

**EXHIBIT A TO THE AGREEMENT
BETWEEN OWNER AND ENGINEER
FOR STUDY AND REPORT
AND
PROFESSIONAL DESIGN AND CONSTRUCTION SERVICES**

FURTHER DESCRIPTION OF ENGINEERING SERVICES AND RELATED MATTERS

This is an exhibit attached to and made part of the supplemental agreement to On-Call Professional Services Agreement dated January 29, 2014 between the City of Greensboro (Owner) and CDM Smith Inc. (Engineer) for study and report and professional design and construction services for the T. Z. Osborne Water Reclamation Facility Ash Clarifier Project (Project).

1. The Basic Services of the Engineer as described in the Agreement are amended and supplemented as follows:

The Engineer will provide the Basic Services defined herein for the Project. The Engineer also agrees to provide optional additional services upon the specific written authorization of Owner.

PROJECT OBJECTIVES AND DESCRIPTION

On November 10, 2016, the Owner met with the Engineer for initial discussions regarding the design and construction of a new ash clarifier located on the T. Z. Osborne Water Reclamation Facility site. The existing ash clarifier and thickened ash slurry pump station are reaching the end of their useful life. In order to improve the reliability of the ash thickening facilities, the Owner desires to construct a new clarifier and pumping facilities to replace the old facilities. The ash clarifier will treat discharges from the existing Fluidized Bed Incinerators (FBI) No. 1 and No. 2 quencher/scrubber and the ash dewatering equipment located in the solids building. The City has targeted location of the new ash clarifier on the west side of the solids building, adjacent to the existing ash clarifier. Thickened underflow from the clarifier will be pumped to existing ash dewatering equipment, which is a rotary press type unit. The overall scope of the Project will consist of the following:

- Review and evaluate maximum existing flows from FBI #1 and FBI #2, and rotary ash press filtrate
- Hydraulic analysis to confirm whether gravity flow directly to the clarifier is possible or, if pumped flow to the clarifier is required
- Evaluate the appropriate clarifier sizing, including the diameter required to handle the anticipated flows and loading rate
- Ash slurry piping (make tie-in connections to piping on the west side of the solids building)
- Modifications to prior scum pre-concentrator design drawings to re-purpose for use as an ash clarifier
- New thickened ash slurry pump station with enclosure structure
- Electrical and Instrumentation/controls improvements necessary for the project
- Yard piping needed for the project

The following Basic Services will be provided under this Agreement:

- Task 1 – Preliminary Engineering Memorandum
- Task 2 – Final Design and Construction Documents
- Task 3 – Permitting Services
- Task 4 – Engineering Services During Bidding and Construction

- Task 5 – Resident Construction Representative Services

This scope of services is based on a construction manager at risk (CMAR) delivery method. The detailed scope of services for the Project follows:

Task 1: Preliminary Engineering Memorandum

A technical memorandum (tech memo) will be prepared to serve as a basis for design.

Task 1.1: Data Collection – The Engineer will request design as-built plans, process flow rates, and equipment information as required to establish the basis of design.

Task 1.2: Hydraulic Calculations – Perform hydraulic calculations to determine the expected flow and head conditions under a range of pumping scenarios for the new thickened ash pumps. The Engineer will also evaluate whether influent flow to the clarifier can be by gravity or if pumping is required.

Task 1.3: Materials of Construction – The materials of construction for the new pump station enclosure structure and ash slurry piping will be selected. The Engineer's recommendation will be summarized in the preliminary engineering tech memo.

Task 1.4: Prepare Design Criteria – The design criteria will be prepared for the ash clarifier, pumping facilities, and ancillary facilities. The Engineer will evaluate pumps and clarification equipment from various manufacturers to meet the established design criteria.

Task 1.5: Prepare Technical Memorandum – a tech memo outlining the basis for design will be prepared and submitted to the Owner for review. The Engineer will present the tech memo as a Draft then finalize the tech memo incorporating comments received from the Owner's review.

Deliverable(s):

- One (1) electronic (PDF) copy of the Draft and Final tech memo

Task 1.6: Meetings: This scope assumes one (1) meeting for Task 1. The CMAR will provide constructability and value engineering comments at the meeting which will be discussed and resolved during the meeting. Formal evaluation of, or responses to, CMAR comments by the Engineer outside of this meeting are not included in this scope of services. In addition to the meeting, the Engineer will maintain communication with the Owner via email and telephone.

Task 1.7: Preliminary Opinion of Probable Construction Cost – prepare a preliminary opinion of probable construction cost based on the preliminary engineering. A breakdown of costs will be provided.

Task 1.8: Preliminary Engineering Technical and Constructability Reviews – during the course of the preliminary engineering phase, conduct a technical review to ensure the basis of design is sound. A review meeting will be held to discuss the comments which will be attended by technical review committee of one or more senior experienced engineers and key members of the Engineer's team.

Task 2: Final Design and Construction Documents

In the final design phase, the Engineer shall prepare drawings and technical specifications for the above listed scope suitable for the CMAR to procure equipment and receive bids for construction of the project. At the conclusion of final design, drawings and specifications will be submitted to the agencies listed in Task 3 for review and approval. Final design services to be provided by the Engineer are described as follows:

Task 2.1: Prepare Construction Drawings – Construction drawings will be prepared showing the scope, extent, and character of the work to be performed by the contractor. One design submittal (60-percent) will be provided for Owner’s review. Following receipt of the Owner’s comments on the 60-percent Design Submittal, the Engineer will bring the design to the 100-percent final bid document level. A preliminary drawing list included in Attachment A to this Exhibit was used as a basis for development of the fee provided herein.

Task 2.2: Prepare Technical Specifications – Technical specification for the civil, process mechanical, electrical and instrumentation construction work will be prepared in general conformance with the 50-division format of the Construction Specification Institute (CSI).

Task 2.3: Survey – The Engineer will collect field survey information required to design the improvements included in this scope of services including topographic information for areas of new structures or piping, elevations and dimensions of critical existing structures.

Task 2.4: Prepare Construction Cost Estimates – a construction cost estimate (e.g., Opinion of Probable Construction Cost) will be prepared after the 60% design completion milestone.

Task 2.5: Technical and Constructability Review – The Engineer will conduct technical reviews of the design documents at the 60-percent stage and the final bid set stage.

Task 2.6: CMAR Designer Services – the Engineer will review one (1) round of CMAR constructability and value engineering comments. Formal responses to CMAR comments will not be provided. The Engineer will prepare final design document revisions incorporating modifications selected by the Owner. This fee includes 30 hours of effort for comment review and revisions.

Deliverable(s):

- Five (5) hardcopy sets of half-size review documents (drawings and specifications)
- Two (2) sets of final bidding documents (one half-size and one full-size)
- One (1) electronic (PDF) set of final bidding documents (drawings and specifications)

Meeting(s): This scope assumes one (1) meeting for Task 2 at the 60% design completion stage to discuss technical issues and critical design decisions. In addition to scheduled meetings, the Engineer will maintain communication with the Owner via email and telephone.

Task 3 – Permitting Services

The Engineer shall prepare and submit applications for and/or coordinate the following permits and approvals:

- Authorization to Construct (NC DEQ - Division of Water Resources)
- City of Greensboro TRC Review – this scope includes a telephone/email discussion with the City TRC review group to confirm that a TRC review is not required. It is assumed that the TRC approval obtained during the Package 1, 2, and 3 design work will suffice for this project.
- Sediment and Erosion Control Plan modification – this scope includes a telephone/email discussion with DEQ Division of Energy, Mineral, and Land Resources to confirm that a Sediment and Erosion Control Plan modification is not required. It is assumed that the approved SEC plan obtained during the Package 3 design work will suffice for this project.

Task 4 – Engineering Services During Bidding and Construction

In the event the Owner elects to bid the construction project, the CMAR designer services (Task 2.6) will be deleted from the scope and replaced with limited bid phase services. Bid phase services will be limited to the preparation of the bid form portion of Division 00 and addenda as appropriate clarify, correct, or change the bidding documents. This scope assumes that construction services will be provided over a total duration of 7 months and will include the following limited engineering services:

- Review shop drawing, request for information (RFI)
- Attend one progress meeting per month – one Engineer’s representative will make one site observation per month (coincident with attending monthly on-site progress meetings)
- Evaluate substitutes
- Prepare backup for change orders and work change directives
- Prepare record drawings – drawings will be delivered in electronic PDF format on CD

Task 5 – Resident Construction Representative Services

The Engineer shall provide, through the Engineer’s Subcontractor (Davenport), part-time on-site Resident Project Representative (RPR) services. The Engineer’s subcontractor shall provide the services of one RPR scheduled for 7 months and budgeted for 20 hours per week. The duties and responsibilities of the RPR are set forth in Exhibit B, “Duties, Responsibilities, and Limitations of Authority of Resident Project Representative”. The ENGINEER will receive additional compensation for any additional or extended RPR or inspection services required via further amendment of this Agreement.

Unspecified Additional Services

This scope of services can be amended so that the Engineer can perform out-of-scope services as requested by Owner. The services that are not included, but may be added at the Owner’s request, include the following:

- Factory witness testing
- Operations and Maintenance manual development

2. Owner’s Responsibilities

Furnish to Engineer, as requested by Engineer for performance of Services as required by the contract documents, the following: a) available data or drawings of physical conditions; and b) other information as required. Owner shall be responsible for, and Engineer may rely upon, the accuracy and completeness of all reports, data, and other information furnished pursuant to this paragraph.

Examine all alternate solutions, studies, reports, drawings and specifications presented by the Engineer (including obtaining advice of an attorney, insurance counselor, and other consultants as Owner deems appropriate with respect to such examination) and render decisions pertaining thereto. Bear all costs incident to compliance with the requirements of the Owner’s responsibilities.

3. Time Period for Performance

The time periods associated with Tasks 1 through 2 are presented in the following table. This schedule table is based on a CMAR method of delivery and assumes all review comments will be available within

2 weeks after review submittals are delivered to the City. If the Owner request changes to the scope, extent or character of the Project, the time performance of Engineer's services shall be adjusted equitably.

Activity	Weeks from NTP
Notice to Proceed	- -
Preliminary Engineering Submittal	6 weeks
Preliminary Engineering Review	8 weeks
60% Design Submittal	15 weeks
60% Design Review	17 weeks
Clarifier Structure Complete	22 weeks
Remainder of Design Complete	26 weeks

Permitting services are anticipated to be completed within 2 months of the completion of design. The construction services will be provided over a total duration of 7 months.

4. Method of Payment

Payment will be made for a lump sum fee of \$321,000 for Tasks 1 - 5 described above. The design phase services funds will be available in Fiscal Year 1 and the construction phase services funds will be available in Year 2. Payment of the Year 2 amount is contingent on passage of the OWNER's annual budget funding for this Project. When Year 2 tasks are authorized by the OWNER, the total lump sum payment amount shall be adjusted to equal the sum of the amounts for the all tasks (Tasks 1 – 5) authorized at that time. The Year 1 and Year 2 amounts are as noted below:

- Year 1 Amount - \$160,000
- Year 2 Amount - \$161,000

The Engineer will submit a request to the Owner for an amendment if an ash clarifier diameter is required that differs from the scum pre-concentrator diameter. Partial payments shall be made by the OWNER on a monthly basis in proportion to the percentage of work completed and the balance of payment made when the work is completed.

The Owner may provide written notice to the Engineer to suspend or terminate the obligation to provide further services under this Agreement. In the event of suspension or termination, the Engineer will be paid for all services rendered and reimbursable expenses incurred to the date of termination or suspension.

5. Special Provisions

None.

ASSUMPTIONS

The following assumptions are included in this scope of services:

- CMAR delivery method will be used for construction

- The ash clarifier will be the same diameter as the previously designed scum pre-concentrator, however the sidewall depth and floor slope may change
- A specification will be provided for the pump vendor to design and provide a fiberglass pre-engineered enclosure, piping, instrumentation and controls required for the air diaphragm pumps; the design drawings will be provided by the vendor during the submittal phase of the project
- Availability of a plant drain line on the south side of the solids handling building for ash clarifier effluent weir discharge flows
- Erosion control permitting will be handled by field revisions under the ongoing construction work at T. Z. Osborne WRF rather than by a new application to NCDEQ
- City permitting will not include a construction drawing review or a TRC review; any electrician reviews will be part of the building permit process which will be handled by the CMAR
- Any permit submittal fees will be paid directly by the Owner
- Materials testing will be handled by the Owner or the contractor
- Polymer feed will not be required for the ash thickening operation
- Geotechnical engineering services will be contracted directly by the Owner with invoices submitted by the geotechnical firm directly to the Owner for payment

EXCLUDED SERVICES

The above fee does not include the following:

- Ash clarifier tank siting evaluation of alternate locations
- Front end (Division 0) contract documents
- Bid phase services not listed above including advertising, distribution of bid sets and addenda, pre-bid meeting, bid opening, contract award, and construction contract document signatures and processing
- Pumping facilities or improvements to convey ash slurry discharges to the ash clarifier
- Modifications to the existing ash clarifier or pump station
- Geotechnical engineering services
- Subsurface utility potholing
- Conformed set of documents to include changes after construction documents are issued

ATTACHMENT A

Preliminary Sheet List

	Cover Sheet
G-1	Drawing Index and Notes
G-2	Abbreviations, Legend, and Symbols
C-1	Overall Site Plan
C-2	Yard Piping and Grading Plans
M-1	Solids Building Partial Plan and Section
M-2	Clarifier Plan
M-3	Clarifier Section
S-1	Structural Notes and Abbreviations
S-2	Clarifier Foundation Plan
S-3	Clarifier Top Plan
S-4	Clarifier Sections and Details
SD-1	Standard Details I
SD-2	Standard Details II
SD-3	Standard Details III
SD-4	Special Inspections
I-1	Instrumentation Symbols
I-2	Instrumentation Legend
I-3	System Architecture
I-4	Process and Instrumentation Diagram
I-5	Details
E-1	Electrical Symbols, Abbreviations and Notes
E-2	Site Plan
E-3	One-Line Power Diagram
E-4	Clarifier Power and Lighting Plan
E-5	Risers and Schedules
E-6	Details