CITY OF TAMPA

Bob Buckhorn, Mayor **CONTRACT ADMINISTRATION DEPARTMENT**

Michael W. Chucran, Director

ADDENDUM 2

DATE: November 27, 2018

Contract 19-C-00012; Southeast Seminole Heights Flooding Relief Project Design-Build

Item 1: Attached, for reference, are copies of a feasibility study and modeling report.

Item 2: Attached is a copy of the Pre-Submission Conference Sign-In Sheets.

Item 3: Short-Listing is expected to be complete by January 11, 2019.

Item 4: Presentations by short-listed firms are scheduled for January 29, 2019.

Item 5: A TEMPORARY link to modelling files will be maintained for a SHORT TIME at the following address: https://mft1.tampagov.net/pkg?token=1bbdfb74-6f55-4a88-8293-83d4411c54f7 .

All other provisions of the RFQ not in conflict with this Addendum remain in full force and effect. Questions are to be e-mailed to Contract Administration@tampagov.net.

Jim Greiner

Jim Greiner, P.E., Contract Management Supervisor

Feasibility Study

for

Southeast Seminole Heights Flooding Relief (N949)

Prepared for:

City of Tampa
Stormwater Department
306 E. Jackson 6N
Tampa, Florida 33602

January 31, 2018
Revised February 26, 2018
Revised May 14, 2018
Revised June 7, 2018
Revised October 1, 2018
Revised October 30, 2018

Prepared by:

FLORIDA DESIGN CONSULTANTS, INC.
THINK IT. ACHIEVE IT.
3030 Starkey Blvd
New Port Richey, FL 34655

Table of Contents

List of Figures

Revisions

31 January 2018 - Initial Draft
26 February 2018 – Revised Based on Comments from City Staff
14 May 2018 – Updated with Revised Route
7 June 2018 – Updated Exhibits for Revised Analysis
1 October 2018 – Revised Title and Removed Conceptual Plans

Revisions (Cont.)

30 October 2018 – Revised based on City's Comments

Certification

Not valid unless stamped or embossed with Engineer's Seal, signed and dated in contrasting color ink.	
These documents have been prepared under the responsible charge of Colin Miller, P.E. and is based on his professional knowledge and available information, in accordance with commonly accepted procedures consistent with applicable standards of practice. Florida Design Consultants, Inc. (EB COA 7421) – 3030 Starkey Blvd. – New Port Richey, FL 34655 – www.fldesign.com – 727.849.7588	[seal or stamp] _____ Colin Tyson Miller, FL P.E. 61775 _____ Date

The following appendices may be provided by other professionals and are not certified by the report's Engineer-of-Record.

Appendices

A. Conceptual Plans (under separate cover, by others)

B. Tree Photographs

C. Cost-Benefit Analysis

1. Executive Summary

The Original Southeast Seminole Heights Drainage Improvement Projects were composed of five (5) separate projects and were analyzed together. These projects range from new construction to replacement of existing structures. Proposed improvements along Hillsborough Avenue, though considered in the Benefit-Cost Analysis, have been included in the conceptual plans for informational purposes (FDOT Segment). During subsequent project development the City revised these projects to logically group activities south (COT Segment 1) and south (COT Segment 2) of Hillsborough Ave.

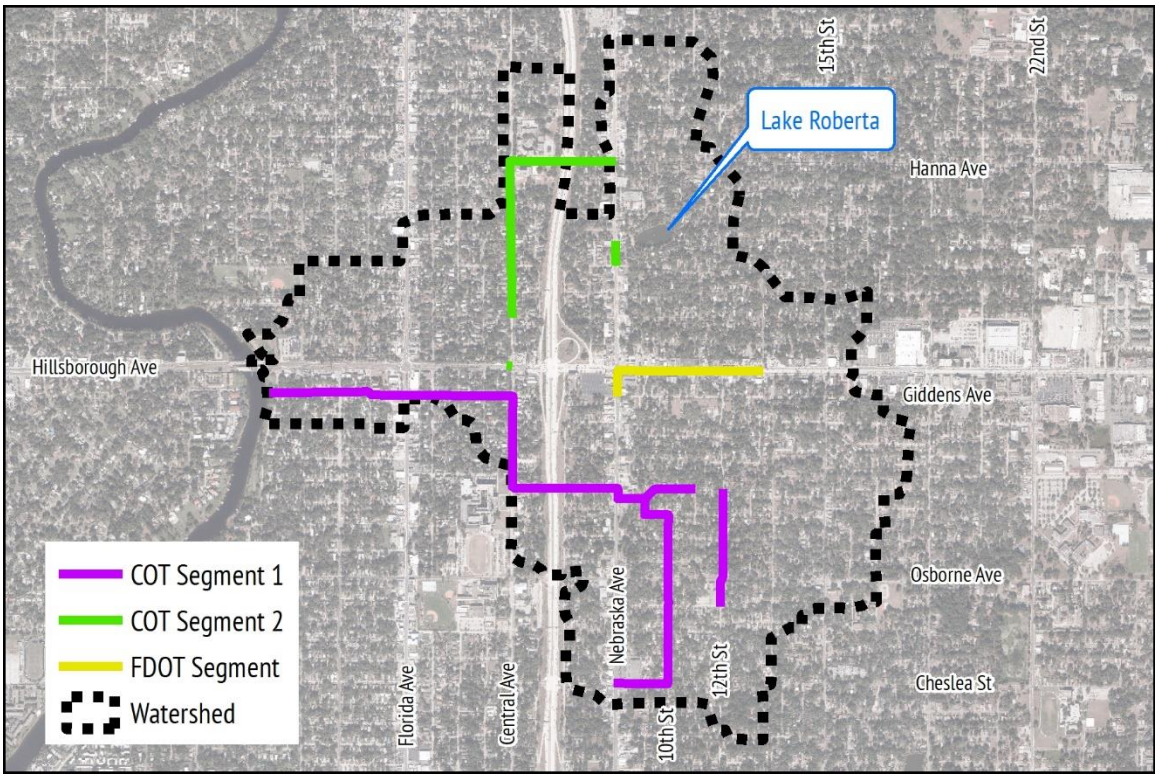

Figure 1. Project Locations

The proposed improvements decrease frequent and catastrophic flooding (see **Figure 2**). The drainage modeling was originally prepared by Land & Water Engineering Science (LWES), updated by Florida Design Consultants, and considered all projects together. No analysis was provided for individual projects.

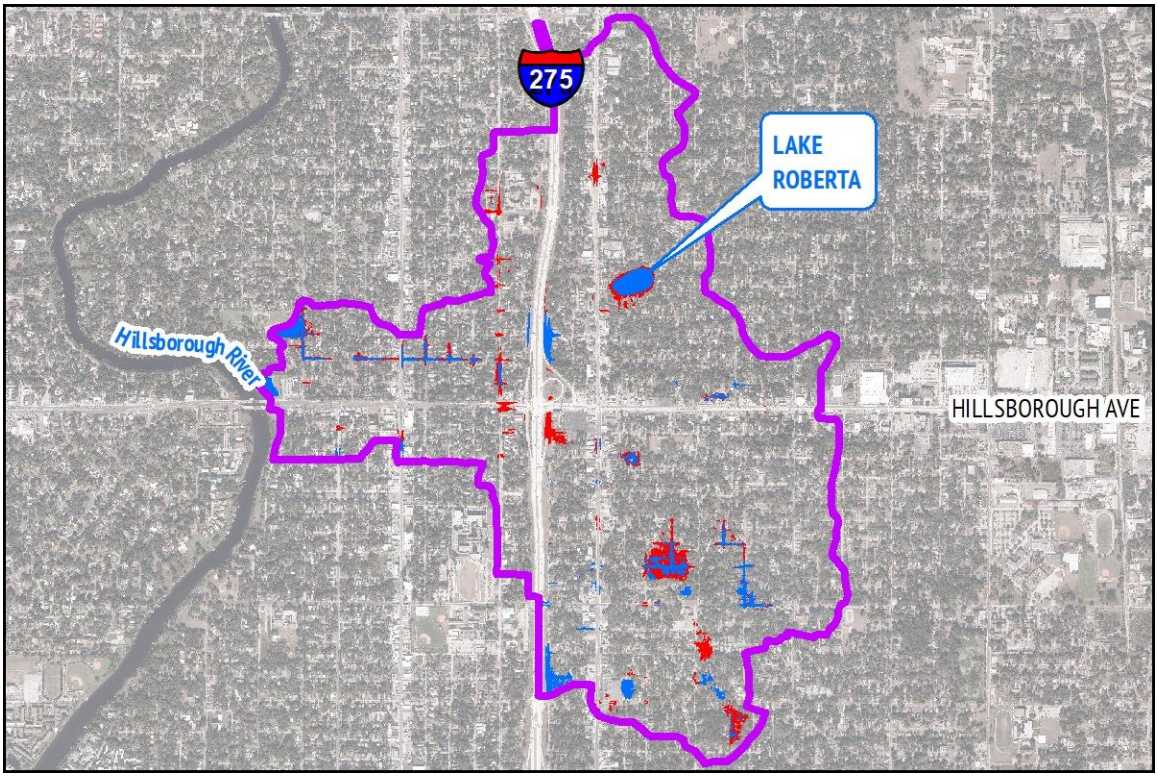

Figure 2. 2.33-Year Storm - Flooding Reductions

The rights-of-way for the proposed drainage improvements are very limited and additionally constrained (by trees and residential uses). We have evaluated numerous configurations to reduce impacts to trees, transportation, and adjacent properties. However, due to the size of the proposed drainage systems, all impacts cannot be eliminated.

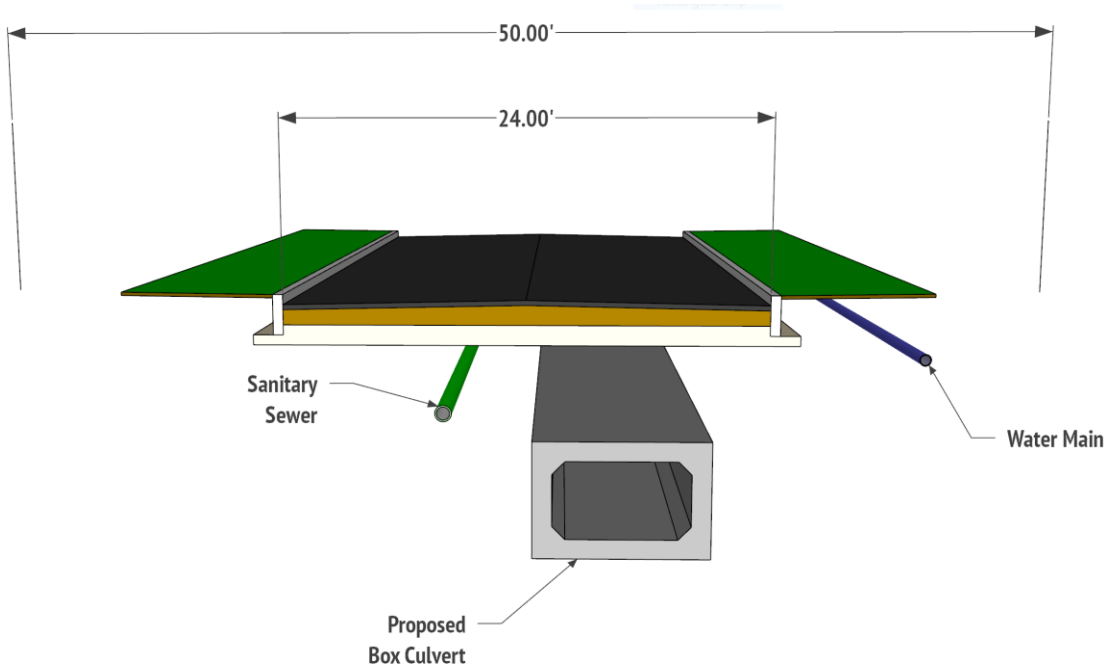

Figure 3. Typical Section - Giddens West of Florida Ave

The initial Benefit-Cost ratio (BCR) was 0.77 based on the original project concept from the LWES BODR, the updated design has a BCR of 0.79 (11/1/2018). There may be portions of the proposed improvements (for example, Projects 2 through 5) and modifications to proposed routes (for example, jack-and-boring under I-275 at Caracas Street) which increased the BCR.

1.1. Recommendations

We recommend refining the conceptual plans by completing the following investigative tasks:

Subsurface Utility Exploration (SUE):

- Along Hanna Ave from Nebraska Ave to Central Ave
- Along Central Ave
- Along 12th St
- Along Central Ave (South of Giddens)
- Along Giddens Ave from I-275 to Central Ave

Topographic Survey:

- Central Ave and Comanche
- 12th St and Caracas St
- Tampa St and Giddens Ave
- Giddens Ave east/west of I-275

Tree Assessment:

- Along Giddens west of Florida Ave
- Along 10th St from Chelsea St to Ellicott St
- Along 12th north of Osborne Ave

2. Introduction

The City of Tampa (COT) Stormwater Department has requested Florida Design Consultants, Inc. (FDC) provide a feasibility study, including a Benefit-Cost Analysis, and Conceptual Plans for the construction of storm sewers in the Southeast Seminole Heights (SESH) project area. The original Southeast Seminole Heights Drainage Improvement Project consists of five (5) separate but dependent drainage improvement projects. These projects were developed in the Southeast Seminole Heights Drainage Improvements Basis of Design (BOD) Report by Land & Water Engineering Science (LWES), 18 December 2015. This BOD Report did not consider individual projects or phasing of projects. FDC relied upon the data (for example, modeling results) from this BOD Report. Subsequent revisions have combined projects into more logical groups.

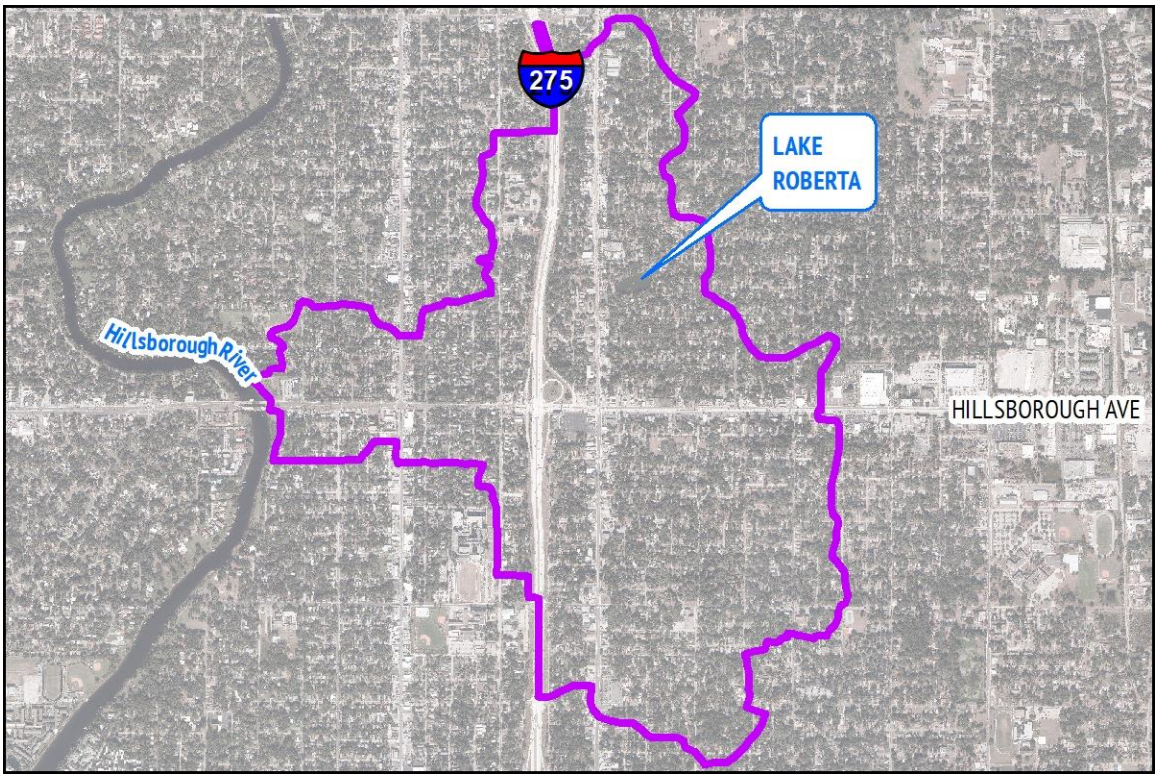

Figure 4. Location Map

COT Segment 1 – Drainage Improvements Along Giddens Ave

This segment involves the construction of a 7- x 4-feet reinforced concrete box culvert (RCB) along Giddens Ave from Central Ave to River Blvd and an 7- x 4-feet RCB from River Blvd to the Hillsborough River. This portion is generally through residential areas (except for Florida Ave crossing) with 50-feet rights-of-way (ROW). A portion of the alignment (from Florida Ave to Tampa St) is significantly narrower (approximately 40-feet) than the majority.

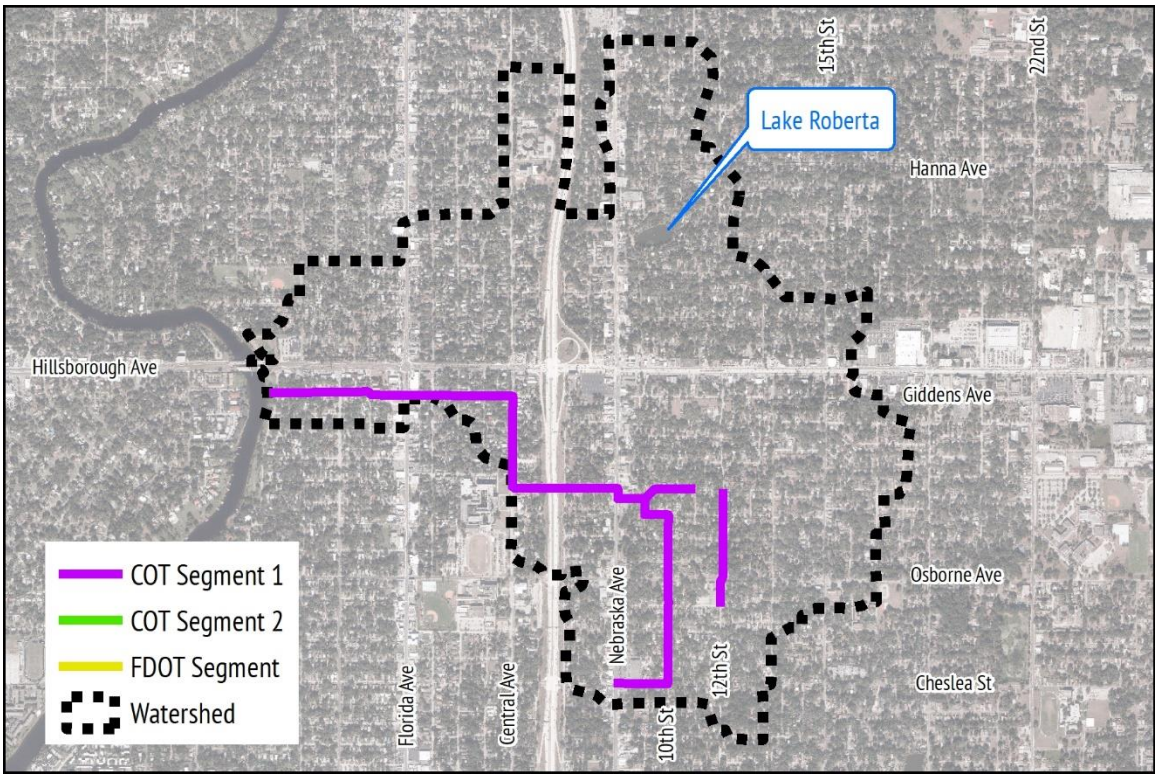

Figure 5. Project 2 Location Map

COT Segment 1 – Drainage Improvements 10th St/Chelsea St to Giddens Ave/Central Ave

Another portion of Segment 1 involves the construction of storm sewers of various sizes, ranging from 36-inch diameter reinforced concrete pipes (RCP) to 7- x 4-feet RCB. The BOD Report considered a portion (7- x 4-feet RCB) of the new storm sewer to be constructed under the existing overpass of Hillsborough Ave by Interstate 275 (I-275). During discussions with the FDOT, this alignment was strongly discouraged, in preference of a jack-and-bore tunnel under I-275 aligned with Giddens Ave. Given the location of existing storm sewers under I-275, an alternative alignment under I-275 at Caracas was proposed. Additionally, a stormwater management systems (pond) is to be constructed near New Orleans Avenue and 11th Street. This pond will require modifications to adjacent storm sewer to direct stormwater into the pond.

COT Segment 1 – Drainage Improvements Along 12th St from Curtis St to Caracas St

The last portion of Segment 1 involves the construction of 48-inch RCP storm sewers. There are a significant number of trees along 12th St.

COT Segment 2 – Drainage Improvements Along Hillsborough Ave

This segment includes the additional connection at Central Avenue. Maintenance of Traffic (MOT) may be significant for work in or adjacent to Hillsborough Ave. There may be significant utility impacts, for example a 48-inch sanitary force main may impact storm pipe locations near 13th Street and 30-inch water main near 15th Street.

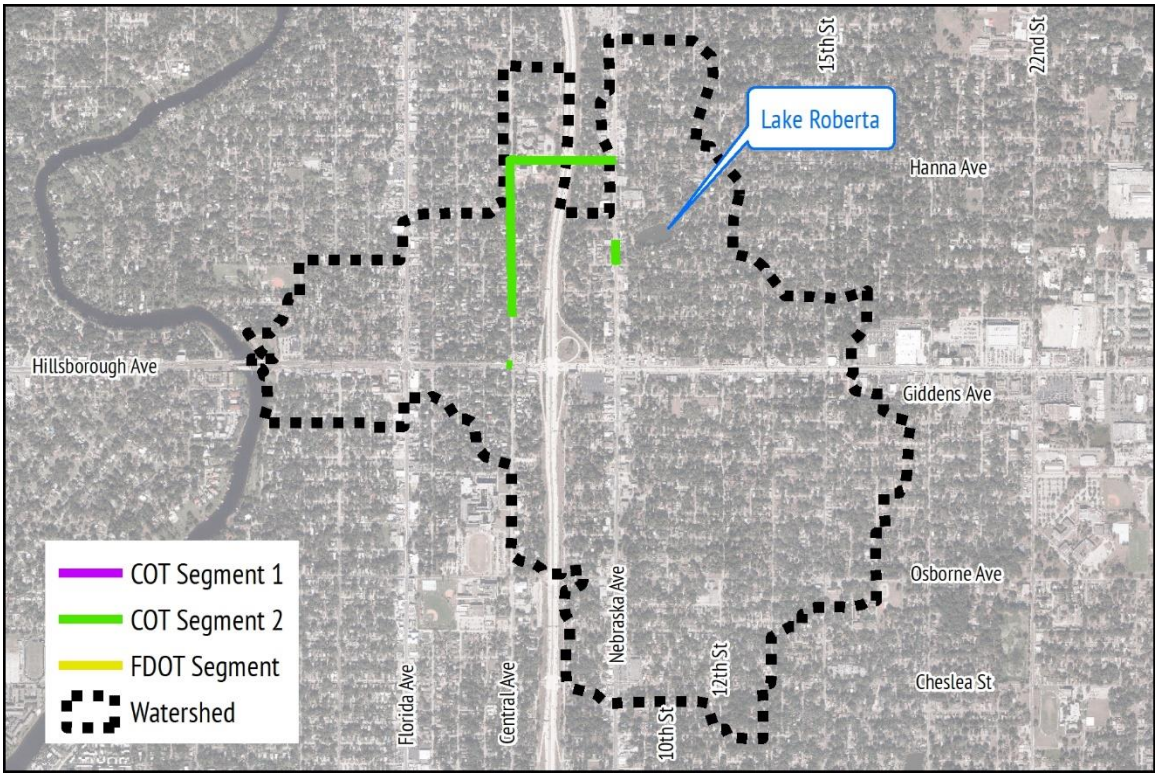

Figure 6. Project 1 Location Map

COT Segment 2 – Drainage Improvements Along Nebraska Ave/Hanna Ave to Central Ave/Comanche Ave

This portion of Segment 2 involves the construction of storm sewers of various sizes, ranging from 24-inch diameter RCP to 7- x 4-feet RCB. The majority of the 7- x 4-feet RCB is to be constructed under Central Ave. There are significant number of trees along Hanna Ave and Central Ave. This project will also require removal or plugging of portion of the storm sewer draining south from Hanna Avenue along Nebraska Avenue.

This project may reduce flooding around Lake Roberta by increasing capacity and adding redundancy to the drainage system.

3. Existing Drainage

The existing drainage system in the Southeast Seminole Heights (SESH) project area, is inconsistent, undersized, and may be reaching the end of its service life.

4. Alternative Routes

Due to this study's limited scope, alternative alignments were not evaluated, with only limited exceptions. For example, jack-and-boring (tunneling) aligned with Giddens Ave under I-275 may reduce costs and certainly Maintenance of Traffic (MOT) impacts for Hillsborough Ave.

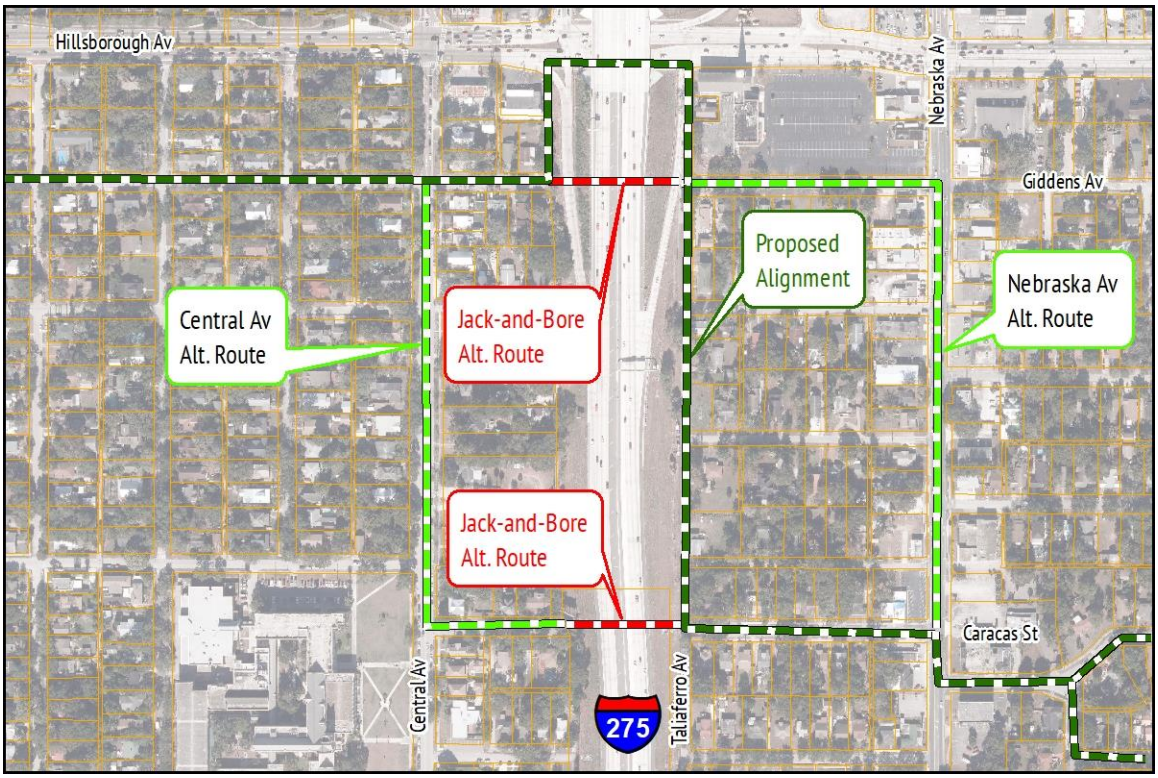

Figure 7. Project 2 Alternative Routes

The Central Ave Alternative Route appears to avoid the impacts to the existing storm sewer along Giddens (dual 54-inch RCPs) but may impact transportation along Central Avenue and near Hillsborough High School. The Nebraska Avenue Alternative Route may avoid the narrow right-of-way, but have significant transportation impacts (along Nebraska Avenue) and significant drainage impacts (along Giddens Avenue). Jack-and-Boring under Interstate 275, either at Giddens Avenue or Caracas Street, may be a viable alternative but warrants significant additional investigation.

The Central Avenue route was considered and this report, plans and modeling was updated correspondingly.

5. Proposed Drainage Improvement Projects

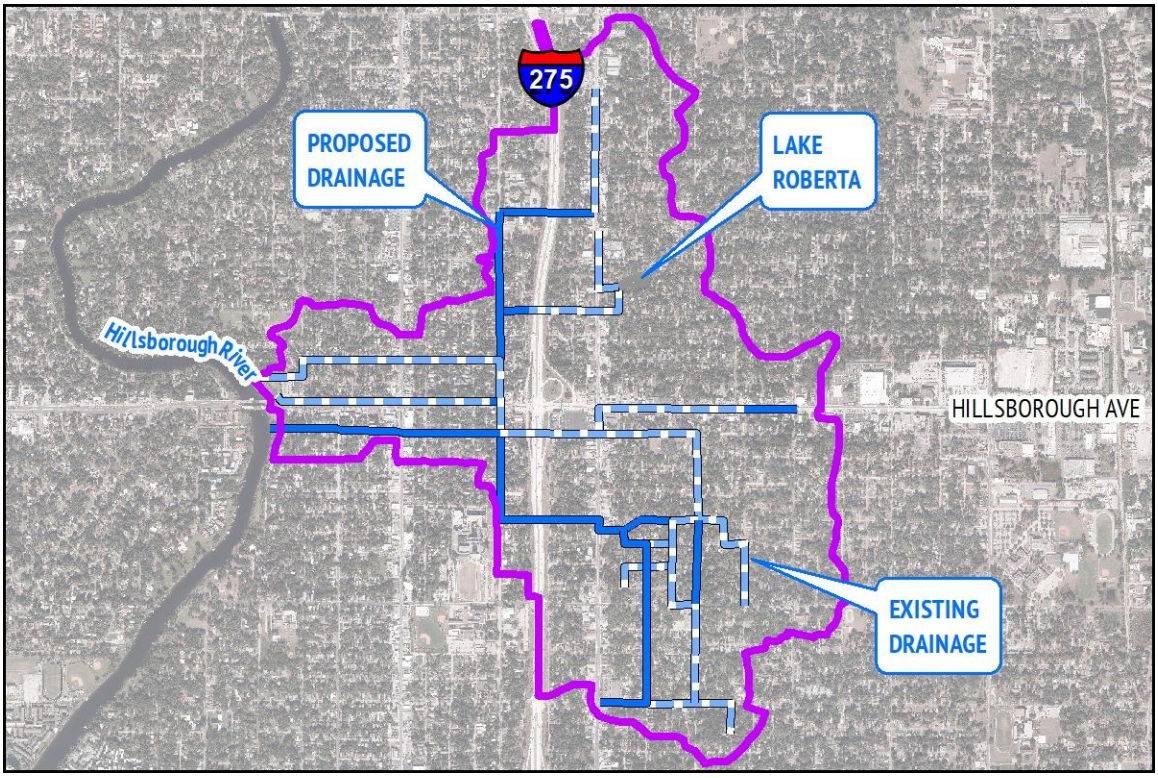

Figure 8. Overall Proposed Drainage

COT Segment 1 – Drainage Improvements Along Giddens Ave

This portion of Segment 1 provides significantly improved drainage capacity. However, it is located within very narrow rights-of-way (generally less than 50-feet), with the portion from Florida Avenue to Tampa Street appearing to be less than forty (40) feet wide. Additional right-of-way may be necessary for this portion to provide preferred horizontal separations from water mains and storm sewer (7- x 4-feet RCB) and sanitary sewer to proposed right-of-way line.

The section proposed generally reduces excavation width at the expense of excavation depth (which creates other logistical issues), to reduce impacts to adjacent trees (more common at western end, near River Road).

COT Segment 1 – Drainage Improvements 10th St/Cheslea St to Giddens Ave/Central Ave

This portion of Segment 1 has some of the most significant unresolved issues. Namely, adding drainage capacity (pipes) from east to west of Interstate 275 (I-275). During a meeting (15 December 2017) with the Florida Department of Transportation (FDOT), the FDOT expressed serious concerns regarding installing a new 7- x 4-feet RCB under the overpass of I-275 at Hillsborough Avenue. The FDOT suggested jack-and-boring a 72-inch instead of the 7 x 4-feet RCB. The substitution of the 72-inch RCP for the proposed 7- x 4-feet RCB appears viable in terms of cost, complexity, and capacity.

Major portions of the proposed drainage improvements occur east of Nebraska Avenue. This area has narrow rights-of-way (less than 40-feet) making relocation of existing utilities exceptionally difficult. Compounding the difficulty of relocating utilities, there are numerous large trees near and adjacent to the existing pavement.

Photograph 1. Grand Oak South of Curtis Street on 10th Street

COT Segment 1 – Drainage Improvements Along 12th St from Curtis St to Caracas St

This portion of Segment 1 appears to have the least issues of the five projects. Majority of the proposed improvements appear to be in areas without significant existing utilities. However, most of the route has large trees in or adjacent to the right-of-way. Additionally, there will be significant impacts to existing utilities south of Osborn Avenue.

COT Segment 2 – Drainage Improvements Along Hillsborough Ave

The original design concept (LWES BODR) required significant improvements along Hillsborough Ave. The FDOT will undertake much of the original project, therefore it is no longer necessary. We have reevaluated the drainage systems with these improvements and revised this report accordingly. This segment includes the additional connection at Central Avenue to provide alternative outfall for drainage at Central Ave and Hillsborough Ave.

COT Segment 2 – Drainage Improvements Along Nebraska Ave/Hanna Ave to Central Ave/Comanche Ave

This portion of Segment 2 has several significant outstanding issues. First, the portion of the alignment along Hanna Avenue is confined by an electrical transmission line (on power poles) on the south and a 42-inch water

main on the north. The available right-of-way appears to support the proposed storm sewer (36-inch RCP), however further refinement of the locations of the sanitary sewer, 42- and 12-inch water mains is necessary to determine if significant lengths of the water mains will need to be relocated. Second, location and depths of sanitary sewers along Central Avenue south of Hanna Avenue is a source of significant uncertainty. Lastly, there are significant potential transportation impacts along Hanna Avenue from I-275 to Central Avenue.

5.1. Topographic Information

No survey (topographic, boundary or specific purpose) was conducted for this study, report, or conceptual construction plans. Elevation information was exclusively based on public available LiDAR data from the Florida Division of Emergency Management (FDEM) development and maintenance of Regional Evacuation Studies. Vertical accuracy of the LiDAR data is approximately ±0.3-feet for unobscured areas.

The LiDAR data was used to create Digital Elevation Models (DEMs) by the Southwest Florida Water Management District and clipped to the project area by FDC. The DEM reduces the accuracy of the topographic information by homogenizing information in a given area (5-feet by 5-feet area). The overall surface information has an accuracy greater than ±0.3-feet for unobscured areas and even less for highly vegetated areas. The DEM was used in AutoCAD Civil 3D to create profiles and sections.

5.2. Transportation Impacts

The proposed projects generally have modest transportation impacts, adjacent to the improvements and limited to the portion of right-of-way under construction. However, there are several significant transportation impacts, with the impacts to Central Ave adjacent to Hillsborough High School being the most acute. Additionally, there are impacts to transportation along Hanna Avenue will impact Seminole Heights Elementary and Seminole Heights United Methodist Church.

Figure 9. Major Transportation Impacts

5.3. Residential Impacts

There is only one dead-end street (Caracas Ave west of I-275) which will be impacted for an extended period of time (construction of 7- x 5-feet RCB). This impact will significantly impact seven (7) residences.

5.4. Utility Impacts

FDC contacted Sunshine One Call for a design ticket utility information for the Southeast Seminole Heights projects areas. The following is a summary of the utility owners; however, it is notable that the majority of the buried utilities are the City's.

- American Traffic Solutions
- Fibernet Direct
- Frontier Communications
- TECO Peoples-Gas
- Tampa Water Department
- Tampa Electric Company (TECO)
- Bright House Networks

The nature of much the proposed projects will cause primary and secondary utility impacts. Primary Utility Impacts are displacement for proposed drainage improvements. Secondary Utility Impacts are service connection impacts.

5.5. Tree Impacts

There are numerous large trees located near or adjacent to the proposed alignments. These trees may be impacted directly or indirectly. We performed a site visit on 17 November 2017 to review the alignments potential impacts and review potential adjustments within the rights-of-way which may reduce these impacts. Locations and photographs of trees near and adjacent to proposed improvements are provided in **Appendix B**. A complete tree inspection and evaluation should be completed to refine the proposed alignments of drainage improvements.

5.6. Water Quality Improvements

There is limited open space for traditional stormwater Best Management Practices (BMPs), for example ponds. The improvements do propose construction of a small offline retention system near New Orleans Avenue and 11th Street. Since no geotechnical investigation was conducted for this report, the type (retention or detention) and necessary modifications (diversion weir) have not been assessed.

There are other stormwater BMPs which may implementable, for example curb inlet screens (inserted into existing or proposed inlets to collect floatable debris). Lastly, baffle boxes (large sediment traps) may only be viable at 12th Street and Caracas Street, due to size and limited available rights-of-way.

5.7. Benefit-Cost Analysis

Benefit-Cost Analysis was performed and is contained in **Appendix A**.

5.8. Phased Construction

Phasing construction based on the projects may be only logical approach. However, the first portion of Segment 2 (7' x 4' RCB on Giddens) will likely need to completed prior to any other construction.

6. Conclusions and Recommendations

The project appears feasible but further investigation would be recommended. We recommend refining the conceptual plans by completing the following investigative tasks:

Subsurface Utility Exploration (SUE):

- Along Hanna Ave from Nebraska Ave to Central Ave
- Along Central Ave
- Along 12th St
- Along Central Ave (South of Giddens)
- Along Giddens Ave from I-275 to Central Ave

Topographic Survey:

- Central Ave and Comanche
- 12th St and Caracas St
- Tampa St and Giddens Ave
- Giddens Ave east/west of I-275

Tree Assessment:

- Along Giddens west of Florida Ave
- Along 10th St from Chelsea St to Ellicott St
- Along 12th north of Osborne Ave

Appendices

A. Conceptual Plans (under separate cover, by others)

B. Tree Photographs

By Florida Design Consultants, Inc. (11/17/2017)

Photo: IMG_20171117_142226725_HDR.jpg
Lat.: 27 ° 59 ‘ 42.32 “
Long.: 82 ° 27 ‘ 18.93 “
Date: 11/17/2017

Description:
Large Oak located at Southwest Corner
Of Giddens and N. Central Ave

Photo: IMG_20171117_142500962.jpg
Lat.: 27 °59 42.41 “
Long.: 82 27 19.78 “
Date: 11/17/2017

Description:
Large Oak Located West of N. Central Ave. on north side of E. Giddens Ave. Overhangs roadway.

Photo: IMG_20171117_142311300.jpg
Lat.: 27 ° 59 ‘ 42.41 “
Long.: 82 ° 27 ‘ 19.78 “
Date: 11/17/2017

Description:
Large Oak located on South side of Giddens Ave. west of N. Central Ave.

Photo: IMG_20171117_14233962.jpg
Lat.: 27 ° 59 ‘ 42.41 “
Long.: 82 ° 27 ’19.78 “
Date: 11/17/2017

Description:
Large Oak located on South side of E. Giddens Ave. east of Seminole Rd. Overhangs the roadway.

Photo: IMG_20171117_143531666.jpg
Lat.: 27 ° 59 ' 43.00 "
Long.: 82 ° 27 ' 23.89 "
Date: 11/17/2017

Description:
Large Oak located on south side of E. Giddens Ave. west of Seminole Rd. Overhangs the roadway.

Photo: IMG_20171117_143453080.jpg
Lat.: 27 ° 59 ' 41.87 "
Long.: 82 ° 27 ' 25.98 "
Date: 11/17/2017

Description:
Large Oak located on south side of E. Giddens Ave east of Branch Rd. Overhangs roadway.

Photo: IMG_20171117_144549397.jpg
Lat.: 27 ° 59 ' 43.09 "
Long.: 82 ° 27 ' 48.80 "
Date: 11/17/2017

Description:
Large Oak located on north side of E. Giddens Ave. west of N. Highland Ave.

Photo: IMG_20171117_144524707.jpg
Lat.: 27 ° 59 ' 43.34 "
Long.: 82 ° 27 ' 48.76 "
Date: 11/17/2017

Description:
Grand Oak located on north side of E. Giddens Ave. west of N. Highland Ave. Overhangs roadway.

Photo: IMG_20171117_144715954.jpg
Lat.: 27 ° 59 43.11 “
Long.: 82 ° 27 ‘ 48.31 “
Date: 11/17/2017

Description:
Large cluster of trees including large Oak located on north side of E. Giddens Ave. west of N. Highland Ave. Overhangs roadway.

Photo: IMG_20171117_144807854.jpg
Lat.: 27 ° 59 ‘ 43.03 “
Long.: 82 ° 27 ‘ 49.57 “
Date: 11/17/2017

Description:
Large Oak located on north side of E. Giddens Ave. west of N. Highland Ave. approaching N. River Blvd. Overhangs roadway.

Photo: IMG_20171117_144832518.jpg
Lat.: 27 ° 59 42.96 “
Long.: 82 ° 27 ‘ 50.83 “
Date: 11/17/2017

Description:
Large cluster of trees including large Oak located on north side of E. Giddens Ave. east of N. River Blvd.

Photo: IMG_20171117_144744416.jpg
Lat.: 27 ° 59 ‘ 42.87 “
Long.: 82 ° 27 ‘ 50.78 “
Date: 11/17/2017

Description:
Large Oak located on south side of E. Giddens Ave. approaching N. River Blvd. Overhangs roadway.

Photo: IMG_20171117_144926898.jpg
Lat.: 27 ° 59 ' 43.03 "
Long.: 82 ° 27 ' 50.04 "
Date: 11/17/2017

Description:
Large Oak located on west side of N. River Blvd at the intersection of E. Giddens Ave.

Photo: IMG_20171117_145029594.jpg
Lat.: 27 ° 59 ' 43.55 "
Long.: 82 ° 27 ' 52.77 "
Date: 11/17/2017

Description:
Grand Oak located on west side of N. River Blvd. at the intersection of E. Giddens Ave.

Photo: IMG_20171117_145007448.jpg
Lat.: 27 ° 59 ‘ 43.66 “
Long.: 82 ° 27 ‘ 52.77 “
Date: 11/17/2017

Description:
Large Oak located west of N. River Blvd in the path of proposed outfall to Hillsborough River.

C. Cost-Benefit Analysis

By Florida Design Consultants, Inc. (Revised 11/1/2018)
Includes Engineer's Opinion of Probable Construction Cost

FLORIDA DESIGN CONSULTANTS, INC.
THINK IT. ACHIEVE IT.

MEMO

To: Alex Awad, City of Tampa Stormwater Division

From: Colin Miller, P.E.

Date: November 1, 2018

Re: Revised Benefit-Cost Analysis for Southeast Seminole Heights Drainage Improvements Project

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The following memorandum summarizes the results and efforts to estimate the Benefit to Cost ratio (B-C) for the Southeast Seminole Heights Drainage Improvements Project by the City of Tampa. The probable construction costs have been revised based on comments from the City.

Avoided Damages (Benefit)	Probable Construction Costs	Benefit-Cost Ratio
$16,712,616	$21,136,964	0.79

Topography

A Digital Elevation Model (DEM) for the vicinity of the Southeast Seminole Heights Drainage Improvements Project area was extracted from (clipped) the Southwest Florida Water Management District's (SWFWMD) Hillsborough County DEM to represent bare land surface elevations.

Hydraulic Model Results

Flood stages were extracted from an updated XP-SWMM model prepared by Florida Design Consultants, Inc. (FDC). This model was based on the proposed drainage improvements, see Conceptual Plans for Southeast Seminole Heights Feasibility Study.

Structure Finished Floor Elevation Estimates

Finished Flood Elevations for potentially affected structures were estimated using the available Building Footprints and the Southeast Seminole Heights DEM. The Finished Floor Elevation was estimated using the average of the average and maximum elevations plus one foot. This is based on the approach detailed in the "Approach to Assessing Level-of-Service, Surface Water Resources, and Best Management Practice Alternatives for Watershed in Hernando County, Florida."

Land Use

Land Use data from the Southwest Florida Water Management District (SWFWMD) was used to determine non-residential structures.

Traffic Information

We gathered available traffic counts from the City of Tampa. However, many local streets did not have traffic count information and we used standard information.

Street / Road	Annual Average Daily Traffic (AADT)
Hillsborough*	54,810
Nebraska*	19,931
Florida Ave*	19,125
Comanche**	1,000
New Orleans**	1,000
Ellicott**	1,000

* City of Tampa Traffic Data (https://www.tampagov.net/transportation/programs/traffic-counts)
** Approach to Assessing Level-of-Service, Surface Water Resources, and Best Management Practice Alternatives for Watersheds in Hernando County, Florida, Jones Edmunds & Associates, Inc., 2013

Roadway Flooding

Roads were manually reviewed for flooding and measurements endeavored to not duplicate inundation lengths through intersections. Depths of flooding greater than 0.5 feet and generally completely across the roadway (meaning above crown) were used to determine flood damage.

Discount Rate

Since the proposed project will realize recurring annual avoided damages (or costs) the benefits (avoid damages) have been estimated over the likely lifespan for the project, 30 years. The time value for avoided damages and inflation likely are identical, and funds are not being deposited to earn interest; we recommend using a modest interest rate of 1% per year, however, we have used 7% as required by the SWFWMD.

Avoided Damages Calculations

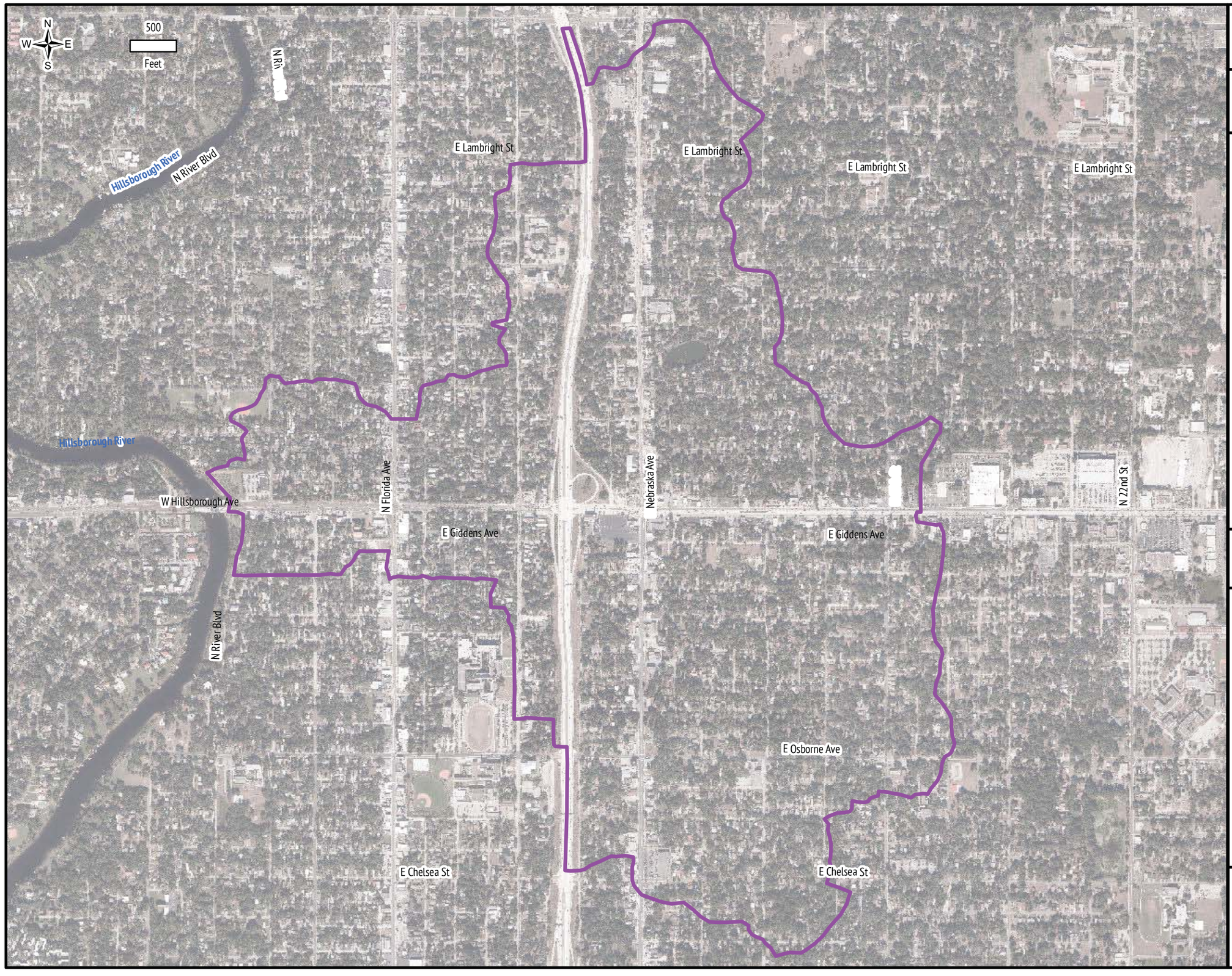
Using an Excel spreadsheet developed by the SWFWMD (Stormwater Improvement Flood Protection (SIFP) Benefit Cost Analysis Tool, July 2016), we estimated the damages for the existing and proposed conditions.

Please note, the SIFP Benefit Cost Analysis Tool does not include features to directly calculate damages for non-residential structures and limits edits to the spreadsheet data and calculations (locked cells) in such a way as to require some outside calculation. We have included the spreadsheet (SIFP Benefit Cost Analysis Tool) with all structures assumed as residential structures (even though several are commercial) for completeness and since this is an underestimation of existing and proposed damages, making the results conservative.

Not Valid Unless Embossed With Engineer's Seal or Original Stamp, Signed And Dated In Contrasting Color Ink.	
These documents have been prepared under the responsible charge of **Colin T. Miller, P.E.** and is based on his professional knowledge and available information, in accordance with commonly accepted procedures consistent with applicable standards of practice. Florida Design Consultants, Inc. (EB COA 7421) – 3030 Starkey Blvd. – New Port Richey, FL 34655 – www.fldesign.com – 727.849.7588	[seal or stamp] Colin Tyson Miller, P.E. FL P.E. 61775 Date

Enclosures:

1. Aerial (2016) Map
2. Topography (2007-2011) Map
3. Land Use (2015) Map
4. Soils Map
5. Impervious Area Map
6. Flooding Comparison (2.33-Year) Maps
7. Flooding Comparison (5-Year) Maps
8. Flooding Comparison (10-Year) Maps
9. Flooding Comparison (25-Year) Maps
10. Flooding Comparison (50-Year) Maps
11. Flooding Comparison (100-Year) Maps
12. Stormwater Improvement Flood Protection (SIFP) Benefit Cost Analysis Tool (electronic only)
13. Engineer's Opinion of Probable Construction Cost



PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

AERIAL MAP*

LEGEND

Watershed

* This is not a survey map. Aerial photography from FDOT circa 2016

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

FLORIDA DESIGN CONSULTANTS, INC.
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PHONE: (800) 532-1047 WWW.FLDESIGN.COM LB 6707 EB 7421

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N River Blvd
Hillsborough River
W Hillsborough Ave
N Florida Ave
N Nebraska Ave
N 22nd St
E Giddens Ave
E Osborne Ave
E Chelsea St
N River Blvd
Florida Ave
Hillsborough Ave
Nebraska Ave
Dr MLK Jr Blvd
275

PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

TOPOGRAPHY*

LEGEND

Watershed

Contours (ft, NAVD88)

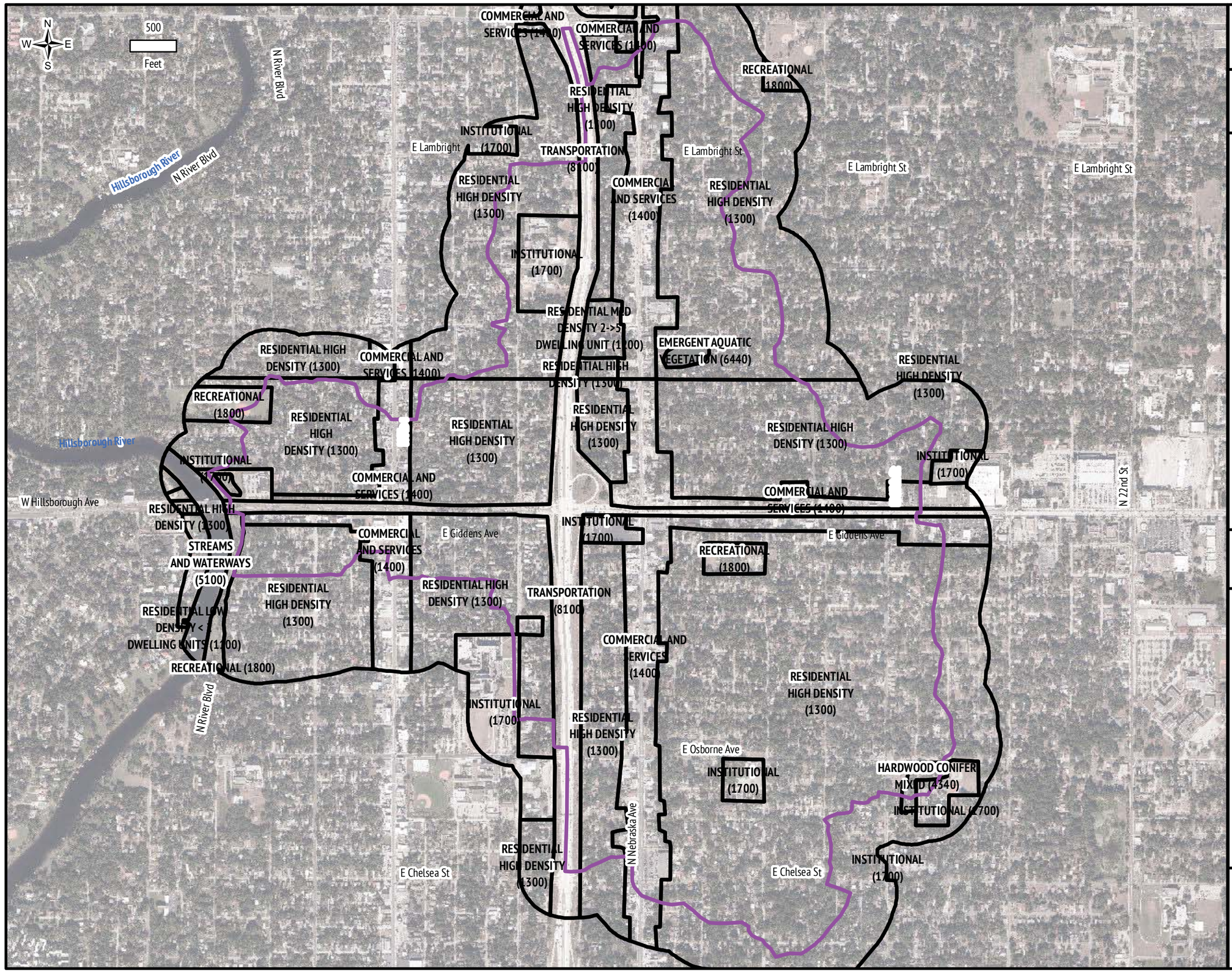
* This is not a survey map. DEM based on the SWFWMD DEM for Hillsborough County (2007-2011).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

FLORIDA DESIGN CONSULTANTS, INC.
THINK IT. ACHIEVE IT.
3030 STARKEY BOULEVARD, NEW PORT RICHEY, FLORIDA 34655
PHONE: (800) 532-1047 WWW.FLDESIGN.COM LB 6707 EB 7421



PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

LAND USE*

LEGEND

- Watershed
- Land Use (2011)

* This is not a survey map. Land Use based on the SWFWMD Land Use Maps circa 2011.

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

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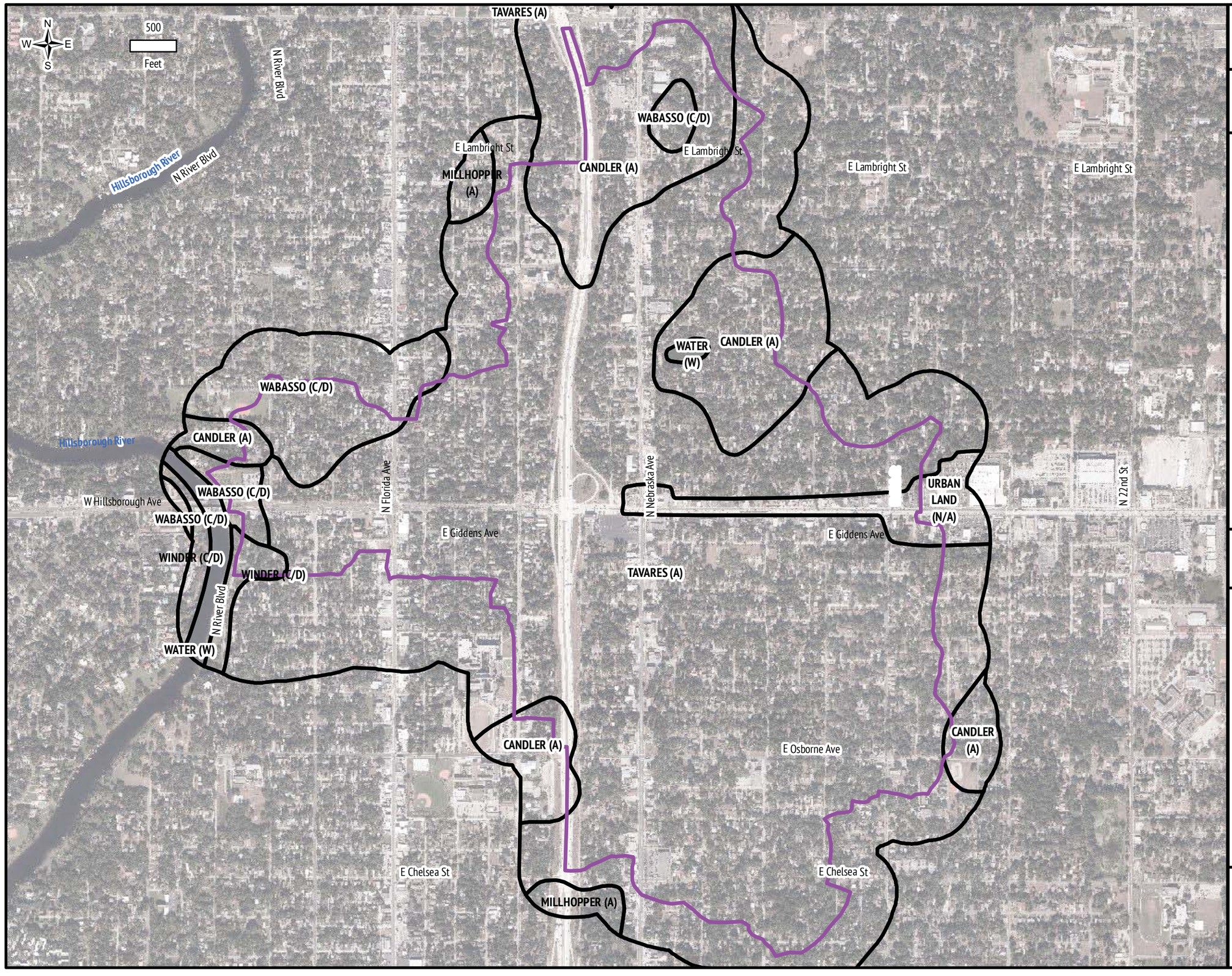


PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

SOILS*

LEGEND

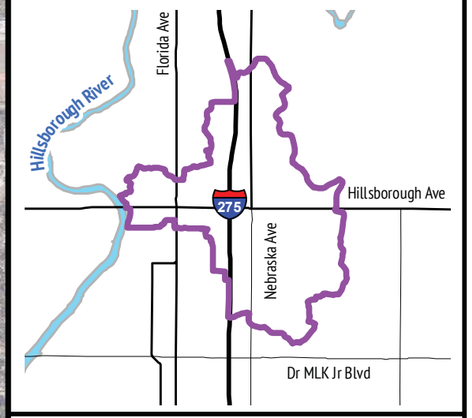
- Watershed
- Soil

* This is not a survey map. Soils information from USGS (2015) from FGDL.

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP



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E Giddens Ave
N River Blvd
E Osborne Ave
E Chelsea St
E Chelsea St

PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

IMPERVIOUS AREA*

LEGEND

- Watershed
- Open Space
- Building
- Pavement
- Roadway

* This is not a survey map. Impervious Area estimate based on Building Foot Prints (from City of Tampa), Road approximate widths (based on aerial photography), and aerial photography (2016).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

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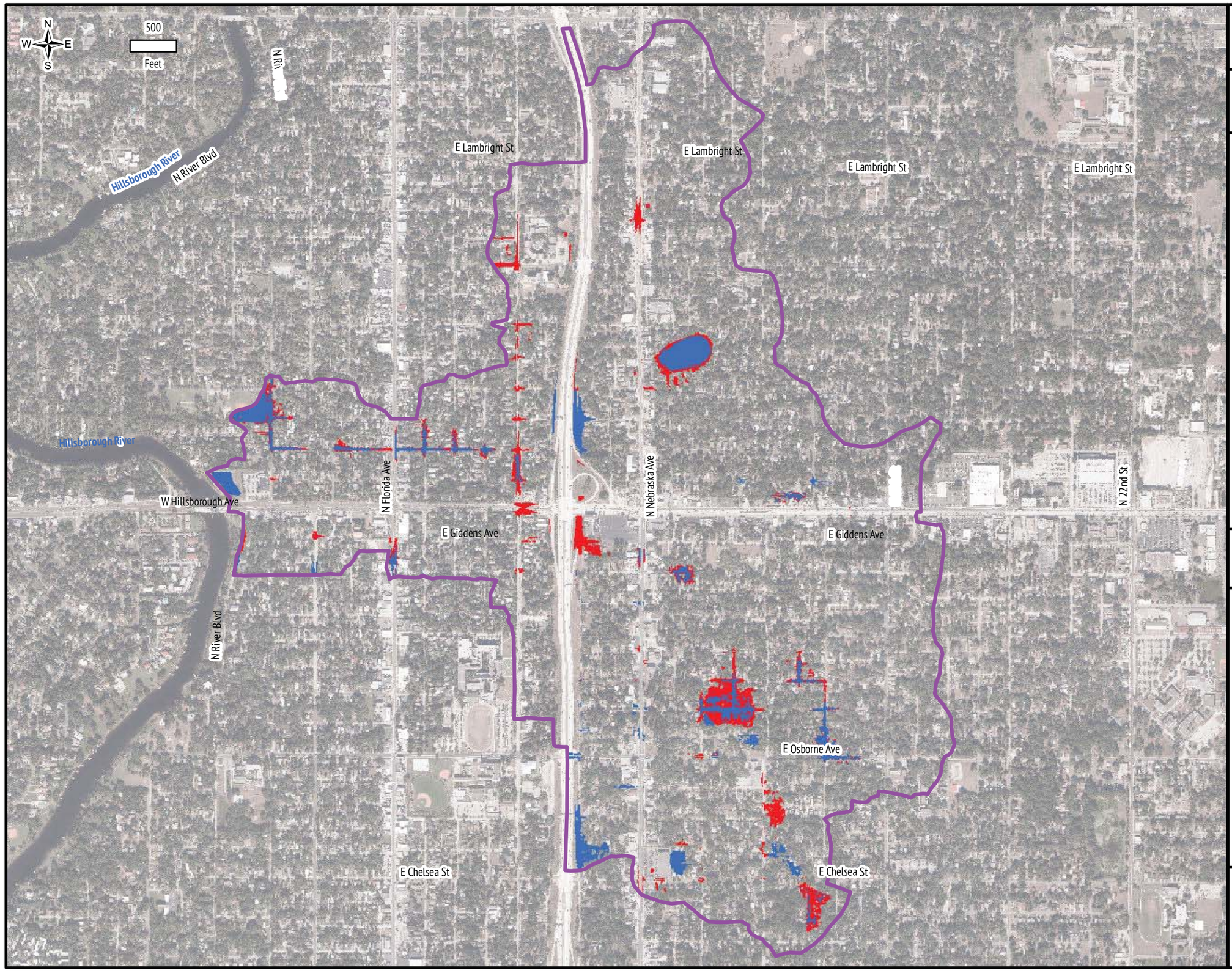

PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

2.33-YR FLOOD MAP*

LEGEND

- Watershed
- Future 2.33YR Flooding
- Existing 2.33YR Flooding

* This is not a survey map. Flood stages based on XP-SWMM model prepared by Florida Design Consultants (2018).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

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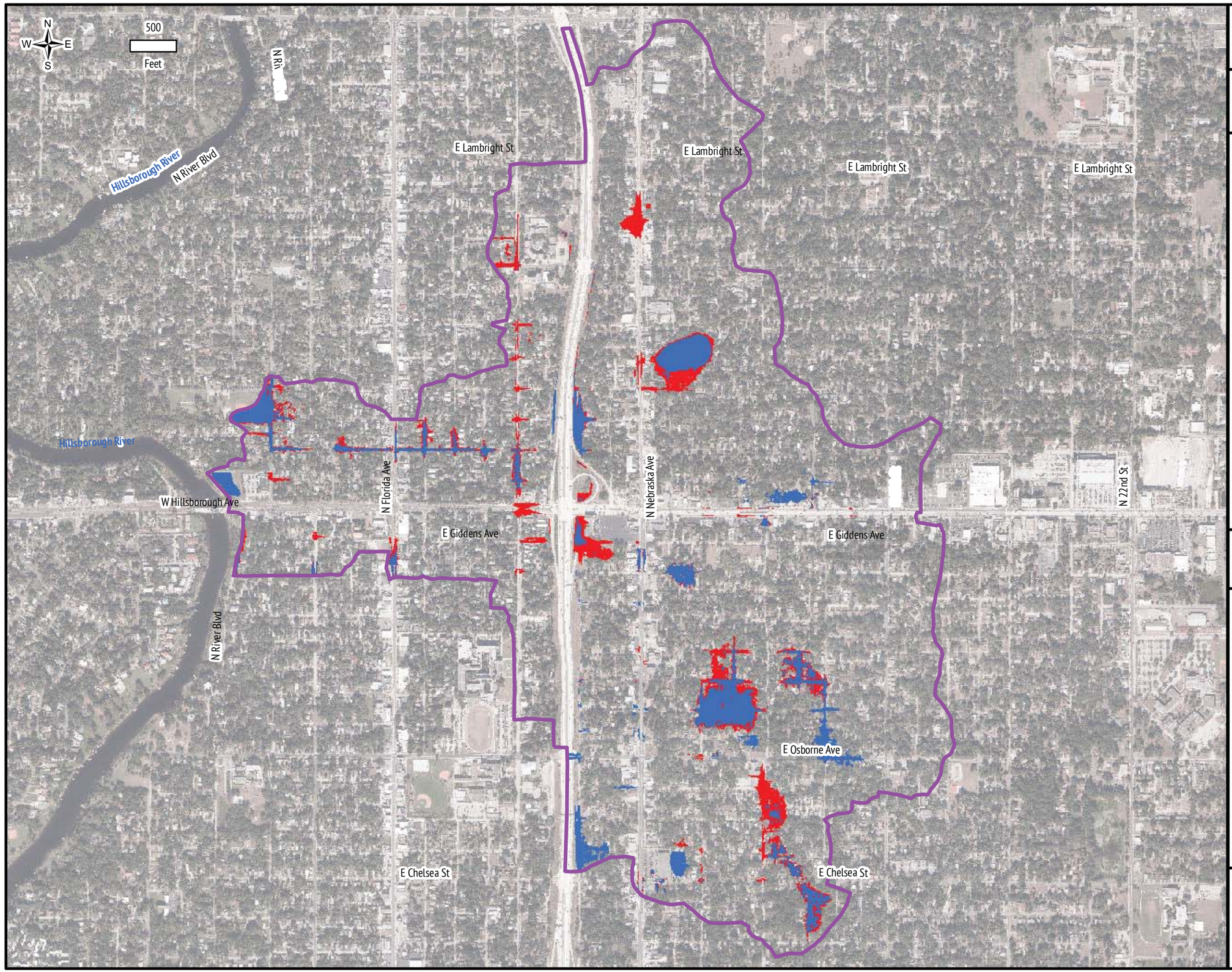

PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

5-YR FLOOD MAP*

LEGEND

- Watershed
- Future 5YR Flooding
- Existing 5YR Flooding

* This is not a survey map. Flood stages based on XP-SWMM model prepared by Florida Design Consultants (2018).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

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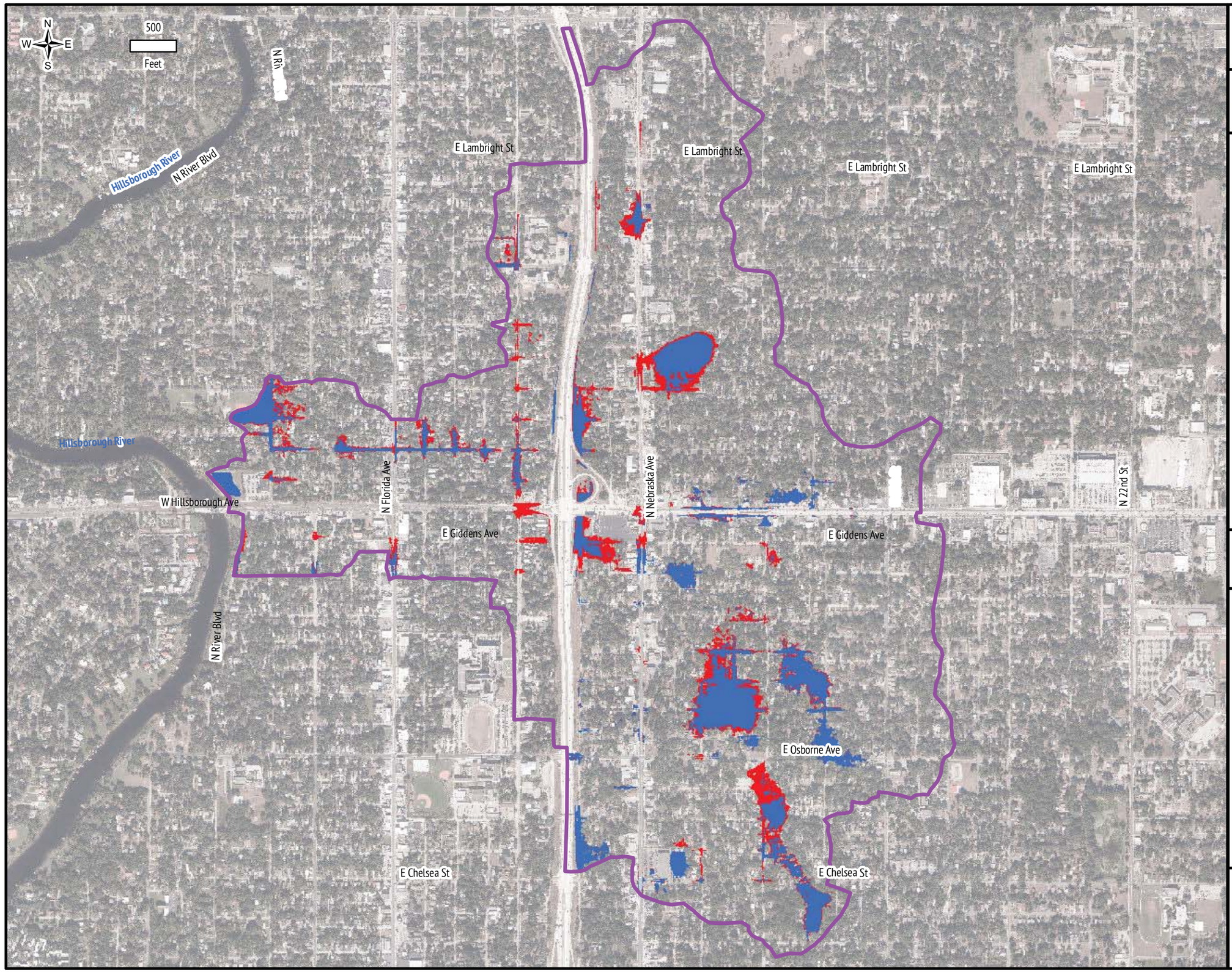


PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

10-YR FLOOD MAP*

LEGEND

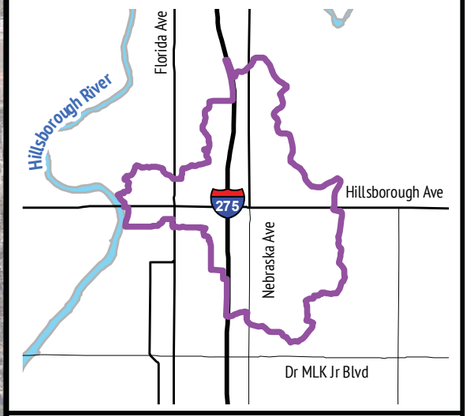
- Watershed
- Future 10YR Flooding
- Existing 10YR Flooding

* This is not a survey map. Flood stages based on XP-SWMM model prepared by Florida Design Consultants (2018).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP



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Hillsborough River

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N Florida Ave

N Nebraska Ave

N 22nd St

E Giddens Ave

E Giddens Ave

N River Blvd

E Osborne Ave

E Chelsea St

E Chelsea St

PROJECT

SOUTHEAST SEMINOLE HEIGHTS
DRAINAGE IMPROVEMENTS PROJECT

SHEET

25-YR FLOOD MAP*

LEGEND

- Watershed
- Future 25YR Flooding
- Existing 25YR Flooding

* This is not a survey map. Flood stages based on XP-SWMM model prepared by Florida Design Consultants (2018).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP

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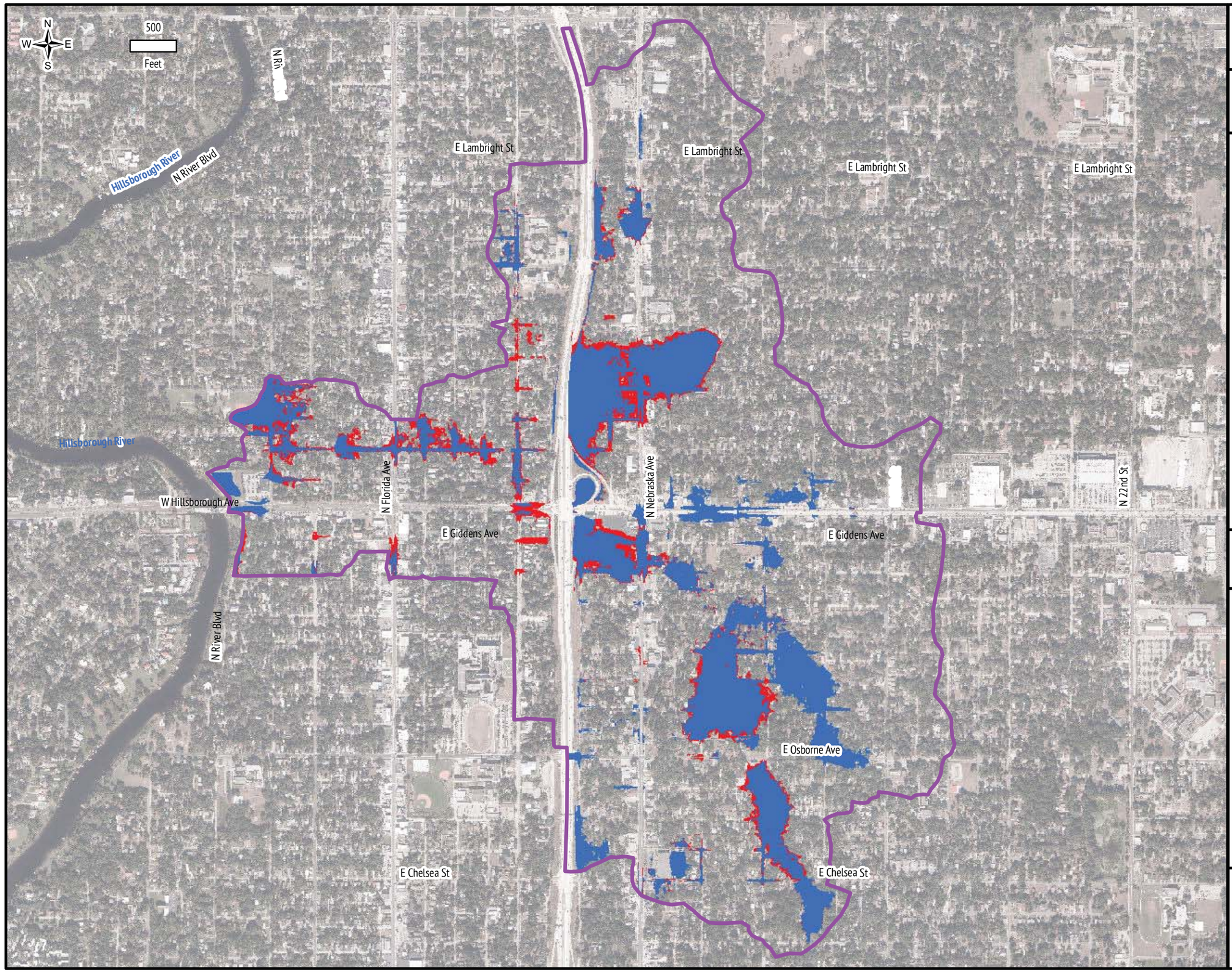


PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

50-YR FLOOD MAP*

LEGEND

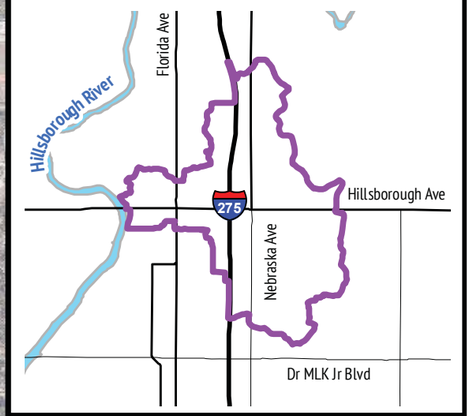
- Watershed
- Future 50YR Flooding
- Existing 50YR Flooding

* This is not a survey map. Flood stages based on XP-SWMM model prepared by Florida Design Consultants (2018).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP



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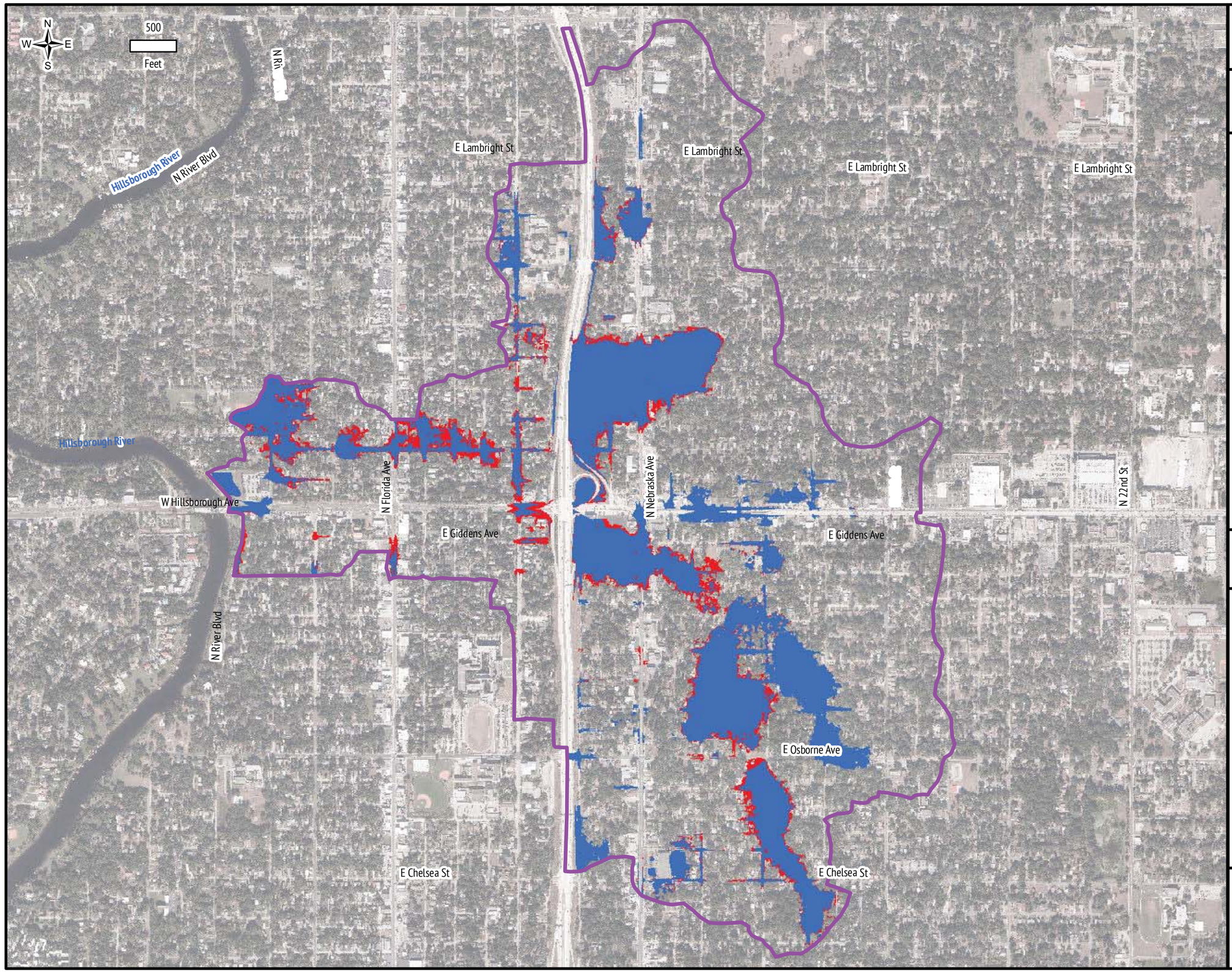


PROJECT

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS PROJECT

SHEET

100-YR FLOOD MAP*

LEGEND

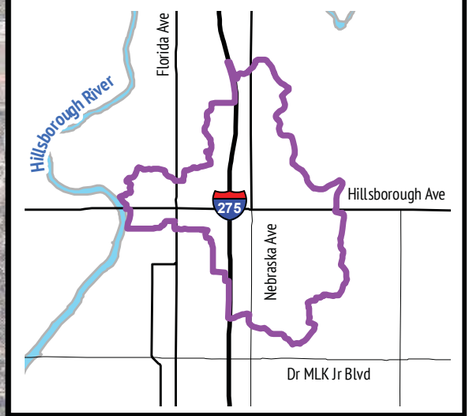
- Watershed
- Future 100YR Flooding
- Existing 100YR Flooding

* This is not a survey map. Flood stages based on XP-SWMM model prepared by Florida Design Consultants (2018).

MAP PUBLISH DATE

JUNE 4, 2018

VICINITY MAP



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FY18 Cooperative Funding Initiative Application
Stormwater Improvement Flood Protection (SIFP) Benefit Cost Analysis Tool
Version 1.0, July 2016

Southwest Florida Water Management District
WATERMATTERS.ORG · 1-800-423-1476

Cooperator/Applicant: *City of Tampa*

Project Number/Name: Southeast Seminole Heights Drainage Improvement Projects

Cooperator/Applicant to insert a short narrative about the project including anticipated benefit(s): *Reduce flooding in the Seminole Heights Neighborhood of the City of Tampa.*

Table A Benefit Cost Information

Benefit Category	Is this benefit addressed by the proposed project? (Yes/No or N/A)	Can you provide B:C information for the CFI application? (Yes and B:C ratio, No, or N/A)	If you answered "No" in column "C", do you need assistance to be able to provide B:C information? (Yes or N/A)	Additional Comments
Flood Protection	Yes	Yes, 1.4	N/A	
Water Quality Improvement	N/A	N/A	N/A	
Additional Benefit 1	N/A	N/A	N/A	
Additional Benefit 2	N/A	N/A	N/A	
Additional Benefit 3	N/A	N/A	N/A	

Table B Project Cost

		(a)	(c)	(d)	(e)	(f)
	Cost Category	**Cooperator Share**	**District Share**	**Other Funding Sources**	**Total**	**% District Funding Match**
(a)	Direct Project Administration Costs				$0	#DIV/0!
(b)	Land Purchase/Easement				$0	#DIV/0!
(c)	Planning/Design/Engineering/Environmental Documentation				$0	#DIV/0!
(d)	Construction/Implementation				$0	#DIV/0!
(e)	Construction/Implementation Contingency				$0	#DIV/0!
(f)	Environmental Compliance/Mitigation/Enhancement				$0	#DIV/0!
(g)	Construction Administration				$0	#DIV/0!
(h)	Other Costs (e.g. O&M)				$0	#DIV/0!
(i)	**Grand Total (Sum rows (a) through (h) for each column)**	**$10,568,481.85**	**$10,568,481.85**	**$0**	**$21,136,964**	50%
Notes:						

Table C Project Benefit Summary

Check all project benefits that are applicable. If you choose to enter a benefit not listed below, please provide a detailed description.

Benefit Considered	Benefit Detail
[x]	Reduced physical damage (buildings, contents, infrastructure, landscaping, vehicles, equipment, crops, ecosystems)
[x]	Reduced loss of functions (net loss of business income, net loss of rental income, net loss of wages, net loss of public services, net loss of utility services, displacement costs of temporary quarters, transportation system disruptions)
[x]	Reduced emergency response costs (evacuation and rescue costs, security costs, dewatering flood management system repairs, humanitarian assistance)
[x]	Reduced public safety and health impacts (population at risk, casualties, displacement/shelter needs, critical facilities)

For benefits that could not be quantified in physical terms, please provide a description below. The description should include a description of economic factors that may affect or qualify the amount of economic benefits to be realized. The description should also include any uncertainty (such as model parameterization) that might affect the level of benefits received.

Description of Qualitative Benefits :

Table D Benefit Cost Analysis

(a)	Expected Annual Damage Without Project [(1)]	$2,740,350
(b)	Expected Annual Damage With Project [(1)]	$1,393,540
(c)	Expected Annual Damage Benefit (a) – (b)	$1,346,810
(d)	Discount Rate	7.0%
(e)	Project Useful Life (# years)	30
(f)	Total Present Value of Future Benefits	$16,712,616
(g)	Total Project Cost	$21,136,964
(h)	Benefit/Cost Ratio	**0.79**

[(1)] *This tool assumes no population growth thus EAD will be constant over analysis period.*

SE SEMINOLE HEIGHTS FLOOD RELIEF (N949) SEGMENT NO. 1

ITEM NO.	DESCRIPTION	QUAN-TITY	UNIT	UNIT COST	COST
1	MOBILIZATION	1	LS	$ 1,171,715.86	$ 1,171,715.86
2	MAINTENANCE OF TRAFFIC	1	LS	$ 160,000.00	$ 160,000.00
3	EROSION AND SEDIMENTATION CONTROL	23,232	LF	$ 5.00	$ 116,160.00
4	REMOVAL OF PAVEMENT	30,976	SY	$ 6.30	$ 195,148.80
5	REMOVAL OF CONCRETE	667	SY	$ 20.00	$ 13,333.33
6	DRIVEWAY RESTORATION (CONCRETE)	20	EA	$ 1,500.00	$ 30,000.00
7	DRIVEWAY RESTORATION (ASPHALT)	50	EA	$ 960.00	$ 48,000.00
8	DRIVEWAY RESTORATION (BRICK)	10	EA	$ 3,500.00	$ 35,000.00
9	CONC. SIDEWALK (4" THICK, 5' WIDE)	6,000	SF	$ 12.00	$ 72,000.00
10	CONC. SIDEWALK (6" THICK, 5' WIDE)	-	SF	$ 16.00	$ -
11	SODDING	11,616	SY	$ 2.50	$ 29,040.00
12	TREE REMOVAL (SMALL)	4	EA	$ 525.75	$ 2,103.00
13	TREE REMOVAL (MEDIUM)	3	EA	$ 938.50	$ 2,815.50
14	TREE REMOVAL (LARGE)	2	EA	$ 1,157.00	$ 2,314.00
15	ROOT PRUNNING	8,712	LF	$ 6.00	$ 52,272.00
16	ASPHALT ROAD W/ CURB	11,616	LF	$ 200.00	$ 2,323,200.00
17	CONCRETE ROAD W/ CURB		LF	$ 300.00	$ -
18	BRICK ROAD W/ CURB	875	LF	$ 400.00	$ 350,000.00
19	DEMO & DISPOSE EXISTING STORM PIPE: DIA ≤ 12"	50	LF	$ 14.00	$ 700.00
20	DEMO & DISPOSE EXISTING STORM PIPE: 12"<DIA≤ 18"	1,056	LF	$ 19.00	$ 20,064.00
21	DEMO & DISPOSE EXISTING STORM PIPE: 18" <DIA≤ 36"	321	LF	$ 30.00	$ 9,630.00
22	DEMO & DISPOSE EXISTING STORM PIPE: > 36"	269	LF	$ 40.00	$ 10,760.00
23	DEMO & DISPOSE EXISTING STORM STRUCTURES	40	EA	$ 1,200.00	$ 48,000.00
24	15" RCP CL3	-	LF	$ 65.00	$ -
25	18" RCP CL3	420	LF	$ 70.00	$ 29,400.00
26	24" RCP CL3	275	LF	$ 90.00	$ 24,750.00
27	30" RCP CL3	2,221	LF	$ 120.00	$ 266,520.00
28	36" RCP CL3	-	LF	$ 150.00	$ -
29	42" RCP CL3	313	LF	$ 180.00	$ 56,340.00
30	48" RCP CL3	1,919	LF	$ 210.00	$ 402,990.00
31	54" RCP CL3	-	LF	$ 230.00	$ -
32	60" RCP CL3	1,863	LF	$ 280.00	$ 521,640.00
33	72" RCP CL3		LF	$ 350.00	$ -
34	72" PIPE, JACK & BORE	210	LF	$ 4,000.00	$ 840,000.00
35	7' x 4' RCB	4,822	LF	$ 900.00	$ 4,339,800.00
36	MANHOLE, FDOT P-7	2	EA	$ 4,000.00	$ 8,000.00

SE SEMINOLE HEIGHTS FLOOD RELIEF (N949) SEGMENT NO. 1

ITEM NO.	DESCRIPTION	QUAN-TITY	UNIT	UNIT COST	COST
37	MANHOLE, FDOT J-7	27	EA	$ 6,000.00	$ 162,000.00
38	MANHOLE, FDOT J-7, 12' x 12'	17	EA	$ 12,000.00	$ 204,000.00
39	INLET	32	EA	$ 5,500.00	$ 176,000.00
40	BAFFLE BOX	1	EA	$ 100,000.00	$ 100,000.00
41	REMOVE & REPLACE SANITARY LATERALS	220	EA	$ 1,400.00	$ 308,000.00
42	DEMO & DISPOSE EXISTING SANITARY STRUCTURES	14	EA	$ 1,300.00	$ 18,200.00
43	DEMO & DISPOSE SANITARY SEWER	2,718	LF	$ 11.00	$ 29,898.00
44	ABANDON SANITARY SEWER	1	LS	$ 10,000.00	$ 10,000.00
45	SANITARY SEWER, 8" PVC SDR35	3,508	LF	$ 60.00	$ 210,480.00
46	SANITARY MANHOLE	20	EA	$ 5,500.00	$ 110,000.00
47	SANITARY SEWER CONFLICT, RCB	4	EA	$ 2,000.00	$ 8,000.00
48	SANITARY SEWER CONFLICT MANHOLE	4	EA	$ 6,500.00	$ 26,000.00
49	DEMO & DISPOSE WM < 12"	1,200	LF	$ 30.00	$ 36,000.00
50	RELOCATE METERS	110	EA	$ 260.00	$ 28,600.00
51	6" WM	1,200	LF	$ 100.00	$ 120,000.00
52	8" WM	-	LF	$ 120.00	$ -
53	12" WM	-	LF	$ 160.00	$ -
54	2" WM ADJUSTMENT	6	EA	$ 2,000.00	$ 12,000.00
55	6" WM ADJUSTMENT	2	EA	$ 5,000.00	$ 10,000.00
56	8" WM ADJUSTMENT	1	EA	$ 8,000.00	$ 8,000.00
57	12" WM ADJUSTMENT	1	EA	$ 10,000.00	$ 10,000.00
58	16" WM ADJUSTMENT	-	EA	$ 20,000.00	$ -
59	20" WM ADJUSTMENT	1	EA	$ 40,000.00	$ 40,000.00
60	24" WM ADJUSTMENT	1	EA	$ 80,000.00	$ 80,000.00
61	30" WM ADJUSTMENT	1	EA	$ 120,000.00	$ 120,000.00

SUBTOTAL	$ 13,008,874.50
30% CONTING.	$ 3,902,662.35
TOTAL	**$ 16,911,536.85**

SE SEMINOLE HEIGHTS FLOOD RELIEF (N949) SEGMENT NO. 2

ITEM NO.	DESCRIPTION	QUAN-TITY	UNIT	UNIT COST	COST
1	MOBILIZATION	1	LS	$ 295,484.40	$ 295,484.40
2	MAINTENANCE OF TRAFFIC	1	LS	$ 160,000.00	$ 160,000.00
3	EROSION AND SEDIMENTATION CONTROL	7,306	LF	$ 5.00	$ 36,530.00
4	REMOVAL OF PAVEMENT	9,741	SY	$ 6.30	$ 61,370.40
5	REMOVAL OF CONCRETE	178	SY	$ 20.00	$ 3,555.56
6	DRIVEWAY RESTORATION (CONCRETE)	20	EA	$ 1,500.00	$ 30,000.00
7	DRIVEWAY RESTORATION (ASPHALT)	50	EA	$ 960.00	$ 48,000.00
8	DRIVEWAY RESTORATION (BRICK)	5	EA	$ 3,500.00	$ 17,500.00
9	CONC. SIDEWALK (4" THICK, 5' WIDE)	1,600	SF	$ 12.00	$ 19,200.00
10	CONC. SIDEWALK (6" THICK, 5' WIDE)	-	SF	$ 16.00	$ -
11	SODDING	7,306	SY	$ 2.50	$ 18,265.00
12	TREE REMOVAL (SMALL)	2	EA	$ 525.75	$ 1,051.50
13	TREE REMOVAL (MEDIUM)	2	EA	$ 938.50	$ 1,877.00
14	TREE REMOVAL (LARGE)	2	EA	$ 1,157.00	$ 2,314.00
15	ROOT PRUNNING	2,740	LF	$ 6.00	$ 16,438.50
16	ASPHALT ROAD W/ CURB	3,653	LF	$ 200.00	$ 730,600.00
17	CONCRETE ROAD W/ CURB	-	LF	$ 300.00	$ -
18	BRICK ROAD W/ CURB	-	LF	$ 400.00	$ -
19	DEMO & DISPOSE EXISTING STORM PIPE: DIA ≤ 12"	-	LF	$ 14.00	$ -
20	DEMO & DISPOSE EXISTING STORM PIPE: 12"<DIA≤ 18"	-	LF	$ 19.00	$ -
21	DEMO & DISPOSE EXISTING STORM PIPE: 18" <DIA≤ 36"	300	LF	$ 30.00	$ 9,000.00
22	DEMO & DISPOSE EXISTING STORM PIPE: > 36"	1,073	LF	$ 40.00	$ 42,920.00
23	DEMO & DISPOSE EXISTING STORM STRUCTURES	10	EA	$ 1,200.00	$ 12,000.00
24	15" RCP CL3	-	LF	$ 65.00	$ -
25	18" RCP CL3	-	LF	$ 70.00	$ -
26	24" RCP CL3	24	LF	$ 90.00	$ 2,160.00
27	30" RCP CL3	49	LF	$ 120.00	$ 5,880.00
28	36" RCP CL3	1,295	LF	$ 150.00	$ 194,250.00
29	42" RCP CL3	712	LF	$ 180.00	$ 128,160.00
30	48" RCP CL3	979	LF	$ 210.00	$ 205,590.00
31	54" RCP CL3	59	LF	$ 230.00	$ 13,570.00
32	60" RCP CL3	-	LF	$ 280.00	$ -
33	72" RCP CL3	-	LF	$ 350.00	$ -
34	72" PIPE, JACK & BORE	-	LF	$ 4,000.00	$ -
35	7' x 4' RCB	685	LF	$ 900.00	$ 616,500.00
36	MANHOLE, FDOT P-7	2	EA	$ 4,000.00	$ 8,000.00

SE SEMINOLE HEIGHTS FLOOD RELIEF (N949) SEGMENT NO. 2

ITEM NO.	DESCRIPTION	QUAN-TITY	UNIT	UNIT COST	COST
37	MANHOLE, FDOT J-7	14	EA	$ 6,000.00	$ 84,000.00
38	MANHOLE, FDOT J-7, 12' x 12'	5	EA	$ 12,000.00	$ 60,000.00
39	INLET	8	EA	$ 5,500.00	$ 44,000.00
40	BAFFLE BOX	1	EA	$ 100,000.00	$ 100,000.00
41	REMOVE & REPLACE SANITARY LATERALS	70	EA	$ 1,400.00	$ 98,000.00
42	DEMO & DISPOSE EXISTING SANITARY STRUCTURES	4	EA	$ 1,300.00	$ 5,200.00
43	DEMO & DISPOSE SANITARY SEWER	1,452	LF	$ 11.00	$ 15,972.00
44	ABANDON SANITARY SEWER	-	LS	$ 10,000.00	$ -
45	SANITARY SEWER, 8" PVC SDR35	1,429	LF	$ 60.00	$ 85,740.00
46	SANITARY MANHOLE	6	EA	$ 5,500.00	$ 33,000.00
47	SANITARY SEWER CONFLICT, RCB	-	EA	$ 2,000.00	$ -
48	SANITARY SEWER CONFLICT MANHOLE	-	EA	$ 6,500.00	$ -
49	DEMO & DISPOSE WM < 12"	-	LF	$ 30.00	$ -
50	RELOCATE METERS	70	EA	$ 260.00	$ 18,200.00
51	6" WM	-	LF	$ 100.00	$ -
52	8" WM	-	LF	$ 120.00	$ -
53	12" WM	-	LF	$ 160.00	$ -
54	2" WM ADJUSTMENT	4	EA	$ 2,000.00	$ 8,000.00
55	6" WM ADJUSTMENT	2	EA	$ 5,000.00	$ 10,000.00
56	8" WM ADJUSTMENT	1	EA	$ 8,000.00	$ 8,000.00
57	12" WM ADJUSTMENT	-	EA	$ 10,000.00	$ -
58	16" WM ADJUSTMENT	-	EA	$ 20,000.00	$ -
59	20" WM ADJUSTMENT	-	EA	$ 40,000.00	$ -
60	24" WM ADJUSTMENT	-	EA	$ 80,000.00	$ -
61	30" WM ADJUSTMENT	-	EA	$ 120,000.00	$ -

SUBTOTAL	$ 3,250,328.35
30% CONTING.	$ 975,098.51
TOTAL	**$ 4,225,426.86**

SOUTHEAST SEMINOLE HEIGHTS DRAINAGE IMPROVEMENTS

BASIS OF DESIGN REPORT

Prepared for:

CITY OF TAMPA

STORMWATER DEPARTMENT

Prepared by:

LAND&WATER
ENGINEERING SCIENCE

9887 4th Street North, Suite 319
St Petersburg, FL 33702
Phone (727) 202 8958
Fax (727) 202 8959
FLORIDA CERTIFICATE OF AUTHORIZATION NUMBER: 26961

December 18, 2015

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December 18, 2015

This report submitted to the City of Tampa Stormwater Department has been prepared by or under the supervision of the undersigned:

_____

Dikran Kalaydjian, PE Date
FL Registration No. 53174

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1.0 Introduction

1.1 Background

The City of Tampa Stormwater Department authorized Land & Water Engineering Science (LWES) to assess flooding conditions and recommend potential improvements for the Southeast Seminole Heights Neighborhood, which is located centrally within the City of Tampa boundary. The SE Seminole Heights Basin is part of the Hillsborough River Watershed that encompasses a drainage basin of 690 square miles, with headwaters originating in the southwestern portion of the Green Swamp, from which the river flows south and southwesterly 54 miles to upper Hillsborough Bay. More specifically, the area of interest covers 779.43 acres of urban environment discharging into the river south of the Hillsborough River Dam. The receiving water body located south of the dam is tidally influenced and classified as brackish at times and is not considered as a limiting factor in the drainage capacity of the basin *(See Figure 1 – Project Location)*.

The SE Seminole Heights Basin is part of a historic Tampa neighborhood that had its beginnings in the early 1900's. The drainage infrastructure and record drawings date back several decades. The study area extends northerly from E Chelsea St east of I-275 freeway to E Diana Street and easterly to N 18th Street. To the west of I-275 the basin narrows and extends from Giddens Avenue to E North Street, with its outfall at the river *(See Figure 2 – Study Area)*.

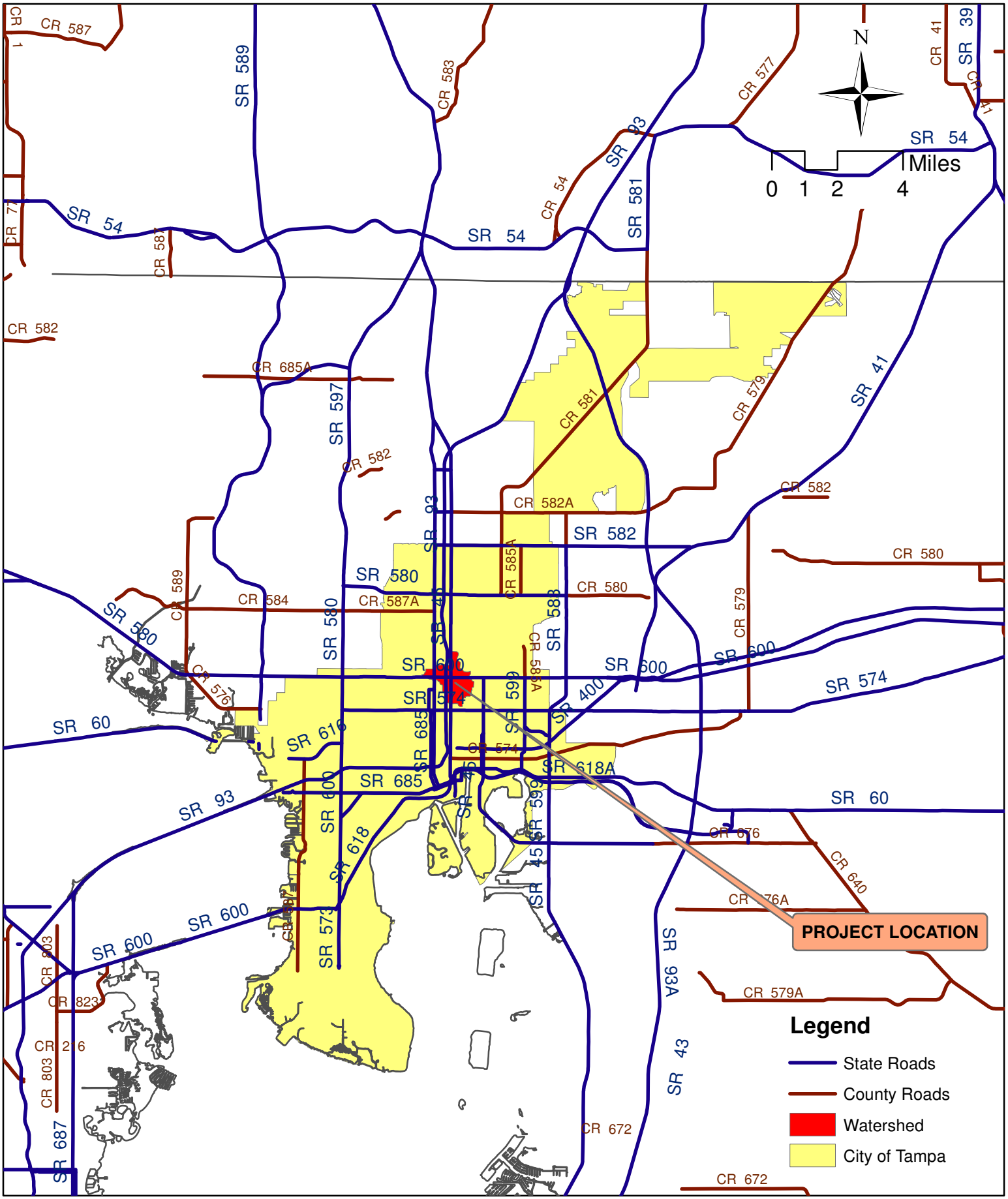
A key characteristic of the basin are the State Roads traversing the study area with a common drainage system serving the residential neighborhoods and the highways. Surface drainage from SR 600 (Hillsborough Avenue East) is connected to the City's storm sewer system at E. Giddens Avenue, and drainage from State Road 45 (Nebraska Avenue N) is discharged to Lake Roberta. In turn, Interstate 275 (SR 93) limits the cross drainage from east to west at three (3) locations: Giddens Avenue, Hillsborough Avenue, and Henry Avenue. Surface drainage generally flows east to west towards the river, but is hindered by the higher elevations of Interstate 275. Observed flooding problems in the basin are the result of an undersized storm sewer system and limited surface drainage infrastructure due to lack of topographic relief in the neighborhood of New Orleans and Ellicott Streets extending from 10th to 12th Street. The study area is highly urbanized and consists mainly of residential neighborhoods with commercial strips extending the length of the main highways. Soils are characterized as sandy and well-drained.

1.2 Purpose and Scope

Flooding problems have persisted in the central part of the basin, from E Louisiana Avenue to the south, to E Ellicott Street to the north, and extending from 10th Street to the west to 12th Street to the east. Recently, the City of Tampa acquired three (3) residential parcels that had experienced damages due to repetitive flooding. Additional residential structures in the area are listed as flood prone with finished floor elevations at close proximity to the road grade. The neighborhood lies in a depressional area of the basin with limited surface drainage. In addition, the intersection of Nebraska Avenue and Chelsea Street has experienced flooding and concern has been raised by local residents and businesses. The City has also received reports of flooding conditions on E Osborne and 13th Street as well as along W Comanche Avenue.

The objective of this study is to provide comprehensive tools in the planning and development of alternative solutions for flood protection of the neighborhood and includes four major elements: (1) Data Acquisition, (2) Basin Conditions Evaluation, (3) Level of Service Determination, and (4) Recommendations for Flood Abatement and Best Management Practices. Recommendations in this report are preliminary in nature with additional survey and data collection necessary for the final design. Note that all elevation data for this study are reported in the NAVD88 vertical datum.

The Southeast Seminole Heights Drainage Improvements Study was authorized under City of Tampa Purchase Order No. 114211187 and is guided by the Agreement for Professional Engineering Services.



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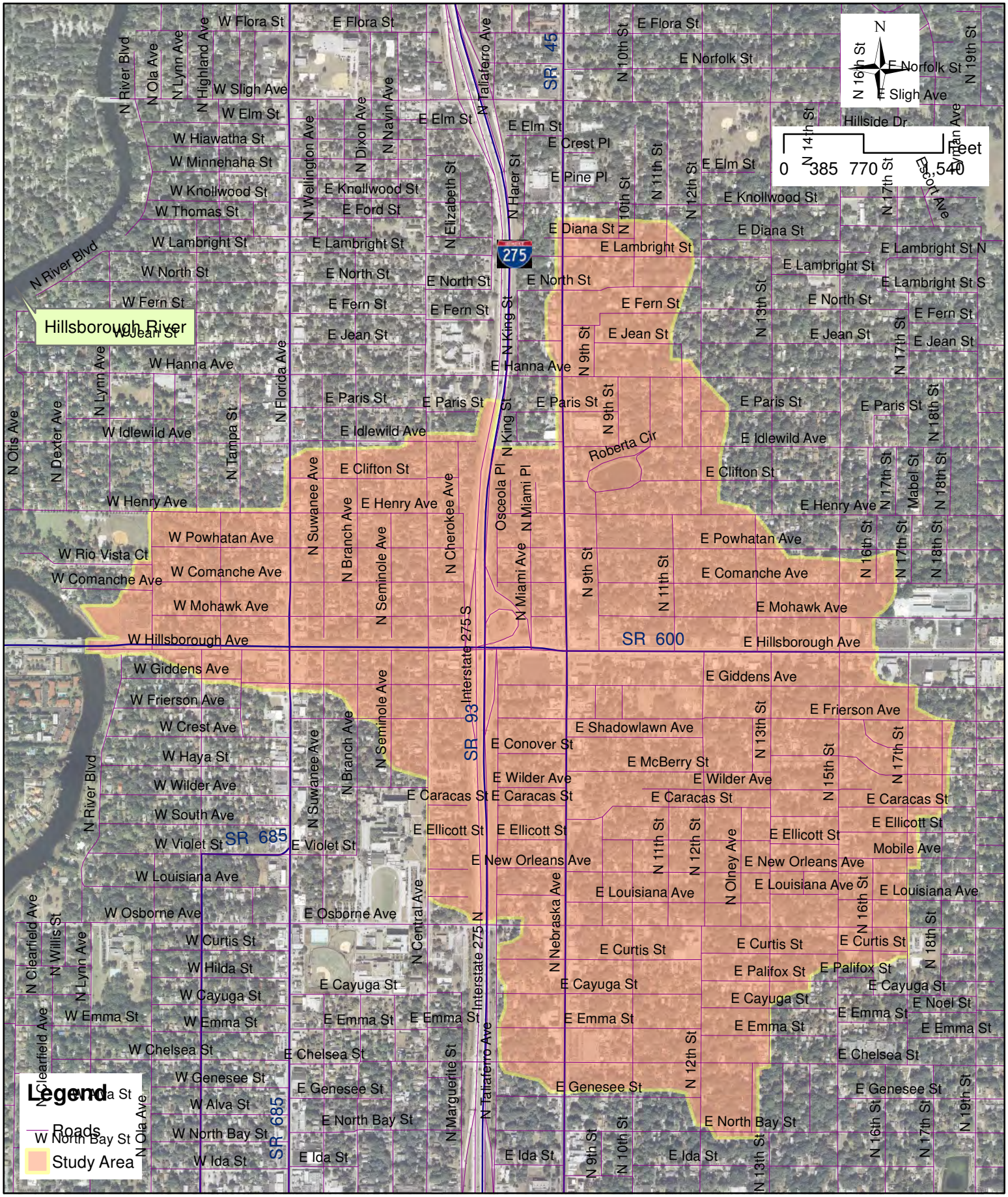
SE Seminole Heights
Drainage Improvements
Figure 1 - Project Location



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SE Seminole Heights
Drainage Improvements
Figure 2 - Study Area

2.0 Data Collection & Review

2.1 Record Drawings & Other Data

The first task in the analysis process was to collect and organize all existing information relevant to the basin. The information gathering process included such activities as desktop reconnaissance, aerial photography, and review of public records such as Environmental Resource Permit files at Southwest Florida Water Management District (SWFWMD) offices, other record drawings from the City of Tampa and Florida Department of Transportation (FDOT), and GIS data from the City of Tampa, SWFWMD, and other state and federal agencies. Land & Water Engineering Science (LWES) received and reviewed the following Information:

- Roadway Plans for SR-600, FDOT Project 10150-3543/3546, (4/25/1994).
- Drainage Basin Maps, FDOT Project No. 10150-3543/3546, (4/25/1994).
- Roadway Plans for SR-45, FDOT Project 403713-1-52-01, (10/25/2005).
- Roadway Plans for SR-93, FDOT Project 258660-1-52-01, (6/3/2005).
- Digital Topographic Information for Hillsborough County mapped by using Light Detection and Ranging (LiDAR) techniques (2007). Information was obtained from the City of Tampa.
- Survey Data depicting weir control elevations, pipe inverts, sizes, and conditions at select locations, prepared by the City of Tampa (April 2015).
- City of Tampa Stormwater Inventory Geodatabase.
- City of Tampa Stormwater Drainage Atlas Sheets E-013, F-012, F-013, F-014, G-013, with supporting record drawings.
- City of Tampa Wastewater Atlas Sheets SS00E-012, SS00E-013, SS00F-012, SS00F-013.
- City of Tampa Redline Properties Shapefile.
- Hillsborough County Parcels Shapefile, obtained from Property Appraiser's website.
- 2010 Aerials from Land Boundary Information System.
- Shapefile obtained from SWFWMD for Land Use Data categorized according to Florida Land Use and Cover Classification System (FLUCCS) (2011).
- Shapefile for Soils Survey prepared by the United States Department of Agriculture/Natural Resource Conservation Services.
- Environmental Resource Permits (ERP) for:
    - Hillsborough Avenue (SR-600) from Rome Ave to I-275 (ERP No. 12243.001)

- Walmart Store (ERP No. 5964-00)
- Tampa Lake Roberta Rehabilitation (ERP No. 33051.000)

- Construction Plans for City Project SW-2007-05, Lake Roberta Urban Lake Rescue Project (2007).
- Construction Plans for City Project Contract No. 5-C-52, Stormwater Sediment Removal Project Lake Roberta (2005).

2.2 Field Reconnaissance

Following the data acquisition and evaluation phase, field reconnaissance visits were conducted prior to the hydrologic and hydraulic network development of the stormwater conveyance system. Additionally, LWES conducted field visits to collect rainfall data from the data loggers installed by City staff for the purposes of this study.

2.3 Areas of Concern

During the project kick-off meeting, the City identified two (2) critical flood prone areas as being: 1) the intersection of Nebraska Avenue and E Chelsea Street, and 2) E New Orleans and N 11th Street. In addition, during field reconnaissance residents of the basin confirmed the flooding conditions on E New Orleans Avenue and provided additional information for flooding conditions on W Comanche Avenue.

LWES conducted a review of the Southwest Florida Water Management District (SWFWMD) Geodatabase for historical flooding locations. This database did not identify historical marks or flooding records in the basin. However, the City's redline property record, which identifies structures with high risk of flooding or recorded flooding, had several properties identified in the central basin area along New Orleans Avenue as flood prone. Furthermore, during a meeting (March 2015) with Mr. Alexander Awad, the City's Chief Planning Engineer, residents of Southeast Seminole Heights shared their concerns about the flooding conditions around Lake Roberta. All information has been mapped to present a keen understanding of the problem areas *(See Figure 3 – Areas of Flooding Concern)*.

2.4 Topographic Data

One-foot and two-foot contour elevations for the basin were obtained from the City of Tampa and a digital elevation model defined for 5-ft x 5-ft grids was developed from those contours. Topographic

data was developed using the Light Detection and Ranging (LiDAR) technology. The data obtained for the study area were flown in 2007 *(See Figure 4 – Topography).* The watershed slopes from high elevations of around 60 feet NAVD at its northeastern and southeastern extremities, westerly towards the Hillsborough River at approximately 12 feet NAVD prior to discharging into the tidal segment of the river. Hillsborough Avenue and Interstate 275 dissect the basin into three (3) major drainage areas: the northeastern, southeastern and western major subbasins.

In the northeastern subbasin, elevations drop towards Nebraska Avenue or Lake Roberta; in both cases, the Lake constitutes the focal point of stormwater collection through surface runoff or storm sewer conveyance.

In the southeastern subbasin, elevations drop centrally from the west along I-275 and from the east along 17th Street N to the middle part of the basin around 11th and 12th Street N. The lowest ground elevations are observed from 9th Street N to 11th Street N and extending from south of E New Orleans to E Ellicott Street. The general topography of the basin past the lowest elevations at the aforementioned location drops north and northwesterly towards the intersection of I-275 and Hillsborough Avenue. The existing storm sewer system follows the general trend of the topography.

The western subbasin covers areas to the west of I-275 to the Hillsborough River. The topography in this area drops towards the river, except for areas close to Hillsborough Avenue and N Central Street, where elevations drop towards W Comanche Avenue.

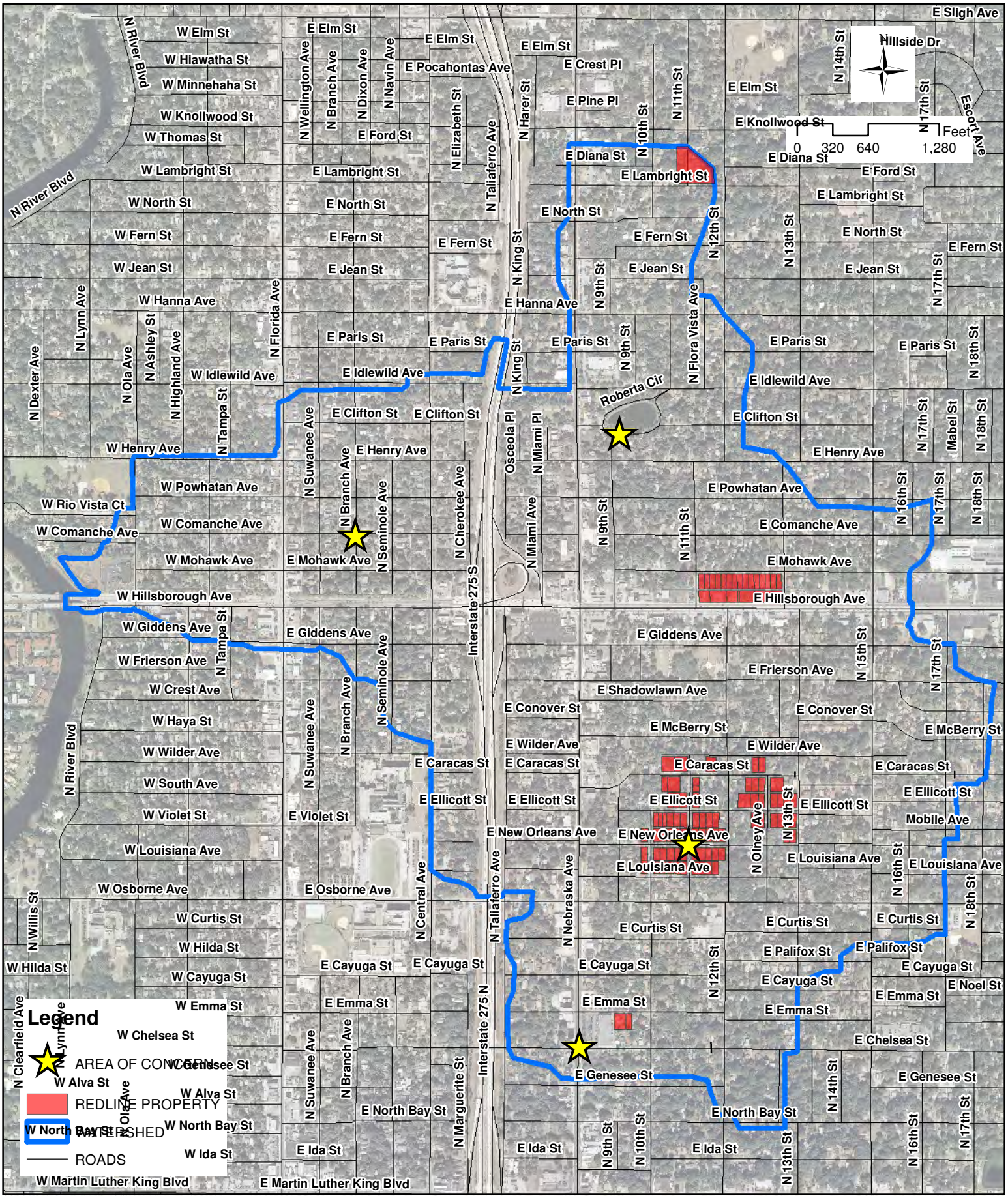

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Figure 3 - Areas of Flooding Concern

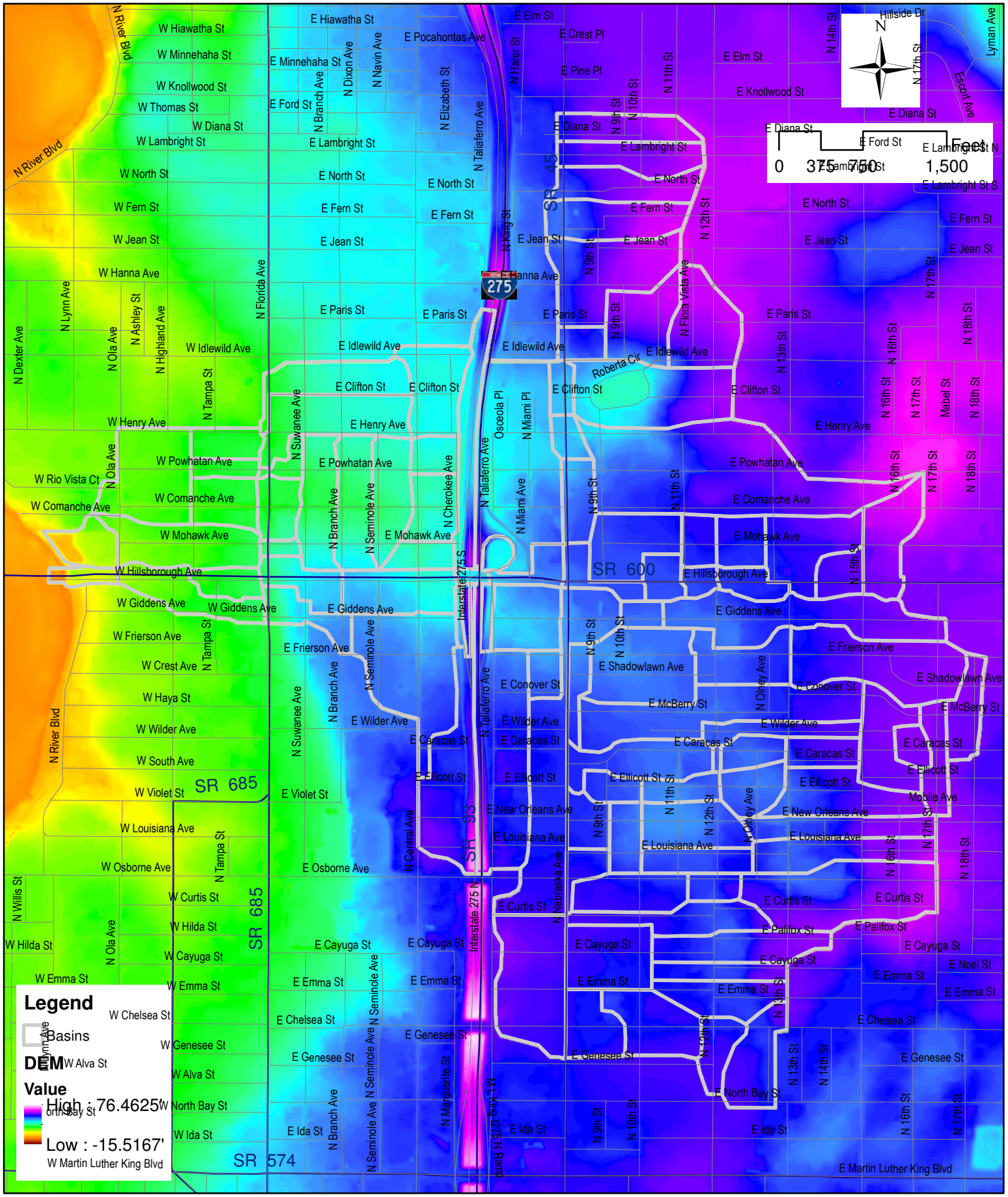

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Figure 4 - Topography

2.5 Land Use Data

Land use mapping in the project area was obtained from the SWFWMD GIS land use coverage. This coverage is based on the Florida Land Use Cover Classification System (FLUCCS) and represents conditions as observed in 2011. Some land use classifications have been adjusted for modeling purposes, such as certain parcels along Hillsborough Avenue and N Central Street that were revised from residential to commercial. The predominant land use category is medium density residential, which covers approximately 75% of the watershed. Table 1 below presents the consolidated eight (8) Land Use Categories used in the model with acreages and percentages of the study area. The watershed land use map is depicted in Figure 5A.

Table 1
Southeast Seminole Heights Drainage Basin
Land Use Categories

Land Use Categories			
FLUCCS	Land Use Description	Total Area (Acres)	Percentage of Study Area (%)
1400	COMMERCIAL AND SERVICES	128.07	16.43%
6440	EMERGENT AQUATIC VEGETATION	3.60	0.46%
4340	HARDWOOD CONIFER MIXED	1.38	0.18%
1700	INSTITUTIONAL	7.25	0.93%
6530	INTERMITTENT PONDS	0.48	0.06%
1800	RECREATIONAL	9.86	1.27%
1200	RESIDENTIAL MED DENSITY 2->5 D.U.	581.15	74.56%
8100	TRANSPORTATION	47.64	6.11%
	Total	779.43	100%

2.6 Soils Data

The soils distribution in the study area was obtained from the District's GIS soils coverage, which is based on the United States Department of Agriculture – Natural Resource Conservation Service (formerly USDA/SCS) soil survey maps and represents the information found in the county soils atlases.

Soils are classified by their hydrologic characteristics. The hydrologic soil groups (HSG) designation for soils is used to estimate runoff from precipitation. There are four major HSG groups including:

- HSG A: Soils having high infiltration rates and low runoff potential when saturated. Soil types comprising this group generally include deep, well drained to excessively drained sands (final infiltration rate greater than 5.67 in./hr.).
- HSG B: Soils having a moderate infiltration rate when saturated. This group is chiefly comprised of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture (final infiltration rate of 1.42 to 5.67 in./hr.).
- HSG C: Soils having a slow infiltration rate when saturated. This group consists chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture (final infiltration rate 0.14 to 1.42 in./hr.).
- HSG D: Soils having a very slow infiltration rate and high runoff potential. These consist primarily of soils that have a permanent high water table or soils that have a claypan, clay layer, or other relatively impermeable material at or near the surface (final infiltration rate less than 0.14 in./hr.).

Infiltration rates for the saturated hydraulic conductivity of the least transmissive layer are presented assuming no impermeable layer exists.

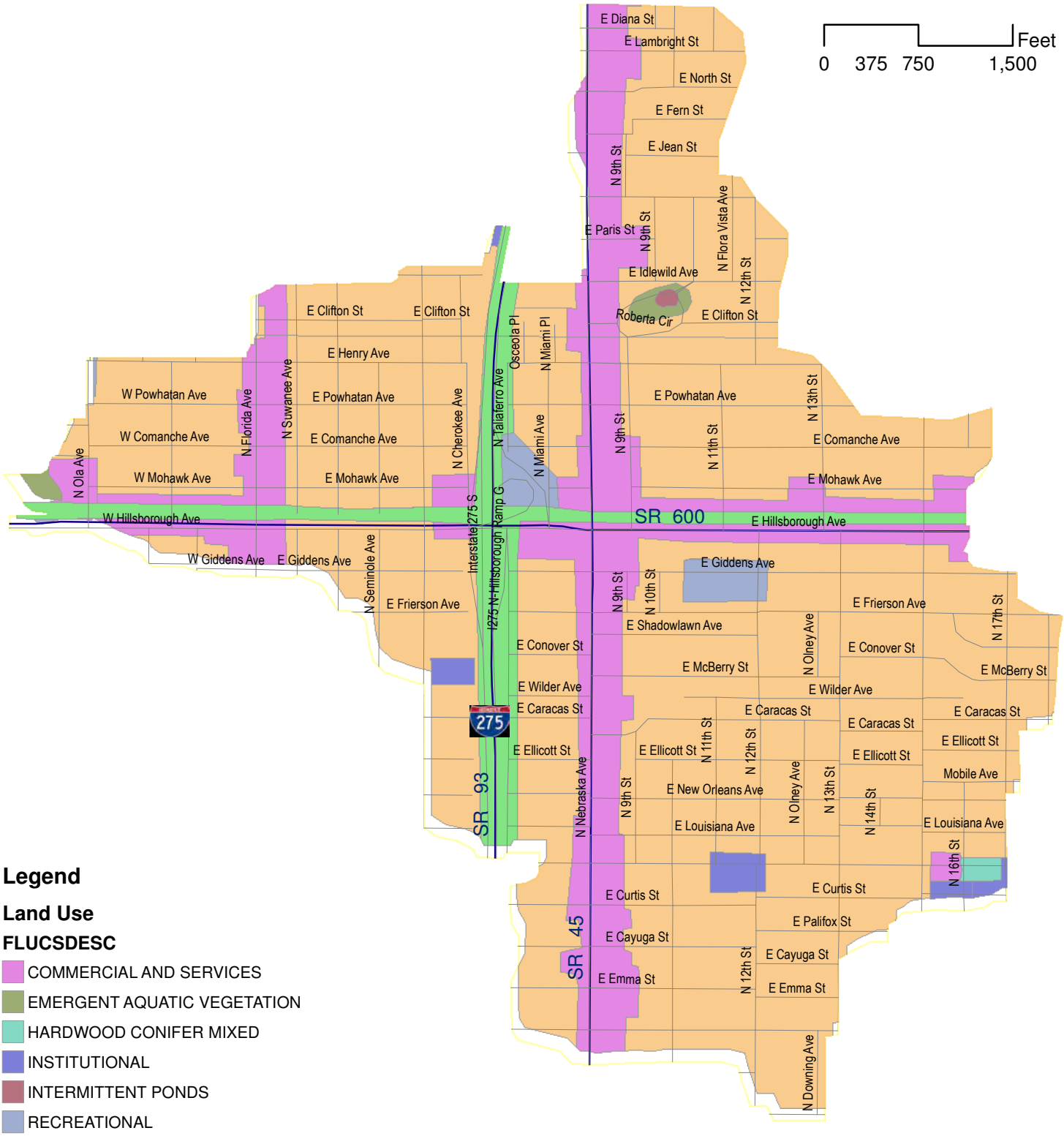
Many soils have dual HSG designations. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic soil group that represents the drained conditions of the soil and then to a hydrologic group that denotes the undrained or perched water table conditions (USDA SCS, 1989). The Hydrologic Soils Group Distribution in the study area is presented in Table 2 below, whereas Figure 5B depicts the HSG soil types for the study area based on a soils GIS layer from SWFWMD.

Table 2
Southeast Seminole Heights Drainage Basin
Hydrologic Soils Group Distribution

Hydrologic Soils Group Classification	Percent Cover
A	90.98%
B/D	5.51%
D	3.52%
Total	100%

2.7 Existing Flood Zone

Flood Insurance Rate Maps (FIRM) for City of Tampa Panel # 12057C0352H and 12057C0214H effective August 8, 2008 indicate that the project area is within Flood Zone X, which represents areas that are determined to be outside the 0.2% annual chance (i.e. 500-year recurrence) floodplain, *where existing drainage conditions may not have been considered (See Exhibit A – FEMA FIRM Maps).*



Legend

Land Use

FLUCSDESC

- COMMERCIAL AND SERVICES
- EMERGENT AQUATIC VEGETATION
- HARDWOOD CONIFER MIXED
- INSTITUTIONAL
- INTERMITTENT PONDS
- RECREATIONAL
- RESIDENTIAL MED DENSITY 2->5 D.U.
- TRANSPORTATION

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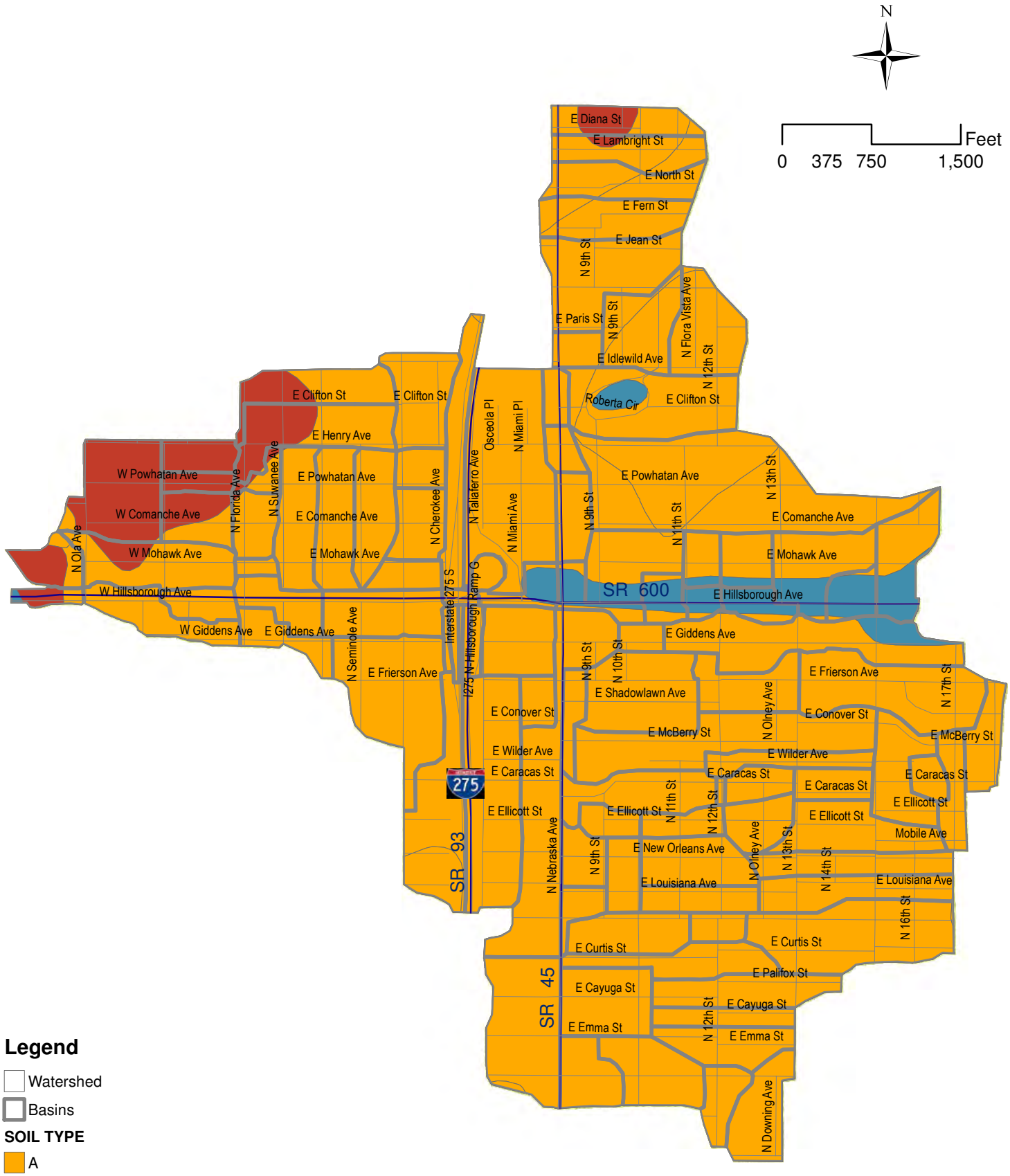
Figure 5A - Land Use Map



Legend

- Watershed
- Basins

SOIL TYPE

- A
- B/D
- D

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Figure 5B - Soils Map

3.0 Existing Conditions Analysis & Problem Identification

This section describes the development of a hydrologic and hydraulic model for the existing stormwater collection and conveyance system of the study area. An analysis of the existing stormwater collection infrastructure through modeling is necessary to assess the locations of concern for roadway or structural flooding and to establish existing flood stages for various design storm events. The results of the existing conditions will guide the development of improvement recommendations to meet the flood protection level of service goals.

3.1 Subbasin Delineation

The drainage basins were delineated based on the LiDAR topographic data. Of key importance is subbasin delineation that adequately reflects terrain, flow paths, and model scale, such that a complete assessment and cause of flooding is identified. Manual GIS techniques were used to delineate subbasins based on the following criteria:

- Ponding depth of over 6 inches in natural areas
- Lakes, ponds, and wetland areas
- Areas connected via subsurface drainage infrastructure combined
- Secondary drainage systems not broken out by inlet

There were a total of 101 subbasins delineated for the existing conditions with the largest being 38.86 acres and the smallest being 0.38 acres. The areas of the existing conditions drainage basins and other hydrologic data are included in Appendix A.

3.2 Hydrologic Parameterization

The hydrologic parameters described below are those required for the hydrologic computer model input. They were calculated based on topography, land use, and soil characteristics. The U.S. Soil Conservation Service (SCS) Runoff Curve Number (CN) method was used for predicting runoff as a function of soils and land use in the study area. The SCS method is suitable for small urban watersheds.

Runoff Curve Numbers and DCIA

The SCS Runoff Curve Number (CN) method was used to determine hydrologic loss rates. The CN is an index that represents the combined hydrologic effect of soil, land use, hydrologic condition, and antecedent soil moisture. The CN method requires land use and soil information (specifically Hydrologic Soil Group (HSG)) for each subbasin. It is a function of potential maximum retention, and potential maximum infiltration after runoff begins (in inches):

$$CN = \frac{1000}{S+10}$$

Where S is related to the soil and cover conditions and has an imparted physical meaning through the empirical relationship:

$$I_a = 0.1\ S$$

Where I_a is the initial abstraction, which includes all losses before runoff begins. It includes water intercepted by vegetation, shallow depression storage, evaporation, and infiltration. For design storm conditions in watersheds containing sandy soils, experience and literature on the subject indicate that infiltration losses comprise the majority of the initial abstraction. In order to improve the runoff response within the urban watershed, the initial abstraction was revised from 20% to 10%.

The optional parameter Directly Connected Impervious Area (DCIA) was used in this modeling analysis. In this case, XPSWMM computes a separate hydrograph which is not subject to any initial abstraction. DCIA lookup tables developed by SWFWMD for watershed modeling purposes were used to present the conditions within the project area. Certain DCIA factors where revised during model verification.

Once DCIA values were assigned for each land use category, the remainders of impervious areas were accounted for and back-calculated. DCIA-adjusted pervious CN were computed for each subbasin by taking an area-weighted average of CNs for all such land use and soil combinations comprising the subbasin areas and excluding DCIA areas. SCS runoff curve number (CN) calculations for the study were based on the GIS intersection of the soil coverage, the updated land use/land cover coverage, and subbasins coverage.

Initial Rainfall Abstraction

Initial rainfall abstraction was revised during model verification from 20% to 10% of the potential maximum retention, which in turn is a function of the curve number.

Unit Hydrograph Method

The SCS unit hydrograph method was used to convert precipitation excess into a runoff hydrograph. A synthetic unit hydrograph with a shape factor of 256 was used for this application. This value of the shape factor is considered adequate for areas with mild slopes and relatively flat terrain, such as those in this basin.

Time of Concentration

Time of concentration was calculated as the sum of the overland and shallow concentration flows for the path identified for each subbasin. Open channel or pipe flow conditions were applied to a few subbasins where it increased the travel time for the hydraulically most distant point in the basin.

$$Tc = Tt1 + Tt2 + \ldots.Ttm$$

Where m is number of flow segments

A minimum of 10 minutes was used for subbasins that had a time of concentration of less than 10 minutes.

3.3 Hydraulic Network

The hydrologic/hydraulic model used for this study is XPSWMM, which contains a one-dimensional and two-dimensional unsteady flow hydraulic flow routing model. This model was prepared using a one-dimensional approach, which utilizes a node-reach representation of the stormwater conveyance system and overland connectivity. A node is a discrete location in the drainage system where conservation of mass (continuity) is maintained. Links or “reaches” are the connections between nodes and are used to convey water through the system. The entire network of nodes and reaches forms the hydraulic model network and serves as the computational framework for XPSWMM.

The model receives hydrograph inputs at specific nodes from the hydrologic model and performs dynamic routing of stormwater flows through a defined storm drainage system to the points of outfall in the receiving waterbody. The program will simulate branched or looped networks; backwater due to tidal conditions; free surface flow; pressure flow or surcharge; flow reversals; flow transfer by weirs, orifices, and pumping facilities; and storage. Types of reaches that can be simulated include pipes, weirs, open channels and regular or irregular cross section, and drop

structures. Simulation output takes the form of water surface elevations and discharges at each node and reach within the model network.

Hydraulic Feature Inventory

The hydraulic features inventory for the study was compiled from an array of sources; aerial photography with topography was used to establish a preliminary list of hydraulic features, which was then updated with information available from: City of Tampa Geodatabase for Stormwater inventory, Drainage Atlas Sheets, record drawings provided by the City and the Florida Department of Transportation, survey data prepared by the City and ERPs collected from SWFWMD. Field reconnaissance was performed to verify hydraulic features when necessary. Components of the hydraulic feature inventory include: storage areas (basin storage, lakes, ponds and wetlands), hydraulic control features (roadway culverts and bridge crossings, channels, ditches and overland flow saddles) and hydraulic interconnectivity.

Description of the Conveyance System

The Southeast Seminole Heights Drainage System covers an area of +/- 779 acres and is distributed mainly among three primary drainage areas (North, South and West) that drain into a major conveyance system with a single outfall. The major system was defined based on its final or historical outfall location. The study area is bounded into three primary drainage areas by major roadways in the area, I-275 and Hillsborough Avenue (SR 600) (*See Figure 6 – Drainage Basins*).

The South Basin is located east of I-275 and south of E Hillsborough Avenue (SR 600). The conveyance system for this area begins at the intersection of N Nebraska Avenue and E Chelsea Street where an 18-inch RCP captures runoff from the residential areas west of Nebraska Avenue and along the aforementioned road extending from the N Nebraska intersection to the N 10th Street intersection (*See Figure 7 – Existing Conveyance System*). The drainage system extends along Chelsea Street easterly while capturing additional drainage from N 10th Street and increasing in size to a 24-inch pipe prior to connecting to the main trunkline, a 30-inch pipe extending northerly from the intersection at Chelsea Street and 12th Street North. The intersection of Chelsea Street and Nebraska Avenue has been identified as an area of chronic flooding. The 30-inch pipe runs north along N 12th Street, incrementally increasing in size from 30-inch to 42-inch RCP, then runs west at the intersection of E Osborne Avenue extending northerly at the intersection of N 11th Street, at which point it increases in size to a 48-inch RCP. This primary storm sewer system continues north

along N 11th Street all the way to E Caracas Street. Flooding conditions in this area are driven by low topographic elevations and limited surface drainage. Additional drainage from residential areas west of N 11th Street is captured in a storm sewer system, which incrementally increases in pipe size from an 18-inch to 36-inch RCP. On E Caracas Street, the primary storm sewer system increases in size from 48-inch to 54-inch RCP, while receiving additional drainage from residential neighborhoods to the east via a storm sewer system varying in size from 24-inch to twin 48-inch pipes.

At its confluence on E Caracas Street, the storm sewer system increases in size to twin 54-inch RCPs extending northerly to E Giddens Avenue and westerly to N Central Avenue while crossing I-275. Prior to crossing the aforementioned highway, it captures drainage from surrounding basins, including Hillsborough Avenue from the intersection of N 15th Street to Nebraska Avenue. Hillsborough Avenue drainage is conveyed through a storm sewer system varying in size from 18-inch RCP to 30-inch RCP at the point of connection to the main trunkline. At the intersection of E Giddens Avenue and N Central Avenue, the twin 54-inch RCP's tie into a 4'x7' box culvert and extend northerly to the intersection of W Comanche Avenue and N Central Avenue, while capturing additional drainage from Hillsborough Avenue extending from east of I-275 to N Central Avenue.

The North Basin is located east of I-275 and north of SR 600. The conveyance system in this area begins at the intersection of E Diana Street with a 24-inch RCP that runs south along N Nebraska Avenue towards SR 600. At the intersection of E Fern Street, the pipe increases in size to a 30-inch RCP while connecting to a smaller 24-inch RCP at the intersection of E Clifton Street prior to connecting to a sedimentation basin and discharging to Lake Roberta via a 24-inch x 38-inch ERCP. In turn, the lake receives a secondary discharge from an 18-inch pipe extending from E Idlewild Avenue from a stormwater sedimentation basin. Flooding conditions have been documented around Lake Roberta, which discharges through a 30-inch RCP running south to the intersection of E Henry Avenue and N 9th Street, at which point it increases to a 36-inch RCP along E Henry Avenue. A 24-inch lateral running north along N Nebraska Avenue also ties into the 36-inch RCP at this intersection. The 36-inch RCP continues to run west, crossing under I-275 and extending to N Central Avenue. The system then continues south until it ties in with the 4'x7' box culvert at the intersection of W Comanche Avenue and N Central Avenue.

Picture No. 1 - Lake Roberta & Manhole at Outfall Structure

Picture No. 2 - Lake Roberta Manhole at Outfall Structure flooding on July 21st, 2007

The West Basin is located west of I-275 and east of the Hillsborough River. The conveyance system in this area combines the drainage from the North and South Basins into a 4'x7' box culvert running along W Comanche Avenue and discharging into the Hillsborough River. A 24-inch RCP ties into the box culvert at the intersection of N Florida Avenue, and a 36-inch RCP at W Henry Avenue. Another storm sewer system ties into the box culvert at the intersection of N Highland Avenue. FDOT Project No. 10150-3543 relocated the aforementioned box culvert to the north of W Hillsborough Avenue while installing a new 60-inch RCP that extends from the river to the intersection of N Suwanee Avenue and Hillsborough Avenue, where it is plugged for future acceptance of drainage from E Hillsborough Avenue. A water quality pond provides treatment prior to final discharge into the river.

Picture No. 3 – Dry Conditions along Comanche Avenue

Picture No. 4 – Flooding Conditions along Comanche Avenue May 2, 2014

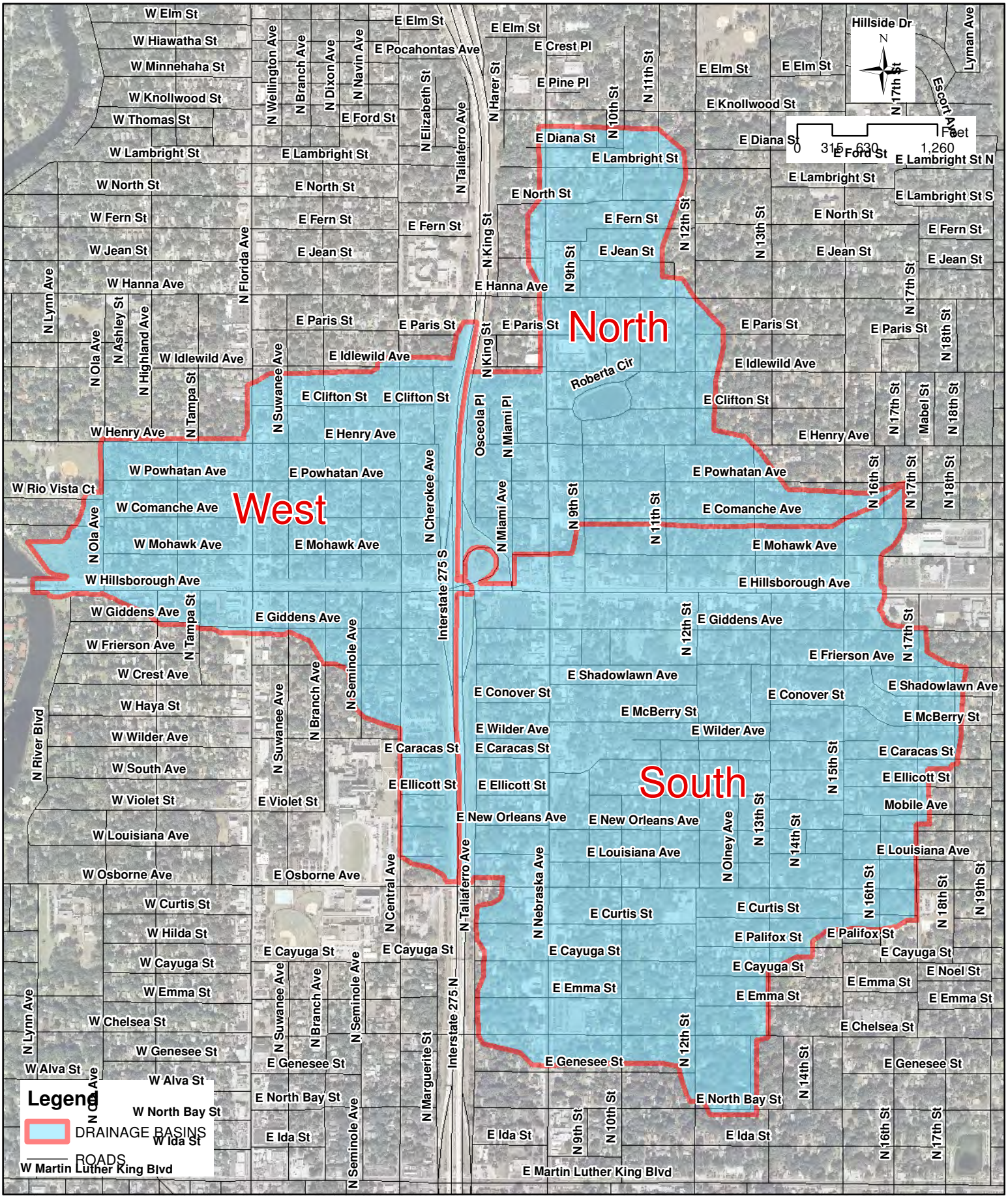

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Figure 6 - Drainage Basins

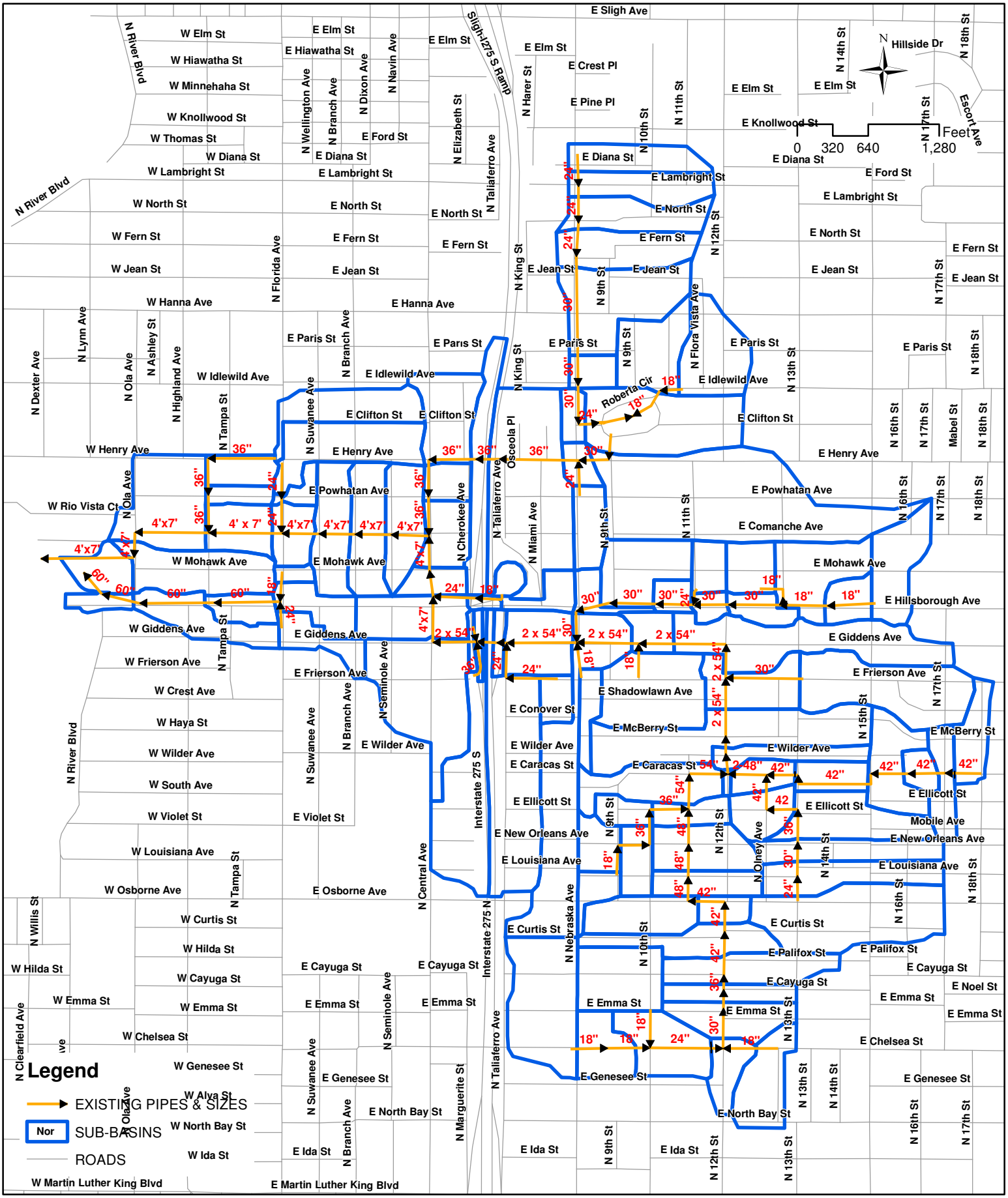

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Figure 7 - Existing
Conveyance System

3.4 Storage Representation

In order to represent the attenuation effects of storage on the hydrographs computed by the hydrologic model, it is important that all significant stormwater storage areas and their hydraulic controls features are well defined within the model.

Lake, pond and wetland storage is represented in the hydraulic model by stage/volume or stage/area relationships assigned to model junctions. This relationship was developed using GIS methods based on the LIDAR data obtained from SWFWMD. Using GIS, a Triangulated Irregular Network (TIN) is generated for each subbasin. The TIN is then used to compute a Digital Elevation Model (DEM) of the existing terrain. Using an ArcHydro tool, a stage/area relationship for each basin was evaluated at 0.2-feet intervals. Additional storage information at manholes/curb inlets were manually added since they are not reflected in the LiDAR data. The stage/area relationship was entered as model input in the format required by XPSWMM. The stage/area data were then used as ground surface storage capacity of the basin to be used when the storm sewer system is surcharged.

3.5 Initial Conditions

Initial water surface elevations for the Southeast Seminole Heights Neighborhood model were determined using various sources of data. Construction record drawings were used to determine the Seasonal High Water Level (SHWL) for Lake Roberta (Node N-630) and the man-made wet detention pond near the Hillsborough River (Node N-100).

3.6 Overland Weirs

In order to model overland flows or road overtopping conditions between adjacent subbasins, hydraulic features were connected as needed with overland conveyance features. These features are more typically referred to as overflow weirs. Weir data was derived from one of the following data sources: a) Digital Elevation Model (DEM) – used for overland weirs, road overtop weirs and pond overbank weirs if no plan data was available, b) survey data - used for weir structures surveyed and in some cases road overtop weirs, c) construction plans/asbuilts – used for structural weirs and pond overbanks.

Weir coefficients were generally assigned by the following:

- Overland weirs – Cd = 2.4
- Road overtop weirs – Cd = 2.6
- Pond overbank weirs – Cd = 2.6

- Spillway weirs – Cd = 2.6
- Concrete sill and box weirs – Cd = 3.2

3.7 Culverts & Channels

In order to model the conveyance system and overland flows along roads between subbasins, hydraulic features were connected as needed. Culvert and overland channel data were derived from one of the following data sources: a) construction plans/as-builts – used for culverts and overland channels, b) survey data – used for culverts and in some cases channels, c) DEM – used for overland channels.

Culverts

- Exit losses – exit loss coefficients for pipes were assigned a value of 1. If the culvert discharges to a storage area, the exit loss is 1. This is fairly standard engineering practice for watershed modeling. If a pipe discharges into a channel, particularly in flood conditions, the exit loss approaches 1. Generally speaking, velocities in channels downstream of culvert crossings are at least three to four times less than in the pipe, if not more. Exit losses of 0.5 were used where pipes are expected to be partially submerged or velocity reductions are anticipated.
- Entrance losses – entrance losses were generally assumed to be concrete pipe with square edge and headwall, which results in an entrance loss of 0.5.
- Manning's n values for culverts were obtained from Table 11, "Hydraulic Design of Highway culverts" FHWA, Sept. 1985 (Report No. FHWA-IP-85-15, Hydraulic Design Series No. 5). The following number was used:
    - Concrete Pipe: 0.012
- Manning's n values for channels were obtained from Table 11, "Hydraulic Design of Highway Culverts" FHWA, Sept. 1985 (Report No. FHWA-IP-85-15, Hydraulic Design Series No. 5). The following numbers were used:
    - Some grass, limited weeds, no brush: 0.035
    - Smooth asphalt: 0.016

Overland Channels

Channels were used to simulate overland flow routes where roadways serve as an overflow conduit from one junction to another. Typical roadway cross sections were derived for two-lane and four-lane roadways. Most of the channels were defined by the length of road between nodes and were presented as a irregular cross sections with upstream and downstream inverts at the gutter or low edge of pavement elevations defined at its endpoints.

3.8 Boundary Conditions

Tidal Information – An analysis of tidal data was performed to determine the tailwater conditions for the model simulations. The data were obtained from the National Oceanic and Atmospheric Administration (NOAA) for station 8726667 at McKay Bay, Tampa, Florida. The highest predicted high tide at the location was calculated to be 3.1 FT NAVD and the mean high tide at 1.69 FT NAVD. A value of 3.5 FT NAVD was used as the tailwater condition for the hydrologic and hydraulic model analysis for all design storm events.

Other watershed boundary conditions representing discharge to adjacent drainage basins via land surface flow were modeled as pop-off nodes set at a fixed backwater elevation. The overflow elevations for these outfall boundary nodes were defined using the DEM.

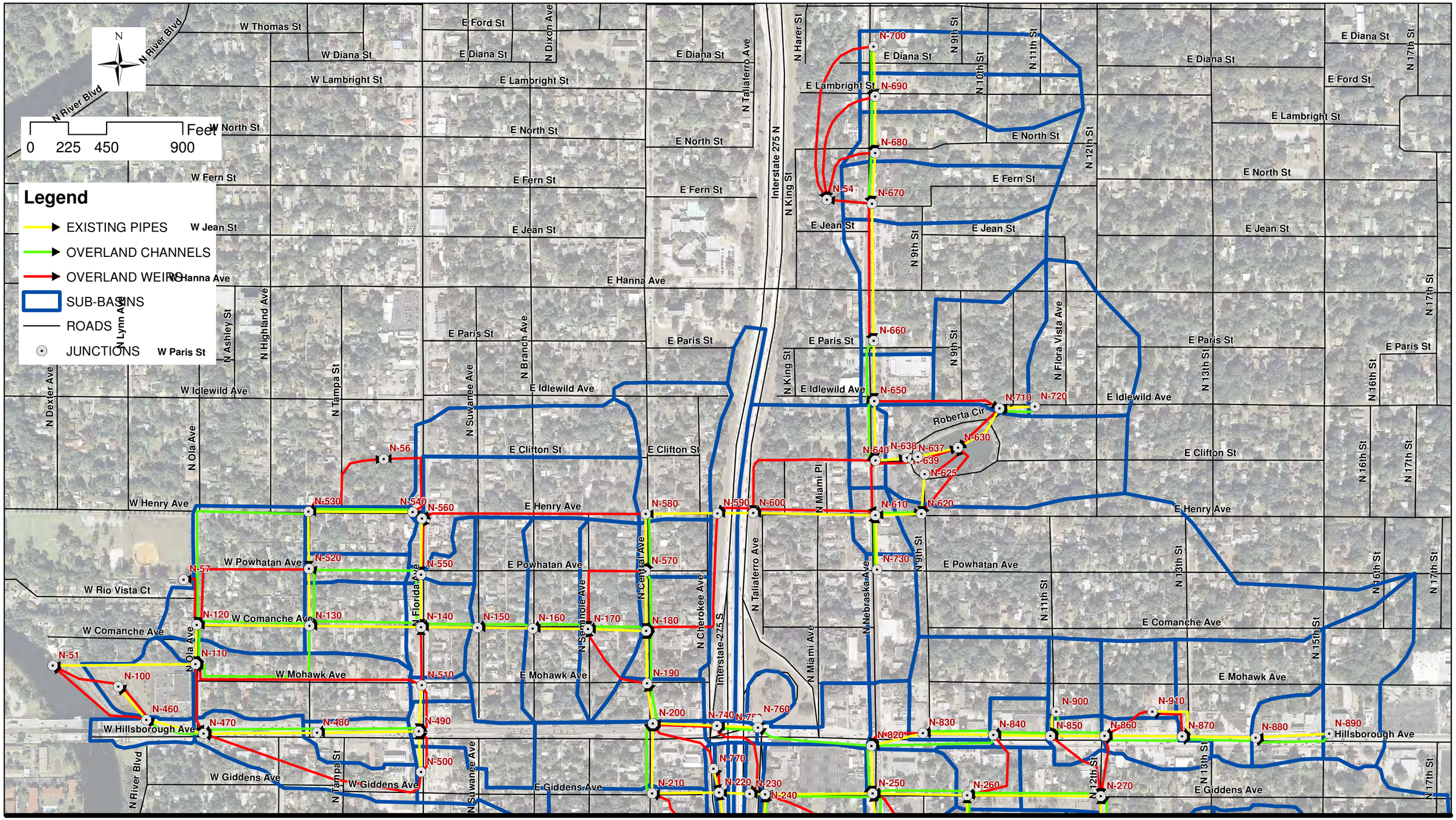
The hydrologic and hydraulic model representing the subbasin areas along with all the nodes and connectivity, including storm sewer system and overland weirs and channels, is presented in the attached Figures 8A/8B – Existing Conditions Connectivity Diagram.

3.9 Datum Conversion

This study is based on the NAVD 88 vertical datum. The main data sources for the model are referenced to the NAVD 88 datum including the terrain and survey conducted for this study. However, a number of other supporting documents for building the model were referenced to the NGVD 29 vertical datum. The following conversion factor was used as necessary:

Elevation in NAVD 88 = Elevation in NGVD 29 – 0.86 feet

This conversion factor is the elevation difference between these two datums based on a centrally located point within the study area as determined from the CORPSCON program supported by the Army Corps of Engineers.



MATCH LINE - SEE FIGURE 8B

City of Tampa Stormwater Department	LAND&WATER ENGINEERING SCIENCE 9887 4th Street N, S # 319 St Petersburg, FL 33702	SE Seminole Heights Drainage Improvements Figure 8A - Existing Conditions Connectivity Diagram

MATCH LINE - SEE FIGURE 8A

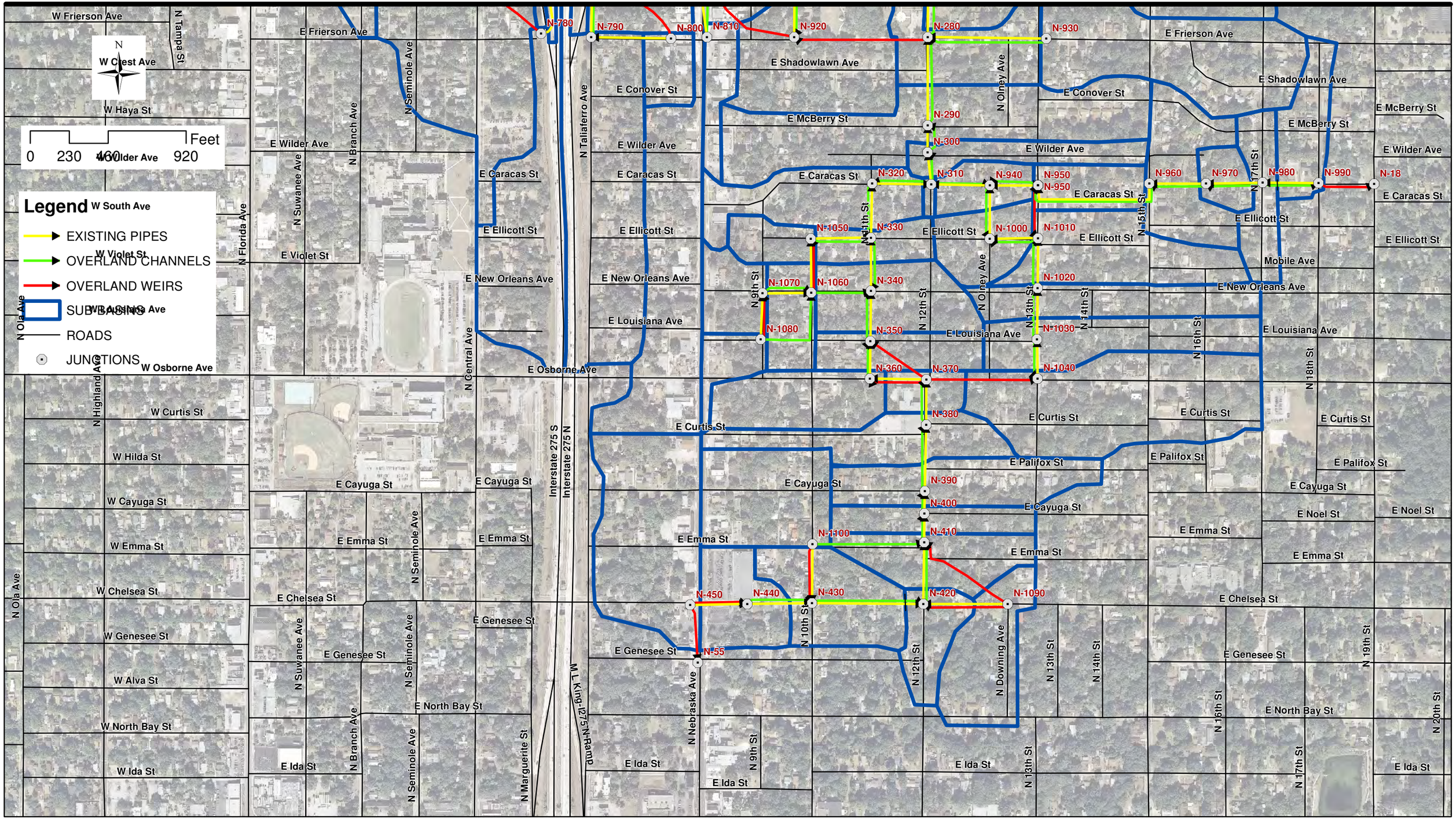


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Figure 8B - Existing Conditions Connectivity Diagram

3.10 Model Verification

The intent of model verification is to match the model storm behavior to that of the real storm events captured by the water stage data loggers. Model verification was performed with precipitation data sourced from rainfall gauges close to the area of study, water stage data loggers installed and maintained by the City at locations near areas of flooding concern, and NexRad Doppler Radar Data for Hillsborough County (*See Figure 9 – Rain Gauge & Data Logger Locations*).

Rainfall data was available from the beginning of January, 2015 through the end of April, 2015. During this time, the greatest storm event occurred on February 4th at 11:00 p.m. through the 5th at 12:03 p.m., with a total rainfall of almost 2.0 inches over the 13-hour duration (*See Exhibit B*). This storm was selected for model verification. Rainfall data for this storm event was sourced from rainfall gauges that are located close to the area of study. These rainfall gauges were chosen to be the USGS 275917082222500 East Lake gauge at Orient Road and USGS 0234500 Hillsborough River gauge. NexRad data was used as a third source for rainfall data due to the lack of a third rainfall gauge near the study area. Three rainfall data sources were required to triangulate an accurate composite rainfall event over the study area. Rainfall data for all three locations were compiled and averaged over the duration of the storm event to create a 15-minute increment composite rainfall event with a total rainfall of 1.976 inches. Graph 1 shows the rainfall data for each location as well as the computed average composite rainfall.

The composite rainfall event was entered into the XPSWMM model of the Southeast Seminole Heights Drainage Basin and simulated. The results of the simulations were examined and viewed at the three (3) water stage data logger locations and compared to the recorded stage data in the storm sewer system manholes at those sites. It was noted that data sourced from two (2) of the three (3) data loggers were deemed as inaccurate. Survey data of the data loggers showed improper placement of the reading node of the data loggers located at the intersection of W Comanche Avenue and N Branch Avenue as well as E New Orleans Avenue and N 11th Street. Data logger probes for these locations appear to have been wiped out by previous storm events and are just resting on the bottom of the storm structure. This results in inaccurate readings that can't be utilized for model verification. As a result, only one data logger location at the intersection of N Nebraska Avenue and E Chelsea Street was utilized for the verification of the model (*See Graph 2*).

Based on initial model simulation results, adjustments were made to hydrologic model parameters to achieve the best fit to recorded stages with respect to peaks, timing and shape of stage hydrographs. Because the Southeast Seminole Heights drainage basin consists primarily of Type A soils, little runoff is generated from rainfall on the pervious soils for normal storm events, and the model was insensitive to any adjustments of soil infiltration parameters. Therefore, the primary mode of model calibration was the fine-tuning of the directly connected impervious percentages (DCIA) assigned to the various land use classifications that predominate the basin. In this case, the DCIA percentages for medium density residential, commercial, institutional, and major roadway land uses were reduced from initial values to better match the recorded stages in the drainage system.

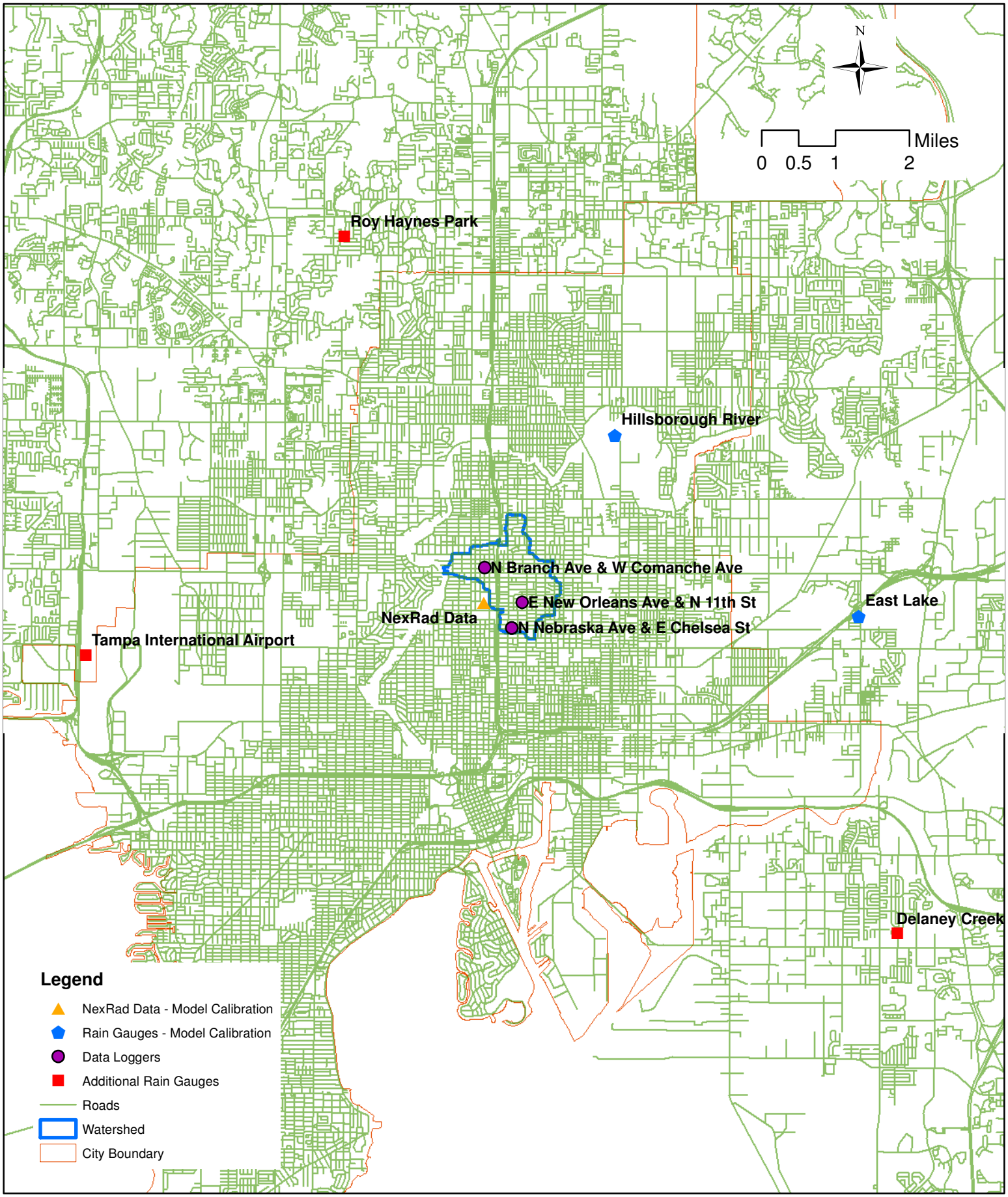

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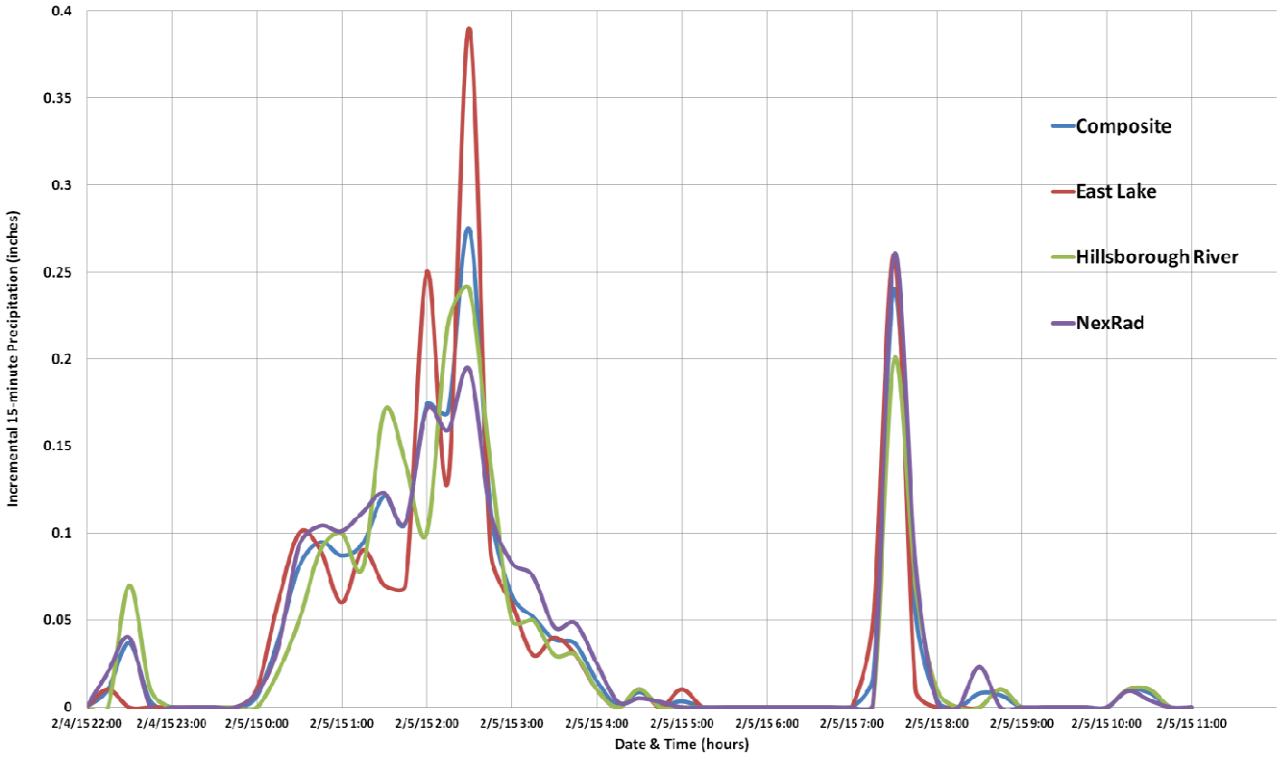
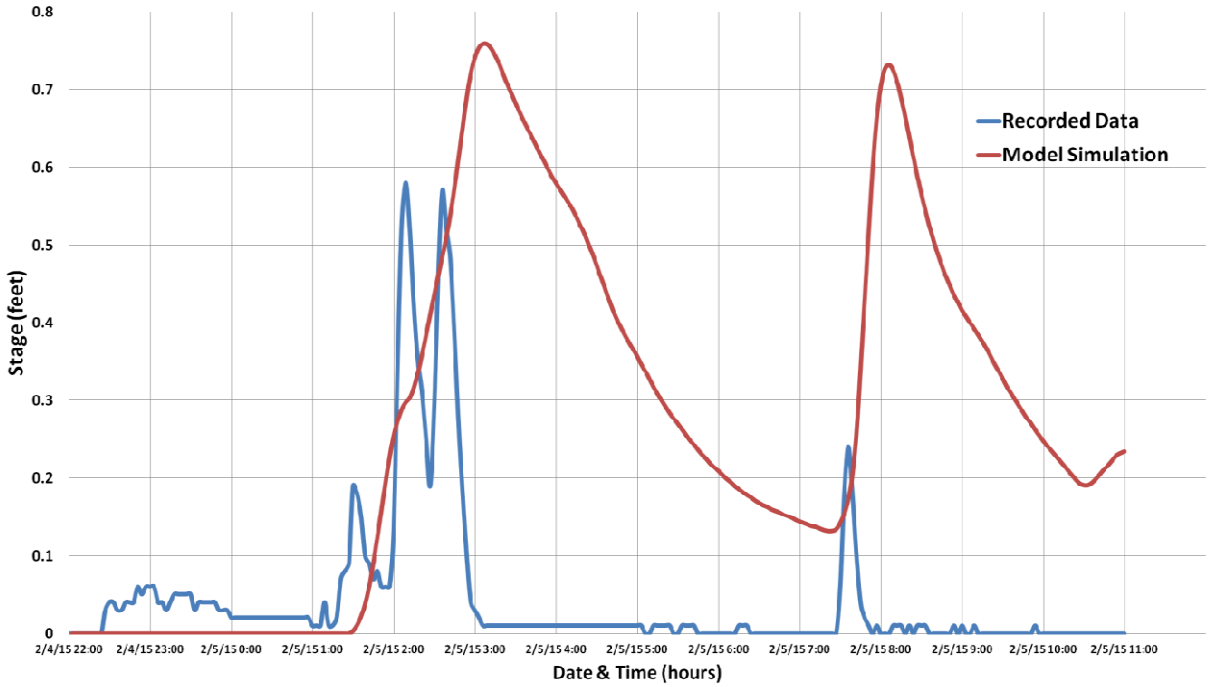
Figure 9 - Rain Gauge &
Data Logger Locations

Graph 1 - February 5, 2015 Calibration Storm Rainfall



Graph 2-E Chelsea Street Stage (Node N-440)
February 5, 2015 Calibration Storm
Recorded vs. Model



4.0 Flooding Level of Service Analysis

4.1 Design Storm Events

The depths of rainfall for various design storm events in the study area were obtained from SWFWMD. Eight-hour and twenty-four hour duration design storms were considered in this study. The depths of rainfall for the various storm events utilized within the model are listed in Table 4.

Table 4
Design Rainfall Events

Rainfall		
Storm Event (Years)	***Duration (Hours)***	***Depth (Inches)***
2.33	2	2.94
2.33	4	3.5
2.33	8	4.32
5	1	2.8
5	2	3.5
5	4	4.32
5	8	5.36
10	24	7
25	24	8
50	24	10
100	24	12

For the twenty-four (24) hour duration storm events, depths of rainfall were obtained from the Southwest Florida Water Management District Environmental Resource Permit Information Manual (February 1996). The depths for the remaining storm events were sourced from the Florida Department of Transportation Drainage Manual (August 2001) and its corresponding IDF curves. These depths are expressed as a function of annual exceedance probability and average recurrence interval, and are the result of region-wide probabilistic analyses of historic maximum annual rainfall depths over a long period of record. Annual exceedance probability is an expression of risk. It is the probability that, in any given year, the maximum annual 24-hour rainfall depth will exceed the cited rainfall depth. For example, the storm with a 1% chance of being equaled or exceeded in a given year is known as a 100-year storm. Similarly, a storm that has a 4% (or 1/25) chance of being

equaled or exceeded in a given year is referred to as a 25-year event. The more severe the storm, the lower is its probability of being equaled or exceeded.

The SCS Type II Florida- Modified rainfall distribution was used to develop the design storm hyetographs for all 24-hour duration storm events. FDOT design storm distributions were used for the other, shorter duration design storm events.

Using the described design storm events as the basis for simulations, the XPSWMM model was run to generate predictions of basinwide flooding conditions. The results of these model simulations are summarized in the Appendices. The summary tables included there list the model node in sequence and the corresponding mean annual, 5, 10, 25, 100 year flood elevations at those locations.

4.2 Critical Duration Analysis

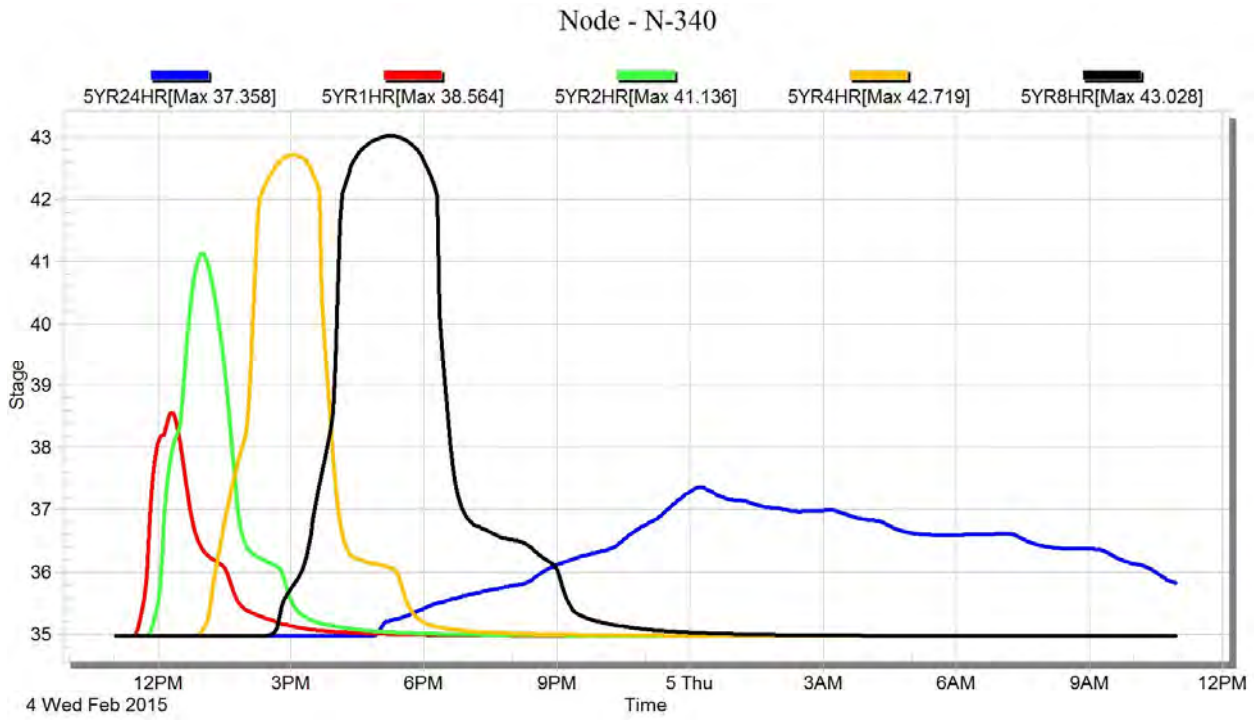
The accurate assessment of flood risk and flood damages, as well as the sizing and design of flood control projects in any watershed, relies on the peak flood discharges, the peak flood stages, and the maximum runoff volumes generated for that watershed. Peak discharges, stages, and runoff volumes can be determined through application of rainfall/runoff and hydraulic methodologies that utilize "critical" design rainfall events (volume, duration, and temporal distribution) to generate runoff hydrographs from design rainfall events. Pursuant to City requirements, a critical duration analysis was performed to a series of 5-year storm events with varying durations of total rainfalls as listed in Table 5 below.

For this study, the critical storm was considered the duration that produces the most severe flooding at the focus area of E New Orleans Avenue and N 11th Street. See Graph 3 below showing the time-stage relationships for each of the 5-year storms for the model junction Node N-340. The 5-year, 8-hour peak stage is the highest stage at the focus area. Thus the 8-hr duration storm event was designated as the critical storm for the drainage basin.

Table 5
Critical Duration Analysis
5-Year Frequency Storms

Storm Duration	Rainfall Depth
1-Hour	2.80
2-Hour	3.50
4-Hour	4.32
8-Hour	5.36
24-Hour	7.44

Graph 3
Critical Duration Analysis



4.3 Flooding Level of Service Criteria

Within the Stormwater Management Element of the City of Tampa Comprehensive Plan, Level of Service (LOS) is described as the degree of stormwater facility function or ability and is directly related to the capacity of a storm sewer system. Detailed design criteria for the performance of all new stormwater facilities are presented in detail in terms of specific frequencies and durations. A majority of the study area was designed and built before such design guidelines were adopted. The capacity of these older systems can vary significantly compared to the standards of design used today. Additionally, land use changes over time can put further stress on the capacity of a system and therefore worsen its current condition. The determination of the appropriate LOS is therefore a very important part of the basin planning process. Once the design storm flood elevations have been determined through the comprehensive modeling procedures, the LOS criteria then becomes the primary factor in determining the cost of retrofitting the existing infrastructure. Thus the LOS criteria become the point at which the cost of infrastructure improvements is balanced against the public's desire to further reduce the flooding in the basin.

As defined by the City of Tampa LOS, there should be no structural flooding for events up to and including the 100-year flood. The City of Tampa's objective is to provide a stormwater system for 98% of the city that prevents structural flooding for the 100-year/24-hour duration (volumetric) storm. The Master Drainage Plans shall be formulated to provide a minimum of Level C service during the 100-year/24-hour storm. Service Level C is defined as the minimum level of stormwater protection provided and comprises the prevention of flooding in structures or appurtenant components of residential, commercial or institutional structures. Sources of flooding in Level C situation are via overland flow, surcharging of the stormwater collection system, or ponding of confined waters. Flooding of major roadways precludes the use of outer traffic lanes while travel in inner lanes is possible, but difficult. Flooding on minor streets precludes travel and allows flooding of front yards up to the front face of the structure, but no structure flooding is indicated. The hydraulic grade line is significantly above the inlet throat. In addition, FPLOS specifies allowable thresholds for street flooding that are based upon residential, collector and arterial roadways being passable for 10-, 25-, and 100-year flood events, respectively.

For the purpose of this study, LOS criteria were analyzed for structural flooding risk from the 100-year storm event and for street flooding from the 5-year storm event and where the road can be "passable" (defined as 6" of flooding or less at the lowest edge of pavement in a travel lane).

4.4 Existing Conditions Model Results

The simulation of the model resulted in flooding conditions that conform to local citizen eyewitness reports. These areas of concern cover four (4) primary regions of the basin. Floodplains for existing conditions have been delineated for the 2.33-yr/ 8-hour and the 5-year/8-hour duration events on Figure 10, and 25-year/24-hour and 100-year/24-hour events on Figure 11.

1. **Intersection of Nebraska Avenue & Chelsea Street:**

   Residents in this area have noted flooding conditions along E Chelsea Street and Nebraska Avenue, where runoff from 16.5 acres of residential/commercial/transportation corridor is conveyed through a cross drain pipe of 18 inches under N Nebraska Avenue. Therefore, the south bound lanes of Nebraska Avenue flood with very limited overtopping occurring from southbound lanes to northbound lanes since the road crown elevation is about 0.8 feet above the edge of pavement. The flooding is further exacerbated east of Nebraska Avenue where an additional 16.2 acres of Commercial/Residential use is drained to the 18-inch RCP running easterly.

2. **Intersection of New Orleans Avenue and N 11th Street and surrounding areas:**

   Documented flooding complaints were also recorded at the intersection of E New Orleans Avenue and N 11th Street. More recently, the City acquired (3) residential lots in this area that were identified as repetitive loss properties in flood prone areas, where structures are not built much higher than the road and are considered at high risk of flooding. It should be noted that the flooding area is not limited to the E New Orleans Avenue and N 11th Street intersection. It also extends north to E Ellicott Street and west to N 10th Street. Flooding is further confirmed by the City's redline properties (where flooding has been recorded) as shown in Figure 3. The cause of flooding in this area is due to a lack of a surface flow outlet due to the topographic conditions associated with higher grounds surrounding the neighborhood. The conveyance system is sized to address smaller storm events such as mean annual rainfall conditions, and is rather sensitive to higher intensity short duration storms where ponding occurs due to the lack of a surface flow outlet.

3. **Lake Roberta and surrounding areas:**

Residents around the lake have noted and documented flooding conditions. The outfall capacity of the drainage system downstream is limited to a 30-inch RCP. The 2.6-acre lake receives surface runoff from an 87.2-acre area and has a storage capacity of approximately 1.9 acre-feet. The limited storage volume does not provide the required attenuation to mitigate for the limited conveyance capacity.

4. **W Comanche Avenue and surrounding areas:**

W Comanche Avenue and the 4'x7' box culvert outfall act as the main conveyance system for the entire watershed, except for a small portion of W Hillsborough Avenue. The topographic relief in this area and the higher finish floor elevations of the structures limit flooding to roadway access where flood stages exceed 6 inches in depth due to large runoff volumes contributing from the entire basin.

Other flooding areas:

Other flooding areas that are noted to be less severe and localized are identified at the following locations:

a) Florida Avenue from south of W Idlewild Intersection to W Henry Avenue Intersection.
b) N Nebraska Avenue from south of E North Street to north of E Jean Street.
c) E Hillsborough Avenue from N 13th Street to N 9th Street.
d) N Central Avenue from east of Mohawk Avenue intersection to Comanche Avenue intersection.
e) Alleyway behind shopping center on north side of Hillsborough Avenue extending from N 13th Street to N 12th Street.
f) E Giddens Avenue, east of the I-275 exit ramp.
g) Intersection of E Frierson Avenue and N 10th Street.
h) Intersection of E Osborne Avenue and N 13th Street.

4.5 Existing Conditions LOS Deficiencies

LOS deficiencies for both roadway access and structures are presented in Tables 6 & 7 below. Tabulated summaries of all storm events are presented in Appendix F.

Table 6
Road Flooding Conditions

Node	Location	Min. Ground Elev. (ft, NAVD 88)	2.33-Year 8-Hour Storm Event		5-Year 8-Hour Storm Event	
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)
N-450	E Chelsea St. & N Nebraska Ave.	49.82	50.08	0.26	50.18	0.36
N-440	N 10th St. & E Chelsea St.	48.99	48.95		49.33	0.34
N-1040	N 13th St. & E Osborne Ave.	43.66	40.7		44.43	0.77
N-1000	N Olney Ave. & E Ellicott St.	42.97	38.95		42.94	
N-1060	N 10th St. & E New Orleans Ave.	42.47	39.32		43.03	0.56
N-340	N 11th St. & E New Orleans Ave.	41.95	39.53		43.03	1.08
N-330	N 11th St. & E Ellicot St.	41.97	39.27		42.94	0.97
N-920	N 10th St. & E Frierson Ave.	41.67	38.03		41.9	0.23
N-870	N 13th St. & E Hillsborough Ave.	47.91	47.76		48.2	0.29
N-860	N 12th St. & E Hillsborough Ave.	47	46.68		47.3	0.3
N-850	N 11th St. & E Hillsborough Ave.	45.97	45.61		46.49	0.52
N-840	½ Way between N 9th St. & N 11th St. along E Hillsborough Ave.	45.99	44.16		46.05	0.06
N-820	N Nebraska Ave. & E Hillsborough Ave.	42.92	39.92		43.02	0.1
N-640	N Nebraska Ave. & E Clifton St.	38.84	38.56		38.78	
N-630	Roberta Circle & E Clifton St. (West Side)	34.76	36.05	1.29	37.17	2.41
N-630	Roberta Circle & N 9th St.	34.89	36.05	1.16	37.17	2.28
N-630	Roberta Circle & E Clifton St. (East Side)	35.17	36.05	0.88	37.17	2
N-630	Roberta Circle & N Orange Blossom Ave.	34.75	36.05	1.3	37.17	2.42
N-670	N Nebraska Ave. & E Fern St.	43.75	44.02	0.27	44.4	0.65
N-240	N Taliaferro Ave. & E Giddens Ave.	38.01	35.99		38.58	0.57
N-200	N Central Ave. & E Hillsborough Ave.	33.66	32.58		33.89	0.23
N-190	N Central Ave. & E Mohawk Ave.	31.59	31.55		32.19	0.6
N-180	N Central Ave. & E Comanche Ave.	30.96	30.43		31.15	0.19
N-570	N Central Ave. & E Powhatan Ave.	31.95	31.32		32	0.05
N-600	N Taliaferro Ave. & E Powhatan Ave.	33.94	33.71		34.45	0.51
N-600	N Taliaferro Ave. & E Comanche Ave.	33	33.71	0.71	34.45	1.45
N-170	N Seminole Ave. & E Comanche Ave.	27.72	28.56	0.84	28.97	1.25
N-160	N Branch Ave. & E Comanche Ave.	25.99	27.28	1.29	27.73	1.74
N-150	N Suwanee Ave. & E Comanche Ave.	24.92	25.83	0.91	26.32	1.4
N-140	N Florida Ave. & E Comanche Ave.	23.75	24.42	0.67	25.23	1.48
N-560	N Florida Ave. & E Henry Ave.	24	23.99		24.12	0.12
N-540	N Florida Ave. & W Henry Ave.	23.86	22.58		24.09	0.23
N-560	N Florida Ave. & E Clifton St.	24	23.99		24.12	0.12
N-540	N Florida Ave. & E Clifton St.	23.95	22.58		24.09	0.14
N-130	N Highland Ave. & W Comanche Ave.	21.96	21.41		23.03	1.07
N-520	N Highland Ave. & W Powhatan Ave.	22.85	21.8		23.28	0.43
N-530	N Highland Ave. & W Henry Ave.	23.41	22.14		23.58	0.17
N-110	N Ola Ave. & W Hillsborough Ave.	15.42	12.61		15.84	0.42

NOTE: Yellow boxes signify roads not passable, over 6 inches of standing water.

Table 7
Structure Flooding Conditions

Node	Parcel Address	Est. Finish Floor Elev. (1) (ft, NAVD 88)	25-Year 24-Hour Storm Event		100-Year 24-Hour Storm Event	
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)
N-1000	1209 E ELLICOTT ST	44.82	44.41		45.52	0.70
N-1000	1218 E ELLICOTT ST	45.30	44.41		45.52	0.22
N-1000	1213 E ELLICOTT ST	44.59	44.41		45.52	0.93
N-1000	1212 E ELLICOTT ST	43.65	44.41	0.76	45.52	1.87
N-1000	1203 E ELLICOTT ST	45.34	44.41		45.52	0.18
N-1000	1214 E ELLICOTT ST	44.05	44.41	0.36	45.52	1.47
N-1000	1204 E ELLICOTT ST	45.16	44.41		45.52	0.36
N-1000	1216 E ELLICOTT ST	44.27	44.41	0.14	45.52	1.25
N-1000	1217 E ELLICOTT ST	44.38	44.41	0.03	45.52	1.14
N-1000	1202 E ELLICOTT ST	45.30	44.41		45.52	0.22
N-1000	1210 E ELLICOTT ST	44.30	44.41	0.11	45.52	1.22
N-1000	1201 E ELLICOTT ST	45.34	44.41		45.52	0.18
N-1000	1208 E ELLICOTT ST	44.28	44.41	0.13	45.52	1.24
N-1000	1205 E ELLICOTT ST	45.33	44.41		45.52	0.19
N-1000	1215 E ELLICOTT ST	44.47	44.41		45.52	1.05
N-1000	1206 E ELLICOTT ST	44.49	44.41		45.52	1.03
N-1010	1212 NEW ORLEANS AV	45.27	44.51		45.54	0.27
N-1010	1220 E NEW ORLEANS AV	44.26	44.51	0.25	45.54	1.28
N-1010	1219 E ELLICOTT ST	44.30	44.51	0.21	45.54	1.24
N-1010	1214 E NEW ORLEANS AV	45.37	44.51		45.54	0.17
N-1010	1218 E NEW ORLEANS AV	45.26	44.51		45.54	0.28
N-1010	1301 E ELLICOTT ST	45.29	44.51		45.54	0.25
N-1030	1302 E LOUISIANA AV	45.30	45.32	0.02	45.79	0.49
N-1030	1304 E OSBORNE AV	45.24	45.32	0.08	45.79	0.55
N-1030	1306 E OSBORNE AV	45.22	45.32	0.10	45.79	0.57
N-1030	1302 E OSBORNE AV	45.52	45.32		45.79	0.27
N-1030	1308 E OSBORNE AV	45.54	45.32		45.79	0.25
N-1030	1310 E OSBORNE AV	45.36	45.32		45.79	0.43
N-1030	1218 E LOUISIANA AVE	45.33	45.32		45.79	0.46
N-1030	4806 N 13TH ST	45.28	45.32	0.04	45.79	0.51
N-1030	1228 E OSBORNE AV	45.49	45.32		45.79	0.30
N-1030	4807 N 13TH ST	45.33	45.32		45.79	0.46
N-1040	1311 E OSBORNE AV	45.40	45.41	0.01	45.80	0.40
N-1040	1309 E OSBORNE AV	45.29	45.41	0.12	45.80	0.51
N-1040	1303 E OSBORNE AV	45.33	45.41	0.08	45.80	0.47
N-1040	1305 E OSBORNE AV	45.12	45.41	0.29	45.80	0.68
N-1040	1307 E OSBORNE AV	45.52	45.41		45.80	0.28
N-1040	1313 E OSBORNE AV	45.34	45.41	0.07	45.80	0.46
N-1040	1315 E OSBORNE AV	45.48	45.41		45.80	0.32
N-1040	1312 E OSBORNE AV	45.49	45.41		45.80	0.31
N-1040	1320 E OSBORNE AV	45.50	45.41		45.80	0.30
N-1040	1314 E OSBORNE AV	45.39	45.41	0.02	45.80	0.41
N-1040	1316 E OSBORNE AV	45.61	45.41		45.80	0.19
N-1060	918 E NEW ORLEANS AV	43.73	44.34	0.61	45.55	1.82
N-1060	916 NEW ORLEANS AV	44.49	44.34		45.55	1.06
N-1060	4906 10TH ST	44.02	44.34	0.32	45.55	1.53
N-1060	912 E LOUISIANA AV	45.26	44.34		45.55	0.29
N-1060	4904 N 10TH ST	44.16	44.34	0.18	45.55	1.39
N-1060	914 E NEW ORLEANS AV	45.10	44.34		45.55	0.45
N-1060	917 NEW ORLEANS AV	44.30	44.34	0.04	45.55	1.25
N-1060	4806 N 10TH ST	45.30	44.34		45.55	0.25
N-1060	914 E LOUISIANA AV	44.28	44.34	0.06	45.55	1.27
N-1090	1214 E CHELSEA ST	47.49	47.55	0.06	47.97	0.48
N-1090	1216 E CHELSEA ST	47.74	47.55		47.97	0.23
N-1090	1215 E CHELSEA ST	47.40	47.55	0.15	47.97	0.57
N-1100	918 E EMMA ST	49.24	49.14		49.32	0.08
N-1100	909 E CAYUGA ST	49.26	49.14		49.32	0.06
N-1100	921 E CAYUGA ST	49.30	49.14		49.32	0.02
N-1100	917 E CAYUGA ST	49.30	49.14		49.32	0.02
N-1100	914 E EMMA ST	49.01	49.14	0.13	49.32	0.31
N-1100	908 E EMMA ST	49.30	49.14		49.32	0.02

Node	Parcel Address	Est. Finish Floor Elev. (1) (ft, NAVD 88)	25-Year 24-Hour Storm Event		100-Year 24-Hour Storm Event	
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)
N-1100	916 E EMMA ST	49.18	49.14		49.32	0.14
N-1100	1002 E EMMA ST	49.30	49.14		49.32	0.02
N-1100	910 E EMMA ST	48.87	49.14	0.27	49.32	0.45
N-1100	912 E EMMA ST	48.59	49.14	0.55	49.32	0.73
N-1100	907 E CAYUGA ST	48.96	49.14	0.18	49.32	0.36
N-130	120 W COMANCHE AV	23.44	23.50	0.06	23.87	0.43
N-130	119 W COMANCHE AV	23.45	23.50	0.05	23.87	0.42
N-140	5602 FLORIDA AV	25.03	25.60	0.57	26.03	1.00
N-150	5607 N SUWANEE AV	26.45	26.64	0.19	27.05	0.60
N-150	5605 N SUWANEE AV	26.67	26.64		27.05	0.38
N-150	5603 N SUWANEE AV	26.90	26.64		27.05	0.15
N-150	5602 N BRANCH AV	26.66	26.64		27.05	0.39
N-150	5609 N SUWANEE AV	26.54	26.64	0.10	27.05	0.51
N-160	5603 N BRANCH AV	27.46	28.07	0.61	28.45	0.99
N-160	307 E COMANCHE AV	28.44	28.07		28.45	0.01
N-160	5601 N BRANCH AV	27.41	28.07	0.66	28.45	1.04
N-160	5509 N BRANCH AV	27.97	28.07	0.10	28.45	0.48
N-160	5605 N BRANCH AV	27.42	28.07	0.65	28.45	1.03
N-170	5601 N SEMINOLE AV	29.65	29.31		29.69	0.04
N-170	5507 N SEMINOLE AV	29.35	29.31		29.69	0.34
N-170	5508 N SEMINOLE AV	29.56	29.31		29.69	0.13
N-170	5509 N SEMINOLE AVE	29.39	29.31		29.69	0.30
N-180	5502 N CENTRAL AV	31.38	31.66	0.28	32.10	0.72
N-180	5504 N CENTRAL AV	31.78	31.66		32.10	0.32
N-190	5410 N CENTRAL AV	32.96	32.65		33.11	0.15
N-240	5315 N TALIAFERRO AV	38.61	39.67	1.06	40.60	1.99
N-240	812 E FRIERSON AV	40.11	39.67		40.60	0.49
N-240	810 E FRIERSON AV	40.13	39.67		40.60	0.47
N-240	816 E FRIERSON AV	40.22	39.67		40.60	0.38
N-240	808 E FRIERSON AV	40.19	39.67		40.60	0.41
N-240	805 E GIDDENS AV	39.13	39.67	0.54	40.60	1.47
N-240	701 E HILLSBOROUGH AV	38.83	39.67	0.84	40.60	1.77
N-240	806 E FRIERSON AV	40.47	39.67		40.60	0.13
N-240	803 E GIDDENS AV	38.58	39.67	1.09	40.60	2.02
N-240	815 E GIDDENS AV	40.06	39.67		40.60	0.54
N-240	809 E GIDDENS AV	39.25	39.67	0.42	40.60	1.35
N-240	807 E GIDDENS AV	39.32	39.67	0.35	40.60	1.28
N-240	801 E GIDDENS AV	38.51	39.67	1.16	40.60	2.09
N-250	5226 N NEBRASKA AV	41.40	41.75	0.35	42.31	0.91
N-250	5202 N NEBRASKA AV	41.54	41.75	0.21	42.31	0.77
N-250	5214 N NEBRASKA AV	41.44	41.75	0.31	42.31	0.87
N-250	5210 N NEBRASKA AV	41.45	41.75	0.30	42.31	0.86
N-250	5205 N NEBRASKA AV	42.18	41.75		42.31	0.13
N-250	5205 N NEBRASKA AV	42.27	41.75		42.31	0.04
N-250	5208 N 9TH ST	42.26	41.75		42.31	0.05
N-250	5301 N NEBRASKA AV	42.01	41.75		42.31	0.30
N-270	1205 E GIDDENS AV	44.02	43.78		45.00	0.98
N-270	1206 E FRIERSON AV	43.80	43.78		45.00	1.20
N-270	940 E GIDDENS AV	44.39	43.78		45.00	0.61
N-270	938 E GIDDENS AV	44.41	43.78		45.00	0.59
N-270	942 E GIDDENS AV	44.41	43.78		45.00	0.59
N-270	1207 E GIDDENS AV	44.16	43.78		45.00	0.84
N-270	944 E GIDDENS AV	44.72	43.78		45.00	0.28
N-270	1208 E FRIERSON AV	44.33	43.78		45.00	0.67
N-270	5209 N 12TH ST	43.88	43.78		45.00	1.12
N-290	1200 E MCBERRY ST	44.35	44.05		45.16	0.81
N-290	924 E MCBERRY ST	44.56	44.05		45.16	0.60
N-290	926 E MCBERRY ST	44.63	44.05		45.16	0.53
N-290	936 E MCBERRY ST	44.88	44.05		45.16	0.28
N-290	938 E MCBERRY ST	44.45	44.05		45.16	0.71
N-290	918 E MCBERRY ST	44.29	44.05		45.16	0.87
N-290	937 E MCBERRY ST	45.16	44.05		45.16	0.00
N-290	920 E MCBERRY ST	44.47	44.05		45.16	0.69
N-290	928 E MCBERRY ST	44.80	44.05		45.16	0.36
N-290	932 E MCBERRY ST	44.78	44.05		45.16	0.38
N-290	922 E MCBERRY ST	44.23	44.05		45.16	0.93

Node	Parcel Address	Est. Finish Floor Elev. (1) (ft, NAVD 88)	25-Year 24-Hour Storm Event		100-Year 24-Hour Storm Event	
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)
N-300	1202 E CARACAS ST	45.17	44.10		45.24	0.07
N-320	1021 E CARACAS ST	44.37	44.29		45.54	1.17
N-320	1014 E CARACAS ST	45.33	44.29		45.54	0.21
N-320	1104 E CARACAS ST	45.38	44.29		45.54	0.16
N-320	1016 E CARACAS ST	44.95	44.29		45.54	0.59
N-320	1010 E ELLICOTT ST	44.31	44.29		45.54	1.23
N-320	1009 E CARACAS ST	45.04	44.29		45.54	0.50
N-320	1105 E CARACAS ST	45.40	44.29		45.54	0.14
N-320	1014 E ELLICOTT ST	43.85	44.29	0.44	45.54	1.69
N-320	1018 E CARACAS ST	44.53	44.29		45.54	1.01
N-320	1022 E CARACAS ST	44.47	44.29		45.54	1.07
N-320	1102 E CARACAS ST	45.31	44.29		45.54	0.23
N-320	1109 E CARACAS ST	45.48	44.29		45.54	0.06
N-320	1107 E CARACAS ST	45.36	44.29		45.54	0.18
N-320	1016 E ELLICOTT ST	43.53	44.29	0.76	45.54	2.01
N-320	1101 E CARACAS ST	44.95	44.29		45.54	0.59
N-320	1012 E ELLICOTT ST	43.79	44.29	0.50	45.54	1.75
N-320	1012 E CARACAS ST	45.41	44.29		45.54	0.13
N-320	1006 E ELLICOTT ST	44.74	44.29		45.54	0.80
N-320	** CONFIDENTIAL **	44.28	44.29	0.01	45.54	1.26
N-320	1019 E CARACAS ST	44.28	44.29	0.01	45.54	1.26
N-320	1018 E ELLICOTT ST	43.46	44.29	0.83	45.54	2.08
N-320	1011 E CARACAS ST	44.30	44.29		45.54	1.24
N-320	1106 E CARACAS ST	45.48	44.29		45.54	0.06
N-330	1110 E ELLICOTT ST	45.42	44.33		45.55	0.13
N-330	1107 E ELLICOTT ST	44.25	44.33	0.08	45.55	1.30
N-330	1011 E ELLICOTT ST	42.34	44.33	1.99	45.55	3.21
N-330	1103 E ELLICOTT ST	43.63	44.33	0.70	45.55	1.92
N-330	1109 E ELLICOTT ST	45.03	44.33		45.55	0.52
N-330	1003 E ELLICOTT ST	43.28	44.33	1.05	45.55	2.27
N-330	1005 E ELLICOTT ST	43.05	44.33	1.28	45.55	2.50
N-330	1101 E ELLICOTT ST	42.67	44.33	1.66	45.55	2.88
N-330	1001 E ELLICOTT ST	43.30	44.33	1.03	45.55	2.25
N-330	1007 E ELLICOTT ST	42.67	44.33	1.66	45.55	2.88
N-330	1009 E ELLICOTT ST	42.44	44.33	1.89	45.55	3.11
N-330	1105 E ELLICOTT ST	43.96	44.33	0.37	45.55	1.59
N-340	1010 E LOUISIANA AV	44.15	44.35	0.20	45.55	1.40
N-340	1202 E NEW ORLEANS AV	45.30	44.35		45.55	0.25
N-340	1102 E NEW ORLEANS AV	42.35	44.35	2.00	45.55	3.20
N-340	5002 N 12TH ST	44.46	44.35		45.55	1.09
N-340	1008 E NEW ORLEANS AV	42.34	44.35	2.01	45.55	3.21
N-340	1104 E NEW ORLEANS AV	42.34	44.35	2.01	45.55	3.21
N-340	1006 E NEW ORLEANS AV	42.36	44.35	1.99	45.55	3.19
N-340	1108 E NEW ORLEANS AV	44.03	44.35	0.32	45.55	1.52
N-340	1004 E NEW ORLEANS AV	42.43	44.35	1.92	45.55	3.12
N-340	1106 E NEW ORLEANS AV	42.80	44.35	1.55	45.55	2.75
N-340	1111 E NEW ORLEANS AV	44.79	44.35		45.55	0.76
N-340	1003 E NEW ORLEANS AV	42.42	44.35	1.93	45.55	3.13
N-340	1001 E NEW ORLEANS AV	42.53	44.35	1.82	45.55	3.02
N-340	1010 E NEW ORLEANS AV	42.30	44.35	2.05	45.55	3.25
N-340	1107 E NEW ORLEANS AV	42.48	44.35	1.87	45.55	3.07
N-340	1109 E NEW ORLEANS AV	43.68	44.35	0.67	45.55	1.87
N-340	1104 E LOUISIANA AVE	44.03	44.35	0.32	45.55	1.52
N-340	1100 E LOUISIANA AV	44.19	44.35	0.16	45.55	1.36
N-340	1002 E LOUISIANA AV	44.40	44.35		45.55	1.15
N-340	1006 E LOUISIANA AV	44.60	44.35		45.55	0.95
N-340	1106 E LOUISIANA AV	44.14	44.35	0.21	45.55	1.41
N-340	1002 E NEW ORLEANS AV	42.67	44.35	1.68	45.55	2.88
N-340	1008 E LOUISIANA AV	43.93	44.35	0.42	45.55	1.62
N-340	1004 E LOUISIANA AV	44.92	44.35		45.55	0.63
N-340	1108 E LOUISIANA AV	44.44	44.35		45.55	1.11
N-340	1101 E NEW ORLEANS AV	42.31	44.35	2.04	45.55	3.24
N-340	1102 E LOUISIANA AV	44.25	44.35	0.10	45.55	1.30
N-370	1102 E CURTIS ST	46.50	45.64		47.13	0.63
N-380	1201 E CURTIS ST	46.29	46.13		47.71	1.42
N-380	1109 E CURTIS ST	47.03	46.13		47.71	0.68

Node	Parcel Address	Est. Finish Floor Elev. (1) (ft, NAVD 88)	25-Year 24-Hour Storm Event		100-Year 24-Hour Storm Event	
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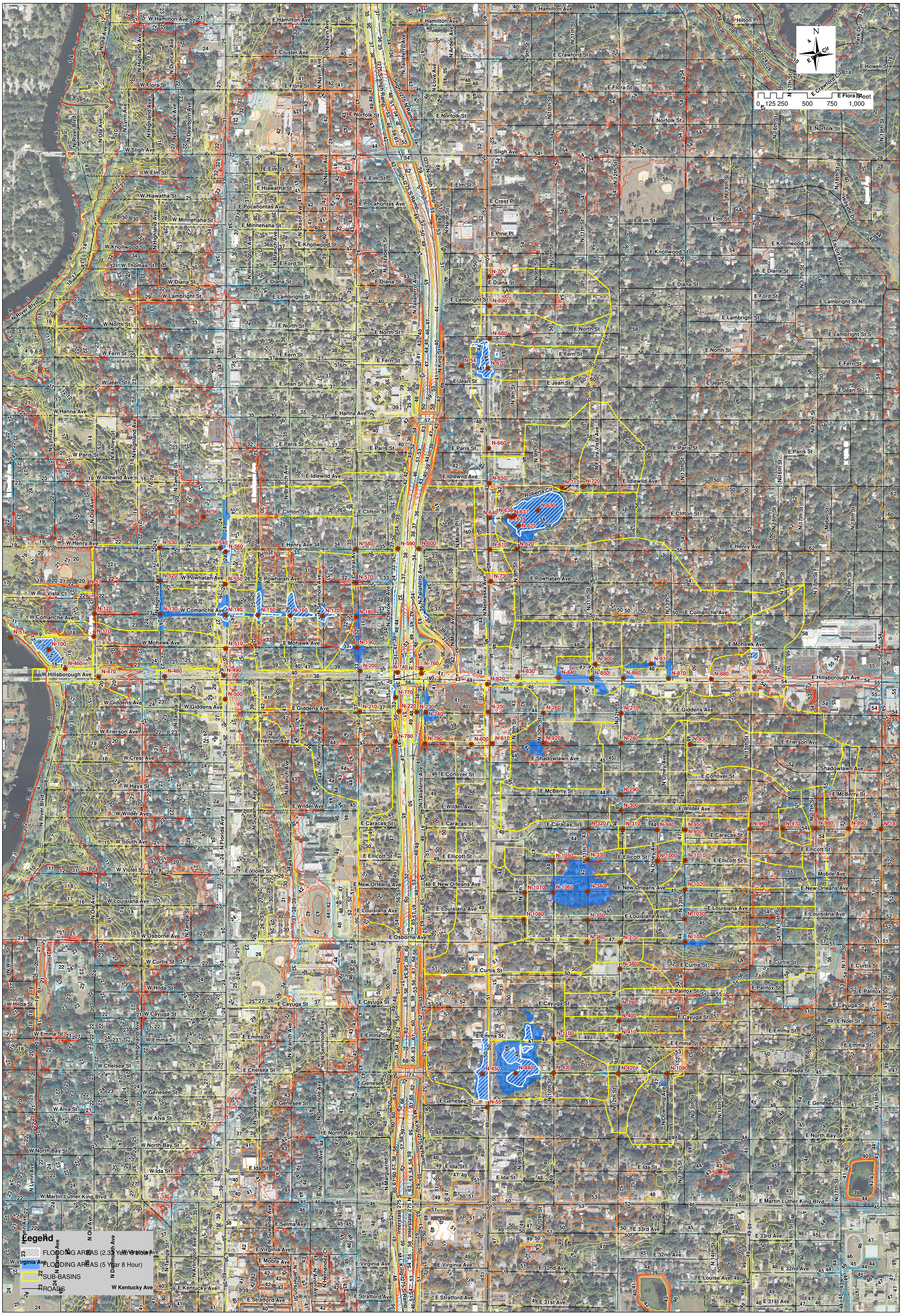
N-380	1205 E CURTIS ST	46.08	46.13	0.05	47.71	1.63
N-380	1202 E CURTIS ST	47.02	46.13		47.71	0.69
N-380	1203 E CURTIS ST	46.13	46.13		47.71	1.58
N-390	1202 E PALIFOX ST	45.54	46.57	1.03	47.76	2.22
N-390	1205 E PALIFOX ST	45.99	46.57	0.58	47.76	1.77
N-390	1209 E PALIFOX ST	46.39	46.57	0.18	47.76	1.37
N-390	1207 E PALIFOX ST	46.19	46.57	0.38	47.76	1.57
N-390	4601 N 12TH ST	46.51	46.57	0.06	47.76	1.25
N-390	1206 E CAYUGA ST	47.06	46.57		47.76	0.70
N-390	1201 E PALIFOX ST	45.94	46.57	0.63	47.76	1.82
N-390	1023 E CAYUGA ST	47.56	46.57		47.76	0.20
N-390	1210 E PALIFOX ST	47.42	46.57		47.76	0.34
N-390	1203 E PALIFOX ST	46.06	46.57	0.51	47.76	1.70
N-390	1204 E CAYUGA ST	46.86	46.57		47.76	0.90
N-390	1202 E CAYUGA ST	46.56	46.57	0.01	47.76	1.20
N-390	1025 E CAYUGA ST	47.27	46.57		47.76	0.49
N-390	1208 E PALIFOX ST	46.15	46.57	0.42	47.76	1.61
N-390	1206 E PALIFOX ST	45.54	46.57	1.03	47.76	2.22
N-390	1204 E PALIFOX ST	45.41	46.57	1.16	47.76	2.35
N-390	1024 E CAYUGA ST	47.53	46.57		47.76	0.23
N-400	1201 E CAYUGA ST	46.82	46.90	0.08	47.80	0.98
N-400	4504 N 12TH ST	46.99	46.90		47.80	0.81
N-400	1203 E CAYUGA ST	46.83	46.90	0.07	47.80	0.97
N-400	1207 E CAYUGA ST	47.07	46.90		47.80	0.73
N-400	1026 E EMMA ST	47.29	46.90		47.80	0.51
N-400	1205 E CAYUGA ST	46.87	46.90	0.03	47.80	0.93
N-410	1212 E EMMA ST	47.29	47.28		47.91	0.62
N-410	1206 E EMMA ST	47.10	47.28	0.18	47.91	0.81
N-410	1202 E EMMA ST	47.24	47.28	0.04	47.91	0.67
N-410	1211 E EMMA ST	47.28	47.28		47.91	0.63
N-410	1215 E EMMA ST	47.32	47.28		47.91	0.59
N-410	1204 E EMMA ST	47.21	47.28	0.07	47.91	0.70
N-410	1205 E EMMA ST	47.39	47.28		47.91	0.52
N-410	1209 E EMMA ST	47.53	47.28		47.91	0.38
N-410	1211 E EMMA ST	47.34	47.28		47.91	0.57
N-410	1212 E CHELSEA ST	47.30	47.28		47.91	0.61
N-430	912 E CHELSEA ST	49.13	48.95		49.34	0.21
N-430	919 E EMMA ST	49.31	48.95		49.34	0.03
N-430	1002 E CHELSEA ST	49.31	48.95		49.34	0.03
N-430	1001 E EMMA ST	49.32	48.95		49.34	0.02
N-430	917 E EMMA ST	48.05	48.95	0.90	49.34	1.29
N-430	910 E CHELSEA ST	48.33	48.95	0.62	49.34	1.01
N-430	911 E EMMA ST	47.14	48.95	1.81	49.34	2.20
N-440	4407 N NEBRASKA AV	49.22	49.62	0.40	49.74	0.52
N-440	908 E CHELSEA ST	47.97	49.62	1.65	49.74	1.77
N-440	904 E CHELSEA ST	48.24	49.62	1.38	49.74	1.50
N-440	906 E CHELSEA ST	47.79	49.62	1.83	49.74	1.95
N-440	911 E CHELSEA ST	49.24	49.62	0.38	49.74	0.50
N-440	907 E CHELSEA ST	49.11	49.62	0.51	49.74	0.63
N-440	909 E CHELSEA ST	49.08	49.62	0.54	49.74	0.66
N-440	913 E CHELSEA ST	49.50	49.62	0.12	49.74	0.24
N-450	4500 N NEBRASKA AV	50.34	50.34		50.56	0.22
N-450	815 E CHELSEA ST	50.46	50.34		50.56	0.10
N-450	4330 N NEBRASKA AV	50.31	50.34	0.03	50.56	0.25
N-450	816 E CHELSEA ST	50.34	50.34		50.56	0.22
N-450	4402 N NEBRASKA AV	50.28	50.34	0.06	50.56	0.28
N-450	4308 N NEBRASKA AV	50.29	50.34	0.05	50.56	0.27
N-450	4302 N NEBRASKA AV	50.30	50.34	0.04	50.56	0.26
N-600	5607 N TALIAFERRO AV	36.54	35.73		37.37	0.83
N-600	5709 N TALIAFERRO AV	37.26	35.73		37.37	0.11
N-600	5701 N TALIAFERRO AV	36.19	35.73		37.37	1.18
N-600	5707 N TALIAFERRO AV	37.08	35.73		37.37	0.29
N-600	5705 N TALIAFERRO AV	36.96	35.73		37.37	0.41
N-600	5605 N TALIAFERRO AV	37.00	35.73		37.37	0.37
N-600	5609 N TALIAFERRO AV	35.78	35.73		37.37	1.59
N-600	5509 N TALIAFERRO AV	34.86	35.73	0.87	37.37	2.51

Node	Parcel Address	Est. Finish Floor Elev. (1) (ft, NAVD 88)	25-Year 24-Hour Storm Event		100-Year 24-Hour Storm Event	
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)
N-600	5802 OSCEOLA PL	36.27	35.73		37.37	1.10
N-610	5725 N NEBRASKA AV	38.79	36.90		39.93	1.14
N-610	5710 N NEBRASKA AV	39.33	36.90		39.93	0.60
N-620	1001 E HENRY AV	39.39	38.31		39.95	0.56
N-620	5712 N 9TH ST	38.93	38.31		39.95	1.02
N-620	1003 E HENRY AV	39.10	38.31		39.95	0.85
N-620	5801 N 9TH ST	37.26	38.31	1.05	39.95	2.69
N-620	1016 E HENRY AV	39.04	38.31		39.95	0.91
N-620	1005 E HENRY AV	39.38	38.31		39.95	0.57
N-620	1007 E HENRY AV	39.91	38.31		39.95	0.04
N-620	1012 E HENRY AV	37.49	38.31	0.82	39.95	2.46
N-620	1014 E HENRY AV	38.12	38.31	0.19	39.95	1.83
N-620	904 E HENRY AV	38.70	38.31		39.95	1.25
N-620	5802 N 9TH ST	38.24	38.31	0.07	39.95	1.71
N-620	5903 ROBERTA CR	39.71	38.31		39.95	0.24
N-630	6013 ROBERTA CR	39.23	38.32		39.95	0.72
N-630	6011 ROBERTA CR	39.23	38.32		39.95	0.72
N-630	6009 ROBERTA CR	38.98	38.32		39.95	0.97
N-630	5907 ROBERTA CR	39.46	38.32		39.95	0.49
N-630	5805 ROBERTA CR	37.11	38.32	1.21	39.95	2.84
N-630	1002 E CLIFTON ST	39.81	38.32		39.95	0.14
N-630	5807 ROBERTA CR	37.54	38.32	0.78	39.95	2.41
N-630	5803 ROBERTA CR	36.57	38.32	1.75	39.95	3.38
N-630	5809 ROBERTA CR	38.30	38.32	0.02	39.95	1.65
N-630	5905 ROBERTA CR	39.07	38.32		39.95	0.88
N-630	1001 E CLIFTON ST	39.04	38.32		39.95	0.91
N-630	6001 ROBERTA CR	38.07	38.32	0.25	39.95	1.88
N-630	5809 N NEBRASKA AV	38.38	38.32		39.95	1.57
N-630	6007 ROBERTA CR	38.80	38.32		39.95	1.15
N-630	5801 ROBERTA CR	38.30	38.32	0.02	39.95	1.65
N-630	5806 N 9TH ST	37.65	38.32	0.67	39.95	2.30
N-630	5804 N 9TH ST	38.22	38.32	0.10	39.95	1.73
N-640	5901 N NEBRASKA AV	38.99	39.15	0.16	39.97	0.98
N-670	6310 N NEBRASKA AV	44.88	44.80		44.95	0.07
N-670	6302 N NEBRASKA AV	44.94	44.80		44.95	0.01
N-670	6306 N NEBRASKA AV	44.36	44.80	0.44	44.95	0.59
N-670	6304 N NEBRASKA AV	44.93	44.80		44.95	0.02
N-680	809 E NORTH ST	45.36	45.48	0.12	45.70	0.34
N-810	5201 N NEBRASKA AV	42.29	42.18		42.35	0.06
N-830	1002 E HILLSBOROUGH AV	45.30	45.22		45.43	0.13
N-850	1115 E HILLSBOROUGH AV	46.80	46.63		46.82	0.02
N-850	1101 E HILLSBOROUGH AV	46.49	46.63	0.14	46.82	0.33
N-850	1102 E HILLSBOROUGH AV	46.81	46.63		46.82	0.01
N-860	1203 E HILLSBOROUGH AV	47.30	47.49	0.19	47.68	0.38
N-860	1205 E HILLSBOROUGH AV	47.59	47.49		47.68	0.09
N-870	1229 E MOHAWK AV	48.56	48.42		48.61	0.05
N-880	1307 E HILLSBOROUGH AV	50.53	50.54	0.01	50.63	0.10
N-920	5204 N 9TH ST	42.30	42.27		42.52	0.22
N-920	5202 N 10TH ST	41.98	42.27	0.29	42.52	0.54
N-920	5203 N 9TH ST	42.30	42.27		42.52	0.22
N-920	5201 N 9TH ST	42.30	42.27		42.52	0.22
N-920	916 E SHADOWLAWN AV	41.97	42.27	0.30	42.52	0.55
N-920	918 E SHADOWLAWN AV	42.01	42.27	0.26	42.52	0.51
N-940	1211 E CARACAS ST	44.34	44.31		45.51	1.17
N-940	1209 E CARACAS ST	44.42	44.31		45.51	1.09
N-940	1206 E CARACAS ST	45.30	44.31		45.51	0.21
N-940	1203 E CARACAS ST	45.41	44.31		45.51	0.10
N-940	1208 E CARACAS ST	44.93	44.31		45.51	0.58
N-940	1210 E CARACAS ST	45.05	44.31		45.51	0.46
N-940	1205 E CARACAS ST	44.76	44.31		45.51	0.75
N-940	1207 E CARACAS ST	44.45	44.31		45.51	1.06
N-940	1204 E CARACAS ST	45.33	44.31		45.51	0.18

(1) Finish floor elevations were defined by reading the DEM ground elevation at close proximity of the structure, and assuming that the finish floor to be 0.3 feet above the highest adjacent grade.



City of Tampa Stormwater Department

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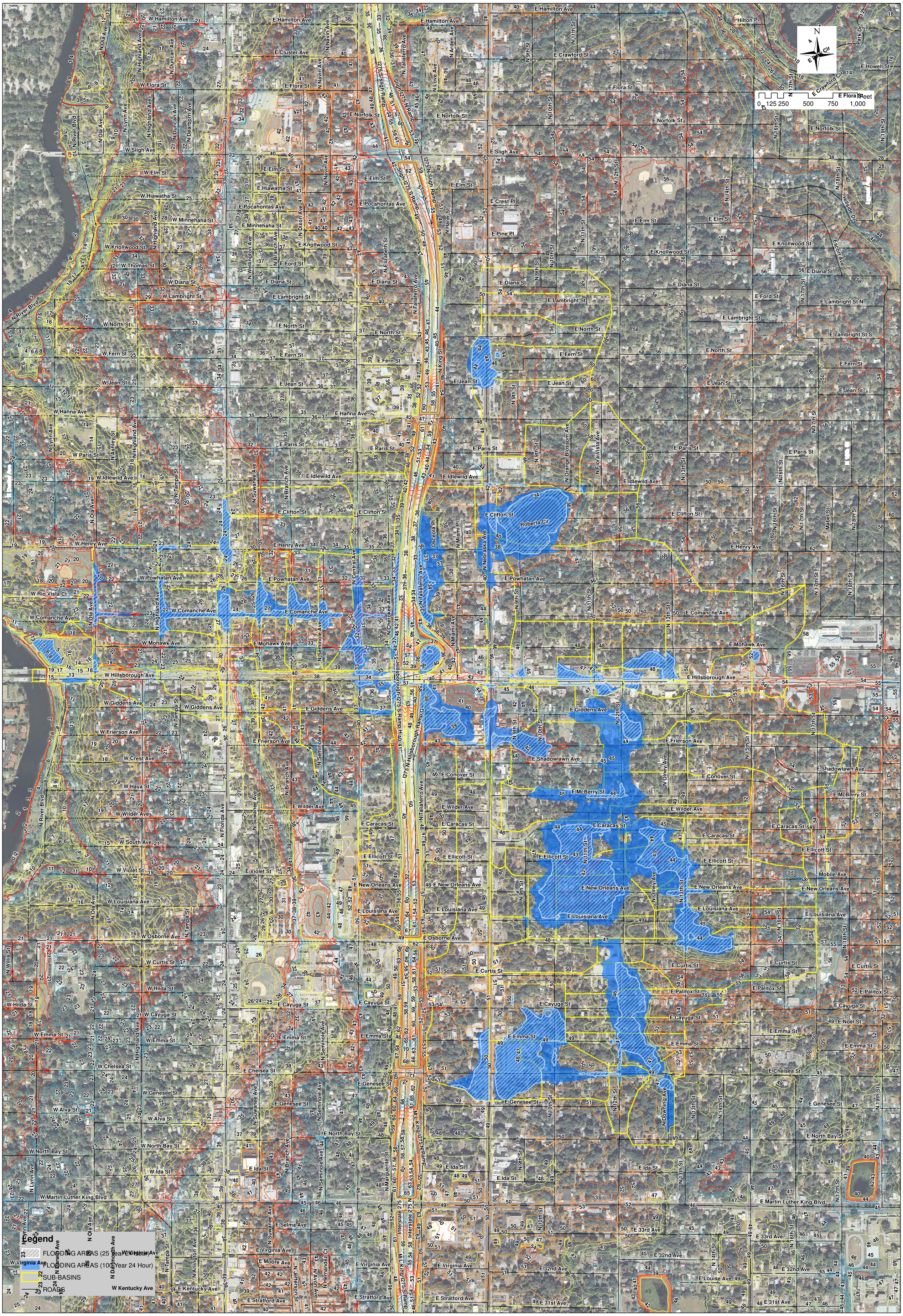
St Petersburg, FL 33702

SE Seminole Heights Drainage Improvements
Figure 10 - Existing Conditions 2.33-Year 8-Hour &
5-Year 8-Hour Storm Events Floodplain Maps



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St Petersburg, FL 33702

SE Seminole Heights Drainage Improvements
Figure 11 - Existing Conditions 25-Year 24-Hour & 100-Year 24-Hour Storm Events Floodplain Maps

5.0 Recommended Improvements

5.1 Modeling Approach

The approach to developing drainage improvements to address identified level of service deficiencies is summarized below:

- Upgrade the drainage component(s) that have the greatest head loss.
- Ensure no adverse impacts upstream or downstream of the area of concern.
- Perform planning level modeling; additional lateral pipes that may be required for proper catchment within the basin shall be further evaluated during the design phase.

5.2 Changes in the Hydrologic & Hydraulic Model

The following changes were made to the existing conditions model:

Basin Areas

Three (3) catchment areas for Nodes N-205, N-663 and N-664 were added to the model to properly evaluate improvements that extended outside the initial study area. Each area was added to determine the amount of runoff and to size the proposed pipe runs within those areas accordingly.

Runoff Curve Numbers

No changes were made.

Initial Rainfall Abstraction

No changes were made.

Unit Hydrograph Method

No changes were made.

Time of Concentration

No changes were made.

Storage Representation

Storage values for node N-340 were reduced. This change was made to compensate for the proposed detention pond within the basin.

The following nodes were added to the proposed conditions to simulate the connection between the proposed detention pond and the existing conveyance system: N-346, N-345 and N-344.

The following additional nodes were added to the proposed conditions model to simulate the added three (3) Basins, the added outfall: N-205, N-58, N-318, N-319, N-663, N-664, and N-665.

Detailed storage volume data is presented in Appendix D.

Initial Conditions

The initial water elevation of Lake Roberta was lowered from 33.54' to 32.25' to match the proposed weir crest elevation. Initial Conditions data is presented in Appendix D.

Overland Weirs

An overland weir (R-345B) was added to simulate a spill crest for the top of bank of the proposed detention pond. Additional weirs (R-205B, R-500D, R-664C and R-663C) were added to simulate overland connections between the three (3) new basins for Nodes N-205, N-663 and N-664. Weir data is presented in Appendix D.

Reaches

Reaches were modified as necessary to accommodate the new structures. See Figure 12A & 12B – Proposed Conditions Hydraulic Connectivity Diagram. Reach data is presented in Appendix D.

Culverts

New and proposed changes to existing culverts, as presented in the Master plan, were updated in the Hydraulic model. Culvert data is presented in Appendix D.

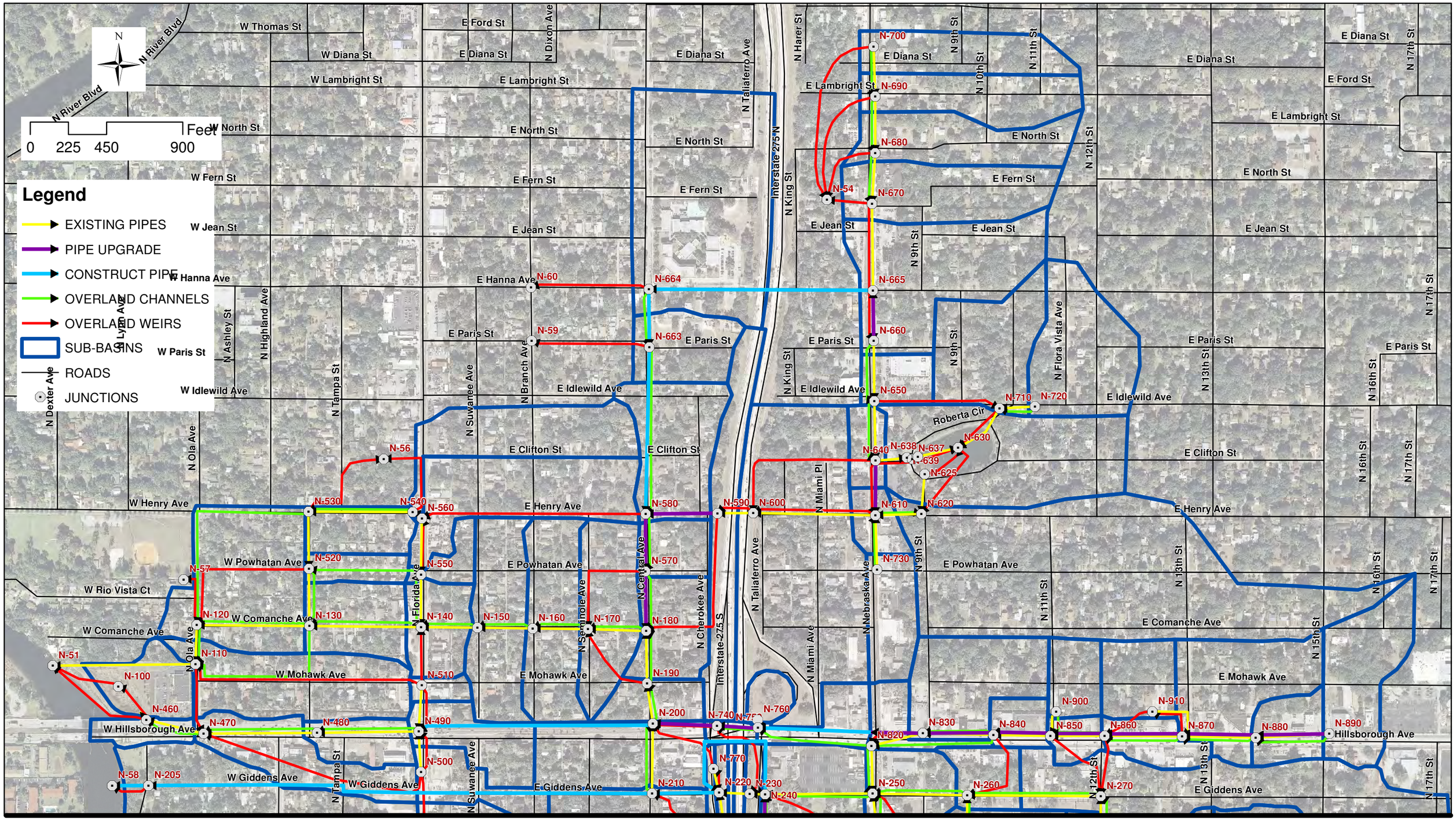
Channels

Additional channels (R-664A and R-663A) were added to simulate overland connections between the three (3) new basins. Channel data is presented in Appendix D.

Boundary Conditions

Three boundary nodes (N-58, N-59 and N-60) were added to properly simulate pop off drainage conditions for the three (3) added basins. Additionally, one other boundary node (N-61) was added to evaluate potential discharge onto N Florida Avenue.

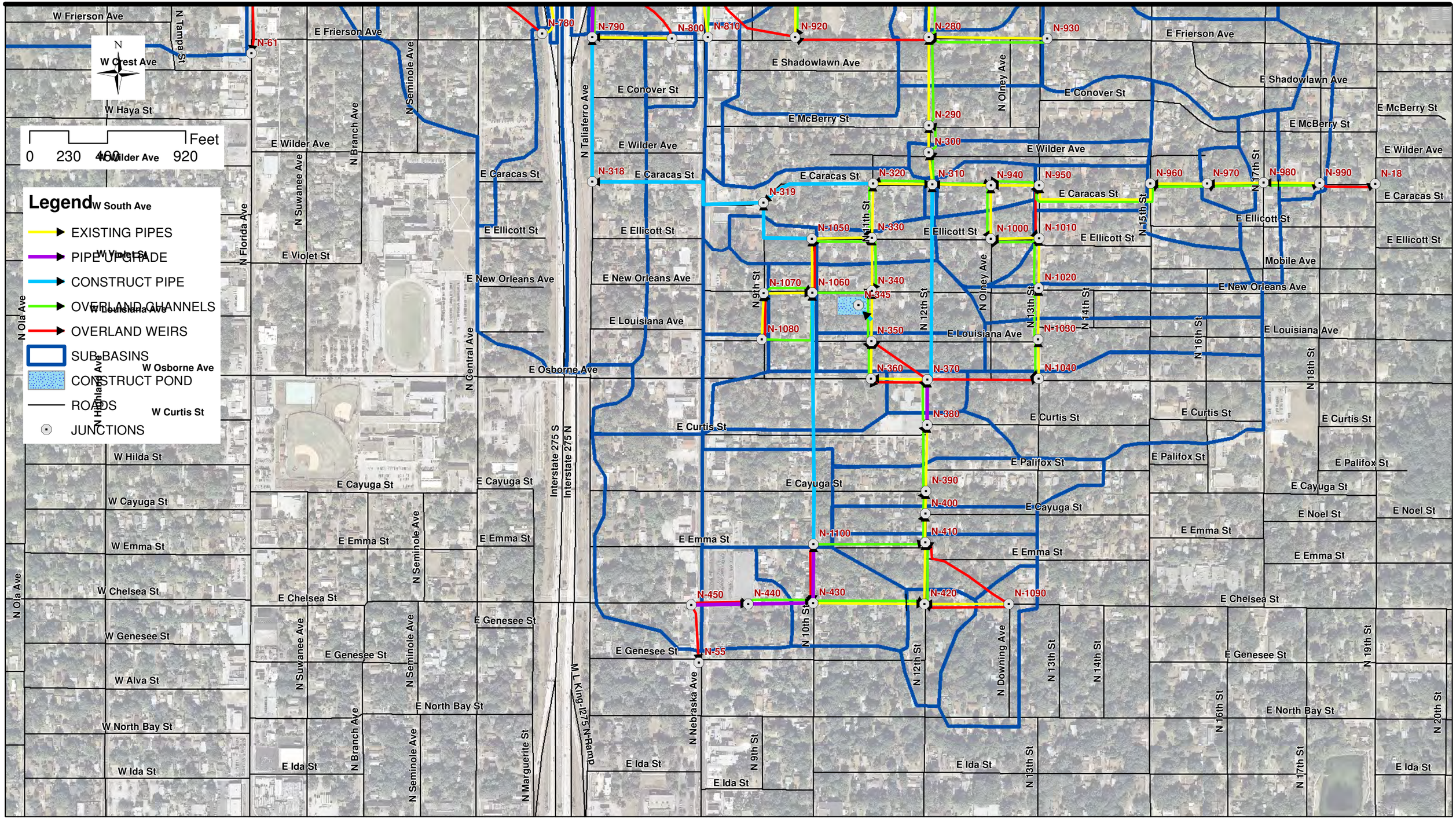
A revised hydraulic connectivity map was created for the proposed conditions (*See Figure 12A & 12B)*.



MATCH LINE - SEE FIGURE 12B

City of Tampa Stormwater Department	LAND&WATER ENGINEERING SCIENCE 9887 4th Street N, S # 319 St Petersburg, FL 33702	SE Seminole Heights Drainage Improvements Figure 12A - Proposed Conditions Connectivity Diagram (North)

MATCH LINE - SEE FIGURE 12A



City of Tampa Stormwater Department	LAND&WATER ENGINEERING SCIENCE 9887 4th Street N, S # 319 St Petersburg, FL 33702	SE Seminole Heights Drainage Improvements Figure 12B - Proposed Conditions Connectivity Diagram (South)

5.3 Discussion of Evaluated Alternatives

Numerous alternatives were evaluated to address the flooding conditions in the four primary areas of concern. The proposed improvements model underwent several iteration to present the ideal solution to alleviate flooding conditions at the following locations:

1. **Intersection of Nebraska Avenue & Chelsea Street:**

Available options for improvements in this area were limited, the conveyance system is an undersized 18 inch RCP. The option to increase the existing pipe size run along Chelsea Street and 12th Street N resulted in adverse impacts downstream. To mitigate the impact, a larger storm sewer piping system would be required for much longer runs. Therefore, it is important to create an alternative parallel drainage system along N 10th Street to E New Orleans Avenue that runs independently to the main trunk line, where the adverse impact is observed. This option was evaluated and recommended.

2. **Intersection of New Orleans Avenue and N 11th Street and surrounding areas:**

Lower ground elevations at the intersection of E New Orleans Avenue and 11th Street with control elevation 3 feet above the low ground limits the surface drainage in this area of concern. To upgrade the main trunk line that runs along N 11th Street would require major capital investment with drastic upsizing of the drainage system all the way to the river a distance of approximately 9,000 LF; instead three separate storm sewer piping systems were evaluated to relieve pressure where the highest head loss is observed along the main trunkline. The first system runs westerly along E Caracas Street from N 11th Street to N Taliaferro Avenue, thence turns north to the intersection of E Frierson Avenue. The second storm sewer system runs westerly along E Ellicott Street from N 10th Street to N 9th Street, thence turns north to tie into the aforementioned proposed storm sewer system at the intersection of E Caracas Street. The third storm sewer piping system is proposed to extend the existing pipe run along N 12th Street from E Osborne Avenue to the main trunk line at E Caracas Street. These improvements alleviate flooding conditions within the area. Proposed improvements in this area will also include a water quality treatment pond to be built on the three (3) residential lots that were acquired by the City at the southwest corner of the intersection of E New Orleans Avenue and N 11th Street. The aforementioned BMP will provide minimal attenuation+/- 3,115 cu-yd. Expansion of the

pond through acquisition of additional residential homes was considered; however storage volume requirement to meet LOS will redeem this option undesirable.

3. Lake Roberta and surrounding areas:

Options were evaluated to disconnect the contributing drainage from North Nebraska Avenue discharging into the lake at E Clifton Street and reconnecting the storm sewer at E Henry Avenue by removing the existing plug and installing a new pipe at proper invert elevations. This option resulted in no improvements to flood stage elevations around the lake due to high tailwater conditions at the intersection of N Nebraska and E Henry Road. Therefore, to reduce the tailwater and observe a positive drainage from the lake, the cross drain culvert under I-275 should be upsized and extended all the way to W Comanche Avenue, or a new storm sewer system would have to be constructed to add capacity in the drainage system. The first route evaluated for the added capacity along Nebraska Avenue from E Henry to E Hillsborough Avenue. Extending the storm sewer to Hillsborough Avenue, resulted in adverse impacts downstream along West Hillsborough Avenue west of the N Florida intersection.

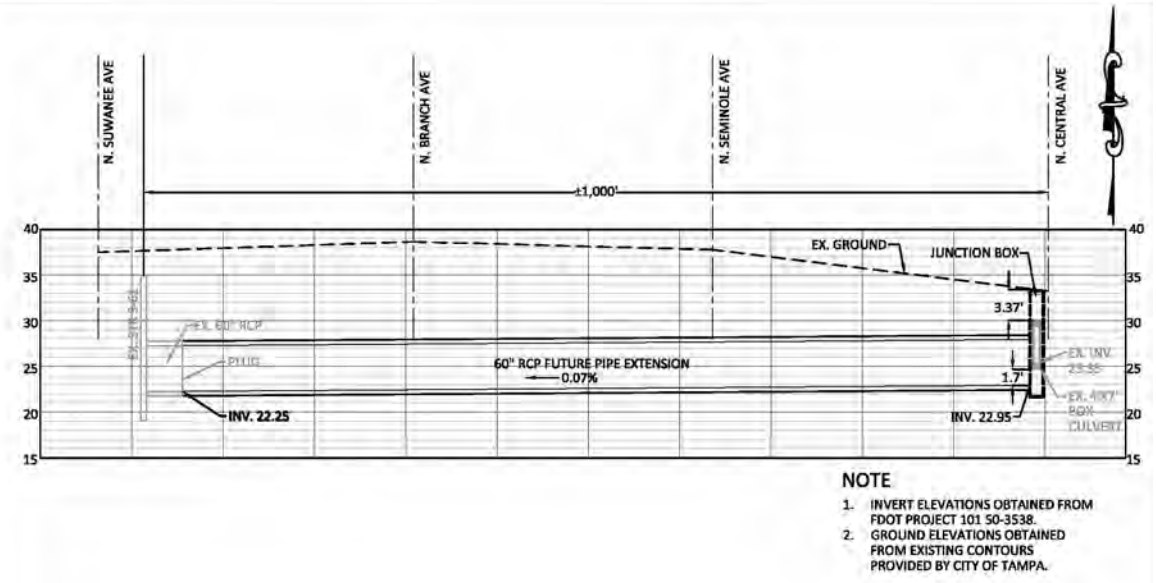
Another evaluated alternative and a recommended option will reduce the weir crest elevation in Lake Roberta by 1.29’ for about 4,700 CY of additional storage capacity; in addition to a new storm sewer piping system proposed along E Hanna Avenue and N Central Avenue. The proposed pipe run would capture the drainage from the basins located north of E Jean Street and route it along E Hanna Avenue prior to connecting into an existing system along N Central Avenue, bypassing Lake Roberta in the process. The existing system on N Central Avenue would then be upgraded to capture the additional drainage. This in turn, will reduce the amount of drainage flowing into the lake while reducing flood elevations along the northern part of N Nebraska Avenue. The proposed improvements would reach the targeted level of service protection.

4. W Comanche Avenue and surrounding areas:

The 4’x7’ box culvert running along Comanche Avenue conveys the drainage from almost the entire study area (except for W Hillsborough Avenue) and is a major outfall for the basin. Its limited capacity is the result of the existing flooding conditions on the road. To alleviate the flooding, either the existing box culvert would have to be upgraded or an additional parallel

conveyance system would have to be installed. Available routes for alternate parallel outfalls are Hillsborough Avenue or Giddens Avenue.

The Florida Department of Transportation, during the improvements for W Hillsborough Avenue, relocated the existing 4'x7' Box Culvert outfall few hundred feet to the north and placed it behind a 'Save-A-Lot' shopping center. In turn, FDOT installed a new 60-inch RCP along W Hillsborough Avenue extending from the river all the way to the intersection of N Suwanee Avenue, where the pipe is plugged. Currently, the 60-inch RCP receives limited drainage from W Hillsborough Avenue and discharges to a water quality treatment pond located west of a 'Save-A–Lot' shopping center. The pond is designed to provide water quality treatment for 89.7–Acre drainage basin extending to E Hillsborough Avenue and surrounding areas and has a treatment volume capacity of 3.74 ac-ft. Upon review of the record drawings for FDOT Project No. 10150-3543 for the improvements of W Hillsborough Avenue and the City File No. 87-E, a potential conflict was noted for the storm sewer extension along Hillsborough Avenue to the east and the 4'x7' box culvert crossing Hillsborough at N Central Avenue. Only 1.7 feet clearance is expected between the inverts of the two pipes. These elevations should be verified during the design stage. For planning purposes, model simulations were conducted to evaluate the benefits of extending the 60-inch RCP 100 LF easterly and connecting it to the box culvert (See Figure below).



Connecting the 60-inch RCP to the 4'x7' box culvert may require modification to the existing Environmental Resource Permit. In addition, this connection provides added relief in the main

trunk line to abate the flooding conditions on W Comanche Avenue and in the neighborhood of New Orleans and 11th Street N. It should be noted that the benefits observed on the neighborhood of New Orleans were limited only to smaller storm events. It adequately addressed the Level of Service requirements for road flooding (5-year/8-hour design storm event) with little or no benefit observed for structure flooding. As an added measure, a third outfall along W Giddens Avenue in addition to the existing Hillsborough Avenue 60-inch RCP and the Comanche Avenue 4'x7' Box culvert was evaluated to address structure protection benefits. The addition of a large box culvert extending from the problem area to the river will provide protection to 33 additional structures, resulting in a total of 98 structures being protected.

5.4 Recommended Project Descriptions

There are five (5) recommended projects for the basin to be constructed in three (3) phases, which are listed in the order to be implemented. Phase No. 1 includes Project No. 1 extending the storm sewer system along Hillsborough Avenue and Project No. 2 consisting of the storm sewer outfall along W Giddens Avenue. Projects 1 and 2 could be implemented concurrently or independently but are to be constructed first to eliminate the possibility for adverse impacts. Project No. 1 is within FDOT jurisdiction. The Department has initiated proposed improvements to E Hillsborough Avenue. Information from this study is to be shared with the Department for proper coordination and extension of the 60-inch RCP along Hillsborough Avenue. Phase 2, when implemented will eliminate the possibility for adverse impacts along the main trunkline in the south basin and includes Project No. 3 and Project No. 4. Project No. 3 is the proposed storm sewer system along E Hanna Avenue and N Central Avenue. Project No. 4 includes a proposed storm sewer system around the I-275 overpass and along E Caracas Street, N Taliaferro Avenue and N 10th Street. Additionally, it includes improvements such as upgrading of existing pipes along E Chelsea Street and disconnecting existing pipes along E Ellicott Street. Phase No. 3 includes Project No. 5 which consists of a proposed storm sewer system and upgrading existing system along N 12th Street.

PROJECT NO. 1 – IMPROVEMENTS ALONG HILLSBOROUGH AVE (SR-600)

This project will address the flooding problems as identified in Section 4 Level of Service Analysis for flooding conditions along Comanche Avenue and the region near the intersection of E New Orleans Avenue and N 11th Street (*See Figure 13*).

Table 8
Description Project No. 1

Project No. 1 – Hillsborough Avenue Improvements (FDOT)			
Project No	Location	Reach/Node No	Proposed Improvements
1	Intersection of N Suwanee Avenue and E Hillsborough Avenue extending east to intersection of N Central Avenue and E Hillsborough Avenue.	R-200C	Constr. 1000 LF 60" RCP. DS inv. 18.15' and US inv. 24.20'.
1	Intersection of N Central Avenue and E Hillsborough Avenue extending east ~620 FT towards intersection of N Nebraska Avenue and E Hillsborough Avenue.	R-740 R-750	Replace existing 24" and 18" RCP with 621 LF 42" RCP. DS inv. 25.11' and US inv. 29.41'.
1	Intersection of N Nebraska Avenue and E Hillsborough Avenue extending west ~678 FT towards intersection of N Central Avenue and E Hillsborough Avenue.	R-820B	Constr. 678 LF 42" RCP. DS inv. 29.41' and US inv. 35.15'.
1	Intersection of N Nebraska Avenue and E Hillsborough Avenue extending south towards intersection of E Giddens Avenue and N Nebraska Avenue.	R-820	Plug upstream end of 30" RCP to disconnect pipe from FDOT drainage system.
1	Intersection of N Nebraska Avenue and E Hillsborough Avenue extending east towards intersection of E Hillsborough Avenue and N 13th Street.	R-830 R-840 R-850 R-860 R-870	Replace existing 30" RCP with 1844 LF 36" RCP. DS inv. 35.15' and US inv. 40.67'.
1	Intersection of E Hillsborough Avenue and N 13th Street extending east towards intersection of E Hillsborough Avenue and N 15th Street.	R-880 R-890	Replace existing 24" RCP with 868 LF 24" RCP. DS inv. 40.67' and US inv. 44.70'.

PROJECT NO. 2 – IMPROVEMENTS ALONG W GIDDENS AVE

This project will further address and alleviate the flooding problems as identified in Section 4 Level of Service Analysis for flooding conditions along Comanche Avenue and the region near the intersection of E New Orleans Avenue and N 11th Street (*See Figure 14*).

Table 9
Project No. 2 – Description

Project No. 2 – W Giddens Avenue			
Project No	Location	Reach/Node No	Proposed Improvements
2	Intersection of N Central Avenue and W Giddens Avenue extending ~3,200 FT west towards the intersection of N River Blvd. and W Giddens Avenue.	R210B	Constr. 3,175 LF of 4' x 7' Box Culvert. DS inv. 2.00' and US inv. 27.00'.
2	Intersection of N River Blvd. and W Giddens Avenue extending ~150 FT west towards the Hillsborough River.	R-205	Constr. 150 LF of 7' x 8' Box Culvert. DS inv. -1.50' and US inv. -1.00'.

PROJECT NO. 3 – IMPROVEMENTS ALONG N 10th ST, E ELLICOT ST, N TALIAFERRO AVE & W GIDDENS AVE

This project will address the flooding problems as identified in Section 4 Level of Service Analysis for flooding conditions along N Nebraska Avenue, E Chelsea Street and the region near the intersection of E New Orleans Avenue and N 11th Street (*See Figure 15*). This project will function in conjunction with the existing dual 54" RCPs under I-275. The existing 54" RCPs are to be inspected, maintained and repaired as necessary to extend service life.

Table 10
Project No. 3 – Description

Project No. 3 – South-West Basins Improvements			
Project No	Location	Reach/Node No	Proposed Improvements
3	Intersection of N Central Avenue and E Giddens Avenue extending east ~325 FT towards I-275.	R-220B	Constr. 396 LF of 4' x 7' Box Culvert. DS inv. 27.00' and US inv. 27.34'.
3	~325 FT east of Intersection of N Central Avenue and E Giddens Avenue extending north to Hillsborough Avenue, going under and around the I-275 overpass and extending south along N Taliaferro Avenue to E Giddens Avenue.	R-240B	Constr. 925 LF of 4' x 7' Box Culvert. DS inv. 27.34' and US inv. 28.27'.
3	Intersection of N Taliaferro Avenue and E Giddens Avenue extending south ~325 FT to E Frierson Avenue.	R-790	Replace existing 24" RCP with 275 LF 4' x 7' Box Culvert. DS inv. 28.27' and US inv. 28.74'.

Project No. 3 – South-West Basins Improvements			
Project No	Location	Reach/Node No	Proposed Improvements
3	Intersection of N Taliaferro Avenue and E Frierson Avenue extending south ~850 FT to E Caracas Street	R-318	Constr. 850 LF of 4' x 7' Box Culvert. DS inv. 28.74' and US inv. 30.82'.
3	Intersection of N Taliaferro Avenue and E Caracas Street extending east ~1,150 FT to N 9th Street.	R-319	Constr. 1,110 LF of 60" RCP. DS inv. 30.82' and US inv. 32.60'.
3	Intersection of E Caracas Street and N 9th Street extending east ~700 FT to N 11th Street.	R-320B	Constr. 690 LF of 60" RCP. DS inv. 32.60' and US inv. 33.71'.
3	Intersection of E Caracas Street and N 9th Street extending south ~230 FT to E Ellicott Street and then extending east ~650 FT to N 11th Street.	R-1050	Constr. 510 LF of 36" RCP. DS inv. 32.60' and US inv. 35.72'. Plug upstream end of 36" RCP to disconnect pipe from main trunkline.
3	Intersection of E New Orleans Avenue and N 10th Street extending south ~1,500 FT to E Emma Street.	R-1100	Constr. 1,480 LF of 30" RCP. DS inv. 36.67' and US inv. 41.30'.
3	Intersection of E Emma Street and N 10th Street extending south ~330 FT to E Chelsea Street.	R-430B	Constr. 330 LF of 30" RCP. DS inv. 41.30' and US inv. 42.35'.
3	Intersection of E Chelsea Street and N 10th Street extending west ~380 LF west towards N Nebraska Avenue.	R-440	Replace existing 18" RCP with 406 LF of 30" RCP. DS inv. 42.35' and US inv. 44.61'.
3	Intersection of N Nebraska Avenue and E Chelsea Street extending ~230 LF east towards N 10th Street.	R-450	Replace existing 18" RCP with 337 LF of 24" RCP. DS inv. 44.51' and US inv. 45.68'.

PROJECT NO. 4 – IMPROVEMENTS LAKE ROBERTA

This project will address the flooding problems as identified in Section 4 Level of Service Analysis for the flood prone area identified as the third primary area. It will reduce flooding conditions around Lake Roberta, along N Nebraska Avenue, along N Taliaferro Avenue between E Powhatan Avenue and E Comanche Avenue, and along E Clifton Street near the intersection of N Nebraska Avenue. The leading reason for flooding in this area is the undersized conveyance system along E Henry Avenue that crosses underneath I-275 (*See Figure 16*).

Table 11
Project No. 4 – Description

Project No. 4 – North-East Basins Improvements			
Project No	Location	Reach/Node No	Proposed Improvements
4	Intersection of E Clifton Street and N Nebraska Avenue extending south to intersection of E Henry Avenue and N Nebraska Avenue.	R-640B	Replace existing 24" RCP with 330 LF 24" RCP. DS inv. 29.05' and US inv. 33.65'.
4	Intersection of Roberta Circle and N 9th Street.	R-630	Lower weir elevation from 33.54' to 32.25.
4	Intersection of N Central Avenue and E Henry Avenue extending east ~430 FT towards I-275.	R-590	Replace existing 36" RCP with 422 LF 42" RCP. DS inv. 26.67' and US inv. 27.62'.
4	Intersection of N Nebraska Avenue and E Paris Street extending north ~350 FT to E Hanna Avenue.	R-660B	Replace existing 30" RCP with 349 LF of 30" RCP. DS inv. 35.00' and US inv. 36.15'.
4	Intersection of Nebraska Avenue and E Hanna Avenue extending west ~1,325 FT to N Central Avenue.	R-665A	Constr. 1,350 LF of 36" RCP. DS inv. 30.00' and US inv. 35.00'.
4	Intersection of N Central Avenue and E Hanna Avenue extending south ~350 FT to E Paris Street.	R-664	Constr. 350 LF of 42" RCP. DS inv. 29.00' and US inv. 30.00'.
4	Intersection of N Central Avenue and E Paris Street extending south ~1,000 FT to E Henry Avenue.	R-663	Constr. 980 LF of 42" RCP. DS inv. 26.61' and US inv. 29.00'.
4	Intersection of N Central Avenue and E Henry Avenue extending south ~350 FT to E Powhatan Avenue.	R-580	Replace existing 36" RCP with 338 LF of 4' x 7' Box Culvert. DS inv. 26.13' and US inv. 26.61'.
4	Intersection of N Central Avenue and E Powhatan Avenue extending south ~350 FT to E Comanche Avenue.	R-570	Replace existing 36" RCP with 351 LF of 4' x 7' Box Culvert. DS inv. 26.07' and US inv. 22.10'.

PROJECT NO. 5 – IMPROVEMENTS ALONG N 12th STREET

This project will address the flooding problems as identified in Section 4 Level of Service Analysis for flooding conditions along N Nebraska Avenue, E Chelsea Street and the region near the intersection of E Osborne Avenue and N 13th Street (*See Figure 17*).

Table 12
Project No. 5 – Description

Project No. 5 – South-East Basins Improvements			
Project No	Location	Reach/Node No	Proposed Improvements
5	Intersection of E Caracas Street and N 12th Street extending south ~1,150 FT to E Osborne Avenue	R-370D	Constr. 1,150 LF of 48" RCP. DS inv. 33.14' and US inv. 37.15'.
5	Intersection of E Osborne Avenue and N 12th Street extending south ~270 FT to E Curtis Street.	R-380	Replace existing 42" RCP with 48" RCP. DS inv. 37.15' and US inv. 37.65'.

5.5 Results of Proposed Improvements

Factors that were considered in developing the recommended projects include maximizing the utilization of the existing system, and construction of new systems which will relieve flooding LOS deficiencies while considering traffic maintenance, existing grades within the basin and potential utility conflicts. These results are presented in Table 14 and Appendix F provides a complete presentation of evaluated design storm events. Please see Figures 18, 19 and 20 for the Proposed and Existing Conditions Floodplain Maps for the 5-Year 8-Hour, 25-Year 24-Hour and 100-year 24-Hour storm events.

These improvements lowered the peak stages to meet the LOS Criteria adopted by the City of Tampa at all locations.

Table 13
Master Plan Model Results

Node	Location	Min. Ground Elev. (ft, NAVD 88)	5-Year 8-Hour Storm Event					100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-450	E Chelsea St. & N Nebraska Ave.	49.82	50.18	0.36	48.03	2.15		50.56	0.74	50.49	0.07	0.67
N-440	N 10th St. & E Chelsea St.	48.99	49.33	0.34	46.52	2.81		49.74	0.75	49.64	0.1	0.65
N-1040	N 13th St. & E Osborne Ave.	43.66	44.43	0.77	41.46	2.97		45.8	2.14	45.77	0.03	2.11
N-1000	N Olney Ave. & E Ellicott St.	42.97	42.94		38.04	4.9		45.53	2.56	45.40	0.13	2.43
N-1060	N 10th St. & E New Orleans Ave.	42.47	43.03	0.56	39.23	3.8		45.55	3.08	44.38	1.17	1.91

Node	Location	Min. Ground Elev. (ft, NAVD 88)	5-Year 8-Hour Storm Event					100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-340	N 11th St. & E New Orleans Ave.	41.95	43.03	1.08	37.05	5.98		45.55	3.6	44.38	1.17	2.43
N-330	N 11th St. & E Ellicot St.	41.97	42.94	0.97	36.65	6.29		45.55	3.58	44.37	1.18	2.40
N-920	N 10th St. & E Frierson Ave.	41.67	41.9	0.23	37.00	4.90		42.52	0.85	42.47	0.05	0.8
N-870	N 13th St. & E Hillsborough Ave.	47.91	48.2	0.29	46.46	1.74		48.61	0.7	48.57	0.04	0.66
N-860	N 12th St. & E Hillsborough Ave.	47	47.3	0.3	45.28	2.02		47.68	0.68	47.64	0.04	0.64
N-850	N 11th St. & E Hillsborough Ave.	45.97	46.49	0.52	44.08	2.41		46.82	0.85	46.79	0.03	0.82
N-840	½ Way between N 9th St. & N 11th St. along E Hillsborough Ave.	45.99	46.05	0.06	42.42	3.63		46.29	0.3	46.26	0.03	0.27
N-820	N Nebraska Ave. & E Hillsborough Ave.	42.92	43.02	0.1	37.36	5.66		43.5	0.58	42.77	0.73	
N-640	N Nebraska Ave. & E Clifton St.	38.84	38.78		34.85	3.93		39.97	1.13	39.02	0.95	0.18
N-630	Roberta Circle & E Clifton St. (West Side)	34.76	37.17	2.41	34.77	2.40	0.01	39.95	5.19	39.10	0.85	4.34
N-630	Roberta Circle & N 9th St.	34.89	37.17	2.28	34.77	2.40		39.95	5.06	39.10	0.85	4.21
N-630	Roberta Circle & E Clifton St. (East Side)	35.17	37.17	2	34.77	2.40		39.95	4.78	39.10	0.85	3.93
N-630	Roberta Circle & N Orange Blossom Ave.	34.75	37.17	2.42	34.77	2.40	0.02	39.95	5.2	39.10	0.85	4.35
N-670	N Nebraska Ave. & E Fern St.	43.75	44.4	0.65	42.24	2.16		44.95	1.2	44.76	0.19	1.01
N-240	N Taliaferro Ave. & E Giddens Ave.	38.01	38.58	0.57	31.75	6.83		40.6	2.59	38.83	1.77	0.82
N-200	N Central Ave. & E Hillsborough Ave.	33.66	33.89	0.23	27.52	6.37		35.01	1.35	32.68	2.33	
N-190	N Central Ave. & E Mohawk Ave.	31.59	32.19	0.6	27.47	4.72		33.11	1.52	32.02	1.09	0.43
N-180	N Central Ave. & E Comanche Ave.	30.96	31.15	0.19	27.40	3.75		32.1	1.14	31.61	0.49	0.65
N-570	N Central Ave. & E Powhatan Ave.	31.95	32	0.05	28.27	3.73		32.4	0.45	32.20	0.2	0.25
N-600	N Taliaferro Ave. & E Powhatan Ave.	33.94	34.45	0.51	33.02	1.43		37.37	3.43	37.00	0.37	3.06
N-600	N Taliaferro Ave. & E Comanche Ave.	33	34.45	1.45	33.02	1.43	0.02	37.37	4.37	37.00	0.37	4.00
N-170	N Seminole Ave. & E Comanche Ave.	27.72	28.97	1.25	26.29	2.68		29.69	1.97	29.16	0.53	1.44
N-160	N Branch Ave. & E Comanche Ave.	25.99	27.73	1.74	25.16	2.57		28.45	2.46	27.97	0.48	1.98
N-150	N Suwanee Ave. & E Comanche Ave.	24.92	26.32	1.4	23.97	2.35		27.05	2.13	26.57	0.48	1.65
N-140	N Florida Ave. & E Comanche Ave.	23.75	25.23	1.48	22.67	2.56		26.03	2.28	25.54	0.49	1.79
N-560	N Florida Ave. & E Henry Ave.	24	24.12	0.12	23.92	0.2		24.38	0.38	24.37	0.01	0.37
N-540	N Florida Ave. & W Henry Ave.	23.86	24.09	0.23	21.20	2.89		24.31	0.45	24.3	0.01	0.44
N-560	N Florida Ave. & E Clifton St.	24	24.12	0.12	23.92	0.2		24.38	0.38	24.37	0.01	0.37
N-540	N Florida Ave. & E Clifton St.	23.95	24.09	0.14	21.20	2.89		24.31	0.36	24.3	0.01	0.35
N-130	N Highland Ave. & W Comanche Ave.	21.96	23.03	1.07	20.18	2.85		23.87	1.91	23.50	0.37	1.54
N-520	N Highland Ave. & W Powhatan Ave.	22.85	23.28	0.43	20.59	2.69		23.87	1.02	23.58	0.29	0.73
N-530	N Highland Ave. & W	23.41	23.58	0.17	20.92	2.66		23.82	0.41	23.72	0.10	0.31

Node	Location	Min. Ground Elev. (ft, NAVD 88)	5-Year 8-Hour Storm Event					100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)	Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
	Henry Ave.											
N-110	N Ola Ave. & W Hillsborough Ave.	15.42	15.84	0.42	12.29	3.55		17.35	1.93	16.80	0.55	1.38

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-1000	1209 E ELLICOTT ST	44.82	45.52	0.70	45.40	0.12	0.58
N-1000	1218 E ELLICOTT ST	45.30	45.52	0.22	45.40	0.12	0.10
N-1000	1213 E ELLICOTT ST	44.59	45.52	0.93	45.40	0.12	0.81
N-1000	1212 E ELLICOTT ST	43.65	45.52	1.87	45.40	0.12	1.75
N-1000	1203 E ELLICOTT ST	45.34	45.52	0.18	45.40	0.12	0.06
N-1000	1214 E ELLICOTT ST	44.05	45.52	1.47	45.40	0.12	1.35
N-1000	1204 E ELLICOTT ST	45.16	45.52	0.36	45.40	0.12	0.24
N-1000	1216 E ELLICOTT ST	44.27	45.52	1.25	45.40	0.12	1.13
N-1000	1217 E ELLICOTT ST	44.38	45.52	1.14	45.40	0.12	1.02
N-1000	1202 E ELLICOTT ST	45.30	45.52	0.22	45.40	0.12	0.10
N-1000	1210 E ELLICOTT ST	44.30	45.52	1.22	45.40	0.12	1.10
N-1000	1201 E ELLICOTT ST	45.34	45.52	0.18	45.40	0.12	0.06
N-1000	1208 E ELLICOTT ST	44.28	45.52	1.24	45.40	0.12	1.12
N-1000	1205 E ELLICOTT ST	45.33	45.52	0.19	45.40	0.12	0.07
N-1000	1215 E ELLICOTT ST	44.47	45.52	1.05	45.40	0.12	0.93
N-1000	1206 E ELLICOTT ST	44.49	45.52	1.03	45.40	0.12	0.91
N-1010	1212 NEW ORLEANS AV	45.27	45.54	0.27	45.42	0.12	0.15
N-1010	1220 E NEW ORLEANS AV	44.26	45.54	1.28	45.42	0.12	1.16
N-1010	1219 E ELLICOTT ST	44.30	45.54	1.24	45.42	0.12	1.12
N-1010	1214 E NEW ORLEANS AV	45.37	45.54	0.17	45.42	0.12	0.05
N-1010	1218 E NEW ORLEANS AV	45.26	45.54	0.28	45.42	0.12	0.16
N-1010	1301 E ELLICOTT ST	45.29	45.54	0.25	45.42	0.12	0.13
N-1030	1302 E LOUISIANA AV	45.30	45.79	0.49	45.76	0.03	0.46
N-1030	1304 E OSBORNE AV	45.24	45.79	0.55	45.76	0.03	0.52
N-1030	1306 E OSBORNE AV	45.22	45.79	0.57	45.76	0.03	0.54
N-1030	1302 E OSBORNE AV	45.52	45.79	0.27	45.76	0.03	0.24
N-1030	1308 E OSBORNE AV	45.54	45.79	0.25	45.76	0.03	0.22

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
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N-1030	1310 E OSBORNE AV	45.36	45.79	0.43	45.76	0.03	0.40
N-1030	1218 E LOUISIANA AVE	45.33	45.79	0.46	45.76	0.03	0.43
N-1030	4806 N 13TH ST	45.28	45.79	0.51	45.76	0.03	0.48
N-1030	1228 E OSBORNE AV	45.49	45.79	0.30	45.76	0.03	0.27
N-1030	4807 N 13TH ST	45.33	45.79	0.46	45.76	0.03	0.43
N-1040	1311 E OSBORNE AV	45.40	45.80	0.40	45.77	0.03	0.37
N-1040	1309 E OSBORNE AV	45.29	45.80	0.51	45.77	0.03	0.48
N-1040	1303 E OSBORNE AV	45.33	45.80	0.47	45.77	0.03	0.44
N-1040	1305 E OSBORNE AV	45.12	45.80	0.68	45.77	0.03	0.65
N-1040	1307 E OSBORNE AV	45.52	45.80	0.28	45.77	0.03	0.25
N-1040	1313 E OSBORNE AV	45.34	45.80	0.46	45.77	0.03	0.43
N-1040	1315 E OSBORNE AV	45.48	45.80	0.32	45.77	0.03	0.29
N-1040	1312 E OSBORNE AV	45.49	45.80	0.31	45.77	0.03	0.28
N-1040	1320 E OSBORNE AV	45.50	45.80	0.30	45.77	0.03	0.27
N-1040	1314 E OSBORNE AV	45.39	45.80	0.41	45.77	0.03	0.38
N-1040	1316 E OSBORNE AV	45.61	45.80	0.19	45.77	0.03	0.16
N-1060	918 E NEW ORLEANS AV	43.73	45.55	1.82	44.38	1.17	0.65
N-1060	916 NEW ORLEANS AV	44.49	45.55	1.06	44.38	1.17	
N-1060	4906 10TH ST	44.02	45.55	1.53	44.38	1.17	0.36
N-1060	912 E LOUISIANA AV	45.26	45.55	0.29	44.38	1.17	
N-1060	4904 N 10TH ST	44.16	45.55	1.39	44.38	1.17	0.22
N-1060	914 E NEW ORLEANS AV	45.10	45.55	0.45	44.38	1.17	
N-1060	917 NEW ORLEANS AV	44.30	45.55	1.25	44.38	1.17	0.08
N-1060	4806 N 10TH ST	45.30	45.55	0.25	44.38	1.17	
N-1060	914 E LOUISIANA AV	44.28	45.55	1.27	44.38	1.17	0.10
N-1090	1214 E CHELSEA ST	47.49	47.97	0.48	47.87	0.10	0.38
N-1090	1216 E CHELSEA ST	47.74	47.97	0.23	47.87	0.10	0.13
N-1090	1215 E CHELSEA ST	47.40	47.97	0.57	47.87	0.10	0.47
N-1100	918 E EMMA ST	49.24	49.32	0.08	49.09	0.23	
N-1100	909 E CAYUGA ST	49.26	49.32	0.06	49.09	0.23	
N-1100	921 E CAYUGA ST	49.30	49.32	0.02	49.09	0.23	
N-1100	917 E CAYUGA ST	49.30	49.32	0.02	49.09	0.23	
N-1100	914 E EMMA ST	49.01	49.32	0.31	49.09	0.23	0.08
N-1100	908 E EMMA ST	49.30	49.32	0.02	49.09	0.23	
N-1100	916 E EMMA ST	49.18	49.32	0.14	49.09	0.23	
N-1100	1002 E EMMA ST	49.30	49.32	0.02	49.09	0.23	

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
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N-1100	910 E EMMA ST	48.87	49.32	0.45	49.09	0.23	0.22
N-1100	912 E EMMA ST	48.59	49.32	0.73	49.09	0.23	0.50
N-1100	907 E CAYUGA ST	48.96	49.32	0.36	49.09	0.23	0.13
N-130	120 W COMANCHE AV	23.44	23.87	0.43	23.50	0.37	0.06
N-130	119 W COMANCHE AV	23.45	23.87	0.42	23.50	0.37	0.05
N-140	5602 FLORIDA AV	25.03	26.03	1.00	25.54	0.49	0.51
N-150	5607 N SUWANEE AV	26.45	27.05	0.60	26.57	0.48	0.12
N-150	5605 N SUWANEE AV	26.67	27.05	0.38	26.57	0.48	
N-150	5603 N SUWANEE AV	26.90	27.05	0.15	26.57	0.48	
N-150	5602 N BRANCH AV	26.66	27.05	0.39	26.57	0.48	
N-150	5609 N SUWANEE AV	26.54	27.05	0.51	26.57	0.48	0.03
N-160	5603 N BRANCH AV	27.46	28.45	0.99	27.97	0.48	0.51
N-160	307 E COMANCHE AV	28.44	28.45	0.01	27.97	0.48	
N-160	5601 N BRANCH AV	27.41	28.45	1.04	27.97	0.48	0.56
N-160	5509 N BRANCH AV	27.97	28.45	0.48	27.97	0.48	
N-160	5605 N BRANCH AV	27.42	28.45	1.03	27.97	0.48	0.55
N-170	5601 N SEMINOLE AV	29.65	29.69	0.04	29.16	0.53	
N-170	5507 N SEMINOLE AV	29.35	29.69	0.34	29.16	0.53	
N-170	5508 N SEMINOLE AV	29.56	29.69	0.13	29.16	0.53	
N-170	5509 N SEMINOLE AVE	29.39	29.69	0.30	29.16	0.53	
N-180	5502 N CENTRAL AV	31.38	32.10	0.72	31.61	0.49	0.23
N-180	5504 N CENTRAL AV	31.78	32.10	0.32	31.61	0.49	
N-190	5410 N CENTRAL AV	32.96	33.11	0.15	32.02	1.09	
N-240	5315 N TALIAFERRO AV	38.61	40.60	1.99	38.83	1.77	0.22
N-240	812 E FRIERSON AV	40.11	40.60	0.49	38.83	1.77	
N-240	810 E FRIERSON AV	40.13	40.60	0.47	38.83	1.77	
N-240	816 E FRIERSON AV	40.22	40.60	0.38	38.83	1.77	
N-240	808 E FRIERSON AV	40.19	40.60	0.41	38.83	1.77	
N-240	805 E GIDDENS AV	39.13	40.60	1.47	38.83	1.77	
N-240	701 E HILLSBOROUGH AV	38.83	40.60	1.77	38.83	1.77	
N-240	806 E FRIERSON AV	40.47	40.60	0.13	38.83	1.77	
N-240	803 E GIDDENS AV	38.58	40.60	2.02	38.83	1.77	0.25
N-240	815 E GIDDENS AV	40.06	40.60	0.54	38.83	1.77	
N-240	809 E GIDDENS AV	39.25	40.60	1.35	38.83	1.77	
N-240	807 E GIDDENS AV	39.32	40.60	1.28	38.83	1.77	
N-240	801 E GIDDENS AV	38.51	40.60	2.09	38.83	1.77	0.32

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N-250	5226 N NEBRASKA AV	41.40	42.31	0.91	41.73	0.58	0.33
N-250	5202 N NEBRASKA AV	41.54	42.31	0.77	41.73	0.58	0.19
N-250	5214 N NEBRASKA AV	41.44	42.31	0.87	41.73	0.58	0.29
N-250	5210 N NEBRASKA AV	41.45	42.31	0.86	41.73	0.58	0.28
N-250	5205 N NEBRASKA AV	42.18	42.31	0.13	41.73	0.58	
N-250	5205 N NEBRASKA AV	42.27	42.31	0.04	41.73	0.58	
N-250	5208 N 9TH ST	42.26	42.31	0.05	41.73	0.58	
N-250	5301 N NEBRASKA AV	42.01	42.31	0.30	41.73	0.58	
N-270	1205 E GIDDENS AV	44.02	45.00	0.98	44.72	0.28	0.70
N-270	1206 E FRIERSON AV	43.80	45.00	1.20	44.72	0.28	0.92
N-270	940 E GIDDENS AV	44.39	45.00	0.61	44.72	0.28	0.33
N-270	938 E GIDDENS AV	44.41	45.00	0.59	44.72	0.28	0.31
N-270	942 E GIDDENS AV	44.41	45.00	0.59	44.72	0.28	0.31
N-270	1207 E GIDDENS AV	44.16	45.00	0.84	44.72	0.28	0.56
N-270	944 E GIDDENS AV	44.72	45.00	0.28	44.72	0.28	
N-270	1208 E FRIERSON AV	44.33	45.00	0.67	44.72	0.28	0.39
N-270	5209 N 12TH ST	43.88	45.00	1.12	44.72	0.28	0.84
N-290	1200 E MCBERRY ST	44.35	45.16	0.81	44.96	0.20	0.61
N-290	924 E MCBERRY ST	44.56	45.16	0.60	44.96	0.20	0.40
N-290	926 E MCBERRY ST	44.63	45.16	0.53	44.96	0.20	0.33
N-290	936 E MCBERRY ST	44.88	45.16	0.28	44.96	0.20	0.08
N-290	938 E MCBERRY ST	44.45	45.16	0.71	44.96	0.20	0.51
N-290	918 E MCBERRY ST	44.29	45.16	0.87	44.96	0.20	0.67
N-290	937 E MCBERRY ST	45.16	45.16	0.00	44.96	0.20	
N-290	920 E MCBERRY ST	44.47	45.16	0.69	44.96	0.20	0.49
N-290	928 E MCBERRY ST	44.80	45.16	0.36	44.96	0.20	0.16
N-290	932 E MCBERRY ST	44.78	45.16	0.38	44.96	0.20	0.18
N-290	922 E MCBERRY ST	44.23	45.16	0.93	44.96	0.20	0.73
N-300	1202 E CARACAS ST	45.17	45.24	0.07	45.00	0.24	
N-320	1021 E CARACAS ST	44.37	45.54	1.17	44.34	1.20	
N-320	1014 E CARACAS ST	45.33	45.54	0.21	44.34	1.20	
N-320	1104 E CARACAS ST	45.38	45.54	0.16	44.34	1.20	
N-320	1016 E CARACAS ST	44.95	45.54	0.59	44.34	1.20	
N-320	1010 E ELLICOTT ST	44.31	45.54	1.23	44.34	1.20	0.03
N-320	1009 E CARACAS ST	45.04	45.54	0.50	44.34	1.20	
N-320	1105 E CARACAS ST	45.40	45.54	0.14	44.34	1.20	

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-320	1014 E ELLICOTT ST	43.85	45.54	1.69	44.34	1.20	0.49
N-320	1018 E CARACAS ST	44.53	45.54	1.01	44.34	1.20	
N-320	1022 E CARACAS ST	44.47	45.54	1.07	44.34	1.20	
N-320	1102 E CARACAS ST	45.31	45.54	0.23	44.34	1.20	
N-320	1109 E CARACAS ST	45.48	45.54	0.06	44.34	1.20	
N-320	1107 E CARACAS ST	45.36	45.54	0.18	44.34	1.20	
N-320	1016 E ELLICOTT ST	43.53	45.54	2.01	44.34	1.20	0.81
N-320	1101 E CARACAS ST	44.95	45.54	0.59	44.34	1.20	
N-320	1012 E ELLICOTT ST	43.79	45.54	1.75	44.34	1.20	0.55
N-320	1012 E CARACAS ST	45.41	45.54	0.13	44.34	1.20	
N-320	1006 E ELLICOTT ST	44.74	45.54	0.80	44.34	1.20	
N-320	** CONFIDENTIAL **	44.28	45.54	1.26	44.34	1.20	0.06
N-320	1019 E CARACAS ST	44.28	45.54	1.26	44.34	1.20	0.06
N-320	1018 E ELLICOTT ST	43.46	45.54	2.08	44.34	1.20	0.88
N-320	1011 E CARACAS ST	44.30	45.54	1.24	44.34	1.20	0.04
N-320	1106 E CARACAS ST	45.48	45.54	0.06	44.34	1.20	
N-330	1110 E ELLICOTT ST	45.42	45.55	0.13	44.37	1.18	
N-330	1107 E ELLICOTT ST	44.25	45.55	1.30	44.37	1.18	0.12
N-330	1011 E ELLICOTT ST	42.34	45.55	3.21	44.37	1.18	2.03
N-330	1103 E ELLICOTT ST	43.63	45.55	1.92	44.37	1.18	0.74
N-330	1109 E ELLICOTT ST	45.03	45.55	0.52	44.37	1.18	
N-330	1003 E ELLICOTT ST	43.28	45.55	2.27	44.37	1.18	1.09
N-330	1005 E ELLICOTT ST	43.05	45.55	2.50	44.37	1.18	1.32
N-330	1101 E ELLICOTT ST	42.67	45.55	2.88	44.37	1.18	1.70
N-330	1001 E ELLICOTT ST	43.30	45.55	2.25	44.37	1.18	1.07
N-330	1007 E ELLICOTT ST	42.67	45.55	2.88	44.37	1.18	1.70
N-330	1009 E ELLICOTT ST	42.44	45.55	3.11	44.37	1.18	1.93
N-330	1105 E ELLICOTT ST	43.96	45.55	1.59	44.37	1.18	0.41
N-340	1010 E LOUISIANA AV	44.15	45.55	1.40	44.38	1.17	0.23
N-340	1202 E NEW ORLEANS AV	45.30	45.55	0.25	44.38	1.17	
N-340	1102 E NEW ORLEANS AV	42.35	45.55	3.20	44.38	1.17	2.03
N-340	5002 N 12TH ST	44.46	45.55	1.09	44.38	1.17	
N-340	1008 E NEW ORLEANS AV	42.34	45.55	3.21	44.38	1.17	2.04
N-340	1104 E NEW ORLEANS AV	42.34	45.55	3.21	44.38	1.17	2.04
N-340	1006 E NEW ORLEANS AV	42.36	45.55	3.19	44.38	1.17	2.02
N-340	1108 E NEW ORLEANS AV	44.03	45.55	1.52	44.38	1.17	0.35

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-340	1004 E NEW ORLEANS AV	42.43	45.55	3.12	44.38	1.17	1.95
N-340	1106 E NEW ORLEANS AV	42.80	45.55	2.75	44.38	1.17	1.58
N-340	1111 E NEW ORLEANS AV	44.79	45.55	0.76	44.38	1.17	
N-340	1003 E NEW ORLEANS AV	42.42	45.55	3.13	44.38	1.17	1.96
N-340	1001 E NEW ORLEANS AV	42.53	45.55	3.02	44.38	1.17	1.85
N-340	1010 E NEW ORLEANS AV	42.30	45.55	3.25	44.38	1.17	2.08
N-340	1107 E NEW ORLEANS AV	42.48	45.55	3.07	44.38	1.17	1.90
N-340	1109 E NEW ORLEANS AV	43.68	45.55	1.87	44.38	1.17	0.70
N-340	1104 E LOUISIANA AVE	44.03	45.55	1.52	44.38	1.17	0.35
N-340	1100 E LOUISIANA AV	44.19	45.55	1.36	44.38	1.17	0.19
N-340	1002 E LOUISIANA AV	44.40	45.55	1.15	44.38	1.17	
N-340	1006 E LOUISIANA AV	44.60	45.55	0.95	44.38	1.17	
N-340	1106 E LOUISIANA AV	44.14	45.55	1.41	44.38	1.17	0.24
N-340	1002 E NEW ORLEANS AV	42.67	45.55	2.88	44.38	1.17	1.71
N-340	1008 E LOUISIANA AV	43.93	45.55	1.62	44.38	1.17	0.45
N-340	1004 E LOUISIANA AV	44.92	45.55	0.63	44.38	1.17	
N-340	1108 E LOUISIANA AV	44.44	45.55	1.11	44.38	1.17	
N-340	1101 E NEW ORLEANS AV	42.31	45.55	3.24	44.38	1.17	2.07
N-340	1102 E LOUISIANA AV	44.25	45.55	1.30	44.38	1.17	0.13
N-370	1102 E CURTIS ST	46.50	47.13	0.63	45.63	1.50	
N-380	1201 E CURTIS ST	46.29	47.71	1.42	46.42	1.29	0.13
N-380	1109 E CURTIS ST	47.03	47.71	0.68	46.42	1.29	
N-380	1205 E CURTIS ST	46.08	47.71	1.63	46.42	1.29	0.34
N-380	1202 E CURTIS ST	47.02	47.71	0.69	46.42	1.29	
N-380	1203 E CURTIS ST	46.13	47.71	1.58	46.42	1.29	0.29
N-390	1202 E PALIFOX ST	45.54	47.76	2.22	47.05	0.71	1.51
N-390	1205 E PALIFOX ST	45.99	47.76	1.77	47.05	0.71	1.06
N-390	1209 E PALIFOX ST	46.39	47.76	1.37	47.05	0.71	0.66
N-390	1207 E PALIFOX ST	46.19	47.76	1.57	47.05	0.71	0.86
N-390	4601 N 12TH ST	46.51	47.76	1.25	47.05	0.71	0.54
N-390	1206 E CAYUGA ST	47.06	47.76	0.70	47.05	0.71	
N-390	1201 E PALIFOX ST	45.94	47.76	1.82	47.05	0.71	1.11
N-390	1023 E CAYUGA ST	47.56	47.76	0.20	47.05	0.71	
N-390	1210 E PALIFOX ST	47.42	47.76	0.34	47.05	0.71	
N-390	1203 E PALIFOX ST	46.06	47.76	1.70	47.05	0.71	0.99
N-390	1204 E CAYUGA ST	46.86	47.76	0.90	47.05	0.71	0.19

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-390	1202 E CAYUGA ST	46.56	47.76	1.20	47.05	0.71	0.49
N-390	1025 E CAYUGA ST	47.27	47.76	0.49	47.05	0.71	
N-390	1208 E PALIFOX ST	46.15	47.76	1.61	47.05	0.71	0.90
N-390	1206 E PALIFOX ST	45.54	47.76	2.22	47.05	0.71	1.51
N-390	1204 E PALIFOX ST	45.41	47.76	2.35	47.05	0.71	1.64
N-390	1024 E CAYUGA ST	47.53	47.76	0.23	47.05	0.71	
N-400	1201 E CAYUGA ST	46.82	47.80	0.98	47.35	0.45	0.53
N-400	4504 N 12TH ST	46.99	47.80	0.81	47.35	0.45	0.36
N-400	1203 E CAYUGA ST	46.83	47.80	0.97	47.35	0.45	0.52
N-400	1207 E CAYUGA ST	47.07	47.80	0.73	47.35	0.45	0.28
N-400	1026 E EMMA ST	47.29	47.80	0.51	47.35	0.45	0.06
N-400	1205 E CAYUGA ST	46.87	47.80	0.93	47.35	0.45	0.48
N-410	1212 E EMMA ST	47.29	47.91	0.62	47.70	0.21	0.41
N-410	1206 E EMMA ST	47.10	47.91	0.81	47.70	0.21	0.60
N-410	1202 E EMMA ST	47.24	47.91	0.67	47.70	0.21	0.46
N-410	1211 E EMMA ST	47.28	47.91	0.63	47.70	0.21	0.42
N-410	1215 E EMMA ST	47.32	47.91	0.59	47.70	0.21	0.38
N-410	1204 E EMMA ST	47.21	47.91	0.70	47.70	0.21	0.49
N-410	1205 E EMMA ST	47.39	47.91	0.52	47.70	0.21	0.31
N-410	1209 E EMMA ST	47.53	47.91	0.38	47.70	0.21	0.17
N-410	1211 E EMMA ST	47.34	47.91	0.57	47.70	0.21	0.36
N-410	1212 E CHELSEA ST	47.30	47.91	0.61	47.70	0.21	0.40
N-430	912 E CHELSEA ST	49.13	49.34	0.21	49.24	0.10	0.11
N-430	919 E EMMA ST	49.31	49.34	0.03	49.24	0.10	
N-430	1002 E CHELSEA ST	49.31	49.34	0.03	49.24	0.10	
N-430	1001 E EMMA ST	49.32	49.34	0.02	49.24	0.10	
N-430	917 E EMMA ST	48.05	49.34	1.29	49.24	0.10	1.19
N-430	910 E CHELSEA ST	48.33	49.34	1.01	49.24	0.10	0.91
N-430	911 E EMMA ST	47.14	49.34	2.20	49.24	0.10	2.10
N-440	4407 N NEBRASKA AV	49.22	49.74	0.52	49.64	0.10	0.42
N-440	908 E CHELSEA ST	47.97	49.74	1.77	49.64	0.10	1.67
N-440	904 E CHELSEA ST	48.24	49.74	1.50	49.64	0.10	1.40
N-440	906 E CHELSEA ST	47.79	49.74	1.95	49.64	0.10	1.85
N-440	911 E CHELSEA ST	49.24	49.74	0.50	49.64	0.10	0.40
N-440	907 E CHELSEA ST	49.11	49.74	0.63	49.64	0.10	0.53
N-440	909 E CHELSEA ST	49.08	49.74	0.66	49.64	0.10	0.56

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
			Exist. Cond. Max. Stage (ft, NAVD88)	Exist. Cond. Max. Depth of Flooding (ft, NAVD88)	Master Plan Max. Stage (ft, NAVD88)	Reduction in Flood Elev. (ft, NAVD88)	Prop. Cond. Max. Depth of Flooding (ft, NAVD88)
N-440	913 E CHELSEA ST	49.50	49.74	0.24	49.64	0.10	0.14
N-450	4500 N NEBRASKA AV	50.34	50.56	0.22	50.49	0.07	0.15
N-450	815 E CHELSEA ST	50.46	50.56	0.10	50.49	0.07	0.03
N-450	4330 N NEBRASKA AV	50.31	50.56	0.25	50.49	0.07	0.18
N-450	816 E CHELSEA ST	50.34	50.56	0.22	50.49	0.07	0.15
N-450	4402 N NEBRASKA AV	50.28	50.56	0.28	50.49	0.07	0.21
N-450	4308 N NEBRASKA AV	50.29	50.56	0.27	50.49	0.07	0.20
N-450	4302 N NEBRASKA AV	50.30	50.56	0.26	50.49	0.07	0.19
N-600	5607 N TALIAFERRO AV	36.54	37.37	0.83	37.00	0.37	0.46
N-600	5709 N TALIAFERRO AV	37.26	37.37	0.11	37.00	0.37	
N-600	5701 N TALIAFERRO AV	36.19	37.37	1.18	37.00	0.37	0.81
N-600	5707 N TALIAFERRO AV	37.08	37.37	0.29	37.00	0.37	
N-600	5705 N TALIAFERRO AV	36.96	37.37	0.41	37.00	0.37	0.04
N-600	5605 N TALIAFERRO AV	37.00	37.37	0.37	37.00	0.37	
N-600	5609 N TALIAFERRO AV	35.78	37.37	1.59	37.00	0.37	1.22
N-600	5509 N TALIAFERRO AV	34.86	37.37	2.51	37.00	0.37	2.14
N-600	5802 OSCEOLA PL	36.27	37.37	1.10	37.00	0.37	0.73
N-610	5725 N NEBRASKA AV	38.79	39.93	1.14	38.35	1.58	
N-610	5710 N NEBRASKA AV	39.33	39.93	0.60	38.35	1.58	
N-620	1001 E HENRY AV	39.39	39.95	0.56	39.10	0.85	
N-620	5712 N 9TH ST	38.93	39.95	1.02	39.10	0.85	0.17
N-620	1003 E HENRY AV	39.10	39.95	0.85	39.10	0.85	
N-620	5801 N 9TH ST	37.26	39.95	2.69	39.10	0.85	1.84
N-620	1016 E HENRY AV	39.04	39.95	0.91	39.10	0.85	0.06
N-620	1005 E HENRY AV	39.38	39.95	0.57	39.10	0.85	
N-620	1007 E HENRY AV	39.91	39.95	0.04	39.10	0.85	
N-620	1012 E HENRY AV	37.49	39.95	2.46	39.10	0.85	1.61
N-620	1014 E HENRY AV	38.12	39.95	1.83	39.10	0.85	0.98
N-620	904 E HENRY AV	38.70	39.95	1.25	39.10	0.85	0.40
N-620	5802 N 9TH ST	38.24	39.95	1.71	39.10	0.85	0.86
N-620	5903 ROBERTA CR	39.71	39.95	0.24	39.10	0.85	
N-630	6013 ROBERTA CR	39.23	39.95	0.72	39.10	0.85	
N-630	6011 ROBERTA CR	39.23	39.95	0.72	39.10	0.85	
N-630	6009 ROBERTA CR	38.98	39.95	0.97	39.10	0.85	0.12
N-630	5907 ROBERTA CR	39.46	39.95	0.49	39.10	0.85	
N-630	5805 ROBERTA CR	37.11	39.95	2.84	39.10	0.85	1.99

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
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N-630	1002 E CLIFTON ST	39.81	39.95	0.14	39.10	0.85	
N-630	5807 ROBERTA CR	37.54	39.95	2.41	39.10	0.85	1.56
N-630	5803 ROBERTA CR	36.57	39.95	3.38	39.10	0.85	2.53
N-630	5809 ROBERTA CR	38.30	39.95	1.65	39.10	0.85	0.80
N-630	5905 ROBERTA CR	39.07	39.95	0.88	39.10	0.85	0.03
N-630	1001 E CLIFTON ST	39.04	39.95	0.91	39.10	0.85	0.06
N-630	6001 ROBERTA CR	38.07	39.95	1.88	39.10	0.85	1.03
N-630	5809 N NEBRASKA AV	38.38	39.95	1.57	39.10	0.85	0.72
N-630	6007 ROBERTA CR	38.80	39.95	1.15	39.10	0.85	0.30
N-630	5801 ROBERTA CR	38.30	39.95	1.65	39.10	0.85	0.80
N-630	5806 N 9TH ST	37.65	39.95	2.30	39.10	0.85	1.45
N-630	5804 N 9TH ST	38.22	39.95	1.73	39.10	0.85	0.88
N-640	5901 N NEBRASKA AV	38.99	39.97	0.98	39.02	0.95	0.03
N-670	6310 N NEBRASKA AV	44.88	44.95	0.07	44.76	0.19	
N-670	6302 N NEBRASKA AV	44.94	44.95	0.01	44.76	0.19	
N-670	6306 N NEBRASKA AV	44.36	44.95	0.59	44.76	0.19	0.40
N-670	6304 N NEBRASKA AV	44.93	44.95	0.02	44.76	0.19	
N-680	809 E NORTH ST	45.36	45.70	0.34	45.66	0.04	0.30
N-810	5201 N NEBRASKA AV	42.29	42.35	0.06	42.28	0.07	
N-830	1002 E HILLSBOROUGH AV	45.30	45.43	0.13	45.24	0.19	
N-850	1115 E HILLSBOROUGH AV	46.80	46.82	0.02	46.79	0.03	
N-850	1101 E HILLSBOROUGH AV	46.49	46.82	0.33	46.79	0.03	0.30
N-850	1102 E HILLSBOROUGH AV	46.81	46.82	0.01	46.79	0.03	
N-860	1203 E HILLSBOROUGH AV	47.30	47.68	0.38	47.64	0.04	0.34
N-860	1205 E HILLSBOROUGH AV	47.59	47.68	0.09	47.64	0.04	0.05
N-870	1229 E MOHAWK AV	48.56	48.61	0.05	48.57	0.04	0.01
N-880	1307 E HILLSBOROUGH AV	50.53	50.63	0.10	50.60	0.03	0.07
N-920	5204 N 9TH ST	42.30	42.52	0.22	42.47	0.05	0.17
N-920	5202 N 10TH ST	41.98	42.52	0.54	42.47	0.05	0.49
N-920	5203 N 9TH ST	42.30	42.52	0.22	42.47	0.05	0.17
N-920	5201 N 9TH ST	42.30	42.52	0.22	42.47	0.05	0.17
N-920	916 E SHADOWLAWN AV	41.97	42.52	0.55	42.47	0.05	0.50
N-920	918 E SHADOWLAWN AV	42.01	42.52	0.51	42.47	0.05	0.46
N-940	1211 E CARACAS ST	44.34	45.51	1.17	45.37	0.14	1.03
N-940	1209 E CARACAS ST	44.42	45.51	1.09	45.37	0.14	0.95
N-940	1206 E CARACAS ST	45.30	45.51	0.21	45.37	0.14	0.07

Node	Parcel Address	Est. Finish Floor Elev. (ft, NAVD 88)	100-Year 24-Hour Storm Event				
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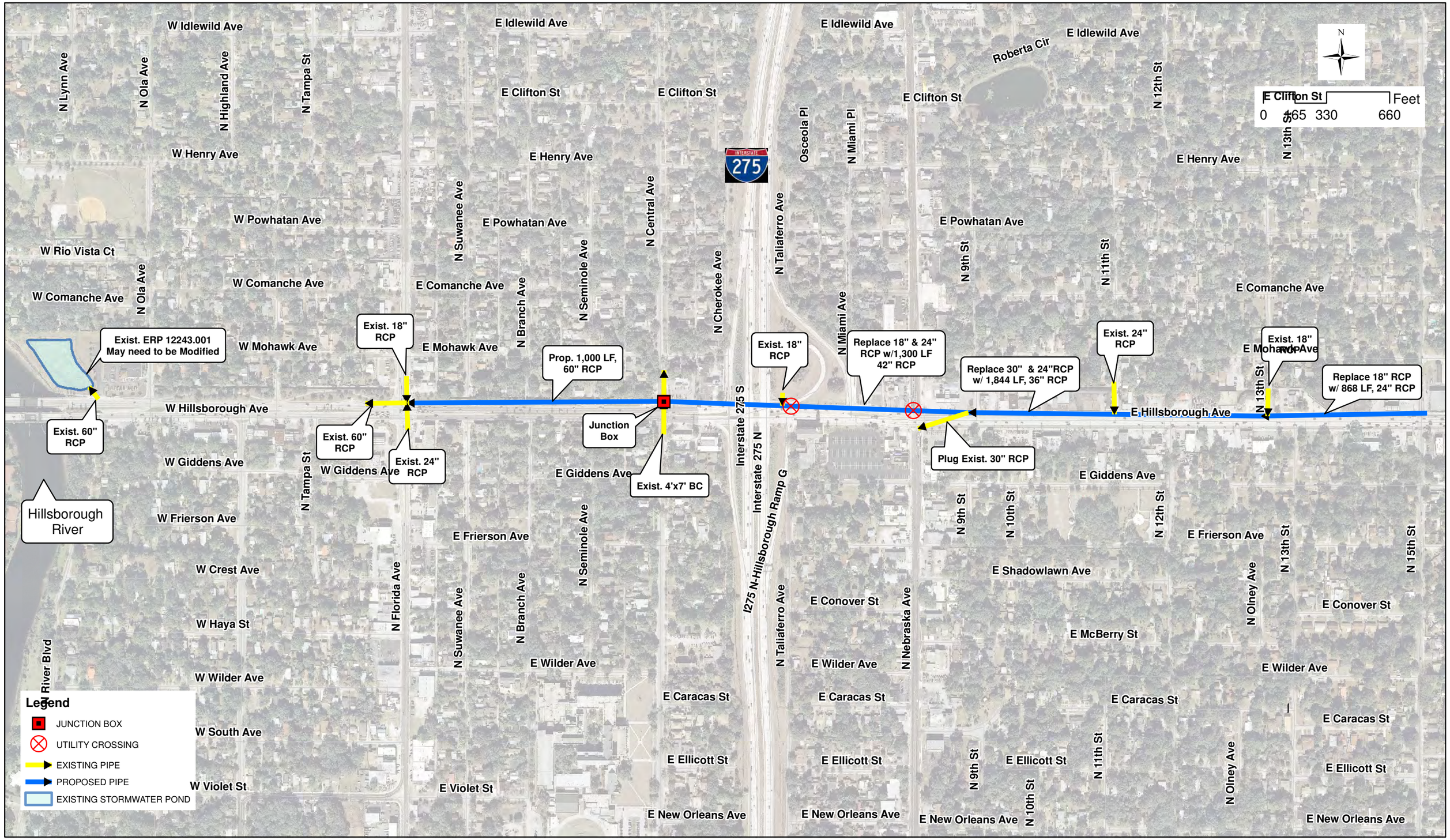
N-940	1203 E CARACAS ST	45.41	45.51	0.10	45.37	0.14	
N-940	1208 E CARACAS ST	44.93	45.51	0.58	45.37	0.14	0.44
N-940	1210 E CARACAS ST	45.05	45.51	0.46	45.37	0.14	0.32
N-940	1205 E CARACAS ST	44.76	45.51	0.75	45.37	0.14	0.61
N-940	1207 E CARACAS ST	44.45	45.51	1.06	45.37	0.14	0.92
N-940	1204 E CARACAS ST	45.33	45.51	0.18	45.37	0.14	0.04



City of Tampa
Stormwater Department

LAND&WATER
ENGINEERING SCIENCE
9887 4th Street N, S # 319
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SE Seminole Heights Drainage Improvements
Figure 13 - Project 1 - Hillsborough Avenue Improvements
(FDOT Jurisdiction)

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SE Seminole Heights Drainage Improvements
Figure 14 - Project 2 - W Giddens Avenue Improvements

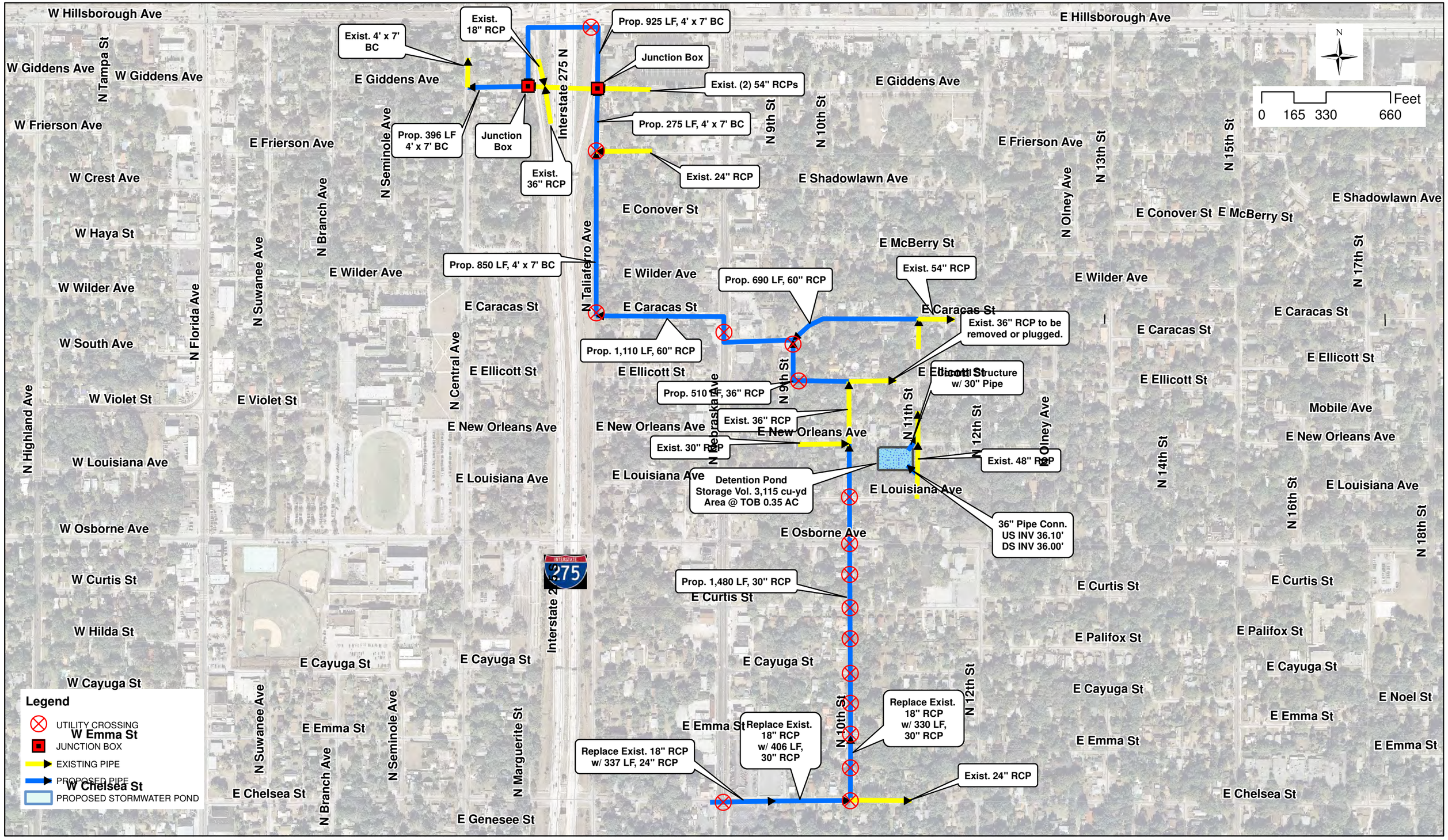

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Figure 15 - Project 3 - South-West Basins Improvements

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Figure 16 - Project 4 - North-East Basins Improvements

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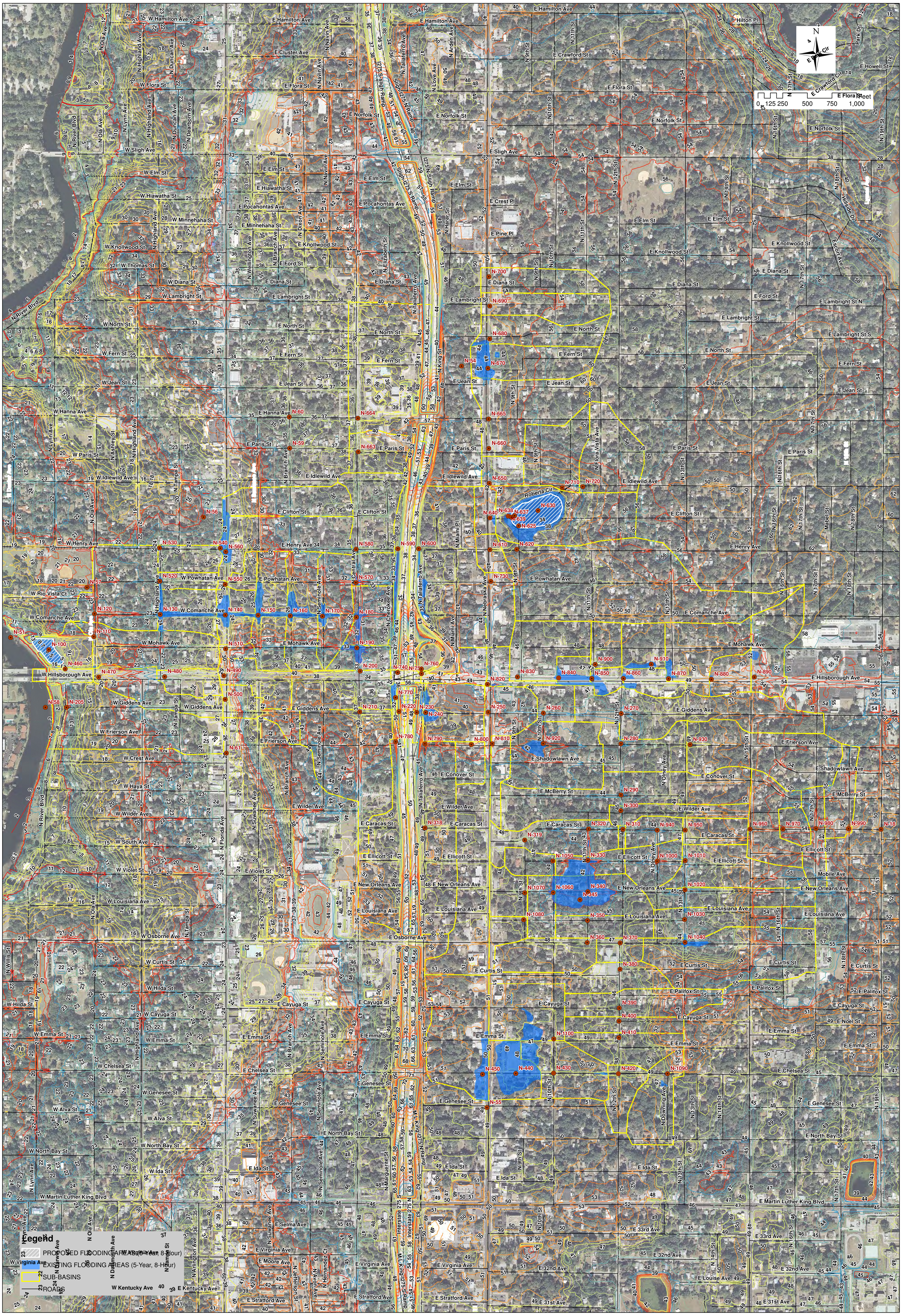
SE Seminole Heights Drainage Improvements
Figure 17 - Project 5 - South-East Basins Improvements



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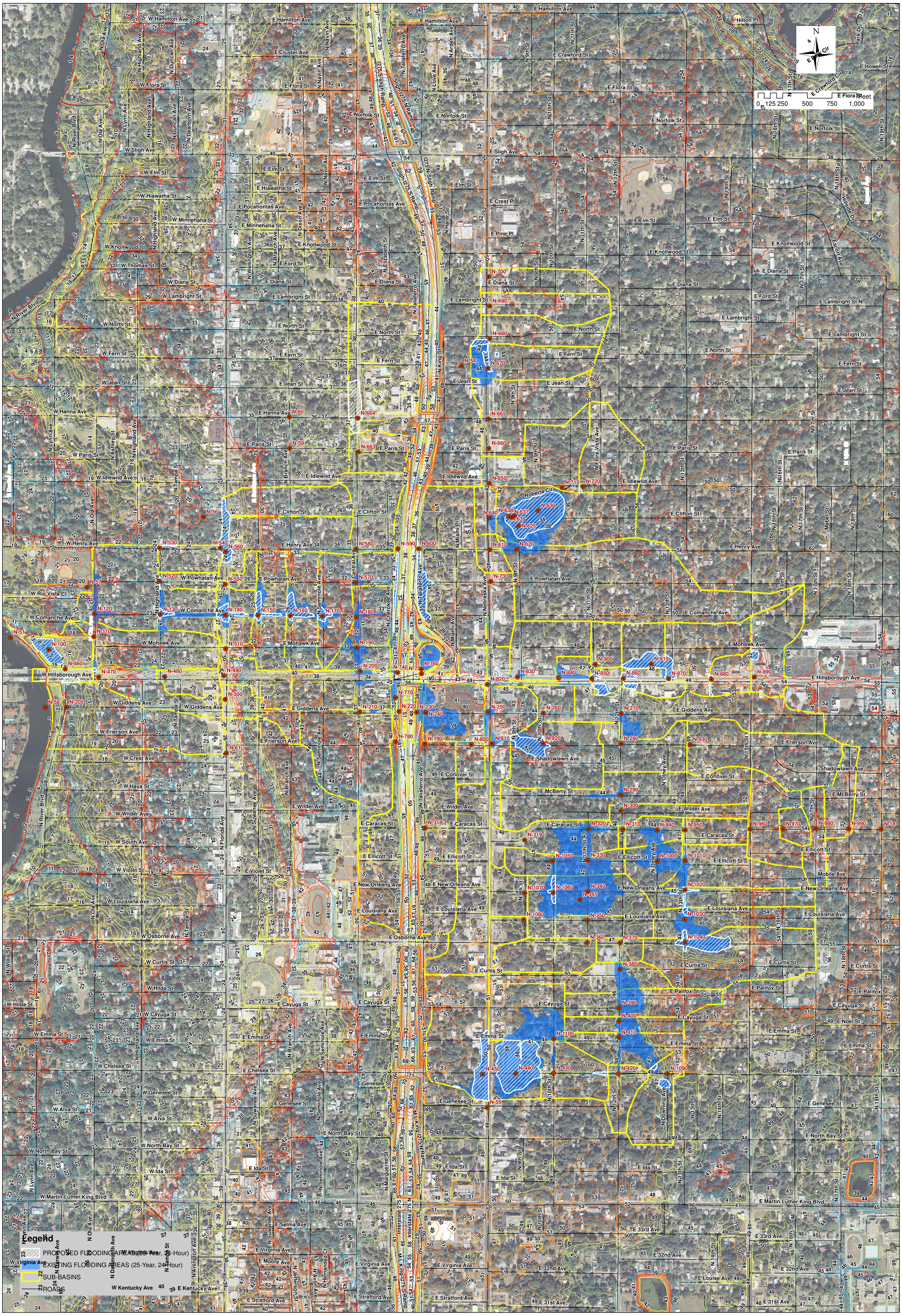
SE Seminole Heights Drainage Improvements
Figure 18 - Proposed Conditions 5-Year 8-Hour &
Existing Conditions 5-Year 8-Hour Storm Events Floodplain Maps



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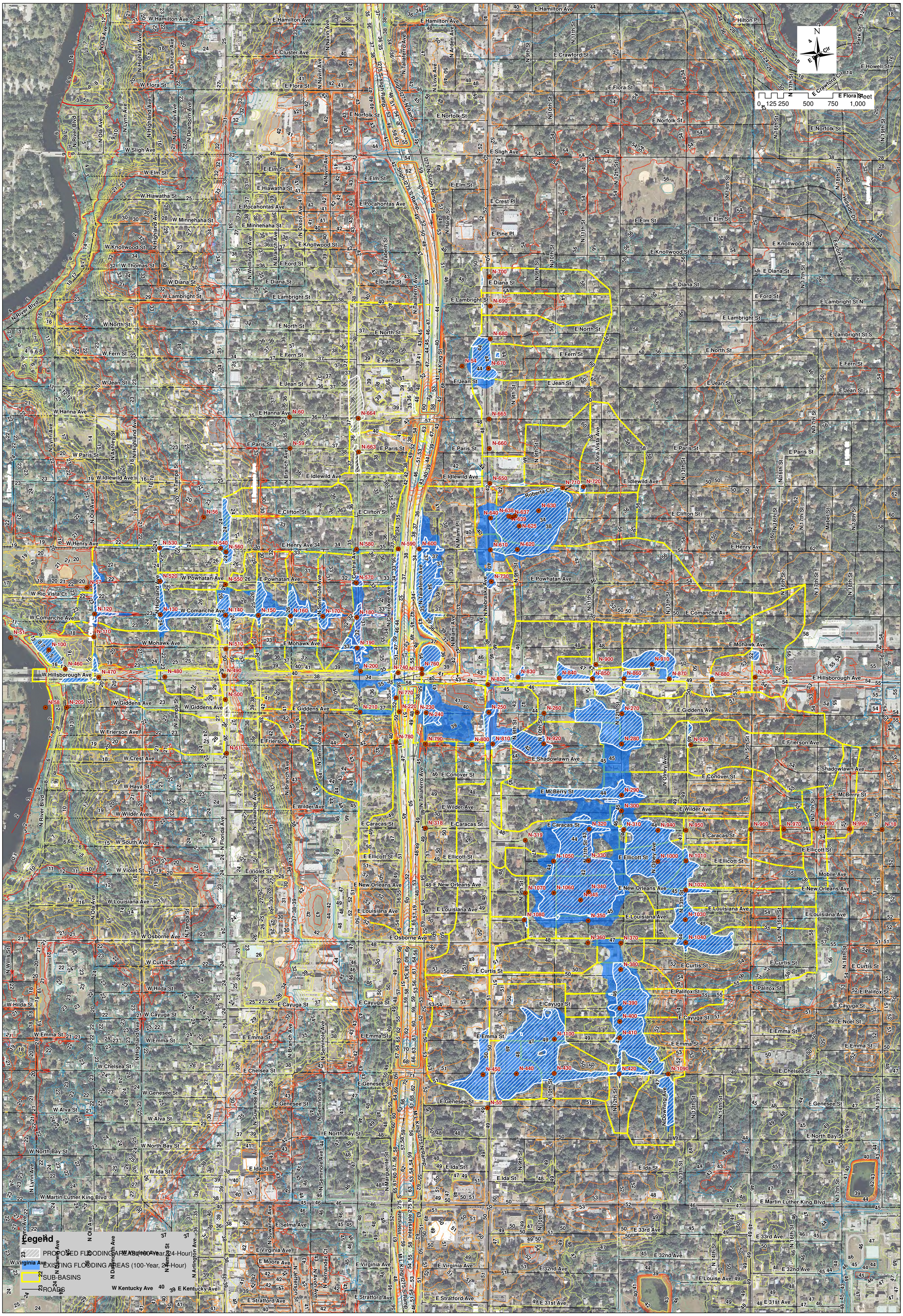
SE Seminole Heights Drainage Improvements
Figure 19 - Proposed Conditions 25-Year 24-Hour &
Existing Conditions 25-Year 24-Hour Storm Events Floodplain Maps



City of Tampa Stormwater Department	LAND&WATER ENGINEERING SCIENCE 9887 4th Street N, S # 319 St Petersburg, FL 33702	SE Seminole Heights Drainage Improvements Figure 20 - Proposed Conditions 100-Year 24-Hour & Existing Conditions 100-Year 24-Hour Storm Events Floodplain Maps

5.6 Recommended Project Costs & Phasing Plan

The preliminary opinions of probable construction cost for the recommended Southeast Seminole Heights Neighborhood Master Plan are itemized in Table 15. The total estimated cost for the entire Master Plan is $15.4M (Year 2015 dollars). It should be noted that due to the conceptual and highly preliminary nature of the design, the unit costs and quantities herein contain large degrees of uncertainty. For this reason, a 30% construction contingency was added to the estimated cost of each recommended project.

Table 14
Master Plan Preliminary Opinion of Construction Cost

Project No.	Project Name	Total Cost
1	Hillsborough Avenue Improvements (FDOT)	$1,928,661
2	W Giddens Avenue Improvements	$3,360,955
3	South-West Basins Improvements	$5,873,153
4	North-East Basins Improvements	$2,587,526
5	South-East Basins Improvements	$1,589,250
	Total CIP Cost:	**$15,339,545**

SE Seminole Heights Flood Abatement Project

Engineer's Opinion of Construction Cost

Project No. **1**
Project Name **Hillsborough Avenue Improvements (FDOT)**
Date **Dec-18**

Item	Description	QTY	Units	Cost/Unit	Total Cost
1	MOBILIZATION	1	LS	$200,000	$200,000
1	TRAFFIC CONTROL	1	LS	$50,000	$50,000
1	24 INCH RCP (CLASS III)	868	LF	$125	$108,500
1	36 INCH RCP (CLASS III)	1,844	LF	$145	$267,380
1	42 INCH RCP (CLASS III)	1,299	LF	$225	$292,275
1	60 INCH RCP (CLASS III)	1,000	LF	$320	$320,000
1	JUNCTION BOX	1	EA	$50,000	$50,000
1	INLETS	18	EA	$5,800	$104,400
1	UTILITY ADJUSTMENTS	1	LS	$150,000	$150,000

Subtotal	$1,483,585
Contingency (30%)	$445,076
Total Project Cost	$1,928,661

NOTE: Cost associated with storm sewer improvements only. Surface restoration not included. The Project is part of FDOT East Hillsborough Avenue Improvements.

SE Seminole Heights Flood Abatement Project

Engineer's Opinion of Construction Cost

Project No.	**2**
Project Name	**W Giddens Avenue Improvements**
Date	**Dec-18**

Item	Description	QTY	Units	Cost/Unit	Total Cost
2	MOBILIZATION	1	LS	$300,000	$300,000
2	TRAFFIC CONTROL	1	LS	$15,000	$15,000
2	4' x 7' BOX CULVERT	3,175	LF	$450	$1,428,750
2	7' x 8' BOX CULVERT	150	LF	$680	$102,000
2	INLETS	12	EA	$5,800	$69,600
2	JUNCTION BOX	1	EA	$50,000	$50,000
2	UTILITY ADJUSTMENTS	1	LS	$150,000	$150,000
2	SURFACE RESTORATION	1	LS	$470,000	$470,000

Subtotal	$2,585,350
Contingency (30%)	$775,605
Total Project Cost	$3,360,955

SE Seminole Heights Flood Abatement Project

Engineer's Opinion of Construction Cost

Project No.	**3**
Project Name	**South-West Basins Improvements**
Date	**Dec-18**

Item	Description	QTY	Units	Cost/Unit	Total Cost
3	MOBILIZATION	1	LS	$430,000	$430,000
3	TRAFFIC CONTROL	1	LS	$50,000	$50,000
3	4' x 7' BOX CULVERT	2,446	LF	$450	$1,100,700
3	60 INCH RCP (CLASS III)	1,800	LF	$320	$576,000
3	36 INCH RCP (CLASS III)	510	LF	$145	$73,950
3	30 INCH RCP (CLASS III)	2,216	LF	$135	$299,160
3	24 INCH RCP (CLASS III)	337	LF	$125	$42,125
3	JUNCTION BOX	2	EA	$50,000	$100,000
3	INLETS	10	EA	$5,800	$58,000
3	EXCAVATION & GRADING POND N-345	3,115	CY	$25	$77,875
3	REMOVAL OF EXISTING RCP	1	LS	$10,000	$10,000
3	SURFACE RESTORATION	1	LS	$900,000	$800,000
3	UTILITY ADJUSTMENTS	1	LS	$300,000	$900,000

Subtotal	$4,517,810
Contingency (30%)	$1,355,343
Total Project Cost	$5,873,153

SE Seminole Heights Flood Abatement Project

Engineer's Opinion of Construction Cost

Project No.	**4**
Project Name	**North-East Basins Improvements**
Date	**Dec-18**

Item	Description	QTY	Units	Cost/Unit	Total Cost
4	MOBILIZATION	1	LS	$200,000	$200,000
4	TRAFFIC CONTROL	1	LS	$40,000	$40,000
4	4' x 7' BOX CULVERT	689	LF	$450	$310,050
4	42 INCH RCP (CLASS III)	1,752	LF	$195	$341,640
4	36 INCH RCP (CLASS III)	1,350	LF	$145	$195,750
4	30 INCH RCP (CLASS III)	349	LF	$135	$47,115
4	24 INCH RCP (CLASS III)	330	LF	$125	$41,250
4	INLETS	12	EA	$5,800	$69,600
4	DRAINAGE STRUCTURE MODIFY	1	EA	$5,000	$5,000
4	SURFACE RESTORATION	1	LS	$600,000	$600,000
4	UTILITY ADJUSTMENTS	1	LS	$140,000	$140,000

Subtotal	$1,990,405
Contingency (30%)	$597,121
Total Project Cost	$2,587,526

SE Seminole Heights Flood Abatement Project

Engineer's Opinion of Construction Cost

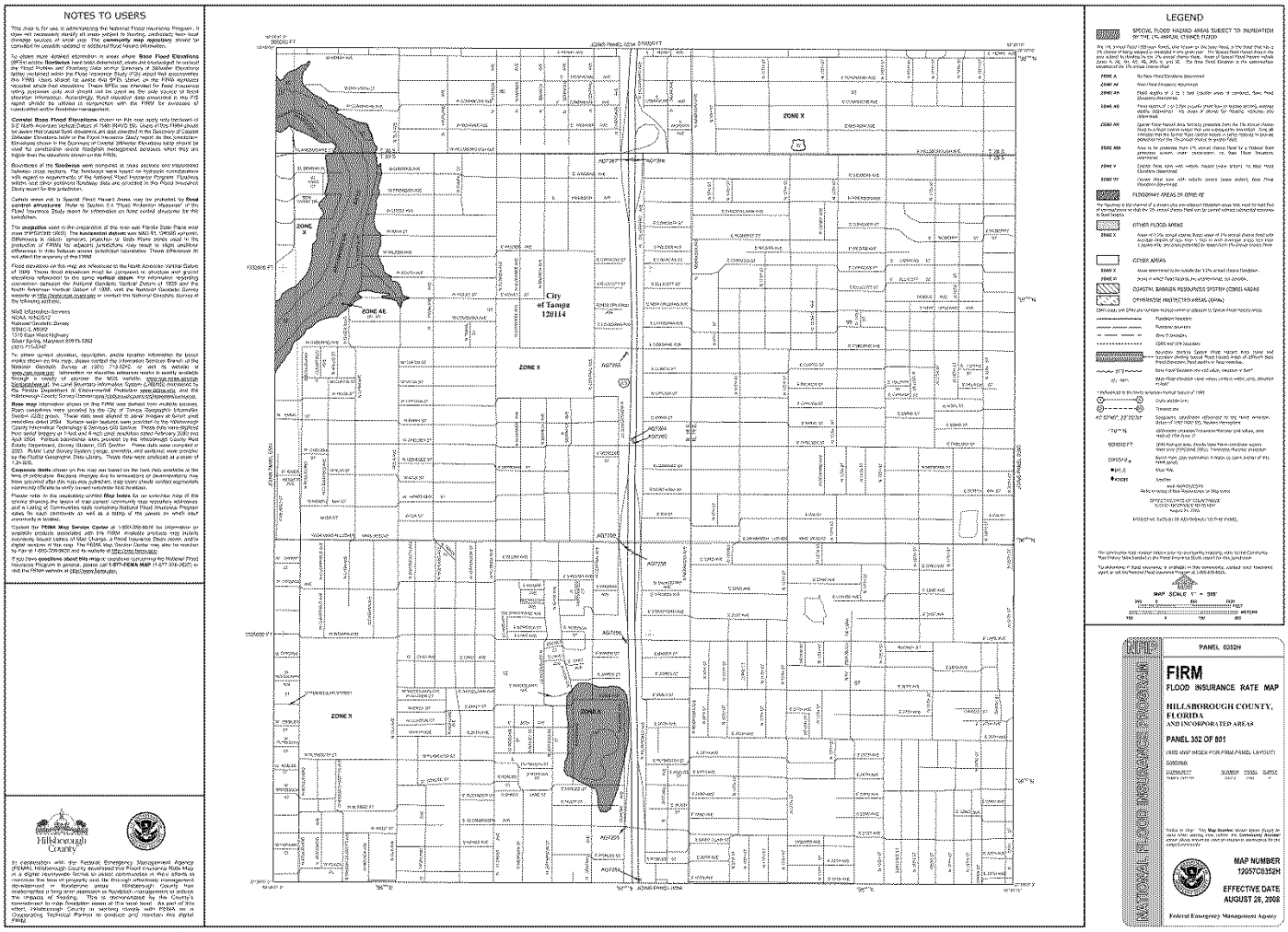
Project No.	**5**
Project Name	**South-East Basins Improvements**
Date	**Dec-18**

Item	Description	QTY	Units	Cost/Unit	Total Cost
5	MOBILIZATION	1	LS	$200,000	$200,000
5	TRAFFIC CONTROL	1	LS	$25,000	$25,000
5	48 INCH RCP (CLASS III)	1,410	LF	$230	$324,300
5	INLETS	4	EA	$5,800	$23,200
5	SURFACE RESTORATION	1	LS	$550,000	$550,000
5	UTILITY ADJUSTMENTS	1	LS	$100,000	$100,000

Subtotal	$1,222,500
Contingency (30%)	$366,750
Total Project Cost	$1,589,250

Exhibit A

FEMA Maps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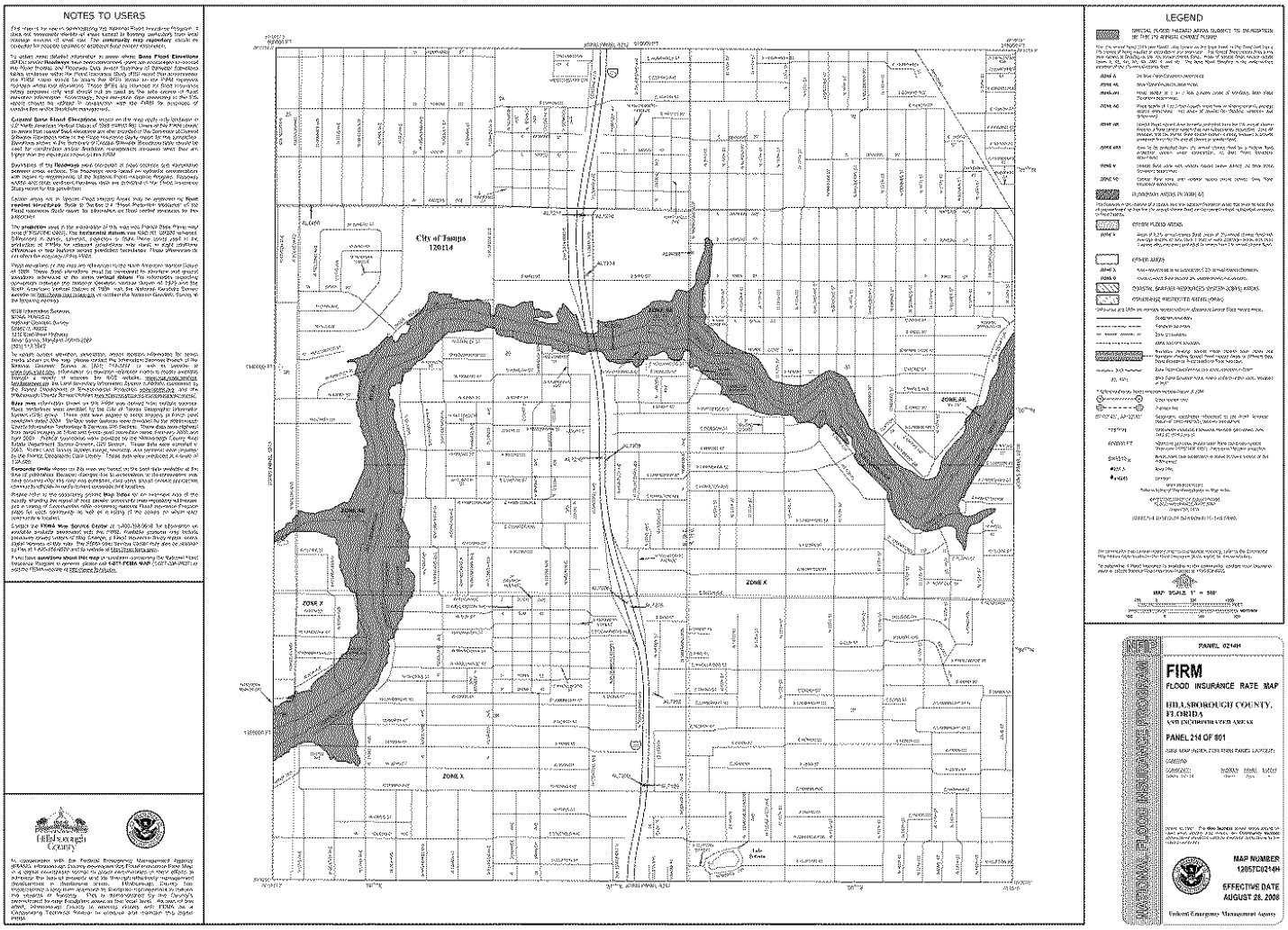
ZONE X
ZONE AE
ZONE A
City of Tampa 120114
FIRM
FLOOD INSURANCE RATE MAP
HILLSBOROUGH COUNTY, FLORIDA
AND INCORPORATED AREAS
PANEL 352 OF 801
MAP NUMBER
12057C0352H
EFFECTIVE DATE
AUGUST 28, 2008
Federal Emergency Management Agency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FIRM
FLOOD INSURANCE RATE MAP
HILLSBOROUGH COUNTY, FLORIDA
PANEL 214 OF 801
MAP NUMBER
12057C0214H
EFFECTIVE DATE
AUGUST 28, 2008

Exhibit B

Hydrologic Model Verification Data

- ***Rainfall Gauges available for Model Calibration/Triangulation***
  - USGS 275917082222500 East Lake Rainfall at Orient Road near Tampa.
  - USGS 280353082283400 Roy Haynes Park Rainfall near Sulphur Springs.
  - USGS 02304500 Hillsborough River near Tampa.
  - USGS 02301750 Delaney Creek near Tampa.
  - NOAA GHCND USW00012842 Tampa International Airport.

- ***Locations of Rainfall Gauges***
  - Please see Figure 8 for rainfall gauge locations.

- ***NexRad Data available for Model Calibration/Triangulation***
  - Hillsborough County NexRad Data.

- ***Available Rainfall Events***
  - 1/23/2015 12:18 p.m. to 1/24/2015 11:12 a.m. (Total Rainfall of 0.66 inches)
  - 2/4/2015 11:00 p.m. to 2/5/2015 12:03 p.m. (Total Rainfall of 1.96 inches)
  - 2/9/2015 12:15 p.m. to 2/9/2015 8:30 p.m. (Total Rainfall of 1.08 inches)
  - 2/17/2015 4:00 p.m. to 2/18/2015 2:00 a.m. (Total Rainfall of 1.58 inches)
  - 2/28/2015 10:00 a.m. to 2/28/2015 4:00 p.m. (Total Rainfall of 1.60 inches)
  - 4/6/2015 8:30 p.m. to 4/6/2015 11:00 p.m. (Total Rainfall of 1.21 inches)
  - 4/20/2015 5:00 p.m. to 4/20/2015 6:15 p.m. (Total Rainfall of 0.86 inches)

- ***Restrictions on Rainfall Data***
  - No NexRad data available yet for April or May. Restricted to using rainfall events between January and March.
  - Tampa International Airport rainfall data only available in hourly time intervals. Not precise enough for model calibration. Data was compared and verified to match the rainfall trends of the surrounding gauges.
  - Roy Haynes Park and Delaney Creek rainfall gauges considered to be too far from the area of study for precise calibration results.
- ***Data Loggers utilized for Model Calibration/Triangulation***
  - Data logger at the intersection of N Branch Avenue and W Comanche Avenue.
  - Data logger at the intersection of E New Orleans Avenue and N 11th Street.
  - Data logger at the intersection of N Nebraska Avenue and E Chelsea Street.
  - Please see Figure 7 for data logger locations.

- ***Restriction on Data Logger Rainfall Data***
  - Data logger at the intersection of N Nebraska Avenue and E Chelsea Street was removed from its location between 2/20/2015 and 3/24/2015 due to construction. Therefore, data is restricted to time periods between 1/15/2015 and 2/20/2015 to 3/24/2015 and 3/31/2015.

19-C-00012; SE Seminole Heights Flooding Relief Project - Design-Build **Pre-Submission Conference 11-27-18**

Sign-In Sheet ▶▶▶Please Print Clearly City of Tampa, Contract Administration Department

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19-C-00012; SE Seminole Heights Flooding Relief Project - Design-Build **Pre-Submission Conference 11-27-18**

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