St. Tammany Parish

GRANDE MAISON BOULEVARD DRAINAGE STUDY

January 2024



STATE OF LOUISIANA
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2/26/24

NEEL-SCHAFFER

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1. Background

In March of 2023, St. Tammany Parish Government (STPG) contracted with Neel-Schaffer Inc. (NSI) to investigate the drainage problems and their causes within the Grandee Maison Subdivision in the Mandeville, LA area. Additional project objectives include developing alternatives to mitigate existing drainage problems, evaluate proposed alternatives, and provide final recommendations.

The project study area is comprised of the Grandee Maison Subdivision with Highway 59 on the west, Independence Drive to the south, and Interstate 12 on the east. in St. Tammany Parish, LA as seen in Figure 1. The subdivision drainage of the site consists of three retention ponds, an open ditch system throughout the subdivision, and driveway culverts. The various outfall pipes from the neighborhood ponds drain into the St. Tammany Parish maintained drainage system to the south.

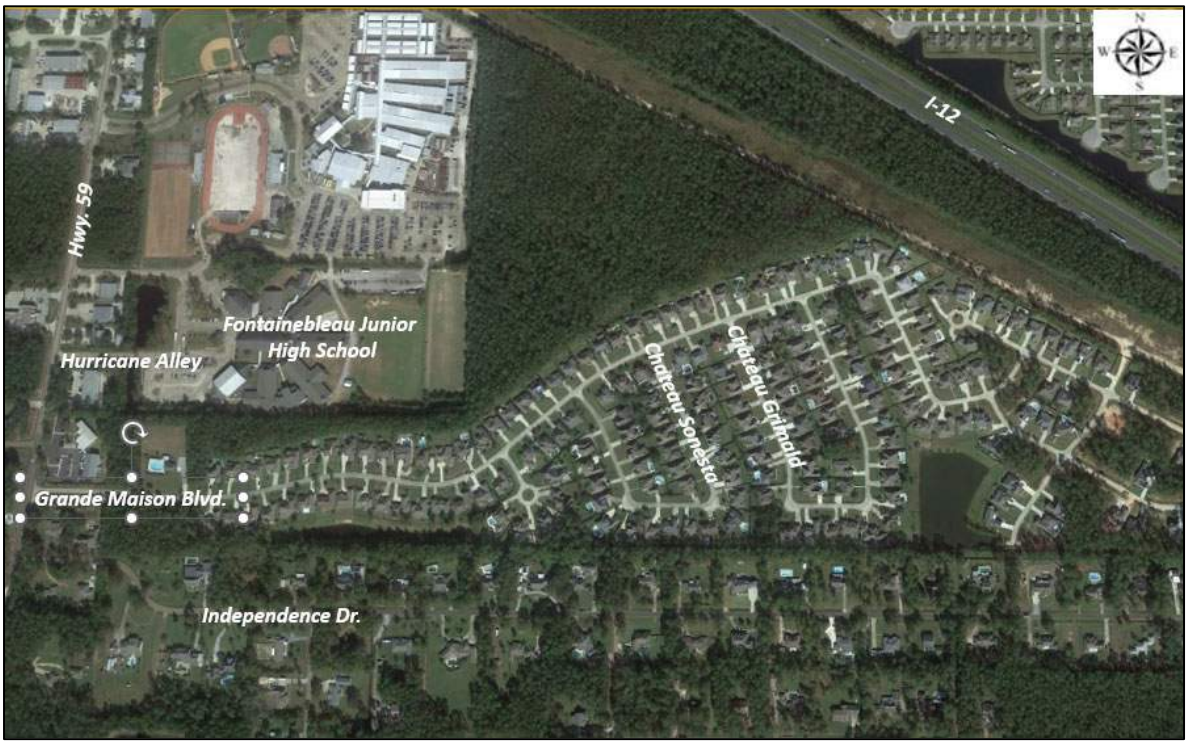

Figure 1 – Project Location

2. Grande Maison Existing Drainage Problems

Over the last four years, this area has experienced multiple flood events. As part of this project, St. Tammany Parish Government provided photographic evidence of flood conditions within the Grandee Maison subdivision for the events. They include photographs and videos from the following dates: July 21, 2019; August 21, 2019; July 27, 2020; and December 30, 2022. Based on discussions with STPG, flooding is not limited to these events; however, these are documented events from residents. Two areas of concern were presented by St. Tammany Parish Government based on complaints from the residents as seen in **Figure 3**.

- Entrance of Grande Maison Subdivision
- Grande Maison Boulevard between Chateau Sonesta and Chateau Grimaldi

Figure 2 - Areas of Concern

Figure 3 - STPG Provided Imagery of Grandee Maison Entrance. Looking East. Dated 12-30-2022.

Figure 4 - STPG Provided Imagery at the Western Intersection of Grandee Maison at Chateau Sonesta. Looking Northeast. Dated 7-21-2019.

Figure 5 - STPG Provided Imagery at the Intersection of Grandee Maison Blvd and Chateau Grimaldi. Looking Northwest. Dated 12-30-2022.

3. Existing Data and Site Visit

As a part of the data collection effort, STPG supplied NSI with various information such as drainage plans, subdivision plats, and recent survey data to facilitate the understanding of the existing conditions within the drainage system.

3.1. STPG Provided Subdivision Data

STPG provided as-built sewer, water, recorded plat, paving, and draining plans for Phases 1 (2005), 2 (2006), and 3 (A, B, and C ranging from 2013-2020) of the Grandee Maison subdivisions. This includes pipe sizing, ditch section, and basic to 1-ft contours for Chateau Papillon, Chateau Andelot, Grandee Maison Blvd, and Chateau Grimaldi.

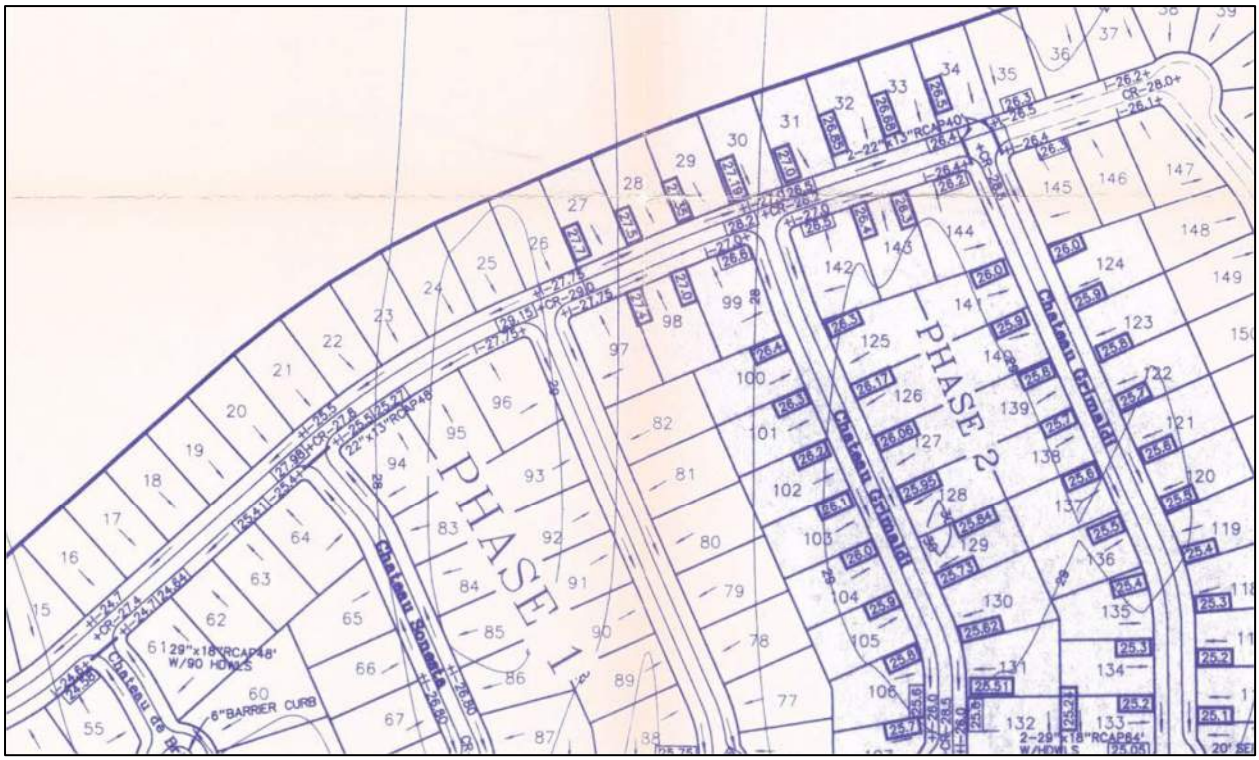

Figure 6 - Sample of Grandee Maison Phase 1 Drainage Plans

In addition to Grandee Maison, plans were also provided for 1979 Phase 1-3 (1979), Phase 4 (1981), Phase 5 (1982), Phase 6 (1986), and Phase 7 (1994) of the Heritage Heights Subdivision. This subdivision is located directly south of the Grandee Maison subdivision and receives outflow from the two Grandee Maison retention ponds. Heritage Heights extends from Highway 59 to Bandywine Drive, covering Independence Drive to Williamsburg Drive.

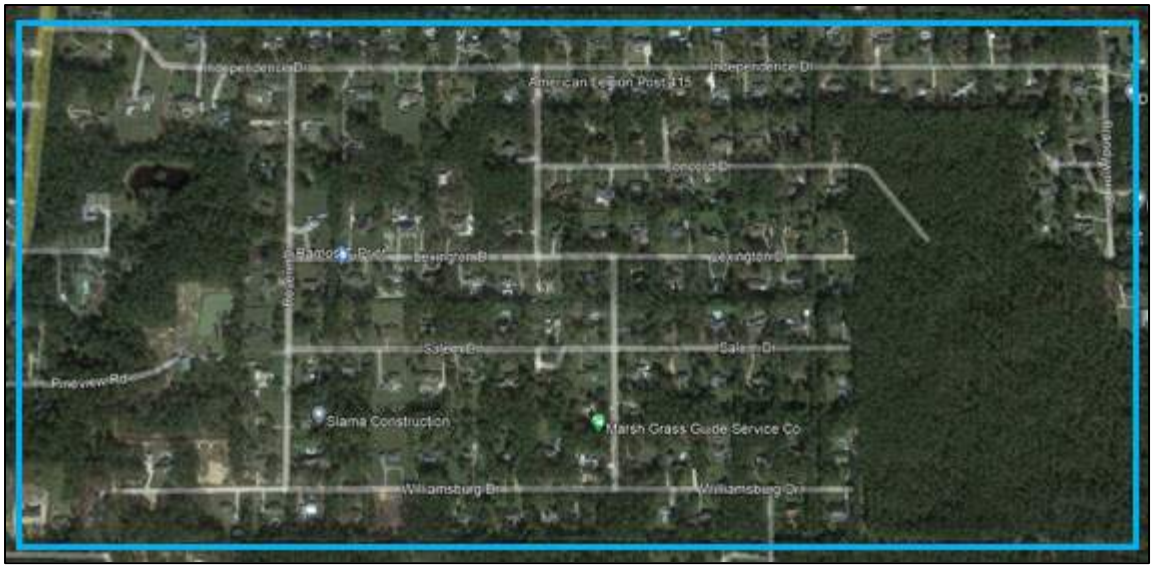

Figure 5 –Overview of Heritage Heights

STPG also provided the as-built data for Fontainbleu Junior High School located to the north of the Grandee Maison subdivision. This includes both the original construction in 2014 and the renovations in 2017.

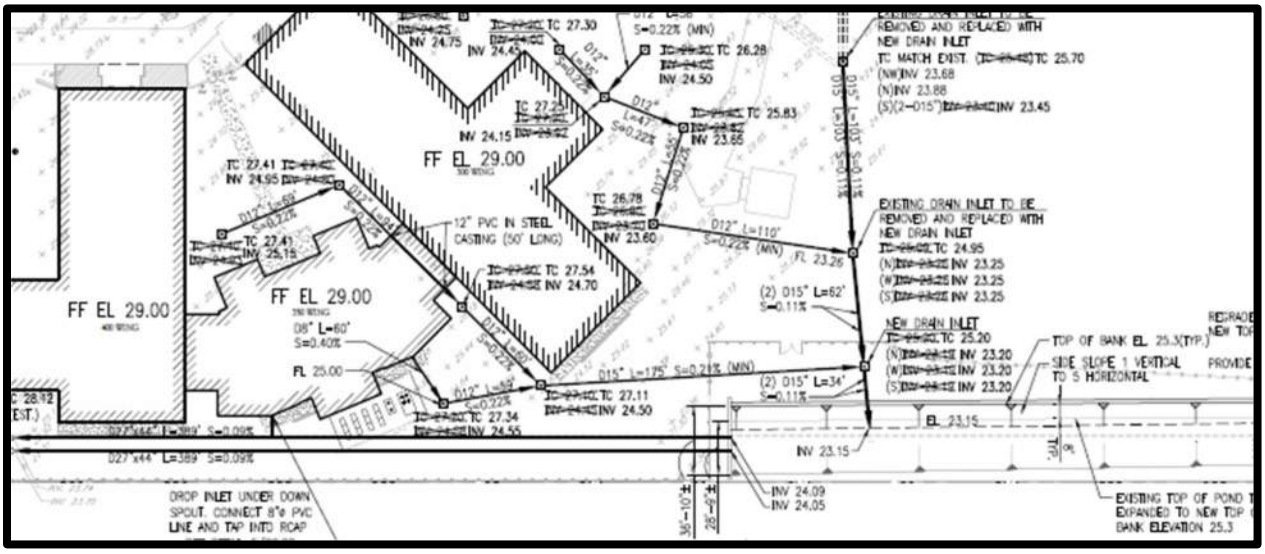

Figure 7 - Fontainbleu Jr. High As-Builts from 2017 Renovations.

3.2. STPG provided Survey Data

A survey performed by T. Baker Smith in July 2022 for the St. Tammany Parish Government was provided to NSI. The survey included the following areas:

- STP Drainage Lateral labeled 4-DW2-20, which is a ditch running perpendicular to Highway 59, alongside the St. Tammany Parish Sherriff's office.

- Grandee Maison Blvd from the intersection at Highway 59 to Chateau De Brie including the drainage pipes, material, size, inverts, top of ditches, and the centerline of ditches along both sides of the road.
- Highway 59 from the top loop of Hurricane Alley to Ridgewood Drive.
- Approximately 300 feet east of the junction of Independence Dr and Revere Dr - surveying the Parish Drainage Lateral including the multiple drop inlets and Reinforced Concrete Pipes (RCPs) that drain from the detention pond along the southern edge of the Grandee Maison subdivision to beyond Williamsburg Dr. These RCPs are connected through a ditch labeled Parish Lateral 4-EW1-82, which continues under Henry Meiners Road through a corrugated metal pipe (CMP).
- A box culvert under Highway 59 approximately 500 ft past Henry Meiners Road from the north going south and is oriented in the east/west direction.

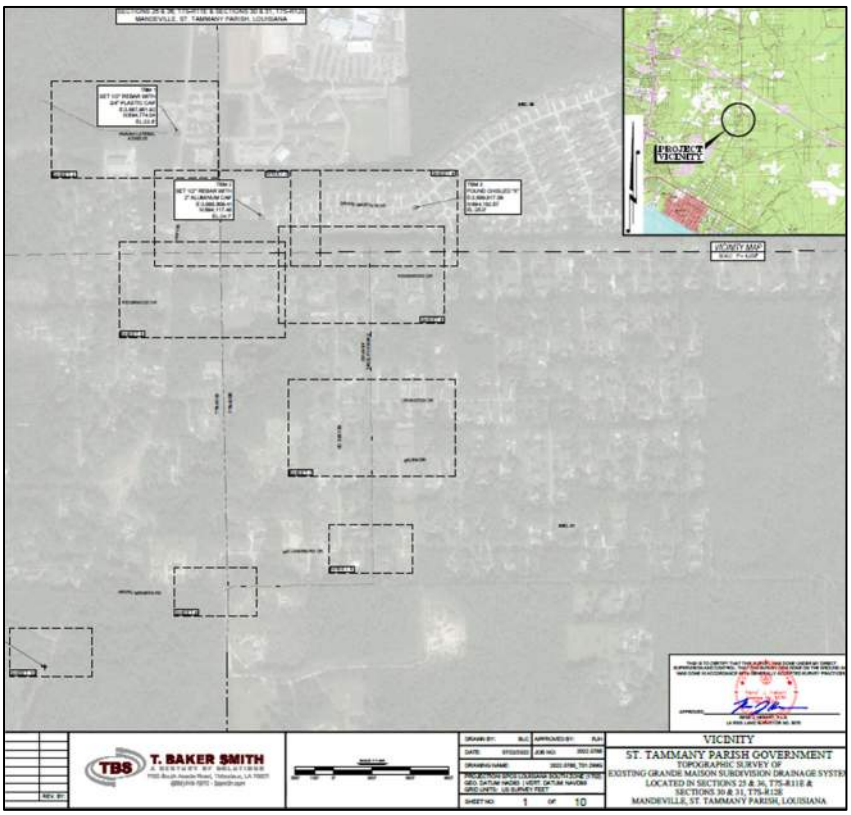

Figure 8 - Sample of Survey Data Provided by STPG.

3.3. LiDAR Survey Data

In addition to the survey data provided by STPG, NSI gathered the most recent LiDAR data set for the project areas. This data was collected from the NOAA Digital Coast Data Access Viewer.

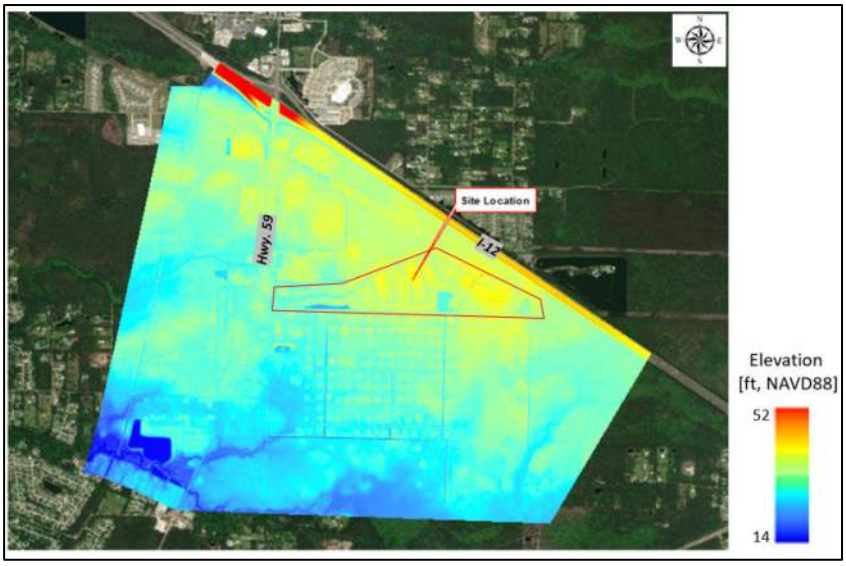

Figure 9 - 2017 USGS Upper Delta Plain LiDAR Data

3.4. Previous Studies and Models

Through the St. Tammany Parish Sustainable Growth Pilot Study (2022), NSI was tasked with developing a hydraulic model to evaluate drainage and flood risk impacts to guide the Parish for sustainable residential and commercial growth. The study area was bound by Interstate 12 to the north, US Highway 190 to the west, US Highway 59 to the east, and Sharp Road to the south. To accomplish this, NSI collected data from the St. Tammany Parish Flood Insurance Study and Critical Drainage Areas Map, Bayou Chinchuba Watershed Management Plan, and surveys. Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) and River Analysis System (HEC-RAS Version 6.2) models were created to appropriately account for drainage features in the Bayou Tete L'ours, Little Creek, Ponticholawa, and Bayou Chinchuba watersheds. Using National Resources Conservation Service (NRCS) unit hydrographs, Flood Insurance Study (FIS) rating curves and stream flow volumes, and National Oceanic and Atmospheric Administration (NOAA) localized precipitation rates, this model was able to evaluate 10-yr, 25-yr, 50-yr, and 100-yr storms within a 24-hr period.

3.5. Site Visit

To gather information about the existing drainage system, NSI team members and staff from the STPG project team conducted a site visit to the Grandee Maison subdivision on June 23rd, 2023. Photographs were taken on the site visit to document and provide a background on the existing conditions. **Appendix A** to this report provides a summary of the photographs taken and their locations.

The site visit reviewed the existing drainage conditions for the subdivision as well as discussed the concerns raised by the neighborhood residents. This discussion included the consistent flooding that occurs at the entrance location. The pictures provided by STPG demonstrated that the flood waters can be seen near the top of the median curb indicating nearly six inches of floodwaters at the location.

4. Methodology

4.1. Existing Model Development

Building on the Sustainable Growth effort and with the understanding that the Grandee Maison subdivision is within the Bayou Chinchuba watershed, the Stainable Growth Pilot Study model was extended beyond Highway 59 to include the Grandee Maison subdivision and the surveyed drainage features provided by STPG.

This two-dimensional (2D) hydrologic and hydraulic (H&H) model was developed with U.S. Army Corps of Engineers (USACE)' River Analysis System (HEC-RAS) software (version 6.2). The 2D HEC-RAS model was utilized to evaluate water surface elevations within the project site and create a dynamic inundation map to identify existing water flow patterns, volume/rate of runoff, and flood levels under existing conditions during storm events. HEC-RAS 2D model simulates two-dimensional water level variations and flows in response to a variety of forcing mechanisms through natural ditches and other channels. In this model, the water levels and flows were resolved on an unstructured grid covering the area of interest based on the following model parameters.

Computational Domain

The topographic LiDAR data within the project area was acquired from the 2017 United States Geological Survey (USGS) Upper Delta Plain data obtained from the Digital Coast National Oceanic and Atmospheric Administration (NOAA). The LiDAR topography data has a resolution of one meter by one meter, with the horizontal datum referenced to the North American Datum of 1983 (NAD83) and the vertical datum referenced to the North Atlantic Vertical Datum 1988 (NAVD88). A site survey conducted in July 2022 by T. Baker Smith Inc. (TBS) was incorporated into the final existing topographic data.

To develop modeled water surface elevation maps, a computational domain mesh was created using topographic and bathymetric data for hydrodynamic analysis. This mesh measures approximately 11,000 ft in the east-west direction and 9,500 ft in the north-south direction from the approximate center of the subject property. The domain of the model was digitized using an unstructured flexible mesh with more than 150k mesh elements (cells) with an average cell size of 472 ft × 472 ft. The computational mesh was further refined at roads, channels, and high-elevation points using break lines and is shown in **Figure 10** below.

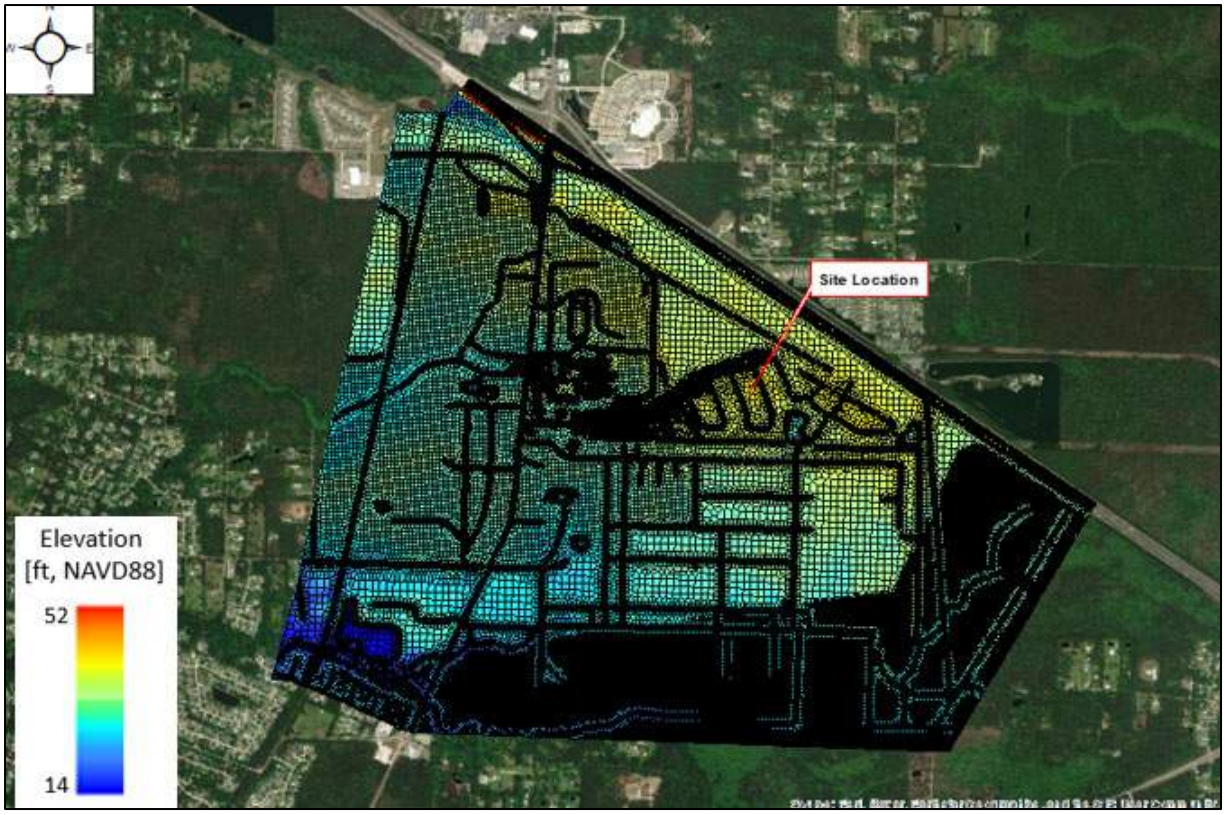

Figure 10 - Computational Mesh

Model Inputs and Assumptions

The hydraulic roughness of the flow channels in the numerical model is described by Manning's bed resistance number, which is specified as a roughness map based on National Land Cover Database (NLCD). The selected land cover data are presented in Table 1, which is within the range of values suggested by the HEC-RAS manual.

Table 1 - Land Cover Data

Type	Manning's N	Percent Impervious
No Data	0.035	0
Emergent Herbaceous Wetlands	0.06	75
Evergreen Forest	0.15	0
Developed, Low Intensity	0.08	20
Developed, Medium Intensity	0.12	40
Developed, High Intensity	0.16	60
Woody Wetlands	0.07	50
Grassland-Herbaceous	0.04	0

Type	Manning's N	Percent Impervious
Open Water	0.035	100
Developed, Open Space	0.035	0
Pasture-Hay	0.045	0
Cultivated Crops	0.05	0
Barren Land Rock-Sand-Clay	0.03	0
Mixed Forest	0.12	0
Shrub-Scrub	0.08	0
Deciduous Forest	0.10	0

Rainfall Data

Precipitation Data used for determining the rainfall intensity was obtained from the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14 within the project area located near Mandeville, LA. This location as seen in **Figure 11** is located at latitude 30.2307 and longitude -89.8016.

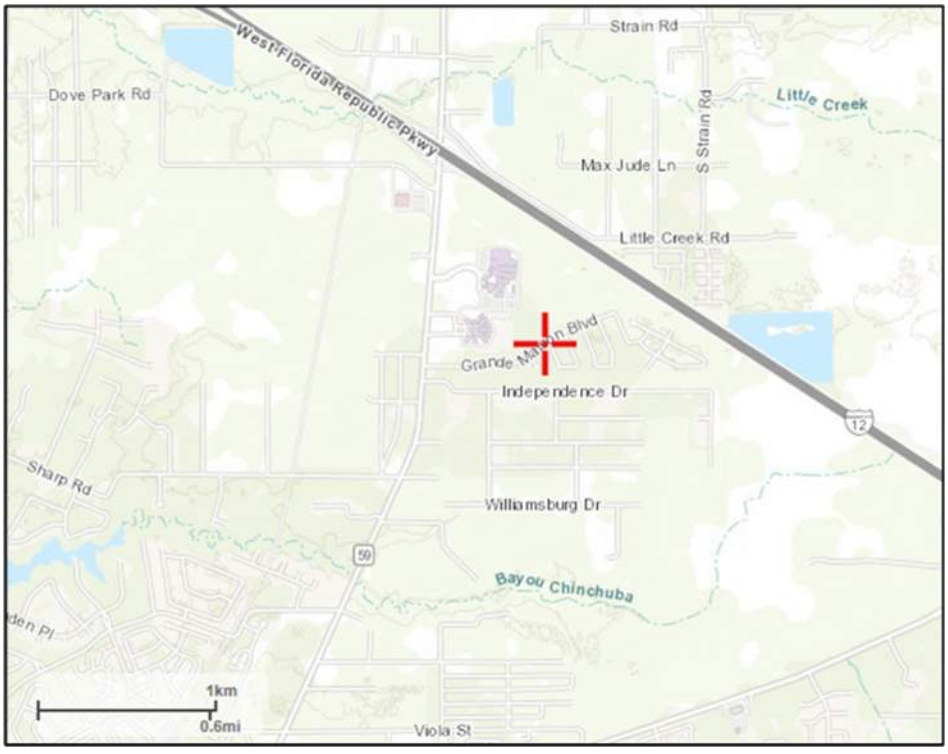

Figure 11 - Location of Point Precipitation Frequency Estimates

Table 2 - NOAA Atlas 14 Rainfall Intervals

Duration	Average Recurrence Interval (years)			
	10	25	50	100
24-hr	7.82	9.72	11.3	13.1

Design Hydrograph

Type III, 24-hr NRCS rainfall distributions were used for the rainfall hydrograph as seen in Figure 12.

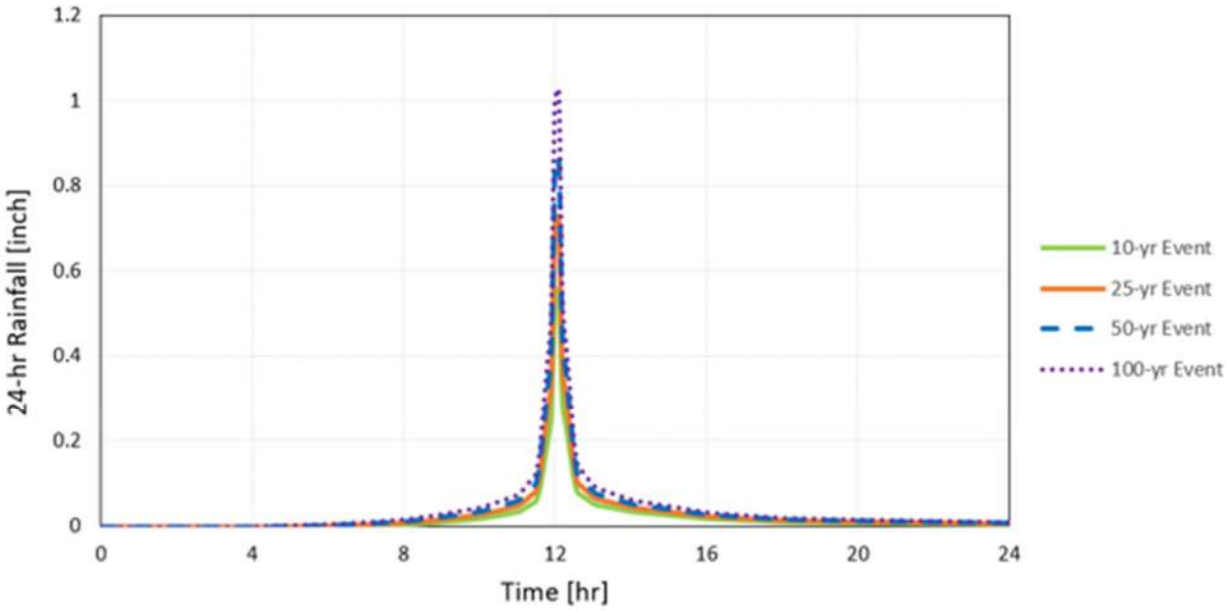

Figure 12 - Rainfall Hydrograph

Boundary Conditions

The simulation run was conducted to determine the drainage problems within the project site. For this analysis, an internal boundary condition in the form of precipitation, i.e., rain-on-grid, was specified, while a normal depth boundary condition was specified at the boundary lines. The internal precipitation boundary condition was applied directly to the 2D flow area as a time series of rainfall excesses. The rainfall data was obtained from the NOAA Atlas 14 precipitation frequency estimates for a 24-hour storm.

4.2. Existing Model Results

For the 10-yr, 24-hr return period storm event, the simulation started as dry. Over the course of the simulation, the water depths increased on the model domain due to the rain-on-grid boundary and the water accumulation continued to increase until it reached the peak of the rain hydrograph.

The results of the HEC-RAS model run for the existing conditions under a 10-yr return period storm event for maximum water surface elevation and water surface elevation after 24 hours are presented in **Figure 13**and **Figure 14**.

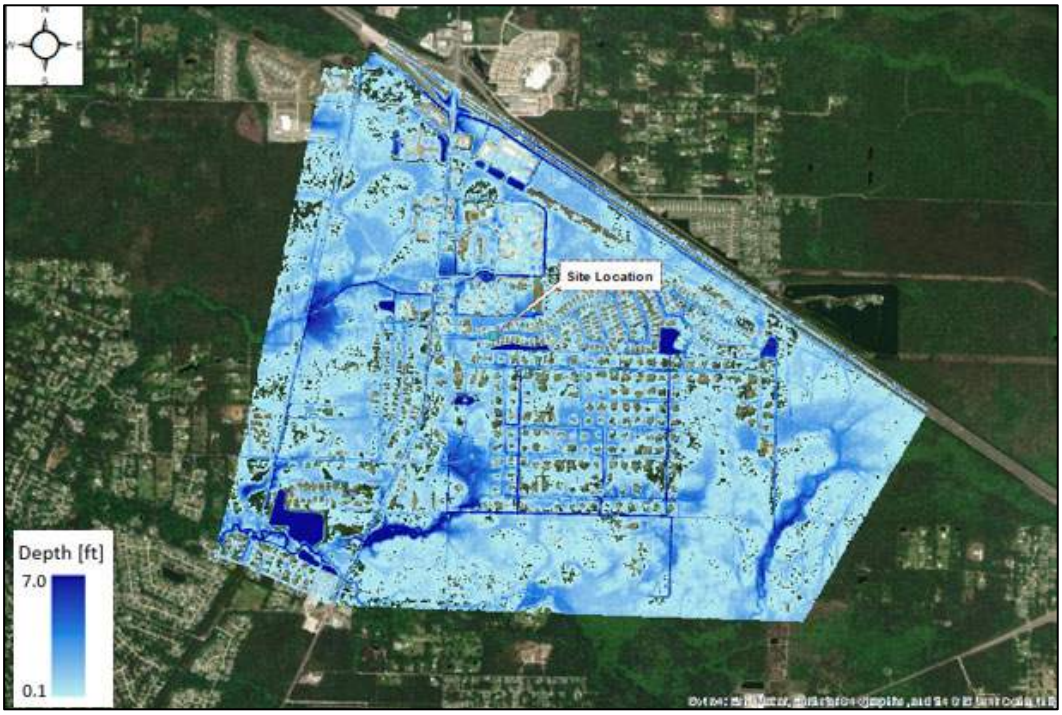

Figure 13 - Maximum Water Surface Elevation Results

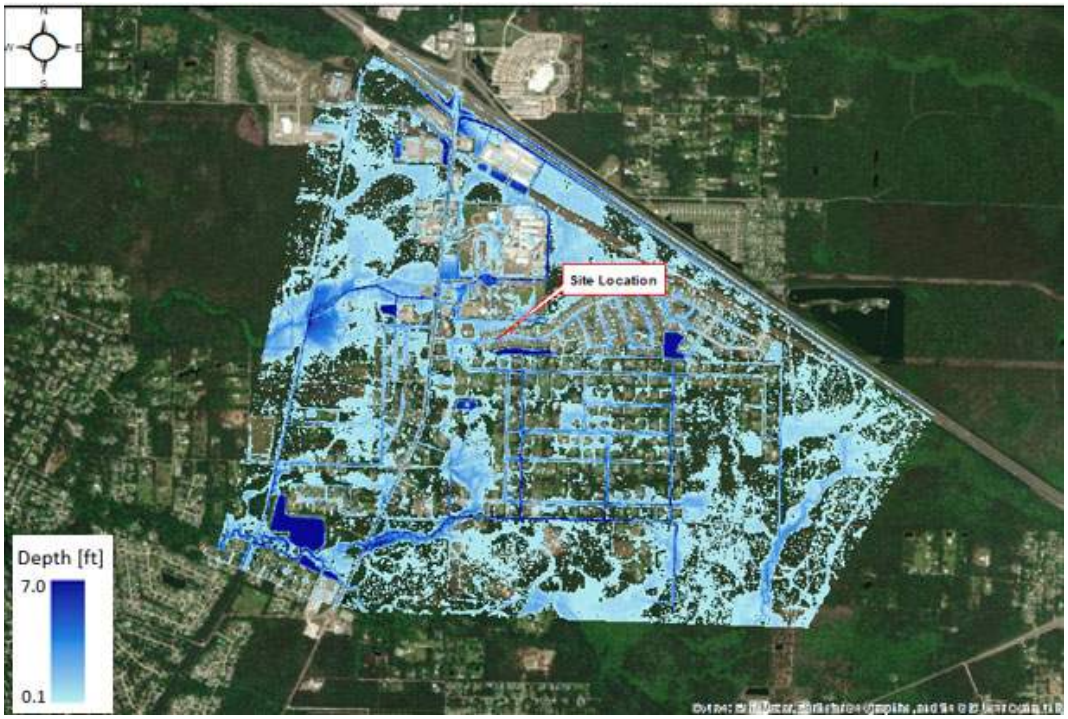

Figure 14 - Water Surface Elevation Results at the end of the Precipitation event

The results from the existing HEC-RAS model runs show similar trends in water surface elevations and ponding at the Grandee Maison Subdivision entrance as seen in the existing documentation provided by STPG. However, it is important to note that while the trends align, there was no measured data to fully calibrate the existing conditions model runs.

Utilizing the existing conditions HEC-RAS velocity vectors shown in **Figure 15,** the main source of water flooding in Grandee Maison Blvd appears to be over land flow from the ponds along the property line of Fontainebleau Junior High School (FJH) to the north of the subdivision.

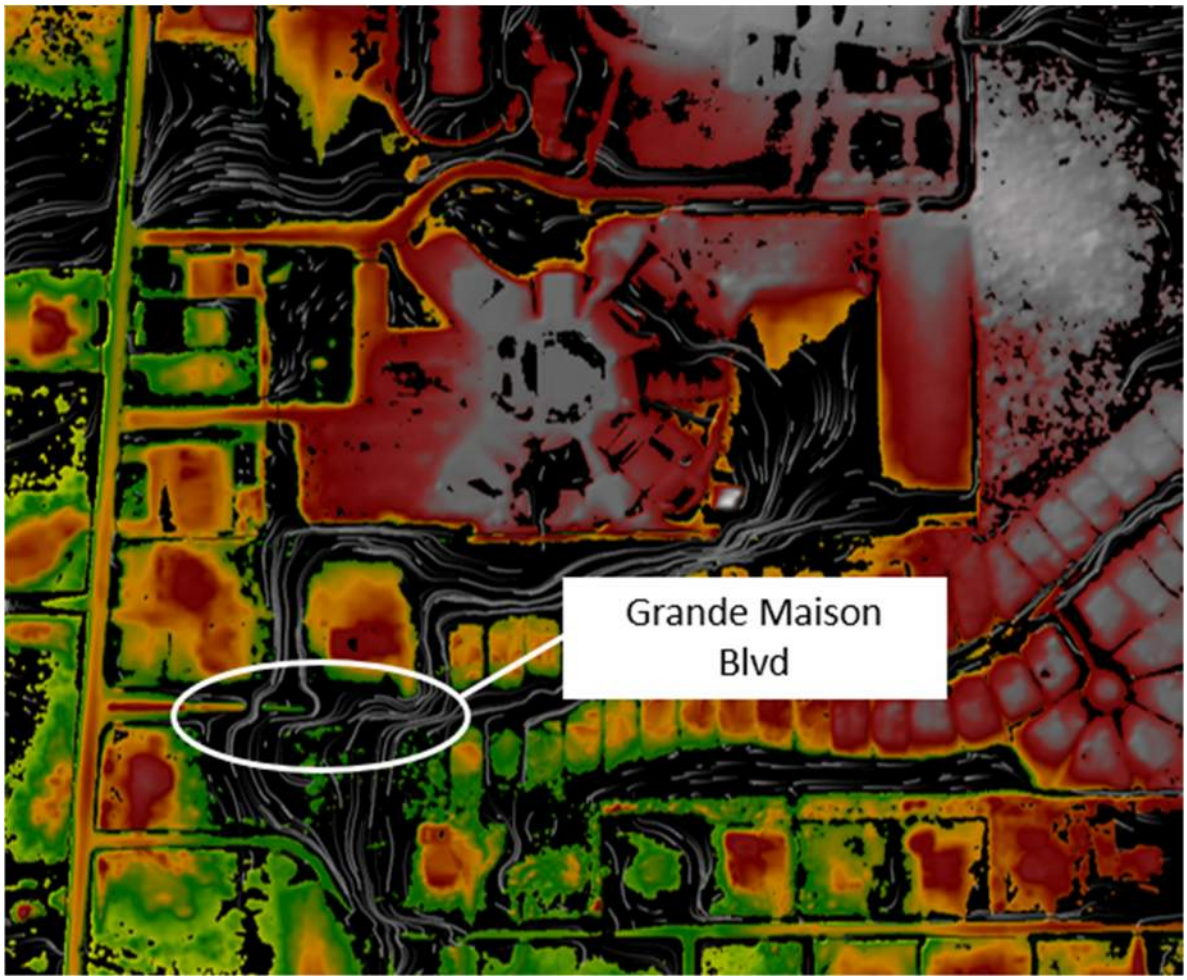

Figure 15 - Model Results for 10-yr Return Period Storm (Velocity Vectors)

In addition, the pond on the north side of Hurricane Alley may also contribute to the issues seen in Grandee Maison. A detailed survey, on existing pond outfall and connection to the FJH ponds, was not provided for this analysis.

5. Proposed Alternatives Development

Based on discussion with STPG, NSI presented several potential options for consideration related to the flooding issues found within Grandee Maison Blvd entrance.

5.1. Alternative 1

Based on the existing modeling resultsfor the area of concern at the front of Grandee Maison Blvd, Alternative 1 utilizes undeveloped land near the entrance of the subdivision to detain the storm waters temporarily onsite during a storm event. These undeveloped areas would be developed into three detention ponds as shown in **Figure 16** for approximately 3.4 acres of water storage.

Figure 16 - Alternative 1 - Grandee Maison Blvd Ponds.

5.2. Alternative 2

Alternative 2 utilizes undeveloped land within the boundaries of the subdivision to detain the storm waters temporarily onsite during a storm event. The three ponds from Alternative 1 would be developed into three detention ponds for approximately 3.4 acres of water storage as well as an additional 8.9 acre pond located in the northeast corner of Grandee Maison directly adjacent to Fontainbleau Junior High. This additional pond would include the flood water routing from the area of concern between Chateau Sonesta and Chateau Grimaldi in addition to flood routing at the entrance of the subdivision as shown in **Figure 17**.

Figure 17 - Alternative 2 - Grandee Maison Blvd with Northeast Pond

6. Alternatives Analysis

6.1. PCSWMM Model Development

PCSWMM version 7.6.3695 is an advanced modeling software for stormwater, wastewater, watershed and water distribution systems. Specifically for drainage design, it can accurately account for flow and volume in subsurface systems. In thoroughly evaluating the subdivision's flooding issues and proposed solutions, it was determined that this software presented the best option for implementing and comparing the two alternatives. PCSWMM was found to provide the additional analysis required for pond designs as compared to the HEC-RAS program which is typically more suited for open channel flow design. The following features were included in the proposed model development.

Terrain

The proposed PCSWMM was created utilizing the same terrain used in the HEC-RAS analysis with the modification of terrain for the three ponds for Alternative 1 and the four ponds for Alternative 2.

Without detailed survey information in the area of the proposed ponds, the elevations and storage information for the existing Grandee Maison Subdivision ponds were utilized to develop the proposed alternative pond features which are summarized below:

Table 3 - Alternative 1 Summary

Feature	Storage Depth (ft)	Area (acres)
Pond #1	3.75	1.4
Pond #2	3.75	0.6
Pond #3	3.75	1.5

Table 4 - Alternative 2 Summary

Feature	Storage Depth (ft)	Area (acres)
Pond #1	3.75	1.4
Pond #2	3.75	0.6
Pond #3	3.75	1.5
Pond #4	3.75	8.9

Obstructions

Obstructions to the model terrain were incorporated in the proposed PCSWMM model. These represent building footprints of existing buildings within the model extents. These included homes in the neighborhood and the Fontainbleau Junior High School as well any other surrounding business. In a model simulation, the water is forced around these objects.

Two-Dimensional (2D) Cells:

In addition to subsurface considerations, PCSWMM also provides a two-dimensional component, allowing a rain event to spread in multiple directions from one 2D cell to another. A two-dimensional approach was chosen for this analysis based on the surrounding flat topography and the limited amount of detailed survey data available at the time of this study. These 2-D cells are hexagon shaped with each face 30 ft long.

Sub-catchments

Sub-catchments are hydrological units of land whose topography and drainage system elements direct surface runoff to a single point of discharge. The Curve Number was used in this model to account for land use and infiltration within each sub-catchment to collectively represent the watershed.

Conduits

Existing drainage conduits and pond information were included in the development of the proposed PCSWMM model. The STPG provided survey data (T. Baker Smith, 2022) and Grandee Maison Subdivision as-built drainage plans were also used as the basis for pipe sizes, inverts, and lengths.

Precipitation

The same 10-yr and 25-yr 24-hr precipitation events evaluated in the existing HEC-RAS model from NOAA Atlas 14 and summarized in Section 4 were utilized for the PCSWMM model development.

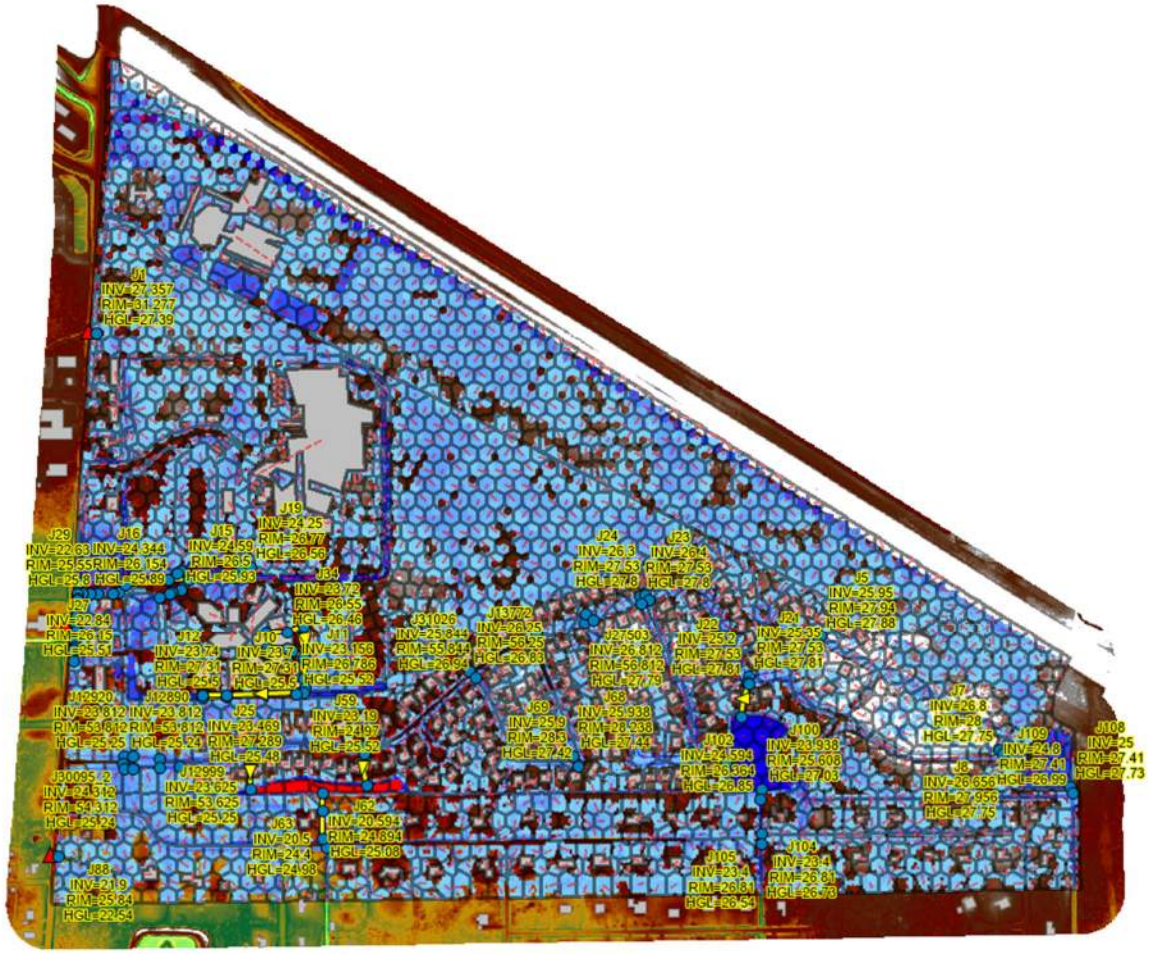

Figure 17 – PCSWMM Model. Existing Conditions.

With these conditions in place, an existing conditions scenario was run to reflect recent flooding events. Results showed that during a 10-yr, 24-hr event, the entrance to the subdivision was subject to 1.4-1.6 ft of flooding. These results were similar to the existing conditions HEC-RAS model runs utilized as the basis for the alternatives development. Once this baseline scenario was established, the modified terrain with the proposed ponds were added to evaluate the effectiveness of the alternatives.

6.2. Alternative 1 Results

Alternative 1 proposed three (3) detention ponds near the front of the neighborhood. 2-ft diameter pipes outfalls were utilized at each pond, allowing routing from Pond 3 (between FJH school and the subdivision) to Pond 2 (north of Grandee Maison Blvd) to Pond 1 (south of Grandee Maison Blvd) and out to the existing pond south of the neighborhood. Each pipe's invert was set to fill the pond near 60% before entering the pipe. In addition to the water routing from Pond 2, Pond 1 also collects rainfall from the street through a 3 ft diameter pipe. Below shows the layout of this alternative.

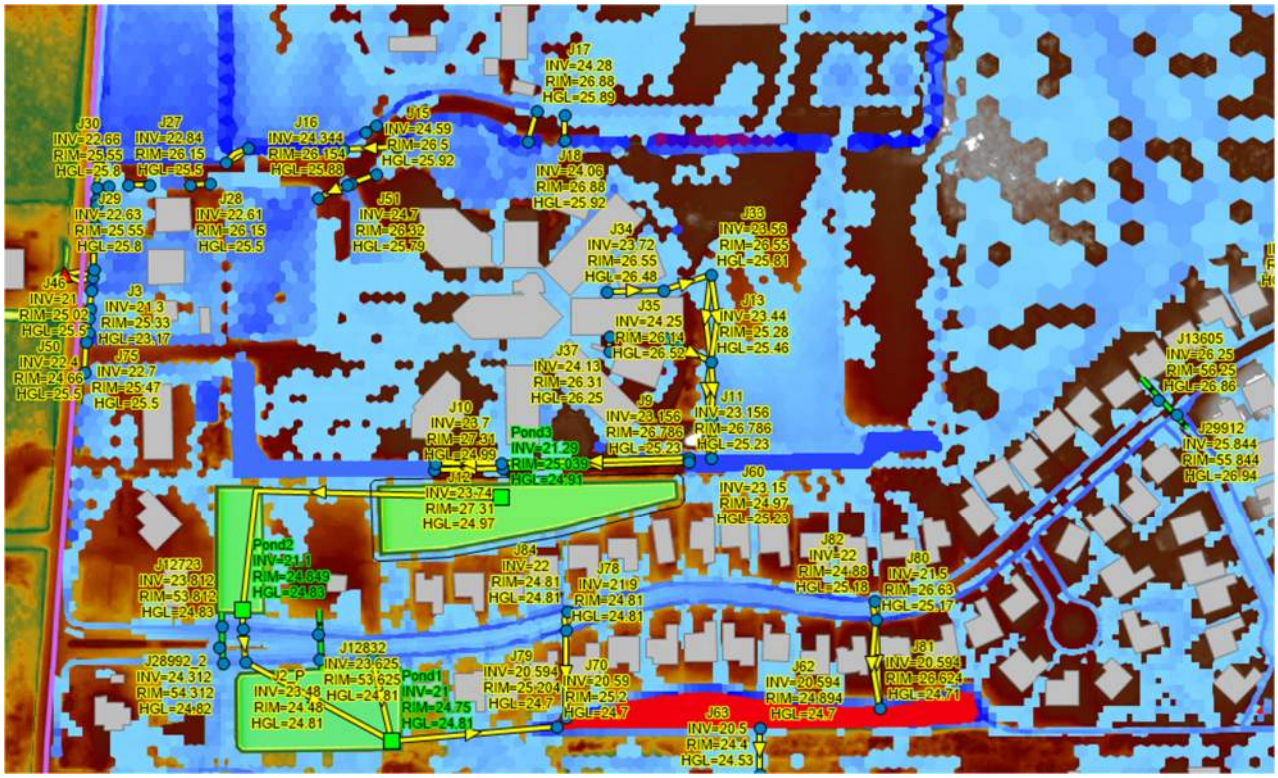

Figure 18 – PCSWMM Model. Alternative 1.

Results from this alternative reduced the flooding by close to 5 inches at the subdivision entrance during a 10-yr event as shown in **Figures 20 – 21** below.

6.3. Alternative 2 Results

Alternative 2 proposed three (3) detention ponds near the front of the neighborhood and one (1) detention pond east of the school, north the neighborhood. 2-ft diameter pipes outfalls were utilized at each pond, allowing routing from Pond 4 to Pond 1 as previously similar to Alternative 1. While each pipe's invert is set to fill Ponds 1-3 near 60% before entering the routing pipe, the invert for the pipe at Pond 4 is set to the bottom of pond's elevation. Below shows the layout of this alternative.

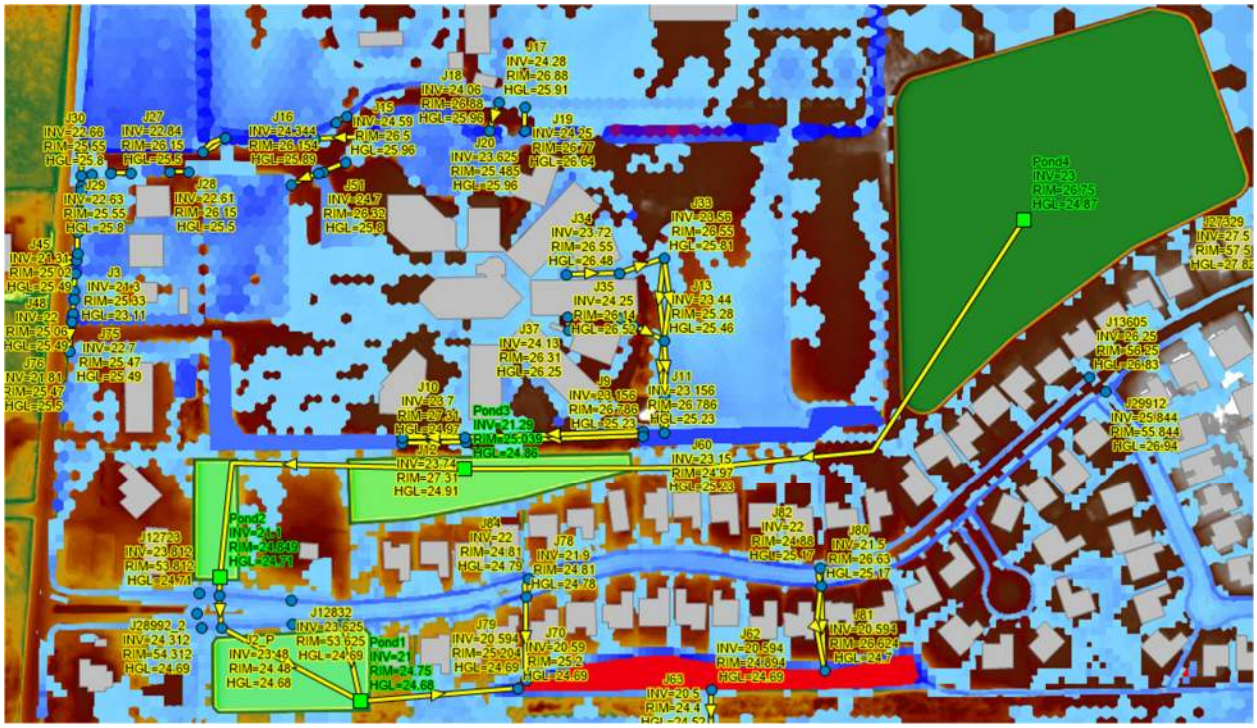

Figure 18 - PCSWMM Model. Alternative 2

Results from this alternative reduced the flooding by close to 6 inches at the entrance of the subdivision during a 10-yr event as shown in **Figures 20 – 21** below.

Figure 19 - PCSWMM Model. Locations of Results Cross Sections

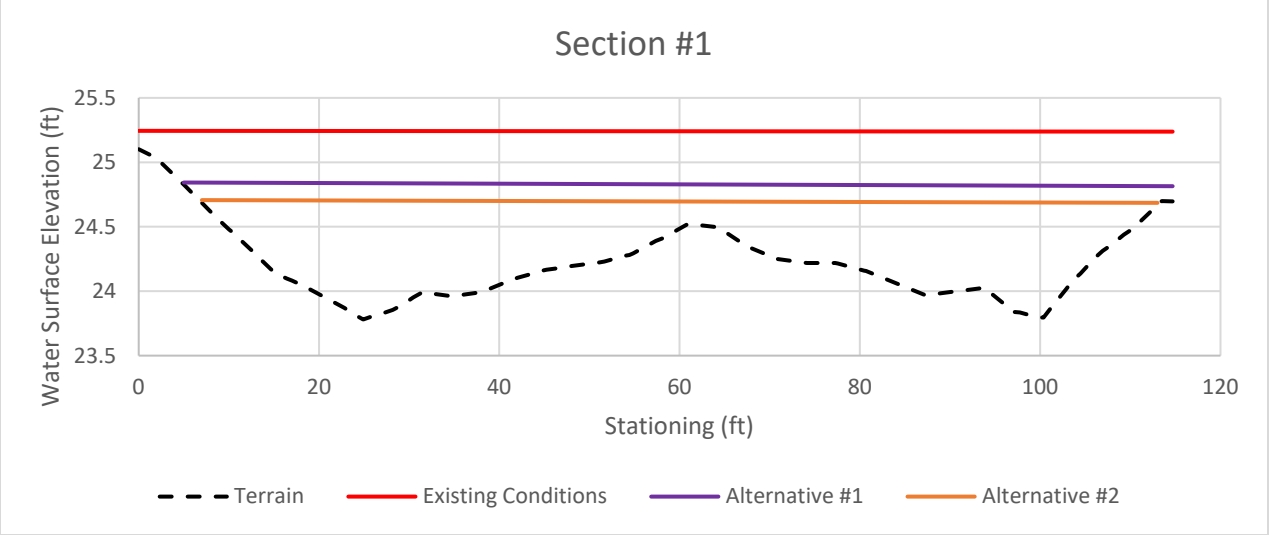

Figure 20 - PCSWMM Model Results

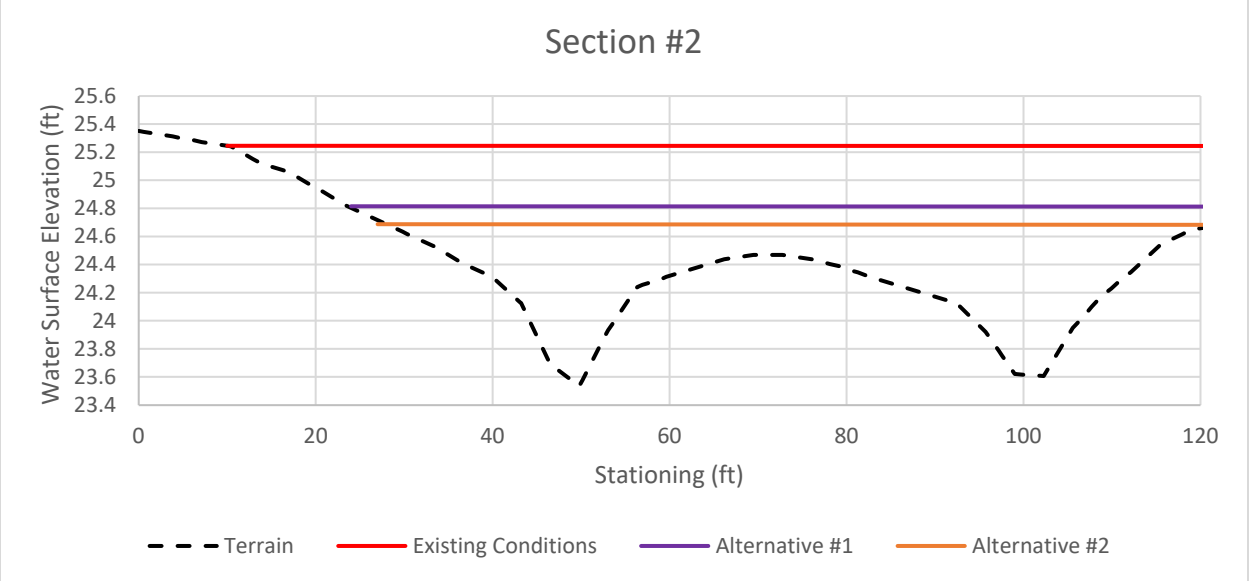

Figure 21 - PCSWMM Model Results

Figure 22 below provides stage-storage hydrographs at each of the proposed ponds in Alternatives 1 and 2.

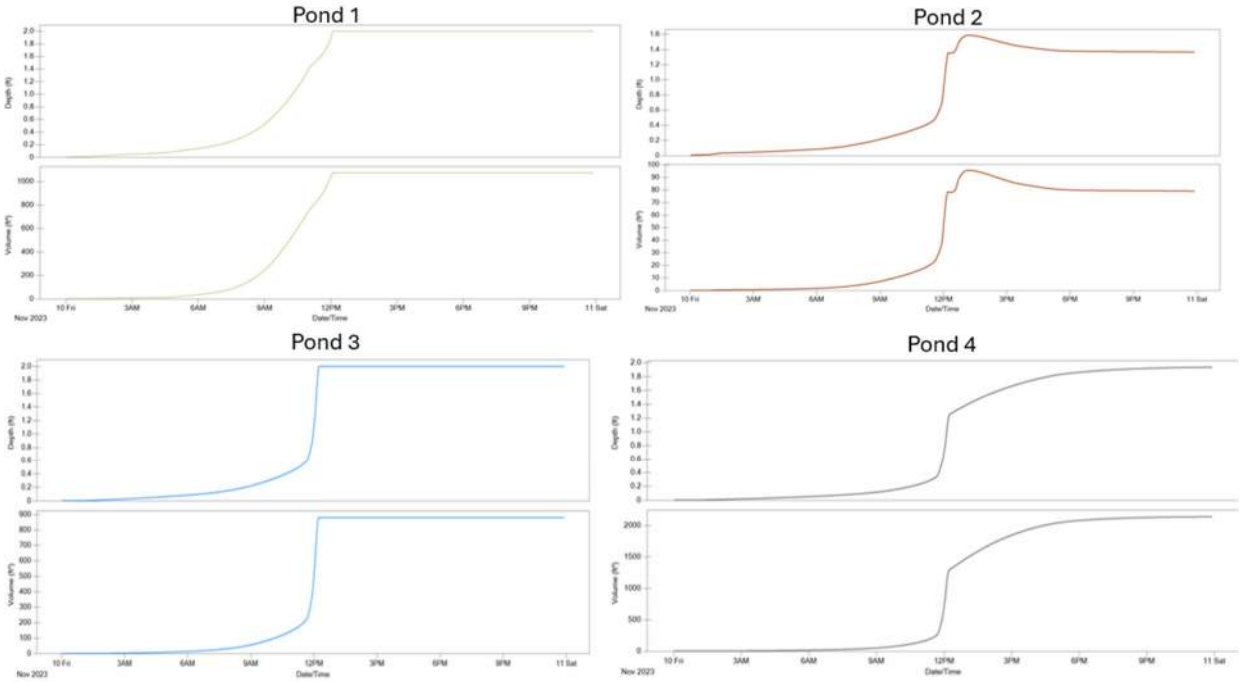

Figure 22 - Pond Performance Results

6.4. Cost Analysis

Conceptual level construction cost estimates are developed for each alternative. The developed engineer's opinion of probable construction cost for the alternatives and project features follow the general format of the Louisiana Uniform Public Work Bid Form for the construction bid schedule. Bid item specific contingencies are applied to optimize costs and reduce cost uncertainties.

To increase the quality, accuracy, and confidence in cost estimates, the likelihood and impact of all relevant uncertainties and risk events must be considered. Due to the early stage of the project, all cost estimates presented below include a 25% contingency factor to address unknown construction market fluctuations between design and future construction periods.

Table 5 - Estimated Construction Costs Summary

Item	Alternative 1	Alternative 2
Clearing/Grubbing/Demo	$ 66,200.00	$ 196,900.00
Excavation/Embankment	$ 351,000.00	$ 1,659,500.00
Drainage Pipes	$ 300,800.00	$ 429,200.00
Riprap/Stone/Concrete/Asphalt	$ 30,300.00	$ 36,700.00
Grassing & Environmental Controls	$ 48,100.00	$ 65,700.00
Mob/Demob/Survey/Utility/As-Builts	$ 145,000.00	$ 209,000.00
Subtotal	$ 941,400.00	$ 2,597,000.00
Contingency (25%)	$ 235,350.00	$ 649,250.00
Total	**$ 1,176,750.00**	**$ 3,246,250.00**

Detailed estimates of probable construction cost for each alternative are provided in **Appendix B**.

6.5. Additional Considerations

Both Alternatives 1 and 2 utilize areas that appear to within the ownership of the Grandee Maison developer. The ponds included in both Alternatives 1 and Alternatives 2 will require temporary access for initial construction of the features and will require periodic access for future operation and maintenance activities.

Pond #1, #2, and #3 are all located adjacent to existing drainage servitudes. Pond #4 may require additional servitudes for both construction and access to the proposed pond. Some of the areas necessary for Pond #4 potential servitudes may be classified as wetlands as shown in **Figure 23** below.

Figure 23 - National Wetlands Inventory Map

7. Summary and Conclusion

Both alternatives presented herein provide an effective solution to mitigate the existing problems at the Grandee Maison Subdivision entrance. Once an alternative is selected, the following optimizations will be completed in design:

- Size and footprint of proposed pond features may be refined.
- Detailed design and optimization of the proposed pond outfall structures should be performed.
- Detailed design of additional roadside drainage to convey flow to the proposed ponds should be performed.
- Material volume optimization/minimization should be checked.

7.1. Next Steps

The alternatives presented in this study are conceptual in nature. The preferred alternative will require detailed data collection, engineering and design will be required to determine optimal locations and configurations. Detailed data collection, engineering and design tasks may include:

- Detailed topographic data collection at the project site.
- Detailed geotechnical data collection and evaluation at the project site, including soil borings, soil classification testing, strength testing.
- Design level hydrologic and hydraulic modeling of the selected alternative to refine and optimize the preferred alternative and outfalls.
- Detailed engineering and design including production of construction plans and technical specifications.

Through these detailed next steps, the preferred alternative can be further refined and designed to progress the project to construction and implementation.

Appendix A - Existing Data and Site Visit Report

St. Tammany Parish

Grande Maison Blvd Drainage Study

Contract No: 23-019
Existing Data Memorandum

NEEL-SCHAFFER
Solutions you can build upon

August 2023

Contents

1. Introduction

The purpose of the study is to investigate the existing drainage patterns and identify drainage problems and their causes in the Grande Maison Subdivision in the Mandeville, LA area. Additional project objectives include developing alternatives to mitigate existing drainage problems and evaluating proposed alternatives and providing final recommendations.

Per the project scope, the study area is comprised of the Grande Maison Subdivision, Highway 59 on the west, and Independence Drive to the south in St. Tammany Parish, LA as seen in Figure 1. Over the last four years, this area has experienced multiple flood events, many of which are highlighted in the following section with photos and corresponding dates. The general subdivision drainage of the site consists of three retention ponds, an open ditch system throughout the subdivision, driveway culverts, and multiple outfall pipes from the neighborhood ponds into the St. Tammany Parish maintained drainage system. This document provides details of the past flooding events, Neel-Schaffer's (NSI) findings from the site visit, and an overview of existing information of the subdivision. The existing subdivision data includes survey data, drainage plans, previous drainage studies and models, and development documents associated with both Grande Maison and Heritage Heights.

Figure 1 – Project Location

2. Grand Maison Existing Drainage Problems

St. Tammany Parish Government (STPG) provided photographic evidence of flood conditions within the Grande Maison subdivision for multiple flood events. They include photographs and videos from the following dates: July 21, 2019; August 21, 2019; July 27, 2020; and December 30, 2022. Based on discussions with STPG, flooding is not limited to these events; however, these are documented events from residents. Below is a sample of images provided by STPG.

Figure 2 - STPG Provided Imagery at the Western Intersection of Grande Maison at Chateau Sonesta. Looking Northeast. Dated 7-21-2019.

Figure 3 - STPG Provided Imagery of Grande Maison Entrance. Looking East. Dated 12-30-2022.

Figure 4 - STPG Provided Imagery at the Intersection of Grande Maison Blvd and Chateau Grimaldi. Looking Northwest. Dated 12-30-2022.

3. Site Visit

To gather information about the existing drainage system, NSI team members and staff from the STPG project team conducted a site visit to the Grande Maison subdivision on June 23rd, 2023.

Photographs were taken on the site visit to document and provide a background on the existing conditions. Appendix A to this report provides a summary of the photographs taken and their locations.

The site visit was conducted starting at the entrance to the Grande Maison subdivision. The group discussed the concerns raised by the neighborhood residents including the consistent flooding that occurs at the entrance location. The pictures provided by STPG demonstrated that the flood waters can be seen near the top of the median curb indicating nearly six inches of floodwaters at the location.

The team then walked east to the 72-inch culvert located approximately 1000 feet from the entrance sign. The culvert connects to one of the neighborhood retention ponds which runs along the southern portion of the neighborhood. Based on the survey and modeling data, this pond is called Pond #6. The culvert runs in a north/south direction from the southern roadside ditch along Grande Maison Blvd into the pond. The pond's outfall is into the Parish drainage ditch that runs north and south from the pond, crossing Independence Dr, near 201 Independence Dr. The ditch is located within the Heritage Heights subdivision and continues south below Williamsburg Dr. Refer to Section 4.1 for additional details.

The team then walked to the Grande Maison entrance intersection at Highway 59 and reviewed the neighborhood drainage culverts. They are 18"x11" reinforced concrete pipes (RCP) oriented in an

east/west direction from the roadside ditch along Grande Maison to the roadside ditch along Highway 59. In addition, the lack of a north/south cross drain at the intersection of Highway 59 and Independence Dr is confirmed by the team through a site visit along Highway 59 to Independence Dr. The existing conditions along Highway 59 roadside ditches north of Grande Maison Blvd is also reviewed by the team.

The team discussed the observations and comments from residents that the water appears to flow from the property to the north across Grande Maison Blvd and then eastward. The team then walked along the north side of Grande Maison Blvd to the neighborhood recreational center approximately 500 feet into the subdivision. This area includes a cleared field used for soccer with pine trees lining the cleared portion.

The team then proceeded to walk through the wooded areas to see if there were low elevations or ponded areas that would indicate standing water conditions. The team found the southwest pond associated with Fontainebleau Jr High School and the connection to the western pond associated with Fontainebleau High School.

The project team then returned to the southwest pond associated with Fontainebleau Jr. High School and traveled east along the pond to find its outlet. It appeared that the pond was divided into two ponds with culverts and at least one headwall. Due to the forested conditions, the team was not able to locate the outfall for the southeast pond. This area was not included in the survey data received by STPG.

The team then traveled by car to the pond connection under Hurricane Alley between the Fontainebleau Jr and High School ponds. The team noted the outlet headwall for the Fontainebleau High School Pond and the associated ditch were not included in the survey data received.

The team then traveled by car to inspect the drainage connection crossing Highway 59 between the Hurricane Alley loop. Accordingly, this location has two 24-inch RCP culverts that cross under Highway 59 and the funnel into an angled 60-inch RCPA pipe with the outfall into the east/west ditch alongside the St. Tammany Parish Sheriff's office. The final outfall is into the Upper Bayou Chinchuba watershed. Also at this location, is a concrete weir with two 36-inch culverts in an east/west orientation. This location was included in the survey data provided by STPG.

4. Existing Data

4.1. STPG provided Survey Data:

A survey performed by T. Baker Smith in July 2022 for the St. Tammany Parish Government was provided to NSI. The survey included the following areas:

- STP Drainage Lateral labeled 4-DW2-20, which is a ditch running perpendicular to Highway 59, alongside the St. Tammany Parish Sherriff's office.
- Grande Maison Blvd from the intersection at Highway 59 to Chateau De Brie including the drainage pipes, material, size, inverts, top of ditches, and the centerline of ditches along both sides of the road.
- Highway 59 from the top loop of Hurricane Alley to Ridgewood Drive.

- Approximately 300 feet east of the junction of Independence Dr and Revere Dr - surveying the Parish Drainage Lateral including the multiple drop inlets and RCPs that drain from the detention pond south of Grande Maison subdivision to beyond Williamsburg Dr. These RCPs are connected through a ditch labeled Parish Lateral 4-EW1-82, which continues under Henry Meiners Road through a corrugated metal pipe (CMP).
- A box culvert under Highway 59 approximately 500 ft past Henry Meiners Road from the north going south and is oriented in the east/west direction.

4.2. STPG Provided Subdivision Data:

As a part of the data collection effort, STPG provided as-built sewer, water, recorded plat, paving, and draining plans for Phases 1 (2005), 2 (2006), and 3 (A, B, and C ranging from 2013-2020) of the Grande Maison subdivisions. This includes pipe sizing, ditch section, and basic to 1-ft contours for Chateau Papillon, Chateau Andelot, Grande Maison Blvd, and Chateau Grimaldi. In addition to Grande Maison, plans were also provided for 1979 Phase 1-3 (1979), Phase 4 (1981), Phase 5 (1982), Phase 6 (1986), and Phase 7 (1994) of the Heritage Heights Subdivision. This subdivision is located directly south of the Grande Maison subdivision and receives outflow from the two Grande Maison retention ponds. Heritage Heights extends from Highway 59 to Bandywine Drive, covering Independence Drive to Williamsburg Drive.

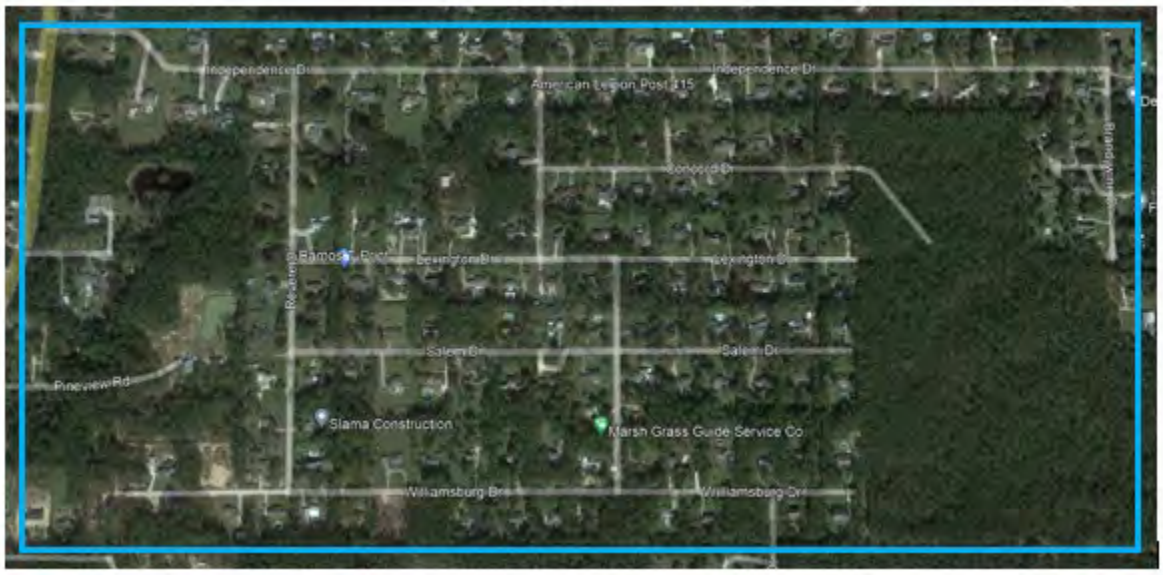

Figure 5 –Overview of Heritage Heights

In addition to these plans, NSI has collected drainage revision calculations to lots 114 and 115 from 2015, justifying the installation of a 36-inch pipe to pond SDSA #7 (see picture below) to accommodate flows up to a 25-yr storm.

Figure 6 – Approximate Location of Approved Pipe (yellow line). Chateau Grimaldi is Located on the Left Side.

4.3. Previous Studies and Models

Through the St. Tammany Parish Sustainable Growth Pilot Study (2022), NSI was tasked with developing a hydraulic model to evaluate drainage and flood risk impacts to guide the Parish for sustainable residential and commercial growth. The study area was bound by Interstate 12 to the north, US Highway 190 to the west, US Highway 59 to the east, and Sharp Road to the south. To accomplish this, NSI collected data from the St. Tammany Parish Flood Insurance Study and Critical Drainage Areas Map, Bayou Chinchuba Watershed Management Plan, and surveys. Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) and River Analysis System (HEC-RAS Version 6.2) models were created to appropriately account for drainage features in the Bayou Tete L'ours, Little Creek, Ponticholawa, and Bayou Chinchuba watersheds. Using National Resources Conservation Service (NRCS) unit hydrographs, Flood Insurance Study (FIS) rating curves and stream flow volumes, and National Oceanic and Atmospheric Administration (NOAA) localized precipitation rates, this model was able to evaluate 10-yr, 25-yr, 50-yr, and 100-yr storms within a 24-hr period.

NSI has also received a Hydrologic Analysis for Grande Maison Subdivision done in 2003 by Kelly McHugh and Associates. The study calculated runoff considered in pre-development and post-development conditions to the site, evaluating the three ponds during 5-yr, 10-yr, and 25-yr storms. Their findings were used to size the proposed Grande Maison subdivision drainage and retention ponds.

4.4. Current Study and Models

Building on the Sustainable Growth effort and with the understanding that the Grande Maison subdivision is within the Bayou Chinchuba watershed, the model will be extended beyond Highway 59 to include the Grande Maison subdivision and the surveyed drainage features

Additional LiDAR data will be used to update the modeled terrain for Grande Maison and surrounding areas. The survey data from TBS will also be used to confirm water flows within the subdivision. Storm events, such as those provided by STPG, will assist in calibrating the model. Then a review of the model

will be performed to assess the need for additional data, such as survey data. After this review, development of proposed alternatives will begin in coordination with St. Tammany Parish Government.

Appendix A: Stakeholder-Provided Images

July 21, 2019


STOP

August 21, 2019

June 27, 2020

December 30, 2022


STOP

Appendix B: Site Visit Log

June 23, 2023: Site Visit for Grande Maison

Attendees:

St. Tammany Parish Government (STPG)–

- Mitchel Roniger

Neel-Schaffer, Inc. (NSI) -

- Leah Selcer
- Amanda Phillips

Richard C. Lambert Consultants (RCLC) (NSI Team Member)

- Frank Zemmer
- Eric Kocken

Figure 5 - Inlet Pipe for Neighborhood Pond. Approximately 750 ft from Grande Maison Entrance.

Figure 2 - Southern Grande Maison Cross Culverts at Southern Pond Inlet. Looking Northeast

Figure 3 -

Figure 4 - Top of Ground for Southern Pond Inlet. Looking South in the Direction of the Pond.

Figure 5 - Outfall of Southern Pond Inlet. Looking Southwest

Figure 6 - Western Edge of Southern Neighborhood Pond. Looking East.

Figure 7 - Outfall of Southern Pond Inlet. Looking Northeast

Figure 8 - Outfall of Southern Pond Inlet. Looking North

Figure 9 - Southern Edge of Southern Neighborhood Pond. Looking East.

Figure 10 - Southern Pond outlet. Looking Southeast

Figure 61 - East Side of South Culvert at Intersection of Grande Maison Blvd and Highway 59. Looking Southwest

Figure 12 - Intersection of Grande Maison Blvd and Highway 59. Looking North from Southern Edge.

Figure 13 – Roadside Ditch Along Grande Maison Blvd at the Intersection of Grande Maison Blvd and Highway 59. Looking Northeast.

Figure 14 -Roadside Ditch Along Highway 59. Looking South from the Intersection of Grande Maison Blvd and Highway 59.

Figure 15 - Culvert Along Grande Maison Blvd at the Intersection of Grande Maison Blvd and Highway 59. Looking Northeast

Figure 16 - Headwall of Southwest Pond Associated with Fontainebleau Jr. High School

Figure 17 - Headwall of Southwest Pond Associated with Fontainebleau Jr. High School

Figure 18- Headwall of Southwest Pond Associated with Fontainebleau Jr. High School

Figure 19 - East Side Roadside Ditch and Cross Culverts along Highway 59. Looking Southeast.

Figure 20 - East Side Roadside Culvert along Highway 59 at Shopping Center between Hurricane Alley Drives. Looking Northwest.

Figure 21 - East Side Roadside Ditch along Highway 59. Looking Southeast.

Figure 22 - West Side of Highway 59 at STP Sherriff Office parking Lot South Exit. Looking Southwest.

Figure 23 - West Side Roadside Ditch and Cross Culverts along Highway 59. Looking Southeast.

Figure 24 – Driveway Cross Culverts at STP Sheriff's Office on West Side Roadside Ditches along Highway 59. Looking West.

Figure 25 -West Side Roadside Ditch and Cross Culverts along Highway 59. Looking North.

Figure 26- Culvert on the West Side of Highway 59 into Inlet Box Structure on the South Side of STP Sheriff Parking Lot. Looking Southeast.

Figure 27 - West Side Roadside Ditch Driveway Culvert along Highway 59. Looking East

Figure 28 - Inlet Box for Culverts on West Side Roadway Ditches and Driveway Culverts. Looking East.

Figure 29 - Open Ditch Discharge from Highway 59 to Upper Bayou Chinchuba (not shown). Looking West.

Figure 30 - Southeast Pond Associated with FJH. Apparent Headwall/Outlet Structure. Looking East.

Figure 317 – Outlet Pipe from FHS West Pond. Looking East.

Appendix C: Existing Information Log

Owner Provided Data			
Associated Date	**Information contained in folder/ file**	**Quantity**	**Folder name**
8/21/2019	Photos of flooded roads	15 photos	Photos
7/27/2020	Photos of flooded roads	27 photos	Photos
7/20/2021	Photos of flooded roads- Grande Maison @ Chateau Conesta	9 photos	Photos
12/30/2022	Photos of flooded roads	4 photos	Photos
7/22/2022	DWG Survey File. Contains: drainage pipes, material, size, and inverts. Utilities and limited elevation points	DWG file	TBS Survey Deliverables
7/22/2022	TBS Survey Plan sheets, PDF	10 pages	TBS Survey Deliverables
7/22/2022	Survey points	Excel	TBS Survey Deliverables
6/2/1905	Heritage Heights Drainage Plans & As-Builts & Recorded Plats	10 files	Subdivision Files
7/12/2005	Grande Maison Phase 1- As-Built Sewer	1 page	Subdivision Files
8/11/2005	Grande Maison Phase 1- As Water Plan	1 page	Subdivision Files
11/7/2005	Grande Maison Phase 1- As Recorded Plat	1 page	Subdivision Files
10/31/2007	Grande Maison Phase 1- As-Built Paving & Draining (Pipe sizing, ditch section, basic contours) Chateau Papillon, Andelot, Grimaldi	1 page	Subdivision Files
	Grande Maison Phase 2- As-Built Sewer	1 page	Subdivision Files
12/7/2006	Grande Maison Phase 2- As-Built Paving & Draining (Pipe sizing, typical ditch sections, 1-ft contours) Grande Maison Blvd, Chateau Papillon, Andelot, Grimaldi	1 page	Subdivision Files
	Grande Maison Phase 2- As Recorded Plat	1 page	Subdivision Files
	Grande Maison Phase 2- As Water Plan	1 page	Subdivision Files
11/17/2015	Grande Maison Phase 2- lots 114,115 Drainage Revisions	2 tabs	Subdivision Files
5/28/2013	Grande Maison Phase 3A- As Built Sewer	1 page	Subdivision Files
4/7/2014	Grande Maison Phase 3A- As Built Paving & Draining (Pipe sizing, typical ditch sections, 1-ft contours) Grande Maison Blvd, Chateau Papillon, Andelot, Grimaldi	1 page	Subdivision Files
4/9/2014	Grande Maison Phase 3A- As Recorded Plat	1 page	Subdivision Files
2/14/2014	Grande Maison Phase 3A- As built Water Plan	1 page	Subdivision Files
4/13/2017	Grande Maison Phase 3B- As Built Paving & Draining	1 page	Subdivision Files
5/24/2017	Grande Maison Phase 3B- Recorded Plat	1 page	Subdivision Files

12/12/2019	Grande Maison Phase 3C As-Built SWPPP Plan	5 pages	Subdivision Files
1/17/2020	Grande Maison Phase 3C- Recorded Plat	1 page	Subdivision Files
3/20/2013	Approval to install pipe to pond	5 pages	Subdivision Files
H&H Coastal Modeling (Sustainable Growth Study)			
6/30/1905	St Tammany Parish Flood Insurance Study	146 pages	Bayou Chinchuba Pond Upgrades
8/12/2006	Bayou Chinchuba HEC-RAS model 3.12		Bayou Chinchuba Pond Upgrades
12/6/2017	As-Built Survey	1 page	Bayou Chinchuba Pond Upgrades
5/11/2021	As-Builts for Bayou Chinchuba Detention Pond (by BHI)	17 pages	Bayou Chinchuba Pond Upgrades
2/1/2006	Bayou Chinchuba Watershed Mgmt Plan	314 pages	Bayou Chinchuba Study
8/22/2007	Bayou Chincuba Phase 2 Stamped plans	20 pages	Bayou Chinchuba Study
7/7/2016	FEMA Solicitation of Views Letter	2 pages	Bayou Chinchuba Study
7/20/2021	Street names of flooded roads	1page	2021.07.20 Rainfall Event
8/25/2022	St Tammany Parish Critical Drainage Areas Map	1 page	Critical Drainage Areas
7/11/2023	Final HEC-HMS model with Alternatives 5 &6		Bayou Chinchuba Study
7/11/2023	Final RAS model		Bayou Chinchuba Study

Appendix B - Estimates of Probable Construction Cost

ALTERNATIVE 1 (PONDS 1, 2, & 3)
OPINION OF PROBABLE CONSTRUCTION COSTS
St. Tammany Parish, Louisiana
PROJECT NAME: GRANDE MAISON DRAINAGE STUDY
JANUARY 12, 2024

Item No.	Item Description	Unit	Quantity	Unit Price	Amount
201-01-00100	CLEARING AND GRUBBING	ACRE	4.06	$12,000.00	$48,708.00
202-01-00100	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP SUM	1	$15,000.00	$15,000.00
202-02-02020	REMOVAL OF ASPHALT PAVEMENT	SQ. YD.	44.4	$25.00	$1,111.11
202-02-06140	REMOVAL OF CONCRETE BARRIER CURB	LIN. FT.	20.0	$15.00	$300.00
202-02-32500	REMOVAL OF CONCRETE PAVEMENT	SQ. YD.	44.4	$25.00	$1,111.11
203-01-00100 (A)	GENERAL EXCAVATION (POND 1)	CU. YD.	7678.7	$17.00	$130,537.90
203-01-00100 (B)	GENERAL EXCAVATION (POND 2)	CU. YD.	3353.4	$17.00	$57,007.80
203-01-00100 (C)	GENERAL EXCAVATION (POND 3)	CU. YD.	7437.8	$17.00	$126,442.60
203-02-00200	DRAINAGE EXCAVATION (DITCH REGRADING)	LIN. FT.	1200.0	$10.00	$12,000.00
203-03-00100	EMBANKMENT	LUMP SUM	1	$5,000.00	$5,000.00
204-02-00100	TEMPORARY HAY OR STRAW BALES	EACH	28	$26.50	$742.00
204-06-00100	TEMPORARY SILT FENCING	LIN. FT.	3300.0	$3.00	$9,900.00
204-07-00100	TEMPORARY STONE CONSTRUCTION ENTRANCE	EACH	2	$3,000.00	$6,000.00
302-02-08010	CLASS II BASE COURE (CRUSHED STONE)(6" THICK MIN.)	SQ. YD.	88.8	$32.50	$2,886.00
502-03-00300	ASPHALT CONCRETE (6" THICK)	SQ. YD.	44.4	$100.00	$4,440.00
601-01-00100	PORTLAND CEMENT CONCRETE PAVEMENT (6" THICK)	SQ. YD.	44.4	$110.00	$4,884.00
701-03-01042	STORM DRAIN PIPE (24" RCP)	LIN. FT.	758.0	$140.00	$106,120.00
701-03-01082	STORM DRAIN PIPE (36" RCP)	LIN. FT.	35.0	$180.00	$6,300.00
701-03-01102	STORM DRAIN PIPE (48" RCP)	LIN. FT.	269.0	$300.00	$80,700.00
701-04-01140	STORM DRAIN PIPE (54" EQUIV. RCPA)	LIN. FT.	80.0	$500.00	$40,000.00
702-03-00010	CATCH BASIN (CB-01)	EACH	9	$5,300.00	$47,700.00
707-01-00100	CONCRETE BARRIER CURB	LIN. FT.	20.0	$26.00	$520.00
711-01-02060	RIP RAP (10 LB, 18" THICK)	SQ. YD.	66.7	$100.00	$6,666.67
713-01-00100	TEMPORARY SIGNS AND BARRICADES	LUMP SUM	1	$10,000.00	$10,000.00
714-01-00100	SLAB SODDING (BERMUDA GRASS)	SQ. YD.	1100.0	$15.00	$16,500.00
727-01-00100	MOBILIZATION	LUMP SUM	1	$50,000.00	$50,000.00
739-01-00100	HYDRO-SEEDING	ACRE	3.79	$4,500.00	$17,045.45
740-01-00100	CONSTRUCTION LAYOUT	LUMP SUM	1	$10,000.00	$10,000.00
NS-600-00220	SAW CUTTING PAVEMENT (FULL DEPTH)(6" TYP.)	IN-FT	720.0	$1.75	$1,260.00
S-001	EXPLORATORY EXCAVATION	EACH	8	$2,500.00	$20,000.00
S-002	DOUBLE 66" HEADWALL @ 90^{o} WITH WINGWALL	EACH	1	$25,000.00	$25,000.00
S-003	CONSTRUCTION MATERIALS TESTING	LUMP SUM	1	$10,000.00	$10,000.00
S-004	TEMPORARY SEDIMENT CHECK DAM (#57 STONE)	EACH	3	$1,200.00	$3,600.00
S-005	PERMANENT MAINTENANCE ROADWAY (AGGREGATE)(6" THICK)	SQ. YD.	1667	$26.00	$43,342.00
S-006	UTILITY RELOCATION	LUMP SUM	1	$50,000.00	$50,000.00
S-007	AS-BUILT PLANS (WORK TO BE DONE BY ENGINEER)	LUMP SUM	1	$15,000.00	$15,000.00
S-008	ENVIRONMENTAL PROTECTION (SWPPP)	LUMP SUM	1	$15,000.00	$15,000.00
				TOTAL:	**$1,000,824.64**
			TOTAL WITH 25% CONTINGENCY:		**$1,251,030.80**

ALTERNATIVE 2 (PONDS 1, 2, 3, & 4)
OPINION OF PROBABLE CONSTRUCTION COSTS
St. Tammany Parish, Louisiana
PROJECT NAME: GRANDE MAISON DRAINAGE STUDY
JANUARY 12, 2024

Item No.	Item Description	Unit	Quantity	Unit Price	Amount
201-01-00100	CLEARING AND GRUBBING	ACRE	14.95	$12,000.00	$179,388.00
202-01-00100	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP SUM	1	$15,000.00	$15,000.00
202-02-02020	REMOVAL OF ASPHALT PAVEMENT	SQ. YD.	44.4	$25.00	$1,110.00
202-02-06140	REMOVAL OF CONCRETE BARRIER CURB	LIN. FT.	20.0	$15.00	$300.00
202-02-32500	REMOVAL OF CONCRETE PAVEMENT	SQ. YD.	44.4	$25.00	$1,111.11
203-01-00100 (A)	GENERAL EXCAVATION (POND 1)	CU. YD.	7678.7	$17.00	$130,537.90
203-01-00100 (B)	GENERAL EXCAVATION (POND 2)	CU. YD.	3353.4	$17.00	$57,007.80
203-01-00100 (C)	GENERAL EXCAVATION (POND 3)	CU. YD.	7437.8	$17.00	$126,442.60
203-01-00100 (D)	GENERAL EXCAVATION (POND 4)	CU. YD.	76969.2	$17.00	$1,308,476.78
203-02-00200	DRAINAGE EXCAVATION (DITCH REGRADING)	LIN. FT.	1200.0	$10.00	$12,000.00
203-03-00100	EMBANKMENT	LUMP SUM	1	$5,000.00	$5,000.00
204-02-00100	TEMPORARY HAY OR STRAW BALES	EACH	28	$26.50	$742.00
204-06-00100	TEMPORARY SILT FENCING	LIN. FT.	4800.0	$3.00	$14,400.00
204-07-00100	TEMPORARY STONE CONSTRUCTION ENTRANCE	EACH	3	$3,000.00	$9,000.00
302-02-08010	CLASS II BASE COURE (CRUSHED STONE)(6" THICK MIN.)	SQ. YD.	88.8	$32.50	$2,886.00
502-03-00300	ASPHALT CONCRETE (6" THICK)	SQ. YD.	44.4	$100.00	$4,440.00
601-01-00100	PORTLAND CEMENT CONCRETE PAVEMENT (6" THICK)	SQ. YD.	44.4	$110.00	$4,884.00
701-03-01042	STORM DRAIN PIPE (24" RCP)	LIN. FT.	1448.0	$140.00	$202,720.00
701-03-01082	STORM DRAIN PIPE (36" RCP)	LIN. FT.	35.0	$180.00	$6,300.00
701-03-01102	STORM DRAIN PIPE (48" RCP)	LIN. FT.	269.0	$300.00	$80,700.00
701-04-01140	STORM DRAIN PIPE (54" EQUIV. RCPA)	LIN. FT.	80.0	$500.00	$40,000.00
702-03-00010	CATCH BASIN (CB-01)	EACH	15	$5,300.00	$79,500.00
707-01-00100	CONCRETE BARRIER CURB	LIN. FT.	20.0	$26.00	$520.00
711-01-02060	RIP RAP (10 LB, 18" THICK)	SQ. YD.	88.9	$100.00	$8,888.89
713-01-00100	TEMPORARY SIGNS AND BARRICADES	LUMP SUM	1	$12,000.00	$12,000.00
714-01-00100	SLAB SODDING (BERMUDA GRASS)	SQ. YD.	1100.0	$15.00	$16,500.00
727-01-00100	MOBILIZATION	LUMP SUM	1	$100,000.00	$100,000.00
739-01-00100	HYDRO-SEEDING	ACRE	6.77	$4,500.00	$30,475.21
740-01-00100	CONSTRUCTION LAYOUT	LUMP SUM	1	$15,000.00	$15,000.00
NS-600-00220	SAW CUTTING PAVEMENT (FULL DEPTH)(6" TYP.)	IN-FT	720.0	$1.75	$1,260.00
S-001	EXPLORATORY EXCAVATION	EACH	8	$2,500.00	$20,000.00
S-002	DOUBLE 66" HEADWALL @ 90^{o} WITH WINGWALL	EACH	1	$25,000.00	$25,000.00
S-003	CONSTRUCTION MATERIALS TESTING	LUMP SUM	1	$15,000.00	$15,000.00
S-004	TEMPORARY SEDIMENT CHECK DAM (#57 STONE)	EACH	4	$1,200.00	$4,800.00
S-005	PERMANENT MAINTENANCE ROADWAY (AGGREGATE) (6" THICK)	SQ. YD.	4444	$26.00	$115,544.00
S-006	UTILITY RELOCATION	LUMP SUM	1	$50,000.00	$50,000.00
S-007	AS-BUILT PLANS (WORK TO BE DONE BY ENGINEER)	LUMP SUM	1	$17,000.00	$17,000.00
S-008	ENVIRONMENTAL PROTECTION (SWPPP)	LUMP SUM	1	$20,000.00	$20,000.00
				TOTAL:	**$2,733,934.28**
				TOTAL WITH 25% CONTINGENCY:	**$3,417,417.86**