US INFRASTRUCTURE OF CAROLINA, INC.
CONSULTING ENGINEERS

February 10, 2016

Mr. Scott J. Kaufhold, P.E.
Town of Indian Trail
P.O. Box 2430
Indian Trail, North Carolina 28079

RE: First Avenue Improvements Project
Fee Proposal
USI Project #160202

Dear Mr. Kaufhold:

USInfrastructure of Carolina, Inc. (USI) is pleased to submit our fee proposal for engineering services for the First Avenue Improvements Project. The project was identified for improvements due to citizen reported property and road flooding along First Avenue and Indian Trail Fairview Road. More citizen reports indicate the roadside ditches along First Avenue do not drain after a storm event, runoff remains in the roadside ditches for weeks. In addition, the First Avenue road structure is in disrepair with pot holes, depressions, and alligator cracking through its entire limits. The initial planning phase of the project will consist of a limited analysis of the existing storm drain system and potential proposed roadway improvements as shown on Exhibit A. Estimated costs to complete the study are shown on Exhibit B. This fee proposal includes survey and engineering costs to perform a planning level limited analysis of the existing storm drainage system, and develop a viable roadway improvement based on full roadway and drainage system replacement. The following represents the scope of work associated with the planning phase of the project.

SCOPE OF WORK

The planning phase of the project involves survey, existing system analysis, proposed system alternatives, and a summary of the findings. Our proposal is based on the following assumptions:

1.0 Survey

- A physical survey shall be performed by Lawrence Associates for the project area along the existing drainage system from Indian Trail Fairview Road to North Fork Crooked Creek Tributary 3 located approximately 600’ to the north. The surveyor shall utilize the existing survey provided by the Town and supplement the existing survey as described and shown on the survey scope, mapping, and fees as shown in Exhibit C.

1043 E. Morehead St. • Suite 203 • Charlotte, NC 28204
(704) 342-3007 • Fax (704) 342-1666
Email: charlotte@usi-eng.com

- Vertical locates shall not be performed as part of this proposal. Depth assumptions of existing underground utilities shall be made based upon typical depths found under normal field conditions.

- A field review of the survey shall be performed by USI.

- Includes 10% markups for sub-consultant fee.

2.0 Existing Drainage System Analysis

- The planning phase shall be limited to the First Avenue drainage systems. Additional drainage (runoff) from Second and Third Avenue shall be accounted for in the culvert crossing and downstream calculations near Indian Trail Fairview Road.

- Through initial visual inspection and discussion with the Town, it was determined that the roadside ditches were too flat and small to contain the quantity of flow directed to them. In addition to the under capacity roadside ditches, the roadway along First Avenue is dilapidated and structurally failing throughout. For these two reasons, a limited existing condition analysis will be performed for the roadside ditches and driveway pipes along First Avenue.

- The existing drainage system consists of an existing channel extending from the north side of Indian Trail Fairview Road to the outfall near North Fork Crooked Creek Tributary 3. The system continues south, crossing Indian Trail Fairview Road via a pipe crossing. The system continues south through roadside ditches and backyard ditches to First Avenue. At First Avenue, existing roadside ditches extend the length of First Avenue. The entire existing drainage system consists of 600' of channel, 6,000' of roadside ditches and driveway culverts, and 400' of existing pipe systems.

- The Rational Method shall be utilized to develop existing landuse and future (built-out) landuse flows for five (5) storm events (2-year, 10-year, 25-year, 50-year, and 100-year). Assume 16 drainage basins and 12 time of concentration calculations are required to perform the hydrologic analysis for the project.

- A Manning's pipe capacity and hydraulic gradeline computation shall be performed for the approximately 400' of the existing pipe system near 1st Avenue and Indian Trail Fairview Road for the five storm events for existing and future landuse conditions. This analysis shall be limited to the area from the drainage system crossing near 6730 First Avenue to Indian Trail Fairview Road. Hydraulic gradeline starting WSE will be assumed at 0.8 x diameter for planning purposes.

- Inlet capacity analysis shall not be performed for the project. There are no drop inlets or catch basins within project the limits.

- The existing channel analysis (600'+/-) downstream of Indian Trail Fairview Road shall be performed for existing and future flow scenarios using HEC-RAS. Cross sections will be provided every 100' along the existing channel.

- The existing roadside ditch and driveway pipe analysis (6,000'+/-) along First Avenue and Indian Trail Fairview Road shall be performed for existing and future flow scenarios using Manning's pipe and channel capacity calculations. At 10 locations, a typical cross section of the existing ditch and a typical driveway pipe shall be analyzed to identify the Level of Service for each segment.

- A detailed overflow analysis shall not be performed as part of this proposal.

3.0 Proposed Improvements System

- Future condition flows shall be utilized as determined in the existing system analysis.

- Proposed improvements shall consist of conceptual roadway and drainage system improvements.

3.1. Roadway and Drainage System Replacement Evaluation

- The proposed conceptual improvements shall consist of roadway and drainage improvements along First Avenue from West Street to Indian Trail Fairview Road. The roadway improvements shall propose complete street replacement with a proposed roadway drainage system consisting of mostly catch basins in the street. The intent of the improvements is to create a complete street system and reduce, if not eliminate the need for the roadside ditches along First Avenue. The improvements will also include drainage system (pipe and channel) upgrades downstream of First Avenue and Indian Trail Fairview Road required to convey the storm runoff.

- The Rational Method shall be utilized to develop future (built-out) landuse flows for five (5) storm events (2-year, 10-year, 25-year, 50-year, and 100-year). Assume an additional 25 drainage basins and 5 time of concentration calculations are required to perform the proposed hydrology for the project. Assume HEC-HMS flows (as described in detention facility) shall be utilized for the proposed storm drainage trunk line.

- A Manning's pipe capacity and hydraulic gradeline computation shall be performed for the proposed pipe system for the five storm events using future landuse conditions. The analysis shall be performed for the length of the First Avenue Improvements.

- Inlet capacity analysis shall be performed for the proposed improvements.

- The proposed channel analysis (600'+/-, assume 100' between cross sections) shall be performed for the future flow proposed conditions using HEC-RAS due to the 100-year FEMA floodplain tailwater conditions. This will help us to understand if the floodplain is impacting channel and pipe system performance.

- A new detention facility (Wet or Dry Pond) will be analyzed within three vacant parcels on Woodhaven Lane to reduce peak flows along First Avenue. If necessary, USI will increase the provided storage volume by utilizing additional adjacent parcels until the facility meets the design criteria established for the project. Water quality computations will not be performed at this time. The main focus of this analysis will be to determine the benefits of the detention facility on peak flow reduction. If the pond is adequately sized for detention, the outlet structure can be easily modified to meet water quality requirements. The analysis will be performed using the steps described below:
    1. HEC-HMS shall be utilized to develop the inflow hydrograph for the 2-, 10-, 25-, 50-, and 100-year design storms for future land use. Up to 5 subbasins will be included in the model. Hydrologic parameters will be developed for the subbasins using SCS methods.
    2. The "Static Method" shall be utilized to simply compare runoff volume to provided storage volume in the detention facility. The method will first be applied to the facility based on utilizing 3 vacant parcels for the footprint. USI will then increase the footprint and provided storage volume to determine how large the facility would need to be to completely contain the runoff volumes for the larger storms. The results of the analysis will be presented to the Town for discussion before proceeding with the other steps.
    3. Stage-storage and Stage-discharge rating curves shall be developed for the facility. The Stage-storage curve shall be based on the physical dimensions selected by the team.
    4. Routing computations for the detention facility shall be performed in HEC-HMS using the rating curves.
    5. Water surface elevations (WSEs) shall be "balanced" between HEC-HMS and the HGL computations for the pipe network on First Avenue. To balance the WSEs, the peak flow from the HEC-HMS model shall be used in the HGL computations to generate WSEs immediately downstream of the storage facility. The WSEs from the HGL computations will then be compared to the WSEs generated by HEC-HMS. If the WSEs differ between the two methods by more than 3 inches for any of the 5 storms, a new Stage-discharge rating curve will be developed for HEC-HMS based on the HGL computations and USI will run the model again. This iterative procedure will be repeated up to 3 times. After 3 iterations, the results will be presented to the Town. Decisions will then be made as to

whether additional iterations are needed or additional detention volume is required by expanding the footprint of the facility.

- The proposed roadway improvement shall meet Town standards for both street and drainage requirements. We propose to create a working alignment and profile for the street and drainage improvements to validate the feasibility of removing the roadside ditches and replacing with a street drainage system. This working plan and profile shall be considered part of the deliverable as conceptual plan and profile sheets with minimal noting. An estimate shall be prepared for the conceptual improvements and conceptual easement needs.

- At the existing outfall near the intersection of West Street and First Avenue, the roadside ditch system empties to a shallow roadside ditch that dissipates into overland flow above the neighborhood near the cul-de-sac at Lincoln Court. We propose to map out, through field investigation, optional outfall paths that may be appropriate to drain the runoff from First Avenue and limit the impacts to the downstream neighborhood. Three conceptual outfall alternatives shall be investigated. The conceptual alternatives shall be mapped (GIS) mapping with a list of pros and cons for each outfall alternative. No estimates or drainage analysis will be performed until discussions are held with the Town.

- Rather than providing a formal report of the planned improvements, USI recommends having a meeting with Town Staff to discuss the findings of the conceptual roadway and drainage improvements. We want the Town to have an adequate understanding of the pros and cons of the conceptual improvements. At this point, the project team can discuss a path forward for the project. No additional deliverables shall be considered until after this meeting.

REIMBURSABLES

Fees shall include all expenses necessary to complete the project including mileage, reproduction costs, plotting costs, etc.

FEES FOR SERVICES

Engineering fees to complete the above-mentioned services shall be a not to exceed hourly amount of $43,000.

SCHEDULE

USI will provide the services as described above within 120 working days of notice to proceed.

ADDITIONAL SERVICES

Upon request by the Town of Indian Trail, USI may provide engineering services beyond the scope of the original contract agreement. Costs for additional services will be determined upon establishment of the scope of the extra work. Additional services may include work such as additional proposed alternatives, underground utility locates, or other related work not in the previously described scope of services.

We look forward to working with you and Town staff on the project. Should you have any questions concerning the proposal, please do not hesitate to contact me. We will begin work on the project immediately upon Notice to Proceed and completion of the necessary contracting documents.

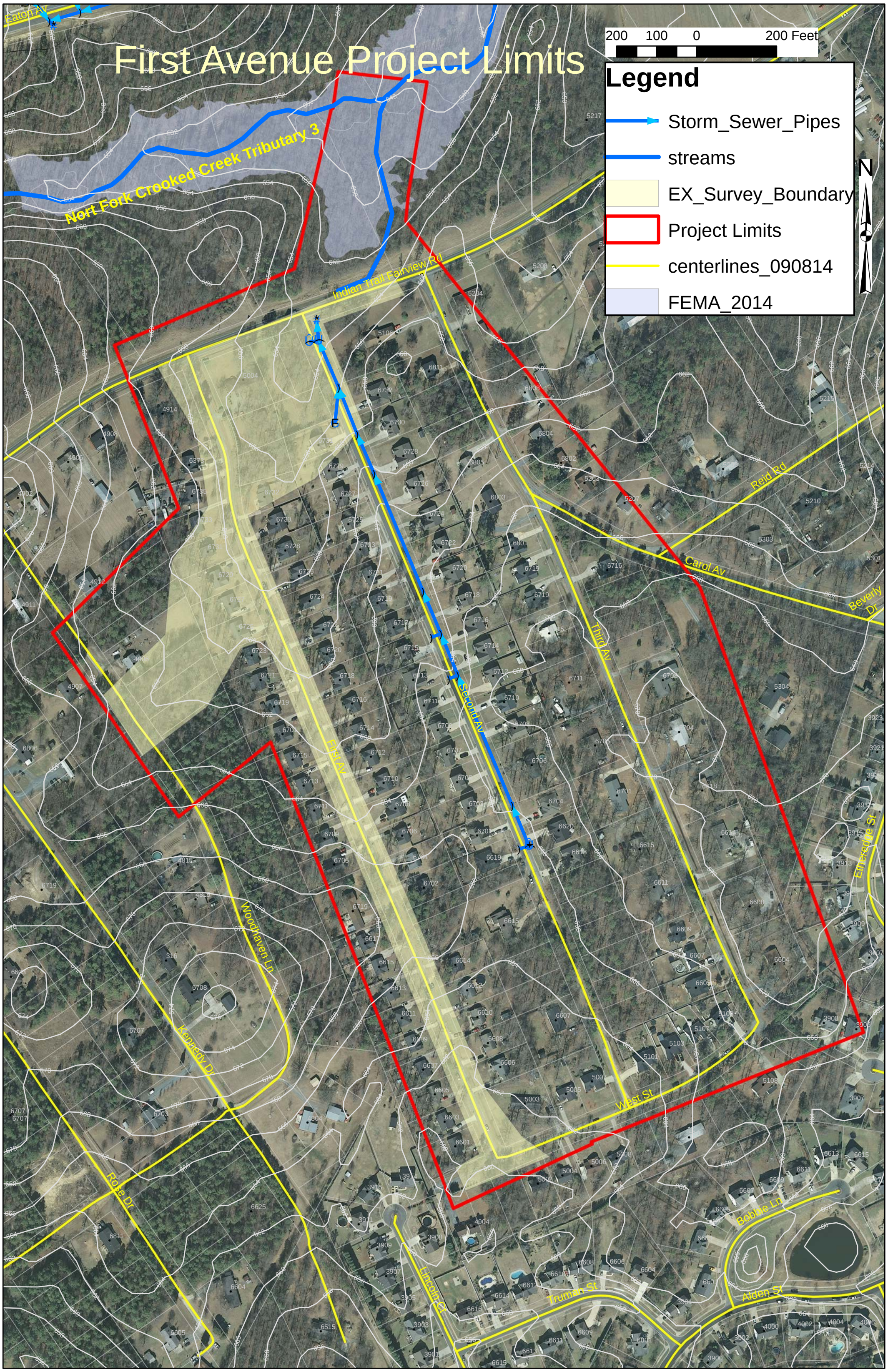
Sincerely,

USInfrastructure of Carolina, Inc.

Robby J. Wayne, P.E.
Project Manager

Attachments

EXHIBIT A


First Avenue Project Limits
Legend
Storm_Sewer_Pipes
streams
EX_Survey_Boundary
Project Limits
centerlines_090814
FEMA_2014
200 100 0 200 Feet
N
Nort Fork Crooked Creek Tributary 3
Indian Trail Fairview Rd
Eaton Av
Reid Rd
Carol Av
Beverly Dr
Third Av
Second Av
First Av
Woodhaven Ln
Kennedy Dr
Rose Dr
West St
Bobbie Ln
Lincoln Ct
Truman St
Alden St
Etheredge St

1st Avenue Improvements
PLANNING PHASE
ENGINEERING FEE ESTIMATE
Prepared by: USInfrastructure of Carolina, Inc.

EXHIBIT B

Date
2/10/2016

Planning Phase Tasks

Hourly Basis Fees	Principal	Project Manager	Senior Engineer	Team Leader	Project Engineer	Design Engineer	ACAD Technician	Clerical	Subcontract Fee	USI Total	Task Total
	$170	$155	$155	$155	$115	$110	$90	$67			
1. Field Surveys											
Survey									$10,200.00	$1,020.00	$11,220.00
Field Survey Project Administration			6.0			6.0				$1,590.00	$1,590.00
1. Field Surveys Totals			**6.0**			**6.0**			**$10,200.00**	**$2,610.00**	**$12,810.00**
2. Existing Drainage System Analysis											
Existing Drainage Areas(16 DAs), c value(Ex. and Fut.), and Tc Delineation (12 Tc)			4.0			20.0				$2,820.00	$2,820.00
Mapping Existing and Future Conditions Map (2)			2.0				4.0			$670.00	$670.00
Manning's and HGL Calculations			4.0			12.0				$1,940.00	$1,940.00
~~Inlet Capacity Calculations~~ (not required for ECA)											
Existing Channel Analysis (Ex. and Future)			1.0			6.0				$815.00	$815.00
Existing Roadside Ditch and Pipe Analysis (Ex. and Future)			4.0			20.0				$2,820.00	$2,820.00
2. Existing Drainage System Analysis Totals			**15.0**			**58.0**	**4.0**			**$9,065.00**	**$9,065.00**
3. Proposed Improvements Analysis											
3.1 Roadway and Drainage System Replacement Evaluation											
Prop. Drainage Areas(25 DAs), c value(Fut.), and Tc Delineation (5 Tc)			2.0			8.0				$1,190.00	$1,190.00
Mapping Proposed Conditions DA Map			1.0			1.0	2.0			$445.00	$445.00
Manning's and HGL Calculations			4.0			16.0				$2,380.00	$2,380.00
Detention Facility											
- HEC-HMS Model Development			2.0			8.0				$1,190.00	$1,190.00
- Simple Method Analysis			1.0			4.0	6.0			$1,135.00	$1,135.00
- Stage-storage & Stage-discharge Rating Curves			2.0			8.0				$1,190.00	$1,190.00
- HEC-HMS Model & HGL Computation Balancing (3 Iterations)			8.0			18.0				$3,220.00	$3,220.00
Inlet Capacity			1.0			6.0				$815.00	$815.00
HECRAS Proposed Channel			2.0			4.0				$750.00	$750.00
Working/Conceptual Prop. Roadway & Drainage Alignment & Profile Plan			8.0			12.0	24.0			$4,720.00	$4,720.00
Construction Cost Estimate			4.0			12.0				$1,940.00	$1,940.00
Alternative Outfall (West St. and First Ave.)			3.0			3.0	4.0			$1,155.00	$1,155.00
Meeting to discuss results of Alt. 1 and path forward			3.0			3.0				$795.00	$795.00
3.1 Roadway and Drainage System Replacement Evaluation			**41.0**			**103.0**	**36.0**			**$20,925.00**	**$20,925.00**
3. Proposed Improvements Analysis Totals			**41.0**			**103.0**	**36.0**			**$20,925.00**	**$20,925.00**
Hourly Basis Effort Total			**62.0**			**167.0**	**40.0**				
Hourly Basis Fees Total	**$0.00**	**$0.00**	**$9,610.00**	**$0.00**	**$0.00**	**$18,370.00**	**$3,600.00**	**$0.00**	**$10,200.00**	**$32,600.00**	**$42,800.00**
Reimbursable Expenses Allowance										$200.00	$200.00
Totals	$0.00	$0.00	$9,610.00	$0.00	$0.00	$18,370.00	$3,600.00	$0.00	$10,200.00	$32,800.00	
Billing Rates	$170	$155	$155	$155	$115	$110	$90	$67			$43,000.00

NOTE: For Subcontract Services, the USI Total includes a 10% fee for the subcontractor costs.

SAY **$43,000.00**

LAWRENCE ASSOCIATES

106 W. Jefferson St.
Monroe, NC 28112
p: 704-289-1013
866-557-8051
f: 704-283-9035

EXHIBIT C

February 5, 2016

Mr. Robby Wayne
US Infrastructure of the Carolina, Inc.
1043 E. Morehead Street
Suite 203
Charlotte, NC 28204

Reference: Proposal for First Ave Drainage Survey
Lawrence Associates Job No. 4173

Dear Robby,

Lawrence Associates (LA) is pleased to submit this proposal to provide surveying services for the First Avenue drainage study. Lawrence Associates understanding of the proposed scope of services is provided herein.

Scope of Services

Surveying Services

- Provide supplemental survey fifteen past the existing R/W along First Avenue.
- Provide utility survey for the identified area along First Avenue and Indian Trail Fairview Road (utilities to be marked by 811).
- Supplement existing survey for identified area at the south eastern intersection of First Avenue and Indian Trail Fairview Road.
- Merge and re-layer existing survey with proposed supplemental survey.
- Provide tree survey north of Indian Trail Fairview Road to include 6" and greater trees for an area of fifty feet in total width centered on the existing channel.

Not to Exceed $9,000

Optional Survey Area-Woodhaven Lane

- Provide supplemental and additional survey data for the identified area along Woodhaven Lane.

Not to Exceed $1,200

EXHIBIT C

Fee Schedule

Lawrence Associates proposes to provide the above surveying services for the following fee:

Not to Exceed $10,200

Elements and Assumptions

- Construction staking is not included in this proposal. All services will be provided at an hourly rate.
- This proposal does not include any boundary surveys or easement map preparation.
- Town is to notify property owners prior to survey crew accessing the properties.
- This proposal does not include a private utility locator.

Respectfully submitted,

Clint Lawrence, PE, PLS
Principal

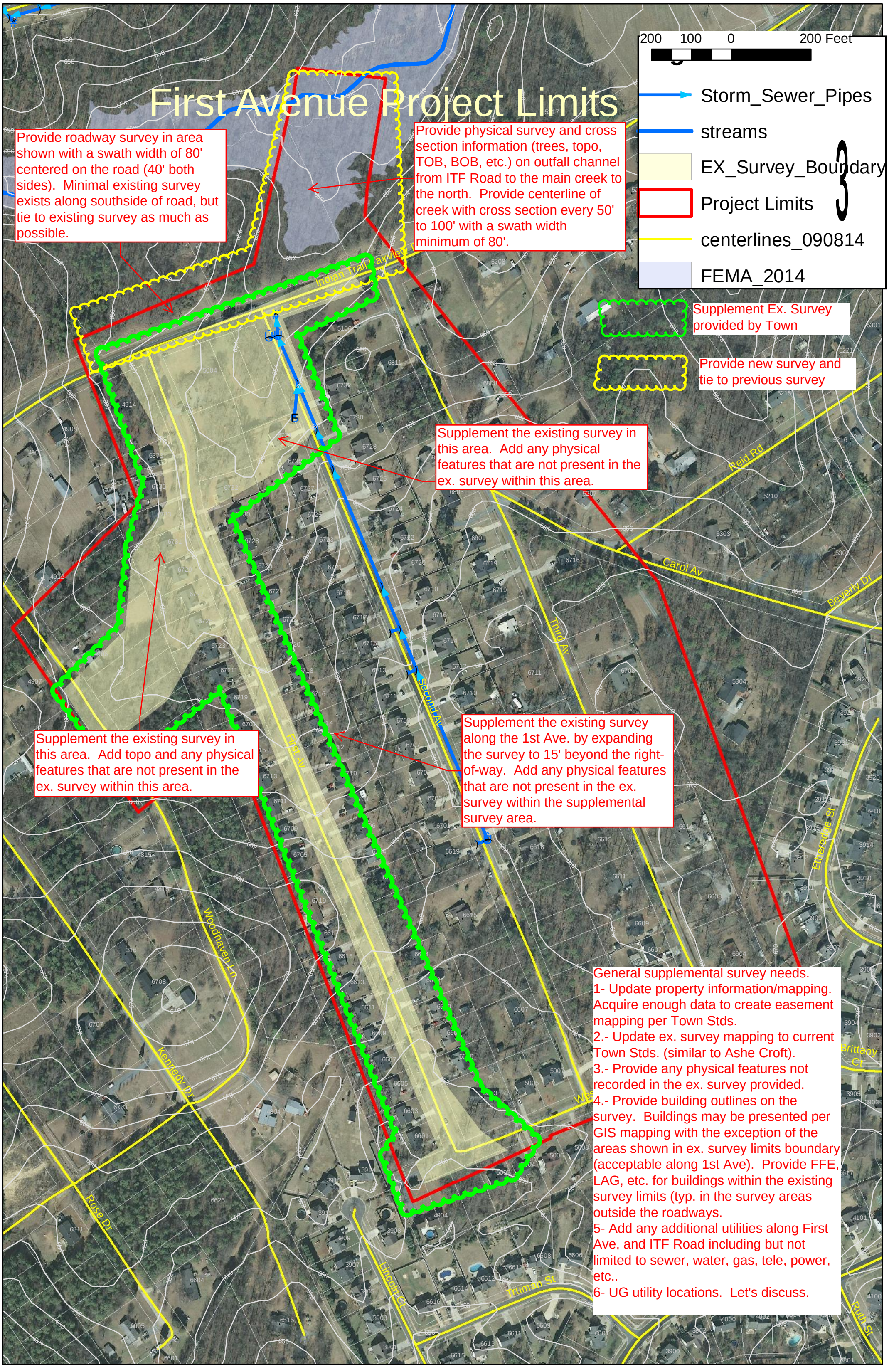
The scope of services, terms and conditions of this Letter Agreement are accepted:

_____
Print (Type) Individual, Firm, or Corporate Name

_____
Signature of Authorized Representative Date

_____
Print (Type) Name of Authorized Representative and Title

EXHIBIT C


First Avenue Project Limits
200 100 0 200 Feet
Storm_Sewer_Pipes
streams
EX_Survey_Boundary
Project Limits
centerlines_090814
FEMA_2014
Provide roadway survey in area shown with a swath width of 80' centered on the road (40' both sides). Minimal existing survey exists along southside of road, but tie to existing survey as much as possible.
Provide physical survey and cross section information (trees, topo, TOB, BOB, etc.) on outfall channel from ITF Road to the main creek to the north. Provide centerline of creek with cross section every 50' to 100' with a swath width minimum of 80'.
Supplement Ex. Survey provided by Town
Provide new survey and tie to previous survey
Supplement the existing survey in this area. Add any physical features that are not present in the ex. survey within this area.
Supplement the existing survey in this area. Add topo and any physical features that are not present in the ex. survey within this area.
Supplement the existing survey along the 1st Ave. by expanding the survey to 15' beyond the right-of-way. Add any physical features that are not present in the ex. survey within the supplemental survey area.
General supplemental survey needs.
1- Update property information/mapping. Acquire enough data to create easement mapping per Town Stds.
2.- Update ex. survey mapping to current Town Stds. (similar to Ashe Croft).
3.- Provide any physical features not recorded in the ex. survey provided.
4.- Provide building outlines on the survey. Buildings may be presented per GIS mapping with the exception of the areas shown in ex. survey limits boundary (acceptable along 1st Ave). Provide FFE, LAG, etc. for buildings within the existing survey limits (typ. in the survey areas outside the roadways.
5- Add any additional utilities along First Ave, and ITF Road including but not limited to sewer, water, gas, tele, power, etc..
6- UG utility locations. Let's discuss.
Indian Trail
Reid Rd
Carol Av
Beverly Dr
Third Av
Second Av
First Av
Woodhaven Ln
Kennedy Dr
Rose Dr
Lincoln Ct
Truman St
Brittany Ct
Ruth St