GRUBBING	LS	1	$84,503.74	$84,503.74
	RAISE EXISTING ROADS				
	0"- 6" (INCLUDES 0-5" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	566	$24.00	$13,584.00
	6" - 12" (INCLUDES 0-3" OF LIMEROCK, 5-8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	3644	$61.50	$224,106.00
	12" - 18" (INCLUDES 3-9" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	6163	$66.50	$409,839.50
	18" - 24" (INCLUDES 9-15" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	4253	$111.50	$474,209.50
	24" - 30" (INCLUDES 15-21" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	1520	$136.50	$207,480.00
	30" - 36" (INCLUDES 21-27" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	98	$162.00	$15,876.00
327-70-1	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	SY	1521	$5.00	$7,605.00
331-2	TYPE S-III ASPHALTIC CONCRETE, 1" (AS PER CITY OF MIAMI)	TN	92	$145.00	$13,340.00
425-1-541	CITY OF MIAMI TYPE 'D' INLET, ≤10'	EA	74	$3,500.00	$259,000.00
425-2-41	MANHOLE (CITY OF MIAMI TYPE A), ≤10'	EA	38	$4,500.00	$171,000.00
430-175-118	PIPE CULVERT, OPT MATERIAL, ROUND 18" (HP STORM PIPE)	LF	3260	$75.00	$244,500.00
430-175-124	PIPE CULVERT, OPT MATERIAL, ROUND 24" (HP STORM PIPE)	LF	1680	$80.00	$134,400.00
430-175-130	PIPE CULVERT, OPT MATERIAL, ROUND 30" (HP STORM PIPE)	LF	255	$115.00	$29,325.00
430-175-136	PIPE CULVERT, OPT MATERIAL, ROUND 36" (HP STORM PIPE)	LF	375	$125.00	$46,875.00
430-175-142	PIPE CULVERT, OPT MATERIAL, ROUND 42" (HP STORM PIPE)	LF	380	$155.00	$58,900.00
430-175-148	PIPE CULVERT, OPT MATERIAL, ROUND 48" (HP STORM PIPE)	LF	175	$205.00	$35,875.00
430-175-154	PIPE CULVERT, OPT MATERIAL, ROUND 54" (HP STORM PIPE)	LF	910	$255.00	$232,050.00
430-175-184	PIPE CULVERT, OPT MATERIAL, ROUND 84" (HP STORM PIPE)	LF	195	$425.00	$82,875.00
570-1-2	PERFORMANCE TURF, SOD	SY	8900	$3.50	$31,150.00
	INLINE CHECK VALVE FOR PROPOSED OUTFALL	EA	1	$32,880.00	$32,880.00
	NEW BERM AT FUTURE PUMP STATION LOCATION	LS	1	$10,000.00	$10,000.00
	SUBTOTAL ROADWAY				**$3,239,309.94**

SUMMARY OF PROBABLE CONSTRUCTION COST

DESCRIPTION	COST
Roadway	**$3,239,309.94**
Permitting Fees (5%)	**$161,965.50**
SUBTOTAL PROJECT	**$3,401,275.43**

30% Contingency	**$1,020,382.63**

TOTAL PROJECT	**$4,421,658.06**

Opinion of Probable Cost
City of Miami
Shore Crest - Mid Range
Drainage Feasibility Study

8550 NW 33rd Street, Suite 202
Doral, FL 33122
Phone: (305)-551-4608
Fax: (305)-551-8977
www.adaeng.net

DATE: March 18, 2019

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	ROADWAY				
101-1	MOBILIZATION	LS	1	$570,275.39	$570,275.39
102-1	MAINTENANCE OF TRAFFIC	LS	1	$407,339.56	$407,339.56
110-1-1	CLEARING AND GRUBBING	LS	1	$244,403.74	$244,403.74
	RAISE EXISTING ROADS				
	0"- 6" (INCLUDES 0-5" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	566	$24.00	$13,584.00
	6" - 12" (INCLUDES 0-3" OF LIMEROCK, 5-8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	3644	$61.50	$224,106.00
	12" - 18" (INCLUDES 3-9" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	6163	$66.50	$409,839.50
	18" - 24" (INCLUDES 9-15" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	4253	$111.50	$474,209.50
	24" - 30" (INCLUDES 15-21" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	1520	$136.50	$207,480.00
	30" - 36" (INCLUDES 21-27" OF LIMEROCK, 8" OF BASE GROUP 6 TYPE B-12.5 AND 1" OF TYPE S-III ASPHALT)	SY	98	$162.00	$15,876.00
327-70-1	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	SY	1521	$5.00	$7,605.00
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570-1-2	PERFORMANCE TURF, SOD	SY	8900	$3.50	$31,150.00
	INLINE CHECK VALVE FOR PROPOSED OUTFALL	EA	1	$32,880.00	$32,880.00
	NEW BERM AT FUTURE PUMP STATION LOCATION	LS	1	$10,000.00	$10,000.00
	RAISE EXISTING SEAWALL	LF	3700	$100.00	$370,000.00
	PUMP STATION (80K GPM - INCLUDES BACK-UP GENERATOR)	LS	1	$4,960,000.00	$4,960,000.00
	SUBTOTAL ROADWAY				**$9,368,809.94**

SUMMARY OF PROBABLE CONSTRUCTION COST

DESCRIPTION	COST
Roadway	**$9,368,809.94**
Permitting Fees (5%)	**$468,440.50**
SUBTOTAL PROJECT	**$9,837,250.43**
30% Contingency	**$2,951,175.13**
TOTAL PROJECT	**$12,788,425.56**