ATTACHMENT NO. 1
TO
TURNAGE HEIGHTS LIFT STATION ABANDONMENT
AND
MUD CREEK OUTFALL PROJECT
FOR
CITY OF DURHAM
AND
McKIM & CREED, INC.
April 11, 2014
M&C # 131225

Project Understanding

The City of Durham desires to abandon the existing Turnage Heights Lift Station located at the intersection of Cameron Blvd. (Hwy 751) and Erwin Road and construct approximately 7,000 LF of 18-inch gravity outfall along Mud Creek to interconnect with the City's existing 18-inch gravity outfall in the vicinity of Ridgewood and Albridge subdivisions.

It is further understood that the proposed 18-inch outfall would extend through a section of Duke Forest and near the Duke Lemur Center. There are potential environmental concerns and sensitive research areas along this corridor of Mud Creek that could preclude the extension of the 18-inch gravity outfall. Therefore, the City has decided to develop the Project in three phases. The first phase, Phase 1, will consist of the Study and Report Phase. As part of the Study and Report Phase, the City has requested to evaluate other potential alternate solutions. Phase 2 will consist of the Preliminary Design Phase through the Bid/Award Phase. The third phase, Phase 3, will be the construction phase to include Construction Administration, Construction Observation through Project Close-Out.

Phase 1

Study and Report Phase

The Study and Report Phase is comprised of the following subtasks:

Subtask - Project Management and Data Collection –

McKim & Creed (M&C) shall provide for project management and data collection services that will include:

- Prepare and attend project meetings with the City
- Maintain a project filing system throughout the life of the project
- Prepare monthly invoices for services in the City's format
- Maintain a project cost accounting system throughout the life of the project

- Prepare a written project program (WPP) to be utilized during the project
- Collect and review the various reports prepared by Black & Veatch (B&V) and Brown & Caldwell (B&C) to be utilized for the basin evaluations
- Prepare property owner notification letters
- Provide for field reconnaissance and assessment of the project area

Subtask - Flow Evaluations –

M&C will provide for flow evaluations which will include the accumulation of the proposed/projected flows for the THP subbasin, the BMP subbasin and the NHO subbasin, and will include the in-stream flow metering of the THP and NHO subbasins.

- McKim & Creed (M&C) will utilize the flow projections developed by Black & Veatch (B&V) for the THP and BMP subbasins. It is understood that flow projections will need to be developed by M&C for a portion of the NHO subbasin as currently the City has not developed flow projections for this subbasin. M&C will utilize the flow methodology developed and used by B&V and accepted by the City so as to be consistent with the previously developed flow projections. For the THP and BMP subbasins, M&C will not be developing new flow projections but rather utilizing the flow projections previously developed by B&V for the purpose of evaluating existing and proposed pipe sizes and proposed pumping rates. Flow projections will also be utilized to evaluate existing downstream infrastructure. M&C will also review the Lift Station Assessment Report prepared by Brown & Caldwell for information pertaining to the Garrett Road (Broadmoor) Lift Station. A skeletonized model will be developed for each subbasin, as needed, to assist in the evaluation of the downstream infrastructure. The City has completed drawdown tests of the Turnage Heights lift station and has provided the results to M&C. A condition assessment of the Turnage Heights Lift Station has not been performed and is not included in the scope of this Study Phase. M&C's evaluation of downstream infrastructure will include the Garrett Road Lift Station and its existing 16-inch force main, to its terminus point at the 36-inch gravity interceptor in the NH1 subbasin. Part of this evaluation will be the review and understanding of the analysis and recommendations of B&V on the Garrett Road Lift Station basin, BMP. The evaluation of the downstream infrastructure will provide for analyses of hydraulic and/or pumping capacity of the existing infrastructure with recommendations for upsizing if required. However, a condition assessment of the existing infrastructure has not been performed and is not included in the scope of this Study Phase.

- M&C will provide for in-stream flow metering of the THP and NHO subbasins. The in-stream flow metering is needed to verify and document the existing dry weather base flows and existing wet weather flows in each subbasin in order to evaluate the future projected flows to determine if the existing pipe sizes (both gravity and force main) and

if the pumping rates of the Garrett Road Lift Station are adequate. The scope of work will generally be as follows:

- McKim & Creed will develop a Preliminary Flow Meter Location Map in an effort to determine where the proposed open channel flow meters will be placed (estimated to be 4 locations, two in each subbasin). McKim & Creed will use this map as a basis for conducting flow meter installation reconnaissance. During the reconnaissance period each identified potential flow monitoring site will be evaluated to ensure that reliable data can be recovered from the location. Metering and sensor configurations shall take into account any special conditions such as surcharging, extreme depths, siltation and debris, odd shaped pipes, etc. It is of the utmost importance that the conditions that may negatively affect flow data collection be established prior to meter installation. The reconnaissance shall be conducted during a one day period.

- Using the information obtained during the reconnaissance period, McKim & Creed will prepare a flow meter installation map showing flow meter catchment boundaries. Copies of the flow meter installation map will be provided to the City for review. McKim & Creed will then begin flow meter installations at the locations identified on the flow meter installation map. Upon completion of final installation each flow meter will be monitored simultaneously for 60 days. **Note: A minimum of three (3) rainfall events are needed to provide for accuracy for projecting the wet weather conditions. If additional monitoring time is required beyond the 60 days, then the cost shall be negotiated as additional services.** McKim & Creed will be responsible for equipment calibration and ensure performance within the manufacturer's specification. Flow meters will be set to record depth and velocity measurements at 15 minute intervals at every site.

- During the flow-metering effort both remote and on-site data retrieval will occur. Each day every site's data will be downloaded and the depth and velocity readings reviewed. As anomalies are identified, McKim & Creed staff will access the affected flow monitoring site and determine the problem causing the inappropriate readings. If equipment failure is the cause that equipment will be removed and replaced within 48 hours.

- During the flow monitoring period, rainfall gauging will also be performed at one (1) location in each subbasin for a total of two (2) locations. M&C will only set one rainfall gauging station in Subbasin NHO. The City has an existing rainfall gauging station set by ADS in Subbasin THP and will make this data available to M&C. The rainfall data will be used to determine storm water inflow and rainfall induced groundwater infiltration. The rain gauges will be setup to measure rainfall accumulation in tenths of an inch, recording at 15 minute increments that will correspond with the flow monitoring intervals.

- The City also has in-stream metering in the NHO and NH1 subbasins provided by ADS. ADS also monitors the pump-run times of the existing Turnage Heights Lift Station. The City will make this data available to assist in the flow analysis.

- Using the flow meter and rainfall data, McKim & Creed shall perform a flow analysis of each flow meter service area. This will entail development of a synopsis that identifies the following flow characteristics:
    - Model Dry Day Flow
    - Model Wet Weather Flow
    - Rainfall Induced Inflow
    - Rainfall Induced Infiltration
    - Apparent Groundwater Infiltration

Subtask - Alternative Evaluations -

The project alternatives basically fall into two categories, with two alternatives in each category: gravity sewer and lift station/force main.

Please see the attached Exhibit Map indicating the four alternatives outlined below.

Gravity Sewer Alternatives

- Alternative No. 1 – Abandonment of the existing Turnage Heights Lift Station and installation of approximately 7,000 LF of 18-inch outfall along Mud Creek to the existing 18-inch gravity outfall. Both north and south sides of Mud Creek will be considered.
- Alternative No. 2 - Abandonment of the existing Turnage Heights Lift Station and extension of approximately 2,600 LF of 18-inch outfall along Hwy 751 to the existing 18-inch gravity outfall on Sandy Creek. The existing 10-inch gravity main (current discharge point of the Turnage Heights force main) will likely be replaced due to its shallow depth. This alternative will require the crossing of 15-501 at its intersection with Hwy 751.

Lift Station/Force Main Alternatives

- Alternative No. 3 – Abandonment of the existing Turnage Heights Lift Station with new lift station and force main along Hwy 751 to terminate at the existing 18-inch gravity outfall on Sandy Creek. The force main would generally follow the alignment of the existing Turnage Heights Lift Station Force Main alignment. This alternative would also evaluate reuse of the existing force main and discharge location at the 10-inch gravity line. The need for upgrade of the existing 10-inch gravity line will be evaluated.

- Alternative No. 4 – Abandonment of the existing Turnage Heights Lift Station with new lift station and force main along the US 15/501 corridor to terminate at the existing 24-inch gravity outfall on Sandy Creek near the intersection of 15/501 and Cornwallis Road.

The follow items shall be provided in order to complete the subtask for the alternative evaluations:

- Preliminary Phase I Site Assessment will consist of a database search of the government records through VERAcheck or Environmental Data Resources (EDR) and providing a one page memo of findings for each of the four (4) alternative alignments.

- McKim & Creed will assist the City in notifying property owners within or adjacent to the proposed pipe line corridors for the purposes of entering their properties for site walks, surveys, environmental evaluations, etc. Services provided will include:

  - Develop GIS map showing properties to be notified
  - Develop draft letter and owner-response form for City of Durham review
  - Develop owner address listing from available GIS parcel data
  - Mail notifications and document responses.

- Preliminary Subsurface Utility Engineering (SUE), Level B, will consist of a site inspection and an electro-magnetic sweep to determine the approximate number and type of underground utilities for each of the four (4) alternative alignments.

- Preliminary Wetland/Stream Buffer/Floodplain Review will consist of a review, evaluation, and recommendation from an environmental perspective to assist in the alignment for each of the four (4) alternate alignments and providing a brief report of the review.

- Preliminary right-of-way and easement research for each of the four (4) alternative alignments.

- Provide for a preliminary meeting and follow up meeting, attended by staff from Duke Forest - Lemur Center and City of Durham (two meetings total).

- Provide for meeting with NCDOT District Office to discuss preliminary alignment options and to obtain information for proposed NCDOT road improvement projects that might impact the preliminary alignment options.

- Provide for a meeting with the City of Durham's staff to review the preliminary evaluations.

Subtask - Report Preparation –

M&C will prepare the Preliminary Engineering Report (PER) that will include the following items:

- Prepare the detailed information including layout and mapping/figures for the 4 alternatives for the draft PER.
- Provide for quantity take-offs and develop cost opinions for the 4 alternatives.
- Develop and write the draft PER and submit to the City's staff for review.
- Provide for a review meeting of the draft PER which will also include the data/input/information gathered at the various meetings mentioned above with the City's staff.
- Prepare the final PER document.
- Provide for a review meeting of the final PER with the City's staff to review the Final (PER) which will include a recommended alternative.

Additional Services

The following items are foreseeable tasks, but outside the current base scope of services and shall be considered additional services. Performance of these services are contingent upon written approval from the City after detailed scopes have been agreed upon.

- Providing for additional property deed research and property owner contacts beyond the scope previously indicated for Phase I Environmental Site Assessment in Basic Services.
- Providing for additional Quality Level B Subsurface Utility Engineering beyond the scope previously indicated for SUE Quality Level B in Basic Services.
- Providing for detailed wetland delineation, survey and mapping.
- Providing for easement surveying and mapping.
- Providing for geotechnical investigations.
- Providing for additional flow metering locations and additional days for metering beyond the scope previously indicated in Basic Services.

- Providing for taking paint samples at the existing Turnage Heights Lift Station for testing for lead paint.

- Providing for Phase II Environmental Site Assessments.

- Providing for soils analysis for contaminated soil, and assisting in developing/monitoring a plan to assure proper disposal of same.

- Providing for professional services and a detailed environmental investigation(s) for acquiring an Army Corps of Engineers Individual Wetlands Permit.

- Providing for assistance with wetland mitigation if required by USACE.

- Providing for an environmental assessment (EA) and a supplemental environmental assessment in accordance with the State Environmental Act if required by NCDENR.

- Providing for detailed investigations and/or surveys for archaeological sites, protected/threatened/endangered species of shellfish, fish, wildlife and natural vegetation.

- Assisting the City with easement acquisitions.

- Providing for preparing and submitting the site plan and zoning submittal packages that may be required for the project to the joint City of Durham/County of Durham Planning Department for approval of site plans.

- Providing for Quality Level A Subsurface Utility Engineering services to determine the exact horizontal and vertical location of underground utilities. Quality Level A services allow for direct inspection of underground facilities. McKim & Creed uses a non-destructive and minimally intrusive vacuum excavation method to expose utilities at critical points. Verification of type and location of each utility is recorded and reported in a document describing the utility and the surrounding work site. An estimate for Quality Level A is recommended to be established at $11,250 (estimated 15 locations at $750.00/hole) for project. A minimum of five location holes must be performed per mobilization of the SUE vacuum truck based on the cost of $750.00/hole.

- Providing for hydraulic modeling beyond the scope previously indicated in Basic Services for the sewer system improvements or existing sewer system.

- Providing for detailed flow projections beyond utilizing the flow projections already developed by B&V for the THP and BMP subbasins.

- Providing for the evaluation of the Eno Economic Development District. It appears at this time that Orange County will not be proceeding with the EDD.

- Providing for design of any downstream improvements to existing infrastructure in the NHO and BMP subbasins including the Garrett Road (Broadmoor) Lift Station that may be determine as a result of the flow evaluations.

- Providing for Sewer System Evaluation Surveys (SSES) of the existing sewer systems to include pipe cleaning, CCTV inspections, smoke testing, dye testing, manhole inspections and night flow isolations.

- Providing for hydraulic modeling of Mud Creek to determine or develop No Rise Certifications, Letter of Map Revision (LOMR) and Conditional Letter of Map Revision (CLOMR) if aerial crossings of streams are required due to the requirements of the detailed design.

- Providing for the design, bidding, construction administration and construction observation for the selected alternative.

- Preparing pre-qualification documents and assisting in the pre-qualification of prime contractors/ bidders.

- Provide for preliminary meetings with the HOA for the Ridgewood and Albridge subdivisions.

- Providing for public outreach meetings.

- Providing for a project web site.

Owner's Responsibilities

The following items shall be considered the responsibility of the Owner:

- The City shall pay for the mailing costs of the required notification letters to the property owners. Mailing costs shall be invoiced as a reimbursable expense to be paid from the additional services budget. Note that certified notification is not required.

- The City shall pay for all costs of publishing the Advertisement to Bids including any advertisements in minority publications. Advertisement costs shall be invoiced as a reimbursable expense to be paid from the additional services budget.

- The City shall be responsible for the acquisition and cost of all easements and fee simple property.

- The City shall prepare all deeds for easements and fee simple purchases.
- The City shall pay all recording fees for deeds, maps, and easement maps. Recording fees shall be invoiced as a reimbursable expense to be paid from the additional services budget.
- The City shall pay all permit application fees as required for permitting. Permit fees shall be invoiced as a reimbursable expense to be paid from the additional services budget.
- The City shall prepare all preliminary and final assessment rolls and documentation as required for annexation purposes.
- The City shall assist in field locations of the City's utilities.
- The City shall provide for excavation and uncovering of existing facilities as may be required.
- The City shall provide the GIS Geodatabase Design (Water/Sewer) for preparing record drawings.
- The City shall provide the flow projections developed by B&V for the THP and BMP subbasins.
- The City shall provide the ADS in-stream metering and Turnage Heights Lift Station monitoring data.
- City will pay for any wetland Mitigation costs.

Project Schedule

The following project schedule has been developed based on a Notice to Proceed of May 1, 2014 for Phase 1 only and that an EA will not be required. Note: The project schedule may be affected if additional in-stream flow metering is required. The final project schedule will be developed at a later date based on the actual alternative selected by the City.

Task Name	Months	2014											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phase I - Study Phase	5.75												
Flow Monitoring	2												
Draft PER	4												
Owner Review	1												
Final PER	0.75												

Phase 2 – Preliminary Design through Bid/Award Phase

Phase 3 – Construction Administration, Construction Observation through Project Close- Out Phase

Once the City has approved the recommended alternative, the City and M&C will enter into a contract amendment for Phase 2 and Phase 3 that will include the various project components as identified in Exhibit A of the agreement and as may be more clearly defined by another attachment to the agreement.

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Alt 1 - Gravity
Alt 2 - Gravity
Alt 3 - LS/FM
Alt 4 - LS/FM

PS New Pump Station
Sewer Gravity Mains
Sewer Force Mains

Rivers & Streams
Parcels
Wetlands

Turnage Heights Lift Station Abandonment Exhibit Map

PW#131225

City of Durham, NC

1 inch = 800 feet

McKIM&CREED

4/11/2014