Hydrologic and Hydraulic Summary Report (Draft)
for
Abbott Road Pavement Preservation:
Seward Highway to Lake Otis Parkway

State Project Number.: CFHWY01010
Federal Project Number: 0506007

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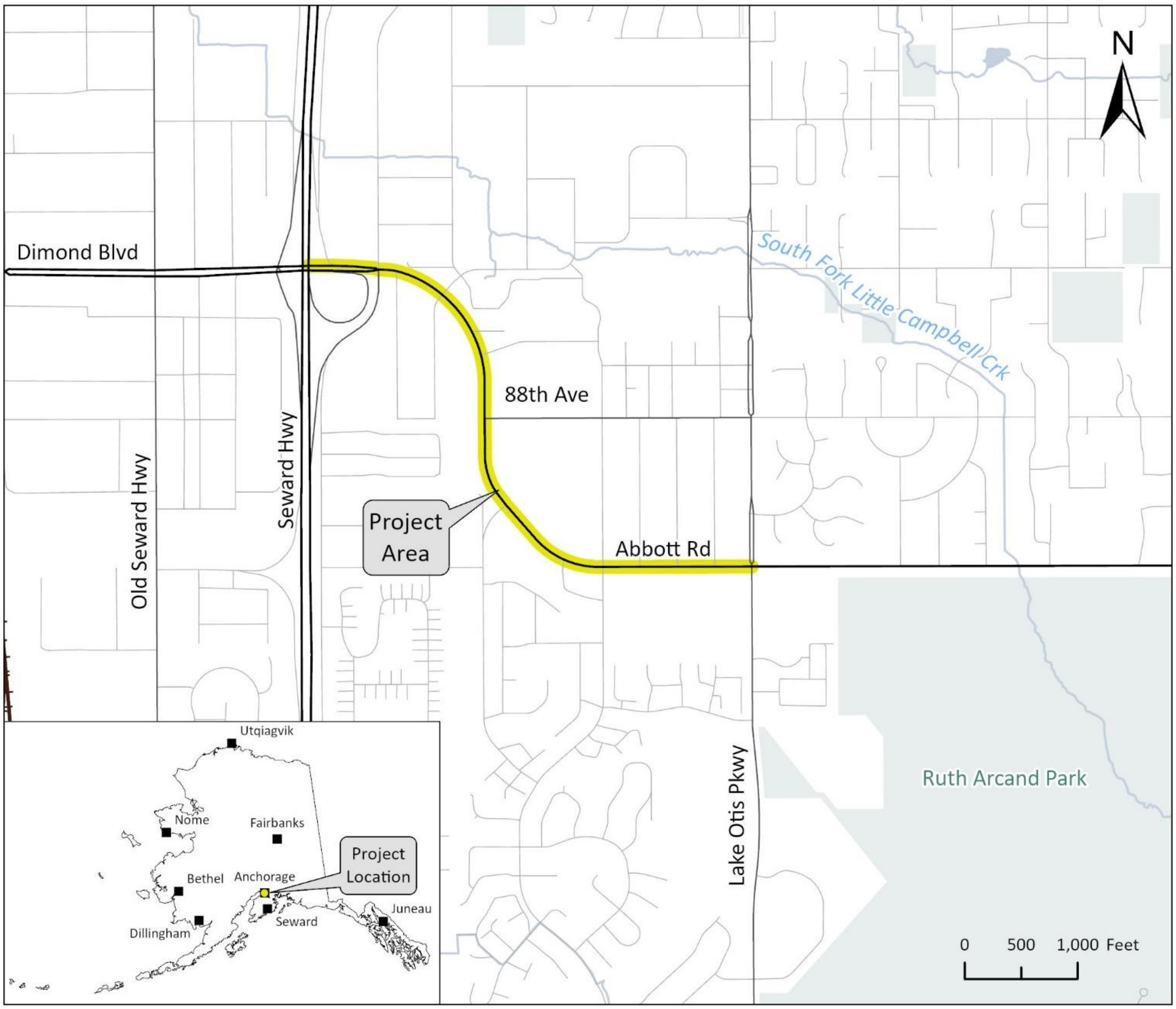
List of Acronyms and Definitions

% – percent
2D – Two-Dimensional
AEP – Annual Exceedance Probability
AHDM – Alaska Highway Drainage Manual
AHPCM – Alaska Highway Preconstruction Manual
AWR – AWR Engineering, LLC
cfs – cubic feet per second
CIPP – Cured-in-Place Pipe
DCM Memorandum – Alaska Department of Transportation and Public Facilities Central Region Revised Policy of Stormwater Facilities Design Within the MOA Memorandum
DOT&PF – Alaska Department of Transportation and Public Facilities
FHWA – Federal Highway Administration
GIS – Geographic Data and Information
H&H – Hydrologic and Hydraulic
HDL – HDL Engineering Consultants, LLC
HSIP – Highway Safety Improvement Program
in - inches
LiDAR – Light Detection and Ranging
M&O – Maintenance and Operations
MOA DCM – Municipality of Anchorage Design Criteria Manual Chapter 2 Drainage
MSB – Matanuska-Susitna Borough
MSB SCM – Matanuska-Susitna Borough Subdivision Construction Manual
NOAA – National Oceanic and Atmospheric Administration
Stephl – Stephl Engineering, LLC

1. Introduction and Background

AWR Engineering, LLC (AWR) is assisting HDL Engineering Consultants, LLC (HDL) and the Alaska Department of Transportation and Public Facilities (DOT&PF) with a pavement preservation project on Abbott Road. HDL is providing transportation engineering for the project, and AWR is providing hydrologic and hydraulic (H&H) analyses, recommendations, and design. The project is located within the Municipality of Anchorage (MOA) between the Seward Highway and Lake Otis Parkway. Figure 1 shows the project location.

Figure 1. Project Location Map



1.1. Current Level of Design

The project is currently at the Plans in Hand design level, which is approximated as 75% design completion. Changes to the proposed improvements will occur as the project progresses.

1.2. Nearby Projects in Design or Construction

DOT&PF is planning two other projects in this project's vicinity, outlined below.

- *AMATS: Academy Drive and Vanguard Drive Area Improvements*. This project is currently in design and is not yet at the Local Review stage.
- *AMATS: 88th Avenue: Abbott Road to Lake Otis Parkway Pavement Preservation*. This project was recently bid for construction and construction should be starting in the coming months.

1.3. Scope of Drainage Analysis

The scope of this project's drainage and H&H analysis includes H&H evaluation of the existing drainage system for the entire project. Evaluation of proposed improvements to the drainage system is limited to the portion of the system from Toloff Street to Lake Otis Parkway. Proposed improvements to the existing drainage system from the Seward Highway to 88th Avenue are included in the scope of the *AMATS: Academy Dr and Vanguard Dr Area Improvements* project listed above. There are no existing drainage facilities from 88th Avenue to Toloff Street.

2. Drainage Features and Design Requirements

The H&H design requirements for this project's hydraulic features are primarily based on the following references:

- DOT&PF *Alaska Highway Drainage Manual* (AHDM)
- DOT&PF *Alaska Highway Preconstruction Manual* (AHPCM)
- MOA *Design Criteria Manual Chapter 2 Drainage* (MOA DCM) and the DOT&PF *Central Region Revised Policy of Stormwater Facilities Design Within the MOA Memorandum* (DCM Memorandum)

2.1. AHDM and AHPCM Requirements

The AHDM and AHPCM require a hydraulic analysis to be completed for design of storm drain systems. Abbott Rd was considered to meet the AHDM classification of "All other Trunk Storm Sewer Lines." Storm drain systems with this classification are required to be designed to convey the 4% annual exceedance probability (AEP) flow. As such, the 4% AEP event was selected as the design event for this project.

2.2. Stormwater Treatment Requirements

DOT&PF is a joint permittee with the MOA for an Alaska Pollutant Discharge Elimination System, Municipal Separate Storm Sewer System Permit. This permit authorizes the permittees to discharge stormwater to water bodies within the MOA and includes requirements for management of stormwater quality. The above-referenced DCM Memorandum provides criteria and guidance for meeting water quality treatment requirements for a variety of project types. Per section 3.3.1 of the DCM Memorandum, pavement preservation projects are considered exempt from stormwater treatment requirements, and water quality treatment was not incorporated into the analyses or recommendations for this project.

2.3. Floodplain Requirements

The project corridor is mapped by the Federal Emergency Management Agency. The areas analyzed in this report are shown as Zone X, which is an "Area of Minimal Flood Hazard". This is not a Special Flood Hazard Area, and no floodplain requirements apply.

2.4. Fish Passage Requirements

There are no natural streams included in the existing drainage system, and the drainage system is not listed as anadromous by the Alaska Department of Fish and Game Interactive Mapping Anadromous Waters Catalog when accessed in June of 2025. No fish passage design criteria were applied to this project.

3. Data Used for this Report

Key data sources used for the analyses described in this report are listed below. Where coordinate systems were relevant, data was either provided in or converted to Anchorage Bowl 2000 Adjustment for the horizontal coordinate system and MOA Greater Anchorage Area Borough Mean Sea Level 1972 Adjustment for the vertical coordinate system based on DOT&PF-provided translations.

<u>Project Survey:</u> Topographic survey of the area was provided by HDL in Civil 3D format. The survey included pipe invert and rim elevations, sizes, and material types for storm drains generally within the project corridor.

<u>Storm Drain CCTV:</u> Stephl Engineering, LLC (Stephl) conducted a storm drain condition assessment for this project based on CCTV of the storm pipes in this project area. This report was used as the basis for pipe condition and to confirm pipe attributes as needed.

<u>88th Avenue H&H Model:</u> The *AMATS: 88th Ave: Abbott Road to Lake Otis Parkway Pavement Preservation* project proposed conditions H&H model was used to represent the 88th Avenue portion of the H&H model.

<u>Topography:</u> Topographic information for the project area was based on the 2015 Anchorage area Light Detection and Ranging (LiDAR) data obtained from the MOA's online Geographic Data and Information Center. These topographic data were used to delineate project subbasins and assign H&H model parameters.

<u>Areawide Soils Data:</u> Hydrologic modeling infiltration parameters were assigned using data from the Natural Resources Conservation Service Gridded Soil Survey Database for Alaska, and from prior soil borings in the project area obtained from the MOA's online Geographic Data and Information Center.

<u>Aerial Imagery:</u> This report utilized 2021 aerial imagery of the project area obtained from the MOA. The imagery was used for developing modeling parameters and for supporting graphics and figures.

<u>Drainage Mapping:</u> To supplement the project survey, drainageway mapping was obtained from the MOA's online Geographic Data and Information Center. This mapping was used to represent the type, ownership, and location of storm drains in the project vicinity and contributing subbasins.

Record Drawings: Record drawings of the area were obtained from DOT&PF, MOA, and Alaska Water and Wastewater Utility. Record drawings were used to define attributes of the drainage infrastructure in cases where infrastructure was not surveyed or included in the CCTV. Attributes obtained from record drawings may include location, connectivity, size, depth, material, and/or slope in locations where these attributes were not included in the project survey or in the below-referenced condition report.

Building Footprints: Building location information was obtained from the MOA's online Geographic Data and Information Center and was used to support development of modeling parameters related to land cover and surface flow obstruction.

Rainfall Data: Design rainfall events were obtained from the National Oceanic and Atmospheric Administration (NOAA) – Atlas 14, Volume 7, 2012 dataset accessed on the Precipitation Frequency Data Server.

Campbell Creek Watershed Stormwater Master Plan. This document and associated modeling results were used to verify the reasonableness of hydraulic results and to help estimate select downstream boundary conditions for hydraulic modeling.

4. Existing Drainage Patterns

Drainage along the entire project corridor and in contributing subbasins is typical of urban areas in Anchorage, with stormwater runoff collected into pipes and channels and conveyed to receiving streams outside of the project area. The contributing subbasins are almost entirely residential and commercial land use, with small pockets of open space and parks.

Drainage along Abbott Road can be divided into three general segments, as discussed below and illustrated in Figure 2.

4.1. Toloff Street to Lake Otis Parkway

Runoff from the roadway surface in the Toloff Street to Lake Otis Parkway section generally drains to an existing storm drain via curbs and inlets. The storm drain is 24-inches in diameter and is a combination of HDPE and lined Corrugated Metal Pipe (CMP). The system flows from east to west, beginning at Lake Otis Parkway. At Toloff Street, the pipe joins an MOA-owned storm drain flowing south along Toloff Street/Independence Drive. The existing pipes along Toloff Street are 24-inch diameter CMP, and the MOA has reported that this system is expected to be in poor condition and undersized. This is consistent with the pipe information presented in the *Campbell Creek Watershed Stormwater Master Plan* for the pipes downstream of the intersection.

4.2. 88th Avenue to Toloff Street:

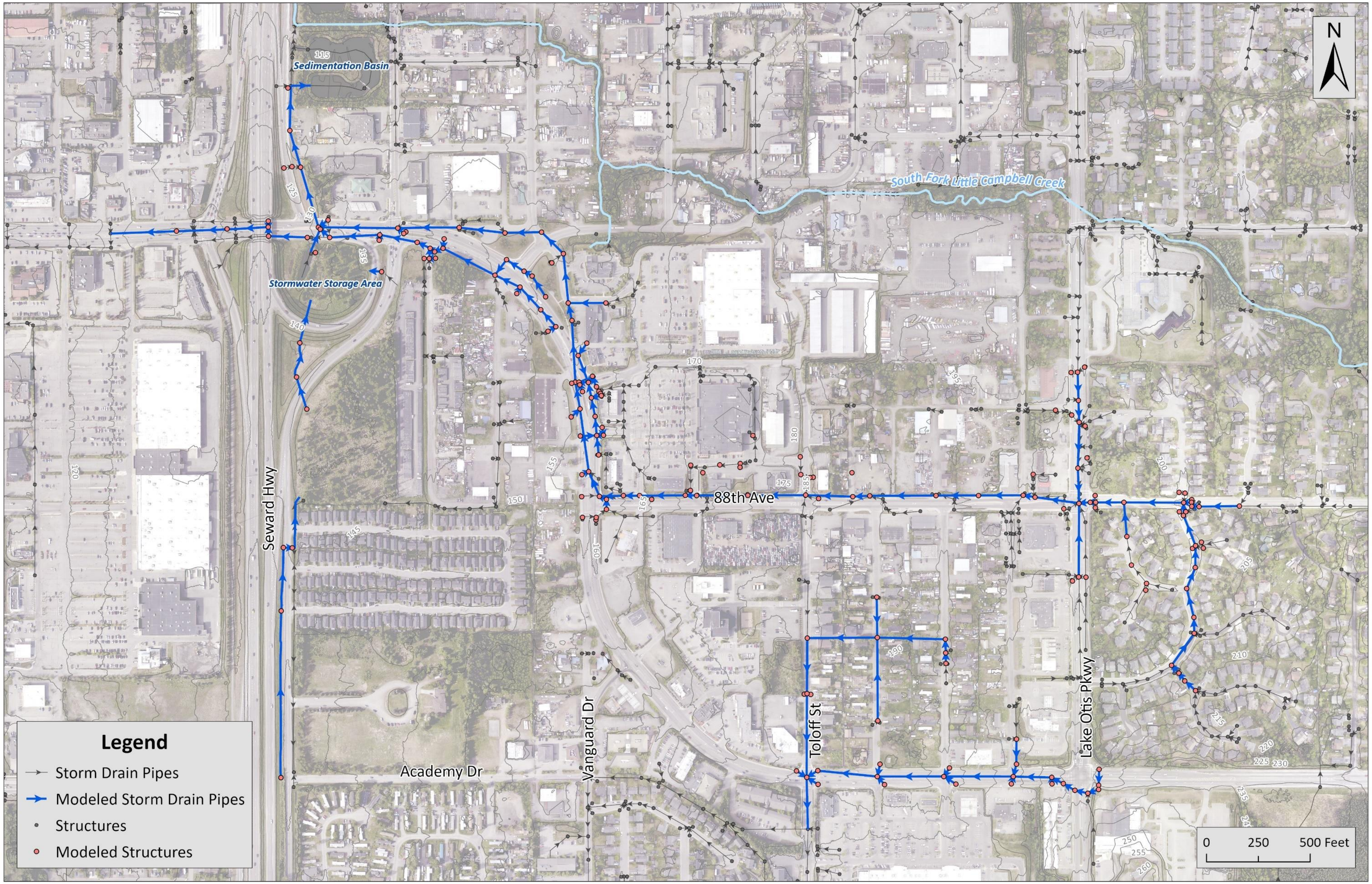
There are no existing storm drain pipes or curb inlets along this section of road, which is approximately 1,800 feet long. Runoff from the roadway surface is collected along the curb and flows to the north, toward 88th Avenue. Some runoff from adjacent parcels is also directed toward the roadway. At the 88th Avenue intersection, curb inlets pick up the water and it continues to flow to the north, as discussed in Section 4.3. MOA Street Maintenance has reported this section of road as one of the most dangerous in Anchorage during rainfall events due to the poor surface drainage.

4.3. Seward Highway to 88th Avenue

This segment of roadway has several parallel storm drain lines. The main line is a 3.5 to 4-foot diameter pipe. The existing storm drain along 88th Avenue flows into this pipe at the 88th Avenue/Abbott Road intersection. The pipe then flows to the north and west, ultimately flowing north along the Seward Highway northbound onramp before discharging to an existing sedimentation basin just upstream of the South Fork Little Campbell Creek.

In addition to the main line, several parallel pipes collect surface water and connect to the main storm drain line, as shown in Figure 2.

Figure 2. Existing Conditions Drainage Schematic



5. Proposed Drainage Patterns

The proposed improvements associated with this project are not changing the impervious surface extents or existing drainage patterns. As such, proposed drainage patterns are the same as existing drainage patterns, as described in Section 4.

6. Summary of Pipe Condition Assessment

Steph Engineering (Stephl) completed a CCTV inspection and condition assessment of the existing storm drain pipes in the project area. Full details regarding that assessment are presented in Stephl's *Storm Drain Condition Assessment* report, dated March 25, 2025. In summary, pipes in the project area are generally in good or fair condition with 15 or more years of expected remaining life. As such, pipe replacements based on physical condition are not included in this report.

The Stephl report notes various levels of manhole defects throughout the project area but does not include recommendations for manhole repairs.

7. Hydrology and Hydraulics

An H&H analysis was completed to evaluate the hydraulic performance of the existing storm drains along Abbott Road, and to evaluate the potential hydraulic benefit of improving select segments of pipe. The analysis does not include a detailed evaluation of curb inlet capacity or inlet spacing. This approach was taken to generally match the overall scope and objectives typical of pavement preservation projects.

AWR had previously completed an H&H model of the 88th Avenue drainage system for ADOT&PF. This model was merged into the Abbott Road model to accurately reflect hydraulic conditions where the two systems flow together. Some of the 88th Avenue storm drain pipes are planned for improvement via CIPP lining; the merged model reflects the post-lining condition of those pipes.

7.1. Existing Conditions Evaluation

H&H modeling was used to estimate 4% AEP event peak flows and associated water surface elevations along the main storm drain under existing conditions. The sections below present the modeling methodology and discuss how the baseline model was established. Additional modeling details are provided in Appendix A.

7.1.1. Modeling Approach and Methods

Modeling was completed using PCSWM, which is a computer software that utilizes the computational engine from the Environmental Protection Agency's Storm Water Management Model (SWMM).

<u>Hydrology Method.</u> The non-linear reservoir method was used to transform rainfall into excess runoff. This is the transformation methodology in SWMM and is an industry-standard approach for estimating stormwater runoff in developed areas.

Infiltration Method. When using the non-linear reservoir method, there are several options for simulating infiltration in pervious areas. For this analysis, Horton's method was selected because of its simplicity and applicability to vegetated areas of a developed drainage basin.

Hydraulic Routing Method. Dynamic wave routing was selected for routing excess runoff through the receiving conveyance network because it is the only routing option in PCSWMM that can account for pressurized flow and backflow. Pressurized flow and/or backflow are common in cases where system capacity is limited and pipes surcharge, which often occurs in urban drainage systems during significant rainfall events.

Two-Dimensional Surface Analysis. PCSWMM's two-dimensional (2D) hydraulic computations were used to determine surface flow direction(s) and extents along the Abbott Road corridor based on the slope of the ground surface and surrounding hydraulic gradients. This approach was primarily applied to locations where multi-directional flow is expected, such as surface flows on streets due to the storm drain system surcharging and overflowing onto the roadway surface.

7.1.2. Design Rainfall Events

The MOA DCM provides base design rainfall depths and design hyetographs that are based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 data for the Ted Stevens Anchorage International Airport weather station. Because rainfall quantities tend to increase closer to the mountains, the MOA DCM also provides orographic factor multipliers that can be applied to base rainfall amounts based on geographic location. Interpolating the values on the orographic factor map resulted in an orographic factor of 1.11 for this project area.

A 24-hour rainfall duration was selected for this analysis, and it was distributed using the 24-hour rainfall hyetograph for Anchorage provided in the MOA DCM. This design event represents a theoretical range of design rainfall events up to a 24-hour duration, including shorter, more intense events. The 24-hour design event is applicable to a wide range of basins, provided the basin time of concentration does not exceed 24 hours. The time of concentration for this drainage system is expected to be significantly less than 24 hours, so this design event is appropriate. The orographically adjusted 24-hour rainfall depth is shown in Table 1.

Table 1: Orographically Adjusted Design Rainfall Depth for the 4% AEP Event

AEP (%)	24-Hour Rainfall Depth (in)
4	3.09

7.1.3. Subbasins

The drainage area that contributes surface runoff to the Abbott Road drainage systems was divided into 75 subbasins based on drainage patterns and land cover homogeneity, which was determined through visual inspection of aerial imagery and topography. Each subbasin has a single outlet point, which is defined as the point where surface runoff from the subbasin either enters the conveyance network or outlets onto a neighboring subbasin.

Subbasin properties include area, width, slope, percent impervious, overland roughness, depression storage, internal routing, maximum and minimum infiltration rates, and a decay constant. These properties were assigned using GIS processing of the data listed in Section 3 along with the recommended values in the MOA DCM. Parameters for each subbasin are provided in Appendix A.

7.1.4. Conveyance Network and 2D Surface Flow

The conveyance network includes main line storm drain pipes and structures as well as some smaller lead pipes and catch basins. Conveyance network properties include location, elevation, connectivity, geometry, Manning's roughness coefficients, loss coefficients, and ponded areas. These properties were assigned using the data listed in Section 3 along with typical published values appropriate for the network configuration. The values for each entity, along with a schematic of the network, are provided in Appendix A.

To represent 2D flow on the ground surface, the piped conveyance network was connected to a 2D "mesh" that represents the ground surface. The mesh is formed by a network of nodes connected by rectangular channels. The nodes represent a sampling of the ground surface, and the elevation of each node was assigned using the topographic information described in Section 3. The node spacing and pattern were established based on the complexity of the terrain and the presence of obstructions such as buildings. The roughness of the channels connecting the nodes was approximated based on visual observations of aerial imagery.

The piped storm drain network was connected to the 2D mesh using orifices. These orifices simulate water spilling out of or flowing into the storm drain system through inlet grates, curb openings, and manhole pick holes. In cases where lead pipes exist but were not included in the model, surface connections were still created in the approximate locations of surface intake structures to accurately represent the location of surface overflow when pipes become surcharged.

7.1.5. Storage Areas

The model uses a one-dimensional storage unit to represent the stormwater storage area located between Abbott Road and the Seward Highway northbound on-ramp from eastbound Abbott Road. The storage capacity of the area was defined as an area-elevation curve, which was approximated from LiDAR contours. The storage unit is connected to the 2D mesh representing the ground surface via a series of orifices, as shown in Appendix A. This allows the model to simulate water from the ground surface entering the storage unit as well as the storage unit overflowing onto the adjacent ground when it becomes full.

7.1.6. Boundary Conditions

The model includes three primary downstream boundaries, representing flow leaving the model.

1. In the Toloff Street to Lake Otis Parkway section, the MOA-owned storm drain along Toloff Street/Independence Drive continues to the south and west but was not modeled. Instead, a downstream boundary of the model was set approximately 250 feet south of the Abbott Rd and Independence Dr intersection, with a constant water surface elevation near the roadway surface, to reflect the undersized and flood-prone nature of this system during large events. This downstream boundary condition was chosen following a sensitivity analysis of a range of downstream conditions, and it is expected to reasonably represent real-world hydraulic performance of the system during the peak of the design event.

2. An outfall was used to represent flow from the main storm drain discharging into the sedimentation basin along the Seward Highway. The outfall was set at a fixed water surface elevation equal to the approximate observable elevation of the pond based on the LiDAR DEM.
3. There is a short segment of storm drain that starts near the Seward Highway bridge and continues flowing to the west on Dimond Boulevard. An outfall was used to represent this flow continuing to the west. This outfall was placed approximately 700 feet west of the Seward Highway and was set to normal depth of the pipe.

Other outfalls included in the model are routed to internal subbasins and do not represent flow leaving the model. In cases where the 88th Avenue model had previously incorporated boundary outfalls that flow into the Abbott Road contributing drainage area, those outfalls were routed to the appropriate Abbott Road subbasin, rather than leaving the model.

A model schematic showing these downstream boundaries is provided in Appendix A.

7.1.7. Future Development

Examination of aerial imagery of this area generally shows little available open land for future development. Additionally, the type of existing development in the area is generally consistent with the type of future development shown on the Anchorage 2040 Land Use Plan mapping. For these reasons, existing conditions are expected to reflect a fully developed basin, and no changes to the existing land cover characteristics were incorporated into the analysis.

7.1.8. South Fork Little Campbell Creek

The South Fork Little Campbell Creek is located northeast of the project area, adjacent to several of the contributing drainage basins for the project. (See Figure 3 and Appendix A.) The hydraulic evaluation completed for this project does not reflect the potential influence of creek floodwaters on hydraulics at the project site. Because the purpose of this analysis was to evaluate the capacity of the storm drain system to convey runoff, downstream flood conditions were not quantified, as they may reduce hydraulic performance due to backwater from the creek that cannot be improved. However, based on review of available FEMA mapping and the results of the Campbell Creek Watershed Stormwater Master Plan model, this influence and the associated backwater effect are expected to be minimal. Additionally, peak flows on the creek and peak flows in the storm drain pipes are likely to occur at different times, further minimizing the potential influence.

The location of the FEMA-mapped floodplain associated with South Fork Little Campbell Creek is shown in Figure 3.

7.2. Existing Conditions Results

The baseline model results are presented visually in Figure 3 and are discussed below.

<u>Toloff Street to Lake Otis Parkway.</u> The modeling results show that during the 4% AEP event, the storm drain pipes from Toloff Street to Elim Street are surcharged and are flooding. From Elim Street to Golovin Street, the pipes are surcharged but not flooding, and from Elim Street to Lake Otis Parkway, the pipes are not surcharged.

The flooding occurring from Toloff Street to Elim Street is primarily the result of the undersized downstream system that the pipes flow into. This is discussed further in Section 7.3.1.

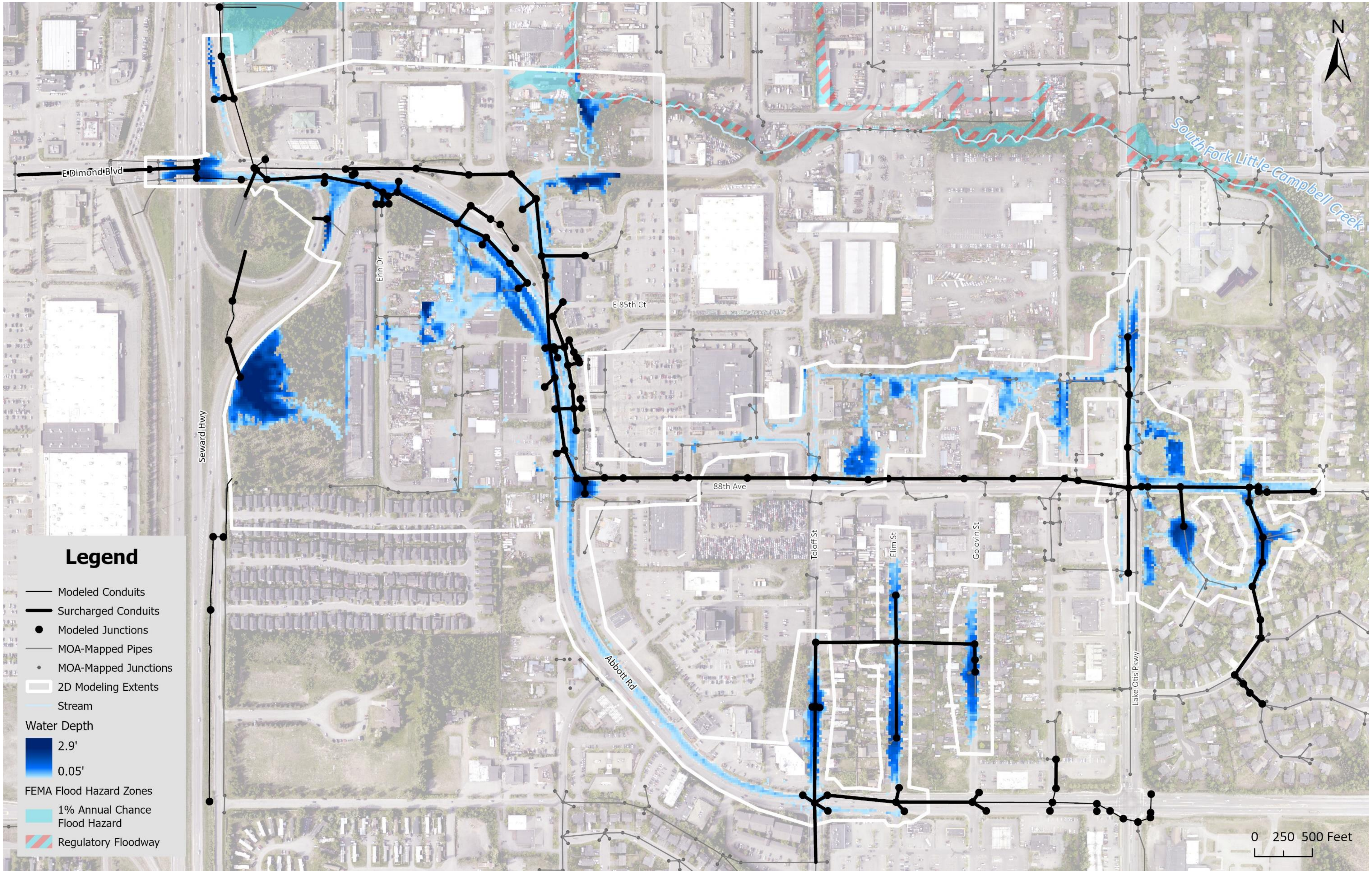
88th Avenue to Toloff Street. This section of roadway does not have storm drain pipes or inlets, so no existing infrastructure was modeled along this segment. However, the modeling results demonstrate that overflow water from the intersection of Abbott Road and Toloff Street flows to the north toward 88th Avenue. It is important to note that visual results do not reflect the gutter flow generated along this segment, as that would require very small discretization of this section of the subbasin.

Seward Highway to 88th Avenue. From the Seward Highway to approximately 85th Court, the main line pipes along this segment are surcharged, but are not flooding. From 85th Court south to 88th Avenue, the main line pipes are flooding, and water is spilling onto the ground surface.

The parallel system to the south of the main line is surcharged for most of its length and is flooding near Erin Street.

The parallel system to the east of the main line that extends from the Carrs entrance drive to 88th Avenue is flooding for nearly the entire length.

Figure 3. 4% AEP Hydraulic Performance – Existing Conditions



7.3. Proposed Conditions

A discussion of considerations regarding proposed drainage improvements for each segment of Abbott Road is presented below.

7.3.1. Toloff Street to Lake Otis Parkway

This analysis considered several proposed upgrades to the existing pipes along Abbott Road to alleviate surface flooding near the Abbott Road/Toloff Street intersection. Upsizing the pipes along Abbott Road is expected to have minimal impact on the hydraulic performance, as the flooding is being driven by the downstream capacity problems. To illustrate this, a normal depth outfall was modeled downstream of the Abbott Road/Toloff Street intersection, and the surface flooding was alleviated. As such, upsizing the pipes downstream of the intersection is expected to alleviate the surface flooding, but is also outside of the scope of this resurfacing project.

7.3.2. 88th Avenue to Toloff Street

Proposed conditions were not evaluated for this segment of roadway, as adding new drainage features is understood to be outside the scope of this resurfacing project. Future projects along this segment of Abbott Road should install appropriate drainage facilities to eliminate surface ponding.

7.3.3. Seward Highway to 88th Avenue

Proposed conditions for this segment of Abbott Road are going to be evaluated as part of the *AMATS: Academy Drive and Vanguard Drive Area Improvements project H&H evaluation*. The Academy Drive/Vanguard Drive project will likely need to install new drainage facilities that will connect to the existing stormwater system(s) along Abbott Road, so potential modifications to the system will be evaluated as that project advances. New drainage facilities for Academy Drive/Vanguard Drive are expected to include detention facilities and/or pipe upgrades to avoid worsening the capacity issues in the existing system.

7.4. Non-Stationarity Considerations

Based on the FHWA publication, *HEC-17 Highways in the River Environment – Floodplains, Extreme Events, Risk, and Resilience,* a non-stationarity evaluation is recommended for the design of new drainage infrastructure. New infrastructure sizing and recommendations are not included with this project, so a non-stationarity evaluation was not completed. Generally, considering upper bounds of design rainfall events is expected to exacerbate current drainage issues and result in more surface flooding/ponding.

8. Conclusion

DOT&PF is planning a pavement preservation project on Abbott Road between the Seward Highway and Lake Otis Parkway within the MOA. The purpose of this report is to present the H&H analyses and associated recommendations.

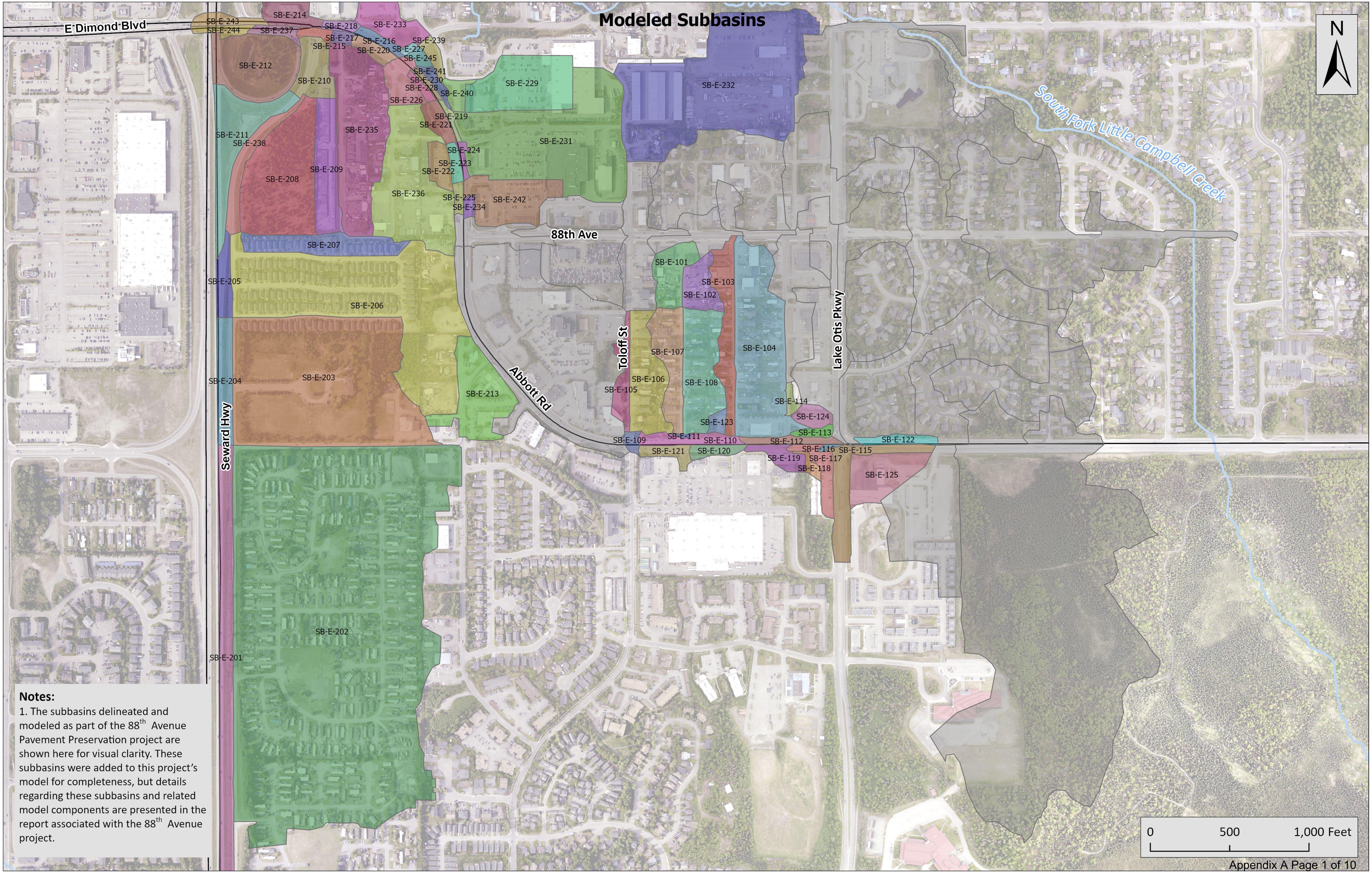
During the 4% AEP event, most of the storm drain system in the project area is surcharged, and several segments are flooding, resulting in water spilling out of catch basins and manholes onto the ground surface. Hydraulic evaluation results are presented visually in Figure 3, and recommendations are summarized briefly below.

- For the storm system located between Toloff Street and Lake Otis Parkway, the surcharging and flooding are the result of limited downstream system capacity. Eliminating the downstream restriction would resolve all flooding in this area but is outside the scope of this project. As such, no improvements are recommended for this section.
- For the storm drain system located between the Seward Highway and 88th Avenue, portions of the system are undersized or at elevations that allow water to spill out of the system and onto the ground surface. Proposed modifications to this system are being considered as part of the *AMATS: Academy Dr and Vanguard Dr Area Improvements* project, which is expected to tie into this system and provide detention/capacity upgrades as needed.
- There are no existing drainage facilities located between 88th Avenue and Toloff Street. Drainage facilities are needed along this segment to improve roadway surface drainage, but adding new drainage facilities is expected to be outside the scope of this project.

Appendix A

Modeling Details

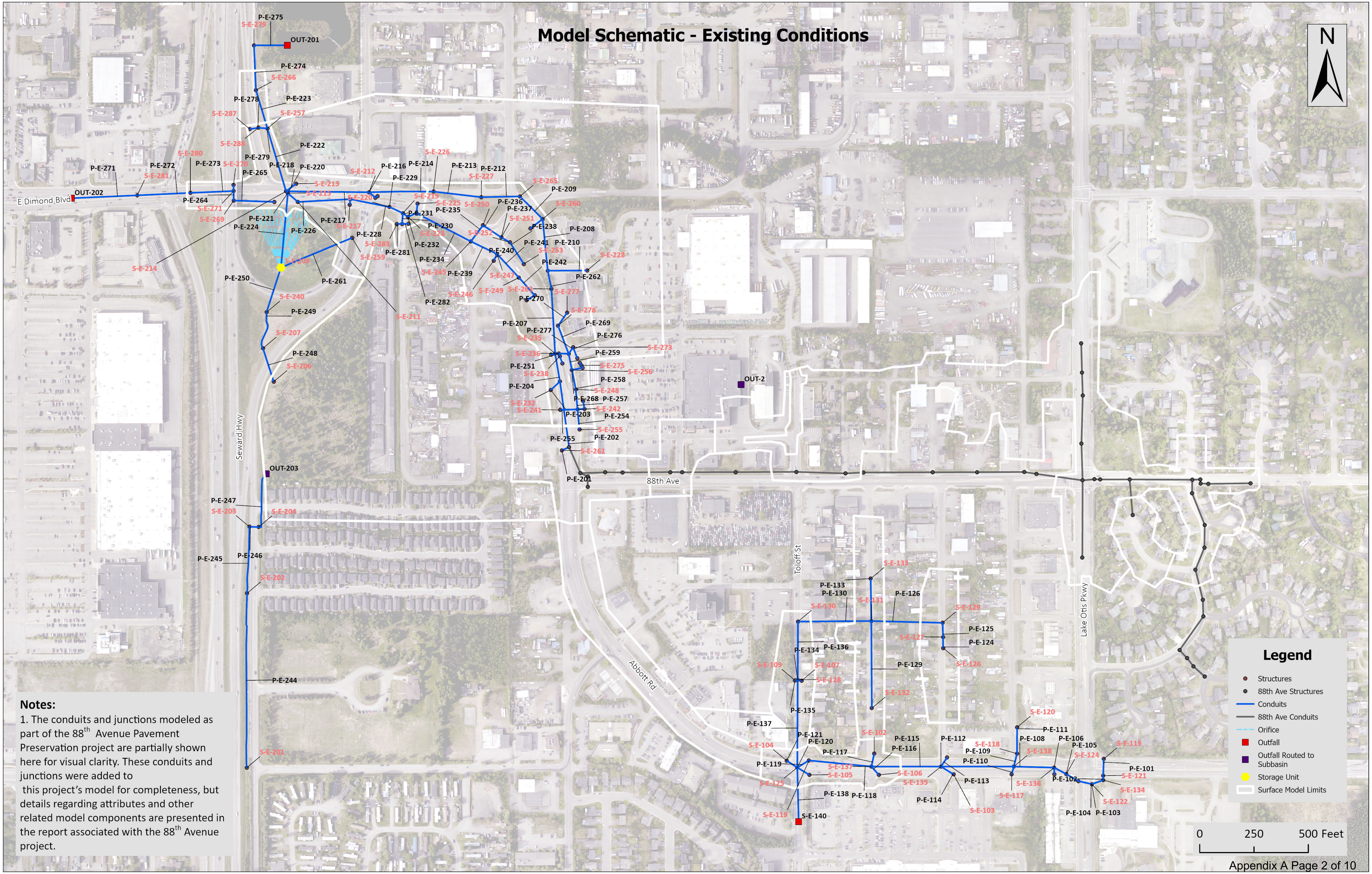
Modeled Subbasins



Notes:

1. The subbasins delineated and modeled as part of the 88th Avenue Pavement Preservation project are shown here for visual clarity. These subbasins were added to this project's model for completeness, but details regarding these subbasins and related model components are presented in the report associated with the 88th Avenue project.

Model Schematic - Existing Conditions



Notes:

1. The conduits and junctions modeled as part of the 88th Avenue Pavement Preservation project are partially shown here for visual clarity. These conduits and junctions were added to this project's model for completeness, but details regarding attributes and other related model components are presented in the report associated with the 88th Avenue project.

Model Parameters
Existing Conditions Subbasins

Name	Outlet	Area (acre)	Width (ft)	Flow length (ft)	Slope (%)	Percent Impervious (%)	Impervious n	Pervious n	Impervious depression storage (in)	Pervious depression storage (in)	Percent impervious with zero depression storage (%)	Subarea routing	Percent routed (%)	Maximum infiltration rate (in/hr)	Minimum infiltration rate (in/hr)	Decay constant (1/hr)
SB-E-101	S-E-133	1.850	1006.37	80.09	3.99	80.73	0.014	0.353	0.06	0.15	28.92	OUTLET	100	1.762	0.162	3.5
SB-E-102	S-E-133	1.467	868.74	73.55	4.46	71.55	0.014	0.411	0.06	0.15	34.34	OUTLET	100	1.762	0.162	3.5
SB-E-103	S-E-126	2.721	1955.41	60.62	4.55	63.51	0.014	0.378	0.06	0.15	34.02	OUTLET	100	1.762	0.162	3.5
SB-E-104	S-E-126	8.489	8642.43	42.79	6.16	56.54	0.014	0.381	0	0.05	32.94	OUTLET	100	1.762	0.162	3.5
SB-E-105	S-E-109	1.155	954.29	52.72	6.44	60.14	0.014	0.437	0	0.05	9.36	OUTLET	100	1.762	0.162	3.5
SB-E-106	S-E-107	3.409	2442.04	60.80	4.88	55.12	0.014	0.385	0.06	0.15	42.89	OUTLET	100	1.762	0.162	3.5
SB-E-107	S-E-132	2.602	2132.45	53.15	4.94	52.87	0.014	0.397	0.06	0.15	33.05	OUTLET	100	1.762	0.162	3.5
SB-E-108	S-E-132	4.041	2529.02	69.61	4.55	36.19	0.014	0.431	0.06	0.15	52.86	OUTLET	100	1.762	0.162	3.5
SB-E-109	S-E-104	0.282	258.60	47.56	3.35	87.77	0.014	0.311	0.06	0.15	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-110	S-E-119	1.019	1041.38	42.64	4.53	66.28	0.014	0.394	0.06	0.15	0.65	OUTLET	100	1.762	0.162	3.5
SB-E-111	S-E-102	0.048	50.06	41.53	6.20	40.98	0.014	0.25	0	0.05	3.24	IMPERVIOUS	42.46	1.762	0.162	3.5
SB-E-112	S-E-101	0.654	435.22	65.45	5.68	87.59	0.014	0.298	0.06	0.15	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-113	S-E-118	0.330	584.92	24.61	15.48	3.90	0.014	0.374	0	0.05	0.00	PERVIOUS	100	1.762	0.162	3.5
SB-E-114	S-E-120	0.253	422.13	26.11	6.87	38.25	0.014	0.316	0	0.05	4.84	OUTLET	100	1.762	0.162	3.5
SB-E-115	S-E-124	2.503	2922.28	37.31	13.65	75.91	0.014	0.276	0	0.05	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-116	S-E-116	0.090	96.61	40.59	4.63	97.06	0.014	0.24	0.06	0.15	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-117	S-E-117	1.063	795.56	58.18	6.63	84.79	0.014	0.253	0	0.05	1.54	OUTLET	100	1.762	0.162	3.5
SB-E-118	SB-E-119	0.255	193.28	57.39	16.89	55.59	0.014	0.472	0	0.05	86.90	OUTLET	100	1.762	0.162	3.5
SB-E-119	S-E-103	0.826	601.70	59.79	3.88	82.77	0.014	0.339	0.06	0.15	11.86	OUTLET	100	1.762	0.162	3.5
SB-E-120	S-E-106	0.548	595.85	40.04	5.52	80.98	0.014	0.285	0.06	0.15	4.10	OUTLET	100	1.597	0.140	3.75
SB-E-121	S-E-105	0.657	866.69	33.02	7.71	75.81	0.014	0.297	0	0.05	0.32	OUTLET	100	1.360	0.108	4.10
SB-E-122	S-E-115	0.662	1097.98	26.25	9.15	71.17	0.014	0.466	0	0.05	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-123	SB-E-110	0.324	232.02	60.86	3.61	11.02	0.014	0.383	0.06	0.15	1.53	OUTLET	100	1.762	0.162	3.5
SB-E-124	S-E-120	0.670	1024.03	28.49	4.64	88.30	0.014	0.327	0.06	0.15	14.78	OUTLET	100	1.762	0.162	3.5
SB-E-125	SB-E-115	2.673	1680.24	69.30	6.72	69.92	0.014	0.28	0	0.05	61.40	OUTLET	100	1.762	0.162	3.5
SB-E-201	S-E-201	5.776	4400.83	57.17	9.43	44.72	0.014	0.405	0	0.05	0	OUTLET	100	1.762	0.162	3.5
SB-E-202	S-E-201	69.041	30932.58	97.23	4.52	52.80	0.014	0.369	0.06	0.15	31.24	OUTLET	100	1.762	0.162	3.5
SB-E-203	S-E-202	20.910	6899.35	132.02	3.96	30.37	0.014	0.374	0.06	0.15	22.50	OUTLET	100	1.558	0.135	3.80
SB-E-204	S-E-202	1.811	1267.29	62.24	9.43	57.54	0.014	0.389	0	0.05	0	OUTLET	100	1.762	0.162	3.5
SB-E-205	S-E-203	1.021	564.45	78.80	7.25	71.65	0.014	0.329	0	0.05	0	OUTLET	100	1.762	0.162	3.5
SB-E-206	OUT-203	18.375	8929.71	89.63	3.50	62.52	0.014	0.412	0.06	0.15	34.52	OUTLET	100	1.113	0.074	4.46
SB-E-207	SB-E-208	2.779	1976.46	61.26	6.64	51.33	0.014	0.404	0	0.05	59.95	OUTLET	100	0.829	0.036	4.88
SB-E-208	S-E-206	7.268	2110.77	150.00	1.15	10.37	0.014	0.437	0.1	0.25	1.43	OUTLET	100	0.750	0.025	5.00
SB-E-209	SB-E-208	2.839	1959.45	63.12	4.57	82.32	0.014	0.481	0.06	0.15	40.53	OUTLET	100	0.892	0.044	4.79
SB-E-210	SB-E-212	1.800	1081.82	72.48	5.20	59.17	0.014	0.326	0.06	0.15	7.48	PERVIOUS	100	1.087	0.071	4.50
SB-E-211	S-E-240	3.888	1932.09	87.66	11.33	37.74	0.014	0.354	0	0.05	0	OUTLET	100	1.355	0.107	4.10
SB-E-212	S-E-208	4.656	1352.06	150.00	3.09	23.71	0.014	0.492	0.06	0.15	0	PERVIOUS	100	1.106	0.073	4.47
SB-E-213	SB-E-206	4.099	2309.59	77.31	6.13	77.16	0.014	0.340	0	0.05	26.12	OUTLET	100	1.762	0.162	3.5

Model Parameters
Existing Conditions Subbasins

Name	Outlet	Area (acre)	Width (ft)	Flow length (ft)	Slope (%)	Percent Impervious (%)	Impervious n	Pervious n	Impervious depression storage (in)	Pervious depression storage (in)	Percent impervious with zero depression storage (%)	Subarea routing	Percent routed (%)	Maximum infiltration rate (in/hr)	Minimum infiltration rate (in/hr)	Decay constant (1/hr)
SB-E-214	S-E-213	1.552	1350.40	50.07	3.67	84.37	0.014	0.377	0.06	0.15	16.64	OUTLET	100	1.762	0.162	3.5
SB-E-215	S-E-217	0.328	381.91	37.37	2.11	81.49	0.014	0.247	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-216	S-E-225	0.433	293.61	64.26	3.02	98.91	0.014	0.264	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-217	S-E-220	0.240	214.36	48.69	3.15	76.27	0.014	0.274	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-218	S-E-221	0.336	340.84	42.93	2.15	79.04	0.014	0.280	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-219	S-E-229	0.236	308.34	33.37	4.55	98.95	0.014	0.240	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-220	S-E-224	0.556	442.01	54.77	3.66	69.33	0.014	0.483	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-221	S-E-231	0.739	687.92	46.78	3.65	53.71	0.014	0.325	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-222	S-E-232	0.842	472.80	77.61	3.86	87.24	0.014	0.265	0.06	0.15	31.48	OUTLET	100	1.762	0.162	3.5
SB-E-223	S-E-237	0.402	445.66	39.24	3.73	79.71	0.014	0.259	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-224	S-E-238	0.237	334.63	30.81	2.49	96.33	0.014	0.298	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-225	S-E-241	0.286	295.03	42.18	2.88	98.22	0.014	0.294	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-226	S-E-245	1.270	713.71	77.49	2.07	76.96	0.014	0.328	0.06	0.15	8.74	OUTLET	100	1.762	0.162	3.5
SB-E-227	S-E-250	0.122	136.49	38.78	1.29	89.54	0.014	0.240	0.1	0.25	0	OUTLET	100	1.762	0.162	3.5
SB-E-228	S-E-246	0.250	329.15	33.06	4.31	92.77	0.014	0.261	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-229	S-E-228	4.753	1587.57	130.40	3.18	90.00	0.014	0.301	0.06	0.15	33.46	OUTLET	100	1.762	0.162	3.5
SB-E-230	S-E-247	0.240	218.87	47.84	2.92	98.36	0.014	0.240	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-232	SB-E-251	17.622	10604.01	72.39	1.81	78.57	0.014	0.385	0.1	0.25	17.09	OUTLET	100	1.762	0.162	3.5
SB-E-233	S-E-226	2.234	938.88	103.63	1.37	65.25	0.014	0.298	0.1	0.25	19.12	OUTLET	100	1.762	0.162	3.5
SB-E-234	S-E-255	0.209	197.26	46.09	1.81	73.27	0.014	0.265	0.1	0.25	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-235	S-E-267	7.647	2800.81	118.93	2.95	64.02	0.014	0.410	0.06	0.15	18	OUTLET	100	1.759	0.162	3.5
SB-E-236	SB-E-235	7.595	3060.74	108.10	3.87	75.65	0.014	0.372	0.06	0.15	22.24	OUTLET	100	1.759	0.162	3.5
SB-E-237	S-E-210	0.478	313.70	66.32	2.54	96.87	0.014	0.249	0.06	0.15	0.00	OUTLET	100	1.663	0.149	3.65
SB-E-238	SB-E-208	1.598	955.41	72.86	11.36	54.18	0.014	0.338	0	0.05	0	OUTLET	100	1.081	0.070	4.51
SB-E-239	S-E-260	0.459	433.22	46.16	5.45	40.32	0.014	0.262	0.06	0.15	0	OUTLET	100	1.762	0.162	3.50
SB-E-240	S-E-264	0.557	499.37	48.55	3.28	77.45	0.014	0.296	0.06	0.15	27	OUTLET	100	1.762	0.162	3.5
SB-E-241	S-E-253	0.370	188.85	85.32	4.10	26.26	0.014	0.309	0.06	0.15	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-242	S-E-242	3.326	1962.24	73.84	3.51	91.91	0.014	0.292	0.06	0.15	17	OUTLET	100	1.762	0.162	3.5
SB-E-243	S-E-270	0.657	621.12	46.07	4.94	89.08	0.014	0.330	0.06	0.15	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-244	S-E-269	0.480	439.02	47.59	0.74	83.48	0.014	0.402	0.1	0.25	0	OUTLET	100	1.762	0.162	3.5
SB-E-245	S-E-251	0.262	376.08	30.29	0.15	35.75	0.014	0.255	0.1	0.25	0	OUTLET	100	1.762	0.162	3.5
SB-E-246	S-E-273	0.158	258.92	26.55	4.53	97.26	0.014	0.243	0.06	0.15	0	OUTLET	100	1.762	0.162	3.5
SB-E-247	S-E-254	0.661	304.99	94.38	1.27	62.81	0.014	0.298	0.1	0.25	17	OUTLET	100	1.762	0.162	3.5
SB-E-248	S-E-256	0.107	169.31	27.50	11.21	39.96	0.014	0.275	0	0.05	0.00	OUTLET	100	1.762	0.162	3.5
SB-E-249	S-E-272	1.204	398.53	131.62	3.03	92.90	0.014	0.302	0.06	0.15	1	OUTLET	100	1.762	0.162	3.5
SB-E-250	S-E-274	6.878	2276.34	131.62	3.03	92.25	0.014	0.286	0.06	0.15	33.92	OUTLET	100	1.762	0.162	3.5
SB-E-251	S-E-277	4.090	1366.07	130.40	3.18	78.78	0.014	0.326	0.06	0.15	33.15	OUTLET	100	1.762	0.162	3.5

Model Parameters
Existing Conditions Conduits

Name	Inlet Node	Outlet Node	Length (ft)	Roughness	Inlet Elevation (ft)	Outlet Elevation (ft)	Cross-section	Pipe Diameter/ Channel Height (ft)	Channel Width (ft)	Left Side Slope (H:V)	Right Side Slope (H:V)	Transect
P-E-101	S-E-115	S-E-121	77.04	0.024	213.96	213.55	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-102	S-E-121	S-E-134	20.77	0.024	213.45	213.35	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-103	S-E-134	S-E-122	55.13	0.024	213.25	212.86	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-104	S-E-122	S-E-123	63.73	0.024	212.74	211.90	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-105	S-E-123	S-E-124	64.32	0.013	211.90	210.40	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-106	S-E-124	S-E-136	63.35	0.013	209.60	204.60	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-107	S-E-116	S-E-136	31.27	0.013	208.60	205.80	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-108	S-E-136	S-E-138	185.74	0.013	204.60	196.20	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-109	S-E-118	S-E-138	61.14	0.013	197.20	197.00	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-110	S-E-117	S-E-138	36.75	0.013	198.50	196.90	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-111	S-E-120	S-E-118	120.92	0.013	197.60	197.20	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-112	S-E-138	S-E-135	335.44	0.013	196.00	183.30	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-113	S-E-101	S-E-135	52.10	0.013	189.10	185.90	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-114	S-E-103	S-E-135	68.43	0.013	189.70	185.90	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-115	S-E-135	S-E-137	320.51	0.013	183.00	180.80	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-116	S-E-106	S-E-137	52.10	0.013	183.00	182.00	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-117	S-E-102	S-E-137	61.46	0.013	184.20	181.90	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-118	S-E-137	S-E-119	289.00	0.013	180.70	178.20	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-119	S-E-119	S-E-125	62.67	0.013	178.20	177.40	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-120	S-E-105	S-E-125	65.16	0.013	179.30	177.90	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-121	S-E-104	S-E-125	58.44	0.013	178.60	177.80	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-124	S-E-126	S-E-127	50.83	0.024	182.85	182.71	CIRCULAR	1.25	N/A	N/A	N/A	N/A
P-E-125	S-E-127	S-E-129	65.51	0.024	182.41	182.19	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-126	S-E-129	S-E-131	328.37	0.024	182.14	181.16	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-129	S-E-132	S-E-131	401.04	0.024	182.85	181.66	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-130	S-E-131	S-E-130	337.76	0.024	181.11	180.11	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-133	S-E-133	S-E-131	195.19	0.024	182.32	181.66	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-134	S-E-107	S-E-128	18.61	0.024	181.40	179.50	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-135	S-E-109	S-E-128	12.53	0.024	181.70	179.60	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-136	S-E-130	S-E-128	267.75	0.024	180.06	179.10	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-137	S-E-128	S-E-125	403.92	0.024	179.00	177.50	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-138	S-E-125	S-E-140	248.92	0.024	177.30	175.70	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-201	S-E-261	S-E-002	36.10	0.024	152.50	150.50	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-202	S-E-002	S-E-233	304.98	0.024	148.60	146.80	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-203	S-E-232	S-E-233	57.75	0.024	147.90	147.20	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-204	S-E-233	S-E-235	130.54	0.024	146.70	145.60	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-205	S-E-237	S-E-235	18.82	0.024	148.90	147.60	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-206	S-E-236	S-E-235	17.86	0.024	147.20	147.30	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-207	S-E-235	S-E-263	297.52	0.024	145.60	143.00	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-208	S-E-264	S-E-260	238.98	0.024	142.00	140.20	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-209	S-E-260	S-E-265	148.13	0.024	140.10	137.40	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-210	S-E-228	S-E-264	181.47	0.024	142.90	142.50	CIRCULAR	3	N/A	N/A	N/A	N/A
P-E-212	S-E-265	S-E-227	177.04	0.024	137.30	135.50	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-213	S-E-227	S-E-226	222.23	0.024	135.40	132.80	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-214	S-E-226	S-E-212	296.39	0.024	132.80	127.50	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-215	S-E-221	S-E-222	12.85	0.024	132.80	132.70	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-216	S-E-222	S-E-212	38.21	0.024	132.60	131.80	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-217	S-E-212	S-E-214	382.47	0.024	127.50	121.60	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-218	S-E-213	S-E-214	57.97	0.024	125.60	122.70	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-220	S-E-211	S-E-215	61.06	0.024	124.40	121.80	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-221	S-E-215	S-E-214	11.86	0.024	121.30	121.20	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-222	S-E-214	S-E-257	301.65	0.013	120.40	117.70	CIRCULAR	4.5	N/A	N/A	N/A	N/A
P-E-223	S-E-257	S-E-266	184.56	0.024	117.70	116.80	CIRCULAR	4.5	N/A	N/A	N/A	N/A
P-E-224	S-E-208	S-E-215	343.60	0.024	126.00	121.40	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-226	S-E-216	S-E-211	242.45	0.024	127.10	124.60	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-227	S-E-217	S-E-216	25.80	0.024	130.20	127.10	CIRCULAR	1.5	N/A	N/A	N/A	N/A

Model Parameters
Existing Conditions Conduits

Name	Inlet Node	Outlet Node	Length (ft)	Roughness	Inlet Elevation (ft)	Outlet Elevation (ft)	Cross-section	Pipe Diameter/ Channel Height (ft)	Channel Width (ft)	Left Side Slope (H:V)	Right Side Slope (H:V)	Transect
P-E-228	S-E-220	S-E-216	183.72	0.024	129.00	127.30	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-229	S-E-219	S-E-220	68.05	0.024	129.80	129.10	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-230	S-E-267	S-E-219	49.81	0.024	130.10	129.80	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-231	S-E-223	S-E-219	28.26	0.024	130.40	129.90	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-232	S-E-224	S-E-223	42.82	0.024	130.90	130.40	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-233	S-E-225	S-E-224	45.13	0.024	137.00	132.40	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-234	S-E-245	S-E-224	282.09	0.024	137.40	131.00	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-235	S-E-250	S-E-245	93.20	0.024	139.40	137.90	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-236	S-E-251	S-E-250	101.06	0.024	140.20	139.90	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-237	S-E-252	S-E-251	45.74	0.024	144.50	140.20	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-238	S-E-253	S-E-252	118.23	0.024	145.70	144.50	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-239	S-E-247	S-E-245	134.31	0.024	139.20	137.90	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-240	S-E-246	S-E-247	34.13	0.024	140.40	140.10	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-241	S-E-249	S-E-247	147.81	0.024	142.70	140.10	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-242	S-E-229	S-E-249	109.51	0.024	144.30	142.80	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-243	S-E-231	S-E-229	43.62	0.024	144.90	144.40	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-244	S-E-201	S-E-202	803.83	0.01	147.45	145.51	TRAPEZOIDAL	3.8	10	4.37	4.37	N/A
P-E-245	S-E-202	S-E-203	306.04	0.01	145.51	142.26	TRAPEZOIDAL	3.8	10	4.37	4.37	N/A
P-E-246	S-E-203	S-E-204	42.15	0.013	142.26	141.90	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-247	S-E-204	OUT-203	264.35	0.01	141.90	137.85	TRIANGULAR	4.45	30	N/A	N/A	N/A
P-E-248	S-E-206	S-E-207	161.29	0.013	129.82	128.35	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-249	S-E-207	S-E-240	174.64	0.03	128.35	127.40	IRREGULAR	0	N/A	N/A	N/A	DitchSBE211
P-E-250	S-E-240	S-E-208	216.37	0.013	127.40	126.00	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-251	S-E-238	S-E-236	13.36	0.024	148.60	147.60	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-252	S-E-239	S-E-238	35.06	0.024	149.60	148.80	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-253	S-E-254	S-E-236	44.72	0.024	147.90	147.30	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-254	S-E-255	S-E-242	93.58	0.024	151.80	150.40	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-255	S-E-241	S-E-242	79.17	0.024	151.80	150.30	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-256	S-E-244	S-E-243	37.36	0.024	152.90	152.60	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-257	S-E-242	S-E-248	91.82	0.024	150.10	149.40	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-258	S-E-248	S-E-256	91.35	0.024	149.40	149.00	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-259	S-E-256	S-E-254	76.12	0.024	148.80	148.00	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-260	S-E-243	S-E-242	32.09	0.024	152.60	151.40	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-261	S-E-259	S-E-208	355.35	0.013	131.43	126.77	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-262	S-E-263	S-E-264	85.63	0.024	142.80	142.30	CIRCULAR	3.5	N/A	N/A	N/A	N/A
P-E-263	S-E-270	S-E-271	28.13	0.024	123.00	122.30	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-264	S-E-269	S-E-271	43.82	0.024	122.90	122.30	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-265	S-E-210	S-E-269	187.23	0.024	124.30	122.90	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-266	S-E-274	S-E-275	13.69	0.013	149.70	149.50	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-267	S-E-275	S-E-276	11.56	0.013	149.30	149.30	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-268	S-E-276	S-E-256	49.47	0.013	149.30	149.10	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-269	S-E-278	S-E-254	138.82	0.024	149.60	148.30	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-270	S-E-277	S-E-278	72.86	0.013	150.20	149.40	CIRCULAR	1	N/A	N/A	N/A	N/A
P-E-271	S-E-281	OUT-202	403.97	0.024	119.00	115.80	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-272	S-E-280	S-E-281	198.47	0.024	120.60	119.00	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-273	S-E-271	S-E-280	199.18	0.024	122.30	121.10	CIRCULAR	2	N/A	N/A	N/A	N/A
P-E-274	S-E-266	S-E-279	216.23	0.024	116.70	114.83	CIRCULAR	4.5	N/A	N/A	N/A	N/A
P-E-275	S-E-279	OUT-201	95.56	0.024	114.70	114.87	ARCH	3.17	N/A	N/A	N/A	N/A
P-E-276	S-E-272	S-E-273	51.76	0.024	151.80	151.60	CIRCULAR	1.5	N/A	N/A	N/A	N/A
P-E-277	S-E-273	S-E-254	35.94	0.024	151.50	149.30	CIRCULAR	1.5	N/A	N/A	N/A	N/A

Model Parameters
Existing Conditions Junctions

Name	Invert Elevation (ft)	Rim Elevation (ft)	Ponded area (sq ft)	2D Surface Connection
S-E-101	189.10	191.94	1000	NO
S-E-102	184.20	187.51	0	YES
S-E-103	189.70	193.74	100	NO
S-E-104	178.60	185.23	0	YES
S-E-105	179.30	186.07	0	YES
S-E-106	183.00	187.68	0	YES
S-E-107	181.40	185.11	0	YES
S-E-108	187.57	217.57	0	YES
S-E-109	181.70	185.12	0	YES
S-E-110	187.74	217.74	0	YES
S-E-111	186.45	216.45	0	YES
S-E-112	186.39	216.39	0	YES
S-E-115	213.96	219.76	0	NO
S-E-116	208.60	212.49	0	NO
S-E-117	198.50	202.38	0	NO
S-E-118	197.20	202.59	0	NO
S-E-119	178.20	186.05	0	YES
S-E-120	197.60	202.14	0	NO
S-E-121	213.45	220.00	0	NO
S-E-122	212.74	218.42	0	NO
S-E-123	211.90	217.54	0	NO
S-E-124	209.60	214.80	0	NO
S-E-125	177.30	185.97	0	YES
S-E-126	182.85	187.50	0	YES
S-E-127	182.41	188.04	0	YES
S-E-128	179.00	185.21	0	YES
S-E-129	182.14	188.47	0	YES
S-E-130	180.06	186.81	0	YES
S-E-131	181.11	187.84	0	YES
S-E-132	182.85	186.60	0	YES
S-E-134	213.25	219.22	0	NO
S-E-135	183.00	192.08	500	NO
S-E-136	204.60	212.88	0	NO
S-E-137	180.70	187.99	0	YES
S-E-138	196.00	203.21	0	NO
S-E-139	189.38	219.38	0	YES
S-E-201	147.45	151.25	0	NO
S-E-202	145.51	149.31	0	NO
S-E-203	142.26	146.06	10000	NO
S-E-204	141.90	146.35	0	NO
S-E-206	129.82	131.82	0	YES
S-E-207	128.35	140.00	0	NO
S-E-210	124.30	129.52	0	YES
S-E-211	124.40	132.40	0	YES
S-E-212	127.50	137.94	0	YES
S-E-213	125.60	131.70	0	YES
S-E-214	120.40	131.20	0	NO
S-E-215	121.30	131.50	0	NO
S-E-216	127.10	137.01	0	NO
S-E-217	130.20	136.66	0	YES
S-E-219	129.80	139.19	0	YES
S-E-220	129.00	138.41	0	YES
S-E-221	132.80	138.43	0	YES
S-E-222	132.60	138.55	0	YES
S-E-223	130.40	138.87	0	YES
S-E-224	130.90	139.87	0	YES
S-E-225	137.00	140.63	0	YES
S-E-226	132.80	142.23	0	NO
S-E-227	135.40	142.62	0	YES
S-E-228	142.90	154.23	0	NO

Name	Invert Elevation (ft)	Rim Elevation (ft)	Ponded area (sq ft)	2D Surface Connection
S-E-229	144.30	152.34	0	YES
S-E-231	144.90	151.46	0	YES
S-E-232	147.90	153.49	0	YES
S-E-233	146.70	155.24	0	YES
S-E-235	145.60	154.84	0	YES
S-E-236	147.20	155.19	0	YES
S-E-237	148.90	154.33	0	YES
S-E-238	148.60	154.99	0	YES
S-E-239	149.60	155.65	0	YES
S-E-240	127.40	140.00	0	NO
S-E-241	151.80	156.20	0	YES
S-E-242	150.10	157.52	0	NO
S-E-243	152.60	157.72	0	YES
S-E-244	152.90	157.68	0	YES
S-E-245	137.40	145.45	0	YES
S-E-246	140.40	147.58	0	YES
S-E-247	139.20	148.23	0	NO
S-E-248	149.40	157.13	0	YES
S-E-249	142.70	150.76	0	YES
S-E-250	139.40	146.94	0	YES
S-E-251	140.20	148.24	0	YES
S-E-252	144.50	149.83	0	YES
S-E-253	145.70	149.34	0	YES
S-E-254	147.90	155.88	0	YES
S-E-255	151.80	157.40	0	YES
S-E-256	148.80	156.68	0	YES
S-E-257	117.70	124.69	0	YES
S-E-258	134.73	136.73	0	NO
S-E-259	131.43	136.91	0	YES
S-E-260	140.10	149.50	0	NO
S-E-261	152.50	157.99	0	YES
S-E-263	142.80	154.04	0	NO
S-E-264	142.00	152.47	0	NO
S-E-265	137.30	147.11	0	NO
S-E-266	116.70	123.35	0	NO
S-E-267	130.10	139.46	0	YES
S-E-268	0.00	0.00	0	NO
S-E-269	122.90	125.34	0	NO
S-E-270	123.00	125.41	0	NO
S-E-271	122.30	126.78	0	YES
S-E-272	151.80	156.26	0	YES
S-E-273	151.50	156.04	0	YES
S-E-274	149.70	160.07	0	YES
S-E-275	149.30	160.10	0	YES
S-E-276	149.30	160.29	0	YES
S-E-277	150.20	154.82	0	YES
S-E-278	149.40	155.47	0	YES
S-E-279	114.70	120.34	0	NO
S-E-280	120.60	128.68	0	NO
S-E-281	119.00	134.68	0	NO
S-E-282	132.10	138.26	0	YES
S-E-283	132.00	138.07	0	YES
S-E-284	125.50	127.50	0	NO
S-E-285	142.00	147.27	0	YES
S-E-287	117.30	122.40	0	YES
S-E-288	118.60	123.31	0	YES

Name	Routed To	Invert Elevation (ft)	Rim Elevation (ft)	Type	Fixed Stage (ft)
OUT-2	SB-E-250	158.41	168.41	FREE	0
OUT-201	N/A	114.87	120.00	FIXED	114.87
OUT-202	N/A	115.80	127.30	NORMAL	0
OUT-203	SB-E-208	137.85	142.30	NORMAL	0
S-E-140	N/A	175.70	185.38	FIXED	185.70

Model Parameters
Existing Conditions Storage Unit

Name	Invert Elevation (ft)	Rim Elevation (ft)
S-E-208	126	130