

Ben Cahoon
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Town of Nags Head

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M. Renée Cahoon
Commissioner

J. Webb Fuller
Commissioner

Michael Siers
Commissioner

Date: May 29, 2019

To: Board of Commissioners

From: David Ryan, P.E.

RE: Town of Nags Head Stormwater Capital Improvement Project Conceptual Designs

At the May 15, 2019 Board of Commissioners meeting, the Board requested additional information regarding the following items:

1. Confirmation from the consulting engineer, WithersRavenel, on the scheduling of the commencement of the topographic survey and partial boundary survey work;
2. Additional information on the Clean Water Management Trust application process and potential for grant award funding and;
3. A cost-benefit analysis for Project Area #9 (Carolinian Circle/Nags Head Pond)

The following provides responses to the additional information requested by the Board:

1. *Confirmation from the consulting engineer, WithersRavenel, on the scheduling of the commencement of the topographic survey and partial boundary survey work.*

Response: WithersRavenel has indicated that the subcontracted surveying services can start within a two-week period of execution of the submitted proposal.

2. *Additional information on the Clean Water Management Trust application process and potential for grant award funding.*

Response: An on-site meeting was conducted with Justin Mercer, Eastern Field Representative with the Clean Water Management Trust Fund (CWMTF). Existing conditions were reviewed in addition to the proposed conceptual drainage improvement plan. Details of the application process were provided, grant program type, time frame for receipt and awarding of grant funding, cost share guidelines and project eligibility.

North Carolina's Clean Water Management Trust Fund (CWMTF) is a non-regulatory organization with a focus on protecting and restoring the State's land and water resources. Annual grants are awarded to non-profit and governmental organizations to protect land for natural, historical and cultural benefit, limit encroachment on military installations, restore degraded streams, and develop and improve stormwater treatment technology.

The Innovative Stormwater Grant program can consider funding innovative stormwater projects that demonstrate a novel and untried method to water quality and achieving CWMTF goal of advancing stormwater-management practices to help protect communities from the effects of urban runoff and enhancing water quality.

CWMTF defines "innovative stormwater projects" as projects that: 1) bring something new or different to practices in stormwater-quality management, 2) build on experience and current practices, and 3) advance practices in stormwater-quality management regionally or statewide.

Recipients of CWMTF innovative stormwater grants must agree to maintain and manage, at maximum functional utility, the stormwater improvements installed or constructed under the innovative stormwater project only for the period during which the site is needed and used for the innovative stormwater project.

CWMTF has only one grant cycle per year via a competitive process with proposals considered based on criteria developed specifically for innovative stormwater projects. Grant award decisions will be made by and at the sole discretion of CWMTF's Board of Trustees.

Moneys from the Fund are appropriated annually to finance projects to clean up or prevent surface water pollution and for land preservation. Appropriations for funding of innovative stormwater projects vary from year to year.

Minimum criteria have been developed for awarding grants via an application rating system. The major components of the rating system are listed below:

Section I. Merit of the project's objectives

Section II. Completeness and clarity of the project description and the project's output

Section III. Potential for the project's results to be applied broadly

Section IV. Applicant's commitment to the project

Section V. Matching Resources

The Board may want to consider the following:

Timeframe:

The time frame for submission of applications is typically the first week in February. Grant award decisions are typically rendered the second week of September. A timeline for this grant application may track as follows:

February 2020- CWMTF application submission
September 2020- CWMTF grant decision
November 2020- Construction drawings completed
December 2020- Project permitting
January 2021- Bidding and contract execution
February 2021- Begin project construction
June 2021- End project construction

Innovation:

A key consideration in the rating of the merits of a projects objective’s is whether the project brings new or different practices in stormwater management. A CWMTF innovative stormwater grant was recently awarded to Caswell Beach, NC for a similar type dune infiltration application. A comparable dune infiltration system has also been constructed in Kure Beach, NC.

Available Funds:

Funding appropriations for innovative stormwater grants have varied over recent years. Total funding for innovative stormwater grants was \$390,253 in 2018 with only two projects funded as compared to \$1.2 million in 2017 for a total of seven grant awards issued. The maximum award amount in 2017 for a single project was \$250,000. Eight applications have been submitted for the 2019 grant cycle with a total requested value of \$1.82 million.

Matching Resources:

Matching resources is a heavily weighted consideration in the rating of application submission. Proposals are assessed a value based on a percentage and source of match. The typical source match ranges between 20% to 50% for a local cost share. The larger grant request amount typically results in a larger local cost share percentage. Our application would propose a 50% local cost share to increase the application score, resulting in an estimated \$250,000 requested amount.

In summary, the project application would be eligible for available funding under the CWMTF innovative stormwater program. There is uncertainty in the appropriated fund amount for the innovative stormwater program. The proposal may lack the novelty, untried methodology and competitiveness due to the duplication of infiltration practices applied from previously funded projects. It will take approximately 16 months before a CWMTF award decision would be rendered and up to approximately 21 months before construction could commence.

3. *A cost-benefit analysis for Project Area #9 (Carolinian Circle/Nags Head Pond)*

Response: WithersRavenel has submitted a memorandum dated May 24, 2019, please see attached, providing additional detail on the cost-benefit of Project Area #9- Carolinian Circle Subdivision/ Nags Head Pond Subdivision.

Roadway and structural flooding have been documented in the subject area for (3) consecutive years from: Hurricane Matthew, a series of rainfall events in summer of 2017 and a series of rainfall events in the summer of 2018. The area is constrained by high water table conditions which, when saturated, can lead to localized flooding.

As noted in the WithersRavenel memorandum, there is minimum measurable and quantifiable benefits resulting from the proposed improvements during large storm events. The larger rainfall events have resulted in the greatest flood impacts for the past several years. The system will perform optimally for less frequent and smaller rainfall events. Based upon similar system performance, it may also provide a benefit in drawing down ponded surface water/groundwater conditions after larger rainfall events.

The types of costs associated with the project development include:

1. Engineering Costs: surveying, design development, construction document preparation, contracting and bidding and construction administration.
2. Project Construction Costs
3. Project Operation and Maintenance Costs

The types of benefits can be classified as

1. Projected decrease in flood frequency
2. Decrease in local ponding duration
3. Quality of life improvement

The WithersRavenel memorandum has been summarized in the Tables A and B below

Table A

Engineering Costs	\$11,500
Estimated Project Construction Costs	\$160,000
Estimated Annual Operation & Maintenance Costs	\$10,000
Estimated Financing and incidental costs	\$28,500
Total Project Costs*	\$400,000

*An estimated 20-yr life-cycle has been applied to the annual operation and maintenance cost to evaluate the asset total project cost

Table B

Description	Metric	Benefit
Carolinian Circle Subdivision	1" rainfall event	decrease flood frequency by 60% decrease in ponding time improved quality of life
Nags Head Pond Subdivision	1" rainfall event	decrease flood frequency by 40% decrease in ponding time improved quality of life
Carolinian Circle Subdivision	> 1.5" rainfall event	no decrease in flood frequency no significant decrease in ponding time no quality of life improvement
Nags Head Pond Subdivision	> 1.5" rainfall event	no decrease in flood frequency no significant decrease in ponding time no quality of life improvement

The costs associated with the project as compared to the benefit can be further quantified by attributing a unit value per lot or per length of roadway served. Results of this evaluation is noted in Table C below.

Table C

Description	Unit	Cost
Carolinian Circle Subdivision	per lot served	\$28,261
Nags Head Pond Subdivision	per lot served	\$11,594
Carolinian Circle Subdivision	per length of road	\$300
Nags Head Pond Subdivision	per length of road	\$167

Attached for the Board’s consideration is the WithersRavenel memorandum dated May 24, 2019, Project Area 9- Carolinian Circle and Nags Head Pond, Additional Cost Benefit Discussion, to supplement the previous provided drainage infrastructure improvement drainage concept design.

The Board may also want to consider Budget Amendment No. 13, for the transfer of appropriated funds from Fund Balance to the Stormwater Capital Reserve Account -Capital Outlay Infrastructure to cover the engineering and surveying costs in the WithersRavenel proposal dated May 13, 2019 which is enclosed herein.

Also enclosed for the Board’s reference is the previously provided Stormwater Master Plan Phase V Budget Summary and Stormwater Master Plan Phase V Engineering Design & Construction Summary.

MEMORANDUM

To: David Ryan
CC: File
From: Hunter Freeman
Date: May 24, 2019
Project: Project Area 9 – Carolinian Circle & Nags Head Pond
Subject: Additional Cost Benefit Discussion

WithersRavenel has been asked by the Town of Nags Head to provide a cost-benefit analysis for Project Area 9. Summary information regarding the results of engineering models and estimated final design and construction costs has been previously submitted and reviewed by the Town.

BACKGROUND

Project Area 9 is an area near Carolinian Circle and Nags Head Pond where the Town has indicated there are long periods of standing water and repetitive structural flooding after rainfall events.

Generally, standing water is a nuisance within the Town right of way – water stands and soils remain saturated in swales and ditches for extended periods of time after rainfall events. Flooding frequency and times vary based on antecedent soil and groundwater conditions, but it is not uncommon for the roadside swales to remain saturated for a period of days. Large rainfall events can also affect the level of service of the roadway travel lanes at times.

Additionally, Town staff has received complaints that existing residences in the area have experienced flooding numerous times. At least three residences within the project area have finished or enclosed ground floor spaces.

WithersRavenel estimates that the watershed draining to the project area is 21 acres with existing development resulting in a net land cover of +/-30% impervious area. The watershed area includes portions of 23 private properties, 1 public property, and several public roadways. There are 5 private properties within the area where flooding has been repeatedly reported.

The flood risk is dependent on soil conditions, rainfall intensity, and overall rainfall depth, but is exacerbated by the generally flat terrain. Ground elevations in area are between 9 and 10, based on LiDAR topography. These elevations remain generally constant between the project area and Highway 158 bypass, resulting in little to no slope available for positive drainage. Field surveys have not been obtained in this area.

Although this area is not within the mapped FEMA 1% annual chance (100-yr) flood risk area, the base flood elevation near this project is approximately 9.0, per FIRM MAP 3720989300J, dated 9/20/06. The area is identified and mapped as being within Zone X. Per the Dare County Flood Insurance Study, Zone X includes areas expected to be inundated during the 0.2% annual chance (500-yr) storm, or areas that may be flooded less than 1 foot deep during the 100-year storm. (Note: FEMA has issued preliminary updates to the flood maps, and the preliminary map, number 3720989300K dated 6/30/2016, has a 100-yr flood elevation of 10.0, but the project area remains in Zone X). While these areas are identified by the FIRM MAP as being outside of the 100-year floodplain, the impacts of large, frequent storms may lead to raised groundwater tables and reduced capacity in downstream infrastructure, both of which increase the potential flood risk.

Although the FEMA FIRM Map indicates that this area is outside of the 100-year floodplain, the historical information relayed by the Town makes it clear that this project area experiences localized flooding during rainfall events significantly smaller than the 100-yr storm.

PROPOSED IMPROVEMENTS & DISCUSSION

The proposed improvements include a series of groundwater pumps connected to a force main system which would discharge to the east of the project area into an existing storm drainage network.

Large storms contain a volume of rainwater and storm surge that causes wide ranging impacts across the watershed. Because of the elevation of roadways and adjacent residences, or portions of the existing residences that have been enclosed at ground level, there is ***minimal measurable and quantifiable benefit resulting from the proposed improvements during large storm events.***

The proposed improvements are aimed at improving conditions during smaller rainfall events. Standing water on the roadway, and extended periods of time when standing water is present adjacent to the roadway result in not only a loss of service, but also increased road and right of way maintenance costs. The pump option is capable of lowering the water table within the project area between small rainfall events. The system will perform optimally at times when rainfall of less than 1" total rainfall occurs no more frequently than every 3 to 5 days. During dry periods with little to no rain anticipated, the pump system may not need to run at all.

During these smaller storms, the simple rainfall-runoff models run by WithersRavenel indicate that the frequency of roadway and structural flooding is reduced by an estimated two thirds in Carolinian Circle, and by an estimated two-fifths in Nags Head Pond. Ponding times after rainfall events is also reduced.

WithersRavenel's current preliminary cost opinion for completion of the project is \$160,000 plus additional fees for design, permitting, bidding and construction administration. The Town estimates that operation and maintenance costs for the proposed system would be in the range of \$10,000 annually. Over a 20-year period, the total Town expenditures for the system, not including regular road and roadside maintenance, would be +/- \$400,000.

The WithersRavenel proposed design alternative had 2 goals:

1. Lower the groundwater table to restore the soil's natural ability to store (infiltrate) rainfall
2. After a storm event, increase the rate at which the water table can be lowered to reduce the duration of flooding

The first goal works to directly reduces the number of anticipated flooding events. The second goal provides an improved quality of life and neighborhood resiliency. Both goals improve the functionality of the existing roadside drainage network, which maintains a high level of service for the roadway and reduces the frequency of flooding on neighboring private property.

The proposed improvements, at a minimum, are expected to improve conditions along 1,000 linear feet of Carolinian Circle, and 600 linear feet of Oak Knoll Drive.

In this area, the models indicate shallow flooding depths following smaller (non-extreme) rainfall events. The LiDAR topography, combined with the modeling approach provides a general assessment of risk and benefit. For more accurate results, detailed field topography and more complex groundwater and surface water models could be used, however the cost of completing such models would represent a significant portion of the anticipated construction budget.



WithersRavenel

Our People. Your Success.

May 13, 2019

Mr. David Ryan, PE
Town Engineer
Town of Nags Head
PO Box 99
Nags Head, NC 27959

(252) 441-6221

RE: Update to the Town of Nags Head Stormwater Master Plan – Phase 5
Agreement for Consulting Engineering Services

WR Project: 02160539.30

Dear Mr. Ryan:

WithersRavenel is pleased to present the attached Agreement for professional consulting services for Phase Five of the Update to the Town of Nags Head Stormwater Master Plan. The completed Phase One work consisted of a review of the Town's previous master plan, and site visits to observe drainage conditions. The completed Phase Four work covered preliminary assessment and recommendations for nine drainage projects prioritized during Phase One by Town Staff.

Phase Five progresses the preliminary assessment completed in Phase Four to field survey for Project Areas #9, #10, #12, and #13, final design and construction drawings for project areas #12 and #13, and assistance with grant applications and supporting documents for Project Area #4. This proposal includes design for the three selected drainage projects including field survey, design, permitting and for the 2 projects expected to be released for bidding, construction documents and bid assistance.

We appreciate the opportunity to provide this agreement and look forward to working with you. If you have any questions or concerns, please contact me at 919.469.3340.

Sincerely,

WithersRavenel

Hunter Freeman, PE

The proposed agreement attached is valid until May 31, 2019.

Attachment

Update to the Stormwater Master Plan – Phase 5 Nags Head, North Carolina Agreement for Consulting Engineering Services

The “ENGINEER” referred to in this Agreement shall be WithersRavenel, Inc. and its sub-consultants

The “TOWN” referred to in this Agreement shall be The Town of Nags Head.

A. PROJECT UNDERSTANDING

The Town of Nags Head desires an update to the Stormwater Master Plan of 2006 and a reevaluation of that plan’s recommended stormwater capital improvement projects. In order to facilitate collaborative solutions between the Town and Engineer, the updated Stormwater Master Plan will be accomplished incrementally in several phases. The completed Phase One consisted of preliminary work including a review of the Town’s previous master plan, area research, and site visits to observe drainage conditions. During Phase One, thirteen project areas were identified. The completed Phase Two covered preliminary design development for five prioritized drainage projects identified during Phase One. Work included preliminary assessment and conceptual design, a report summarizing proposed solutions and recommendations, project meetings, and site visits.

A previous agreement for Phase Three progresses the preliminary assessment completed in Phase 2 to a final design and construction drawings for three of the five project areas. The three projects include the Gallery Row Outfall (Project Area #1), Nags Head Acres/Vista Colony (Project Area #2), and The Village at Nag’s Head (Project Area #3). The previous agreement included a final design for the three drainage projects including survey, design, construction documents, and bid assistance.

A previous agreement provided Construction Observation services for Areas 1, 2, & 3.

A previous agreement for Phase Four included additional conceptual design concepts for Project Areas #4 and #5, and preliminary design concepts for the remaining Project Areas #6 - #13.

This Project, Phase Five, progresses the preliminary design concepts completed in Phase 4 to final designs and construction drawings for two of the seven project areas. The two projects included in Phase 5 are South Nags Head (Project Area #12), and Old Oregon Inlet Road (Project Area #13). This agreement includes a final design for these two drainage projects including survey, design, construction documents, permitting, bid assistance, and construction administration. This agreement assumes the two projects are to be designed and bid as one bid package.

Additionally, the Town wishes to obtain field survey information for project areas #4 (Wrightsville Avenue), #9 (Carolinian Circle and Nags Head Pond) and #10 (Nags Head Cove), and pursue grant funding for future design and construction of the concept for Project Area #4 (Wrightsville Ave.).

B. BASIC SERVICES OF THE ENGINEER

Task 1 – Topographic Survey and Partial Boundary Survey

The Engineer will perform the following topographic and partial boundary services to be used for design, staking and mapping for Project Areas #4, #9, #10, #12, and #13 as outlined in Exhibit III (Survey Exhibit):

- ▶ Establish horizontal survey control tied to the NC Grid Coordinate System;
- ▶ Establish vertical survey control benchmarks based on NAVD 88 datum;
- ▶ Locate right-of-way limits, known easements, and adjacent property boundaries fronting the right of way or project area (front irons only) for Project Areas #4, #9, #10, #12, and #13 (approx. 11,000 total linear feet of right-of-way);
- ▶ Perform field topographic survey with grade shots at a 50’ x 50’ grid within each project area;

- ▶ Locate existing visible structures, vehicular areas, utilities and similar features within the project limits
- ▶ Locate horizontal and vertical location of water, gas, and sewer utilities at spot locations potholed by the Town of Nags Head Public Works. Utility sizes to be provided by the Town.

Full boundary survey of parcels and easement mapping services are not included as a part of this Task. See attached Exhibit III (Survey Exhibit) for proposed survey boundaries. This survey task may be performed by a subcontractor and coordinated by WithersRavenel.

This task will be completed and billed in accordance with Exhibit II.

Task 2 – Design Development Phase Services

2.1 Meetings

The ENGINEER will attend one meeting with TOWN representatives to review the TOWN's comments on the Preliminary Designs completed during Phase Four, confirm the project requirements for sites 4, 12, and 13 and to receive any additional necessary information from the Town that may have been identified during the previous tasks and Town meetings. The ENGINEER will provide meeting minutes to the TOWN via e-mail. The ENGINEER will conduct video conference calls via GoToMeeting or Webex up to twice a month with the TOWN for up to two months during the Design Development Phase. This Task may include one field visit to view critical conditions at the ENGINEER's discretion. This Task may include up to one presentation to Town Council during a Council Work Session.

2.2 Preliminary Construction Contract Documents (Approx. 60% Complete)

The ENGINEER will utilize the conceptual plan and TOWN review comments to develop Preliminary Construction Contract Documents for Project Areas #12, and #13 for submittal to the TOWN. During the Preliminary Design completed in Phase 4, two design alternatives were developed for each project area (see attached report in Appendix A). The TOWN selected a preferred design option for each project area as described below. The scope is based off of these selected designs.

- ▶ **2.2.1: Project Area #12: South Nags Head**
 - Conceptual Design Alternative #1: Add additional french drain infrastructure on east side of South Old Oregon Inlet Road and groundwater lowering system to pump stormwater to TOWN selected discharge location east of Old Oregon Inlet Road.
 - This design excludes design for improved beach access or associated TOWN amenities within project limits.
- ▶ **2.2.2: Project Area #13: Old Oregon Inlet Road**
 - Conceptual Design Alternative #1: Add additional french drain infrastructure, well, pump and force main design to outfall near Town Fire Station.
 - This design excludes soil testing and design of infiltration area in existing grassed area north of Town Fire Station

The selected projects are detailed in the attached Exhibit IV and Appendix A.

Comments generated by the TOWN during the review of the Preliminary Design completed in Phase 4 will be addressed and the following items will be developed and submitted electronically to the TOWN for one review cycle:

- ▶ One updated opinion of estimated probable cost
- ▶ Preliminary Construction Drawings including approximately the following sheets:
 - A cover sheet with vicinity map, index, notes and legend
 - Existing Condition Sheet(s)
 - Sediment and Erosion Control Plan
 - Site Plan for each project area
 - Grading and Drainage Plan for each project area

- Plan & Profile Sheet(s) for selected proposed pipe infrastructure [as deemed necessary by the ENGINEER]
- Groundwater Pumping Plan, Well Design, and Details [as deemed necessary by the ENGINEER]
- Standard Detail Sheets
- ▶ Preliminary Bidding Documents and Specifications (i.e. Project Manual) consistent with NCDOT's standard format for project areas #12 and #13

The ENGINEER may, at ENGINEER'S discretion, subcontract with Moffatt and Nichol for review of project design and plans with regards to the previous 2006 Stormwater Master Plan. The above documents will be the basis for the Final Construction Contract Documents. Submittal of the Preliminary Construction Contract Documents marks the completion of this Task.

Task 3 – Construction Contract Document Phase Services

3.1 Meetings

The ENGINEER will attend one meeting with TOWN representatives and NCDOT to review comments on submittals from the Design Development Phase. The ENGINEER will provide meeting minutes to the TOWN via e-mail. The ENGINEER will conduct conference calls up to twice a month with the TOWN for up to three months during the Construction Contract Document Phase. This Task may include one field visit to view critical conditions at the ENGINEER's discretion.

3.2 Final Construction Contract Documents

The ENGINEER will utilize the conceptual plan and TOWN & NCDOT review comments to develop Construction Contract Documents for Project Areas #12 and #13 for submittal to the TOWN and NCDOT. Comments generated by the TOWN and NCDOT during the Design Development Phase will be addressed and the following items will be developed and submitted electronically to the TOWN for one review cycle:

- ▶ One updated opinion of estimated probable cost
- ▶ Final Construction Drawings for Project Areas #12 and #13
- ▶ Final Bidding Documents and Specifications (i.e. Project Manual) for project areas #12 and #13 consistent with NCDOT's standard format

The ENGINEER may, at ENGINEER'S discretion, subcontract with Moffatt and Nichol for review of project design and plans with regards to the previous 2006 Stormwater Master Plan.

Changes to the final documents beyond the ENGINEER's control, or those that are a departure from the Design Development Phase (60% Drawings) shall warrant additional fees. Any additional bid alternates, splitting the project areas into separate bid packages, or phased bid documents shall warrant additional fees.

Advertisement for bid by the Town marks completion of this task.

3.3 NCDOT Encroachment Agreement Preparation

Project Area #12 (South Nags Head) and Project Area #13 (Old Oregon Inlet Road)] are proposed in NCDOT right-of-way and may require encroachment agreements with NCDOT. The ENGINEER will provide supporting documentation sufficient for the TOWN to prepare NCDOT standard forms. The TOWN shall submit documentation to NCDOT for review and approval of the encroachment agreements. The ENGINEER will assist the TOWN in responding to comments on the Encroachment Agreements.

Submittal of the Final Construction Contract Documents to the TOWN marks the completion of this Task.

Task 4 – Project Area #4 (Wrightsville Avenue) Design Development and Grant Application

The ENGINEER will use the collected survey information to develop preliminary plans for a french drain system, pump, force main, and infiltration system for pumping floodwaters from Wrightsville Avenue to the Bonnett Street Beach Access Parking Lot. The ENGINEER will develop concept plans for green infrastructure improvements at the Bonnet Street parking lot.

The ENGINEER will assist the Town with compiling one grant application for this project. At this time is it anticipated that the Town will pursue a Clean Water Management Trust Fund Grant for the project. The ENGINEER will attend one grant interview meeting as part of this scope of work.

The grant interview will constitute completion of this task. In the event that the grant agency does not require an interview, the grant application submittal constitutes completion of this task.

Task 5 – Permitting (NCDEQ & USACE)

The ENGINEER will attend one meeting between the TOWN and the NCDEQ and USACE to present the plans for each of the three project areas being designed under this contract. Following the agency meeting, the ENGINEER will prepare a development permit submittal package for project areas #12 and #13, and after TOWN review, will submit for applicable permits.

Site 4 may be added to the permit package for additional fees if requested by the TOWN.

The ENGINEER will respond to up to 2 rounds of comments from the permitting agencies, however responses that require design modifications or comments that request items outside the scope of work (such as for environmental services) will necessitate additional fees.

Task 6 – Bidding and Construction Contract Award Phase Services

Upon approval by the TOWN of the work performed in the Construction Contract Document Phase, and upon receipt of written authorization from the TOWN, the ENGINEER will assist the TOWN during the Bidding and Construction Contract Award Phase Services, consisting generally of the following sub-tasks:

6.1 Bid Advertisement

Assist the TOWN in advertising the PROJECT for competitive bids by formal or informal process to be determined. This task will include submitting the "Notice to Bidders" as required by the North Carolina General Statutes to the targeted contractors and/or for publication on the TOWN web site as deemed necessary by the ENGINEER and the TOWN for proper notification and solicitation of bids. NCDOT requirements will also be followed. Conflicts between TOWN and NCDOT bidding policies shall be resolved by TOWN staff. TOWN will pay all fees associated with advertising which would be included in reimbursable expenses. For purposes of this proposal, this task includes services for one bid process.

ENGINEER to provide assistance associated with this task at its Cary, NC office.

6.2 Pre-Bid Meeting

Upon request of TOWN, the ENGINEER will attend one Pre-Bid Meetings with the TOWN's representatives, NCDOT, and prospective bidders and material suppliers. The ENGINEER will respond, in writing, to questions generated during the pre-bid meeting.

6.3 Additional Bid RFIs and Addendums

The ENGINEER will provide prompt written responses to prospective bidders' Request for Information between the date the project is advertised and the deadline for accepting questions regarding the bid documents (2 week maximum unless otherwise agreed to by the ENGINEER). This task would also cover any addendums issued during the bid process.

Submittal of the approved contracts to the TOWN shall mark the end of the Bidding and Construction Contract Award Phase task.

Task 7 – Construction Phase Services

The general intent is to provide construction observation site visits to fit during the construction schedule for Project Areas #12 and #13. It is anticipated that the projects will be constructed in one continuous construction timeline, without lengthy breaks between active construction days once construction begins. The construction observation services provided will be for key points in the construction of the installation of the storm sewer infrastructure as determined by WithersRavenel and the Town noting there is a limited number of site visits. Some assumptions for the proposed work are shown below which may be modified upon mutual agreement between the Town and WithersRavenel. Refer to the scope of work for other specifics.

- ▶ Project has 2 Project Areas;
- ▶ Area 12 consists of installation of french drain and potential installation of pump and force main system.
- ▶ Area 13 consists of french drain and installation of pump and forcemain system to discharge point.
- ▶ No engineering certifications and record drawings (as-builts) are included. Any water lowerings and/or unforeseen conditions that result in additional trips or time on the project site are not included.
- ▶ WR will provide the Town limited support by responding to Contractor requests for information.
- ▶ Fee and expense schedule shall follow the Fee & Rate Schedule approved by the Town in the most recent agreement.

7.1 Limited Construction Observation

This task would be for periodic general observation and documentation concerning the construction of the Project's storm water infrastructure which includes photos and field reports.

During the project, WR will perform the periodic field observations to document general compliance with the plans and specifications which includes the below:

- ▶ One (1) WR representative to attend pre-construction conference/site visit (estimated 8 hours total);
- ▶ Perform limited Construction Observation on a per visit basis for an average of eighteen (18) hours per overnight trip and mileage/hotel expenses (12 trips estimated);
- ▶ Prepare Field Reports of activities observed while on site; Take photos during Observations for documentation; Identify progress of work. Provide copies of these reports to the Client (estimated at 1.5 hours per site visit);
- ▶ Identify and relay to the Client non-conforming work observed on the date of the site visit (estimated 6 hours total);
- ▶ Conduct one (1) general punch list inspection in conjunction with a site visit and provide requirements to be completed for the contractor associated with the storm sewer system once construction is complete. Provide 1 punch list (estimated 2 hours);
- ▶ Attend one (1) general acceptance inspection of the installed public utility improvements with the Town of Nags Head and Contractor (estimated 8 hours total);
- ▶ Correspondence with Client and contractors on project related items during construction period (6 months, estimated 0.5 hour per week on average). This includes review of information provided by the Town.
- ▶ Respond to Requests for Information (RFI) from contractor or Town. WR to assist in answering design or construction related questions with respect to the approved plans. Assist town with developing and drafting project specific details and specifications (estimated 12 hours total).

If the schedule is accelerated or delayed, the overall fee could be adjusted accordingly. This contract does not include observation of pump and forcemain for Project Area #12 if such construction is commenced at a later date or as part of a separate contract.

Because WR will not contract directly with Geotechnical and any contractors performing the work, we are not responsible for the direction of work. The intent of on-site observation is to become generally familiar with the progress and quality of the portion of the Work completed, and to determine, in general, if the Work is being performed generally in accordance with the general construction standards and specifications, contract documents. WR shall not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work and shall not have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents. On the basis of the site visits, WR shall keep the Owner reasonably informed about the progress of the associated Work completed, and it shall be the Owner's responsibility to make decisions on work progress, changes, and costs. Also, it shall be the Client's responsibility to engage the contractor and schedule to repair any work that needs remediation as identified by the government agencies inspection reports or notices of violations or as identified on WR reports.

C. ADDITIONAL SERVICES OF THE ENGINEER

The ENGINEER shall undertake Additional Services only upon receipt of written authorization from the TOWN and agreement of additional fees. Fees for additional services may be lump sum or based on the hourly rates for project personnel as based on the WithersRavenel Fee Schedule (Exhibit II), subject to agreement between ENGINEER and TOWN. Such additional services may include (but not be limited to) any of the following which are not included in this proposal:

- ▶ Wetland and Buffer Determination Services
- ▶ Soil Investigation Services
- ▶ Additional Meetings with TOWN Stormwater Engineering Staff including Meeting Minutes (*\$160 per hour per each ENGINEER's representative at additional meetings + \$160 for preparation of Meeting Minutes*)
- ▶ TOWN permitting, such as lot coverage, zoning compliance, or other associated local land use code compliance documentation
- ▶ Permitting at agencies other than those described above
- ▶ Public Meetings and Presentations (except as described above)
- ▶ Permeable Pavement Design
- ▶ Sanitary sewer services or wastewater treatment services
- ▶ Groundwater testing or treatment (such as for water quality)
- ▶ Flood studies or coordination with FEMA (such as for CLOMRs or LOMRs)
- ▶ Additional Survey Work (such as Complete Boundary, Tree Surveys, Construction, As-built surveys, Easement Staking)
- ▶ Subsurface Utility Exploration or Engineering
- ▶ Land/easement mapping & acquisition services or coordination (such as metes and bounds for land / easement acquisitions except as designated above)
- ▶ Offsite storm drainage design (such as for areas upstream or downstream of the drainage projects)
- ▶ Preparing drawings and specifications for alternate bids except as stated above
- ▶ Providing services of special consultants other than the as specifically described under Basic Services.
- ▶ Serving as an expert witness for the TOWN in any litigation involving the PROJECT.
- ▶ Providing additional services, if the PROJECT is required to be re-bid for any reason.
- ▶ Hardscape & sign plans;
- ▶ Structural engineering, including for items such as retaining wall or foundation designs (except as described above);
- ▶ Pavement designs, other than patching and trench repair (such as for roads or greenways);

- ▶ Road widening or turn lane improvements;
- ▶ Offsite Utility extensions;
- ▶ Preparation of electronic file suitable for GPS machine control;
- ▶ Utility relocation coordination such as water lines;
- ▶ Specialty drainage structures or headwalls;
- ▶ NPDES Monitoring;
- ▶ Negotiations/coordination with NCDOT for modifications to NCDOT standard encroachment agreements;
- ▶ Geotechnical services such as engineering, testing, or certifications
- ▶ Investigative review or audit of construction contractor submitted information (such as Performance and Payment Bond, Financial Statement, and Insurance coverages).
- ▶ Record drawings or As-builts;
- ▶ Any other items not specifically listed in the Scope of Services.

D. THE OWNER'S RESPONSIBILITIES

During the performance of the ENGINEER'S services under this AGREEMENT, the TOWN will:

- ▶ Provide full information as to its requirements for the PROJECT.
- ▶ Assist the ENGINEER by providing all available information pertinent to the PROJECT, including previous inspection data and reports, maps, old drawings, maintenance records and any other data relative to design and construction of the PROJECT.
- ▶ Provide full and complete comments during submittals for review (review cycles). ENGINEER has established a maximum number of review cycles at various stages of design. Additional submittals or review cycles may require additional fees.
- ▶ Examine all studies, reports, sketches, estimates, specifications, drawings, proposals and other documents presented by the ENGINEER and render in writing decisions pertaining thereto within a reasonable time so as not to delay the services of the ENGINEER.
- ▶ Designate a person in writing authorized to act and make binding decisions on behalf of the TOWN with respect to the scope of work covered under this PROJECT.
- ▶ TOWN shall be responsive and engaging throughout the project by providing timely responses to inquiries made by the ENGINEER
- ▶ Give prompt written notice to the ENGINEER whenever the TOWN observes or otherwise becomes aware of any defect in the PROJECT.
- ▶ Acquire all required land and easements acquisitions necessary for construction.
- ▶ Pay all submittal, regulatory, permit, advertising, and public notice fees and charges.
- ▶ Coordinate with applicable project stakeholders to provide third party information on adjacent projects under the TOWN's purview and required for completion of the Basic Services listed above.
- ▶ Provide assistance regarding any matters relating to the PROJECT and requiring an attorney at law.
- ▶ Client understands that various governmental entities (such as FEMA, NCDOT, NCDEQ and others) have authority for approval or disapproval of submittals such as construction drawings and permits. Consultant does not guarantee a particular outcome.

E. EXPENSES

Expenses shall be considered reimbursable in accordance with our attached fee schedule. Anticipated expenses may include, but are not limited to, the following:

- ▶ Courier Trips
- ▶ Prints/Mylars
- ▶ Mileage
- ▶ Bid Advertisement

F. COMPENSATION FOR SERVICES

FIXED FEE CHARGES

Tasks that have been identified in Section B as fixed fee charges (plus expenses) are as outlined in the table below:

Task Number	Task Name	Fee
TASK 2	Design Development Phase Services	\$30,000
2.1	<i>Meetings</i>	<i>(\$5,000)</i>
2.2.1	<i>Project Area #12</i>	<i>(\$11,500)</i>
2.2.2	<i>Project Area #13</i>	<i>(\$13,500)</i>
TASK 3	Construction Contract Document Phase Services	\$55,000
3.1	<i>Meetings</i>	<i>(\$5,000)</i>
3.2	<i>Shared Construction Document Costs</i>	<i>(\$10,000)</i>
3.2.1	<i>Project Area #12</i>	<i>(\$17,500)</i>
3.2.2	<i>Project Area #13</i>	<i>(\$22,500)</i>
TASK 4	Project Area #4 Design Development	\$15,000
TASK 5	Permitting	\$12,000
TASK 6	Bidding and Construction Contract Award Phase Services	\$10,000
TASK 7	Construction Phase Services	\$45,000
7.1	<i>Project Area #12</i>	<i>(\$19,000)</i>
7.2	<i>Project Area #13</i>	<i>(\$26,000)</i>
TOTAL FIXED FEE CHARGES		\$167,000

Note: Information in italics shown for additional detail and cost breakdown at the request of the Town.

(continued next page)

REIMBURSABLE CHARGES

The budget amounts for survey tasks below have been provided in good faith and may be subject to change, subject to further project development. These tasks shall be invoiced in accordance with the Cost + 15% rate as outlined under Subcontractor Fees in the Fee & Expense Schedule (Exhibit II).

Task Number	Task Name	Budget
TASK 1	Topographic Survey and Partial Boundary Survey	\$50,000
	<i>Project Area #4</i>	<i>(\$13,500)</i>
	<i>Project Area #9</i>	<i>(\$11,500)</i>
	<i>Project Area #10</i>	<i>(\$10,000)</i>
	<i>Project Area #12</i>	<i>(\$6,000)</i>
	<i>Project Area #13</i>	<i>(\$9,000)</i>

Note: Information in italics shown for additional detail and cost breakdown at the request of the Town.

Reimbursable expenses shall be invoiced in accordance with the Fee Schedule outlined in Exhibit II.

Note: If the PROJECT is required to be re-bid for any reason or if the of the PROJECT design, bidding, or construction is delayed significantly for reasons beyond the ENGINEER'S control, the Fee for Basic Services shall be subject to re-negotiation. Changes to the schedule or scope of services may require additional fees.

G. OTHER PAYMENT PROVISIONS

Payment shall become due and payable monthly upon receipt of the ENGINEER'S itemized invoice. For Basic Services, the Lump Sum Fees will be based on estimated percent completion of each task at time of billing.

H. SCHEDULE

The ENGINEER targets a project starting date no later than June 1, 2019 in order to deliver a set of plans acceptable for bid advertisement (completion of Tasks 3 & 5) in September 2019.

I. ATTACHMENTS

The following attachments are hereby included with and form a part of this agreement.

Exhibit I - Standard Terms and Conditions

Exhibit II - Fee & Expense Schedule

Exhibit III – Survey Exhibit

Exhibit IV – Phase 4 Project Exhibits

Appendix A – Phase 4 Design Alternatives Summary Report

J. ACCEPTANCE

Receipt of an executed copy of this agreement will serve as the written agreement between WithersRavenel, Inc. and Town of Nags Head for the services outlined in Section B of this document and the terms outlined in the attached Exhibit – Standard Terms & Conditions.

Submitted by ENGINEER:

WithersRavenel, Inc.
115 MacKenan Drive
Cary, NC 27511

Accepted by CLIENT:

Authorized Signature:

Lars R. Hagen Jr.

Printed Name:

Director, Stormwater

Title:

lhagen@withersravenel.com

Email Address:

(919) 469-3340

Phone:

Date Signed:

Authorized Signature:

Printed Name:

Title:

Email Address:

Phone:

Date Signed:

Stormwater Master Plan Phase V Budget Summary

Project Area #	Project Location	Project Area of Concern	Description	Estimated Const. Cost	Budgeted Surveying / Engineering Costs	Notes
4	Wrightsville Ave.	Intersection of Bonnett St. to Bainbridge St.	Groundwater lowering system with subsurface dispersal to Bonnett St. Beach Access	\$400,000 \$500,000	\$28,500.00	WR to prepare design development and grant application package
9	Carolinian Circle Subdivision/Nags Head Pond Subdivision	Along the length of Carolinian Circle, along the length of W. Oak Knoll	Pump groundwater to to downstream storm drainage network	\$155,000 \$160,000	\$11,500.00	Surveying provided by WR, TNH staff to manage design & construction
10	Nags Head Cove Subdivision	Barracuda Dr. in the proximity of Kipper Ct.	Install storm drainage system to connect to ex. system at Danube St.	\$40,000 \$45,000	\$10,000.00	Surveying provided by WR, TNH staff to manage design & construction
12	S. Old Oregon Inlet Rd.	Proximity of MP 19.5	Install french drains & perforated pipe system	\$100,000 \$125,000	\$84,000.00	WR to prepare design development through construction and project closeout, include future pump connection in design
13	S. Old Oregon Inlet Rd.	Proximity of MP 18	Install french drains & pump groundwater to an area by FS 21	\$225,000 \$275,000	\$83,000.00	WR to prepare design development through construction and project closeout

Design/Construction by TNH Staff
 Design/Construction by WithersRavenel

Low Const. Cost* **\$520,000** **\$217,000**
High Const. Cost* **\$605,000**

** numbers exclude \$100,000 NCDOT contribution*

Stormwater Master Plan Phase V Engineering Design & Construction Administration Summary

Site #	Surveying	Design Development	Construction Drawings	Permitting	Bidding	Construction Admin Project Closeout	Total
4	\$13,500	\$15,000					\$28,500
9	\$11,500						\$11,500
10	\$10,000						\$10,000
12	\$6,000	\$15,000	\$28,000	\$7,500	\$7,500	\$19,000	\$83,000
13	\$9,000	\$15,000	\$27,000	\$4,500	\$2,500	\$26,000	\$84,000
Totals	\$50,000	\$45,000	\$55,000	\$12,000	\$10,000	\$45,000	\$217,000