2025

Supplemental Stormwater Master Plan Report

TOWN OF HOLDEN BEACH, NORTH CAROLINA

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TOWN OF HOLDEN BEACH

BRUNSWICK COUNTY, NORTH CAROLINA

SUPPLEMENTAL STORMWATER MASTER PLAN REPORT

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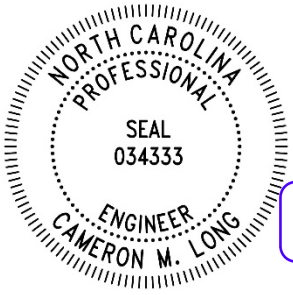

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PROJECT NO. 24.07073

Executive Summary
Town of Holden Beach Supplemental Stormwater Master Plan

Introduction/Scope of Work

The Town of Holden Beach (Town) retained McGill Associates (McGill) to prepare this Supplemental Stormwater Master Plan (SWMP) following completion of the Town's initial Stormwater Master Plan in June 2024. The primary purposes of this project were to expand the stormwater system inventory, analyze flooding conditions within four additional areas of concern, evaluate alternatives to improve flooding conditions during the 10-year storm event, and provide recommendations for capital improvements.

The additional areas of concern are as follows:

- Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive
- Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street
- Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive
- Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

A geographic information system (GIS)-based stormwater system inventory developed in 2024 was expanded with additional field survey and topographic data in the supplemental study areas. This information was incorporated into the Town's hydrologic and hydraulic model, developed in Personal Computer Storm Water Management Model (PCSWMM), to assess drainage conditions during the 10-year storm event. For these supplemental areas, two-dimensional modeling was performed to evaluate surface flooding, roadway overtopping, and potential solutions where formal infrastructure is limited or absent.

Two alternative solutions to address flooding were evaluated for each area of concern. Alternatives generally consisted of improvements such as installing new stormwater pipes and catch basins, adding swales, or incorporating infiltration systems, with some options including

tide-gated outfalls discharging to adjacent canals or marshes. Concept-level cost estimates were prepared for each alternative to guide prioritization and potential funding opportunities.

A Supplemental Stormwater Master Plan has been prepared to summarize the results of this analysis and provide recommendations for the Town's consideration.

Recommendations for Stormwater Improvements

After completing our requested scope of services, McGill is pleased to provide the following recommendations to the Town:

Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive

- **Issue:** Flooding in public right-of-way (ROW) and streets during the 10-year storm event due to undersized pipes west of Dunescape Drive and no stormwater infrastructure east of Dunescape Drive.
- **Public Benefit:** Reduces roadway flooding along McCray Street, Avenue B, and Dunescape Drive, improving access and minimizing ponding.
- **Recommended Solution:** Install new stormwater pipes and catch basins west of Dunescape Drive tying into the existing network near Ocean Boulevard East, and construct a second system east of Dunescape Drive to convey runoff to a dune infiltration system.

Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street

- **Issue:** Flooding in public ROW and streets during the 10-year storm event due to flat roadway topography and limited or no stormwater infrastructure.
- **Public Benefit:** Reduces roadway ponding throughout the canal street network, particularly on Fayetteville, High Point, Sanford, and Burlington Streets, improving drainage and emergency access.
- **Recommended Solution:** Construct new stormwater systems along multiple streets, including catch basins and conveyance pipes tied to tide-gated outfalls or infiltration systems, while maintaining existing drainage patterns where effective.

Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive

- **Issue:** Flooding in public ROW and streets during the 10-year storm event, with limited stormwater infrastructure and reliance on overland flow to canals.
- **Public Benefit:** Reduces roadway flooding along Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive, improving accessibility and limiting nuisance ponding.
- **Recommended Solution:** Install new stormwater conveyance and collection systems, including catch basins, infiltration systems, and tide-gated outfalls where needed, to improve drainage and reduce ponding along roadway low points.

Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

- **Issue:** Frequent flooding in public ROW and streets during the 10-year storm event due to undersized or negatively sloped pipes, limited infiltration systems, and reliance on overland flow.
- **Public Benefit:** Provides significant reductions in roadway flooding throughout the canal street network, with substantial improvements on Tuna Drive and Dolphin Street, enhancing overall stormwater capacity and roadway access.
- **Recommended Solution:** Implement new stormwater systems with catch basins, upgraded conveyance pipes, and tide-gated outfalls where required to reduce ponding and improve drainage performance across the street network.

Table of Contents

Attachments

1.0 Introduction

The Town of Holden Beach (Town) is located in Brunswick County, North Carolina, on a barrier island situated between Oak Island to the east and Ocean Isle Beach to the west. It is bounded by the Intracoastal Waterway to the north and the Atlantic Ocean to the south.

The Town's stormwater infrastructure consists of a combination of pipes, structures, and open ditches that convey stormwater throughout the island. The North Carolina Department of Transportation (NCDOT) also owns and maintains stormwater infrastructure within the Town limits associated with NCDOT roadways.

The Town's stormwater infrastructure is frequently overburdened by rainfall events, as well as sunny day tidal flooding, resulting in roadway ponding, erosion, and property impacts. Following completion of the Stormwater Master Plan in June 2024, the Town requested additional evaluation of four additional areas of concern (AOCs) that are not served by formal drainage systems. These areas were selected for further evaluation based on recurring nuisance flooding and roadway overtopping, with several areas previously documented in Section 7 – Other Problem Areas of the 2024 report. In these locations, roads are constructed at low elevations with little to no stormwater infrastructure, limited positive drainage outlets, and a reliance on surface flow, infiltration, or direct discharge into adjacent canals or the Intracoastal Waterway. The AOCs include:

Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive

Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street

Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive

Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

The Town retained McGill Associates, PA (McGill) to prepare this Supplemental Report to the 2024 Stormwater Master Plan. The purpose of this supplement is to:

1. Expand the stormwater system inventory with additional survey and field data collection in the identified areas of concern.
2. Analyze existing stormwater system performance and drainage conditions for the 10-year rainfall event.
3. Identify deficiencies contributing to roadway and property flooding and evaluate feasible alternatives to improve drainage conditions.
4. Provide recommendations for prioritized capital improvements consistent with the methodology established in the 2024 Stormwater Master Plan.

Figure 1.1 Location Map

2.0 Existing Stormwater System Mapping

As part of the 2024 Stormwater Master Plan (SWMP), McGill Associates developed a comprehensive inventory of the Town's stormwater infrastructure. Available data from Town records, the North Carolina Floodplain Mapping Program (NCFMP), survey, and NCDOT were compiled to establish an understanding of major drainage patterns, outfalls, and system characteristics. A field reconnaissance effort was conducted with Town staff to confirm the presence of stormwater features and identify gaps in the available data.

The 2024 SWMP included a field mapping program to populate a Geographic Information System (GIS) database of stormwater features and to create an initial inventory of the fragmented stormwater network. This program included GPS-grade mapping of inlets, catch basins, pipes, and ditches, as well as a detailed topographic survey of key areas of concern along Ocean Boulevard. Closed-circuit television (CCTV) inspections were also attempted at select outfalls, although blockages prevented full inspection of some pipes.

For this Supplemental Report, the system mapping completed in 2024 was used as the baseline dataset and was expanded to include additional areas of concern identified by the Town (Areas 7–10). Supplemental survey and data collection were performed within the additional AOCs to document roadway elevations, outfalls, and drainage features, if the data was not already available in those areas. These areas are largely devoid of formal drainage systems, relying instead on surface conveyance and direct discharge to adjacent canals or marshes. The additional survey data has been incorporated into the Town's GIS database and used to update the hydrologic and hydraulic model. The updated Topographic & Stormsewer As-built Survey is included in **Attachment A** of this report and provides a majority of the surveyed infrastructure. The full extent of the surveyed infrastructure is provided in the updated stormwater network GIS geodatabase, which is included as a digital submittal with this report.

Horizontal survey control was based on the North American Datum of 1983 (NAD 83), and vertical data were referenced to the North American Vertical Datum of 1988 (NAVD 88), consistent with the methodology established in the 2024 SWMP.

3.0 Hydrologic and Hydraulic Analysis

Computational Hydraulics International's (CHI) Personal Computer Storm Water Management Model (PCSWMM) version 7.7 was used to conduct hydrologic and hydraulic analyses for this supplemental study. The hydraulic modeling conducted as part of the Stormwater Master Plan (SWMP) completed in June 2024 relied primarily on one-dimensional (1D) methods, which are well-suited for representing existing stormwater infrastructure such as pipes, culverts, and manholes, and for evaluating conveyance capacity within defined systems. For this supplemental analysis, two-dimensional (2D) modeling was used to represent flooding conditions in areas with limited or no stormwater infrastructure. One-dimensional modeling is appropriate where closed conveyance systems are present, while two-dimensional modeling provides the ability to simulate overland flow and roadway overtopping by distributing rainfall directly across the ground surface and routing it according to topography.

The hydrologic inputs and data sources remained consistent with those used in the June 2024 SWMP. Curve numbers were developed using the SCS method based on land cover and soil characteristics. Soil data were obtained from the USDA Soil Survey Geographic (SSURGO) database, and land cover data were derived from the 2021 National Land Cover Database. Topographical components were derived from QL2 LiDAR data from the North Carolina Spatial Data Download (NC SDD), survey data, aerial imagery, and site photos for each of the AOCs. Rainfall depths were obtained from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the 10-year, 24-hour design storm. Seasonal high-water table (SHWT) and groundwater level data were available from other studies performed on the island by ECS Southeast LLC. From these sources the SHWT used for this project is estimated at elevation 2.5 with the groundwater level around elevation 2. Tidal data was obtained from two NOAA Tidal Datum Stations, Bowen Point - Shallotte Inlet on the west side of the island and Varnamtown - Lockwood Folly River on the east side of the island. Mean tide levels and mean higher-high water (MHHW) levels were obtained from each station and averaged together to create one mean tide and one MHHW level for the whole island. This tidal information is summarized in Table 3.1. Outfalls were set to a fixed elevation equivalent to the mean tide for the 10-year storm event runs.

Table 3.1 - Tidal Station Data

	Mean Tide (ft.)	**Mean Higher-High Water Level (ft.)**
Station 8659665 Bowen Point – Shallotte Inlet	2.28	4.76
Station 8659414 Varnamtown – Lockwood Folly River	2.08	4.27
Island-wide Average Used for Model	2.18	4.52

The hydrologic and hydraulic modeling completed in June 2024 was incorporated into this supplemental analysis and expanded upon using the 2D modeling methodology. Area 7 of this supplemental study incorporated the 1D modeling performed for the adjacent Area 2 from the June 2024 SWMP, and Area 8 incorporated the modeling from Area 1. Hydraulic parameters of the existing stormwater system were input into the model based on the data collected during survey. Channel cross-sections were generally based on the topographic survey, supplemented with QL2 LiDAR as needed. The 2D modeling approach used in the supplemental analysis applied the same SCS Curve Number methodology as before to define rainfall-runoff response. A computational mesh was developed for the 2D domain at a 15-foot resolution, and subcatchments were generated at the same resolution as the mesh elements. Curve numbers were assigned to each subcatchment based on land cover and soils data, and rainfall was distributed across the mesh surface using the SCS method. The resulting runoff was routed across the ground surface according to topography, which allowed for the evaluation of shallow flooding and roadway overtopping conditions in the identified problem areas. The time of concentration was calculated by PCSWMM using the Soil Conservation Service (SCS) Curve Number method. This approach provided continuity with the methodologies used in the June 2024 SWMP, while refining the analysis to address specific nuisance flooding locations identified for further study.

Maps included in **Attachment B** illustrate the soil and land cover data used in the development of curve numbers and hydrologic inputs for the supplemental study. Rainfall data and tidal data are also included in **Attachment B**.

A description of each area of concern is provided below and existing stormwater infrastructure is noted, if present.

Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive

This area of concern includes the entire length of McCray Street, from its intersection with Ocean Boulevard East (OBE) to its eastern terminus, Avenue B, and the portion of Dunescape Drive south of its intersection with McCray Street. To represent the full stormwater network in this area, the model also incorporated OBE, Avenues A, D, and E, and the complete stormwater system modeled in Area 2 from the 2024 report, encompassing infrastructure along OBE and between Mullet Street and Halstead Street.

The existing stormwater network in this region extends only to the western edge of the area of concern, beginning near the intersection of OBE and McCray Street. At this location, a drainage channel and 15- and 18-inch pipes connect into larger stormwater pipes along OBE and Mullet Street before discharging to the Intracoastal Waterway. A majority of the area, particularly east of Dunescape Drive, is not served by any stormwater infrastructure, and runoff in these sections relies on overland flow, collecting in roadway depressions where it slowly infiltrates into the sandy soils.

Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street

This area of concern includes the series of canal streets noted above. The existing stormwater infrastructure in this area is limited and fragmented. Small-diameter pipes, generally ranging from 12 to 18 inches, are present along portions of Greensboro Street and High Point Street, while most of the remaining streets lack stormwater infrastructure and rely on direct overland flow to the canals. Along Ocean Boulevard West (OBW), portions of the existing network were identified by survey, and for modeling purposes these pipes were assumed to outfall into the adjacent canals.

To represent the full network, the model also incorporated OBW and the Area 1 system from the 2024 report, including drainage leading to High Point Street from Brunswick Avenue West.

Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive

This area of concern includes the series of canal streets noted above. For modeling purposes, the adjacent portion of OBW was also included. The existing stormwater infrastructure is limited to a small number of pipes and isolated catch basins. Along Starfish Drive, two 12-inch pipes and a catch basin function as a localized infiltration system, but they are insufficiently sized and provide only limited drainage capacity. Scotch Bonnet Drive contains several 15-inch culverts near its northeast corner that outlet with restricted capacity due to roadway embankment. Lions Paw Street and most of Sand Dollar Street do not contain formal stormwater infrastructure, with runoff relying primarily on overland flow to the canals.

Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

This area of concern includes the series of canal streets noted above. For modeling purposes, the adjacent portion of OBW was also included. The existing stormwater infrastructure is limited and inconsistent across the area. Along Sailfish Street, 15-inch pipes provide only localized drainage at the roadway edges. Tarpon Drive contains an existing stormwater network, but portions of the system were installed at negative slopes, reducing conveyance efficiency and contributing to surcharging. Marlin Drive contains a small infiltration system that is undersized and does not outlet directly to the adjacent canal. Tuna Drive and Dolphin Street do not contain formal stormwater infrastructure, and runoff in these sections relies primarily on overland flow toward the canals. Swordfish Drive contains a culvert crossing near its inside bend, which outlets ponded water toward the canal but provides limited capacity.

4.0 Existing Stormwater System Analysis

The supplemental analysis evaluated drainage performance within each of the additional areas of concern. Model results highlighted deficiencies in locations where stormwater infrastructure is present, including undersized pipes, negative slopes, and limited conveyance capacity. Equally significant, the analysis confirmed that large portions of the study areas—such as McCray Street east of Dunescape Drive and several of the canal streets—do not contain formal stormwater infrastructure at all, with runoff instead relying on overland flow, infiltration, and evaporation. These conditions contribute to recurring roadway ponding and flooding during the 10-year storm. **Attachment C** includes maps outlining the existing infrastructure, where present, and portrays the modeled results of the 10-year flooding extents.

Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive

Public right-of-way (ROW) along McCray Street, Avenues A–E, and the southern portion of Dunescape Drive experiences widespread flooding during the 10-year storm event. Much of the existing network near the intersection of McCray Street and Ocean Boulevard East (OBE) is undersized, and portions of the system surcharge as runoff exceeds pipe capacity. As documented during the 2024 Stormwater Master Plan analysis, several pipes in this area were installed with negative slopes, resulting in inefficient flow conditions and contributing to surcharging.

A majority of the area east of Dunescape Drive is not served by stormwater infrastructure, and runoff in these sections travels by overland flow where it ponds in low-lying areas and must infiltrate or evaporate.

Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street

Public ROW within this series of canal streets experiences varying levels of flooding during the 10-year storm event. Runoff generally drains toward the canals; however, limited stormwater infrastructure, coupled with flat roadway topography, results in localized flooding along several streets.

Flooding along Greensboro Street is relatively minor, with water appearing to be contained near the roadway ends and limited ponding observed elsewhere. Charlotte Street and Sanford Street both exhibit more substantial flooding, with stormwater accumulating through the central, low-lying portions of each roadway and extending across much of their length. Conditions along Lumberton Street are similar, with flooding concentrated in central depressions and persisting through much of the roadway extent. Raleigh Street shows flooding concentrated near its canal outlet, where roadway elevations are lowest, while the remainder of the street appears to drain effectively. Fayetteville Street demonstrates more significant issues, with modeled flooding extending across nearly 90 percent of the roadway length. High Point Street also experiences notable flooding, particularly at its intersection with Brunswick Avenue and Ocean Boulevard West (OBW).

The existing stormwater network within this area is fragmented and generally limited to small-diameter pipes and isolated catch basins. Along portions of Greensboro and High Point Streets, 12- to 18-inch pipes are present; however, the available conveyance capacity appears insufficient to manage runoff during the 10-year storm event, as surcharging and surface flooding are still observed. Most of the remaining streets do not contain formal stormwater infrastructure, and stormwater runoff relies primarily on overland flow to the adjacent canals.

Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive

Public ROW within this area experiences moderate flooding during the 10-year storm event, with conditions varying by street. Sand Dollar Street exhibits roadway flooding concentrated near the interior bend, where low elevations result in ponding that extends across much of the street width. Starfish Drive shows a small pocket of flooding near its intersection with Ocean Boulevard West, where stormwater accumulates in a localized low depression. The two 12-inch pipes and catch basin along Starfish function as a localized infiltration system, but they are insufficiently sized and provide only limited drainage capacity under the 10-year event.

Lions Paw Street demonstrates more substantial flooding, with water accumulating along nearly half of its length, particularly through the central and inland portions of the roadway. Scotch Bonnet Drive shows flooding concentrated near the northeastern corner of the roadway loop, where low elevations and restricted culvert outfalls limit drainage capacity.

Stormwater infrastructure within this area is limited and undersized for the 10-year storm event. Beyond the infiltration system on Starfish Drive and the culverts on Scotch Bonnet Drive, most streets lack formal infrastructure and rely on overland flow toward the adjacent canals, where ponding persists in low-lying roadway sections.

Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

Public ROW within this area experiences frequent flooding during the 10-year storm event, with several streets showing widespread ponding. Sailfish Street exhibits localized flooding near its northeastern end, where roadway low points coincide with the 15-inch pipes that provide only limited capacity. Tarpon Drive demonstrates more extensive flooding, with ponding occurring along a large portion of the roadway. The existing network in this corridor is compromised by sections of pipe installed with negative slopes, which reduce conveyance efficiency and contribute to surcharging under storm conditions.

Marlin Drive experiences flooding in its central portion, where stormwater accumulates in low areas. The small infiltration system located along Marlin is undersized and does not outlet directly to the adjacent canal, limiting its effectiveness during the 10-year event. Tuna Drive and Dolphin Street both show roadway flooding through their central and inland segments, reflecting the absence of formal stormwater infrastructure in these streets. Swordfish Drive also experiences flooding, particularly near its interior bend where the culvert outfall provides restricted conveyance.

Overall, the existing stormwater infrastructure in this area is limited and inconsistent. Where pipes and culverts are present, they are undersized or inefficiently aligned and do not provide sufficient capacity to manage runoff from the 10-year storm event. In the absence of effective infrastructure, runoff across most of these streets relies on overland flow to the adjacent canals, resulting in persistent ponding in roadway depressions.

Modeling Results Summary

The results of the existing conditions analysis are summarized in Table 4.1, which presents representative water surface elevations and flood depths at key points within each area of concern. These values provide a reference for understanding current flooding conditions and serve as the basis for comparison with the improvement alternatives discussed in Section 5.0.

Table 4.1 - Existing Condition Model Results

Area of Concern	Point of Interest	Elevation (ft.)	10-YR Storm	
			WSEL	Flood Depth (ft.)
7	Intersection of McCray St. and OBE	7.17	7.27	0.10
	Intersection of McCray St. and Ave. B	7.71	8.01	0.30
	Intersection of McCray St. and Dunescape Dr.	9.43	9.44	0.01
	McCray St. Between Dunescape Dr. and Ave. D	7.08	7.81	0.73
	Intersection of McCray St. and Ave. D	7.62	7.75	0.13
	McCray St. Between Ave. D and Ave. E	7.26	7.48	0.22
8	Location of Maximum Flooding			
	High Point Street	4.46	5.04	0.58
	Lumberton Street	4.66	5.01	0.35
	Fayetteville Street	4.48	4.92	0.44
	Raleigh Street	4.37	4.71	0.34
	Sanford Street	3.86	4.59	0.73
	Salisbury Street	5.34	5.47	0.13
	Burlington Street	4.70	5.05	0.35
	Durham Street	4.70	5.05	0.35
	Charlotte Street	4.06	4.83	0.77
	Greensboro Street	3.86	4.04	0.18
9	Location of Maximum Flooding			
	Sand Dollar Street	3.71	4.16	0.45
	Starfish Drive	5.24	5.67	0.43
	Lions Paw Street	4.19	4.63	0.44
	Scotch Bonnet Drive	3.45	3.99	0.54
10	Location of Maximum Flooding			
	Sailfish Street	3.99	4.69	0.70
	Tarpon Drive	3.58	4.39	0.81
	Marlin Drive	3.94	4.59	0.65
	Tuna Drive	3.37	4.39	1.02
	Dolphin Street	3.44	4.23	0.79
	Swordfish Drive	4.27	4.88	0.61

5.0 Evaluation of Alternatives

Two alternatives were evaluated for Areas of Concern 7 through 10 as identified in Section 4 to improve conditions during the 10-year storm. Where achieving a full 10-year level of service was not possible, the alternatives were developed to reduce flooding to the extent feasible and to improve roadway and property conditions. The following subsections present the alternatives, anticipated benefits, costs, and challenges for each area of concern.

The purpose of evaluating Alternative 1 and Alternative 2 was not simply to identify one as superior to the other, but to explore different approaches to stormwater management. In some cases, Alternative 1 relies more on infiltration-based systems or smaller-scale improvements, while Alternative 2 introduces outfalls requiring additional permitting, higher costs, and greater construction complexity. In other locations, both alternatives are similar, consisting primarily of new pipes, catch basins, and small infiltration systems. This approach allows the Town to consider trade-offs in performance, cost, constructability, and permitting. Ultimately, combinations or hybrid solutions that blend elements of both alternatives may prove to be the most effective path forward during detailed design.

Model results in this section are based on points of interest identified after reviewing locations with the greatest roadway flooding depths under existing conditions. These same points were used in the existing conditions analysis in Section 4 (Table 4.1), providing a consistent basis for comparison. For each area of concern, tables present water surface elevations (WSEL) and flood depths at these points of interest, allowing direct comparison between existing conditions and each proposed alternative. While these values provide useful benchmarks, they do not necessarily represent reductions across entire streets or neighborhoods. Instead, they highlight performance at critical locations where flooding is most severe.

Flood reduction can be measured in multiple ways, including depth reductions at key points, reductions in overall flood extent (as shown in the fact sheets), or reductions in the time or duration of flooding. Because most of the areas of concern lack existing stormwater infrastructure, duration was not used as a metric in this report; however, it is expected that implementation of either alternative would reduce the time that floodwaters persist after storm events, even if this benefit was not quantified here.

The alternatives presented in this section are conceptual and not intended as final designs. Final layouts may change as pipe alignments, slopes, and material selections are refined during detailed design and permitting. Alternatives that include dune infiltration systems (DIS) or new outfalls are expected to involve greater permitting effort, which increases the uncertainty of associated costs. Another limitation of this analysis is that subsurface utilities were not evaluated. The location and depth of water, sewer, or gas lines could significantly influence the feasibility and cost of stormwater improvements, particularly where trenching or installation of large-diameter pipes is required. These factors will require further investigation during the design phase.

Supporting materials are included in this report to supplement the narrative descriptions. Fact sheets are included in this chapter for each alternative, summarizing the problem, proposed solution, anticipated benefits, and costs in a format suitable for standalone presentations to stakeholders. Maps of each alternative are provided in **Attachment D**, and detailed Opinions of Probable Project Cost are presented in **Attachment E**.

Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive

Solutions to the flooding issues within the McCray Street corridor are closely tied to the deficiencies in the existing stormwater system serving Area 2 (east end of Mullet Street and Avenue A). The 2024 SWMP identified that the existing stormwater network along Ocean Boulevard East (OBE) and Mullet Street was undersized and did not adequately convey even the 2-year storm event. For this reason, the improvements outlined in Area 2 Alternative 1 of the 2024 SWMP were assumed to be implemented prior to, or in conjunction with, any improvements proposed for Area 7. Without these downstream upgrades, routing additional stormwater from McCray Street into the existing network would further burden an already undersized system. The supplemental modeling for Area 7 therefore incorporated the Area 2 improvements as a baseline condition, ensuring that the alternatives considered in this report reflect a functioning downstream system capable of receiving flows from McCray Street and Dunescape Drive.

Alternative 1

Alternative 1 consists of two new drainage networks constructed along McCray Street. West of the intersection of McCray Street and Dunescape Drive, a series of catch basins, shallow swales, and new pipes ranging in size from 8 to 12 inches would be installed to collect roadway runoff. These conveyances would tie into the upgraded stormwater system near the intersection of McCray Street and OBE, which is included in the Area 2 Alternative 1 improvements from the 2024 SWMP. East of Dunescape Drive, a second network of catch basins and new pipes ranging from 8 to 24 inches in diameter would be constructed to collect runoff and convey it to a proposed dune infiltration system (DIS) located within the adjacent dunes.

Modeling results show Alternative 1 would reduce flood depths along McCray Street to less than 0.3 feet at most intersections during the 10-year storm, with notable reductions between Dunescape Drive and Avenue D (reduced from 0.73 feet under existing conditions to 0.52 feet). Roadway overtopping is minimized, and localized ponding is significantly reduced.

The estimated probable construction cost of Alternative 1 is $1,284,000 to $1,557,000, in addition to $650,000 to $975,000 for the required Area 2 improvements.

Alternative 2

Alternative 2 expands the use of infiltration by introducing multiple decentralized stormwater networks throughout the east end, each outletting directly to individual dune infiltration systems. This reduces reliance on the existing OBE/Mullet Street network and distributes flows more evenly across the project area. Proposed improvements include new catch basins and pipes of

varying diameters (8 to 24 inches), directing localized runoff into multiple dune infiltration systems strategically sited along McCray Street and Dunescape Drive.

This approach provides the most effective reduction in flood depths across Area 7. Ponding at Avenue B, which is modeled at 0.30 feet under existing conditions, is fully eliminated under Alternative 2. Depths between Dunescape Drive and Avenue D are reduced from 0.73 feet to 0.15 feet, and flooding at the intersection of McCray Street and OBE remains minimal at 0.09 feet.

The estimated probable construction cost of Alternative 2 is $3,327,000 to $4,034,000, in addition to the $650,000 to $975,000 needed for Area 2 improvements.

Project Challenges

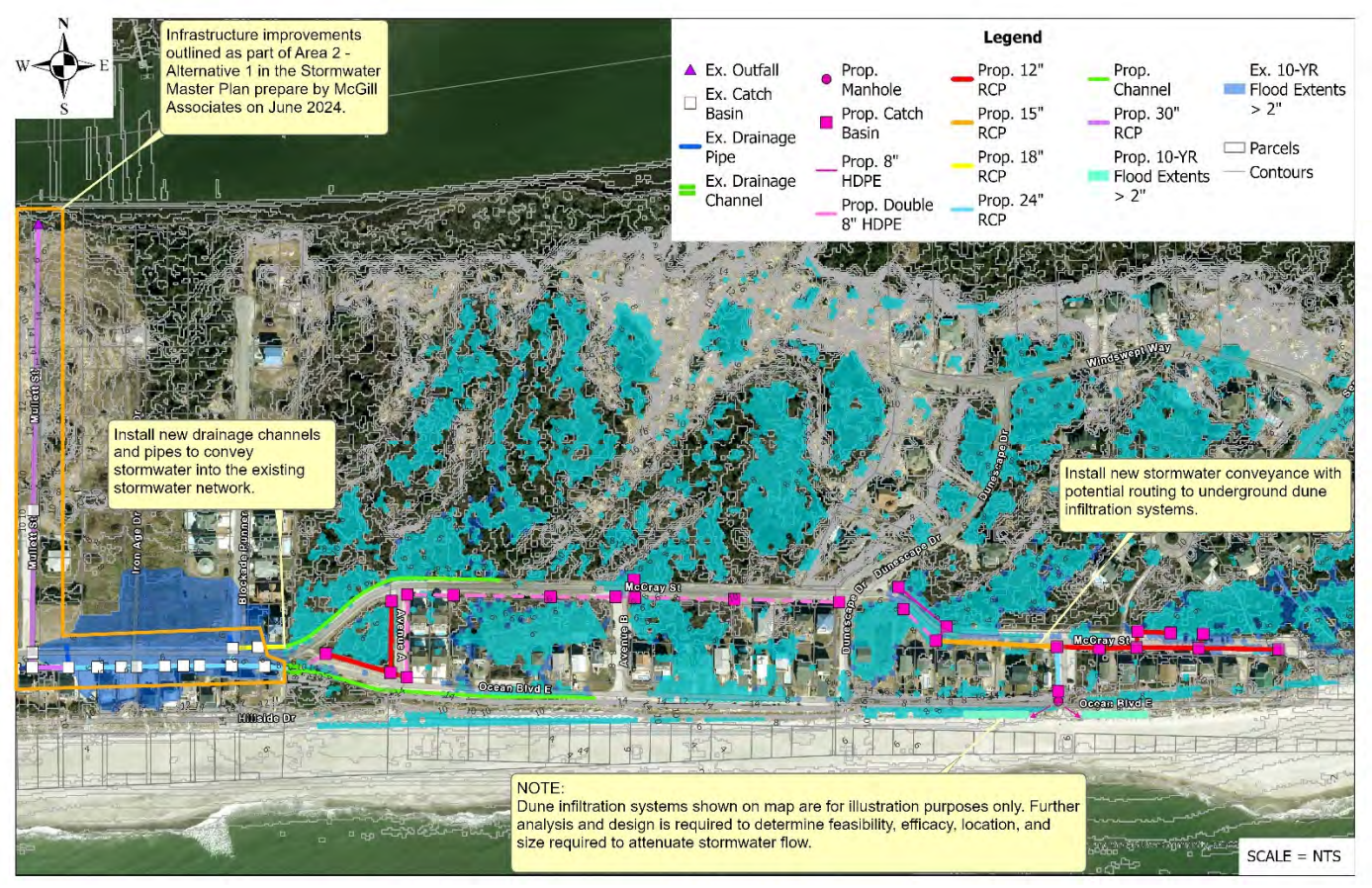
The placement of dune infiltration systems and other stormwater infrastructure within Ocean Hazard Areas will require Coastal Area Management Act (CAMA) major permitting and a variance from the Coastal Resources Commission (CRC). Oak Island recently obtained such a variance to implement dune infiltration systems, providing precedent for potential approval at Holden Beach. The proposed DIS remains conceptual at this stage and will require detailed design and additional engineering analysis to confirm feasibility and refine cost estimates. Installation costs are relatively high, and ongoing maintenance will be necessary to ensure continued performance.

Modeling Results Comparison

Table 5.1 - Area 7 Results Comparison

Point of Interest	Elevation (ft.)	10-Year Storm			
		Alternative 1		Alternative 2	
		WSEL	Flood Depth (ft.)	WSEL	Flood Depth (ft.)
Intersection of McCray St. and OBE	7.17	7.24	0.07	7.26	0.09
Intersection of McCray St. and Ave. B	7.71	8.00	0.29	7.71	0.00
Intersection of McCray St. and Dunescape Dr.	9.43	9.44	0.01	9.44	0.01
McCray St. Between Dunescape Dr. and Ave. D	7.08	7.6	0.52	7.23	0.15
Intersection of McCray St. and Ave. D	7.62	7.64	0.02	7.74	0.12
McCray St. Between Ave. D and Ave. E	7.26	7.28	0.02	7.28	0.02

Area 7 – Alternative 1	East End: McCray Street, Avenue B, and Dunescape Drive



PROBLEM

The east end area along McCray St. experiences significant roadway flooding during the 10-year storm, which is a result of local topography and a lack of stormwater infrastructure. This flooding may restrict safe travel along McCray St. and/or OBE in an emergency.

SOLUTION

- Components outlined in the figure above from the 2024 SWMP must be constructed either before or in conjunction with this project
- Install 1-foot-deep swales along portions of McCray St. and OBE and new stormwater pipes and catch basins which connect to the existing stormwater network
- Install new stormwater pipes and catch basins along McCray St., east of Dunescape Dr., that outlet to underground dune infiltration systems (DIS)

PROJECT BENEFITS

This alternative reduces flooding extents and depths along McCray St., OBE, Dunescape Dr. and intersecting avenues during the 10-year storm.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options
- Stormwater capacity may be exceeded within the upgraded network along OBE and Mullett St.
- Proposed DIS will require continual maintenance
- CAMA permitting and CRC variance required

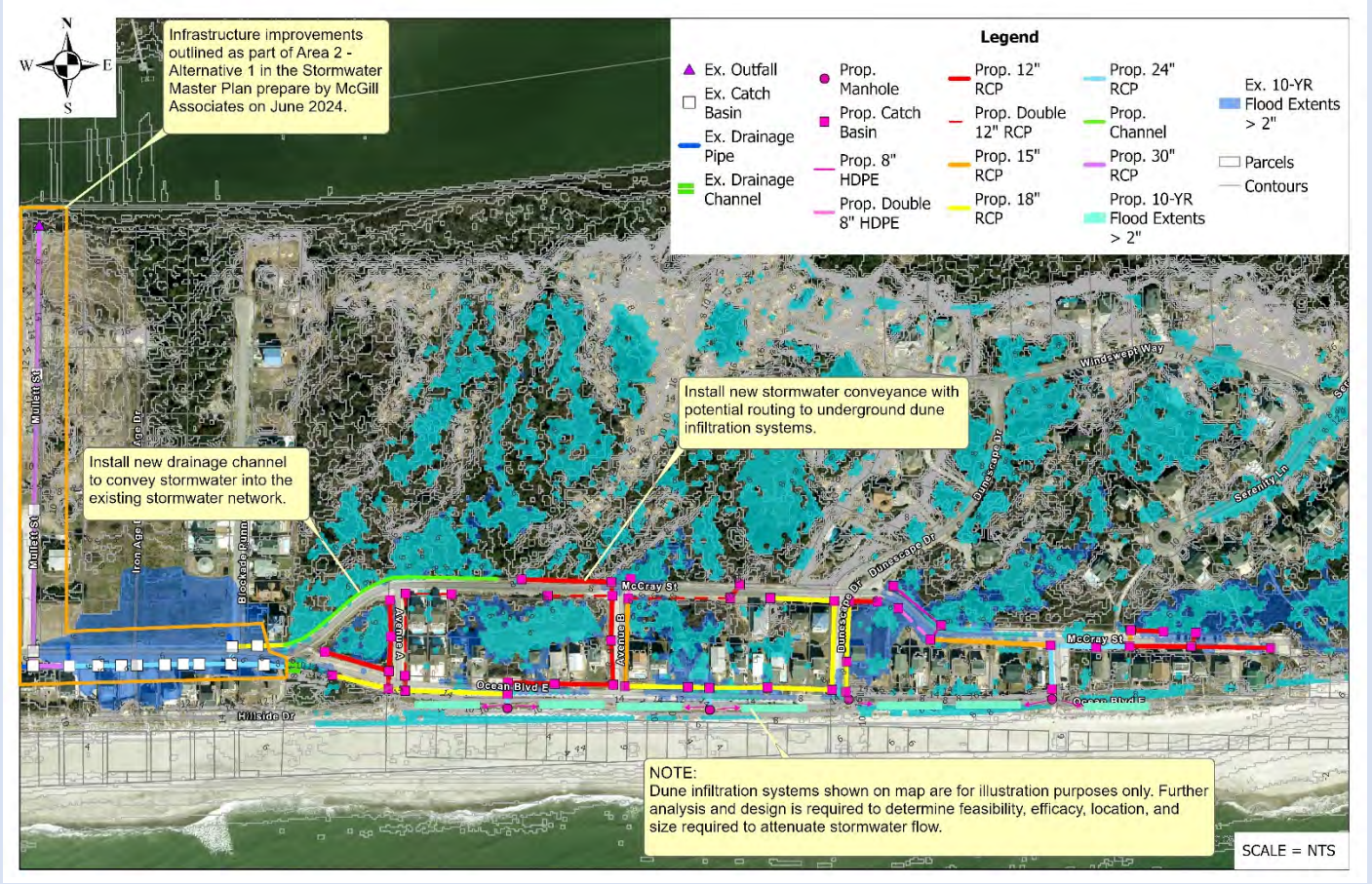
COST

Estimated Probable Project Cost Range

Area 7 – Alternative 1: **$1,284,000 to $1,557,000**

(2024 SWMP) Area 2 – Alternative 1: **$650,000 to $975,000**

Area 7 – Alternative 2	East End: McCray Street, Avenue B, and Dunescape Drive



PROBLEM

The east end area along McCray St. experiences significant roadway flooding during the 10-year storm, which is a result of local topography and a lack of stormwater infrastructure. This flooding may restrict safe travel along McCray St. and/or OBE in an emergency.

SOLUTION

- Components outlined in the figure above from the 2024 SWMP must be constructed either before or in conjunction with this project
- Install a 1-foot-deep swale along a portion of McCray St. which connects to the existing stormwater network
- Install multiple stormwater networks throughout the east end that outlet to various underground dune infiltration systems (DIS)

PROJECT BENEFITS

This alternative further reduces flooding extents and depths along McCray St., OBE, Dunescape Dr. and intersecting avenues during the 10-year storm, and limits the additional flow being routed to the existing stormwater network.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options
- Proposed DIS will require continual maintenance
- CAMA permitting and CRC variance required

COST

Estimated Probable Project Cost Range

Area 7 – Alternative 2: **$3,327,000 to $4,034,000**

(2024 SWMP) Area 2 – Alternative 1: **$650,000 to $975,000**

Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street

Alternative 1

Alternative 1 proposes targeted stormwater improvements throughout the canal street network, focusing on localized collection and infiltration systems. Improvements include new catch basin infiltration systems along portions of Fayetteville, Lumberton, High Point, Durham, Burlington, Sanford, Raleigh, Greensboro, and Charlotte Streets. These systems would utilize pipes generally in the 18-inch range to encourage localized infiltration where soils permit. Salisbury Street did not show significant flooding concerns in the analysis, and no improvements are proposed for this location.

Modeling results show that Alternative 1 provides localized reductions compared to existing conditions. The most notable improvement occurs on Greensboro Street, where flood depths decrease from 0.18 feet to 0.03 feet. Smaller reductions of 0.01 to 0.02 feet are observed on Burlington, Durham, Sanford, Fayetteville, High Point, and Lumberton Streets, while Charlotte and Raleigh Streets show no measurable change. Overall, Alternative 1 provides modest benefit, with the greatest improvement concentrated at Greensboro Street.

The collective estimated construction cost of Alternative 1 for the Area 8 canal streets ranges from $1,060,000 to $1,380,000. These values represent the total project area, while the fact sheets included below provide cost estimates broken out by individual street segments. Full detailed estimates are provided in **Attachment E**.

Alternative 2

Alternative 2 provides a more comprehensive set of improvements by introducing new outfalls with tide gates, together with additional catch basins, manholes, and bubble-up inlets. For the purposes of this report, bubble-up inlets/catch basins are defined as bottomless catch basins connected to perforated pipes, intended to provide supplemental storage and infiltration. These systems are designed to overflow into the downstream basin once capacity is exceeded, while limiting sediment discharge by allowing sediment to settle within the downstream structure. Outfalls are proposed along Lumberton, Sanford, Durham, Burlington, Charlotte, and High Point Streets, each paired with collection systems to capture runoff and safely discharge it to adjacent canals. Proposed conveyance pipes generally range from 18- to 24-inches in diameter, with tide gates included to prevent tidal backflow.

Alternative 2 achieves broader reductions compared to existing conditions. Significant improvements occur on High Point Street (0.58 feet to 0.38 feet) and Sanford Street (0.73 feet to 0.51 feet). Other streets such as Lumberton, Burlington, Durham, Charlotte, and Raleigh show smaller decreases ranging from 0.02 to 0.19 feet. Greensboro Street improves less under Alternative 2 (0.18 feet to 0.17 feet) than it does under Alternative 1. Overall, Alternative 2 produces greater area-wide reductions than Alternative 1, though a few streets perform better under Alternative 1.

The collective estimated construction cost of Alternative 2 for the Area 8 canal streets ranges from $1,133,000 to $1,473,000. As with Alternative 1, this represents the total cost for all improvements within Area 8, with street-level costs provided in the fact sheets below and detailed estimates in **Attachment E.**

Project Challenges

Implementation in the canal street network faces several common challenges. Construction will disrupt traffic within narrow public rights-of-way, and low roadway elevations limit the ability to install larger conveyances without shallow slopes. New outfalls will require CAMA major permits, which are evaluated on a case-by-case basis and may require water quality measures prior to discharge. In addition, certain improvements may require securing public utility easements to establish outfall alignments.

Modeling Results Comparison

Table 5.2 – Area 8 Results Comparison

Point of Interest	Elevation (ft.)	10-Year Storm			
		Alternative 1		Alternative 2	
		WSEL	Flood Depth (ft.)	WSEL	Flood Depth (ft.)
Location of Maximum Flooding					
High Point Street	4.46	5.03	0.57	4.84	0.38
Lumberton Street	4.66	5.00	0.34	4.87	0.21
Fayetteville Street	4.48	4.91	0.43	5.07	0.59
Raleigh Street	4.37	4.71	0.34	4.68	0.31
Sanford Street	3.86	4.58	0.72	4.37	0.51
Burlington Street	4.70	5.11	0.41	4.94	0.24
Durham Street	4.70	5.03	0.33	4.94	0.24
Charlotte Street	4.06	4.83	0.77	4.72	0.66
Greensboro Street	3.86	3.89	0.03	4.03	0.17

Note, Salisbury Street did not exhibit significant flooding or ponding during the 10-year storm beyond minor nuisance depths of less than 2 inches. Field observations by McGill engineering staff confirmed that roadway flooding was minimal, and the street did not appear deficient in level of service for the 10-year event. As a result, no improvements are recommended for Salisbury Street, and no data relating to this street is included in Table 5.2.

Area 8 – Alternative 1	Fayetteville Street - Lumberton Street – High Point Street

PROBLEM

Lumberton Street lacks stormwater infrastructure, and High Point Street has limited existing infrastructure, consisting of a single culvert on the east side of High Point Street.

SOLUTION

- Add a catch basin infiltration system along the northernmost stretch of Fayetteville Street comprised of five (5) catch basins and 340 LF of 18” HDPE
- Add a catch basin infiltration system along Lumberton Street comprised of three (3) catch basins and 190 LF of 18” perforated HDPE
- Add a catch basin infiltration system along High Point Street comprised of six (6) catch basins and 430 LF of 18” perforated HDPE

PROJECT BENEFITS

This alternative reduces both the flood depth and flood extents of the 10-year, 24-hour storm event on Fayetteville, Lumberton, and High Point Streets by capturing stormwater and encouraging increased infiltration.

PROJECT CHALLENGES

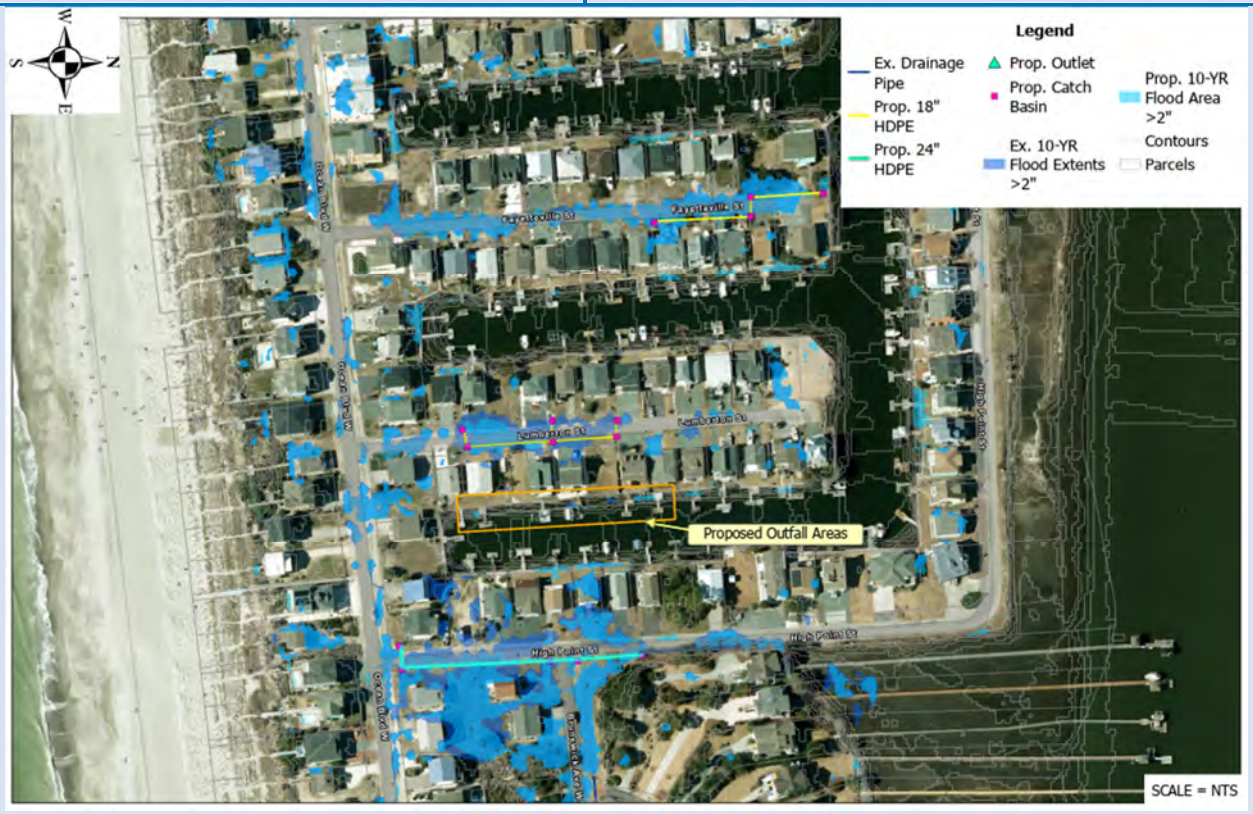
- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along Fayetteville Street and Lumberton Street
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Fayetteville Street: $112,000 to $146,000
Lumberton Street: $75,000 to $98,000
High Point Street: $92,000 to $120,000

Area 8 – Alternative 2	Fayetteville Street - Lumberton Street – High Point Street



PROBLEM

Lumberton Street lacks stormwater infrastructure, and High Point Street has limited existing infrastructure, consisting of a single culvert on the east side of High Point Street. This lack of infrastructure limits discharges due to pluvial flooding.

SOLUTION

- Add a bubble-up catch basin with four (4) upstream catch basins at the northern end of Fayetteville Street
- Add a new outfall with six (6) new upstream catch basins at southern end of Lumberton Street where flooding depth is at its greatest
- Add a new outfall west of intersection of High Point Street and Brunswick Avenue West connected to a proposed manhole with and three (3) proposed catch basins
- Add tide gates to both proposed outfalls

PROJECT BENEFITS

This alternative reduces both the flood depth and flood extents of the 10-year, 24-hour storm event on Lumberton Street and High Point Street by capturing stormwater from High Point Street from Ocean Boulevard West (OBW) to Brunswick Avenue West, while not impeding existing flow through ditch along east side of High Point Street

PROJECT CHALLENGES

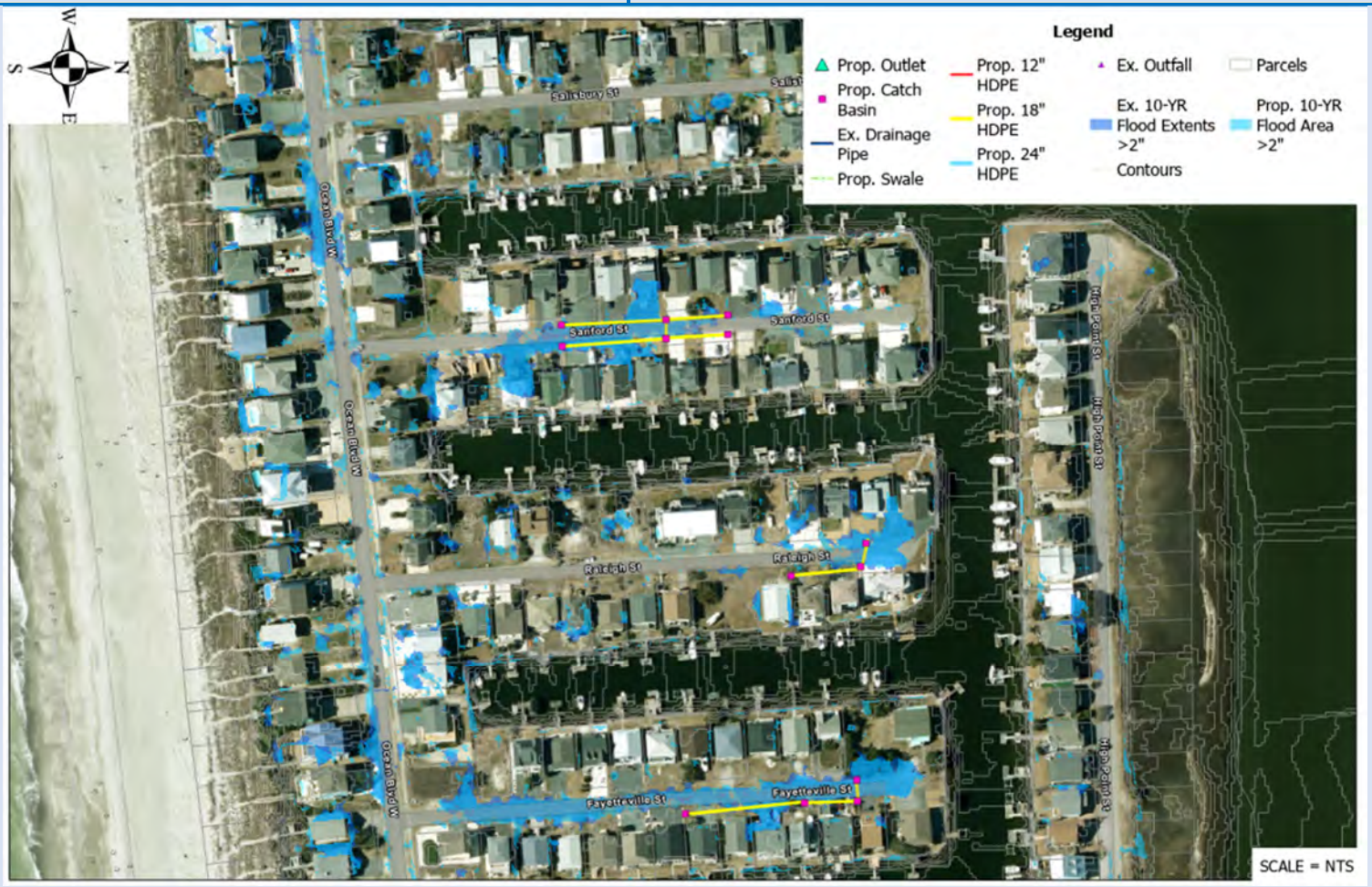
- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system options are limited without a CAMA permit
- Right-of-way acquisition required for additional outfall

COST

Estimated Construction Cost Range

Fayetteville Street: $92,000 to $120,000
Lumberton Street: $214,000 to $278,000
High Point Street: $170,000 to $221,000

Area 8 – Alternative 1	Sanford Street – Raleigh Street



PROBLEM

Sanford Street and Raleigh Street lack any existing stormwater infrastructure. During the 10-year, 24-hour storm event, flood depth impacts the level of service along the entries of Sanford Street, as well as portion of Raleigh Street.

SOLUTION

- Add a catch basin infiltration system along central section of Sanford Street comprised of six (6) catch basins and 540 LF of 18" perforated HDPE
- Add a catch basin infiltration system along northernmost stretch of Raleigh Street comprised of four (4) catch basins and 240 LF of 18" perforated HDPE

PROJECT BENEFITS

This alternative reduces both the flood depth and flood extents of the 10-year, 24-hour storm event on Sanford Street and Raleigh Street by capturing stormwater and encouraging increased infiltration.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along Sanford Street
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Sanford Street: $159,000 to $207,000
Raleigh Street: $79,000 to $103,000

Area 8 – Alternative 2	Sanford Street – Raleigh Street

PROBLEM

Sanford Street and Raleigh Street lack any existing stormwater infrastructure. During the 10-year, 24-hour storm event, flood depth impacts the level of service along the entirety of Sanford Street, as well as portion of Raleigh Street.

SOLUTION

- Add a bubble-up catch basin with a single upstream catch basin at northern end of Raleigh Street
- Add a new outfall with five (5) upstream catch basins at the southern end of Sanford Street where flooding is at its greatest depth
- Add tide gate to new 18" outfall

PROJECT BENEFITS

This alternative eliminates reduces both the flood depth and flood extents of the 10-year, 24-hour storm event on Sanford Street and Raleigh Street by capturing stormwater and through the use of bubble-up catch basins allows for increased stormwater quality and lower maintenance costs than infiltration alone.

PROJECT CHALLENGES

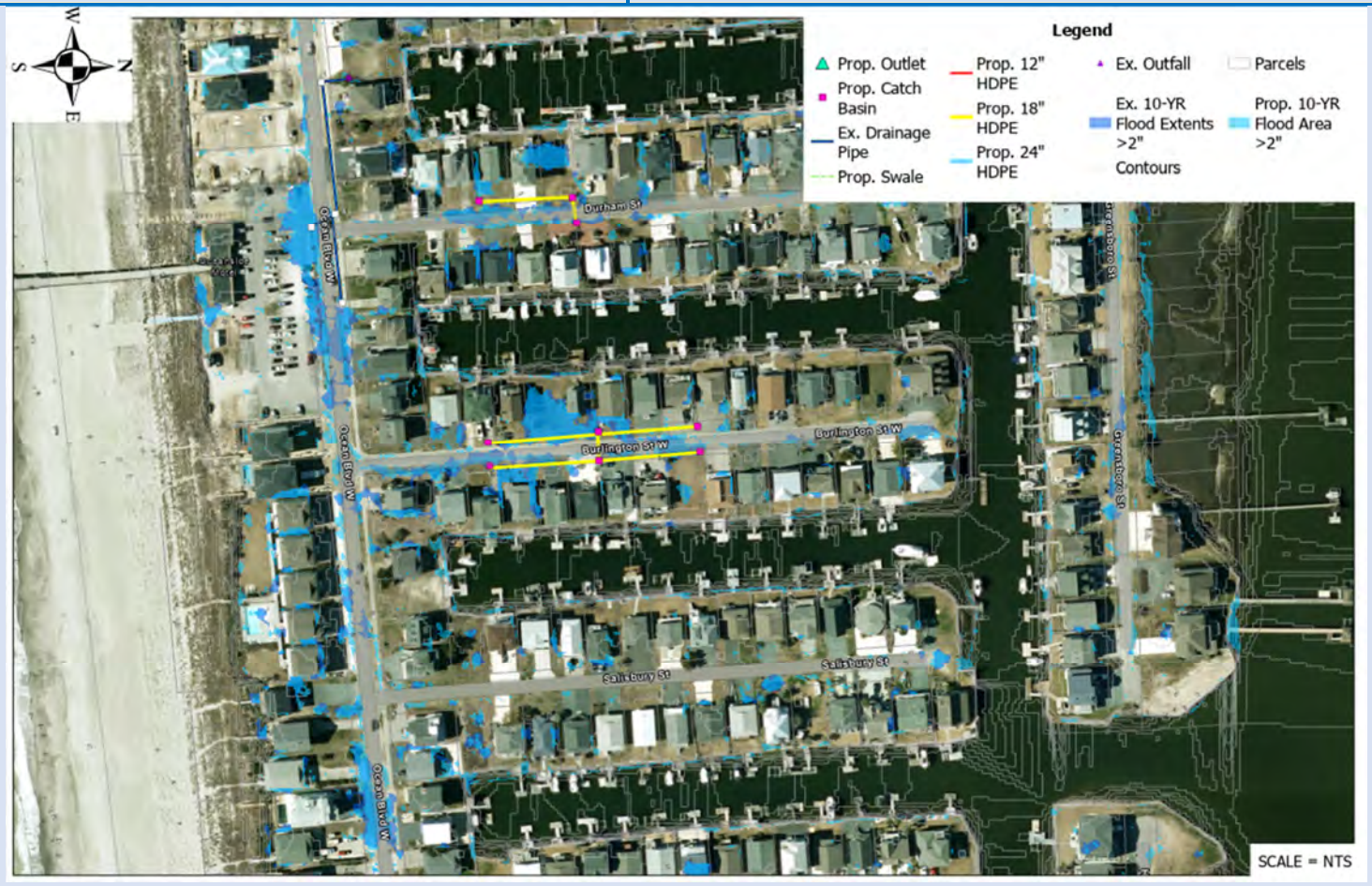
- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBE
- New stormwater system options are limited without a CAMA permit
- Right-of-way acquisition required for additional outfall

COST

Estimated Construction Cost Range

Sanford Street: $157,000 to $204,000
Raleigh Street: $52,000 to $68,000

Area 8 – Alternative 1	Durham Street - Burlington Street – Salisbury Street



PROBLEM

Durham Street, Burlington Street, and Salisbury Street lack any existing stormwater infrastructure. During the 10-year, 24-hour storm event, flood depth impacts the level of service along the southern portions of both Durham Street and Burlington Street.

SOLUTION

- Add a catch basin infiltration system along Durham Street comprised of three (3) catch basins and 190 LF of 18” perforated HDPE
- Add a catch basin infiltration system along Burlington Street comprised of six (6) catch basins and 430 LF of 18” perforated HDPE

PROJECT BENEFITS

This alternative reduces both the flood depth and flood extents of the 10-year, 24-hour storm event on Durham Street and Burlington Street by capturing stormwater and encouraging increased infiltration.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along Burlington Street
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Durham Street: $52,000 to $68,000
Burlington Street: $149,000 to $194,000

Area 8 – Alternative 2	Durham Street - Burlington Street – Salisbury Street

PROBLEM

Durham Street, Burlington Street, and Salisbury Street lack any existing stormwater infrastructure. During the 10-year, 24-hour storm event, flood depth impacts the level of service along the southern portions of both Durham Street and Burlington Street.

SOLUTION

- Add a catch basin infiltration system along Durham Street comprised of four (4) catch basins and 320 LF of 18" perforated HDPE leading to a new outfall with tide gate at southern end of Durham Street
- Add a bubble-up catch basin at northern end of Burlington Street, with three (3) upstream catch basins on east side of Burlington Street
- Add three (3) catch basins along at southern end of Burlington Street leading to a new outfall with tide gate

PROJECT BENEFITS

This alternative reduces both the flood depth and flood extents of the 10-year, 24-hour storm event on Durham Street and Burlington Street by capturing stormwater and safely routing stormwater to the canal through the use of a tide gate and bubble-up catch basin.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system requires a CAMA permit
- Right-of-way acquisition required for additional outfall

COST

Estimated Construction Cost Range

Durham Street: $74,000 to $96,000
Burlington Street: $148,000 to $192,000

Area 8 – Alternative 1	Greensboro Street – Charlotte Street

PROBLEM

Portions of Charlotte Street experiences significant flooding during the 10-year 24-hour storm event. A lack of stormwater infrastructure on Charlotte Street leads to significant roadway flooding, potentially impeding vehicular access.

SOLUTION

- Install a Catch basin Infiltration System comprised of nine (9) catch basins connected by 390 LF of 18" HDPE
- Install a 12" RCP outlet along bend in Greensboro Street to outlet ponded stormwater before stormwater depth exceeds roadway elevation

PROJECT BENEFITS

This alternative reduces flooding immediately north of Ocean Boulevard West where flood depths are at their greatest level during the 10-year, 24-hour storm event. Flood extents are similarly reduced across the entire problem area.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along Charlotte Street
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Greensboro Street: $54,000 to $70,000
Charlotte Street: $151,000 to $197,000

Area 8 – Alternative 2	Greensboro Street – Charlotte Street

PROBLEM

Portions of Charlotte Street experience significant flooding during the 10-year 24-hour storm event. A lack of stormwater infrastructure on Charlotte Street leads to significant roadway flooding, potentially impeding vehicular access.

SOLUTION

- Install a bubble-up catch basin at the end of Charlotte Street connecting two (2) new upstream catch basins
- Install a bubble-up catch basin at the outside corner of Greensboro Street connecting to a proposed upstream catch basin at the inside corner of Greensboro Street
- Install six (6) new catch basins at southern end of Charlotte Street leading to a new outfall with tide gate

PROJECT BENEFITS

This alternative reduces flooding immediately north of Ocean Boulevard West where flooding is at their greatest level during the 10-year, 24-hour storm event. Flood extents are similarly reduced across the entire problem area.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system requires a CAMA permit
- Right-of-way acquisition required for additional outfall

COST

Estimated Construction Cost Range

Greensboro Street: $39,000 to $51,000
Charlotte Street: $187,000 to $243,000

Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive

Alternative 1

Alternative 1 introduces localized stormwater improvements focused on infiltration-based systems. Sand Dollar Street would receive new catch basins and small-diameter conveyance pipes to direct runoff into a subsurface infiltration chamber. A similar infiltration approach is proposed for Starfish Drive, where a network of new basins and conveyances would connect to a chamber located near the central low point of the roadway. Along Lions Paw Street, improvements include a larger infiltration system paired with upsized pipes designed to collect runoff from the majority of the roadway length. Scotch Bonnet Drive would receive a short section of new piping to replace undersized culverts at its northeastern corner, increasing conveyance to the canal.

Alternative 1 provides substantial reductions compared to existing conditions on Sand Dollar Street (0.45 feet to 0.07 feet) and Starfish Drive (0.43 feet to 0.02 feet). Scotch Bonnet Drive shows a smaller decrease from 0.54 feet to 0.47 feet, while Lions Paw Street decreases slightly from 0.44 feet to 0.42 feet. Overall, the most notable benefits are observed on Sanddollar and Starfish Drives.

The estimated probable construction cost for Alternative 1 is approximately $380,000 to $495,000 for the corridor. Detailed costs by street are provided in the fact sheets and in **Attachment E.**

Alternative 2

Alternative 2 replaces the reliance on infiltration-only systems with new outfalls and tide-gated discharge structures. Sanddollar and Starfish Drives would each be outfitted with new catch basins and piping routed to tide-gated canal outfalls, providing a more direct outlet for stormwater and reducing long-term reliance on infiltration. Lions Paw Street would receive an upsized collection system that consolidates flows into a single tide-gated outfall, addressing flooding across much of the roadway more effectively than Alternative 1. Scotch Bonnet Drive would benefit from improved culvert replacements and an additional tide-gated outlet that increases conveyance capacity along its northeastern corner.

Alternative 2 also provides reductions compared to existing conditions. Starfish Drive decreases from 0.43 feet to 0.03 feet, and Lions Paw Street from 0.44 feet to 0.39 feet. Scotch Bonnet Drive decreases from 0.54 feet to 0.46 feet, while Sand Dollar Street sees only a minor reduction from 0.45 feet to 0.41 feet. Overall, Alternative 2 results in smaller reductions at Sand Dollar Street compared to Alternative 1 but maintains consistent improvements across the corridor.

The estimated probable construction cost for Alternative 2 is approximately $279,000 to $363,000 for the corridor, with detailed costs provided in the fact sheets and in **Attachment E.**

Project Challenges

Both alternatives face several challenges. Installation will require traffic disruption during construction and coordination for stormwater outfalls, including potential public utility easement acquisition in constrained locations. Roadway elevations remain low throughout the project area, limiting available pipe slopes and potentially constraining pipe size. Alternatives that introduce new outfalls will require CAMA major permitting, and depending on location, permits may impose design conditions or water quality treatment measures before discharges are approved. Infiltration systems, as proposed in Alternative 1, carry higher long-term maintenance requirements, while tide-gated systems in Alternative 2 will require routine inspection and functional upkeep to maintain effectiveness.

Modeling Results Comparison

Table 5.3 - Area 9 Results Comparison

Point of Interest	Elevation (ft.)	10-Year Storm			
		Alternative 1		Alternative 2	
		WSEL	Flood Depth (ft.)	WSEL	Flood Depth (ft.)
Location of Maximum Flooding					
Sand Dollar Street	3.71	3.78	0.07	4.12	0.41
Starfish Drive	5.24	5.26	0.02	5.27	0.03
Lions Paw Street	4.19	4.61	0.42	4.58	0.39
Scotch Bonnet Drive	3.45	3.92	0.47	3.91	0.46

Area 9 – Alternative 1	Sand Dollar Street – Starfish Drive

PROBLEM

Portions of the existing stormwater network along Sand Dollar Street Starfish Drive are undersized for the 10-year, 24-hour storm. The existing catch basin infiltration system along the western side of Starfish Drive is insufficient to capture stormwater leading to roadway flooding in this area during the 10-year storm. The right-angle bend along Sand Dollar Street creates a local high point, preventing stormwater discharge.

SOLUTION

- Install an additional catch basin over existing infiltration pipe along west side of Starfish Street, consisting of three (3) new catch basins and approximately 200 LF of 24" perforated HDPE
- Install 24" RCP Culvert at curve along Sand Dollar Street to outlet ponded water on inside of roadway, before ponded depth of stormwater overtops the roadway

PROJECT BENEFITS

This alternative reduces roadway flooding on Sand Dollar Street, Starfish Drive, and portions of OBW during the 10-year, 24-hour storm event. The addition of a new catch basin will reduce gutter spread, by increasing stormwater capture rate and storage volume.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Sand Dollar Street: $28,000 to $37,000
Starfish Drive: $57,000 to $74,000

Area 9 – Alternative 2	Sand Dollar Street – Starfish Drive

PROBLEM

Portions of the existing stormwater network along Sand Dollar Street and Starfish Drive are undersized for the 10-year, 24-hour storm. The existing catch basin infiltration system along the western side of Starfish Drive is insufficient to capture stormwater leading to roadway flooding in this area during the 10-year storm. The right-angle bend along Sand Dollar Street creates a local high point, preventing stormwater discharge.

SOLUTION

- Install a bubble-up catch basin with one (1) upstream catch basin, at bend on Sand Dollar Street to allow for stormwater discharge
- Add outlet with tide gate to Canal 3 along Sailfish Drive to discharge water from existing catch basin infiltration system

PROJECT BENEFITS

This alternative reduces roadway flooding on Sand Dollar Street and Starfish Drive during the 10-year, 24-hour storm event. The addition of a new catch basin will reduce gutter spread, by increasing stormwater capture rate and storage volume. An additional bubble-up catch basin on the outside of Sand Dollar Street, and a new outlet on Starfish Drive will safely discharge stormwater away from surface streets.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system requires a CAMA permit
- Right-of-way acquisition required for additional outfall

COST

Estimated Construction Cost Range

Sand Dollar Street: $39,000 to $51,000
Starfish Drive: $54,000 to $70,000

Area 9 – Alternative 1	Lions Paw Street – Scotch Bonnet Drive

PROBLEM

Lions Paw Street currently lacks any stormwater infrastructure. The existing culverts along the north-east corner of Scotch Bonnet Drive have limited outflow due to the road embankment impeding water egress. This lack of stormwater infrastructure leads to roadway flooding in this area during the 10-year, 24-hr storm.

SOLUTION

- Add catch basin infiltration system along Lions Paw Street, consisting of seven (7) catch basins with 18” and 24” perforated HDPE
- Route existing culvert outfalls to a new junction box. Place new 24” RCP culvert crossing Scotch Bonnet Drive
- Install a tide gate on the final outlet pipe

PROJECT BENEFITS

This alternative eliminates flooding on Scotch Bonnet Drive during the 10-year 24-hour storm event. Roadway flooding along Lions Paw Street is similarly reduced but not eliminated during the 10-year 24-hour storm event.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options crossing Scotch Bonnet Drive
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Lions Paw Street: $273,000 to $355,000
Scotch Bonnet Drive: $22,000 to $29,000

Area 9 – Alternative 2	Lions Paw Street – Scotch Bonnet Drive

PROBLEM

Lions Paw Street currently lacks any stormwater infrastructure. The existing culverts along the north-east corner of Scotch Bonnet Drive have limited outflow due to the road embankment impeding water egress. This lack of stormwater infrastructure leads to roadway flooding in this area during the 10-year, 24-hr storm.

SOLUTION

- Add storm drainage system along the southern portion of Lions Paw Street, consisting of eight (8) catch basins with approximately 530 LF of 18" perforated HDPE leading to new outfall with tide gate to Canal 1
- Route existing culvert outfalls to a new junction box and place new RCP culvert crossing Scotch Bonnet Drive to bubble-up catch basin

PROJECT BENEFITS

This alternative eliminates flooding on Scotch Bonnet Drive during the 10-year 24-hour storm event. Roadway flooding along Lions Paw Street is similarly reduced but not eliminated during the 10-year 24-hour storm event. The addition of a bubble-up catch basin on the outside of Scotch Bonnet Drive will safely discharge stormwater away from surface streets.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options crossing Scotch Bonnet Drive
- New stormwater system requires a CAMA permit

COST

Estimated Construction Cost Range

Lions Paw Street: $154,000 to $200,000
Scotch Bonnet Drive: $32,000 to $42,000

Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

Alternative 1

Alternative 1 introduces localized infiltration-based improvements across the canal street network. Sailfish, Tarpon, Marlin, Tuna, Dolphin, and Swordfish Drives would each receive new catch basins and small-diameter conveyance systems tied to subsurface infiltration chambers or upgraded culverts intended to capture runoff and encourage infiltration into the sandy soils. These systems are designed to address roadway ponding during storm events without relying on direct outfalls to the canal.

Modeling results show that Alternative 1 provides measurable reductions in several locations compared to existing conditions. Tarpon Drive improves to a flood depth of 0.17 feet, while Swordfish Drive reduces to 0.29 feet. More substantial flooding remains along Tuna Drive (0.94 feet), Dolphin Street (0.77 feet), and Marlin Drive (0.63 feet), indicating that infiltration alone is not sufficient to resolve deeper ponding in the lowest roadway depressions. Sailfish Street also continues to experience notable flooding at 0.63 feet. Overall, Alternative 1 reduces depths modestly in parts of the corridor but leaves significant ponding in the most flood-prone streets.

The estimated probable construction cost of Alternative 1 is approximately $698,000 to $908,000 for the corridor. Detailed costs for each street are provided in the fact sheets and summarized in **Attachment E.**

Alternative 2

Alternative 2 introduces new outfalls equipped with tide gates along with expanded collection systems to reduce reliance on infiltration and provide direct conveyance to the adjacent canals. Improvements include catch basins and upsized pipes ranging from 18 to 24 inches, with tide gates installed at new canal outfalls to prevent tidal backflow. These upgrades are proposed along each of the Area 10 canal streets, targeting the most flood-prone depressions with new outfalls while also replacing undersized culverts.

Modeling results show that Alternative 2 produces more substantial reductions in flood depths compared to existing conditions. Tuna Drive improves dramatically, from 0.94 feet under Alternative 1 to only 0.04 feet. Dolphin Street decreases to 0.23 feet, and Sailfish Street improves to 0.28 feet. Tarpon Drive experiences a slight increase compared to Alternative 1 but remains low at 0.25 feet. Marlin Drive reduces marginally to 0.57 feet, while Swordfish Drive increases slightly to 0.57 feet compared to Alternative 1. Despite these variations, Alternative 2 generally provides greater flood reduction across the corridor, particularly in the streets experiencing the deepest ponding.

The estimated probable construction cost of Alternative 2 is approximately $623,000 to $810,000 for the corridor. As with Alternative 1, detailed costs for each street are provided in the fact sheets and summarized in **Attachment E.**

Project Challenges

As with other areas of concern, construction of either alternative will require phased traffic management and work within constrained rights-of-way. Low roadway elevations limit design flexibility for pipe slopes and outfall placement. Alternative 2's reliance on new outfalls will require CAMA major permits, and permit conditions may restrict alignment, depth, or require supplemental water quality measures prior to discharge approval. Infiltration systems proposed under Alternative 1 carry higher installation costs relative to performance benefit, while tide-gated outfalls in Alternative 2 will require long-term maintenance and inspection to remain effective.

Modeling Results Comparison

Table 5.4 - Area 10 Results Comparison

Point of Interest	Elevation (ft.)	10-Year Storm			
		Alternative 1		Alternative 2	
		WSEL	Flood Depth (ft.)	WSEL	Flood Depth (ft.)
Location of Maximum Flooding					
Sailfish Street	3.99	4.62	0.63	4.27	0.28
Tarpon Drive	3.58	3.75	0.17	3.83	0.25
Marlin Drive	3.94	4.57	0.63	4.51	0.57
Tuna Drive	3.37	4.31	0.94	3.41	0.04
Dolphin Street	3.44	4.21	0.77	3.67	0.23
Swordfish Drive	4.27	4.56	0.29	4.84	0.57

Area 10 – Alternative 1	Sailfish Street – Tarpon Drive – Marlin Drive

PROBLEM

Portions of the existing stormwater network along the Canal Streets comprised of Sailfish Street, Tarpon Drive, and Marlin Drive are undersized for the 10-year. While Sailfish Street experiences minimal flooding during the 10-year, 24-hour storm event, portions of Tarpon Drive and Marlin Drive experience significant flooding despite having existing infrastructure. Some pipes along the existing Tarpon Drive network were installed at a negative slope, leading to water retention and surcharging. The network along Marlin Drive does not outlet directly to a canal, and the existing catch basin infiltration system is not adequately sized for the 10-year, 24-hour storm event.

SOLUTION

- Drop inverts of existing pipes along Tarpon Drive as needed to create a positive outfall
- Extend catch basin infiltration along Marlin Drive with 18” perforated HDPE, adding two (2) additional catch basins on east side of Marlin Drive
- Extend existing pipe network south along Tarpon Drive with 18” perforated HDPE, adding three (3) additional catch basins
- Install a tide gate on the existing outlet pipe (Tarpon Drive)

PROJECT BENEFITS

This alternative reduces flooding depths and flooding extents during the 10-year storm along Tarpon Drive and Marlin Drive. No additional outfalls would be required.

PROJECT CHALLENGES

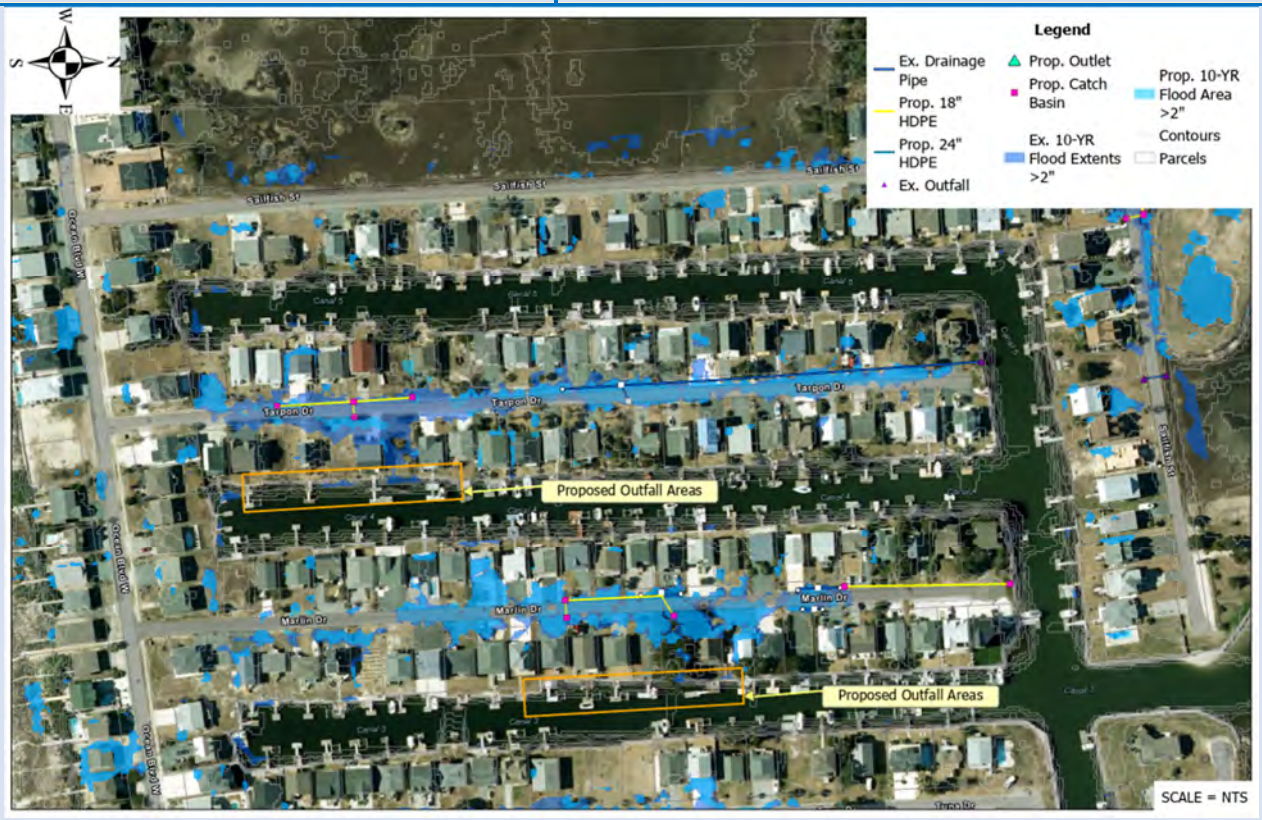
- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along Tarpon Drive & Marlin Drive
- Extended Catch basin Infiltration System will require continual maintenance.
- New stormwater system options are limited without a CAMA permit

COST

Estimated Construction Cost Range

Sailfish Street: $43,000 to $56,000
Tarpon Drive: $137,000 to $178,000
Marlin Drive: $127,000 to $165,000

Area 10 – Alternative 2	Sailfish Street – Tarpon Drive – Marlin Drive



PROBLEM

Portions of the existing stormwater network along the Canal Streets comprising Sailfish Street, Tarpon Drive, and Marlin Drive are undersized for the 10-year. While Sailfish Drive experiences minimal flooding during the 10-year, 24-hour storm event, portions of Tarpon Drive and Marlin Drive experience significant flooding despite having existing infrastructure. Some pipes along the existing Tarpon Drive network were installed at a negative slope, leading to water retention and surcharging. The network along Marlin Drive does not outlet directly to a canal, and the existing catch basin infiltration system is not adequately sized for the 10-year, 24-hour storm event.

SOLUTION

- Drop inverts of existing pipes along Tarpon Drive as needed to create a positive outfall
- Add secondary pipe network at the southern portion of Tarpon Drive with four (4) new catch basins and install a new outlet pipe with tide gate outlet pipe (Tarpon Drive)
- Add an additional inlet along existing pipe network leading to existing outfall (Canal 5)
- Add bubble-up catch basin on North side of Sailfish Street connected to two (2) new upstream catch basins
- Add bubble-up catch basin to north end of Marlin Drive connecting to existing catch basin infiltration system and add a new catch basin at the end of existing infiltration to establish connection
- Add new outfall and three (3) new catch basins to connect to existing catch basin infiltration system near midpoint of Marlin Drive

PROJECT BENEFITS

This alternative reduces flooding depths and flooding extents during the 10-year storm along Tarpon Drive and Marlin Drive. No additional outfalls would be required.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe extending existing pipe network due to insufficient cover
- Additional catch basins will require continual maintenance
- CAMA permit will be required for additional outfall
- Right-of-way acquisition required for additional outfall

COST

Estimated Construction Cost Range

Sailfish Street: $58,000 to $75,000
Tarpon Drive: $75,000 to $98,000
Marlin Drive: $187,000 to $243,000

Area 10 – Alternative 1	Tuna Drive - Dolphin Street – Swordfish Drive

PROBLEM

Tuna Drive and Dolphin Street experience significant flooding for the 10-year, 24-hour storm event. The entire project area comprising Tuna Drive, Dolphin Street lacks stormwater infrastructure. A lack of stormwater infrastructure causes long flooding duration during the 10-year, 24-hour storm event.

SOLUTION

- Install seven (7) catch basins with 602 LF of 24" diameter perforated HDPE along Tuna Drive to capture, store, and increase the infiltration along Tuna Drive
- Install five (5) catch basins with 505 LF of 15" diameter perforated HDPE along Dolphin Street to capture, store, and increase the infiltration along Dolphin Street
- Install 24" RCP culvert across Swordfish Drive to outlet ponded water at east side of inside bend of Swordfish Drive before ponded stormwater overtops roadway

PROJECT BENEFITS

This alternative reduces flooding depths during the 10-year, 24-hour storm event along the south end of Dolphin Street and Tuna Drive.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system options are limited without a CAMA permit
- Extended Catch basin Infiltration System will require continual maintenance
- A 10-Year Level of Service (LOS) is not achieved with proposed infrastructure

COST

Estimated Construction Cost Range

Tuna Drive: $215,000 to $280,000
Dolphin Street: $159,000 to $207,000
Swordfish Drive: $17,000 to $22,000

Area 10 – Alternative 2	Tuna Drive - Dolphin Street – Swordfish Drive

PROBLEM

Tuna Drive and Dolphin Street experience significant flooding for the 10-year, 24-hour storm event. The entire project area comprising Tuna Drive and Dolphin Street lacks stormwater infrastructure. A lack of stormwater infrastructure causes long flooding duration during the 10-year, 24-hour storm event.

SOLUTION

- Install six (6) catch basins with 560 linear feet of 18" diameter perforated HDPE along Tuna Drive and route stormwater to a new outfall with tide gate at southern end of Tuna Drive to Canal 2
- Install six (6) catch basins with 540 linear feet of 18" diameter perforated HDPE along Dolphin Street to capture to route stormwater a new outfall to Canal 1, near southern end of Dolphin Street
- Install a bubble-up catch basin on northeast corner of Swordfish Drive with two (2) new upstream catch basins near intersection of Swordfish Drive and Heron Landing Wynd

PROJECT BENEFITS

This alternative reduces flooding depths during the 10-year, 24-hour storm event along the south end of Dolphin Street and Tuna Drive. Bubble-up catch basin provides enhanced sediment removal and improved water quality over typical pipe outfall.

PROJECT CHALLENGES

- Disruption of traffic during construction
- Low road surface elevations limit pipe size options along OBW
- New stormwater system options require CAMA permit
- Extended Catch basin Infiltration System will require continual maintenance

COST

Estimated Construction Cost Range

Tuna Drive: $150,000 to $195,000
Dolphin Street: $117,000 to $152,000
Swordfish Drive: $36,000 to $47,000

6.0 Stormwater Project Recommendations

The following is a summary of the recommended alternatives for each area of concern based on flood reduction performance, implementation cost, permitting requirements, and overall net benefit. For Area 7, a single recommended alternative is provided. For Areas 8 through 10, where conditions vary considerably from street to street, recommendations are presented individually. These solutions are not interdependent and may be implemented independently as funding, permitting, and easement acquisition allow. Cost estimates are summarized for each alternative in Table 6.1 below, with full details provided in the fact sheets and **Attachment E.**

Area 7 – East End: McCray Street, Avenue B, and Dunescape Drive

Alternative 1 is recommended for Area 7. Modeling results indicate that the portion of McCray Street west of the intersection with Dunescape Drive can be accommodated by the existing stormwater network along Mullet Street, once the improvements identified in Area 2 are implemented. East of Dunescape Drive, proposed catch basins and conveyance piping under Alternative 1 would route stormwater to a dune infiltration system, providing reductions in roadway flooding within the low-lying segments. This combined approach leverages existing capacity on the western end while introducing new infrastructure on the eastern end, making Alternative 1 the more cost-effective and practical solution ($1.28M–$1.56M, plus $650k–$975k for Area 2 improvements).

Coastal Area Management Act (CAMA) major permitting and a variance from the Coastal Resources Commission (CRC) will still be required for construction of the proposed dune infiltration system and any infrastructure within the Ocean Hazard Area. It should also be noted that if the Town prefers to reduce reliance on the existing network along Mullet Street and achieve greater independence for stormwater conveyance, Alternative 2 would provide a more robust but higher-cost solution through multiple dune infiltration systems.

Area 8 – Canal Streets: Greensboro Street, Charlotte Street, Durham Street, Burlington Street, Salisbury Street, Sanford Street, Raleigh Street, Fayetteville Street, Lumberton Street, and High Point Street

High Point Street – Alternative 2 is recommended. Flood depths decrease from 0.58 feet under existing conditions to 0.38 feet, compared to 0.57 feet under Alternative 1. The addition of a tide-gated outfall improves conveyance and provides a measurable reduction in flooding across the corridor. Construction of the new outfall will require CAMA major permitting.

Lumberton Street – Alternative 2 is recommended. Flood depths reduce from 0.35 feet to 0.21 feet, while Alternative 1 produces only minor improvement. Costs are comparable between the two, making Alternative 2 the more effective option. A new outfall with tide gate is included and will require CAMA major permitting and utility easement acquisition.

Fayetteville Street – Alternative 1 is recommended. Flooding depths reduced minimally by 0.01 feet at a specific point of analysis, but infiltration is expected to improve flood depths and duration of flooding.

Raleigh Street – Alternative 2 is recommended. Flood depths are reduced slightly, from 0.34 feet to 0.31 feet, compared to no change under Alternative 1. While improvements are modest, the added outfall capacity in Alternative 2 provides incremental benefit at lower cost. Construction of the new outfall will require CAMA major permitting and may also require right-of-way acquisition.

Sanford Street – Alternative 2 is recommended. Flooding is reduced from 0.73 feet to 0.51 feet, compared to 0.72 feet under Alternative 1. The inclusion of a tide-gated outfall provides a meaningful improvement at comparable cost. Construction of the outfall will require CAMA major permitting and utility easement acquisition.

Salisbury Street – No improvements are recommended. Flooding during the 10-year storm is limited to nuisance levels less than 2 inches, and the street is not deficient in level of service.

Burlington Street – Alternative 2 is recommended. Flood depths reduce from 0.35 feet to 0.24 feet, compared to 0.41 feet under Alternative 1. With costs nearly identical, Alternative 2 provides greater benefit. The design includes a new tide-gated outfall, which will require CAMA major permitting and utility easement acquisition.

Durham Street – Alternative 2 is recommended. Depths decrease from 0.35 feet to 0.24 feet, compared to 0.33 feet under Alternative 1. Although Alternative 2 is slightly more costly, it provides improved conveyance through a tide-gated outfall. Construction of the outfall will require CAMA major permitting and utility easement acquisition.

Charlotte Street – Alternative 2 is recommended. Flood depths reduce from 0.77 feet to 0.66 feet, while no change occurs under Alternative 1. Despite higher cost, Alternative 2 provides improved drainage performance. A new outfall with tide gate is included, which will require CAMA major permitting and utility easement acquisition.

Greensboro Street – Alternative 1 is recommended. Flood depths reduce substantially from 0.18 feet to 0.03 feet, compared to only 0.17 feet under Alternative 2. At lower cost, Alternative 1 provides the most effective solution for this street.

Area 9 – Canal Streets: Sand Dollar Street, Starfish Drive, Lions Paw Street, and Scotch Bonnet Drive

Sand Dollar Street – Alternative 1 is recommended. Flood depths are reduced significantly from 0.45 feet under existing conditions to 0.07 feet, compared to 0.41 feet under Alternative 2. The infiltration-based approach in Alternative 1 is more effective and cost-efficient, and no new outfall is proposed.

Starfish Drive – Alternative 1 is recommended. Both alternatives provide substantial reductions in flooding, reducing depths from 0.43 feet to approximately 0.02–0.03 feet. Because performance is nearly identical, Alternative 1 is recommended due to slightly lower cost and avoidance of new outfall permitting requirements.

Lions Paw Street – Alternative 2 is recommended. Flood depths are reduced from 0.44 feet to 0.39 feet, compared to 0.42 feet under Alternative 1. The cost of Alternative 2 is substantially lower, making it the more favorable option. Construction of the proposed outfall will require CAMA major permitting and utility easement acquisition.

Scotch Bonnet Drive – Alternative 2 is recommended. Flood depths decrease slightly from 0.54 feet under existing conditions to 0.46 feet, compared to 0.47 feet under Alternative 1. While the difference in modeled performance is modest, Alternative 2 provides a more effective and comprehensive solution by combining new culvert improvements with a bubble-up catch basin and a tide-gated outfall to safely discharge stormwater away from surface streets.

Area 10 – Canal Streets: Sailfish Street, Tarpon Drive, Marlin Drive, Tuna Drive, Dolphin Street, and Swordfish Drive

Sailfish Street – Alternative 2 is recommended. Flood depths are reduced from 0.70 feet under existing conditions to 0.28 feet, compared to 0.63 feet under Alternative 1. Alternative 2 introduces a bubble-up catch basin on the north side of Sailfish Street with two upstream catch basins, which improves localized drainage and reduces roadway ponding.

Tarpon Drive – Alternative 1 is recommended. Flood depths decrease to 0.17 feet compared to 0.25 feet under Alternative 2. Improvements focus on correcting negative slope sections and extending the infiltration system along Tarpon Drive.

Marlin Drive – Alternative 2 is recommended. Flood depths decrease modestly from 0.65 feet to 0.57 feet, compared to no significant improvement under Alternative 1. Alternative 2 adds a bubble-up catch basin connected to the existing infiltration system and a new outfall with additional catch basins, improving overall conveyance. Construction will require CAMA major permitting and utility easement acquisition.

Tuna Drive – Alternative 2 is strongly recommended. Flood depths decrease dramatically from 1.02 feet to 0.04 feet, compared to 0.94 feet under Alternative 1. Alternative 2 installs a tide-gated outfall at the southern end of Tuna Drive, which is critical for addressing persistent roadway flooding. This will require CAMA major permitting and utility easement acquisition.

Dolphin Street – Alternative 2 is recommended. Flood depths decrease from 0.79 feet to 0.23 feet, compared to no reduction under Alternative 1. Alternative 2 includes six new catch basins with 540 LF of pipe leading to a tide-gated outfall at Canal 1, providing significant flood relief. Construction will require CAMA major permitting and utility easement acquisition.

Swordfish Drive – Alternative 1 is recommended. Flood depths remain lower at 0.29 feet compared to 0.57 feet under Alternative 2. Alternative 1 includes a culvert crossing at the inside bend to alleviate ponding, avoiding additional permitting or outfall construction.

Table 6.1. Summary of Selected Alternatives

Project Area	Area Description	Selected Alternative	Cost Estimate
7	East End: McCray Street, Avenue B, and Dunescape Drive	Alternative 1	$1,284,000 – $1,557,000 + (2024 SWMP) Area 2 - Alternative 1 $650,000 – $975,000
8	High Point Street	Alternative 2	$170,000 – $221,000
	Lumberton Street	Alternative 2	$214,000 – $278,000
	Fayetteville Street	Alternative 1	$112,000 – $146,000
	Raleigh Street	Alternative 2	$52,000 – $68,000
	Sanford Street	Alternative 2	$157,000 – $204,000
	Salisbury Street	None	-
	Burlington Street	Alternative 2	$148,000 – $192,000
	Durham Street	Alternative 2	$74,000 – $96,000
	Charlotte Street	Alternative 2	$187,000 – $243,000
	Greensboro Street	Alternative 1	$54,000 – $70,000
9	Sand Dollar Street	Alternative 1	$28,000 – $37,000
	Starfish Drive	Alternative 1	$57,000 – $74,000
	Lions Paw Street	Alternative 2	$154,000 – $200,000
	Scotch Bonnet Drive	Alternative 2	$32,000 – $42,000
10	Sailfish Street	Alternative 2	$58,000 – $75,000
	Tarpon Drive	Alternative 1	$137,000 – $178,000
	Marlin Drive	Alternative 2	$187,000 – $243,000
	Tuna Drive	Alternative 2	$150,000 – $195,000
	Dolphin Street	Alternative 2	$117,000 – $152,000
	Swordfish Drive	Alternative 1	$17,000 – $22,000

References

2023-24 UNC School of Government, Environmental Finance Center NC Residential Stormwater Utility Fee Dashboard https://efc.sog.unc.edu/nc-stormwater-dashboard/

ECS Southeast LLC, *Report of Seasonal High Water Table Estimation and Infiltration Testing: Ocean Boulevard Driveway*, ESC Project No. 49.22774, April 5, 2024

NC Spatial Data Download https://sdd.nc.gov/

NOAA's National Weather Service Precipitation Frequency Data Server https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=nc

NOAA's Tides & Currents Tidal Datums https://tidesandcurrents.noaa.gov/stations.html?type=Datums

United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

USGS, National Land Cover Database https://www.usgs.gov/centers/eros/science/national-land-cover-database?qt-science_center_objects=0#qt-science_center_objects

Urban Hydrology for Small Watersheds, Technical Release 55, United States Department of Agriculture, June 1986

TOWN OF HOLDEN BEACH | SUPPLEMENTAL STORMWATER MASTER PLAN REPORT

Attachment A

As-Built Survey & Stormwater Network Map

TOPOGRAPHIC & STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

FEBRUARY 2024

PREPARED FOR:

mcgill Shaping Communities Together®

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THIS GROUND SURVEY WAS PERFORMED AT THE 95 PERCENT CONFIDENCE LEVEL TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THIS SURVEY WAS PERFORMED TO MEET THE REQUIREMENTS FOR A TOPOGRAPHIC SURVEY TO THE ACCURACY OF CLASS A AND VERTICAL ACCURACY WHEN APPLICABLE TO THE CLASS C STANDARD, AND THAT THE ORIGINAL DATA WAS OBTAINED ON 09-23-2023; THAT THE SURVEY WAS COMPLETED ON 02-05-2024; THAT CONTOURS SHOWN AS [BROKEN LINES] MAY NOT MEET THE STATED STANDARD; AND ALL COORDINATES ARE BASED ON N.A.D. 83 (2011 ADJUSTMENT) AND ALL ELEVATIONS ARE BASED ON N.A.V.D. 88; I CERTIFY THAT THE GRID TIE TO PROJECT CONTROL SHOWN WAS PERFORMED UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THIS SURVEY:

CLASS OF SURVEY:	AA
POSITIONAL ACCURACY:	0.008 METERS
TYPE OF GPS FIELD PROCEDURE:	RTN
DATES OF SURVEY:	10-26-2023
DATUM/EPOCH:	NAD 83-2011
PUBLISHED /FIXED CONTROL:	RTN
GEIOD MODEL:	18B
COMBINED GRID FACTOR:	1.00014710
UNITS:	US FEET

THAT THE RATIO OF PRECISION IS 1:10,000; AND THAT THIS SURVEY IS OF AN EXISTING PARCEL OF LAND; AND THAT THIS MAP MEET'S THE REQUIREMENTS OF THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN NORTH CAROLINA (21 NCAC 56. 1600). THIS 5TH DAY OF FEBRUARY, 2024.

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. STANLEY

PROFESSIONAL LAND SURVEYOR NC L-3387

PROJECT CONTROL POINTS (NAD 83/2011)				
DESCRIPTION	POINT NUMBER	NORTHING (US FT.)	EASTING (US FT.)	ELEVATION (US FT.)
HB 005 MONUMENT	10004	60874.23	2226046.10	7.46
NCGS - FERRY	10001	60842.10	2224472.25	9.13
MNF-JORDAN BLVD	2114	61029.42	2222242.48	14.17
MNF - OBW & DELANNE	11501	60342.61	2220390.53	6.33
CSPK - OBW & HIGHPOINT	10812	59861.31	2215641.89	4.80
CSPK - OBW & CHARLLOTTE	12222	59556.89	2212806.91	5.78
MNF - OBW & GREENSBORO	12221	59510.59	2212443.08	5.29
CSPK - OBW & SHELL	3802	57251.49	2195110.01	6.71
MNF - 1321 OBW	2820	56385.49	2190567.78	3.68

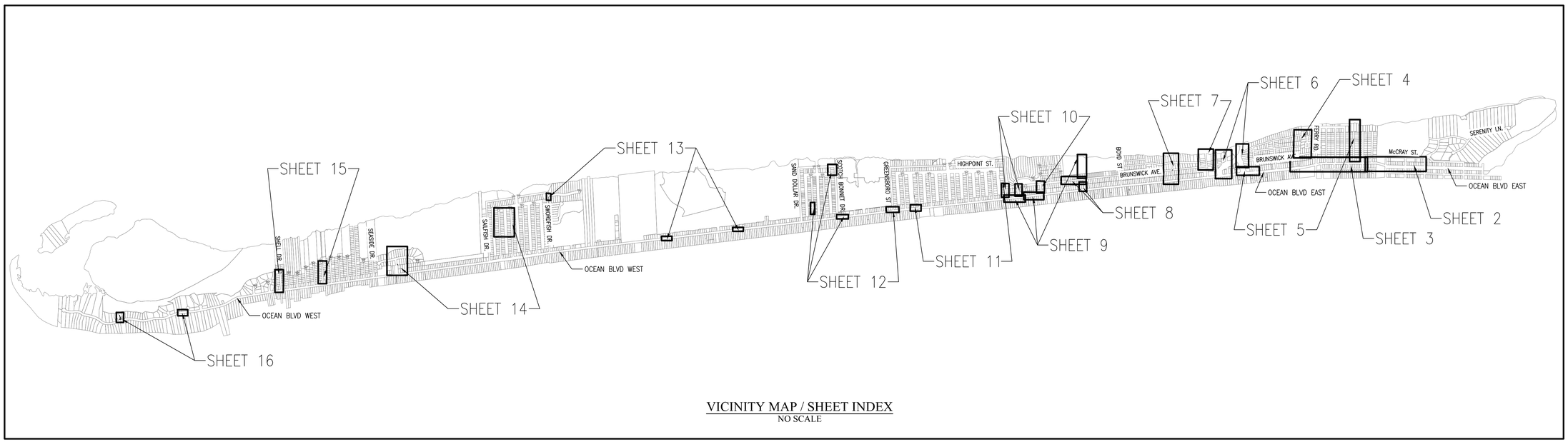
PROJECT LEGEND		
LABEL	SYM.	DESCRIPTION
IPF/IRF	●	IRON PIPE /ROD FOUND
MNF	▲	MAG NAIL FOUND
CMF	■	CONC. MON. FOUND
NCGS	⛢	GEODETIC MONUMENT
CSPK	⊕	COTTON SPIKE
CATV	Ⓣ	CABLE TV PEDESTAL
TPED	🅃	TELEPHONE PEDESTAL
TMH	Ⓣ	TELEPHONE MANHOLE
FOP	◪	FIBER OPTIC POST
FOB	FOB	FIBER OPTIC BOX
ICV	Ⓘ	IRRIGATION VALVE
EB	EB	ELECTRIC BOX
SMH	Ⓢ	SEWER MANHOLE
SCO	Ⓒ	SEWER CLEANOUT
SV	⋈	SEWER VALVE
RPZ	⋈	REDUCED PRESSURE ZONE
FH	⅄	FIRE HYDRANT
WM	▣	WATER METER
SWMH	Ⓢ	STORMWATER MANHOLE
GS	>23.5	SPOT ELEVATION
CB		CATCH BASIN
INV.		INVERT OF PIPE
CPP		CORRUGATED PLASTIC PIPE
RCP		REINFORCED CONCRETE PIPE
CMP		CORRUGATED METAL PIPE
HDPE		HIGH DENSITY POLYETHYLENE PIPE
R/W		RIGHT OF WAY

GENERAL NOTES:

1. ADJOINING DEED REFERENCES BASED ON CURRENT INFORMATION FOUND IN THE BRUNSWICK COUNTY TAX OFFICE.
2. THIS PROPERTY IS SUBJECT TO ANY AND ALL EASEMENTS, COVENANTS, RESTRICTIONS, RIGHT-OF-WAYS OF RECORD, GOVERNMENTAL ORDINANCES AND/OR REQUIREMENTS WHICH MAY LIMIT THE USE OF THIS PROPERTY; WHETHER SHOWN OR NOT SHOWN ON THIS SURVEY MAP.
3. THIS SURVEY PERFORMED AND MAP PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND IS THEREBY SUBJECT TO ANY FACTS WHICH MAY BE DISCLOSED BY A FULL AND ACCURATE TITLE SEARCH. USERS OF THIS PLAT SHOULD OBTAIN AN ACCURATE LEGAL OPINION AS TO OWNERSHIP WITHIN THE BOUNDARIES OF THIS PLAT.
4. ALL BEARINGS ARE BASED ON NC GRID NORTH (NAD83-NSRS 2011); ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES.
5. ALL RIGHT OF WAY AND PROPERTY LINES ARE BASED ON BRUNSWICK COUNTY GIS AND WERE NOT SURVEYED BY ME AT THIS TIME.
6. ELEVATIONS WERE OBTAINED FROM NORTH CAROLINA REAL TIME NETWORK AND ARE BASED ON NAVD 88.
7. ONE FOOT CONTOUR INTERVALS.
8. AREA BY COORDINATE METHOD.
9. US SURVEY FEET.

SUB-SURFACE UTILITY DISCLAIMER:

THERE HAS BEEN NO ATTEMPT BY THE CERTIFYING SURVEYOR TO LOCATE, MARK OR IDENTIFY ANY SUB-SURFACE UTILITY LINES ON THE PROPERTIES SHOWN ON THIS MAP. THE EXISTENCE OF SUB-SURFACE UTILITIES, IF ANY, MAY AFFECT THE USE OF THESE PROPERTIES BEYOND THE CONTROL OF THE SURVEYOR. USERS OF THIS MAP, AND THEIR ASSIGNS, ARE HEREBY NOTIFIED AND ACKNOWLEDGE THAT ANY DAMAGE RESULTING FROM ANY UTILITY SHOWN OR NOT SHOWN ON THIS MAP IS NOT THE RESPONSIBILITY OF THE SURVEYOR OR COASTAL GEOMATICS, PLLC.



VICINITY MAP / SHEET INDEX
NO SCALE

Revisions

08/20/25 ADDED ADDITIONAL AREA ON SCOTCH BONNETT DRIVE (SHEET 12)

COASTALGEOMATICS
LAND SURVEYING • MAPPING • PLANNING
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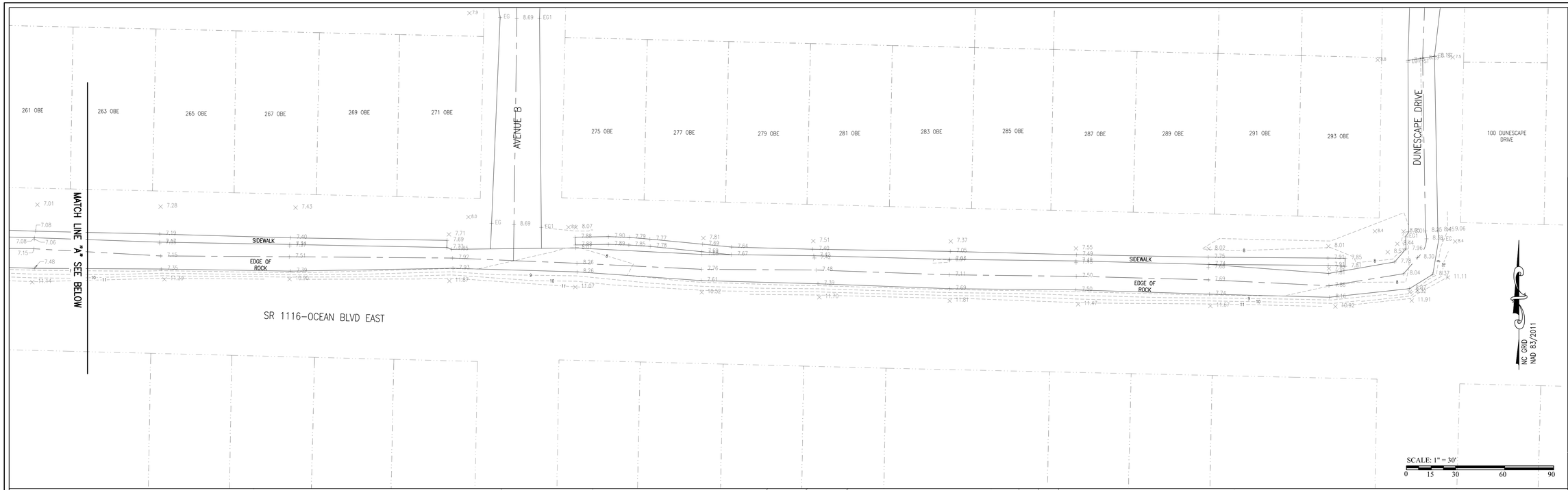
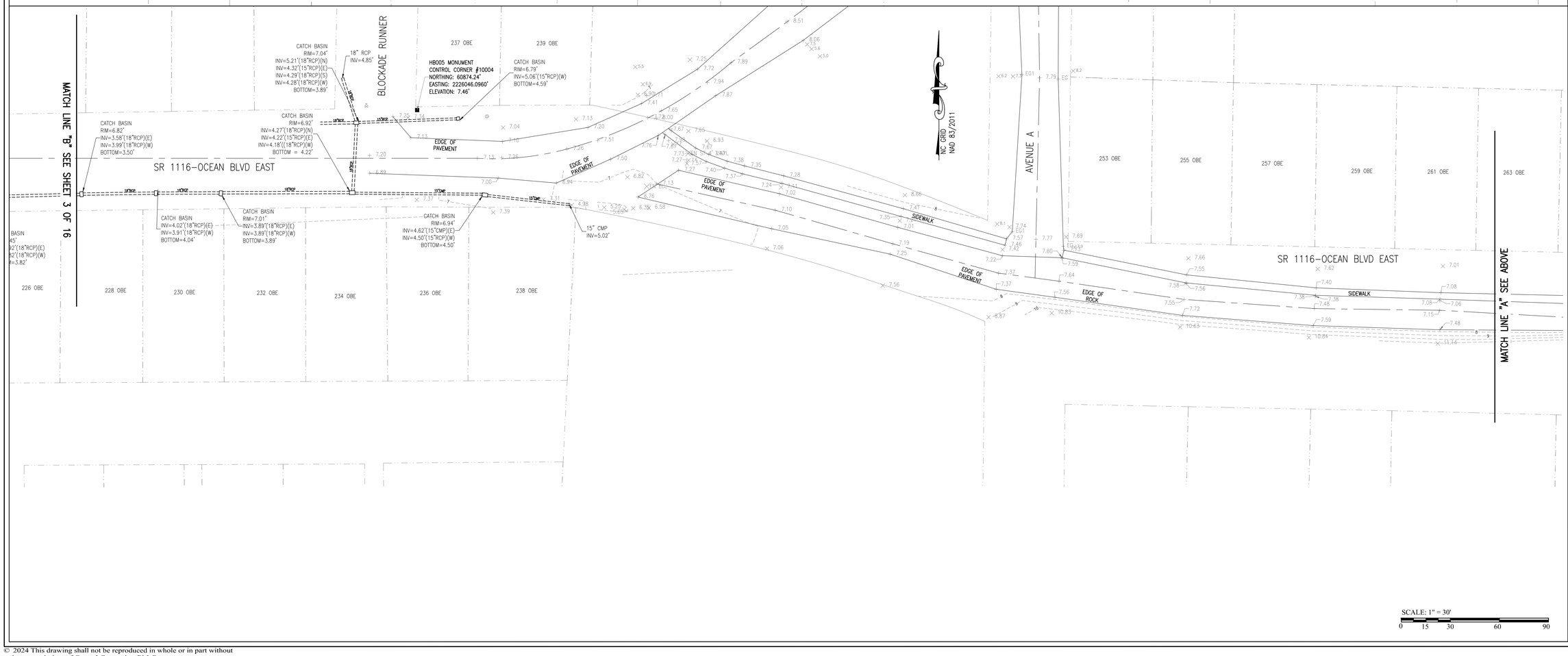
Telephone: 910-356-1800 ~ www.coastalgeomatics.com
Firm License # P-2248

TOPOGRAPHIC & STORMSWER ASBUILT SURVEY FOR:
TOWN OF HOLDEN BEACH
HOLDEN BEACH, NORTH CAROLINA

SHEET 1 OF 16

PROJECT NO. 4900.64





Revisions

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TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. SMITH

SHEET 2 OF 16

PROJECT NO. 4900.64

MATCH LINE "E" SEE SHEET 5 OF 16

APPROXIMATE POINT OF PIPE SIZE CHANGE

CONCH STREET

MULLET STREET

IRON AGE DRIVE

SR 1116–OCEAN BLVD WEST

SR 1116–OCEAN BOULEVARD EAST

SR 1116–OCEAN BLVD EAST

MATCH LINE "C" SEE BELOW

MATCH LINE "B" SEE SHEET 2 OF 16

ELIZABETH STREET

BENDIGO STREET

199 OBE
201 OBE
211 OBE
196 OBE
198 OBE
200 OBE
202 OBE
204 OBE
206 OBE
210 OBE
212 OBE
214 OBE
216 OBE
218 OBE
222 OBE
226 OBE
228 OBE
230 OBE
232 OE

CATCH BASIN
RIM=7.17'
INV=3.76'(18"RCP)(N)
INV=3.88'(18"RCP)(S)
BOTTOM=3.75'

15" RCP
INV=5.11'

CATCH BASIN
RIM=6.82'
INV=3.58'(18"RCP)(E)
INV=3.99'(18"RCP)(W)
BOTTOM=3.50'

NC GRID
NAD 83/2011

CATCH BASIN
RIM=7.00'
INV=4.24'(18"RCP)(E)
INV=4.16'(18"RCP)(W)
BOTTOM=4.16'

CATCH BASIN
RIM=6.55'
INV=4.25'(18"RCP)(E)
INV=4.24'(18"RCP)(W)
BOTTOM=4.24'

CATCH BASIN
RIM=6.60'
INV=4.15'(18"RCP)(E)
INV=4.23'(18"RCP)(W)
BOTTOM=4.09'

CATCH BASIN
RIM=6.70'
INV=4.43'(18"RCP)(E)
INV=4.32'(18"RCP)(W)
BOTTOM=4.32'

CATCH BASIN
RIM=6.68'
INV=4.27'(18"RCP)(E)
INV=4.17'(18"RCP)(W)
BOTTOM=4.17'

CATCH BASIN
RIM=6.89'
INV=4.24'(18"RCP)(E)
INV=4.20'(18"RCP)(W)
BOTTOM=4.18'

CATCH BASIN
RIM=7.39'
INV=4.26'(18"RCP)(E)
INV=4.24'(18"RCP)(W)
BOTTOM=4.19'

CATCH BASIN
RIM=6.98'
INV=3.97'(18"RCP)(N)
INV=3.80'(18"RCP)(E)
INV=3.78'(18"RCP)(W)
BOTTOM=3.78'

CATCH BASIN
RIM=6.78'
INV=4.03'(15"RCP)(N)
INV=3.28'(18"RCP)(E)
INV=3.48'(18"RCP)(W)
BOTTOM=3.08'

CATCH BASIN
RIM=6.64'
INV=3.11'(18"RCP)(E)
INV=3.17'(18"RCP)(W)
BOTTOM=3.04'

CATCH BASIN
RIM=6.34'
INV=3.84'(18"RCP)(E)
INV=3.72'(18"RCP)(W)
BOTTOM=3.67'

CATCH BASIN
RIM=6.45'
INV=3.92'(18"RCP)(E)
INV=3.82'(18"RCP)(W)
BOTTOM=3.82'

CATCH BASIN
INV=4.02'(18"RCP)(E)
INV=3.91'(18"RCP)(W)
BOTTOM=4.04'

CATCH BASIN
RIM=7.01'
INV=3.89'(18
INV=3.89'(18
BOTTOM=3.8

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "D" SEE BELOW

FERRY ROAD

SHRIMP STREET

CRAB STREET

HOLDEN STREET

NCGS–FERRY
CONTROL CORNER #10001
NORTHING: 60842.10'
EASTING: 2224472.2480'
ELEVATION: 9.13'

163 OBE
165 OBE
167 OBE
175 OBE
177 OBE
179 OBE
181 OBE
185 OBE
191 OBE
199
180 OBE
182 OBE
184 OBE
186 OBE
188 OBE
190 OBE
194 OBE
196 OBE
198 OBE

CATCH BASIN
RIM=6.97'
INV=5.06'("CPP)(N)
INV=5.44'(6"CPP)(E)
BOTTOM=3.32'

CATCH BASIN
RIM=7.08'
INV=5.22'(6"CPP)(E)
INV=5.18'(6"CPP)(E)
BOTTOM=3.86'

CATCH BASIN
RIM=6.87'
INV=5.15'(6"CPP)(W)
INV=5.11'(6"CPP)(W)
BOTTOM=3.64'

CATCH BASIN
RIM=6.80'
INV=4.07'(18"RCP)(E)
INV=4.25'(18"RCP)(W)
BOTTOM=4.07'

CATCH BASIN
RIM=7.07'
INV=4.83'(15"RCP)(S)
BOTTOM=3.87'

CATCH BASIN
RIM=6.29'
INV=4.09'(18"RCP)(E)
INV=4.14'(18"RCP)(W)
BOTTOM=3.99'

CATCH BASIN
RIM=6.45'
INV=4.22'(18"RCP)(E)
INV=4.23'(18"RCP)(W)
BOTTOM=4.22'

CATCH BASIN
RIM=6.74'
INV=4.26'(18"RCP)(E)
INV=4.22'(18"RCP)(W)
BOTTOM=4.22'

CATCH BASIN
RIM=6.45'
INV=3.91'(18"RCP)(E)
INV=3.85'(18"RCP)(W)
BOTTOM=3.85'

CATCH BASIN
RIM=6.75'
INV=4.00'(18"RCP)(E)
INV=3.96'(18"RCP)(W)
BOTTOM=3.96'

CATCH BASIN
RIM=7.84'
INV=4.34'(18"RCP)(E)
INV=4.33'(18"RCP)(W)
BOTTOM=4.23'

CATCH BASIN
RIM=6.55'
INV=4.75'(15"RCP)(N)
INV=4.23'(18"RCP)(E)
INV=4.30'(18"RCP)(W)
BOTTOM=4.16'

CATCH BASIN
RIM=5.32'
INV=4.07'(18"RCP)(E)
INV=4.13'(18"RCP)(W)
BOTTOM=3.73'

CATCH BASIN
RIM=6.41'
INV=4.14'(18"RCP)(E)
INV=4.13'(18"RCP)(W)
BOTTOM=4.13'

CATCH BASIN
RIM=6.60'
INV=4.15'(18"RCP)(E)
INV=4.23'(18"RCP)(W)
BOTTOM=4.09'

CATCH BASIN
RIM=6.55'
INV=4.25'(18"RCP)(E)
INV=4.24'(18"RCP)(W)
BOTTOM=4.24'

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "C" SEE ABOVE

NC GRID
NAD 83/2011

141 OBE
143 OBE
145 OBE
147 OBE
149 OBE
151 OBE
153 OBE
157 OBE
159 OBE
161 OBE
163 OBE
165 OBE
167 OBE
175 OBE

CATCH BASIN
RIM=6.15'
INV=5.45'(4"PVC)(E)
INV=5.35'(4"PVC)(S)
BOTTOM=4.09'

CATCH BASIN
RIM=6.22'
INV=4.63'(12"CPP)(E)
INV=5.63'(4"PVC)(W)
BOTTOM=3.90'

12" CPP
INV=4.98'

GS 6.63
TD 6.19
BD 5.83
TD 6.74
GS 7.90

CONCRETE FLANGE
INV=4.92'(15"RCP)

CATCH BASIN
6.54'
INV=4.78'(6"CPP)(W)
INV=4.79'(6"CPP)(W)
BOTTOM=3.35'

CATCH BASIN
RIM=6.57'
INV=4.82'(6"CPP)(E)
INV=4.86'(6"CPP)(E)
BOTTOM=3.29'

CATCH BASIN
RIM=6.81'
INV=4.55'(15"RCP)(E)
INV=4.51'(15"RCP)(W)
BOTTOM=4.51'

CATCH BASIN
RIM=6.85'
INV=4.72'(18"RCP)(E)
INV=4.65'(15"RCP)(W)
BOTTOM=4.63'

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "D" SEE ABOVE

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Firm License # P-2248

TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

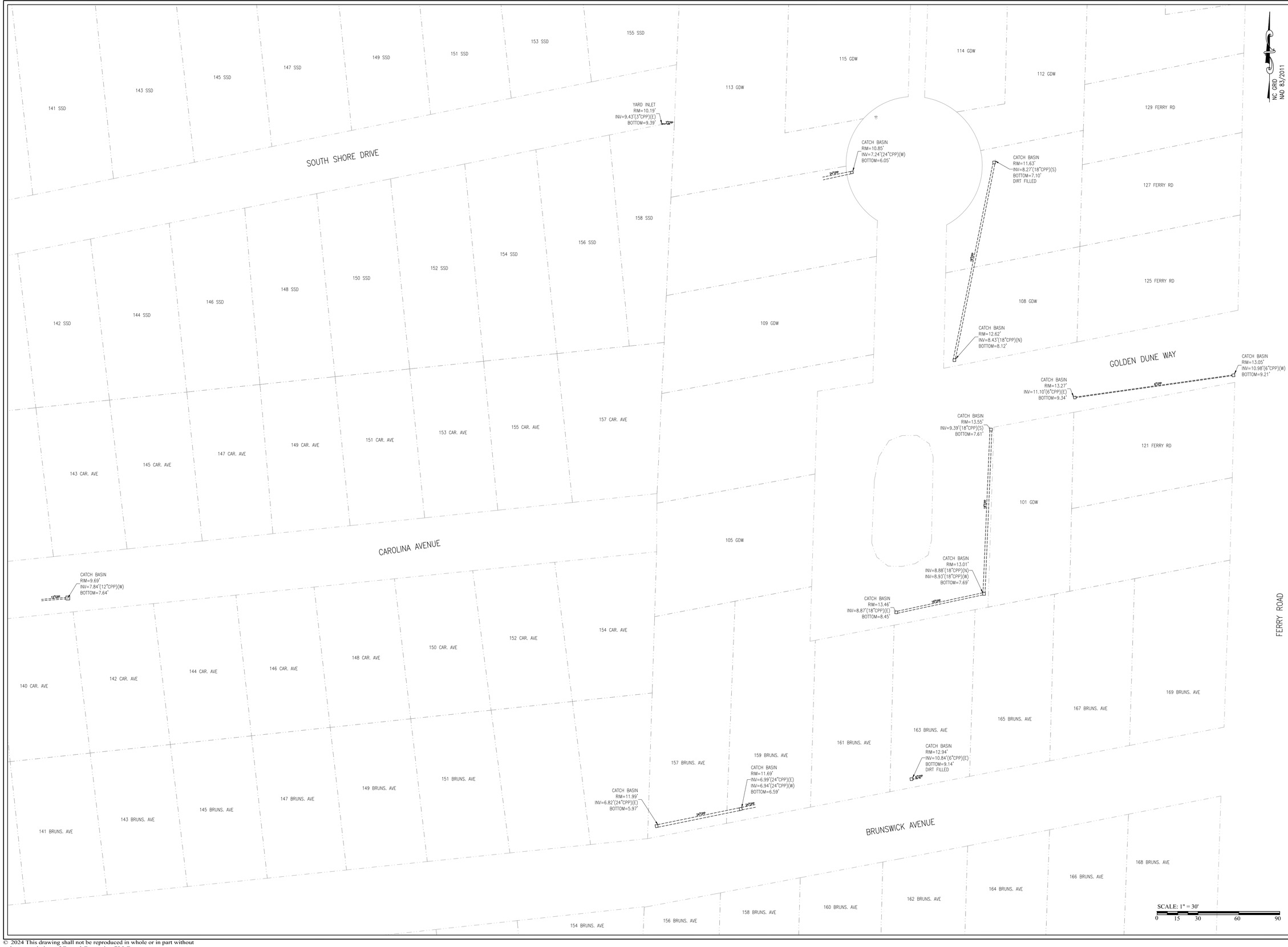
TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. TAYLOR

SHEET 3 OF 16

PROJECT NO. 4900.64



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TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
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Checked By: CDS

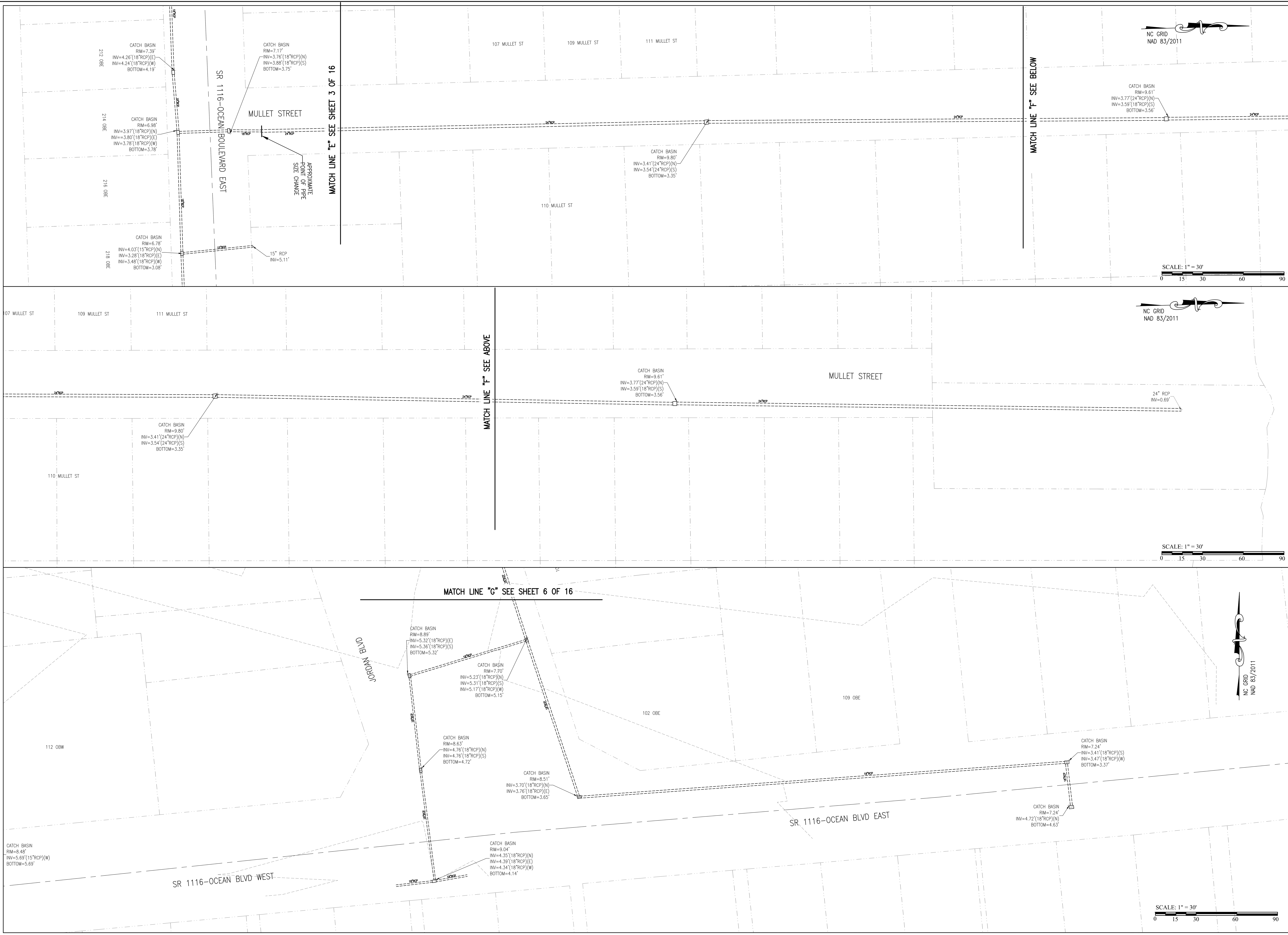
TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. SMITH

SHEET 4 OF 16

PROJECT NO. 4900.64



NC GRID
NAD 83/2011
107 MULLET ST
109 MULLET ST
111 MULLET ST
212 OBE
214 OBE
216 OBE
218 OBE
SR 1116–OCEAN BOULEVARD EAST
MULLET STREET
MATCH LINE "E" SEE SHEET 3 OF 16
MATCH LINE "F" SEE BELOW
APPROXIMATE POINT OF PIPE SIZE CHANGE
CATCH BASIN RIM=7.39' INV=4.26'(18"RCP)(E) INV=4.24'(18"RCP)(W) BOTTOM=4.19'
CATCH BASIN RIM=7.17' INV=3.76'(18"RCP)(N) INV=3.88'(18"RCP)(S) BOTTOM=3.75'
CATCH BASIN RIM=6.98' INV=3.97'(18"RCP)(N) INV=3.80'(18"RCP)(E) INV=3.78'(18"RCP)(W) BOTTOM=3.78'
CATCH BASIN RIM=6.78' INV=4.03'(15"RCP)(N) INV=3.28'(18"RCP)(E) INV=3.48'(18"RCP)(W) BOTTOM=3.08'
15" RCP INV=5.11'
CATCH BASIN RIM=9.80' INV=3.41'(24"RCP)(N) INV=3.54'(24"RCP)(S) BOTTOM=3.35'
CATCH BASIN RIM=9.61' INV=3.77'(24"RCP)(N) INV=3.59'(18"RCP)(S) BOTTOM=3.56'
110 MULLET ST
SCALE: 1" = 30'
0 15 30 60 90
MATCH LINE "F" SEE ABOVE
24" RCP INV=0.69'
MATCH LINE "G" SEE SHEET 6 OF 16
JORDAN BLVD
CATCH BASIN RIM=8.89' INV=5.32'(18"RCP)(E) INV=5.36'(18"RCP)(S) BOTTOM=5.32'
CATCH BASIN RIM=7.70' INV=5.23'(18"RCP)(N) INV=5.31'(18"RCP)(S) INV=5.17'(18"RCP)(W) BOTTOM=5.15'
CATCH BASIN RIM=8.63' INV=4.76'(18"RCP)(N) INV=4.76'(18"RCP)(S) BOTTOM=4.72'
CATCH BASIN RIM=8.51' INV=3.70'(18"RCP)(N) INV=3.76'(18"RCP)(E) BOTTOM=3.65'
CATCH BASIN RIM=9.04' INV=4.35'(18"RCP)(N) INV=4.39'(18"RCP)(E) INV=4.34'(18"RCP)(W) BOTTOM=4.14'
CATCH BASIN RIM=8.48' INV=5.69'(15"RCP)(W) BOTTOM=5.69'
CATCH BASIN RIM=7.24' INV=3.41'(18"RCP)(S) INV=3.47'(18"RCP)(W) BOTTOM=3.37'
CATCH BASIN RIM=7.24' INV=4.72'(18"RCP)(N) BOTTOM=4.63'
112 OBW
102 OBE
109 OBE
SR 1116–OCEAN BLVD EAST
SR 1116–OCEAN BLVD WEST

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TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025
NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3387

PROJECT NO. 4900.64

JORDAN BLVD

SR 1116-OCEAN BOULEVARD

CATCH BASIN
RIM=8.63'
INV=4.76'(18"RCP)(N)
INV=4.76'(18"RCP)(S)
BOTTOM=4.72'

CATCH BASIN
RIM=8.89'
INV=5.32'(18"RCP)(E)
INV=5.36'(18"RCP)(S)
BOTTOM=5.32'

CAT
RIM
INV
INV
IN
BO
=4.14'

CATCH BASIN
RIM=7.70'
INV=5.23'(18"RCP)(N)
INV=5.31'(18"RCP)(S)
INV=5.17'(18"RCP)(W)
BOTTOM=5.15'

CATCH BASIN
RIM=8.51'
INV=3.70'(18"RCP)(N)
INV=3.76'(18"RCP)(E)
BOTTOM=3.65'

MATCH LINE "C" SEE SHEET 5 OF 16

MNF AT CENTERLINE OF JORDAN BLVD
CONTROL CORNER #2114
NORTHING: 61029.42'
EASTING: 2222242.4750'
ELEVATION:: 14.17'

NC GRID
NAD 83/2011

131 JORDAN BLVD

CATCH BASIN
RIM=9.56'
INV=3.86'(18"RCP)(N)
INV=3.88'(18"RCP)(S)
BOTTOM=3.81'

STORM WATER MAN HOLE
RIM=9.26'
INV=3.01'(18"RCP)(N)
INV=3.16'(18"RCP)(S)
BOTTOM=2.96'

STORM WATER MAN HOLE
RIM=9.31'
INV=2.81'(18"RCP)(N)
INV=2.96'(18"RCP)(S)
BOTTOM=2.71'

18" CMP
INV=1.07'

108 JORDAN BLVD
110 JORDAN BLVD
112 JORDAN BLVD

BRUNSWICK AVE E.

SOUTH SHORE DRIVE

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "H" SEE BELOW

118 OBW
114 OBW

COLE STREET

DAVIS STREET

HOLDEN BEACH ROAD

CURB INLET
RIM=9.96'
INV=7.10'(15"RCP)(S)
BOTTOM=7.10'

STORM WATER MAN HOLE
RIM=10.39'
INV=6.64'(15"RCP)(N)
INV=6.64'(15"RCP)(E)
INV=6.64'(15"RCP)(W)
BOTTOM=6.64'

CATCH BASIN
RIM=11.17'
INV=7.51'(15"RCP)(E)
INV=8.31'(15"RCP)(S)
BOTTOM=7.51'

CATCH BASIN
RIM=11.41'
INV=8.59'(15"RCP)(N)
BOTTOM=8.54'

CATCH BASIN
RIM=8.74'
INV=5.79'(18"RCP)(N)
INV=6.10'(15"RCP)(S)
INV=5.96'(15"RCP)(E)
INV=6.02'(15"RCP)(W)
BOTTOM=5.79'

CATCH BASIN
RIM=8.48'
INV=5.69'(15"RCP)(W)
BOTTOM=5.69'

CATCH BASIN
RIM=8.73'
INV=6.40'(15"RCP)(N)
BOTTOM=6.40'

SR 1116-OCEAN BLVD WEST

132 OBW
128 OBW
129 OBW
127 OBW
125 OBW
123 OBW
119 OBW
117 OBW
115 OBW
113 OBW
109 OBW

SCALE: 1" = 30'
0 15 30 60 90

NC GRID
NAD 83/2011

119 OBW
117 OBW
115 OBW
113 OBW

COLE STREET

MATCH LINE "H" SEE ABOVE

HOLDEN BEACH ROAD

BRUNSWICK AVE W.

CATCH BASIN
RIM=8.74'
INV=5.79'(18"RCP)(N)
INV=6.10'(15"RCP)(S)
INV=5.96'(15"RCP)(E)
INV=6.02'(15"RCP)(W)
BOTTOM=5.79'

CATCH BASIN
RIM=8.73'
INV=6.40'(15"RCP)(N)
BOTTOM=6.40'

CATCH BASIN
RIM=8.48'
INV=5.69'(15"RCP)(W)
BOTTOM=5.69'

CATCH BASIN
RIM=7.31'
INV=4.14'(18"RCP)(N)
INV=4.41'(18"RCP)(S)
BOTTOM=4.14'

CATCH BASIN
RIM=6.91'
INV=4.21'(15"RCP)(E)
BOTTOM=4.11'

CATCH BASIN
RIM=7.31'
INV=3.95'(24"RCP)(N)
INV=3.91'(18"RCP)(S)
INV=4.03'(12"RCP)(S)
INV=3.88'(15"RCP)(W)
BOTTOM=3.88'

CURB INLET
RIM=28.22'
INV=25.35'(12"RCP)(N)
INV=25.86'(12"RCP)(E)
BOTTOM=25.35'

24" RCP
INV=0.54'

123 COLE ST

118 OBW
114 OBW

SCALE: 1" = 30'
0 15 30 60 90

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TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER TOWNSEND

SHEET 6 OF 16

PROJECT NO. 4900.64

NC GRID
NAD 83/2011

BRUNSWICK AVENUE

107 ROTH. ST

ROTHSCHILD STREET

CATCH BASIN
RIM=13.51'
INV=11.54'(12"HDPE)(N)
BOTTOM=11.41'

12"HDPE
INV=4.13'
METAL LID

132 OBW

110 ROTH. ST

120 ROTH. ST

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "I" SEE BELOW

196 OBW 194 OBW 192 OBW 190 OBW 188 OBW 186 OBW 184 OBW 182 OBW 180 OBW 178 OBW 176 OBW

DELANNE STREET

172 OBW 170 OBW 168 OBW 166 OBW 164 OBW 162 OBW

CATCH BASIN
RIM=4.85'
INV=2.44'(18"RCP)(E)
INV=1.95'(15"RCP)(S)
BOTTOM=1.95'

CATCH BASIN
RIM=5.63'
INV=3.17'(18"RCP)(N)
INV=3.09'(18"RCP)(W)
BOTTOM=1.33'

MNF-OBW & DELANNE
CONTROL CORNER #11501
NORTHING: 60342.61'
EASTING: 2220390.5290'
ELEVATION: 6.33'

SR 1116-OCEAN BLVD WEST

CATCH BASIN
RIM=5.24'
INV=1.38'(15"RCP)(N)
BOTTOM=1.37'

195 OBW 193 OBW 191 OBW 189 OBW 187 OBW 185 OBW 181 OBW 179 OBW 177 OBW 175 OBW 173 OBW 171 OBW 169 OBW 167 OBW 163 OBW 161 OBW 159 OBW

NC GRID
NAD 83/2011

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "J" SEE SHEET 8 OF 16

173 BRUNSWICK AVE W

175 OBW

SR 1116-OCEAN BLVD WEST

CATCH BASIN
RIM=5.63'
INV=3.17'(18"RCP)(N)
INV=3.09'(18"RCP)(W)
BOTTOM=1.33'

176 OBW

175 BRUNSWICK AVE W

BRUNSWICK AVE W.

181 YACHT WATCH DR

15"RCP
INV=3.58'

BD
4.07

15"RCP
INV=3.57'

GS
6.75

TD
5.47

GS
5.48

TD
4.98

12" HDPE
INV=3.65'

12"CPP
INV=4.25'

180 YACHT WATCH DR

180 YACHT WATCH DR

SAILOR STREET

18" RCP
INV=2.35'

DELANNE STREET

MATCH LINE "I" SEE ABOVE

JB MISSING

CATCH BASIN
RIM=5.63'
INV=3.07'(18"RCP)(N)
INV=3.21'(18"RCP)(S)
INV=3.50'(12"HDPE)(W)
BOTTOM=1.33'

12"CPP
INV=4.58'

YACHT WATCH DRIVE

165 YACHT WATCH DR

12"CPP
INV=4.68'

173 OBW 171 OBW 169 OBW

172 OBW 170 OBW

171 BRUNSWICK AVE W

169 BRUNSWICK AVE W

NC GRID
NAD 83/2011

SCALE: 1" = 30'
0 15 30 60 90

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TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
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Checked By: CDS

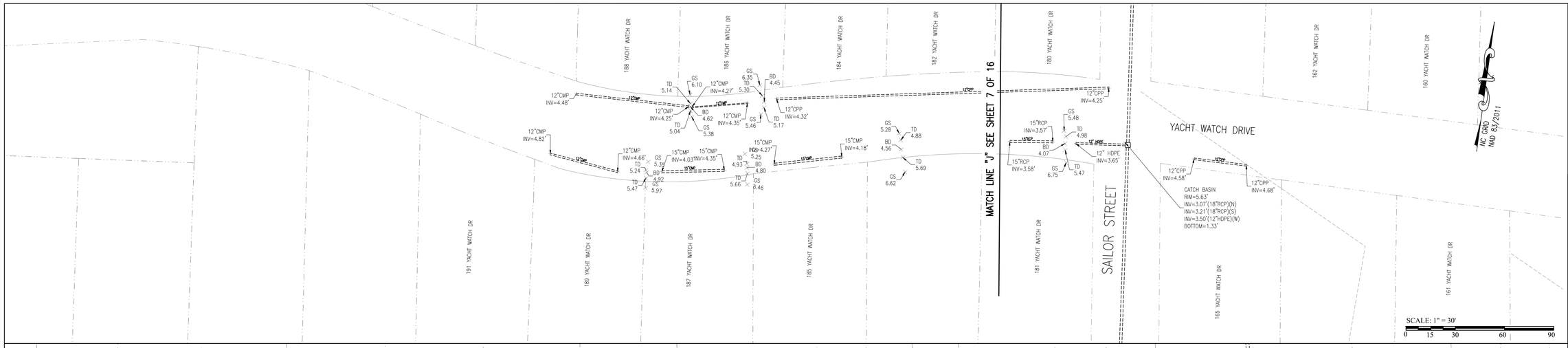
TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

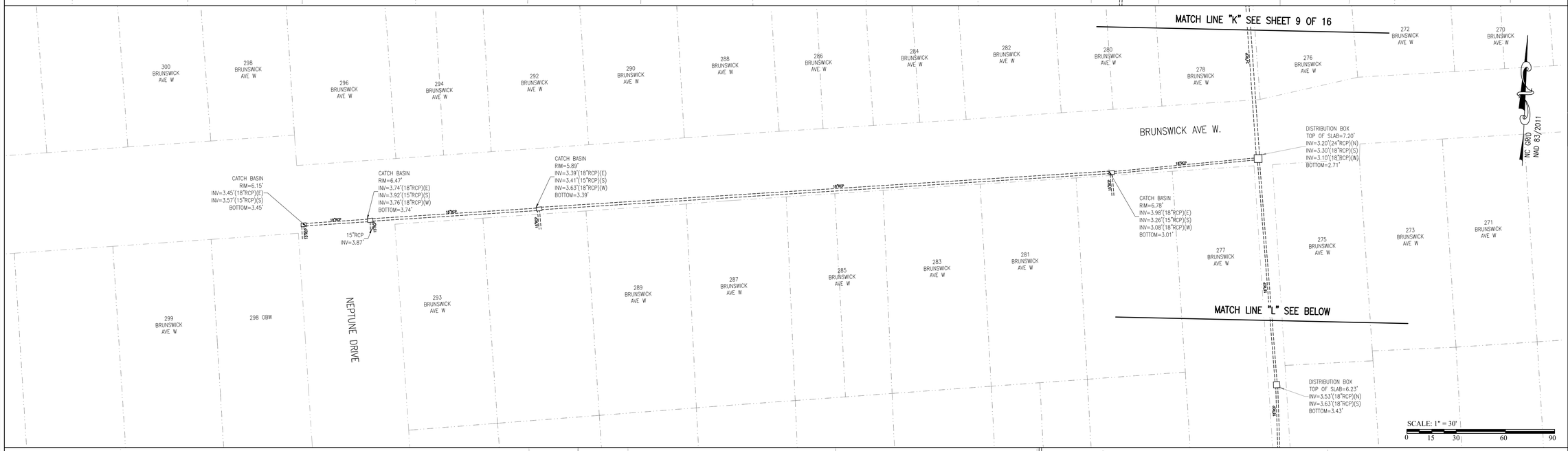
08-20-2025

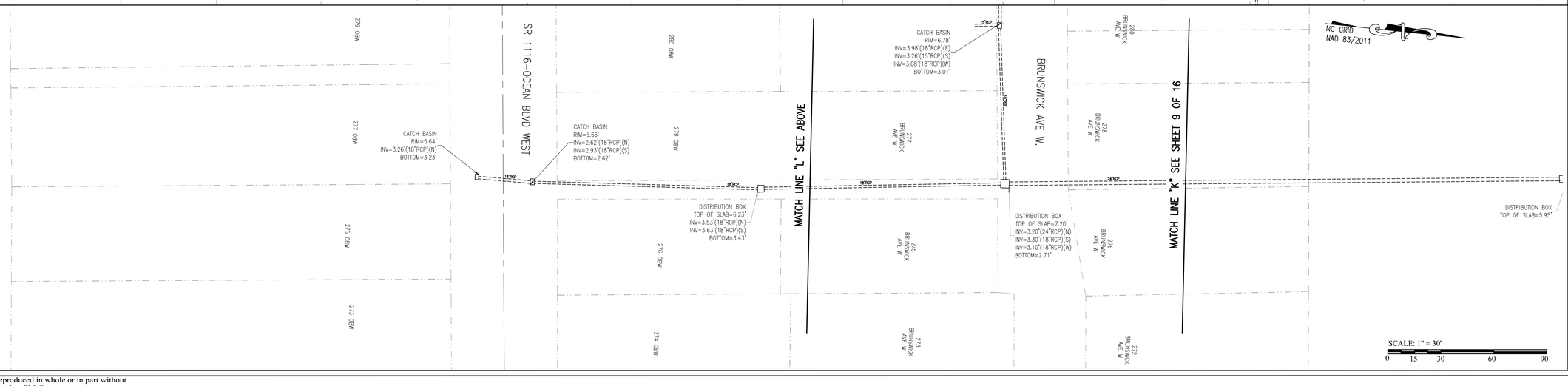
NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. SMITH

SHEET 7 OF 16

PROJECT NO. 4900.64







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TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER T. MCKEITHAN

SHEET 8 OF 16

PROJECT NO. 4900.64

CATCH BASIN
RIM=6.78'
INV=3.98'(18"RCP)(E)
INV=3.26'(15"RCP)(S)
INV=3.08'(18"RCP)(W)
BOTTOM=3.01'

BRUNSWICK AVE W.

277 BRUNSWICK AVE W

278 BRUNSWICK AVE W

280 BRUNSWICK AVE W

275 BRUNSWICK AVE W

276 BRUNSWICK AVE W

DISTRIBUTION BOX
TOP OF SLAB=7.20'
INV=3.20'(24"RCP)(N)
INV=3.30'(18"RCP)(S)
INV=3.10'(18"RCP)(W)
BOTTOM=2.71'

MATCH LINE "K" SEE SHEET 8 OF 16

DISTRIBUTION BOX
TOP OF SLAB=5.95'

DISTRIBUTION BOX
TOP OF SLAB=6.15'

24" RCP
INV=-1.41'

NC GRID
NAD 83/2011

SCALE: 1" = 30'
0 15 30 60 90

MATCH LINE "M" SEE SHEET 10 OF 16

336 OBW 334 OBW 332 OBW 330 OBW 328 OBW 322 OBW 320 OBW 316 OBW

CATCH BASIN
RIM=4.47'
INV=2.42'(12"CPP)(E)
INV=2.31'(12"CPP)(W)
BOTTOM=1.15'

SIDEWALK
EDGE OF PAVEMENT

12" CPP 12" CPP

MATCH LINE "L" SEE BELOW

12" CPP 12" CPP

CATCH BASIN
RIM=4.83'
INV=2.65'(12"CPP)(E)
INV=2.48'(12"CPP)(W)
BOTTOM=1.50'

SR 1116-OCEAN BLVD WEST

335 OBW 333 OBW 331 OBW 329 OBW 327 OBW 325 OBW 323 OBW 321 OBW 319 OBW 317 OBW 315 OBW

SCALE: 1" = 20'
0 10 20 40 60

354 OBW 350 OBW 348 OBW 346 OBW 344 OBW 338 OBW 336 OBW 334 OBW

CSPK-OBW & HIGHPOINT
CONTROL CORNER #10812
NORTHING: 59861.31'
EASTING: 2215641.8890'
ELEVATION: 4.80'

HIGHPOINT STREET

SIDEWALK
EDGE OF PAVEMENT

MATCH LINE "O" SEE SHEET 10 OF 16

MATCH LINE "N" SEE SHEET 10 OF 16

SR 1116-OCEAN BLVD WEST

MATCH LINE "L" SEE ABOVE

NC GRID
NAD 83/2011

355 OBW 351 OBW 349 OBW 347 OBW 345 OBW 343 OBW 341 OBW 339 OBW 337 OBW 335 OBW 333 OBW

SCALE: 1" = 20'
0 10 20 40 60

Revisions

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TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR

SHEET 9 OF 16

PROJECT NO. 4900.64

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CREW: CT/RM
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08-20-2025
NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3387

PROJECT NO. 4900.64

107 HIGHPOINT ST
109 HIGHPOINT ST
111 HIGHPOINT ST
113 HIGHPOINT ST
115 HIGHPOINT ST
117 HIGHPOINT ST

HIGHPOINT STREET

EDGE OF PAVEMENT

LOW POINT 4.50

MATCH LINE "Q" SEE SHEET 10 OF 16

15"CPP
15"CPP INV=3.37'
15"CPP INV=2.62'

349 BRUNSWICK AVE W

NC GRID NAD 83/2011

SCALE: 1" = 20'
0 10 20 40 60

113 HIGHPOINT ST
111 HIGHPOINT ST
109 HIGHPOINT ST
HIGHPOINT STREET

MATCH LINE "P" SEE SHEET 10 OF 16

12"RCP
12"RCP INV=4.10'
12"RCP INV=4.24'

BRUNSWICK AVE W.

EDGE OF PAVEMENT

349 BRUNSWICK AVE W
341 BRUNSWICK AVENUE W
337 BRUNSWICK AVENUE W

CHARLOTTE STREET
DURHAM STREET

466 OBW
464 OBW
460 OBW
456 OBW
454 OBW
450 OBW
448 OBW
446 OBW
444 OBW

CSPK-OBW & CHARLLOTTE
CONTROL CORNER #12222
NORTHING: 59556.89'
EASTING: 2212806.9060'
ELEVATION: 5.78'

CATCH BASIN
RIM=6.28'
INV=4.38'(12"HDPE)(N)
BOTTOM=3.94'

CATCH BASIN
RIM=6.01'
INV=3.81'(15"RCP)(N)
INV=3.89'(15"RCP)(S)
BOTTOM=3.81'

CATCH BASIN
RIM=5.95'
INV=4.24'(15"RCP)(N)
BOTTOM=3.96'

SR 1116-OCEAN BLVD WEST

NC GRID NAD 83/2011

SCALE: 1" = 20'
0 10 20 40 60

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TOWN OF HOLDEN BEACH

Date: 02-05-2024
Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

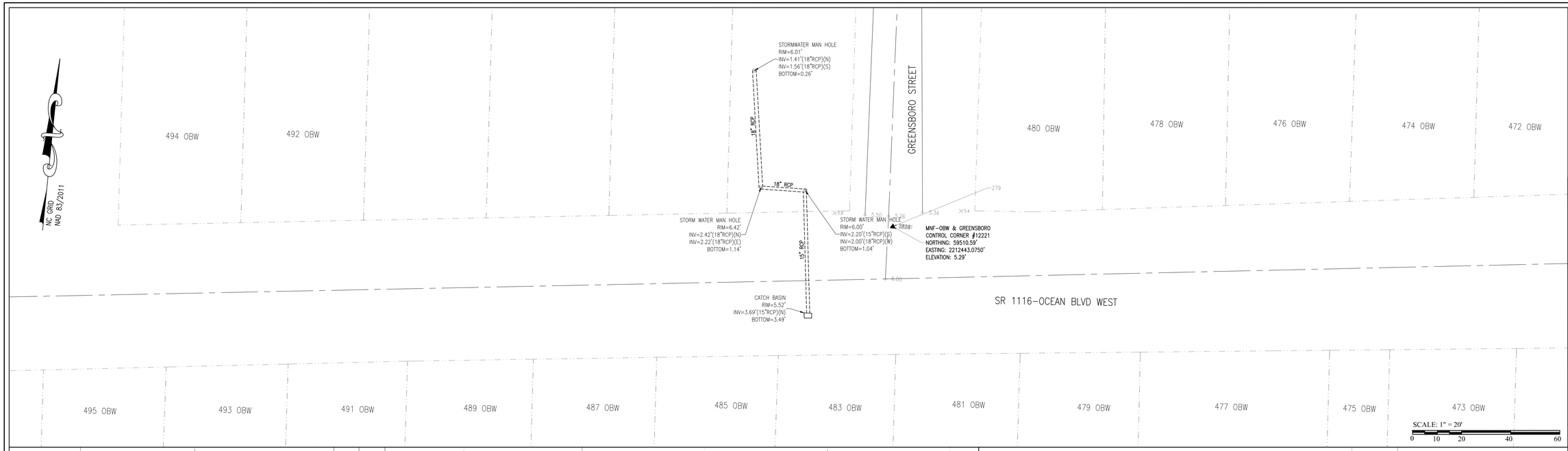
TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

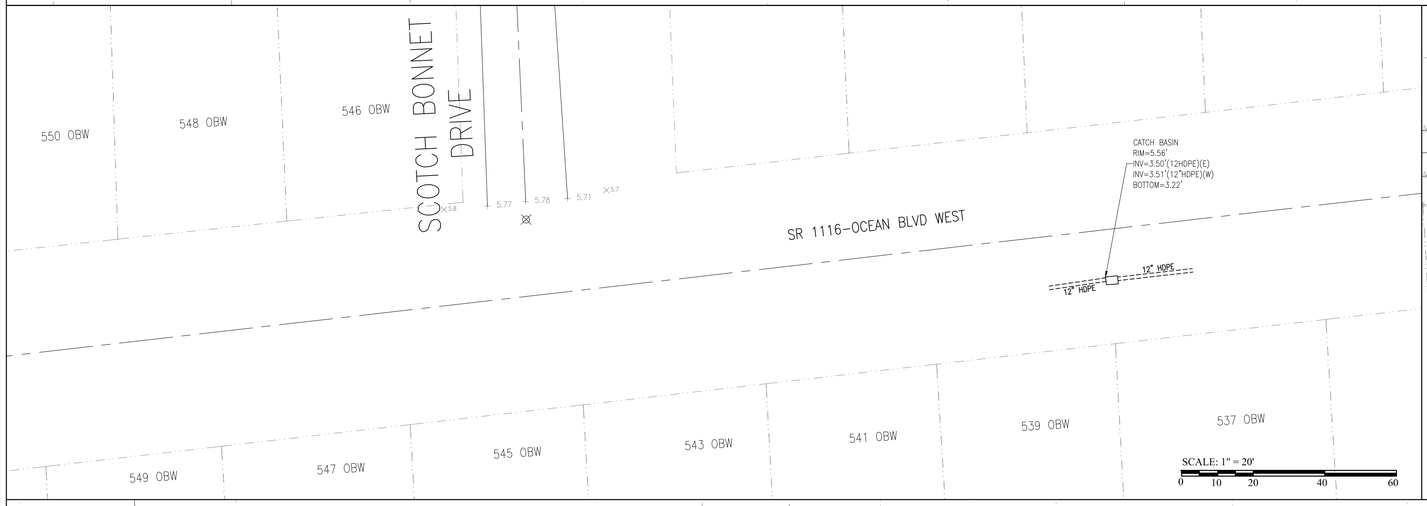
08-20-2025

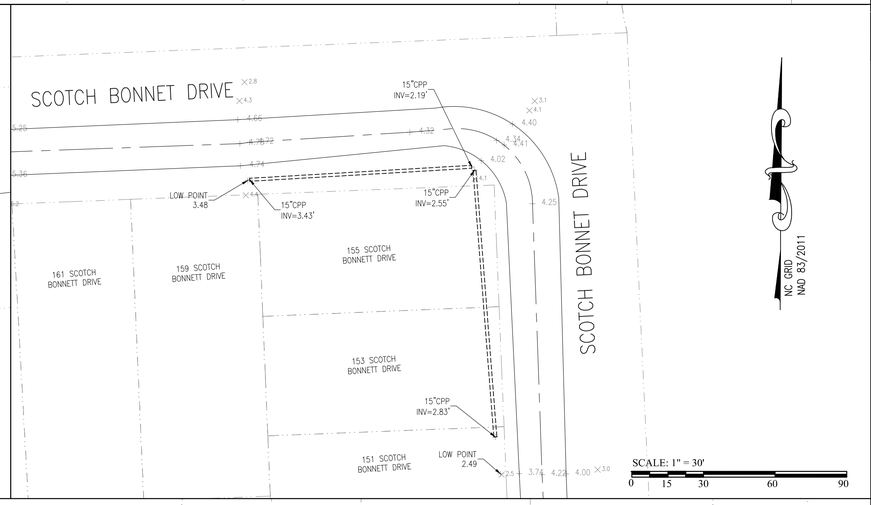
NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR

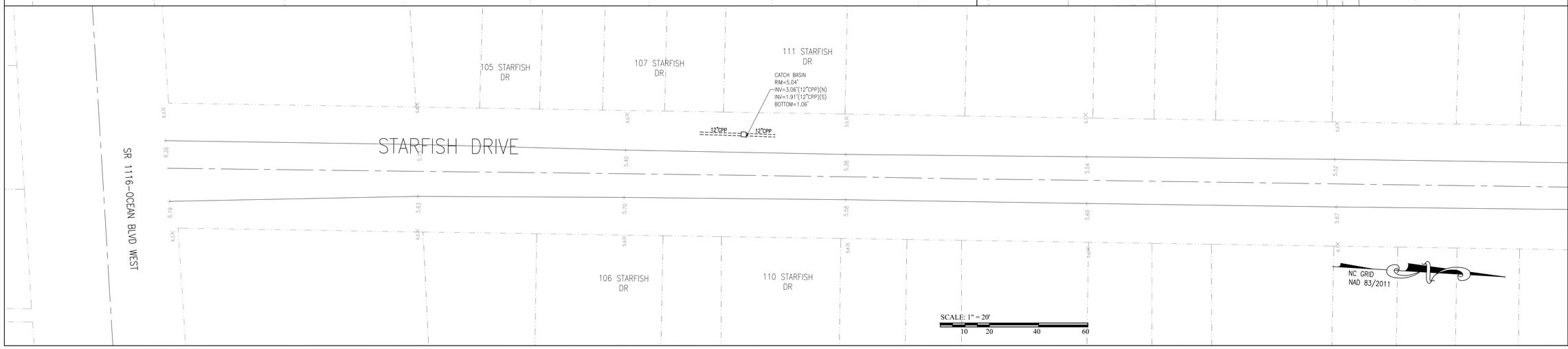
SHEET 11 OF 16

PROJECT NO. 4900.64









Revisions

08/20/25 ADDED ADDITIONAL AREA ON SCOTCH BONNETT DRIVE

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TOPOGRAPHIC AND STORMSEWER ASBUILT SURVEY FOR:

TOWN OF HOLDEN BEACH

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Scale: AS SHOWN
Drawn By: CT
Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER T. TOLAR

SHEET 12 OF 16

PROJECT NO. 4900.64

668 OBW
664 OBW
662 OBW
660 OBW
658 OBW
671 OBW
669 OBW
667 OBW
665 OBW
663 OBW
661 OBW
659 OBW
662 OBW
657 OBW
655 OBW
653 OBW
651 OBW
SR 1116–OCEAN BLVD WEST
CATCH BASIN
RIM=6.74'
INV=4.66'(18"RCP)(N)
INV=4.75'(9"CPP)(W)
BOTTOM=4.66'
18" RCP
9" CPP
NC GRID
NAD 83/2011
SCALE: 1" = 20'
0 10 20 40 60

752 OBW
748 OBW
746 OBW
744 OBW
753 OBW
751 OBW
749 OBW
747 OBW
745 OBW
743 OBW
741 OBW
739 OBW
737 OBW
735 OBW
733 OBW
731 OBW
SR 1116–OCEAN BLVD WEST
CATCH BASIN
RIM=5.09'
INV=2.96'(12"CPP)(E)
INV=2.84'(12"CPP)(W)
BOTTOM=0.38'
12" CPP
12" CPP
NC GRID
NAD 83/2011
SCALE: 1" = 20'
0 10 20 40 60

153 SWORDFISH DR
157 SWORDFISH DR
159 SWORDFISH DR
SWORDFISH DRIVE
HIGH POINT 6.75
LOW POINT 3.99
LOW POINT 4.26
18"RCP INV=2.98'
18" RCP
18"RCP INV=3.40'
LOW POINT 3.80'
LOW POINT 5.70
873 HLW
HERON LANDING WYND
SCALE: 1" = 30'
0 15 30 60 90

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Checked By: CDS

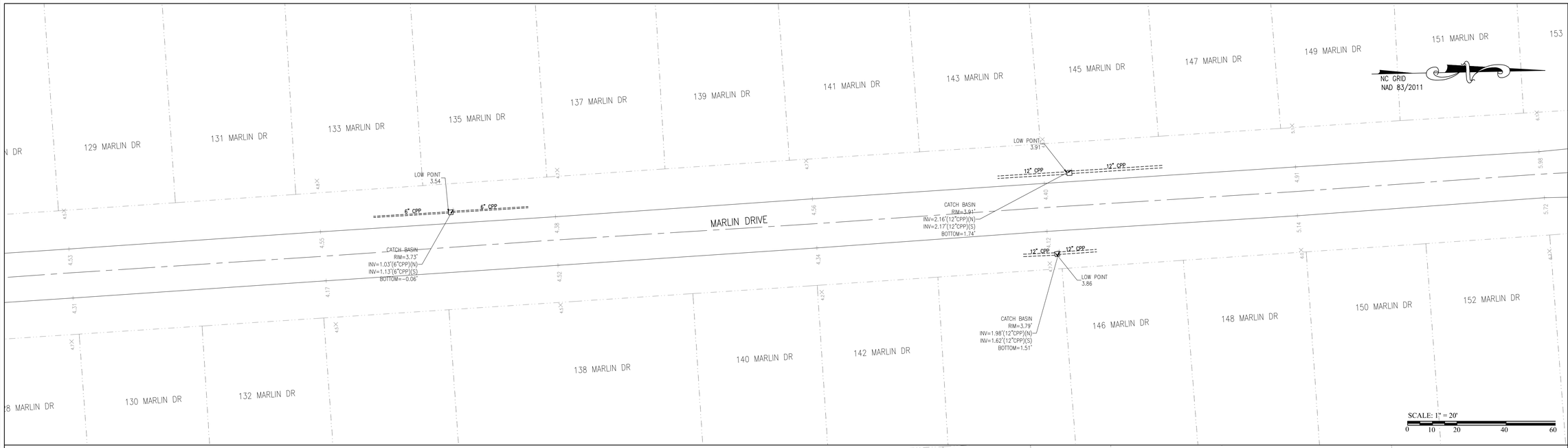
TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

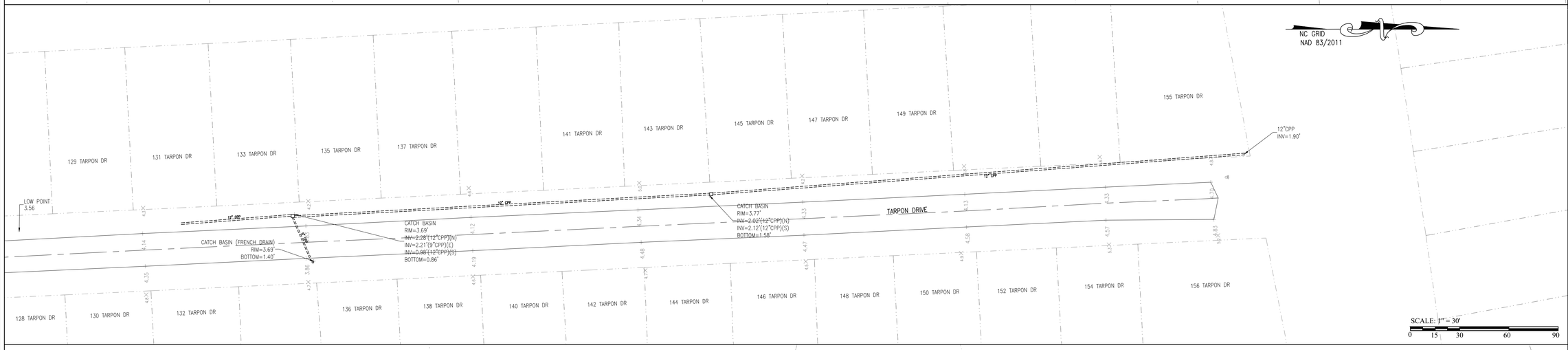
08-20-2025

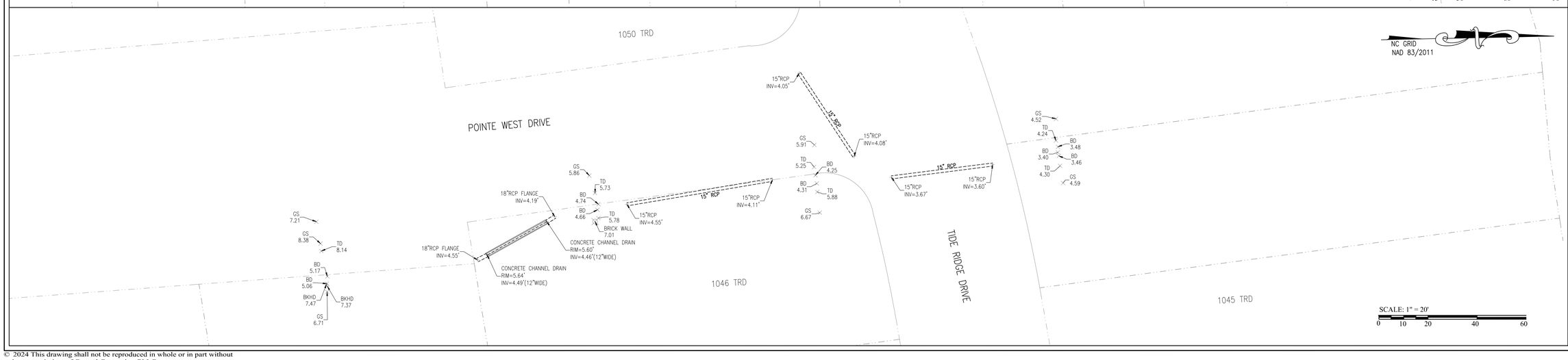
NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. SMITH

SHEET 13 OF 16

PROJECT NO. 4900.64







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Date: 02-05-2024
Scale: AS SHOWN
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Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
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NORTH CAROLINA PROFESSIONAL SEAL L-3287 SURVEYOR CHRISTOPHER D. SMITH

SHEET 14 OF 16

PROJECT NO. 4900.64

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Checked By: CDS

TOWNSHIP: LOCKWOOD FOLLY
COUNTY: BRUNSWICK
STATE: NC
CREW: CT/RM
FB/PG: FILE

08-20-2025
NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR

SHEET 15 OF 16

PROJECT NO. 4900.64

Revisions

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08-20-2025

NORTH CAROLINA PROFESSIONAL SEAL L-3387 LAND SURVEYOR CHRISTOPHER D. SMITH

SHEET 16 OF 16

PROJECT NO. 4900.64

Holden Beach Supplemental Stormwater Masterplan

Attachment A.1
Existing SW Features
Area 7- East End:
McCray St., Ave. B, and Dunescape Dr.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Surveyed Low Point
- Surveyed Pipe
- Surveyed Channel

Surveyed SW Structure

- Catch Basin
- Curb Inlet
- Yard Inlet
- Junction Box
- Distribution Box
- SW Manhole
- Flange
- Contour 5ft
- Parcel

0 100 200 400
US Feet

1 inch = 400 feet

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919.378.9111

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Holden Beach Supplemental Stormwater Masterplan

Attachment A.2
Existing SW Features
Area 8- Canal Streets:
High Point St. to Greensboro St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Surveyed Low Point
- Surveyed Pipe
- Surveyed Channel

Surveyed SW Structure

- Catch Basin
- Curb Inlet
- Yard Inlet
- Junction Box
- Distribution Box
- SW Manhole
- Flange
- Contour 5ft
- Parcel

0 125 250 500
Feet
1 inch = 350 feet

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Holden Beach Supplemental Stormwater Masterplan

Attachment A.3 Existing SW Features Area 9- Canal Streets: Scotch Bonnet Dr to Sand Dollar St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Surveyed Low Point
- Surveyed Pipe
- Surveyed Channel

Surveyed SW Structure

- Catch Basin
- Curb Inlet
- Yard Inlet
- Junction Box
- Distribution Box
- SW Manhole
- Flange
- Contour 5ft
- Parcel

0 75 150 300
Feet

1 inch = 200 feet

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Holden Beach Supplemental Stormwater Masterplan

Attachment A.4
Existing SW Features
Area 10- Canal Streets:
Swordfish Dr. to Sailfish St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Surveyed Low Point
- Surveyed Pipe
- Surveyed Channel

Surveyed SW Structure

- Catch Basin
- Curb Inlet
- Yard Inlet
- Junction Box
- Distribution Box
- SW Manhole
- Flange
- Contour 5ft
- Parcel

0 125 250 500
Feet
1 inch = 270 feet

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TOWN OF HOLDEN BEACH | SUPPLEMENTAL STORMWATER MASTER PLAN REPORT

Attachment B

Hydrologic Data & Calculations

Holden Beach Supplemental Stormwater Masterplan

Attachment B.1
Soil Map

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

Legend

Match Line

Soils

Soil Hydrologic Group

- A
- B
- C
- D

0 275 550 1,100
Feet

1 inch = 1100 feet

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Holden Beach Supplemental Stormwater Masterplan

Attachment B.2 Land Use Map

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

Legend

Match Line

Land Use

NLCD

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Sand)
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbacous
- Pasture/Hay
- Woody Wetlands
- Emergent Herb. Wetlands

0 275 550 1,100
US Feet

1 inch = 1100 feet

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Holden Beach Supplemental Stormwater Masterplan

Attachment B.3
CN Map

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

Legend

Match Line

Curve Number

CN

- 30
- 49
- 55
- 61
- 62
- 68
- 69
- 75
- 77
- 79
- 83
- 85
- 87
- 89
- 90
- 94
- 95
- 98
- 100

0 275 550 1,100 Feet

1 inch = 1100 feet

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United States Department of Agriculture

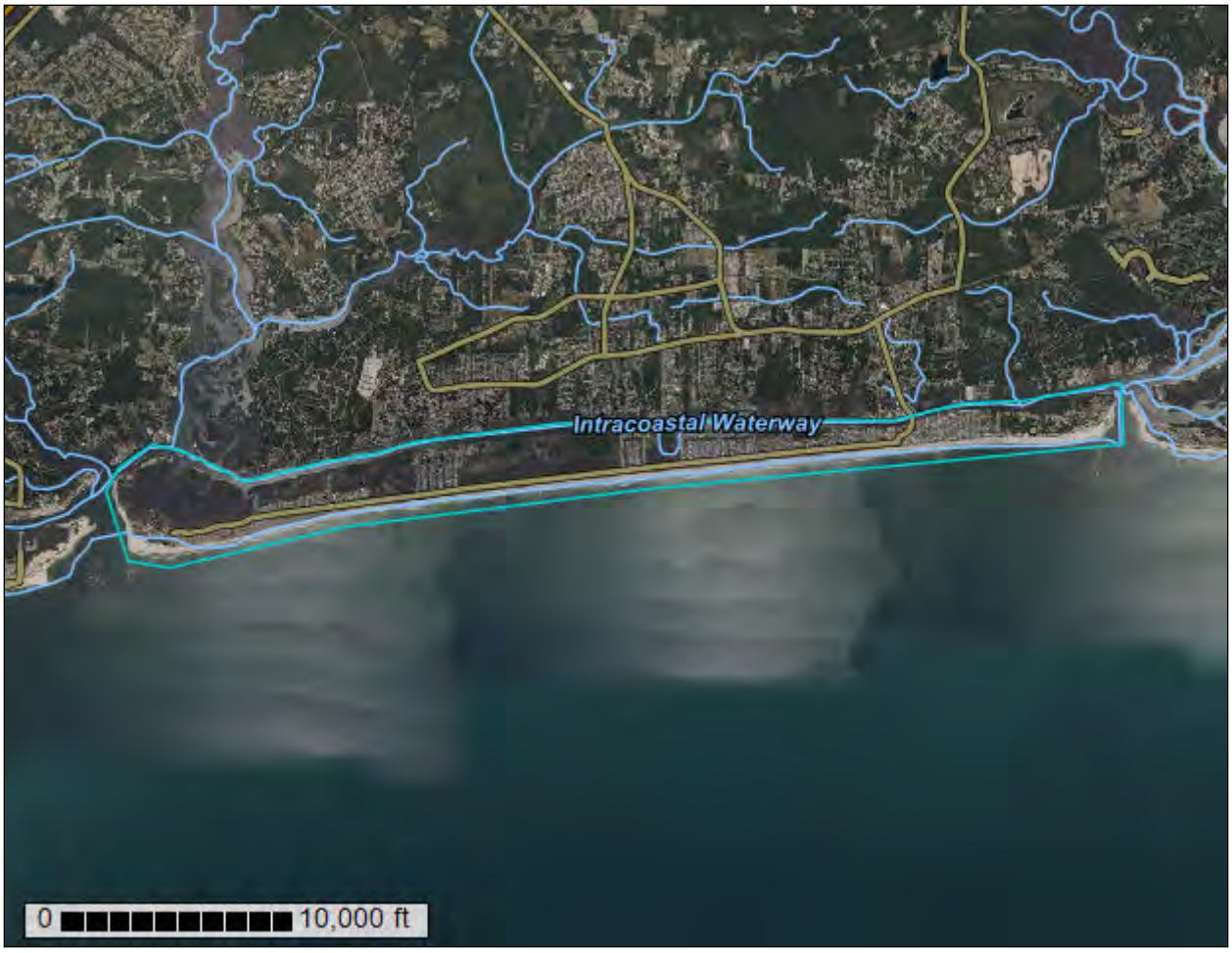
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Brunswick County, North Carolina

Holden Beach SW Management RFQ



March 26, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Brunswick County, North Carolina
Survey Area Data: Version 28, Sep 13, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—May 15, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BO	Bohicket silty clay loam	10.1	0.3%
CA	Carteret loamy fine sand	542.8	18.5%
Co	Corolla fine sand	169.8	5.8%
Du	Duckston fine sand	24.7	0.8%
NeE	Newhan fine sand, 2 to 30 percent slopes	793.5	27.0%
NhE	Newhan fine sand, dredged, 2 to 30 percent slopes	419.9	14.3%
W	Water	405.7	13.8%
Totals for Area of Interest		**2,934.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Brunswick County, North Carolina

BO—Bohicket silty clay loam

Map Unit Setting

National map unit symbol: 3w6q
Elevation: 0 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Bohicket, tidal, and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bohicket, Tidal

Setting

Landform: Tidal marshes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey fluviomarine deposits

Typical profile

A - 0 to 8 inches: silty clay loam
Cg1 - 8 to 38 inches: silty clay
Cg2 - 38 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum: 55.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: D
Ecological site: R153BY130NC - Tidal Marsh on Mineral Soil
Hydric soil rating: Yes

CA—Carteret loamy fine sand

Map Unit Setting

National map unit symbol: 3w6v
Elevation: 0 to 10 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Carteret, tidal, and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carteret, Tidal

Setting

Landform: Tidal flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy fluviomarine deposits and/or eolian sands

Typical profile

Ag - 0 to 9 inches: sand
Cg - 9 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Maximum salinity: Strongly saline (16.0 to 80.0 mmhos/cm)
Sodium adsorption ratio, maximum: 60.0
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R153BY130NC - Tidal Marsh on Mineral Soil
Hydric soil rating: Yes

Co—Corolla fine sand

Map Unit Setting

National map unit symbol: 3w6y
Elevation: 0 to 10 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Corolla and similar soils: 85 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Corolla

Setting

Landform: Troughs on barrier islands
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Eolian sands and/or beach sand

Typical profile

A - 0 to 3 inches: fine sand
C - 3 to 26 inches: fine sand
Ab - 26 to 32 inches: sand
Cg - 32 to 80 inches: sand

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R153BY110NC - Coastal Strand, Beaches, and Dunes
Hydric soil rating: No

Minor Components

Duckston

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R153BY120NC - Wet Dune Slack
Hydric soil rating: Yes

Carteret, high

Percent of map unit: 2 percent
Landform: Tidal marshes
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R153BY130NC - Tidal Marsh on Mineral Soil
Hydric soil rating: Yes

Du—Duckston fine sand

Map Unit Setting

National map unit symbol: 3w70
Elevation: 0 to 10 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Duckston and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duckston

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Eolian sands and/or beach sand

Typical profile

A - 0 to 8 inches: fine sand
Cg - 8 to 13 inches: sand
Ab - 13 to 17 inches: sand
C'g - 17 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R153BY120NC - Wet Dune Slack
Hydric soil rating: Yes

NeE—Newhan fine sand, 2 to 30 percent slopes

Map Unit Setting
National map unit symbol: 3w7f
Elevation: 0 to 20 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition
Newhan and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newhan

Setting
Landform: Dunes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands and/or beach sand

Typical profile
A - 0 to 2 inches: fine sand
C1 - 2 to 50 inches: fine sand
C2 - 50 to 80 inches: sand

Properties and qualities
Slope: 2 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: A
Ecological site: R153BY110NC - Coastal Strand, Beaches, and Dunes
Hydric soil rating: No

Minor Components

Beaches
Percent of map unit: 5 percent
Landform: Barrier beaches, barrier flats
Ecological site: R153BY110NC - Coastal Strand, Beaches, and Dunes, R153BY120NC - Wet Dune Slack
Hydric soil rating: Yes

NhE—Newhan fine sand, dredged, 2 to 30 percent slopes

Map Unit Setting
National map unit symbol: 3w7g
Elevation: 0 to 10 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition
Newhan and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newhan

Setting
Landform: Dune slacks, dunes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy dredge spoils

Typical profile
A - 0 to 1 inches: fine sand

C - 1 to 80 inches: fine sand

Properties and qualities

Slope: 2 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: A
Ecological site: R153BY110NC - Coastal Strand, Beaches, and Dunes
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

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NOAA Atlas 14, Volume 2, Version 3 SOUTHPORT 5 N
Station ID: 31-8113
Location name: Southport, North Carolina, USA*
Latitude: 33.9922°, Longitude: -78.01°
Elevation:
Elevation (station metadata): 20 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.544** (0.506-0.588)	**0.647** (0.601-0.699)	**0.750** (0.695-0.808)	**0.837** (0.774-0.902)	**0.943** (0.867-1.01)	**1.02** (0.940-1.10)	**1.11** (1.01-1.19)	**1.19** (1.08-1.28)	**1.30** (1.16-1.41)	**1.39** (1.24-1.51)
10-min	**0.869** (0.808-0.939)	**1.04** (0.961-1.12)	**1.20** (1.11-1.29)	**1.34** (1.24-1.44)	**1.50** (1.38-1.62)	**1.63** (1.50-1.76)	**1.76** (1.60-1.90)	**1.89** (1.71-2.04)	**2.06** (1.84-2.22)	**2.19** (1.95-2.38)
15-min	**1.09** (1.01-1.17)	**1.30** (1.21-1.40)	**1.52** (1.41-1.64)	**1.69** (1.56-1.82)	**1.90** (1.75-2.05)	**2.07** (1.90-2.23)	**2.23** (2.03-2.40)	**2.38** (2.16-2.57)	**2.59** (2.32-2.80)	**2.75** (2.44-2.99)
30-min	**1.49** (1.38-1.61)	**1.80** (1.67-1.94)	**2.16** (2.00-2.33)	**2.45** (2.27-2.64)	**2.82** (2.59-3.03)	**3.11** (2.85-3.35)	**3.41** (3.11-3.67)	**3.71** (3.36-4.00)	**4.12** (3.69-4.46)	**4.46** (3.96-4.84)
60-min	**1.86** (1.73-2.01)	**2.26** (2.09-2.43)	**2.77** (2.56-2.98)	**3.20** (2.95-3.44)	**3.76** (3.45-4.04)	**4.22** (3.87-4.54)	**4.70** (4.28-5.06)	**5.20** (4.71-5.61)	**5.91** (5.29-6.39)	**6.51** (5.78-7.06)
2-hr	**2.22** (2.05-2.43)	**2.71** (2.50-2.96)	**3.41** (3.14-3.72)	**4.03** (3.70-4.39)	**4.87** (4.45-5.31)	**5.60** (5.09-6.10)	**6.38** (5.76-6.95)	**7.23** (6.48-7.87)	**8.47** (7.51-9.24)	**9.56** (8.40-10.5)
3-hr	**2.38** (2.18-2.61)	**2.90** (2.66-3.18)	**3.66** (3.36-4.02)	**4.36** (3.98-4.78)	**5.34** (4.86-5.85)	**6.22** (5.61-6.81)	**7.16** (6.42-7.84)	**8.21** (7.30-8.98)	**9.79** (8.58-10.7)	**11.2** (9.70-12.3)
6-hr	**2.98** (2.73-3.30)	**3.64** (3.34-4.02)	**4.62** (4.22-5.09)	**5.50** (5.01-6.06)	**6.77** (6.12-7.44)	**7.90** (7.08-8.68)	**9.13** (8.13-10.0)	**10.5** (9.26-11.5)	**12.6** (10.9-13.9)	**14.5** (12.4-16.0)
12-hr	**3.50** (3.18-3.91)	**4.27** (3.87-4.75)	**5.45** (4.93-6.07)	**6.53** (5.88-7.26)	**8.10** (7.22-8.98)	**9.50** (8.42-10.5)	**11.1** (9.71-12.2)	**12.8** (11.1-14.2)	**15.5** (13.3-17.2)	**17.9** (15.1-19.8)
24-hr	**4.08** (3.76-4.47)	**4.94** (4.57-5.44)	**6.40** (5.89-7.02)	**7.67** (7.04-8.43)	**9.64** (8.76-10.6)	**11.4** (10.2-12.5)	**13.4** (11.9-14.7)	**15.7** (13.6-17.3)	**19.2** (16.3-21.3)	**22.2** (18.6-24.9)
2-day	**4.68** (4.34-5.11)	**5.66** (5.26-6.18)	**7.25** (6.71-7.96)	**8.64** (7.94-9.49)	**10.7** (9.76-11.8)	**12.6** (11.3-13.9)	**14.7** (13.1-16.3)	**17.1** (15.0-19.0)	**20.7** (17.8-23.1)	**23.9** (20.2-26.9)
3-day	**4.90** (4.56-5.33)	**5.92** (5.51-6.44)	**7.54** (6.99-8.22)	**8.94** (8.24-9.76)	**11.0** (10.1-12.1)	**12.9** (11.6-14.1)	**14.9** (13.3-16.4)	**17.2** (15.2-19.0)	**20.8** (18.0-23.3)	**23.9** (20.3-27.0)
4-day	**5.13** (4.78-5.55)	**6.18** (5.76-6.70)	**7.82** (7.27-8.49)	**9.24** (8.54-10.0)	**11.3** (10.4-12.3)	**13.1** (11.9-14.3)	**15.1** (13.6-16.5)	**17.4** (15.4-19.1)	**20.9** (18.2-23.4)	**24.0** (20.5-27.1)
7-day	**5.79** (5.44-6.19)	**6.98** (6.56-7.48)	**8.77** (8.22-9.40)	**10.3** (9.58-11.0)	**12.5** (11.5-13.4)	**14.3** (13.2-15.4)	**16.3** (14.9-17.6)	**18.5** (16.6-20.0)	**21.7** (19.2-23.7)	**24.3** (21.2-27.4)
10-day	**6.50** (6.12-6.94)	**7.78** (7.32-8.32)	**9.63** (9.02-10.3)	**11.2** (10.5-12.0)	**13.4** (12.5-14.4)	**15.3** (14.1-16.5)	**17.4** (15.9-18.7)	**19.6** (17.7-21.2)	**22.7** (20.2-24.8)	**25.4** (22.2-27.9)
20-day	**8.72** (8.20-9.32)	**10.4** (9.77-11.1)	**12.6** (11.9-13.6)	**14.5** (13.6-15.6)	**17.2** (16.0-18.4)	**19.4** (17.9-20.8)	**21.7** (19.9-23.4)	**24.2** (22.0-26.2)	**27.7** (24.8-30.3)	**30.5** (27.0-33.6)
30-day	**10.8** (10.2-11.5)	**12.8** (12.1-13.7)	**15.4** (14.5-16.4)	**17.5** (16.5-18.6)	**20.4** (19.1-21.7)	**22.7** (21.1-24.2)	**25.0** (23.2-26.8)	**27.5** (25.3-29.6)	**30.9** (28.1-33.5)	**33.6** (30.2-36.6)
45-day	**13.3** (12.6-14.1)	**15.7** (14.9-16.7)	**18.7** (17.6-19.8)	**21.0** (19.8-22.3)	**24.3** (22.8-25.8)	**26.8** (25.1-28.5)	**29.5** (27.3-31.4)	**32.2** (29.6-34.4)	**35.8** (32.6-38.7)	**38.7** (35.0-42.1)
60-day	**16.3** (15.5-17.3)	**19.2** (18.3-20.3)	**22.5** (21.3-23.8)	**25.1** (23.7-26.5)	**28.5** (26.9-30.2)	**31.2** (29.4-33.1)	**33.9** (31.7-36.0)	**36.6** (34.0-39.0)	**40.2** (37.0-43.1)	**42.9** (39.3-46.2)

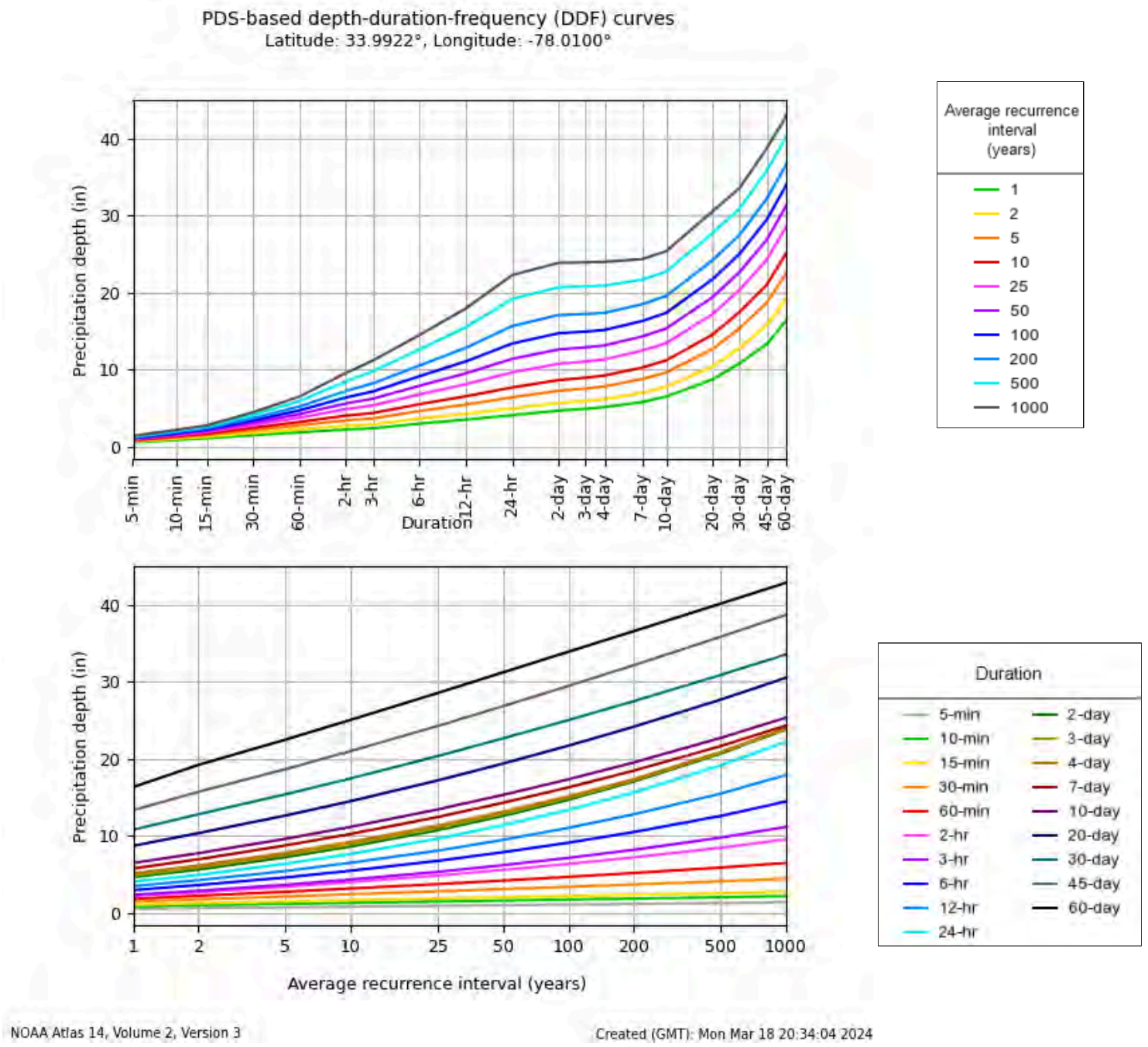
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

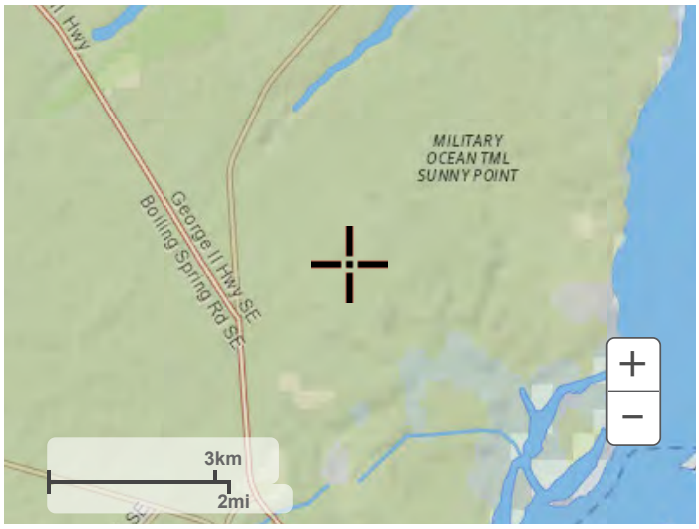
PF graphical



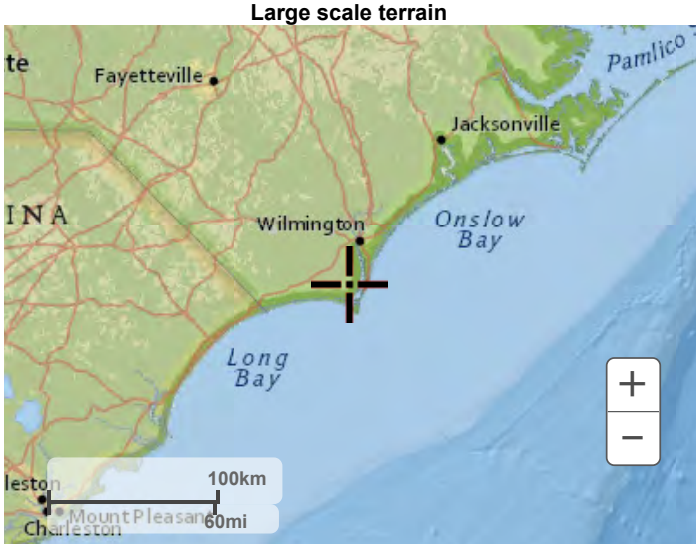
Back to Top

Maps & aerials

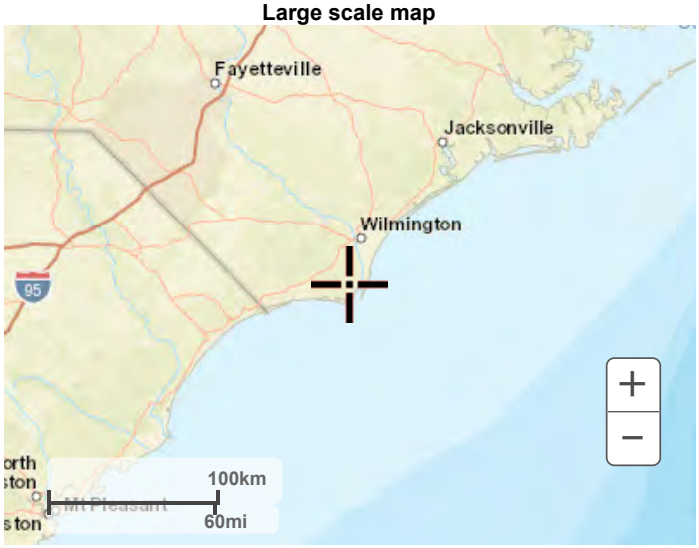
Small scale terrain



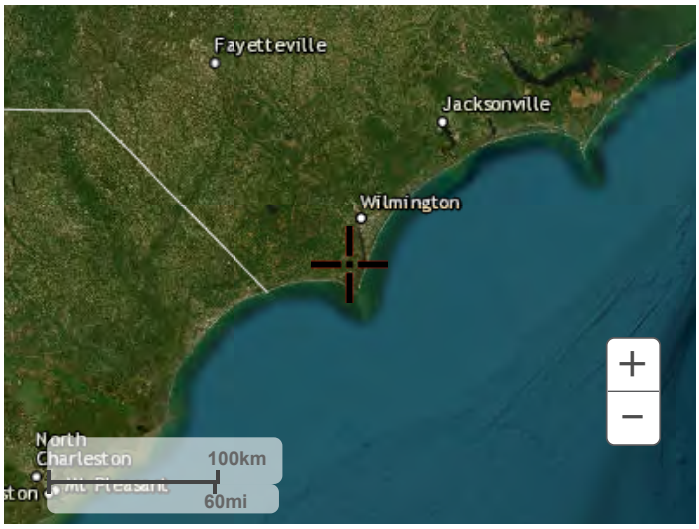
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Datums for 8659665, BOWEN POINT, SHALLOTTE INLET

NOTICE: All data values are relative to the MLLW.

Elevations on Mean Lower Low Water

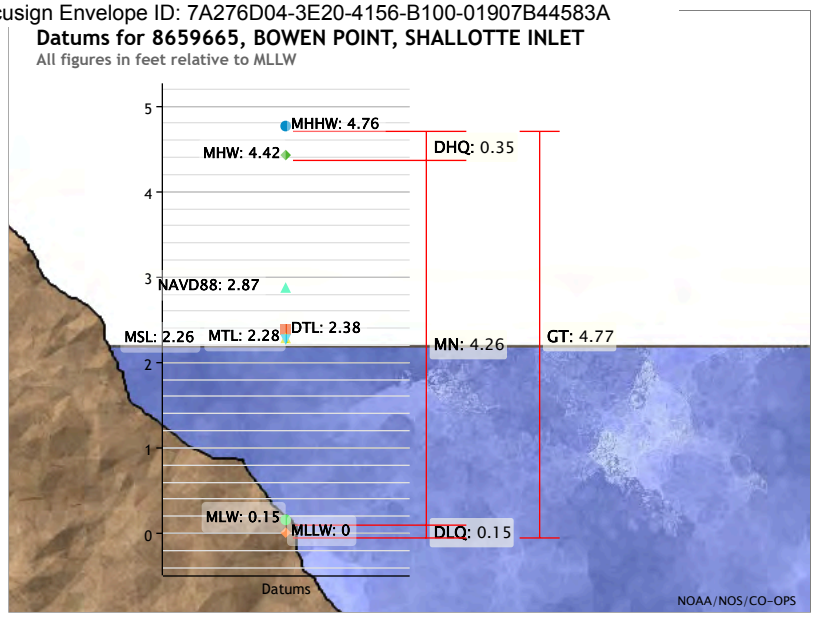
Station: 8659665, BOWEN POINT, SHALLOTTE INLET
Status: Accepted (Jan 31 2023)
Units: Feet
Control Station: 8658120 Wilmington, NC
T.M.: 0
Epoch: (/datum_options.html#NTDE) 1983-2001
Datum: MLLW

Datum	Value	Description
MHHW (/datum_options.html#MHHW)	4.76	Mean Higher-High Water
MHW (/datum_options.html#MHW)	4.42	Mean High Water
MTL (/datum_options.html#MTL)	2.28	Mean Tide Level
MSL (/datum_options.html#MSL)	2.26	Mean Sea Level
DTL (/datum_options.html#DTL)	2.38	Mean Diurnal Tide Level
MLW (/datum_options.html#MLW)	0.15	Mean Low Water
MLLW (/datum_options.html#MLLW)	0.00	Mean Lower-Low Water
NAVD88 (/datum_options.html)	2.87	North American Vertical Datum of 1988
STND (/datum_options.html#STND)	-23.90	Station Datum
GT (/datum_options.html#GT)	4.77	Great Diurnal Range
MN (/datum_options.html#MN)	4.26	Mean Range of Tide
DHQ (/datum_options.html#DHQ)	0.35	Mean Diurnal High Water Inequality
DLQ (/datum_options.html#DLQ)	0.15	Mean Diurnal Low Water Inequality
HWI (/datum_options.html#HWI)	0.52	Greenwich High Water Interval (in hours)
LWI (/datum_options.html#LWI)	6.90	Greenwich Low Water Interval (in hours)
Max Tide (/datum_options.html#MAXTIDE)		Highest Observed Tide
Max Tide Date & Time (/datum_options.html#MAXTIDEDT)		Highest Observed Tide Date & Time
Min Tide (/datum_options.html#MINTIDE)		Lowest Observed Tide
Min Tide Date & Time (/datum_options.html#MINTIDEDT)		Lowest Observed Tide Date & Time
HAT (/datum_options.html#HAT)	6.16	Highest Astronomical Tide
HAT Date & Time	10/28/2011 13:30	HAT Date and Time
LAT (/datum_options.html#LAT)	-1.52	Lowest Astronomical Tide
LAT Date & Time	02/09/2001 07:24	LAT Date and Time

Tidal Datum Analysis Periods

01/01/2022 - 05/31/2022

^



Showing datums for

1611347 PORT ALLEN, HAN…

Datum

MLLW

Data Units ◉ Feet ○ Meters

Epoch ◉ Present (1983-2001) ○ Superseded (1960-1978)

Submit

Hide nearby stations

NEAR BOWEN POINT, SHALLOTTE INLET

Wilmington, NC (datums.html?id=8658120&name=Wilmington&state=NC)

Springmaid Pier, SC (datums.html?id=8661070&name=Springmaid Pier&state=SC)

Wrightsville Beach, NC (datums.html?id=8658163&name=Wrightsville Beach&state=NC)

Beaufort, Duke Marine Lab, NC (datums.html?id=8656483&name=Beaufort, Duke Marine Lab&state=NC)

Don Holt Bridge Air Gap, SC (datums.html?id=8664753&name=Don Holt Bridge Air Gap&state=SC)

Ravenel Bridge Air Gap, SC (datums.html?id=8665353&name=Ravenel Bridge Air Gap&state=SC)

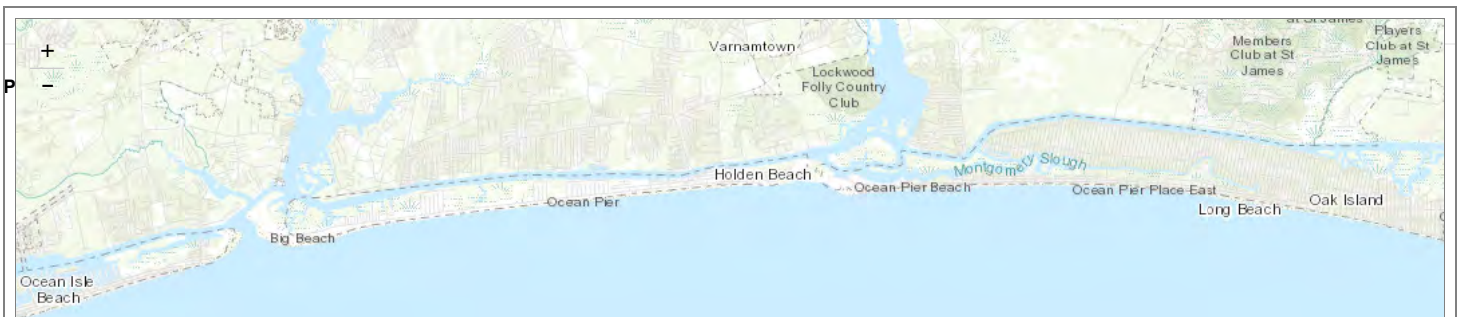
Charleston, SC (datums.html?id=8665530&name=Charleston&state=SC)

ORIENTAL, NEUSE RI, R, (datums.html?id=8655133&name=ORIENTAL, NEUSE RI&state=R,)

CEDAR ISL, D, (datums.html?id=8655151&name=CEDAR ISL&state=D,)

Ocracoke, Pamlico So, d, (datums.html?id=8654769&name=Ocracoke, Pamlico So&state=d,)

Fort Pulaski, GA (datums.html?id=8670870&name=Fort Pulaski&state=GA)



Datums for 8659414, Varnamtown, Lockwoods Folly River

NOTICE: All data values are relative to the MLLW.

Elevations on Mean Lower Low Water

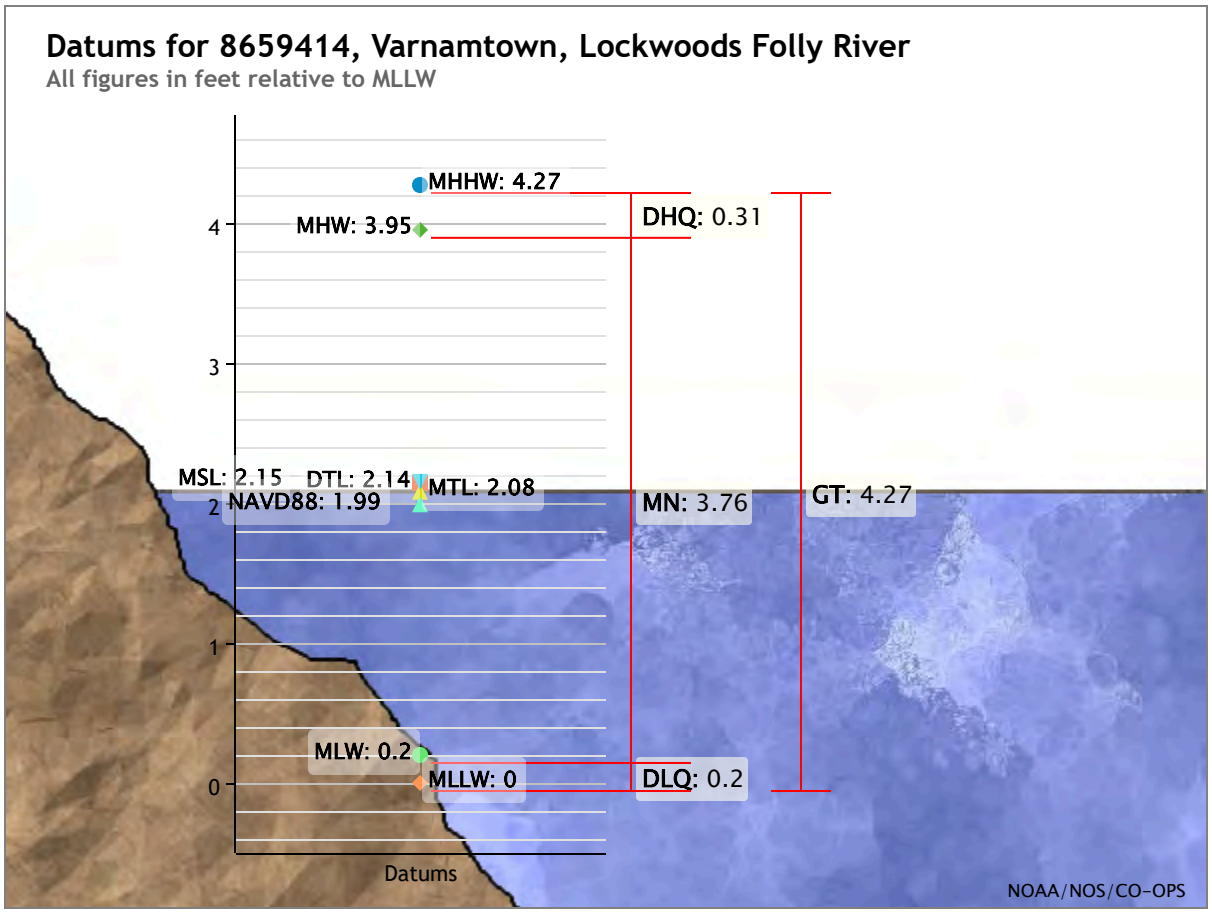
Station: 8659414, Varnamtown, Lockwoods Folly River
Status: Accepted (Apr 26 2023)
Units: Feet
Control Station: 8658163 Wrightsville Beach, NC
T.M.: 0
Epoch: (/datum_options.html#NTDE) 1983-2001
Datum: MLLW

Datum	Value	Description
MHHW (/datum_options.html#MHHW)	4.27	Mean Higher-High Water
MHW (/datum_options.html#MHW)	3.95	Mean High Water
MTL (/datum_options.html#MTL)	2.08	Mean Tide Level
MSL (/datum_options.html#MSL)	2.15	Mean Sea Level
DTL (/datum_options.html#DTL)	2.14	Mean Diurnal Tide Level
MLW (/datum_options.html#MLW)	0.20	Mean Low Water
MLLW (/datum_options.html#MLLW)	0.00	Mean Lower-Low Water
NAVD88 (/datum_options.html)	1.99	North American Vertical Datum of 1988
STND (/datum_options.html#STND)	-26.13	Station Datum
GT (/datum_options.html#GT)	4.27	Great Diurnal Range
MN (/datum_options.html#MN)	3.76	Mean Range of Tide
DHQ (/datum_options.html#DHQ)	0.31	Mean Diurnal High Water Inequality
DLQ (/datum_options.html#DLQ)	0.20	Mean Diurnal Low Water Inequality

Datum	Value	Description
HWI (/datum_options.html#HWI)	1.05	Greenwich High Water Interval (in hours)
LWI (/datum_options.html#LWI)	7.62	Greenwich Low Water Interval (in hours)
Max Tide (/datum_options.html#MAXTIDE)		Highest Observed Tide
Max Tide Date & Time (/datum_options.html#MAXTIDEDT)		Highest Observed Tide Date & Time
Min Tide (/datum_options.html#MINTIDE)		Lowest Observed Tide
Min Tide Date & Time (/datum_options.html#MINTIDEDT)		Lowest Observed Tide Date & Time
HAT (/datum_options.html#HAT)	5.63	Highest Astronomical Tide
HAT Date & Time	10/27/2007 13:54	HAT Date and Time
LAT (/datum_options.html#LAT)	-0.91	Lowest Astronomical Tide
LAT Date & Time	01/31/2014 07:30	LAT Date and Time

Tidal Datum Analysis Periods

04/01/2022 - 06/30/2022



TOWN OF HOLDEN BEACH | SUPPLEMENTAL STORMWATER MASTER PLAN REPORT

Attachment C

Existing Conditions Maps

Holden Beach Supplemental Stormwater Masterplan

Attachment C.1
Existing Conditions 10-yr
Area 7- East End:
McCray St., Ave. B, and Dunescape Dr.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

Old Ferry Rd SW
Beaufain St SW
B Var Rd SW
Betty's Waterfront Restaurant
See Note
Canal Dr
Ferry Rd
Shrimp St
Crab St
Mullet St
Ferry Rd
Ocean Blvd E
Hillside Dr
Ocean Blvd E
McCray St
Windswept Way
Serenity Ln

Legend

- Outfall
- Ex. Catch Basin
- Ex. Junction Box
- Ex. Drainage Pipe
- Ex. Chanel
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <2.5'
- <3'
- <3.5'
- <4'
- >4'

0 100 200 400
US Feet

1 inch = 400 feet

Note:
Area was previously evaluated as part of the June 2024 Stormwater Masterplan provided by McGill Associates. Stormwater features shown are those recommended within the 2024 Stormwater Masterplan.
See 2024 Stormwater Masterplan, Area 2 for more information.

mcgill
5400 Trinity Road Suite 107
Raleigh, NC 27607
919.378.9111

NC Firm License # C-0459

Holden Beach Supplemental Stormwater Masterplan

Attachment C.2
Existing Conditions 10-yr
Area 8- Canal Streets:
High Point St. to Greensboro St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Ex. Catch Basin
- Ex. SW Manhole
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <=2.5

0 125 250 500
Feet
1 inch = 350 feet

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Holden Beach Supplemental Stormwater Masterplan

Attachment C.3
Existing Conditions 10-yr
Area 9- Canal Streets: Scotch Bonnet Dr to Sand Dollar St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Ex. Catch Basin
- Ex. SW Manhole
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <=2.5

0 75 150 300
Feet

1 inch = 200 feet

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Holden Beach Supplemental Stormwater Masterplan

Attachment C.4
Existing Conditions 10-yr
Area 10- Canal Streets:
Swordfish Dr. to Sailfish St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Ex. Catch Basin
- Ex. SW Manhole
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <=2.5

0 125 250 500
Feet
1 inch = 270 feet

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TOWN OF HOLDEN BEACH | SUPPLEMENTAL STORMWATER MASTER PLAN REPORT

Attachment D

Proposed Conditions Maps

Holden Beach Supplemental Stormwater Masterplan

Attachment D.1A
Proposed Conditions 10-yr
Alternative 1
Area 7- East End:
McCray St., Ave. B, and Dunescape Dr.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Prop. Dune Infil. Manifold
- Prop. Catch Basin
- Ex. Outfall
- Ex. Catch Basin
- Ex. Junction Box
- Prop. Dune Infiltration
- Prop. Channel
- Prop. Pipe
- Ex. Drainage Pipe
- Ex. Chanel
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <2.5'
- <3'
- <3.5'
- <4'
- >4'

0 100 200 400
US Feet
1 inch = 400 feet

Note:
Area was previously evaluated as part of the June 2024 Stormwater Masterplan provided by McGill Associates. Stormwater features shown are those recommended within the 2024 Stormwater Masterplan.
See 2024 Stormwater Masterplan, Area 2 for more information.

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Raleigh, NC 27607
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NC Firm License # C-0459

Holden Beach Supplemental Stormwater Masterplan

Attachment D.1B
Proposed Conditions 10-yr
Alternative 2
Area 7- East End:
McCray St., Ave. B, and Dunescape Dr.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Prop. Dune Infil. Manifold
- Prop. Catch Basin
- Ex. Outfall
- Ex. Catch Basin
- Ex. Junction Box
- Prop. Dune Infiltration
- Prop. Channel
- Prop. Pipe
- Ex. Drainage Pipe
- Ex. Chanel
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <2.5'
- <3'
- <3.5'
- <4'
- >4'

0 100 200 400
US Feet
1 inch = 400 feet

Note:
Area was previously evaluated as part of the June 2024 Stormwater Masterplan provided by McGill Associates. Stormwater features shown are those recommended within the 2024 Stormwater Masterplan.
See 2024 Stormwater Masterplan, Area 2 for more information.

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Holden Beach Supplemental Stormwater Masterplan

Attachment D.2A
Proposed Conditions 10-yr
Alternative 1
Area 8- Canal Streets:
High Point St. to Greensboro St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Blind Flange on Ex. Pipe Inlet
- Prop. Catch Basin
- Ex. Catch Basin
- Prop. Drainage Pipe
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <=2.5'

0 125 250 500
Feet
1 inch = 350 feet

Note: Proposed Pipe networks will drain to the canals. Pipe outfall location and path to be determined at a later date with public input.

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Holden Beach Supplemental Stormwater Masterplan

Attachment D.2B
Proposed Conditions 10-yr
Alternative 2
Area 8- Canal Streets:
High Point St. to Greensboro St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Prop. Catch Basin
- Ex. Catch Basin
- Ex. SW Manhole
- Prop. Drainage Pipe
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <2.5'
- <3'
- <3.5'

0 125 250 500
Feet
1 inch = 350 feet

Note: Proposed Pipe networks will drain to the canals. Pipe outfall location and path to be determined at a later date with public input.

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Raleigh, NC 27607
919.378.9111

NC Firm License # C-0459

Note: Proposed Pipe networks will drain to the canals. Pipe outfall location and path to be determined at a later date with public input.

Holden Beach Supplemental Stormwater Masterplan

Attachment D.3A
Proposed Conditions 10-yr
Alternative 1
Area 9- Canal Streets: Scotch Bonnet Dr to Sand Dollar St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Blind Flange on Ex. Pipe Inlet
- Prop. Catch Basin
- Ex. Catch Basin
- Prop. Drainage Pipe
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <=2.5'

0 75 150 300
Feet

1 inch = 200 feet

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919.378.9111

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Note: Proposed Pipe networks will drain to the canals. Pipe outfall location and path to be determined at a later date with public input.

Holden Beach Supplemental Stormwater Masterplan

Attachment D.3B
Proposed Conditions 10-yr
Alternative 2
Area 9- Canal Streets: Scotch Bonnet Dr to Sand Dollar St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Prop. Catch Basin
- Ex. Catch Basin
- Ex. SW Manhole
- Prop. Drainage Pipe
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <2.5'
- <3'
- <3.5'

0 75 150 300
Feet

1 inch = 200 feet

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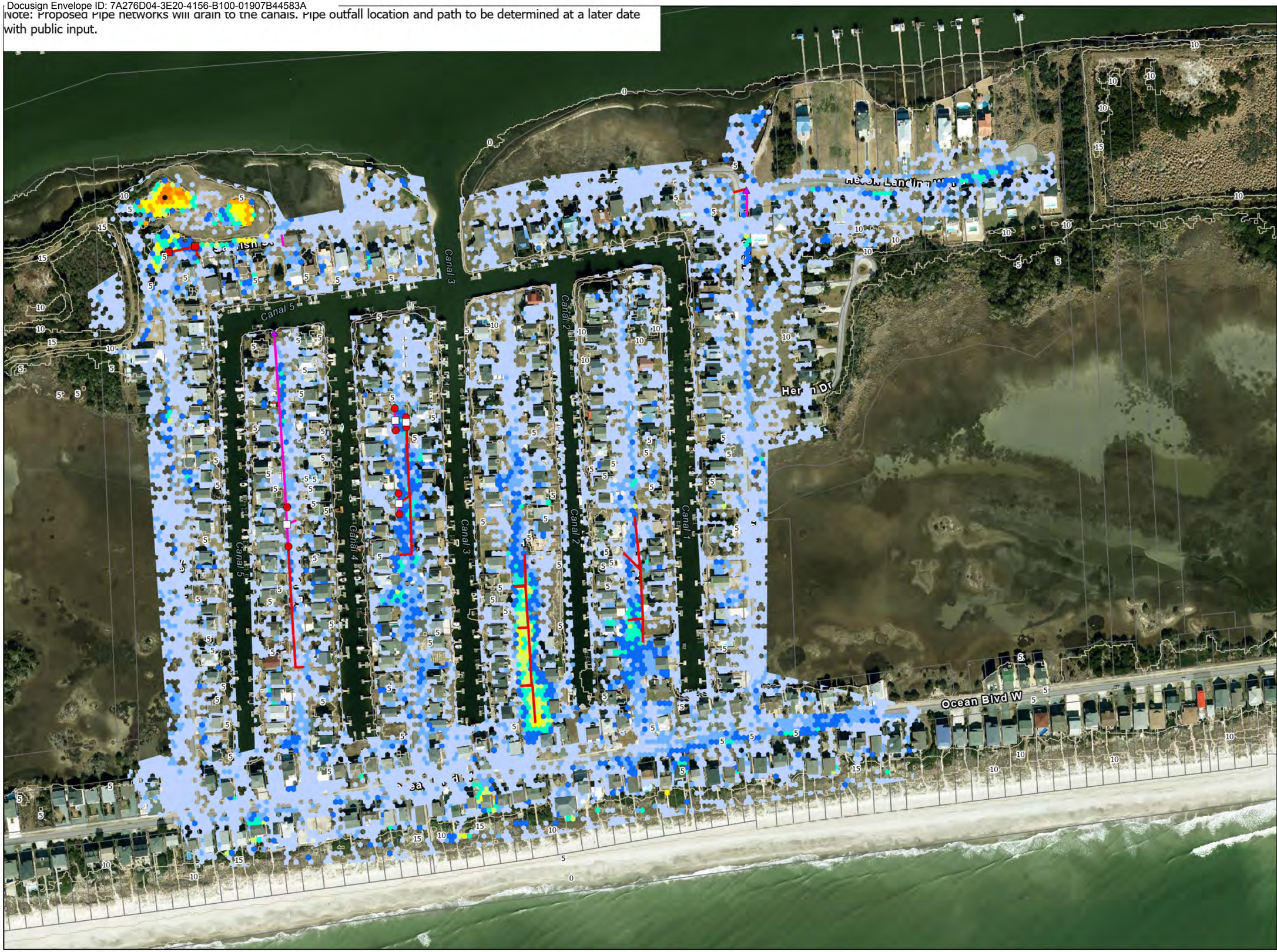
919.378.9111

NC Firm License # C-0459

Note: Proposed Pipe networks will drain to the canals. Pipe outfall location and path to be determined at a later date with public input.



Holden Beach Supplemental Stormwater Masterplan

Attachment D.4A
Proposed Conditions 10-yr
Alternative 1
Area 10- Canal Streets:
Swordfish Dr. to Sailfish St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Blind Flange on Ex. Pipe Inlet
- Prop. Catch Basin
- Ex. Catch Basin
- Prop. Drainage Pipe
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <=2.5'

0 125 250 500
Feet
1 inch = 270 feet

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919.378.9111

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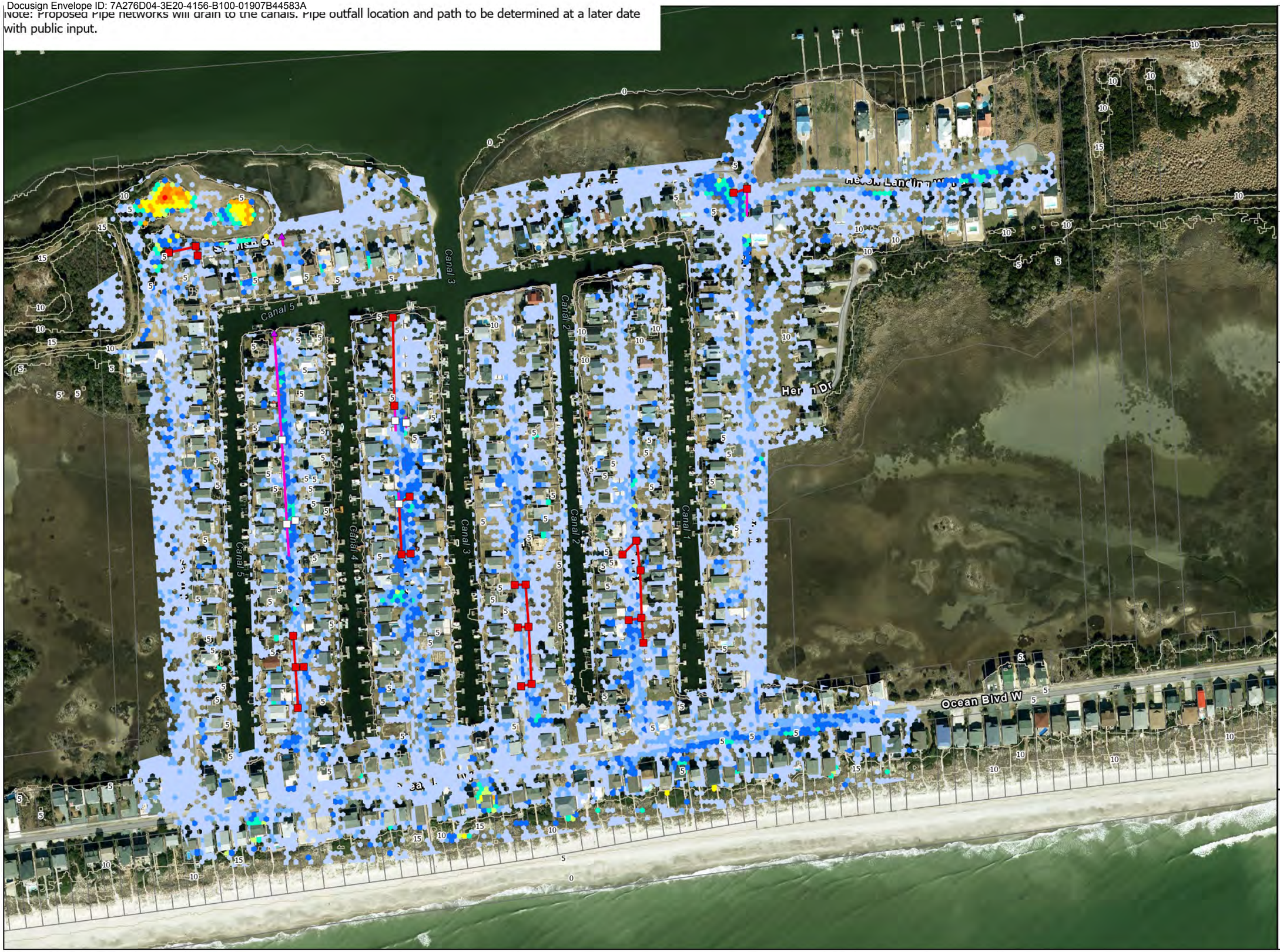
Note: Proposed Pipe networks will drain to the canals. Pipe outfall location and path to be determined at a later date with public input.



Holden Beach Supplemental Stormwater Masterplan

Attachment D.4B
Proposed Conditions 10-yr
Alternative 2
Area 10- Canal Streets: Swordfish Dr. to Sailfish St.

MAP PROJECTION:
NORTH CAROLINA STATE PLANE (FEET)

DATUM:
NAD 1983 (HORIZONTAL)
NAVD 1988 (VERTICAL)

DESIGNER: KA & MF
REVIEWER: CL
DATE: AUGUST 2025

N
W E
S

Legend

- Outfall
- Prop. Catch Basin
- Ex. Catch Basin
- Ex. SW Manhole
- Prop. Drainage Pipe
- Ex. Drainage Pipe
- Parcel
- Contour 5ft

10-yr Flooding

- No Flooding
- <1"
- <3"
- <6"
- <9"
- <1'
- <1.5'
- <2'
- <2.5'
- <3'
- <3.5'

0 125 250 500
Feet
1 inch = 270 feet

mcgill

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919.378.9111

NC Firm License # C-0459

TOWN OF HOLDEN BEACH | SUPPLEMENTAL STORMWATER MASTER PLAN REPORT

Attachment E

Construction Cost Estimates

Holden Beach Stormwater Improvements
East End Mcray St., Ave. B, and Dunescape Dr. - Alternative 1
Opinion of Probable Construction Cost

August 29, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 44,275.00	$ 44,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 26,565.00	$ 27,000.00
3	EROSION CONTROL	1	LS	$ 26,565.00	$ 27,000.00
4	CONTROL OF WATER/ DEWATERING	1	LS	$ 26,565.00	$ 27,000.00
5	CLEARING & GRUBBING	1	AC	$ 4,848.03	$ 5,500.00
6	BREAKING OF EXT ASPH PVMT	49	SY	$ 4.82	$ 500.00
7	REMOVAL OF EXT ASPHALT PVMT	49	SY	$ 14.07	$ 1,000.00
8	2" ASP CONC SURF CRS S9.5B OR S9.5C	4	TON	$ 88.09	$ 500.00
9	8" ASP CONC BASE CRS B25.0C	18	TON	$ 106.06	$ 2,000.00
10	CATCH BASIN	25	EA	$ 5,000.00	$ 125,000.00
11	MANHOLE	1	EA	$ 8,117.46	$ 8,500.00
12	8" HDPE	3,209	LF	$ 13.00	$ 42,000.00
13	12" CLASS III RCP	1,092	LF	$ 149.57	$ 163,500.00
14	15" CLASS III RCP	300	LF	$ 110.24	$ 33,500.00
15	18" CLASS III RCP	70	LF	$ 108.50	$ 8,000.00
16	24" CLASS III RCP	135	LF	$ 134.92	$ 18,500.00
17	PERMANENT DITCH WITH LINING	1,320.0	LF	$ 30.00	$ 40,000.00
18	DUNE INFILTRATION SYSTEM	11,300	CF	$ 35.00	$ 395,500.00
19	FINE GRADING	5,405	SY	$ 3.00	$ 16,500.00
20	SEEDING AND MULCHING	1.12	AC	$ 2,958.63	$ 3,500.00
21	HAULING EXCESS MATERIAL	755	CY	$ 28.00	$ 21,500.00
				Subtotal*	**$ 1,011,000.00**
	Contingencies (22%)				$ 222,420.00
	*Price Escalation Factor (5%)***				$ 50,550.00
				Construction Total*	**$ 1,284,000.00**
	Opinion of Probable Construction Cost Range*: $1,011,000.00 to $1,284,000.00				
	Design and Permitting (22%)				$ 222,420.00
	Construction Administration (5%)				$ 50,550.00
				Engineering Subtotal*	**$ 273,000.00**
				Project Total*	**$ 1,557,000.00**
	Opinion of Probable Project Cost Range*: $1,284,000.00 to $1,557,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

NOTE:

McCray Street East End Area - Alternative 1 scope and project costs assume improvements presented in the East End Mullet Street & East End Avenue A - Alternative 1 have been constructed.

Holden Beach Stormwater Improvements
East End Mcray St., Ave. B, and Dunescape Dr. - Alternative 2
Opinion of Probable Construction Cost

August 29, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 114,875.00	$ 115,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 68,925.00	$ 69,000.00
3	EROSION CONTROL	1	LS	$ 68,925.00	$ 69,000.00
4	CONTROL OF WATER/ DEWATERING	1	LS	$ 68,925.00	$ 69,000.00
5	CLEARING & GRUBBING	1	AC	$ 4,848.03	$ 7,000.00
6	BREAKING OF EXT ASPH PVMT	88	SY	$ 4.82	$ 500.00
7	REMOVAL OF EXT ASPHALT PVMT	88	SY	$ 14.07	$ 1,500.00
8	2" ASP CONC SURF CRS S9.5B OR S9.5C	8	TON	$ 88.09	$ 1,000.00
9	8" ASP CONC BASE CRS B25.0C	32	TON	$ 106.06	$ 3,500.00
10	CATCH BASIN	47	EA	$ 5,000.00	$ 235,000.00
11	MANHOLE	4	EA	$ 8,117.46	$ 32,500.00
12	8" HDPE	1,955	LF	$ 13.00	$ 25,500.00
13	12" CLASS III RCP	3,243	LF	$ 149.57	$ 485,500.00
14	15" CLASS III RCP	560	LF	$ 110.24	$ 62,000.00
15	18" CLASS III RCP	1,631	LF	$ 108.50	$ 177,000.00
16	24" CLASS III RCP	441	LF	$ 134.92	$ 59,500.00
17	PERMANENT DITCH WITH LINING	1,320.0	LF	$ 30.00	$ 40,000.00
18	DUNE INFILTRATION SYSTEM	31,460	CF	$ 35.00	$ 1,101,500.00
19	FINE GRADING	6,758	SY	$ 3.00	$ 20,500.00
20	SEEDING AND MULCHING	1.40	AC	$ 2,958.63	$ 4,500.00
21	HAULING EXCESS MATERIAL	1,437	CY	$ 28.00	$ 40,500.00
				Subtotal*	**$ 2,620,000.00**
	Contingencies (22%)				$ 576,400.00
	*Price Escalation Factor (5%)***				$ 131,000.00
				Construction Total*	**$ 3,327,000.00**
	Opinion of Probable Construction Cost Range*: $2,620,000.00 to $3,327,000.00				
	Design and Permitting (22%)				$ 576,400.00
	Construction Administration (5%)				$ 131,000.00
				Engineering Subtotal*	**$ 707,000.00**
				Project Total*	**$ 4,034,000.00**
	Opinion of Probable Project Cost Range*: $3,327,000.00 to $4,034,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

NOTE:

McCray Street East End Area - Alternative 1 scope and project costs assume improvements presented in the East End Mullet Street & East End Avenue A - Alternative 1 have been constructed.

Holden Beach Stormwater Improvements
Area 8 - High Point Street - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,025	$ 3,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,815	$ 2,000.00
3	EROSION CONTROL	1	LS	$ 1,815	$ 2,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	1	EA	$ 5,000.00	$ 5,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	30	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	30	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	3	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	11	TON	$ 107.07	$ 1,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	430	LF	$ 73.22	$ 31,500.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	2,430	SY	$ 2.86	$ 7,000.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	191	SY	$ 38.25	$ 7,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 75,000.00**
	Contingencies (22%)				$ 16,500.00
	Utility Relocation (10%)				$ 7,500.00
	*Price Escalation Factor (5%)***				$ 3,937.50
				Construction Total*	**$ 103,000.00**
	Opinion of Probable Construction Cost Range*: $75,000.00 to $103,000.00				
	Design and Permitting (18%)				$ 13,500.00
	Construction Administration (5%)				$ 3,750.00
				Engineering Subtotal*	**$ 17,000.00**
				Project Total*	**$ 120,000.00**
	Opinion of Probable Project Cost Range*: $92,000.00 to $120,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - High Point Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 2,950	$ 3,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,770	$ 2,000.00
3	EROSION CONTROL	1	LS	$ 1,770	$ 2,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	14	EA	$ 5,000.00	$ 70,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	30	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	30	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	3	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	11	TON	$ 107.07	$ 1,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	410	LF	$ 73.22	$ 30,500.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	2,317	SY	$ 2.86	$ 7,000.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	182	SY	$ 38.25	$ 7,000.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 138,000.00**
	Contingencies (22%)				$ 30,360.00
	Utility Relocation (10%)				$ 13,800.00
	*Price Escalation Factor (5%)***				$ 7,245.00
				Construction Total*	**$ 189,000.00**
	Opinion of Probable Construction Cost Range*: $138,000.00 to $189,000.00				
	Design and Permitting (18%)				$ 24,840.00
	Construction Administration (5%)				$ 6,900.00
				Engineering Subtotal*	**$ 32,000.00**
				Project Total*	**$ 221,000.00**
	Opinion of Probable Project Cost Range*: $170,000.00 to $221,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Lumberton Street - Alternative 1
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,950	$ 2,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,170	$ 1,500.00
3	EROSION CONTROL	1	LS	$ 1,170	$ 1,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	3	EA	$ 5,000.00	$ 15,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	90	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	90	SY	$ 14.07	$ 1,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	8	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	32	TON	$ 107.07	$ 3,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	190	LF	$ 73.22	$ 14,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,074	SY	$ 2.86	$ 3,500.00
20	SEEDING AND MULCHING	0.02	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	84	SY	$ 38.25	$ 3,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 61,000.00**
	Contingencies (22%)				$ 13,420.00
	Utility Relocation (10%)				$ 6,100.00
	*Price Escalation Factor (5%)***				$ 3,202.50
				Construction Total*	**$ 84,000.00**
	Opinion of Probable Construction Cost Range*: $61,000.00 to $84,000.00				
	Design and Permitting (18%)				$ 10,980.00
	Construction Administration (5%)				$ 3,050.00
				Engineering Subtotal*	**$ 14,000.00**
				Project Total*	**$ 98,000.00**
	Opinion of Probable Project Cost Range*: $75,000.00 to $98,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Lumberton Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 4,550	$ 5,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,730	$ 3,000.00
3	EROSION CONTROL	1	LS	$ 2,730	$ 3,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	14	EA	$ 5,000.00	$ 70,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	80	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	80	SY	$ 14.07	$ 1,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	7	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	29	TON	$ 107.07	$ 3,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	650	LF	$ 73.22	$ 48,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,674	SY	$ 2.86	$ 11,000.00
20	SEEDING AND MULCHING	0.06	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	289	SY	$ 38.25	$ 11,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 174,000.00**
	Contingencies (22%)				$ 38,280.00
	Utility Relocation (10%)				$ 17,400.00
	*Price Escalation Factor (5%)***				$ 9,135.00
				Construction Total*	**$ 239,000.00**
	Opinion of Probable Construction Cost Range*: $174,000.00 to $239,000.00				
	Design and Permitting (18%)				$ 31,320.00
	Construction Administration (5%)				$ 8,700.00
				Engineering Subtotal*	**$ 40,000.00**
				Project Total*	**$ 279,000.00**
	Opinion of Probable Project Cost Range*: $214,000.00 to $279,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Fayetteville Street - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 2,875	$ 3,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,725	$ 2,000.00
3	EROSION CONTROL	1	LS	$ 1,725	$ 2,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	5	EA	$ 5,000.00	$ 25,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	128	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	128	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	12	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	46	TON	$ 107.07	$ 5,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	340	LF	$ 73.22	$ 25,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,922	SY	$ 2.86	$ 5,500.00
20	SEEDING AND MULCHING	0.03	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	151	SY	$ 38.25	$ 6,000.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 91,000.00**
	Contingencies (22%)				$ 20,020.00
	Utility Relocation (10%)				$ 9,100.00
	*Price Escalation Factor (5%)***				$ 4,777.50
				Construction Total*	**$ 125,000.00**
	Opinion of Probable Construction Cost Range*: $91,000.00 to $125,000.00				
	Design and Permitting (18%)				$ 16,380.00
	Construction Administration (5%)				$ 4,550.00
				Engineering Subtotal*	**$ 21,000.00**
				Project Total*	**$ 146,000.00**
	Opinion of Probable Project Cost Range*: $112,000.00 to $146,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Fayetteville Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 2,375	$ 2,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,425	$ 1,500.00
3	EROSION CONTROL	1	LS	$ 1,425	$ 1,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	4	EA	$ 5,000.00	$ 20,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	60	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	60	SY	$ 14.07	$ 1,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	5	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	22	TON	$ 107.07	$ 2,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	290	LF	$ 73.22	$ 21,500.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,639	SY	$ 2.86	$ 5,000.00
20	SEEDING AND MULCHING	0.03	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	129	SY	$ 38.25	$ 5,000.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 75,000.00**
	Contingencies (22%)				$ 16,500.00
	Utility Relocation (10%)				$ 7,500.00
	*Price Escalation Factor (5%)***				$ 3,937.50
				Construction Total*	**$ 103,000.00**
	Opinion of Probable Construction Cost Range*: $75,000.00 to $103,000.00				
	Design and Permitting (18%)				$ 13,500.00
	Construction Administration (5%)				$ 3,750.00
				Engineering Subtotal*	**$ 17,000.00**
				Project Total*	**$ 120,000.00**
	Opinion of Probable Project Cost Range*: $92,000.00 to $120,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Raleigh Street - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 2,100	$ 2,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,260	$ 1,500.00
3	EROSION CONTROL	1	LS	$ 1,260	$ 1,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	3	EA	$ 5,000.00	$ 15,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	45	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	45	SY	$ 14.07	$ 1,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	4	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	16	TON	$ 107.07	$ 2,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	240	LF	$ 73.22	$ 18,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,356	SY	$ 2.86	$ 4,000.00
20	SEEDING AND MULCHING	0.02	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	107	SY	$ 38.25	$ 4,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 64,000.00**
	Contingencies (22%)				$ 14,080.00
	Utility Relocation (10%)				$ 6,400.00
	*Price Escalation Factor (5%)***				$ 3,360.00
				Construction Total*	**$ 88,000.00**
	Opinion of Probable Construction Cost Range*: $64,000.00 to $88,000.00				
	Design and Permitting (18%)				$ 11,520.00
	Construction Administration (5%)				$ 3,200.00
				Engineering Subtotal*	**$ 15,000.00**
				Project Total*	**$ 103,000.00**
	Opinion of Probable Project Cost Range*: $79,000.00 to $103,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Raleigh Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,350	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 810	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 810	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	2	EA	$ 5,000.00	$ 10,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	14	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	14	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	1	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	5	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	90	LF	$ 73.22	$ 7,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	509	SY	$ 2.86	$ 1,500.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	40	SY	$ 38.25	$ 2,000.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 42,000.00**
	Contingencies (22%)				$ 9,240.00
	Utility Relocation (10%)				$ 4,200.00
	*Price Escalation Factor (5%)***				$ 2,205.00
				Construction Total*	**$ 58,000.00**
	Opinion of Probable Construction Cost Range*: $42,000.00 to $58,000.00				
	Design and Permitting (18%)				$ 7,560.00
	Construction Administration (5%)				$ 2,100.00
				Engineering Subtotal*	**$ 10,000.00**
				Project Total*	**$ 68,000.00**
	Opinion of Probable Project Cost Range*: $52,000.00 to $68,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Sanford Street - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 4,325	$ 4,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,595	$ 3,000.00
3	EROSION CONTROL	1	LS	$ 2,595	$ 3,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	6	EA	$ 5,000.00	$ 30,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	235	SY	$ 4.82	$ 1,500.00
9	REMOVAL OF EXT ASPHALT PVMT	235	SY	$ 14.07	$ 3,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	21	TON	$ 87.81	$ 2,000.00
11	8" ASP CONC BASE CRS B25.0C	85	TON	$ 107.07	$ 9,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	540	LF	$ 73.22	$ 40,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,052	SY	$ 2.86	$ 9,000.00
20	SEEDING AND MULCHING	0.05	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	240	SY	$ 38.25	$ 9,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 129,000.00**
	Contingencies (22%)				$ 28,380.00
	Utility Relocation (10%)				$ 12,900.00
	*Price Escalation Factor (5%)***				$ 6,772.50
				Construction Total*	**$ 177,000.00**
	Opinion of Probable Construction Cost Range*: $129,000.00 to $177,000.00				
	Design and Permitting (18%)				$ 23,220.00
	Construction Administration (5%)				$ 6,450.00
				Engineering Subtotal*	**$ 30,000.00**
				Project Total*	**$ 207,000.00**
	Opinion of Probable Project Cost Range*: $159,000.00 to $207,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Sanford Street - Alternative 2
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,625	$ 4,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,175	$ 2,500.00
3	EROSION CONTROL	1	LS	$ 2,175	$ 2,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	6	EA	$ 5,000.00	$ 30,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	148	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	148	SY	$ 14.07	$ 2,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	13	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	53	TON	$ 107.07	$ 6,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	440	LF	$ 73.22	$ 32,500.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	2,487	SY	$ 2.86	$ 7,500.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	196	SY	$ 38.25	$ 7,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 113,000.00**
	Contingencies (22%)				$ 24,860.00
	Utility Relocation (10%)				$ 11,300.00
	*Price Escalation Factor (5%)***				$ 5,932.50
				Construction Total*	**$ 155,000.00**
Opinion of Probable Construction Cost Range*: $113,000.00 to $155,000.00					
	Design and Permitting (18%)				$ 20,340.00
	Construction Administration (5%)				$ 5,650.00
				Engineering Subtotal*	**$ 26,000.00**
				Project Total*	**$ 181,000.00**
Opinion of Probable Project Cost Range*: $139,000.00 to $181,000.00					

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Burlington Street - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 4,000	$ 4,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,400	$ 2,500.00
3	EROSION CONTROL	1	LS	$ 2,400	$ 2,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	6	EA	$ 5,000.00	$ 30,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	140	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	140	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	0	TON	$ 87.81	$ -
11	8" ASP CONC BASE CRS B25.0C	50	TON	$ 107.07	$ 5,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	660	LF	$ 73.22	$ 48,500.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,730	SY	$ 2.86	$ 11,000.00
20	SEEDING AND MULCHING	0.06	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	0	CY	$ 38.25	$ -
22	GRADING	293	SY	$ 38.25	$ 11,500.00
23	HAULING EXCESS MATERIAL	0	CY	$ 28.00	$ -
				Subtotal*	**$ 121,000.00**
	Contingencies (22%)				$ 26,620.00
	Utility Relocation (10%)				$ 12,100.00
	*Price Escalation Factor (5%)***				$ 6,352.50
				Construction Total*	**$ 166,000.00**
	Opinion of Probable Construction Cost Range*: $121,000.00 to $166,000.00				
	Design and Permitting (18%)				$ 21,780.00
	Construction Administration (5%)				$ 6,050.00
				Engineering Subtotal*	**$ 28,000.00**
				Project Total*	**$ 194,000.00**
	Opinion of Probable Project Cost Range*: $149,000.00 to $194,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Burlington Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,725	$ 4,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,235	$ 2,500.00
3	EROSION CONTROL	1	LS	$ 2,235	$ 2,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	7	EA	$ 5,000.00	$ 35,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	140	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	140	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	0	TON	$ 87.81	$ -
11	8" ASP CONC BASE CRS B25.0C	50	TON	$ 107.07	$ 5,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	610	LF	$ 73.22	$ 45,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,448	SY	$ 2.86	$ 10,000.00
20	SEEDING AND MULCHING	0.06	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	0	CY	$ 38.25	$ -
22	GRADING	271	SY	$ 38.25	$ 10,500.00
23	HAULING EXCESS MATERIAL	0	CY	$ 28.00	$ -
				Subtotal*	**$ 120,000.00**
	Contingencies (22%)				$ 26,400.00
	Utility Relocation (10%)				$ 12,000.00
	*Price Escalation Factor (5%)***				$ 6,300.00
				Construction Total*	**$ 165,000.00**
	Opinion of Probable Construction Cost Range*: $120,000.00 to $165,000.00				
	Design and Permitting (18%)				$ 21,600.00
	Construction Administration (5%)				$ 6,000.00
				Engineering Subtotal*	**$ 28,000.00**
				Project Total*	**$ 193,000.00**
	Opinion of Probable Project Cost Range*: $148,000.00 to $193,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Durham Street - Alternative 1
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,100	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 660	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 660	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	3	EA	$ 5,000.00	$ 15,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	42	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	42	SY	$ 14.07	$ 1,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	0	TON	$ 87.81	$ -
11	8" ASP CONC BASE CRS B25.0C	15	TON	$ 107.07	$ 2,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	160	LF	$ 73.22	$ 12,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	904	SY	$ 2.86	$ 3,000.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	0	CY	$ 38.25	$ -
22	GRADING	71	SY	$ 38.25	$ 3,000.00
23	HAULING EXCESS MATERIAL	0	CY	$ 28.00	$ -
				Subtotal*	**$ 42,000.00**
	Contingencies (22%)				$ 9,240.00
	Utility Relocation (10%)				$ 4,200.00
	*Price Escalation Factor (5%)***				$ 2,205.00
				Construction Total*	**$ 58,000.00**
	Opinion of Probable Construction Cost Range*: $42,000.00 to $58,000.00				
	Design and Permitting (18%)				$ 7,560.00
	Construction Administration (5%)				$ 2,100.00
				Engineering Subtotal*	**$ 10,000.00**
				Project Total*	**$ 68,000.00**
	Opinion of Probable Project Cost Range*: $52,000.00 to $68,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Durham Street - Alternative 2
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,675	$ 2,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,005	$ 1,500.00
3	EROSION CONTROL	1	LS	$ 1,005	$ 1,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	4	EA	$ 5,000.00	$ 20,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	56	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	56	SY	$ 14.07	$ 1,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	0	TON	$ 87.81	$ -
11	8" ASP CONC BASE CRS B25.0C	20	TON	$ 107.07	$ 2,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	240	LF	$ 73.22	$ 18,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,356	SY	$ 2.86	$ 4,000.00
20	SEEDING AND MULCHING	0.02	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	0	CY	$ 38.25	$ -
22	GRADING	107	SY	$ 38.25	$ 4,500.00
23	HAULING EXCESS MATERIAL	0	CY	$ 28.00	$ -
				Subtotal*	**$ 60,000.00**
	Contingencies (22%)				$ 13,200.00
	Utility Relocation (10%)				$ 6,000.00
	*Price Escalation Factor (5%)***				$ 3,150.00
				Construction Total*	**$ 82,000.00**
	Opinion of Probable Construction Cost Range*: $60,000.00 to $82,000.00				
	Design and Permitting (18%)				$ 10,800.00
	Construction Administration (5%)				$ 3,000.00
				Engineering Subtotal*	**$ 14,000.00**
				Project Total*	**$ 96,000.00**
	Opinion of Probable Project Cost Range*: $74,000.00 to $96,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Charlotte Street - Alternative 1
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,200	$ 3,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,920	$ 2,000.00
3	EROSION CONTROL	1	LS	$ 1,920	$ 2,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	10	EA	$ 5,000.00	$ 50,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	140	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	140	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	13	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	50	TON	$ 107.07	$ 5,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	390	LF	$ 73.22	$ 29,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	2,204	SY	$ 2.86	$ 6,500.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	173	SY	$ 38.25	$ 7,000.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 123,000.00**
	Contingencies (22%)				$ 27,060.00
	Utility Relocation (10%)				$ 12,300.00
	*Price Escalation Factor (5%)***				$ 6,457.50
				Construction Total*	**$ 169,000.00**
	Opinion of Probable Construction Cost Range*: $123,000.00 to $169,000.00				
	Design and Permitting (18%)				$ 22,140.00
	Construction Administration (5%)				$ 6,150.00
				Engineering Subtotal*	**$ 28,000.00**
				Project Total*	**$ 197,000.00**
	Opinion of Probable Project Cost Range*: $151,000.00 to $197,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Charlotte Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 4,700	$ 5,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,820	$ 3,000.00
3	EROSION CONTROL	1	LS	$ 2,820	$ 3,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	9	EA	$ 5,000.00	$ 45,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	21	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	21	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	2	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	8	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	720	LF	$ 73.22	$ 53,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	4,069	SY	$ 2.86	$ 12,000.00
20	SEEDING AND MULCHING	0.07	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
22	GRADING	320	SY	$ 38.25	$ 12,500.00
23	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 152,000.00**
	Contingencies (22%)				$ 33,440.00
	Utility Relocation (10%)				$ 15,200.00
	*Price Escalation Factor (5%)***				$ 7,980.00
				Construction Total*	**$ 209,000.00**
	Opinion of Probable Construction Cost Range*: $152,000.00 to $209,000.00				
	Design and Permitting (18%)				$ 27,360.00
	Construction Administration (5%)				$ 7,600.00
				Engineering Subtotal*	**$ 35,000.00**
				Project Total*	**$ 244,000.00**
	Opinion of Probable Project Cost Range*: $187,000.00 to $244,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Greensboro Street - Alternative 1
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,500	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 900	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 900	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	1	EA	$ 5,000.00	$ 5,000.00
7	INSTALL TIDE GATE	1	EA	$ 4,000.00	$ 4,000.00
8	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
9	BREAKING OF EXT ASPH PVMT	14	SY	$ 4.82	$ 500.00
10	REMOVAL OF EXT ASPHALT PVMT	14	SY	$ 14.07	$ 500.00
11	2" ASP CONC SURF CRS S9.5B OR S9.5C	1	TON	$ 87.81	$ 500.00
12	8" ASP CONC BASE CRS B25.0C	5	TON	$ 107.07	$ 1,000.00
13	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
14	12" DRAINAGE PIPE	30	LF	$ 130.67	$ 4,000.00
15	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
16	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
18	REMOVE & REPLACE TIDE GATE	1	EA	$ 10,000.00	$ 10,000.00
19	CLASS B RIP RAP 18" THICK	5.0	TON	$ 80.00	$ 500.00
20	GEOTEXTILE FOR DRAINAGE	113	SY	$ 2.86	$ 500.00
21	SEEDING AND MULCHING	0.00	AC	$ 2,623.24	$ 500.00
22	EXCAVATION	160	CY	$ 38.25	$ 6,500.00
23	GRADING	13	SY	$ 38.25	$ 1,000.00
24	HAULING EXCESS MATERIAL	160	CY	$ 28.00	$ 4,500.00
				Subtotal*	**$ 44,000.00**
	Contingencies (22%)				$ 9,680.00
	Utility Relocation (10%)				$ 4,400.00
	*Price Escalation Factor (5%)***				$ 2,310.00
				Construction Total*	**$ 60,000.00**
	Opinion of Probable Construction Cost Range*: $44,000.00 to $60,000.00				
	Design and Permitting (18%)				$ 7,920.00
	Construction Administration (5%)				$ 2,200.00
				Engineering Subtotal*	**$ 10,000.00**
				Project Total*	**$ 70,000.00**
	Opinion of Probable Project Cost Range*: $54,000.00 to $70,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 8 - Greensboro Street - Alternative 2
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 850	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 510	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 510	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	2	EA	$ 5,000.00	$ 10,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	14	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	14	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	1	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	5	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	40	LF	$ 73.22	$ 3,000.00
16	24 DRAINAGE PIPE	38	LF	$ 143.22	$ 5,500.00
17	INSTALL TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	512	SY	$ 2.86	$ 1,500.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	35	CY	$ 38.25	$ 1,500.00
22	GRADING	35	SY	$ 38.25	$ 1,500.00
23	HAULING EXCESS MATERIAL	35	CY	$ 28.00	$ 1,000.00
				Subtotal*	**$ 32,000.00**
	Contingencies (22%)				$ 7,040.00
	Utility Relocation (10%)				$ 3,200.00
	*Price Escalation Factor (5%)***				$ 1,680.00
				Construction Total*	**$ 44,000.00**
	Opinion of Probable Construction Cost Range*: $32,000.00 to $44,000.00				
	Design and Permitting (18%)				$ 5,760.00
	Construction Administration (5%)				$ 1,600.00
				Engineering Subtotal*	**$ 7,000.00**
				Project Total*	**$ 51,000.00**
	Opinion of Probable Project Cost Range*: $39,000.00 to $51,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Scotch Bonnet Drive - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 700	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 420	$ 500.00
3	EROSION CONTROL	1	LS	$ 420	$ 500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	0	EA	$ 5,000.00	$ -
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	21	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	21	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	2	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	8	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE		LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	30	LF	$ 143.22	$ 4,500.00
17	24" TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	5.0	TON	$ 80.00	$ 500.00
19	GEOTEXTILE FOR DRAINAGE	226	SY	$ 2.86	$ 1,000.00
20	SEEDING AND MULCHING	0.00	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	13	CY	$ 38.25	$ 1,000.00
22	GRADING	13	SY	$ 38.25	$ 1,000.00
23	HAULING EXCESS MATERIAL	13	CY	$ 28.00	$ 500.00
				Subtotal*	**$ 18,000.00**
	Contingencies (22%)				$ 3,960.00
	Utility Relocation (10%)				$ 1,800.00
	*Price Escalation Factor (5%)***				$ 945.00
				Construction Total*	**$ 25,000.00**
	Opinion of Probable Construction Cost Range*: $18,000.00 to $25,000.00				
	Design and Permitting (18%)				$ 3,240.00
	Construction Administration (5%)				$ 900.00
				Engineering Subtotal*	**$ 4,000.00**
				Project Total*	**$ 29,000.00**
	Opinion of Probable Project Cost Range*: $22,000.00 to $29,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Scotch Bonnet Drive - Alternative 2
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 625	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 375	$ 500.00
3	EROSION CONTROL	1	LS	$ 375	$ 500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	2	EA	$ 5,000.00	$ 10,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	21	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	21	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	2	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	8	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	40	LF	$ 143.22	$ 6,000.00
17	24" TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	301	SY	$ 2.86	$ 1,000.00
20	SEEDING AND MULCHING	0.00	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	18	CY	$ 38.25	$ 1,000.00
22	GRADING	18	SY	$ 38.25	$ 1,000.00
23	HAULING EXCESS MATERIAL	18	CY	$ 28.00	$ 500.00
				Subtotal*	**$ 26,000.00**
	Contingencies (22%)				$ 5,720.00
	Utility Relocation (10%)				$ 2,600.00
	*Price Escalation Factor (5%)***				$ 1,365.00
				Construction Total*	**$ 36,000.00**
	Opinion of Probable Construction Cost Range*: $26,000.00 to $36,000.00				
	Design and Permitting (18%)				$ 4,680.00
	Construction Administration (5%)				$ 1,300.00
				Engineering Subtotal*	**$ 6,000.00**
				Project Total*	**$ 42,000.00**
	Opinion of Probable Project Cost Range*: $32,000.00 to $42,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Lions Paw Street - Alternative 1
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 7,875	$ 8,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 4,725	$ 5,000.00
3	EROSION CONTROL	1	LS	$ 4,725	$ 5,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	9	EA	$ 5,000.00	$ 45,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	180	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	180	SY	$ 14.07	$ 3,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	16	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	65	TON	$ 107.07	$ 7,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	60	LF	$ 73.22	$ 4,500.00
16	24 DRAINAGE PIPE	640	LF	$ 143.22	$ 92,000.00
17	24" TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	5,162	SY	$ 2.86	$ 15,000.00
20	SEEDING AND MULCHING	0.06	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	311	CY	$ 38.25	$ 12,000.00
22	GRADING	311	SY	$ 38.25	$ 12,000.00
23	HAULING EXCESS MATERIAL	311	CY	$ 28.00	$ 9,000.00
				Subtotal*	**$ 222,000.00**
	Contingencies (22%)				$ 48,840.00
	Utility Relocation (10%)				$ 22,200.00
	*Price Escalation Factor (5%)***				$ 11,655.00
				Construction Total*	**$ 305,000.00**
	Opinion of Probable Construction Cost Range*: $222,000.00 to $305,000.00				
	Design and Permitting (18%)				$ 39,960.00
	Construction Administration (5%)				$ 11,100.00
				Engineering Subtotal*	**$ 51,000.00**
				Project Total*	**$ 356,000.00**
	Opinion of Probable Project Cost Range*: $273,000.00 to $356,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Lions Paw Street - Alternative 2
Opinion of Probable Construction Cost
September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,975	$ 4,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,385	$ 2,500.00
3	EROSION CONTROL	1	LS	$ 2,385	$ 2,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	7	EA	$ 5,000.00	$ 35,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	100	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	100	SY	$ 14.07	$ 1,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	9	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	36	TON	$ 107.07	$ 4,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	410	LF	$ 73.22	$ 30,500.00
16	24 DRAINAGE PIPE	60	LF	$ 143.22	$ 9,000.00
17	24" TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	2,769	SY	$ 2.86	$ 8,000.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	209	CY	$ 38.25	$ 8,000.00
22	GRADING	209	SY	$ 38.25	$ 8,000.00
23	HAULING EXCESS MATERIAL	209	CY	$ 28.00	$ 6,000.00
				Subtotal*	**$ 125,000.00**
	Contingencies (22%)				$ 27,500.00
	Utility Relocation (10%)				$ 12,500.00
	*Price Escalation Factor (5%)***				$ 6,562.50
				Construction Total*	**$ 172,000.00**
Opinion of Probable Construction Cost Range*: $125,000.00 to $172,000.00					
	Design and Permitting (18%)				$ 22,500.00
	Construction Administration (5%)				$ 6,250.00
				Engineering Subtotal*	**$ 29,000.00**
				Project Total*	**$ 201,000.00**
Opinion of Probable Project Cost Range*: $154,000.00 to $201,000.00					

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Starfish Drive - Alternative 1
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,050	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 630	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 630	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	4	EA	$ 5,000.00	$ 20,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	40	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	40	SY	$ 14.07	$ 1,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	4	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	14	TON	$ 107.07	$ 2,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	40	LF	$ 130.67	$ 5,500.00
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	38	LF	$ 143.22	$ 5,500.00
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	437	SY	$ 2.86	$ 1,500.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	35	CY	$ 38.25	$ 1,500.00
22	GRADING	35	SY	$ 38.25	$ 1,500.00
23	HAULING EXCESS MATERIAL	35	CY	$ 28.00	$ 1,000.00
				Subtotal*	**$ 46,000.00**
	Contingencies (22%)				$ 10,120.00
	Utility Relocation (10%)				$ 4,600.00
	*Price Escalation Factor (5%)***				$ 2,415.00
				Construction Total*	**$ 63,000.00**
	Opinion of Probable Construction Cost Range*: $46,000.00 to $63,000.00				
	Design and Permitting (18%)				$ 8,280.00
	Construction Administration (5%)				$ 2,300.00
				Engineering Subtotal*	**$ 11,000.00**
				Project Total*	**$ 74,000.00**
	Opinion of Probable Project Cost Range*: $57,000.00 to $74,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Starfish Drive - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,450	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 870	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 870	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	2	EA	$ 5,000.00	$ 10,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	28	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	28	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	3	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	10	TON	$ 107.07	$ 1,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	160	LF	$ 73.22	$ 12,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	904	SY	$ 2.86	$ 3,000.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	71	CY	$ 38.25	$ 3,000.00
22	GRADING	71	SY	$ 38.25	$ 3,000.00
23	HAULING EXCESS MATERIAL	71	CY	$ 28.00	$ 2,000.00
				Subtotal*	**$ 44,000.00**
	Contingencies (22%)				$ 9,680.00
	Utility Relocation (10%)				$ 4,400.00
	*Price Escalation Factor (5%)***				$ 2,310.00
				Construction Total*	**$ 60,000.00**
	Opinion of Probable Construction Cost Range*: $44,000.00 to $60,000.00				
	Design and Permitting (18%)				$ 7,920.00
	Construction Administration (5%)				$ 2,200.00
				Engineering Subtotal*	**$ 10,000.00**
				Project Total*	**$ 70,000.00**
	Opinion of Probable Project Cost Range*: $54,000.00 to $70,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Sand Dollar Street - Alternative 1
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 900	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 540	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 540	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	0	EA	$ 5,000.00	$ -
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	14	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	14	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	1	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	5	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	60	LF	$ 143.22	$ 9,000.00
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	5.0	TON	$ 80.00	$ 500.00
19	GEOTEXTILE FOR DRAINAGE	452	SY	$ 2.86	$ 1,500.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	27	CY	$ 38.25	$ 1,500.00
22	GRADING	27	SY	$ 38.25	$ 1,500.00
23	HAULING EXCESS MATERIAL	27	CY	$ 28.00	$ 1,000.00
				Subtotal*	**$ 23,000.00**
	Contingencies (22%)				$ 5,060.00
	Utility Relocation (10%)				$ 2,300.00
	*Price Escalation Factor (5%)***				$ 1,207.50
				Construction Total*	**$ 32,000.00**
	Opinion of Probable Construction Cost Range*: $23,000.00 to $32,000.00				
	Design and Permitting (18%)				$ 4,140.00
	Construction Administration (5%)				$ 1,150.00
				Engineering Subtotal*	**$ 5,000.00**
				Project Total*	**$ 37,000.00**
	Opinion of Probable Project Cost Range*: $28,000.00 to $37,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 9 - Sand Dollar Street - Alternative 2
Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 850	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 510	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 510	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	2	EA	$ 5,000.00	$ 10,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	14	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	14	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	1	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	5	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	40	LF	$ 73.22	$ 3,000.00
16	24 DRAINAGE PIPE	38	LF	$ 143.22	$ 5,500.00
17	INSTALL TIDE GATE	0	EA	$ 2,400.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	512	SY	$ 2.86	$ 1,500.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	35	CY	$ 38.25	$ 1,500.00
22	GRADING	35	SY	$ 38.25	$ 1,500.00
23	HAULING EXCESS MATERIAL	35	CY	$ 28.00	$ 1,000.00
				Subtotal*	**$ 32,000.00**
	Contingencies (22%)				$ 7,040.00
	Utility Relocation (10%)				$ 3,200.00
	*Price Escalation Factor (5%)***				$ 1,680.00
				Construction Total*	**$ 44,000.00**
	Opinion of Probable Construction Cost Range*: $32,000.00 to $44,000.00				
	Design and Permitting (18%)				$ 5,760.00
	Construction Administration (5%)				$ 1,600.00
				Engineering Subtotal*	**$ 7,000.00**
				Project Total*	**$ 51,000.00**
	Opinion of Probable Project Cost Range*: $39,000.00 to $51,000.00				

* Rounded to the nearest $1000

** Assumes bidding will ocurr in 2025

Holden Beach Stormwater Improvements
Area 10 - Swordfish Drive - Alternative 1

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 525	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 315	$ 500.00
3	EROSION CONTROL	1	LS	$ 315	$ 500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	0	EA	$ 5,000.00	$ -
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	18	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	18	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	2	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	6	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	40	LF	$ 83.45	$ 3,500.00
15	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	5.0	TON	$ 80.00	$ 500.00
19	GEOTEXTILE FOR DRAINAGE	188	SY	$ 2.86	$ 1,000.00
20	SEEDING AND MULCHING	0.00	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	18	CY	$ 38.25	$ 1,000.00
22	GRADING	18	SY	$ 38.25	$ 1,000.00
23	HAULING EXCESS MATERIAL	18	CY	$ 28.00	$ 500.00
				Subtotal*	**$ 14,000.00**
	Contingencies (22%)				$ 3,080.00
	Utility Relocation (10%)				$ 1,400.00
	*Price Escalation Factor (5%)***				$ 735.00
				Construction Total*	**$ 19,000.00**
	Opinion of Probable Construction Cost Range*: $14,000.00 to $19,000.00				
	Design and Permitting (18%)				$ 2,520.00
	Construction Administration (5%)				$ 700.00
				Engineering Subtotal*	**$ 3,000.00**
				Project Total*	**$ 22,000.00**
	Opinion of Probable Project Cost Range*: $17,000.00 to $22,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Swordfish Drive - Alternative 2

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 750	$ 1,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 450	$ 500.00
3	EROSION CONTROL	1	LS	$ 450	$ 500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	2	EA	$ 5,000.00	$ 10,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	20	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	20	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	2	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	7	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	40	LF	$ 143.22	$ 6,000.00
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	301	SY	$ 2.86	$ 1,000.00
20	SEEDING AND MULCHING	0.00	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	18	CY	$ 38.25	$ 1,000.00
22	GRADING	18	SY	$ 38.25	$ 1,000.00
23	HAULING EXCESS MATERIAL	18	CY	$ 28.00	$ 500.00
				Subtotal*	**$ 29,000.00**
	Contingencies (22%)				$ 6,380.00
	Utility Relocation (10%)				$ 2,900.00
	*Price Escalation Factor (5%)***				$ 1,522.50
				Construction Total*	**$ 40,000.00**
	Opinion of Probable Construction Cost Range*: $29,000.00 to $40,000.00				
	Design and Permitting (18%)				$ 5,220.00
	Construction Administration (5%)				$ 1,450.00
				Engineering Subtotal*	**$ 7,000.00**
				Project Total*	**$ 47,000.00**
	Opinion of Probable Project Cost Range*: $36,000.00 to $47,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Dolphin Street - Alternative 1

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 4,350	$ 4,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,610	$ 3,000.00
3	EROSION CONTROL	1	LS	$ 2,610	$ 3,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	6	EA	$ 5,000.00	$ 30,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	100	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	100	SY	$ 14.07	$ 1,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	9	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	36	TON	$ 107.07	$ 4,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	390	LF	$ 130.67	$ 51,000.00
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	40	LF	$ 73.22	$ 3,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,696	SY	$ 2.86	$ 5,000.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	191	CY	$ 38.25	$ 7,500.00
22	GRADING	191	SY	$ 38.25	$ 7,500.00
23	HAULING EXCESS MATERIAL	191	CY	$ 28.00	$ 5,500.00
				Subtotal*	**$ 129,000.00**
	Contingencies (22%)				$ 28,380.00
	Utility Relocation (10%)				$ 12,900.00
	*Price Escalation Factor (5%)***				$ 6,772.50
				Construction Total*	**$ 177,000.00**
	Opinion of Probable Construction Cost Range*: $129,000.00 to $177,000.00				
	Design and Permitting (18%)				$ 23,220.00
	Construction Administration (5%)				$ 6,450.00
				Engineering Subtotal*	**$ 30,000.00**
				Project Total*	**$ 207,000.00**
	Opinion of Probable Project Cost Range*: $159,000.00 to $207,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Dolphin Street - Alternative 2

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 2,825	$ 3,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 1,695	$ 2,000.00
3	EROSION CONTROL	1	LS	$ 1,695	$ 2,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	6	EA	$ 5,000.00	$ 30,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	138	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	138	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	12	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	50	TON	$ 107.07	$ 5,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	310	LF	$ 73.22	$ 23,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,752	SY	$ 2.86	$ 5,500.00
20	SEEDING AND MULCHING	0.03	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	138	CY	$ 38.25	$ 5,500.00
22	GRADING	138	SY	$ 38.25	$ 5,500.00
23	HAULING EXCESS MATERIAL	138	CY	$ 28.00	$ 4,000.00
				Subtotal*	**$ 95,000.00**
	Contingencies (22%)				$ 20,900.00
	Utility Relocation (10%)				$ 9,500.00
	*Price Escalation Factor (5%)***				$ 4,987.50
				Construction Total*	**$ 130,000.00**
	Opinion of Probable Construction Cost Range*: $95,000.00 to $130,000.00				
	Design and Permitting (18%)				$ 17,100.00
	Construction Administration (5%)				$ 4,750.00
				Engineering Subtotal*	**$ 22,000.00**
				Project Total*	**$ 152,000.00**
	Opinion of Probable Project Cost Range*: $117,000.00 to $152,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Tuna Drive - Alternative 1

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 5,975	$ 6,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 3,585	$ 4,000.00
3	EROSION CONTROL	1	LS	$ 3,585	$ 4,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	8	EA	$ 5,000.00	$ 40,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	130	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	130	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	12	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	47	TON	$ 107.07	$ 5,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	0	LF	$ 73.22	$ -
16	24 DRAINAGE PIPE	510	LF	$ 143.22	$ 73,500.00
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,843	SY	$ 2.86	$ 11,000.00
20	SEEDING AND MULCHING	0.05	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	227	CY	$ 38.25	$ 9,000.00
22	GRADING	227	SY	$ 38.25	$ 9,000.00
23	HAULING EXCESS MATERIAL	227	CY	$ 28.00	$ 6,500.00
				Subtotal*	**$ 175,000.00**
	Contingencies (22%)				$ 38,500.00
	Utility Relocation (10%)				$ 17,500.00
	*Price Escalation Factor (5%)***				$ 9,187.50
				Construction Total*	**$ 240,000.00**
	Opinion of Probable Construction Cost Range*: $175,000.00 to $240,000.00				
	Design and Permitting (18%)				$ 31,500.00
	Construction Administration (5%)				$ 8,750.00
				Engineering Subtotal*	**$ 40,000.00**
				Project Total*	**$ 280,000.00**
	Opinion of Probable Project Cost Range*: $215,000.00 to $280,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Tuna Drive - Alternative 2

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 4,225	$ 4,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,535	$ 3,000.00
3	EROSION CONTROL	1	LS	$ 2,535	$ 3,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	5	EA	$ 5,000.00	$ 25,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	90	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	90	SY	$ 14.07	$ 1,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	8	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	32	TON	$ 107.07	$ 3,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	540	LF	$ 73.22	$ 40,000.00
16	24 DRAINAGE PIPE	0	LF	$ 143.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,052	SY	$ 2.86	$ 9,000.00
20	SEEDING AND MULCHING	0.05	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	240	CY	$ 38.25	$ 9,500.00
22	GRADING	240	SY	$ 38.25	$ 9,500.00
23	HAULING EXCESS MATERIAL	240	CY	$ 28.00	$ 7,000.00
				Subtotal*	**$ 122,000.00**
	Contingencies (22%)				$ 26,840.00
	Utility Relocation (10%)				$ 12,200.00
	*Price Escalation Factor (5%)***				$ 6,405.00
				Construction Total*	**$ 167,000.00**
	Opinion of Probable Construction Cost Range*: $122,000.00 to $167,000.00				
	Design and Permitting (18%)				$ 21,960.00
	Construction Administration (5%)				$ 6,100.00
				Engineering Subtotal*	**$ 28,000.00**
				Project Total*	**$ 195,000.00**
	Opinion of Probable Project Cost Range*: $150,000.00 to $195,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Sailfish Street - Alternative 1

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,225	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 735	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 735	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	1	EA	$ 5,000.00	$ 5,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	60	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	60	SY	$ 14.07	$ 1,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	5	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	22	TON	$ 107.07	$ 2,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	30	LF	$ 73.22	$ 2,500.00
16	24" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	REMOVE & REPLACE TIDE GATE	1	EA	$ 10,000.00	$ 10,000.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	170	SY	$ 2.86	$ 500.00
20	SEEDING AND MULCHING	0.00	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	18	CY	$ 38.25	$ 1,000.00
22	GRADING	128	SY	$ 38.25	$ 5,000.00
23	HAULING EXCESS MATERIAL	18	CY	$ 28.00	$ 500.00
				Subtotal*	**$ 35,000.00**
	Contingencies (22%)				$ 7,700.00
	Utility Relocation (10%)				$ 3,500.00
	*Price Escalation Factor (5%)***				$ 1,837.50
				Construction Total*	**$ 48,000.00**
	Opinion of Probable Construction Cost Range*: $35,000.00 to $48,000.00				
	Design and Permitting (18%)				$ 6,300.00
	Construction Administration (5%)				$ 1,750.00
				Engineering Subtotal*	**$ 8,000.00**
				Project Total*	**$ 56,000.00**
	Opinion of Probable Project Cost Range*: $43,000.00 to $56,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Sailfish Street - Alternative 2

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,325	$ 1,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 795	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 795	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	3	EA	$ 5,000.00	$ 15,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	14	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	14	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	1	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	5	TON	$ 107.07	$ 1,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	120	LF	$ 73.22	$ 9,000.00
16	24" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	INSTALL TIDE GATE	2	EA	$ 2,400.00	$ 5,000.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	678	SY	$ 2.86	$ 2,000.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	71	CY	$ 38.25	$ 3,000.00
22	GRADING	53	SY	$ 38.25	$ 2,500.00
23	HAULING EXCESS MATERIAL	71	CY	$ 28.00	$ 2,000.00
				Subtotal*	**$ 47,000.00**
	Contingencies (22%)				$ 10,340.00
	Utility Relocation (10%)				$ 4,700.00
	*Price Escalation Factor (5%)***				$ 2,467.50
				Construction Total*	**$ 65,000.00**
	Opinion of Probable Construction Cost Range*: $47,000.00 to $65,000.00				
	Design and Permitting (18%)				$ 8,460.00
	Construction Administration (5%)				$ 2,350.00
				Engineering Subtotal*	**$ 11,000.00**
				Project Total*	**$ 76,000.00**
	Opinion of Probable Project Cost Range*: $58,000.00 to $76,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Marlin Drive - Alternative 1

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,625	$ 4,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,175	$ 2,500.00
3	EROSION CONTROL	1	LS	$ 2,175	$ 2,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	4	EA	$ 5,000.00	$ 20,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	100	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	100	SY	$ 14.07	$ 1,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	9	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	36	TON	$ 107.07	$ 4,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	440	LF	$ 73.22	$ 32,500.00
16	24" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	REMOVE & REPLACE TIDE GATE	0	EA	$ 10,000.00	$ -
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	2,487	SY	$ 2.86	$ 7,500.00
20	SEEDING AND MULCHING	0.04	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	261	CY	$ 38.25	$ 10,000.00
22	GRADING	196	SY	$ 38.25	$ 7,500.00
23	HAULING EXCESS MATERIAL	261	CY	$ 28.00	$ 7,500.00
				Subtotal*	**$ 103,000.00**
	Contingencies (22%)				$ 22,660.00
	Utility Relocation (10%)				$ 10,300.00
	*Price Escalation Factor (5%)***				$ 5,407.50
				Construction Total*	**$ 141,000.00**
	Opinion of Probable Construction Cost Range*: $103,000.00 to $141,000.00				
	Design and Permitting (18%)				$ 18,540.00
	Construction Administration (5%)				$ 5,150.00
				Engineering Subtotal*	**$ 24,000.00**
				Project Total*	**$ 165,000.00**
	Opinion of Probable Project Cost Range*: $127,000.00 to $165,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Marlin Drive - Alternative 2

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 5,375	$ 5,500.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 3,225	$ 3,500.00
3	EROSION CONTROL	1	LS	$ 3,225	$ 3,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	6	EA	$ 5,000.00	$ 30,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	160	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	160	SY	$ 14.07	$ 2,500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	14	TON	$ 87.81	$ 1,500.00
11	8" ASP CONC BASE CRS B25.0C	58	TON	$ 107.07	$ 6,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	630	LF	$ 73.22	$ 46,500.00
16	24" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	3,561	SY	$ 2.86	$ 10,500.00
20	SEEDING AND MULCHING	0.06	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	373	CY	$ 38.25	$ 14,500.00
22	GRADING	280	SY	$ 38.25	$ 11,000.00
23	HAULING EXCESS MATERIAL	373	CY	$ 28.00	$ 10,500.00
				Subtotal*	**$ 152,000.00**
	Contingencies (22%)				$ 33,440.00
	Utility Relocation (10%)				$ 15,200.00
	*Price Escalation Factor (5%)***				$ 7,980.00
				Construction Total*	**$ 209,000.00**
	Opinion of Probable Construction Cost Range*: $152,000.00 to $209,000.00				
	Design and Permitting (18%)				$ 27,360.00
	Construction Administration (5%)				$ 7,600.00
				Engineering Subtotal*	**$ 35,000.00**
				Project Total*	**$ 244,000.00**
	Opinion of Probable Project Cost Range*: $187,000.00 to $244,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Tarpon Drive - Alternative 1

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 3,775	$ 4,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 2,265	$ 2,500.00
3	EROSION CONTROL	1	LS	$ 2,265	$ 2,500.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	5	EA	$ 5,000.00	$ 25,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	28	SY	$ 4.82	$ 500.00
9	REMOVAL OF EXT ASPHALT PVMT	28	SY	$ 14.07	$ 500.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	3	TON	$ 87.81	$ 500.00
11	8" ASP CONC BASE CRS B25.0C	10	TON	$ 107.07	$ 1,500.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	240	LF	$ 130.67	$ 31,500.00
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	90	LF	$ 73.22	$ 7,000.00
16	24" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	REMOVE & REPLACE TIDE GATE	1	EA	$ 10,000.00	$ 10,000.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	1,413	SY	$ 2.86	$ 4,500.00
20	SEEDING AND MULCHING	0.03	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	196	CY	$ 38.25	$ 7,500.00
22	GRADING	147	SY	$ 38.25	$ 6,000.00
23	HAULING EXCESS MATERIAL	196	CY	$ 28.00	$ 5,500.00
				Subtotal*	**$ 111,000.00**
	Contingencies (22%)				$ 24,420.00
	Utility Relocation (10%)				$ 11,100.00
	*Price Escalation Factor (5%)***				$ 5,827.50
				Construction Total*	**$ 152,000.00**
	Opinion of Probable Construction Cost Range*: $111,000.00 to $152,000.00				
	Design and Permitting (18%)				$ 19,980.00
	Construction Administration (5%)				$ 5,550.00
				Engineering Subtotal*	**$ 26,000.00**
				Project Total*	**$ 178,000.00**
	Opinion of Probable Project Cost Range*: $137,000.00 to $178,000.00				

* Rounded to the nearest $1000

** Assumes bidding will occur in 2026

Holden Beach Stormwater Improvements
Area 10 - Tarpon Drive - Alternative 2

Opinion of Probable Construction Cost

September 5, 2025

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
1	MOBILIZATION	1	LS	$ 1,525	$ 2,000.00
2	MAINTENANCE OF TRAFFIC	1	LS	$ 915	$ 1,000.00
3	EROSION CONTROL	1	LS	$ 915	$ 1,000.00
4	CLEARING & GRUBBING	1	LS	$ 1,500	$ 1,500.00
5	REMOVE & REPLACE CATCH BASIN	0	EA	$ 9,000.00	$ -
6	INSTALL NEW CATCH BASIN	5	EA	$ 5,000.00	$ 25,000.00
7	CONTROL OF WATER/ DEWATERING	0	LS	$ 3,000.00	$ -
8	BREAKING OF EXT ASPH PVMT	118	SY	$ 4.82	$ 1,000.00
9	REMOVAL OF EXT ASPHALT PVMT	118	SY	$ 14.07	$ 2,000.00
10	2" ASP CONC SURF CRS S9.5B OR S9.5C	11	TON	$ 87.81	$ 1,000.00
11	8" ASP CONC BASE CRS B25.0C	42	TON	$ 107.07	$ 5,000.00
12	REMOVE & REPLACE SIDEWALK	0	SY	$ 122.00	$ -
13	12" DRAINAGE PIPE	0	LF	$ 130.67	$ -
14	15" DRAINAGE PIPE	0	LF	$ 83.45	$ -
15	18" DRAINAGE PIPE	120	LF	$ 73.22	$ 9,000.00
16	24" DRAINAGE PIPE	0	LF	$ 73.22	$ -
17	INSTALL TIDE GATE	1	EA	$ 2,400.00	$ 2,500.00
18	CLASS B RIP RAP 18" THICK	0.0	TON	$ 80.00	$ -
19	GEOTEXTILE FOR DRAINAGE	678	SY	$ 2.86	$ 2,000.00
20	SEEDING AND MULCHING	0.01	AC	$ 2,623.24	$ 500.00
21	EXCAVATION	71	CY	$ 38.25	$ 3,000.00
22	GRADING	53	SY	$ 38.25	$ 2,500.00
23	HAULING EXCESS MATERIAL	71	CY	$ 28.00	$ 2,000.00
				Subtotal*	**$ 61,000.00**
	Contingencies (22%)				$ 13,420.00
	Utility Relocation (10%)				$ 6,100.00
	*Price Escalation Factor (5%)***				$ 3,202.50
				Construction Total*	**$ 84,000.00**
	Opinion of Probable Construction Cost Range*: $61,000.00 to $84,000.00				
	Design and Permitting (18%)				$ 10,980.00
	Construction Administration (5%)				$ 3,050.00
				Engineering Subtotal*	**$ 14,000.00**
				Project Total*	**$ 98,000.00**
	Opinion of Probable Project Cost Range*: $75,000.00 to $98,000.00				

* Rounded to the nearest $1000

** Assumes bidding will ocurr in 2025